WILDLIFE HAZARD MANAGEMENT PLAN

JACKSON HOLE AIRPORT
Teton County, Wyoming

September 2014

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ATTACHMENT *t No. 97-09, "Wildlife Hazard Management Plan*

ATTACHMENT *ular No. 150 / 5200-33B, "Hazardous Wildlife ear Airports"*

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ATTACHMENT *5200-32B,"Reporting Wildlife Aircraft Strikes" and Web Strike Incident Report Form (E5200-7)*

ATTACHMENT *(1 page) and Airport Daily Log*

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SIGNATURES

The following *Wildlife Hazard Management Plan for the Jackson Hole Airport* has been reviewed and accepted by the United States Department of Transportation, Federal Aviation Administration (FAA) and will be incorporated into the Airport Certification Manual. The Plan will become effective upon signature by the following:

James Elwood, Airport Director — Date: 30 Sep 14

Lynn Deardorff, FAA Certification Safety Inspector — Date: SEP 24 2014

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PLAN AVAILABILITY

The Wildlife Hazard Management Plan (WHMP) for the Jackson Hole Airport was prepared to fulfill the requirements of the Code of Federal Regulations (CFR), Title 14 of the Federal Aviation Regulations (FAR) Part 139.337 (e) and (f). The WHMP is intended to monitor and reduce the presence of potentially hazardous wildlife that can pose risks to aircraft operations.

The WHMP was distributed to airport staff and agency representatives as identified in the following table:

Name/Position	Contact information
James Elwood Airport Director Jackson Hole Airport	1250 E Airport Road Jackson, WY 83001 Phone: (307) 733-7695
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Lynn Deardorff Airport Certification Safety Inspector Northwest Mountain Region	Federal Aviation Administration Airports Division 1601 Lind Avenue SW Renton, WA 98055-4056 Phone: (425) 227-1621
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Gary Pollack Management Assistant	Grand Teton National Park P.O. Drawer 170 Moose, WY 83012-0170 Phone: (307) 739-3428

TABLE OF REVISIONS

The Wildlife Hazard Management Plan (WHMP) for the Jackson Hole Airport. The initial WHMP was approved by FAA in 2013.

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Section 1 – Project Background

Section 1 presents the purpose, background, and regulatory framework associated with the Wildlife Hazard Management Plan (WHMP) and provides a summary of the WHMP contents.

1.1 Wildlife Hazard Management Plan Purpose and Regulatory Framework

The Federal Aviation Administration (FAA) is responsible for establishing and enforcing Federal Aviation Regulations (FARs). The FAA establishes policies to enhance public safety at air carrier airports holding an Airport Operating Certificate under FAR Part 139 (also referred to as Title 14, Code of Federal Regulations [14 CFR Part 139]). To obtain a certificate, an airport operator must agree to certain operational and safety standards, which vary depending on the size of the airport and the type of flights available. To ensure that airports with Airport Operating Certificates meet the requirements of FAR Part 139, the FAA conducts certification inspections. If an airport does not meet its obligations under Part 139, the FAA can impose an administrative action, a financial penalty, or, in extreme cases, revoke an airport's certificate or impose limits on its operations. The Jackson Hole Airport (JAC) is a federally obligated air carrier airport that holds an Airport Operating Certificate from the FAA.

FAR Part 139 addresses wildlife hazard management because it is a safety issue. To ensure compliance with FAR Part 139, codified at Title 14, CFR Part 139.337b (see **Attachment B**), the FAA requires the operator of a certificated airport to conduct a Wildlife Hazard Assessment (WHA), and if necessary, prepare a WHMP when a "triggering event" occurs on or near the airport. According to FAR Part 139:

> In a manner authorized by the FAA Administrator, each certificate holder must ensure that a WHA is conducted when any of the following events occurs on or near the airport:
>
> (1) An air carrier aircraft experiences multiple wildlife strikes;
>
> (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;
>
> (3) An air carrier aircraft experiences an engine ingestion of wildlife; or
>
> (4) Wildlife of a size, or in numbers, capable of causing an event described in paragraphs (b)(1), (b)(2), or (b)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

If one or more triggering event occurs, the FAA will require an airport operator to perform a WHA.

1.2 Need for a Wildlife Hazard Management Plan at the Jackson Hole Airport

Airport operators are obligated under FAR Part 139 to conduct WHAs if certain criteria are met. The FAA required the Airport Board to conduct a WHA at JAC because air carrier aircraft had experienced multiple wildlife strikes and because wildlife capable of causing an event was observed to have access to the airport flight pattern and aircraft movement area.

In response to the FAA's request, the Jackson Hole Airport Board performed a WHA during the 12-month period from August 2006 to July 2007 under the direction of an FAA-qualified biologist. Avian and terrestrial surveys were performed to identify the presence and abundance of wildlife species as well as behavior, movement, and migration patterns. Twenty-three avian species and eight mammal species were observed during the study. (For more detailed discussions of the WHA, refer to **Section 2.4**.)

The airport submitted a report to the FAA in 2009 that summarized the results of its 12-month WHA surveys. Based on the findings presented in the WHA report, the FAA determined that a WHMP was needed at JAC in accordance with FAR Part 139.337(f).

1.3 Wildlife Hazard Management Plan Development

The WHA provided a general understanding of wildlife hazards at JAC. Based on the data presented in the WHA and the site-specific issues identified, such as the location of JAC within Grand Teton National Park (GRTE) and the presence of the greater sage-grouse (*centrocercus urophasianus*) within the air operations area (AOA), the Airport Board determined that additional expertise would be needed to develop the WHMP.

In late 2012, the Airport Board convened a Wildlife Hazard Working Group (WHWG) that included those most knowledgeable about the Jackson Hole sage-grouse population and others knowledgeable about aviation and wildlife. The WHWG included representatives from the following:

- United States Department of Transportation, FAA
- United States Department of Agriculture, (USDA), Wildlife Services
- United States Department of the Interior, National Park Service, at Grand Teton National Park (GRTE)
- Wyoming Game and Fish Department
- Craighead-Beringia South, a wildlife research and education institute
- JAC Airport Operations staff
- Consultants specializing in airport planning and wildlife hazard management

The group met to guide the development of the WHMP based on its location within a national park and the status of the sage-grouse as a candidate for federal protection under the federal Endangered Species Act of 1973 and a candidate for state protection. The WHWG considered the biological conditions associated with the presence of the sage-grouse at JAC and reviewed available data pertaining to the presence and behavior of the sage-grouse at the airport and the greater Jackson Hole area. The group also considered state and local species conservation efforts. The species-specific focus associated with the JAC WHMP is unprecedented.

Working collaboratively the group formulated and documented a strategy to reduce the potential for wildlife strikes between aircraft and the sage-grouse. *The Greater Sage-Grouse Habitat Restoration Plan,* which documents the working group's strategy for addressing both wildlife hazard management and the special circumstances associated with the sage-grouse, is presented as **Attachment A** to the WHMP. The habitat restoration strategy includes:

- Increasing the separation between aircraft and sage-grouse through the restoration of brood-rearing habitat in disturbed areas of GRTE. The habitat will be restored to draw sage-grouse hens farther from aircraft movement areas and eventually outside of the airport boundary;
- Restoring two historic lek sites and developing a satellite lek near the restored brood-rearing habitat to attract male sage-grouse; and
- Modifying airport conditions to make the areas within the airport boundaries less attractive to sage-grouse. The modifications will only occur after restored brood-rearing habitat and lek sites become available.

The goal of the proposed habitat enhancement strategy is to provide additional habitat in multiple off-site locations to draw the sage-grouse use away from the airport; however, the WHMP does *not* include measures to actively relocate sage-grouse.

The airport's most recent Master Plan Update was completed in 1998, and the plan was evaluated in an Environmental Assessment in accordance with the National Environmental Policy Act of 1969 (NEPA). As documented in the EA, the purpose associated with the 1998 master plan was "to enhance safety and efficiency of JAC, while safeguarding the special values of Jackson Hole and Grand Teton National Park." The development of a WHMP that will reduce risks to the traveling public and address the special conditions associated with the sage-grouse and other wildlife within a national park is consistent with the previously approved Airport Master Plan.

1.4 Plan Overview

The objective of the WHMP is to provide a well defined set of policies, goals, and standards that will be implemented to reduce the risk of wildlife strikes. The WHMP includes the following components to fulfill the legal requirements set forth in FAR Part 139.337(f):

- Persons who have authority and responsibility for implementing the plan (see **Section 3**);
- Resources to be provided by the airport operator/certificate holder for implementation of the plan (see **Section 4**);
- Priorities for needed habitat management and land use identified in the WHA, including target dates for completion (see **Section 5**);
- The legal status of wildlife including laws and regulations pertaining to permits needed for management actions and species-specific management measures (see **Section 6**);

- Procedures to be followed during air carrier operations, including: personnel assignments; physical inspections of the movement area and other areas critical to wildlife hazard management; specific wildlife control measures; and communication protocols for wildlife personnel and air traffic (see **Section 7**);
- Procedures for the periodic review and evaluation of the WHMP (see **Section 8**); and
- Necessary training required to properly identify wildlife and apply wildlife management techniques in a safe, effective, and efficient manner (see **Section 9**).

Section 2 – Airport Background

This section provides background information about JAC, including the Airport's location, facilities, and the unique relationship between the Airport Board and the National Park Service. The results of the WHA are also summarized.

2.1 Airport Location and Facilities

2.1.1 Location and Environmental Setting

JAC resides on a 542-acre parcel located at the base of the Teton Mountains in northwestern Wyoming, approximately 10 miles north of the Town of Jackson. The Airport is located wholly within GRTE (see **Figure 2-1**).

The Airport is located at an elevation of 6,451 feet above sea level, where the standard day temperature is 36° Fahrenheit (F). Seasonal weather conditions vary greatly in the Jackson Hole area. Spring and fall each last for approximately three months; summer is short, from July through August; and winter is the longest season, usually starting in mid-November and ending late March or April. The average annual high temperature (July) is 83° F and the average low (January) is 6° F. Average precipitation ranges between 1.01-1.98 inches per month, with the maximum average precipitation occurring in May. Climatic conditions in the Jackson Hole area present rigorous challenges for Airport operations, with heavy winter snowfall taxing snow removal operations, and summer temperatures and high elevation necessitating longer takeoff and landing distances for aircraft.

As shown on **Figure 2-1**, the Airport is situated in the narrow, generally flat Snake River Valley and surrounded by steeply rising terrain in all directions. The Grand Teton Mountains to the west of the Airport and the mountains of the Gros Ventre Wilderness area to the east have peaks ranging in elevation from 9,600 to 13,800 feet above mean sea level and form the narrow, elongated Snake River Valley in which the Airport is located. The Airport's high elevation and surrounding topography present challenges to aircraft performance. The primary ground transportation corridor to the Airport is via U.S. Highway 89, which runs north and south through the Snake River Valley and includes an exit onto East Airport Road.

2.1.2 Nearby Wildlife Attractants

JAC is surrounded by abundant natural resources and wildlife. The airport and its immediate vicinity provide a combination of vegetation components and water sources (see **Figure 2-2**). The Enterprise Ditch is located adjacent to the airport and passes through the southern portion of the property. The combination of cover and water sources meets the basic needs of several species and, in some cases, provides an ideal habitat for species that live or migrate through this elevation.

Nearby off-site locations and features also support diverse wildlife communities, such as mountainous areas, sagebrush communities and the Snake River corridor. Nearby manmade features include ponds and residential landscaping.

The presence of the airport within a national park and a region that contains abundant natural resources does not necessarily indicate an elevated risk of wildlife strikes. In most cases, resources that are present within the airport boundary are also present in nearby areas outside of the airport boundary. However, manipulated areas within the airport may offer different types of food sources or habitat than would be present in these adjacent areas. For example, the areas of mowed grass and sagebrush that are adjacent to aircraft movement areas appear to attract many species of birds and mammals.

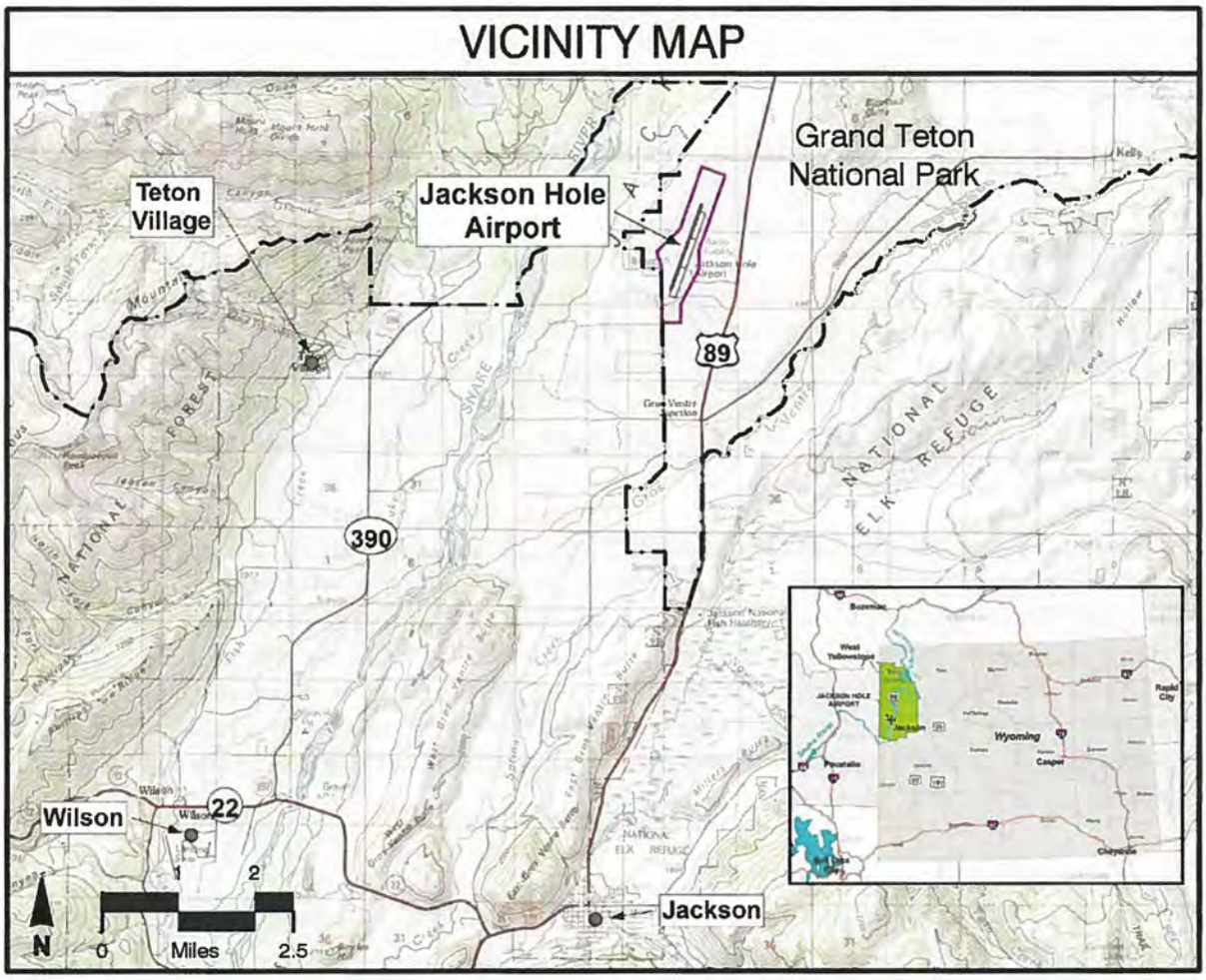
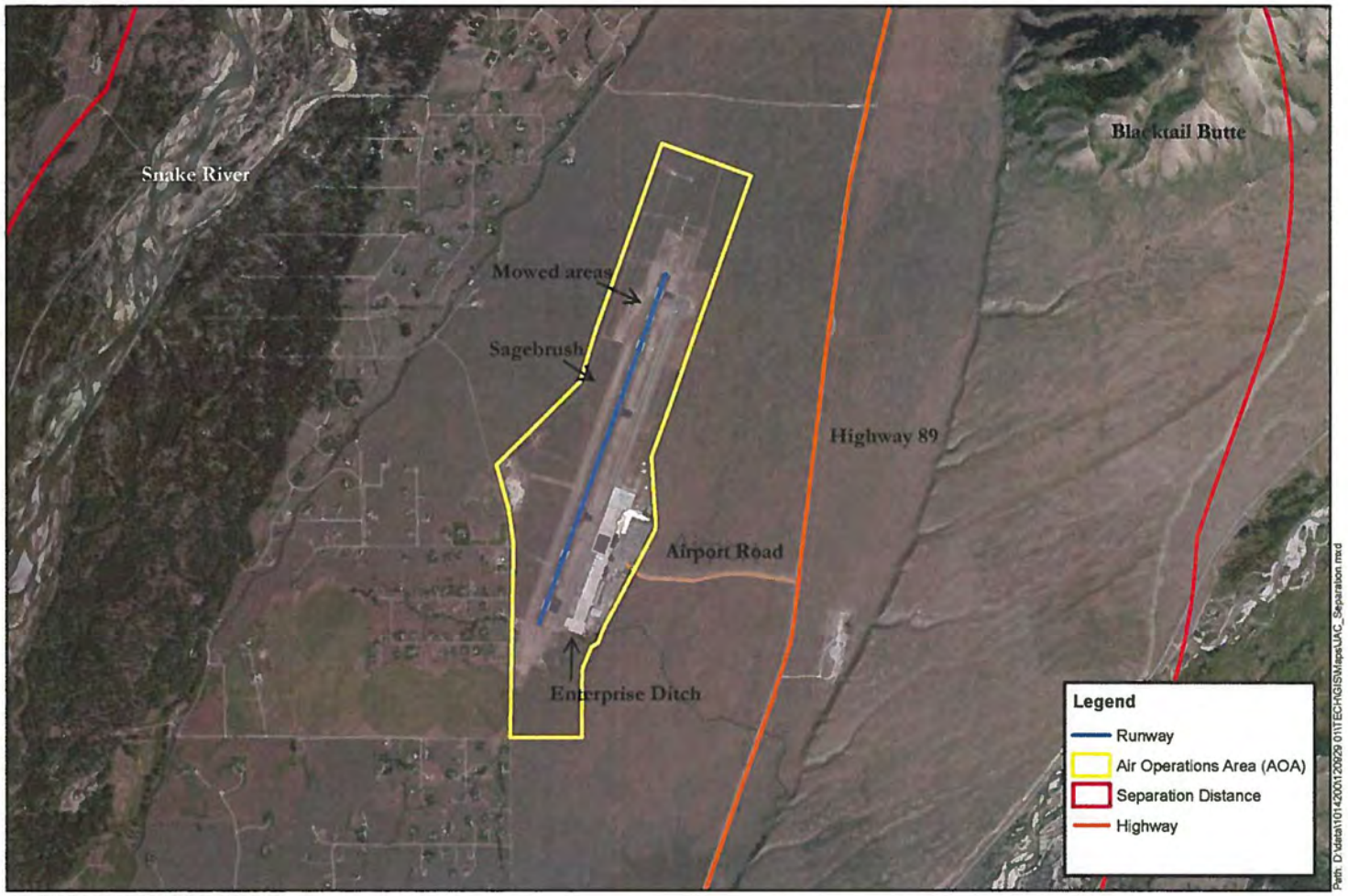


Figure 2-1. Site Location



JACKSON HOLE AIRPORT

Figure 2-2. Nearby Wildlife Attractants

N

Data Sources:
Image: (c) 2010 Microsoft Corporation and its data suppliers
Park Boundaries: NPS, National Park Service, Grand Teton National Park, Science & Resource Management, 2004 (Accessed Jan 2013)
Roads: ESRI Data & Maps, 9.3

Mead & Hunt

2.2 Airport Background

2.2.1 History and Role

JAC was established by the Town of Jackson in the 1930s. The original Grand Teton National Park was set aside by an act of Congress in 1929 and included only the Teton Range and six glacial lakes at the base of the mountains. The Airport is located on land included in the Jackson Hole National Monument, as decreed by Franklin Delano Roosevelt through presidential proclamation in 1943, and made up of the combined Teton National Forest acreage and other federal properties including Jackson Lake and 35,000 acres donated by John D. Rockefeller, Jr. The original 1929 Park and the 1943 National Monument (including the Airport) were united into a "new" GRTE in 1950 as defined by its current boundaries.

FAA includes JAC in its National Plan of Integrated Airport Systems (NPIAS), making it eligible for federal Airport Improvement Program (AIP) funding. The Airport is classified by the NPIAS as a primary, non-hub commercial service airport, and its operations account for 70% of annual passenger enplanements in the State of Wyoming. Although the State of Wyoming includes ten airports, few occur in close proximity to the Jackson Hole area. Nearby airports that provide commercial service include those in Casper, Wyoming; Bozeman, Butte and Billings, Montana; Salt Lake City, Utah; and Idaho Falls, Idaho. All of these airports are more than 100 driving miles from the JAC, with most more than 250 driving miles away.

The Town of Jackson is the Teton County seat and a world-famous resort community. Tourism plays a major role in the local economy. The Town of Jackson serves as a gateway to both GRTE and Yellowstone National Park. GRTE typically hosts three to four million visitors each year. Approximately 10% of summertime visitors arrive using commercial airlines. Five major airlines currently serve JAC during the peak summer and winter months: American Airlines, Delta Air Lines, Frontier Airlines, Skywest Airlines, and United Airlines.

2.2.2 Operation and Facilities

The Airport is operated by the Jackson Hole Airport Board, a five-member joint-powers body appointed by Teton County and the Town of Jackson. In 1982, the Secretary of the Interior recognized the Airport Board as the sole proprietor of the Airport and stated that the Airport "is necessary for the proper performance of the functions of the Department of Interior." The Airport Director, responsible for oversight of the screening, administrative, maintenance, security, and Aircraft Rescue and Fire Fighting (ARFF) departments, is appointed by the Airport Board and supported by an Assistant Director and Director of Operations.

The airport includes landside facilities on the southeastern corner and airside facilities located on the western side of the airport site. The Airport diagram is presented as **Figure 2-3**.

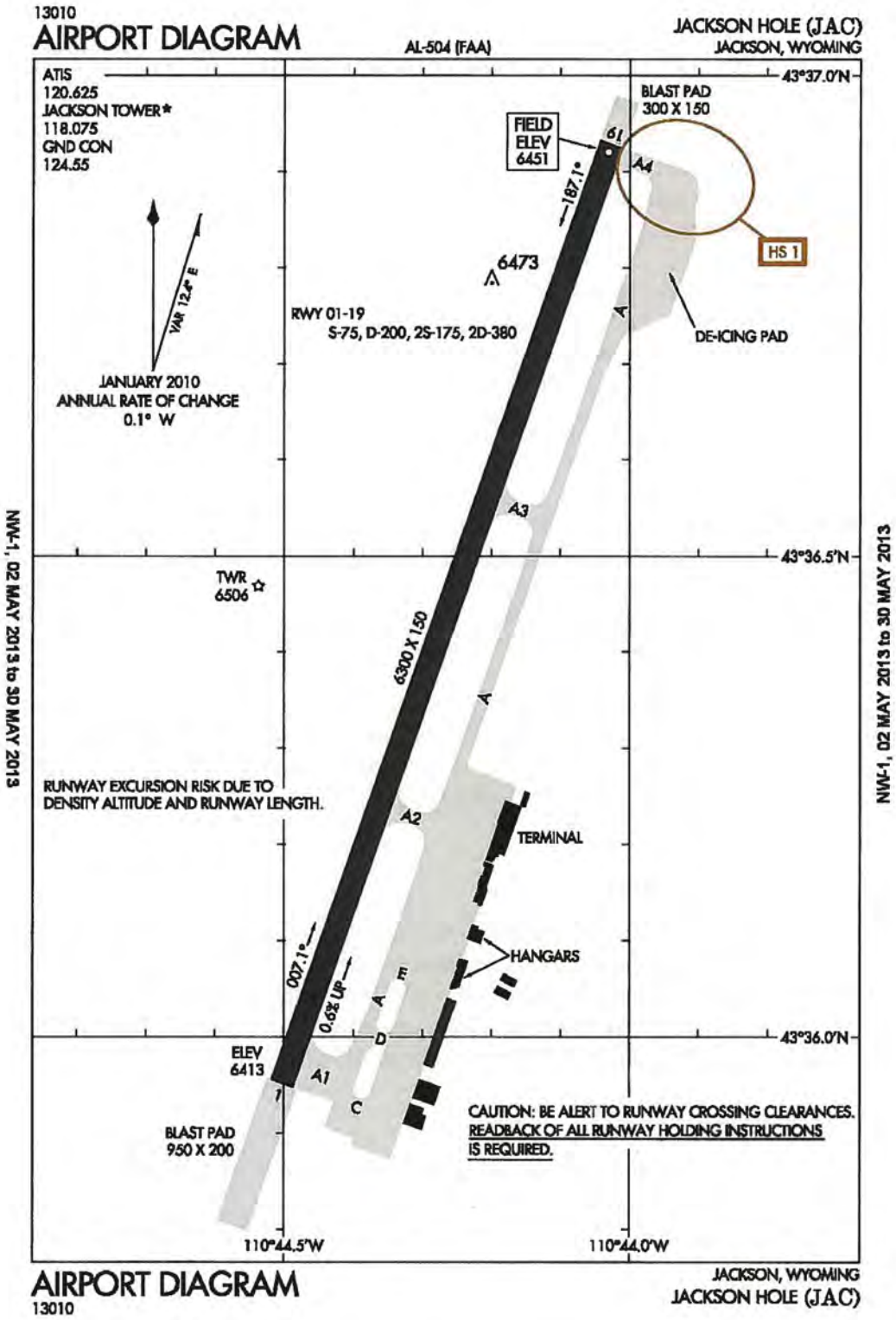


Figure 2-3. Jackson Hole Airport Diagram

Terminal Area

The Airport's passenger terminal building houses gates; ticket counters; a baggage claim area; security screening, rental car counters; office space for Airport staff, airlines, and rental car companies; a restaurant; and restroom facilities. The Airport is capable of storing and/or boarding eight to ten commercial aircraft at one time on its 335,000-square-foot commercial apron. Ground service equipment is stored north of the commercial apron, and aircraft are fueled by trucks on the apron. SkyWest Airlines and Worldwide are responsible for de-icing commercial aircraft, and the Airport Operations staff is responsible for removing de-icing fluid with a vacuum truck.

In addition to parking areas, landside facilities include an Airport Operations Building that houses maintenance and ARFF crews and equipment; a rental car service and storage facility for cleaning, fueling, and maintenance of the rental car fleet; and three Fixed Base Operator (FBO) buildings co-located with aircraft hangars for Airport tenants. FBO services include aircraft fueling, maintenance, and tie-down spaces; aircraft rental; flight training; and catering.

Runway and Taxiways

JAC's only runway, Runway 1-19, is oriented from north to south on a true bearing of N 20° 44' 08" E. Both ends of Runway 1-19 have abbreviated precision instrument markings. The runway has two non-standard blast pads designed to enhance safety in the event of an overrun. At the departure end of Runway 1 the pad is 150 feet wide by 300 feet long. At the departure end of Runway 19 the pad is 200 feet wide by 950 feet long and stressed for occasional use by Boeing 757 aircraft.

Runway 1-19 has one full length parallel taxiway, Taxiway A, which is 75 feet wide and has four right-angled connector taxiways used to access or exit the runway. The Airport has three additional right-angled taxiways (Taxiways C, D, and E) that connect the general aviation and air carrier aprons to Taxiway A. There are two deicing pads and a high speed run-up area on the east side of Taxiway A across from A4.

Support Functions and Facilities

The Airport currently has a fleet of five vehicles to assist aircraft in distress. The fleet consists of three ARFF vehicles, one light rescue vehicle and one mobile command vehicle. The ARFF facility, located adjacent to the passenger terminal building, also serves as the staging area for maintenance equipment and personnel, and is open from 6 A.M. to the last daily commercial aircraft arrival. The ARFF facility has 10 staff members that rotate between the ARFF and Airport Operations duties.

2.3 Regulatory Environment

The JAC was constructed in the 1930s and was included within the boundaries of the national park when Congress established Grand Teton in 1950. As previously stated, JAC is the only commercial-service airport in the United States that operates within the boundaries of a national park.

2.3.1 Lease Agreement

JAC is operated by the Jackson Hole Airport Board in accordance with a lease agreement between the United States Department of the Interior and the Airport Board. The Jackson Hole Airport Agreement (Agreement) was made pursuant to the Department of the Interior Airports Act, which

was enacted on March 18, 1950, and authorizes the Secretary of the Interior to "plan, acquire, establish, construct, enlarge, improve, maintain, equip, operate, regulate, and protect airports in the continental United States in, or in close proximity to National Parks, when such airports are determined by him to be necessary to the proper performance of the functions of the Department of the Interior" (United States Code, Title 15, Chapter 1, subchapter I, Sections 7a-e). The Agreement sets forth the terms and conditions by which the Board operates the airport, including language that requires the Board to "comply with all applicable Federal rules and regulations." The Agreement is administered by National Park Service (NPS).

The Lease Agreement was entered into on April 27, 1983, and had a primary term of 30 years (through 2013), followed by two 10-year renewal options that were exercised in 1993 and 2003 (through 2033). Following the Airport Board's most recent request to extend the term of the Agreement, the NPS issued a Record of Decision (ROD) in December 2010. In accordance with the ROD, the Agreement was amended to include two additional 10-year renewal options that would extend the Agreement term to 2053.

The Agreement includes language that requires the Airport Board "to work in good faith to further reduce and mitigate the impacts of the airport on Grand Teton National Park." The 2010 ROD includes a list of mitigation measures that the Board has agreed to pursue. The following language is germane to the WHMP:

> **Wildlife.** The Board and the National Park Service will collaborate to develop procedures, methods, and strategies regarding techniques to minimize conflicts between sage grouse and aircraft. The lek at the north end of the runway has been present for decades, despite the presence of aircraft. In cooperation with the National Park Service, the Board will develop procedures, methods, and strategies to minimize conflicts between sage-grouse and airport operations. In addition, the National Park Service and Board will collaborate on funding research studies that could help determine whether the airport is affecting other wildlife, such as gleaning bats and insects that may be sensitive to noise and light emissions.

2.3.2 Applicable National Park Service Laws and Policies

All natural and cultural resources with GRTE, including wildlife, are managed by the NPS in accordance with the laws, policies, and regulations that pertain to the National Park System. The most important statutory directives for the National Park Service are provided by the interrelated provisions of the NPS Organic Act of 1916 and the NPS General Authorities Act of 1970, as amended. The Service's *2006 Management Policies* and regulations found within Title 36 of the Code of Federal Regulations (CFR) interpret the Organic Act and provide a regulatory framework for management of park resources, including wildlife. In general, the taking or disturbance of wildlife is prohibited.

2.3.3 National Park Service Management Policies (2006)

The NPS *2006 Management Policies* (Management Policies) is the basic policy document implemented by the NPS. The policies flow from the laws that pertain to management of the National Park System, and they provide a detailed interpretation of those laws.

As stated in section 1.4.3 of the Management Policies:

> The fundamental purpose of the national park system…begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources…. The laws do give the Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

Section 1.4 of the Management Policies provides guidance for park managers on what constitutes impairment. In planning and implementing plant and animal population management actions, the NPS must follow established planning procedures, including provisions for public review and comment. Following approval of the WHMP by the FAA, the specific measures presented in the plan will be subject to review in accordance with NEPA to determine the potential environmental impacts associated with the management measures proposed in the WHMP. At that time, the NPS will determine whether the proposed management measures would result in an impairment to park resources.

Chapter 4 of the NPS Management Policies addresses natural resource management. In general, resources are managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The NPS does not intervene in natural biological or physical process, except in certain specific circumstances including "when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities. Any such intervention will be kept to the minimum necessary to achieve the stated management objectives" (2006 Management Policies 4.1).

Further guidance on the management of native plants and animals is provided in Section 4.4.2 of the Management Policies. The policies allows NPS to intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the population of the species or to other components and processes of the ecosystems that support them. In addition, such management must be necessary for at least one of a number of specific reasons, including:

- To accommodate intensive development in portions of parks appropriate for and dedicated to such development
- To protect property when it is not possible to change the pattern of human activities, or
- To maintain human safety when it is not possible to change the pattern of human activities

The *2006 Management Policies* also address the management of threatened or endangered species within national parks. According to Section 4.4.2.3, Management of Threatened or Endangered Plants and Animals, NPS will "strive to recover all species…that are listed under the Endangered Species Act." For more information on the relationship between NPS and threatened and endangered species, refer to **Attachment A**.

2.3.4 National Environmental Policy Act of 1969

The proposed WHMP includes measures that will be performed within GRTE and have the potential to affect the natural and human environment. Following acceptance of the WHMP by FAA, the measures within the plan that have the potential to affect the natural and human environment will be subject to review pursuant to NEPA.

Section 1.4 of the *2006 Management Policies* provides guidance for park managers on what constitutes impairment. Following FAA's approval of the proposed plan, but prior to adoption by the Airport Board, NPS, in cooperation with the Board and the FAA, will prepare an environmental document to comply with NEPA. At that time, the proposed wildlife management measures will be reviewed to create a detailed project description and alternatives for evaluation. Public scoping and outreach will be conducted in accordance with NEPA and its implementing regulations. Based upon the NEPA review, NPS will determine whether the management measures proposed in the WHMP would result in impairment or other unacceptable impacts.

2.3.5 Implementation Authority

Only the NPS has the authority to manage resources within park boundaries, including wildlife. Therefore, any management measures proposed in the WHMP can be undertaken only by, or under the direction of, NPS. The NPS will work with the Airport Board to ensure that NPS staff and airport staff are able to implement the wildlife hazard management measures in a manner that is consistent with the WHMP as well as NPS law, policy, and regulations. In addition, the NPS and the Board will cooperate on a funding strategy to ensure that the Board is responsible for funding actions that are necessary as a result of ongoing airport operations.

2.4 Wildlife Hazard Assessment Findings and Results

2.4.1 Wildlife Strike History

FAA's Wildlife Strike Database includes wildlife strike records from airports nationwide during the period from 1990 to the present. **Table 2-1** provides a summary of the wildlife strike records for JAC that are included in FAA's Wildlife Strike Database, and all data in the table was excerpted directly from the database in March 2014. As shown in **Table 2-1**, the first strike associated with JAC was recorded in 1994.

Aircraft crews and operations staff, tower personnel, and others should report wildlife strikes in the FAA's database immediately after a strike occurs, evidence of a strike is observed on an aircraft, or animal remains are discovered within 250 feet of the runway. NPS staff should be alerted to the strike, and the animal remains should be transported to NPS staff immediately for identification (see also Section 7.4). The primary purpose of the wildlife strike database is to determine the frequency with which wildlife strikes occur at an airport and the presence of potentially hazardous wildlife and wildlife attractants on and near the airport.

FAA encourages aircraft operators and airport staff to submit biological material associated with a wildlife strike to the Smithsonian Institution's Feather Identification Laboratory in Washington, D.C. The Feather Identification Lab analyzes the remains of animals involved in wildlife strikes in support of the U.S. Navy, U.S. Air Force, and FAA. Analyses include feather analyses, DNA analyses, or others depending on the type of sample received, and staff will update the database record to correctly identify the species associated with the strike. As a result, discrepancies and inconsistencies can occur between the data associated with the initial entry of the strike record and subsequent analyses.

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
6/16/2013	UNKNOWN	UNKNOWN	Great horned owl			OWL FOUND ON THE APRCH END OF RWY 1. NO PHYSICAL DMG TO BIRD NOTED OTHER THAN DECEASED.	Carcass Found
4/4/2013	BUSINESS	C-210 CENTUR	Horned lark	N		NO DMG TO A/C. THREE CARCASSES.	Airport Operations
9/12/2012	UNKNOWN	UNKNOWN	Greater sage-grouse	N		BIRDS REPTD AS SAGE GROUSE.	Airport Operations
9/12/2012	UNKNOWN	UNKNOWN	Greater sage-grouse			ON THE RWY AT 1000 FOOT MARKERS. 845 AM DAY.	Carcass Found
8/27/2012	SKYWEST AIRLINES	CL-RJ700	Unknown bird - small	N		PILOT CALLED TWR. REPTD FROM KDEN WHEN HE LANDED. NO DMG. FOUND A FEATHER ON WINDSHLD WIPER.	Tower
7/23/2012	UNKNOWN	UNKNOWN	Mountain bluebird			FEMALE MOUNTAIN BLUEBIRD. DATA ENTRY NOTE: # STRUCK NOT REPTD, ASSUME 1.	Carcass Found
3/27/2012	FLIGHT OPTIONS	BE-400 BJET	Horned lark	N		NO DMG.	Other
3/25/2012	BUSINESS	C-680	Sparrows			SMALL SPARROW. NO DMG.	Other

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
9/3/2011	AMERICAN AIRLINES	B-757-200	Greater sage-grouse	N		WARNED IN REMARKS SECTION OF ARPT PAGES. NO DMG TO A/C.	Pilot
5/10/2011	UNITED AIRLINES	A-320	Unknown bird - small	M	500	DURING WALKAROUND NOTICED A/C RT LANDING LIGHT BROKEN WITH REMAINS OF BIRD. REPTD TO MX OF BIRDSTRIKE. KJAC TOWER REQUESTED CALL, THEY INFORMED THAT THEY FOUND GLASS AND BIRD REMAINS ON RWY. DID NOT NOTICE BIRD ON FINAL TO RWY 19. A/C TIME OUT OF SERV REP	Pilot
12/27/2010	DELTA AIR LINES	A-319	Greater sage-grouse	M		A/C HIT BIRDS (ASSUME 2-10) ON ROTATION OUT OF JAC. ENG HAD 5 DAMAGED BLADES. POSSIBLE DMG TO ENG PENDING FURTHER INVESTIGATION. TOOK BLOOD SAMPLES. UNKN HOW MANY BIRDS.	Airport Operations
10/23/2010	DELTA AIR LINES	A-319	Greater sage-grouse	N		NO DMG.	Airport Operations
8/13/2010	UNKNOWN	UNKNOWN	Greater sage-grouse	M?		PILOT STRUCK THREE MEDIUM SIZED SAGE GROUSE WHILE CLIMBING AFTER T/O. DMG TO LT FLAP OF A/C.	Airport Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
8/4/2010	UNKNOWN	UNKNOWN	Greater sage-grouse			PILOT REPTD DEAD SAGE GROUSE ON T/O ROLL RWY 19. CARCASS DISCOVERED BY ARPT OPS DURING INSPN. 0855 AM DAY.	Carcass Found
8/1/2010	UNKNOWN	UNKNOWN	Greater sage-grouse			PILOT REPTD CARCASS OF DEAD SAGE GROUSE ON T/O ROLL RWY 19. CARCASS DISCOVERED BY ARPT OPS DURING INSPN. 0905 AM DAY.	Carcass Found
7/14/2010	SKYWEST AIRLINES	CL-RJ700	Greater sage-grouse	N		NO DMG NOTED.	Pilot
4/3/2010	BOMBARDIER BUSINESS JET	LEARJET-45	Unknown bird - small	N		STRUCK SMALL BIRD DEPARTING (ASSUME T/O) RWY 19. NO REPTD DMG.	Other
3/31/2010	SKYWEST AIRLINES	CL-RJ700	Greater sage-grouse	N		PILOT REPTD NO APPARENT DMG. ARPT OPS SAW GROUSE IMMEDIATELY FOLLOWING THE REPORT AND DISPERSED THEM. THEY ALSO FOUND SCATTERED REMAINS/FEATHERS NEAR THE DEPTR END OF RWY.	Airport Operations
3/31/2010	BUSINESS	C-560	Unknown bird - small	N		BIRD HIT LEFT WING 1000-1500 AFTER TAKE-OFF. NO DMG REPTD.	Airport Operations
10/3/2009	UNITED AIRLINES	A-319	Greater sage-grouse	N			Airport Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
9/5/2009	AMERICAN AIRLINES	B-757-200	Greater sage-grouse	M		ID BY SMITHSONIAN, FAA 3611. REMAINS COLLECTED FROM DFW AA MX AT 1500L. MX REPTD LDG GEAR STRUCK. BRAKE REPLACED. FLT ORIGINATED AT JACKSON HOLE. ASSUME THAT IS WHERE STRIKE OCCURRED SINCE THE SPECIES IS NOT FOUND AT DFW. PHASE WOULD HAVE BEEN TAKE OFF RU	Airport Operations
8/27/2009	AMERICAN AIRLINES	B-757-200	Unknown bird - small	N		STARLING TYPE BIRD. NO MENTION OF BIRDS OF ATIS WHAT WE CAN RECALL.	Pilot
8/23/2009	UNITED AIRLINES	B-757-200	Greater sage-grouse			VERY LITTLE INFORMATION. PHASE UNKN. # STRUCK UNKN. JUST ENG #2 HAD A BIRDSTRIKE AT JAC.	Airline Operations
8/13/2009	FLIGHT OPTIONS	HAWKER 800	Greater sage-grouse	M	165	HIT 2-3 BIRDS ON T/D/ LANDING ROLLOUT. MINOR DAMAGE. FLAP ASSEMBLY. COST WAS FOR LABOR AND REPO CHARGES.	Tower
7/14/2009	BUSINESS	PILATUS PC12	Unknown bird - small	N		STRUCK A SMALL BIRD ON DEPARTURE ROTATION (ASSUME CLIMB). THERE DID NOT SEEM TO BE ANY DMG. A/C CONT TO DEST.	Tower
9/29/2008	UNITED AIRLINES	B-757-200	Greater sage-grouse	N		ON DEPARTURE (ASSUME TAKE OFF RUN), A/C HIT 1 SML BIRD. NO DMG REPORTED.	Airport Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
9/24/2008	BUSINESS	C-560	Sparrows	N		HIT A SPARROW WHEN LDG. NO DMG.	Tower
6/13/2008	NETJETS	C-560	Unknown bird - small	N		HIT SML BIRD ON DEPTR (ASSUME TAKE OFF RUN). NO DMG REPTD.	Tower
6/13/2008	UNITED AIRLINES	B-757-200	Unknown bird - small	N		HIT SML BIRD ON DEPTR (ASSUME TAKE OFF RUN). NO DMG.	Tower
5/29/2008	BUSINESS	GULFSTREAM V	Unknown bird - small	N		NO DMG REPTD.	Tower
4/29/2008	SKYWEST AIRLINES	CL-RJ700	Unknown bird - small	N		PILOT REPTD HITTING A FLOCK OF SML BIRDS AFTER T/O. N DMG INDICATED.	Tower
3/24/2008	UNITED AIRLINES	A-319	Greater sage-grouse	M?		BIRDSTRIKE DURING LDG. HIT A FLOCK OF BIRDS. (REPTD AS CHICKADEES AND SAGE GROUSE ON DIFFERENT REPTS.) SOME WENT INTO ENGINE. NO DMG STATED (MEANS UNKN). BIRDS REPTD AS SAGE GROUSE BY AIRLINE AND CHICKADEES BY AIRPORT. NO DMG ACCORDING TO AIRPORT. LATER AI	Airline Operations
3/24/2008	UNITED AIRLINES	B-757-200	Unknown bird - small			DURING LANDING HIT A BIRD OR TWO ON FINAL. 1 HIT THE F/O'S WINDSHLD, ONE (OR SAME BIRD) HIT ON #2 COWL. NO DMG STATED (MEANS UNKNOWN) APPEARED TO BE A SMALL BIRD.	Airline Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
3/14/2007	BOMBARDIER BUSINESS JET	CHALLENGER 300	Mountain chickadee	N		REPTD BIRDSTRIKE ON ROLLOUT	Airport Operations
3/14/2007	SKYWEST AIRLINES	CL-RJ700	Greater sage-grouse	N		CAPT REPTD THERE WAS NO DMG.	Pilot
3/13/2007	CITATIONAIR	C-550	Unknown bird - small	N		SPARROWS? FEATHERS ON A/C. NO DMG.	Pilot
7/28/2006	SKYWEST AIRLINES	CL-RJ700	Unknown bird - small	N		HIT SML BIRD AS A/C ROTATED FOR DEPTR. NO DMG REPTD	Tower
7/25/2006	SKYWEST AIRLINES	CL-RJ700	Unknown bird - small	N		SML BIRD HIT WINDSHLD WHILE INBOUND. NO REPT OF DMG.	Tower
7/25/2006	BUSINESS	C-340	Unknown bird - small	N		SML BIRD HIT WINDSCREEN ON DEPTR. A/C CONTD WITH NO APPARENT DMG	Tower
3/7/2006	BUSINESS	LEARJET-35	Greater sage-grouse	N		HIT BIRD AT ROTATION. NO DMG.	Tower
8/13/2005	BUSINESS	BE-400 BJET	Greater sage-grouse	S	30,000	DMG TO LE OF L WING. 12-15" LONG, 4-5" WIDE AND 4" DEEP. HOLE IN LEADING EDGE. COST REPORTED INCLUDES OTHER COSTS BESIDES DAMAGE.	Pilot
8/3/2005	BUSINESS	C-680	Greater sage-grouse	N		STRIKE WAS ABOUT 3000 FT S OF THRESHOLD ON RWY 19. NO DMG REPTD BY PILOT.	Airport Operations
7/30/2005	MILITARY	C-32B	Sharp-tailed grouse	E	0		

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
7/22/2005	DELTA AIR LINES	B-737-300	Greater sage-grouse	N		HIT BIRD ABOUT 2500 ' S OF RWY 19 THRESHOLD. TWR REPTD NO BIRD ACTIVITY PRIOR TO THIS INCIDENT. A/C RETD TO GATE FOR DMG CHECK. FOUND DMG TO L ENG FAN BLADES. AT LEAST 1 BIRD INGESTED. ARPT OPS HAS PHOTOS. NO ARFF RESPONSE.	Tower
7/10/2005	UNITED AIRLINES	A-319	Greater sage-grouse	M		SAW 4 BIRDS ON RWY, HEARD 2 THUMPS AS THEY HIT NOSEGEAR. LDG LIGHT DAMAGED WITH CARCASS WRAPPED AROUND. 2 MAN HRS	Airline Operations
5/30/2005	SKYWEST AIRLINES	EMB-120	Sparrows	N		HIT SEVERAL SPARROWS ON APCH. NO APPARENT DMG.	Tower
3/24/2005	DELTA AIR LINES	B-737	Sparrows	N			Airport Operations
9/28/2004	UNITED AIRLINES	A-319	Greater sage-grouse	N		BIRDSTRIKE AT 10 O'CLOCK POSITION BY SIDE OF RADOME. ENG PARA NORMAL. NO DMG.	Airline Operations
8/5/2004	DELTA AIR LINES	B-737-300	Swallows	N		NO DMG REPTD	Other
7/27/2004	CORPORATE AIR	EMB-120	Greater sage-grouse	N		SHORTLY AFTER LDG, A FLOCK OF 8-10 SAGE GROUSE CROSSED THE RWY IN FRONT OF THE A/C. PILOT WAS UNABLE TO AVOID 2 OR THE BIRDS. HIT MAIN LDG GEAR.	Pilot
7/3/2004	AMERICAN AIRLINES	B-757-200	Greater sage-grouse	N		NO DMG. REMAINS ON RT INBD FLAP	Airport Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
6/23/2004	UNITED AIRLINES	A-319	Greater sage-grouse	N		BIRDSTRIKE ON T/O. HEN TURKEY. HIT LWR RT SDIE OF #2 ENG. INSPN. CHECKS OK. WILL NEED BORESCOPE. EVIDENCE OF FEATHERS ON 1.5 STAGE. NO DMG. WS STATE DIR SAID NO TURKEY IN WY. BUT CHECKLISTS SHOW IT IS THERE.	Airline Operations
3/1/2004	UNKNOWN	CITATIONJET	Unknown bird - small			EXACT DATE UNKN, JUST MO/YR. ON SHORT FINAL, SEVERAL SML BIRD HIT A/C. ADZ TWR OF STRIKE. CONTACTED CESSNA FIELD SVC REP FOR ACTION TO BE TAKEN. ENG INSPN. NO CORE INGESTION. WE DEPTD AND MADE FLTS THE FOLLOWING WEEK. LATER AFTER CALL FROM FAA	Pilot
9/6/2003	CONTINENTAL AIRLINES	B-737	Greater sage-grouse	S	225,000	FLT CANCELLED. MECHANICS WERE FLOWN IN.	
8/21/2003	BUSINESS	CL-601/604	Greater sage-grouse	M?		POSSIBLY GROUSE. #1 ENG FAN BLADE DAMAGE AND L WING LE DMG.	Airline Operations
8/4/2003	UNITED AIRLINES	A-319	Greater sage-grouse	N		HIT ABOVE F/O'S WINDSCREEN ON APCH. NO DMG.	Airline Operations

Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
3/27/2003	BUSINESS	CITATIONJET	Greater sage-grouse	N		JUST PRIOR TO LDG, ABOUT 50 MED SIZED BIRDS, REPORTEDLY QUAIL, FLEW IN FRONT OF THE A/C. 4 BIRDS STRUCK THE A/C. NO DMG. 1 WENT THRU FAN BYPASS DUCT OF #1 ENG. 1 HIT WINDSHLD AND 1 HIT EACH WING. WS STATE DIRECTOR SAID THERE ARE NO QUAIL IN WY	Pilot
5/3/2002	SKYWEST AIRLINES	EMB-120	American kestrel	N			
4/1/2002	SKYWEST AIRLINES	EMB-120	Unknown bird - small	N		FOUND A FEW FEATHERS ON RWY	Tower
3/29/2002	NETJETS	HAWKER 800	Unknown bird - small	N		BIRD STRIKE AT ROTATION SPEED ABOVE L WINDSCREEN & ON LEFT WINGTIP. REMAINED IN PATTERN, MADE PREC. LDG. TIME OUT OF SVC 1.5 HRS. INSPN, CLEANED. NO DMG.	Tower
3/28/2002	SKYWEST AIRLINES	EMB-120	Unknown bird - small	N		SNOW BIRD	
7/10/1997	DELTA AIR LINES	B-737	Greater sage-grouse	S		1 BIRD INGESTED. SEVERAL FAN BLADES DAMAGED. CORE INGESTION.	Airport Operations
8/21/1996	DELTA AIR LINES	B-737	Greater sage-grouse	S		1 INGESTED. DAMAGED 2 FAN BLADES.	Airport Operations

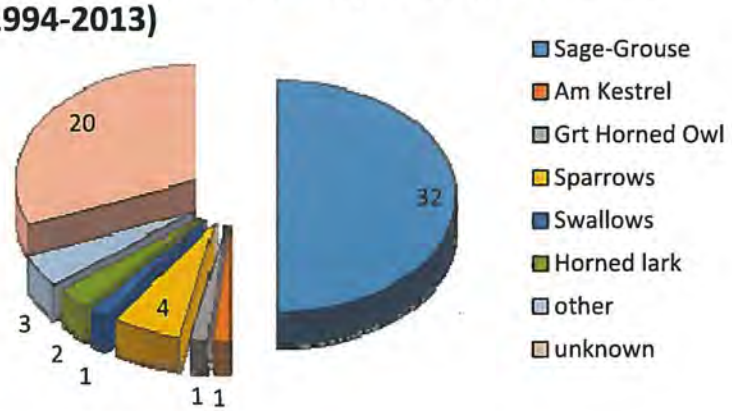
Table 2-1. Wildlife Strikes Reported in the FAA Wildlife Strike Database at JAC (1994 to 2013)

Date	Operator	Aircraft Type	Species	Damage	Repair Costs	Remarks (excerpted from reports)	Reported by:
4/8/1994	AMERICAN AIRLINES	MD-80	Unknown bird - small	N		BIRDS WERE SMALL TWEETY TYPE	

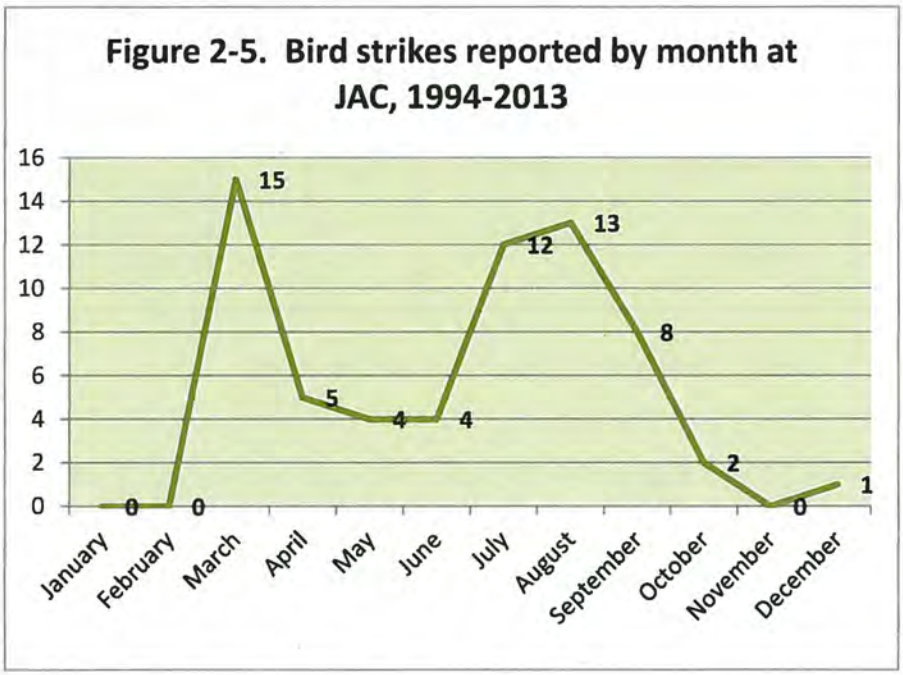
Source: FAA Wildlife Strike Database. Available at: http://wildlife.faa.gov/strikenew.aspx

As shown on **Table 2-1** and **Figure 2-4**, 64 strikes were reported at JAC from January 1, 1994, to December 31, 2013. Thirty-two strikes were associated with sage-grouse, 20 with unknown birds, most of which were small. Four strikes were associated with sparrows, five associated with larks, chickadees, and bluebirds. One strike was associated with an American kestrel, a swallow, and a lark. No mammal strikes were reported.

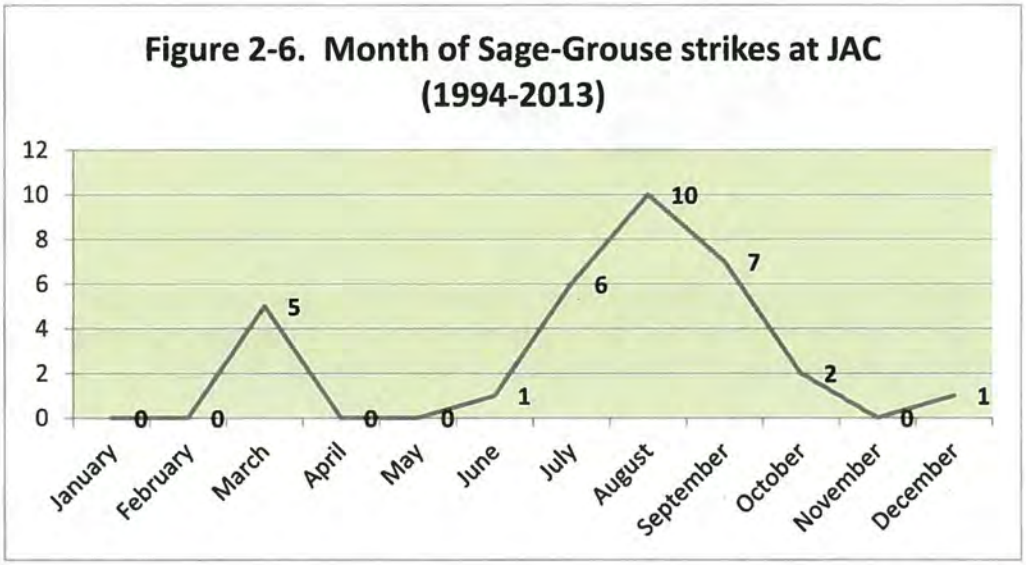
Figure 2-4. Number and variety of species responsible for strikes reported to FAA at JAC (1994-2013)



Based on available FAA data and illustrated on **Figure 2-5**, the greatest number of wildlife strikes occurred in March and throughout the late summer months (July through September). One strike was reported during the four-month period from November through February.



Spring and summer appear to be the most active seasons for wildlife in the vicinity of JAC. Migrating populations increase significantly throughout the month of March. If weather conditions deteriorate at higher altitudes, birds can temporarily be forced to stay where there is available food and shelter. The greater number of wildlife strikes in March is partially due to the return of migratory species. As shown in **Figure 2-6**, the number of sage-grouse strikes peaks during the late summer. The increased frequency of sage-grouse strikes during the late summer appears to be associated with the return of sage-grouse hens with their young to utilize brood-rearing habitat within the airport boundary.



2.4.2 Wildlife Hazard Assessment Results and Recommendations

The monitoring locations associated with the 12-month WHA study were selected to identify and document the presence of species that spend time in the local environment. Monitoring locations (points) were specifically placed in areas most species were likely to frequent. The overall goal of the monitoring effort was to record all the species that have the potential—directly or indirectly—to increase the risk of interaction with aircraft or attract other species that could negatively affect aircraft operations.

Six off-site wildlife locations were selected to determine the presence of wildlife within 5 miles of the airport. Each location was selected because it included characteristics that would likely attract wildlife. These sites offered ponded water, food, and opportunities for protection that are not available at other locations. The goal in selecting these areas was to monitor wildlife that did not necessarily frequent the airport, but might travel in airspace used by aircraft approaching or departing JAC.

The WHA concluded that JAC is located within a resource-rich area that supports abundant and diverse wildlife, and some species that are known to pose hazards to aircraft were observed on and near the airport. As a result, a WHA recommended that a WHMP be prepared to reduce the risks posed by such species and to make the airport less attractive to them. General recommendations were identified in the WHA as described in **Sections 2.4.3 through 2.4.5**.

2.4.3 General Operations

Recommendations identified in the WHA and subsequent observations for an overall WHMP include the following:

- Designate a Wildlife Coordinator,
- Annually update and revise the WHMP,
- Continue to monitor wildlife activity and use within the airport boundary,
- Perform regular maintenance and inspections of the perimeter fence to exclude wildlife,
- Maintain relationships with other resource management agencies (U.S. Fish and Wildlife Service [USFWS] Sage-grouse Conservation Objectives Team, local conservation groups (i.e., Upper Snake River Basin Sage Grouse Local Working Group, etc.)
- Improve record keeping to document wildlife hazards and management actions,
- Provide wildlife hazard management training for staff involved with wildlife hazard management,
- Perform ongoing monitoring of nearby proposals and land-use changes by qualified personnel, such as an FAA-qualified biologist as described in FAA Advisory Circular 150/5200-36A, "Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports,"
- Ensure that proposed projects that include construction or landscape modifications are reviewed by a FAA-qualified biologist (see **Attachment C**), and
- Develop a wildlife hazard reporting and communication protocol.

The results of the WHA, subsequent observations, and research identified specific species that must be managed to reduce wildlife hazards to aircraft. Such species included: sage-grouse, common ravens, horned larks, red-tailed hawks, waterfowl, coyotes, fox, deer, moose, and elk. All protocols will be developed in cooperation with NPS staff at GRTE.

2.4.4 Habitat Management

The WHA identified habitat modification as the initial and preferred method for dispersing or discouraging observed populations of potentially hazardous wildlife species from using the area within the airport boundary. To make an area less attractive, it may be necessary to eliminate the resources that provide one or more of the three basic needs of wildlife: food, water and cover. For example, on-site observations indicate that sage-grouse may be attracted to forbs that grow in mowed areas adjacent to the runway. The relocation of this food source to more distant areas of the airport might discourage sage-grouse hens from visiting the AOA.

Additional habitat management measures identified during WHMP development include, but are not limited to, the following:

- Restore off-site sage-grouse brood-rearing habitat and lek sites,
- Enclose the portion of the Enterprise Ditch within the airport perimeter fence, and
- Provide adequate drainage for snow melt and transfer to the Enterprise Ditch.

2.4.5 Wildlife Deterrents

The species observed at the JAC were evaluated based on their potential to pose a threat to aircraft operations that would result in substantial damage to aircraft, species populations, or their ability to support other species that could substantially affect aircraft operations. The adoption of an incremental and adaptive approach towards wildlife hazard management was determined to be the most prudent approach to address hazards associated with several species observed at JAC. Specific recommendations identified in the WHA and during WHMP development included:

- Expanding wildlife surveillance to include all hours of operation,
- Performing a concentrated hazing/harassment effort for targeted species during the morning,
- Restoring off-site brood-rearing habitat and lek sites in an effort to attract sage-grouse to areas that are more distant from aircraft movement areas and ultimately outside of airport boundaries, and
- Adopting a zero-tolerance policy toward hazardous wildlife species, such as Canada geese and large wild and domestic mammals observed on the airfield.

Sections 3 through 8 of this WHMP provide policies to address the recommendations presented in the WHA and summarized in Sections 2.2.1 through 2.3.3.

Section 3 – Plan Authority, Roles, and Responsibilities

FAR Part 139.337(f)(1) & (5i): The individuals having authority and responsibility for implementing each aspect of the plan and designation of personnel responsible for implementing the procedures.

In accordance with FAR Part 139, the Airport Director has the authority and is responsible for designating a Wildlife Coordinator to implement the WHMP. Each department and associated agency that has responsibilities outlined in the WHMP must incorporate the responsibilities into their programs. The Airport Director will ensure that the WHMP is prepared in coordination with the National Park Service at GRTE, approved by the FAA, and implemented through coordination between NPS and airport staff in accordance with federal regulations.

Clear communication and direction among airport personnel are essential elements of a successful WHMP. Clear communication between JAC staff and NPS Staff is just as essential. Currently, JAC staff and NPS staff at GRTE have undertaken the development of a communications protocol to address airport activities that have the potential to involve the use of or affect NPS resources within airport boundaries. The communications protocol is incorporated into this document by reference.

Section 3 presents the organization of the authority at the Jackson Hole Airport and those responsible for implementing the WHMP.

3.1 Wildlife Hazard Working Group

The Wildlife Hazard Working Group (WHWG) is composed of individuals from many departments/divisions throughout the airport and NPS staff from GRTE. The purpose of the group is to provide a forum for discussing ongoing issues associated with wildlife hazard management and to determine whether the WHMP is effective. The WHWG will meet at least annually, with intermittent meetings as necessary.

At a minimum, the WHWG shall include persons or representatives of the following airport departments or groups

- Airport Director
- Wildlife Coordinator/Director of Operations
- National Park Service staff from GRTE
- Airport Project Manager
- Fire Chief
- Director of Security
- FAA Airport Certification Safety Inspector
- FAA Air Traffic Control Tower Manager
- FAA-qualified Biologist

The WHWG is responsible for reviewing the WHMP at least annually or sooner in the event of a triggering event. The WHWG will review the WHMP to determine the effectiveness of the WHMP at reducing wildlife strikes, monitor the status of hazard reduction projects, and determine whether updates are necessary including the initiation and completion dates provided in **Section 5**, **Table 5-1**, **Table 5-2**, and **Table 5-3**. Each evaluation effort should consider the duties and activities performed by each member of the group, and the status of the recommendations or efforts described in the WHMP. The WHWG will present proposed WHMP recommendations or revisions to the Wildlife Coordinator, who will consider the recommendation and approve proposed revisions to the WHMP. Each revision to the WHMP must be approved by FAA.

3.2 Staff Roles and Responsibilities

Section 3.2 provides an overview of the roles and responsibilities of JAC staff involved in wildlife related issues. The airport management structure is illustrated in **Figure 3-1**.

Figure 3-1. Jackson Hole Airport Organizational Chart

3.2.1 Airport Director

The Airport Director provides the decision-making authority for major program decisions, controversial issues or conflict resolution in support of the aviation mission. The Airport Director's specific duties in association with the WHMP and its implementation include:

- Ensure ongoing coordination with the NPS at GRTE, including the Park Superintendent.
- Serve as Chair of the WHWG.

- Involve the Wildlife Coordinator/Director of Operations with off-site project proposals that could potentially result in hazardous wildlife attractants within 5 miles of JAC in accordance with FAA Advisory Circular 150/5200-33B, "Hazardous Wildlife Attractants On and Near Airports" (see **Attachment E**).
- Involve the Wildlife Coordinator/Director of Operations with land use planning and mitigation efforts.
- Involve the Wildlife Coordinator/Director of Operations in evaluating permit requirements and agency coordination for activities in wetlands, streams, or on mitigation sites.
- Provide public relations support for wildlife hazard management activities as necessary.

3.2.2 Wildlife Coordinator / Director of Operations

As stated in Chapter 2, JAC is located entirely within GRTE, and the NPS is responsible for the implementation of all wildlife hazard management measures in accordance with its *2006 Management Policies.*

The Wildlife Coordinator is responsible for coordinating and implementing the Wildlife Hazard Management Program on behalf of airport management. The Wildlife Coordinator must work with NPS staff to carry out the measures identified in the WHMP and to ensure that all airport staff members who perform wildlife hazard management duties receive appropriate training to carry out their responsibilities.

The Director of Operations at JAC shall serve as the Wildlife Coordinator. The Wildlife Coordinator is responsible for providing managerial support for all wildlife hazard management efforts and for making sure that sufficient resources are available to implement the wildlife hazard management measures described in the WHMP. In addition, the Wildlife Coordinator is also responsible for maintaining an ongoing record of all management activities. The Wildlife Coordinator's specific duties are summarized in **Table 3-1**:

Table 3-1. Wildlife Coordinator Duties in association with the WHMP Jackson Hole Airport	
Serve as decision maker for significant issues at the program level.	• Plan and administer the budget for the program. • Coordinate technical issues with a qualified wildlife biologist. • Review proposed plans for their potential to increase wildlife hazards (e.g., landscaping plans). • Elevate issues to the Director of Aviation as appropriate. • Facilitate ongoing communication with NPS staff at GRTE in accordance with the Communications Protocol.

Table 3-1. Wildlife Coordinator Duties in association with the WHMP Jackson Hole Airport	
Provide directions to the Operations Staff regarding WHMP policies, guidance and implementation	• Provide both strategic guidance and operational direction to the program. • Provide guidance for program protocols, management decisions, or technical questions. • Provide direction to the Project Manager regarding WHMP implementation policies and guidelines.
Facilitate Wildlife Hazard Working Group activities	• Describe and disseminate information and wildlife hazard management assignments through the WHWG. • Facilitate annual WHMP evaluation and necessary revisions. • Ensure that the WHMP remains consistent with CFR 14 Part 139.337.
Serve as WHMP and Program Liaison for both internal and external departments and agencies.	• Brief airport management on the WHMP program progress, management activities, and controversial issues, and relay management guidance to members of the Operations and Safety Staff. • Actively engage NPS staff, airport staff, and the public in a dialogue to foster greater understanding of wildlife hazard management objectives and activities. • Provide coordination with federal, state, and local, state, agencies on land use decisions that could create additional hazardous wildlife attractants on or near the airport. • Provide public relations support for wildlife hazard management activities as necessary. • Serve as the WHMP program liaison with the FAA.

Table 3-1. Wildlife Coordinator Duties in association with the WHMP Jackson Hole Airport	
Provide Training for Wildlife Hazard Management Activities and Supervise Operations Staff in Wildlife Hazard Management Plan Implementation.	• Ensure that only properly trained Operations Staff perform wildlife hazard management activities in the AOA in accordance with FAA regulations. • Train, supervise, coordinate, and monitor activities of the Operations Staff and NPS Staff as outlined in the WHMP with regard to: the use of wildlife hazard management tools (screamers, bangers, lasers, Long-Range Acoustic Devices (LRAD), or other tools), radio communications, driving and safety within the AOA, and appropriate use of methods and techniques to resolve wildlife risks. • Serve as a liaison with NPS in the development of wildlife hazard management training programs and protocols. • Provide NPS with wildlife hazard management resources as necessary, including supplemental training with regard to aviation and wildlife concerns.
Manage/Oversee Ongoing Wildlife Hazard Management.	• Alleviate hazardous wildlife attractants deemed an imminent hazard. • Coordinate with NPS staff regarding the removal of imminent threats. • Coordinate the issuance of Notices to Airmen (NOTAM) pertaining to wildlife hazards. If necessary, alert the Airport's Air Traffic Control Tower (ATCT) to advise pilots about wildlife hazards—including imminent hazards—on the Automated Terminal Information Service (ATIS). • Monitor facilities and tenant concerns with wildlife conflicts. • Coordinate with NPS Staff at GRTE and, if necessary, obtain and maintain permits for wildlife harassment, capture, marking, and relocation, and depredation.
Serve as liaison/coordinator for proposed on-site and off-site development projects.	• Coordinate with consulting environmental staff, all modifications planned in wetlands, streams, storm water facilities, or mitigation areas with required stakeholders to prevent the creation of wildlife attractants. • Work to alter wildlife habitat as needed to minimize hazardous wildlife attractants on JAC property. • Review plans involving land use changes to avoid the inadvertent creation of hazardous wildlife attractants. Obtain the opinion of a FAA-qualified biologist when necessary to determine potential impacts of proposed projects.

Table 3-1. Wildlife Coordinator Duties in association with the WHMP Jackson Hole Airport	
Prepare/maintain documentation.	• Maintain a log of wildlife strikes and control actions and forward strike reports to FAA. • Document control actions and make documentation available to airport management upon request. • Make copies of all wildlife strike reports available to airport operations staff, airport management, and NPS staff.

3.2.3 Airport Project Manager, Director of Security, and Fire Chief

The Airport Project Manager, Director of Security, and Fire Chief are responsible for assisting the Wildlife Coordinator as requested and providing frequent updates regarding wildlife management issues to the Wildlife Coordinator and Operations staff. They will support wildlife hazard management activities by ensuring that facilities and infrastructure operate effectively and by performing facility inspections and repairs as necessary. Specific duties include:

- Log all known wildlife strikes on the online electronic strike report (**Attachment G**) and forward the forms to the Wildlife Coordinator.
- Inform the ATCT and pilots of imminent wildlife hazards.
- Ensure that wildlife-attracting refuse does not accumulate in fields and ditches on the airport.
- Inspect critical areas for wildlife activity and strikes and maintain a record of the action, even if no wildlife was present.
- Reduce wildlife hazards from critical areas when appropriate as outlined in **Section 7**.
- Record all wildlife activity or animals dispersed or removed on the "Wildlife Log" (**Attachment H**) and forward the report to the Wildlife Coordinator.
- Assist with wildlife management activities involving field rodents, bird and mammals other programs.
- Assist the Wildlife Coordinator in evaluating permit requirements and agency coordination for activities in wetlands, streams, or on mitigation sites.
- Alleviate all attractants deemed an imminent hazard and, if necessary, coordinate a runway closure to prevent potential wildlife strikes.
- Conduct runway inspections to identify and remove dead or injured wildlife.
- Inspect aircraft and the AOA for snarge (wildlife remains).

3.2.4 Airport Public Safety Staff

Airport Public Safety Staff are responsible for assisting the Wildlife Coordinator in the performance of wildlife hazard management efforts and control activities in accordance with NPS policies and regulations. The Public Safety Staff is also responsible for performing routine inspections of the AOA and airport property. Specific duties are summarized in **Table 3-2**.

Table 3-2. Airport Operations Staff – Wildlife Hazard Management Responsibilities	
Ongoing Activities	• Conduct regular runway inspections to identify and remove dead or injured wildlife from the AOA. Once removed from the AOA, the staff shall call NPS to retrieve the injured animal or remains. • Inspect aircraft and the AOA for snarge (wildlife remains). • Inspect the AOA for wildlife activity and strikes and maintain a record of the action, even if no wildlife is present. • Ensure that refuse does not accumulate within the airport boundary, including fields and ditches. • Perform wildlife control measures in critical areas when appropriate (see **Section 7**). • Record all wildlife activity and dispersal activity on the Wildlife Log (**Attachment H**) • Assist with wildlife control activities involving field rodents, rabbits, bird abatement, and other programs in accordance with NPS guidance and regulations.
Identify and alleviate imminent hazards.	• Inform the ATCT and pilots of imminent wildlife hazards. • Alleviate all attractants deemed an imminent hazard and, if necessary, coordinate a runway closure to remedy wildlife hazards.
Perform routine maintenance to prevent or reduce wildlife hazards.	• Maintain ditches and drains to ensure that water flows, thereby avoiding pooling and accumulation of water on the airport. • Maintain the perimeter fence line to exclude large mammals such as moose, bison, deer, and coyotes. • Minimize pooling water formed by rain on tarmac and infield areas, and grade or drain if necessary. • Rodent-proof buildings, dumpsters, and other refuse containers to the extent feasible. • Assist with or identify resources to implement habitat modification measures identified in the WHMP, such as vegetation maintenance, brush/tree removal, and tree pruning.
Provide ongoing support to Wildlife Coordinator	• Inform the Wildlife Coordinator of rodents and other wildlife found in and around buildings. • Involve the Wildlife Coordinator with project proposals that could potentially result in hazardous wildlife attractants within 5 miles of JAC. • Involve the Wildlife Coordinator with land use planning and

Table 3-2. Airport Operations Staff – Wildlife Hazard Management Responsibilities	
	mitigation efforts. • Assist the Wildlife Coordinator in evaluating permit requirements and agency coordination for activities in wetlands, streams, or on mitigation sites.
Report and document wildlife hazards.	• Log all known wildlife strikes on FAA's online electronic strike report (see **Attachment G**) and forward the forms to the Wildlife Coordinator. • Document all wildlife control actions on the "Wildlife Log" (see **Attachment H**) and forward the reports to the NPS staff regularly. If FAA staff perform wildlife hazard management, ensure that all actions are logged.
Participate in Wildlife Hazard Management Training.	• Participate in Wildlife Hazard Identification and Management Training as required by FAA regulations at FAR Part 139.337.

3.3 Federal Aviation Administration

FAA staff members provide the following support to wildlife hazard management efforts:

- Review WHMP for incorporation into the Airport Certification Manual.
- Provide information related to aircraft-wildlife strikes and other wildlife incidents to the Wildlife Coordinator.
- Assist JAC in reviewing proposed land use changes, construction plans, and mitigation projects for potential wildlife hazards to aircraft as necessary.
- Review changes or edits to the WHMP.

3.4 FAA-Qualified Biologist

FAA guidance at 150/5200-36A, Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports." FAA recommends that airports, at a minimum, consult with a FAA-qualified biologist when developing a WHMP.

The FAA-qualified biologist is responsible for providing ongoing assistance to airport staff during the preparation and implementation of its WHMP. Specific duties include:

- Training airport personnel and NPS Staff participating in wildlife hazard management activities about wildlife hazards awareness. Instructing airport and NPS staff in the safe handling and proper use of wildlife dispersal equipment and techniques
- Assisting airport staff in reviewing proposed land use changes, construction plans, and mitigation projects proposed on site and within 5 miles of the airport for their potential to increase wildlife hazards to aircraft.
- Providing ongoing consultation regarding wildlife hazard management issues as they arise.

3.5 National Park Service Staff at Grand Teton National Park

As stated previously, GRTE is responsible for the management of wildlife resources within the national park, including those within airport boundaries. All wildlife hazard management measures and protocols must be developed in coordination with NPS staff and communicated to NPS using the communications protocol developed by NPS and JAC staff.

Although most routine wildlife hazard management activities will be performed daily by appropriately trained Airport staff, NPS staff at GRTE shall be responsible for assisting the Wildlife Coordinator in wildlife hazard management efforts and control activities in accordance with federal policies and regulations. GRTE Staff is also responsible for enforcement efforts regarding the feeding of wildlife in the vicinity of JAC.

Specific duties to be performed by NPS staff in association with this WHMP include:

- Responding to requests for assistance from JAC in time to alleviate risks due to wildlife presence.
- Attending annual wildlife hazard identification training provided by a FAA-qualified biologist.
- Making recommendations to address attractive habitat features, new wildlife attractants or other situation that arise in a manner that is both protective to the traveling public and park resources.
- Assisting with laboratory analysis to identify wildlife species that are involved with aircraft strikes.

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Section 4 – Resources

FAR Part 139.337(f)(4) Identification of resources to be provided by the certificate holder for implementation of the plan.

4.1 Airport Staff and Resources

The Director of Operations, Project Manager, Director of Security, Fire Chief and Public Safety Staff will be responsible for responding to emergency calls from the Airport's ATCT or other airport staff to disperse animals from the runways. The airport public safety vehicles should be equipped with the supplies presented in **Table 4-1** to facilitate an immediate response to wildlife hazards.

When responding to emergency calls, staff must maintain radio communications with the ATCT, and all inspections and responses conducted within aircraft movement areas must be performed according to FAA guidelines.

Table 4-1. Available Wildlife Hazard Management Supplies at Jackson Hole Airport

Item	Description and Quantity
Documentation	Wildlife Hazard Management Plan
	Bird and mammal identification guides. A copy of each guide will be kept in all vehicles used to inspect the airfield, and an additional copy should be kept in the Wildlife Coordinator's office.
	Wildlife Log forms (**Attachment H**)
	Prevention and Control of Wildlife Damage (see Section 7.1)
Wildlife Harassment/Hazing Supplies	*Launchers.* The airport should maintain a supply of 15 mm pistol launchers and caps. One pistol launcher will be available in each vehicle that performs airfield inspections.
	Screamers and Whistlers. Screamers/whistlers will be available in each vehicle used for airfield inspections, and one week's supply must be available in storage.
	Bird Bangers/Bombs. Bird bangers/bombs will be available in each vehicle used for airport inspections, and one week's supply must be available in storage.
	Personnel Safety Equipment. Eye and hearing protection shall be maintained in each vehicle used for airfield inspections. Protective eye goggles, ear protection and a fire extinguisher shall be included in each vehicle, and extras should be maintained at all times.
Monitoring Equipment	*Binoculars.* One pair of binoculars will be kept in each vehicle used to perform airfield inspections.
	Spotlight. A spotlight will be available in each vehicle for night time operations.

Table 4-1. Available Wildlife Hazard Management Supplies at Jackson Hole Airport	
Item	**Description and Quantity**
	Wildlife Log. A logbook/computer file shall be available to document daily observations pertaining to wildlife hazards and all management activities.
Devices	• Catch pole Coyote decoy • Laser deterrent • Bio-acoustic deterrent
Firearm/ammunition And Personal Safety Equipment	*12-gauge shotgun and non-toxic ammunition.* *Personnel Safety Equipment.* Eye and hearing protection shall be maintained in each vehicle used for airfield inspections. Protective eye goggles, ear protection and a fire extinguisher shall be included in each vehicle, and extras should be maintained at all times. If lethal control is necessary, the airport must maintain a 12-gauge shotgun and non-toxic ammunition for use by appropriately trained airport employees in addition to the Wildlife Coordinator. A cleaning kit for all firearms must also be provided. Lethal control will be performed only after authorization/ consultation with the park's senior wildlife biologist.
Miscellaneous Items	• Mylar tape • Latex gloves • Garbage bags • Gallon-size food storage bags

The Wildlife Coordinator is responsible for ensuring that an adequate supply of wildlife management equipment is always available at JAC for use by trained personnel. Additional supplies, such as distress calls, long-range audio devices, mammal traps, rotating beacons, and sirens, may be necessary to address specific situations. The Wildlife Coordinator is responsible for ensuring that these items are available and can be procured in a timely manner.

4.2 National Park Service Resources and Supplies

Some wildlife hazard management measures will be carried out exclusively by NPS staff at GRTE, such as measures to trap, capture, and relocate wildlife and lethal management as warranted and in accordance with NPS policy.

NPS Staff will be responsible for responding to emergency calls from the Airport Operations staff to remove injured animals from the AOA and to capture or remove animals that pose a threat to airport operations, such as large mammals found within the airport perimeter fence. Recommended equipment for NPS staff and vehicles when facilitating an immediate response to wildlife hazards is presented in **Table 4-2**.

Table 4-2. Available Wildlife Hazard Management Supplies Maintained by National Park Service Staff at Grand Teton National Park	
Item	**Description and Quantity**
Documentation	*Wildlife Hazard Management Plan*
	Wildlife Log forms to document observations pertaining to wildlife hazards and all management activities. A copy of completed forms shall be transmitted to the JAC Wildlife Coordinator immediately following any management activity.
Monitoring equipment	*Binoculars.* One pair of binoculars must be kept in each vehicle used to perform airfield inspections.
	Spotlight. A spotlight must be available in each vehicle for night time operations.
	Flashing Amber Light. All vehicles used within the air operations area must be equipped with a flashing amber light.
	Radio. All NPS staff performing wildlife management within the air operations area must be equipped with and trained to use a radio to communicate with airport staff and the ATCT.
Animal Traps/Devices	Various traps including: • Snare/catch pole • Cage trap for dogs (e.g., Tomahawk 110B) • Cage trap for cats/raccoons (Tomahawk 108)
Firearm/ammunition	*12-gauge shotgun and non-toxic ammunition.* *Personnel Safety Equipment.* Eye and hearing protection shall be maintained in each vehicle used for airfield inspections. Protective eye goggles, ear protection and a fire extinguisher shall be included in each vehicle, and extras should be maintained at all times. Lethal control would be performed only after authorization or consultation with the park's senior wildlife biologist. If lethal control is necessary, the airport shall maintain a 12-gauge shotgun and non-toxic ammunition for use by appropriately trained airport employees in addition to the Wildlife Coordinator. A cleaning kit for all firearms shall also be provided. *Lethal control shall be performed only by appropriately trained staff in areas outside of the national park or other federal land.*
Miscellaneous Items	• Mylar tape • Latex gloves • Garbage bags • Gallon-size food storage bags

4.3 Budget Allocations

The operating and maintenance budget allocations must include funding for equipment, materials and supplies, and any contracted pest management services. Many items are one-time expenses, while others are supplies that must be restocked periodically. The Wildlife Coordinator will be responsible for reviewing wildlife management expenses and performing the inventory of resources

to determine the appropriate funding required to equip staff and vehicles. The Wildlife Coordinator will alert the Director of Operations to the budgets and costs associated with wildlife hazard management efforts.

The Director of Operations will be responsible for monitoring costs and developing an annual budget for wildlife hazard management expenses. The budget will be submitted to the Airport Director. JAC and NPS staff shall determine the extent to which the Airport Board will provide for the equipment identified in **Table 4-2**.

Section 5 – Habitat Management Strategies

FAR Part 139.337(f)(2ii, iii) Priorities for needed habitat modification and changes in land use identified in the wildlife hazard assessment with target dates for completion.

5.1 Overview

Habitat management provides the most effective long-term solution for reducing wildlife hazards on and near airports. Habitat management measures include the physical removal, exclusion, or manipulation of areas that are known to be attractive to potentially hazardous wildlife. The ultimate goal of a habitat management strategy is to create an airport environment that is neither diverse nor attractive to the species that pose the greatest hazards to aviation.

As required by FAR Part 139, a WHMP must include prioritized, site-specific habitat management measures to render the airport less attractive to hazardous wildlife, thereby reducing the risk of wildlife strikes. Habitat modification efforts must be adaptive, and airport operators must perform ongoing monitoring following the implementation of habitat modification measures to determine their effectiveness and to prevent the inadvertent creation of new wildlife attractants for different species.

Table 5-1. General Maintenance/Management Actions

Action	Priority	Target Date	Date Completed
Develop an electronic record-keeping system for wildlife strikes and hazing efforts.	Critical	Spring 2014	
Stock and maintain wildlife control supplies.	Critical	Spring 2014	
Develop and maintain a Wildlife Hazard Management Plan.	Critical	Spring 2014	
Maintain and regularly inspect airport perimeter fence.	Critical	Spring 2014	
Implement a wildlife hazard reporting and communication protocol.	Critical	Spring 2014	
Ensure gaps between all gate frames and fence or ground are not greater than 3 inches.	Critical	Spring 2014	
Regularly inspect all outdoor garbage containers to ensure they are properly covered and emptied regularly.	Critical	Spring 2014	Ongoing
Report instances of road killed animals around JAC to the proper officials for removal.	High	Spring 2014	Ongoing
Install small mesh wire on the bottom 24 inches of the perimeter fence.	Critical	Fall 2014	
Train personnel in wildlife hazards identification and hazing procedures, and species identification.	Critical	Winter 2014	
Monitor fence for areas to increase the height to prevent moose access.	Critical	Winter 2014	

Table 5-1. General Maintenance/Management Actions			
Action	**Priority**	**Target Date**	**Date Completed**
Continue to meet annually with the wildlife hazard working group.	High	Winter 2014	
Note: Some projects may have been implemented or completed already, but because they require a continued effort, they are listed as "ongoing".			

Tables 5-1, **5-2**, and **5-3** present prioritized lists of general or standard maintenance measures that can be applied at most airports to reduce the risk of wildlife hazards, specific habitat management measures to address the wildlife present on and near JAC, and species-specific population management measures based on the recommendations presented in the WHA and developed following discussions with the WHWG.

Each management measure is prioritized based on its ability to reduce risk based on the site-specific surveys and observations conducted during the WHA and available industry data pertaining to wildlife hazard management at airports. As shown in **Table 5-1 through 5-3**, red shading was assigned to identify measures prioritized as critical, orange to measures identified has having a high priority, and yellow to measures having a moderate priority for implementation.

5.2 General Maintenance / Management Measures

Table 5-1 presents general maintenance/management measures to reduce the risk of wildlife hazards at JAC. Each project is presented with a proposed target date for completion and an area in which the completion date may be recorded.

5.2.1 Site-Specific Habitat Modifications Measures

Table 5-2 presents proposed habitat modification measures to reduce the risk of wildlife hazards at JAC. Each measure is presented with a proposed target date for completion and an area in which the completion date shall be recorded.

Table 5-2. Site Specific Habitat Management Actions			
Action	**Priority**	**Target Date**	**Date Completed**
Monitor and evaluate potential wildlife hazards associated with proposed airport development projects, nearby land-use changes, and construction.	High	Spring 2014	Ongoing
Mow and maintain grass at a height of 7 to 14 inches in currently managed areas.	High	Spring 2014	
Remove on-site snow to encourage lekking behavior in areas more distant from the runway prior to and during restoration/development of off-site leks.	Critical	Spring 2015	
Improve drainage on southeast side to allow snow melt drainage into Enterprise Ditch.	Moderate	Spring 2015	

Table 5-2. Site Specific Habitat Management Actions			
Action	**Priority**	**Target Date**	**Date Completed**
Enclose the Enterprise Ditch from North Spring Gulch Road to an area east of the current eastern perimeter fence.	High	Summer 2015	
Install fence on the top of the enclosed Enterprise Ditch both east and west sides.	High	Summer 2015	
Create off-site sage-grouse leks as described in Attachment A of the WHMP.	Critical	TBD	
Create off-site sage-grouse brooding habitat as described in Attachment A.	Critical	TBD	
Encourage monotypic stands of native grasses that are not attractive to potentially hazards wildlife in currently mowed areas and reduce the presence of forbs within the AOA through the application of a herbicide approved by NPS.	Critical	TBD	
Encourage grouse to use lek areas located farther from the runway.	Critical	TBD	
Note: Some projects may have been implemented or completed already, but because they require a continued effort, they are listed as "ongoing."			

5.2.2 Species-Specific Population Management Measures

Table 5-3 presents a prioritized list of species-specific population management actions. The actions are proposed to reduce the overall presence and abundance of species that were identified as posing the greatest threats to aircraft operations at JAC. Each project is presented with a proposed target date for completion and an area in which the completion date may be recorded.

Table 5-3. JAC Population Management Actions			
Action	**Priority**	**Target Date**	**Date Completed**
Maintain a zero-tolerance policy towards hazardous species and events by hazing according to approved protocol and escalating to further consultation with GRTE staff. Hazardous species include Canada geese and large wild and domestic mammals that occur within the airport boundary.	Critical	Spring 2014	Ongoing
Monitor large mammal populations - maintain visibility of animals that gain access to the AOA or are near the public areas. In landside areas, escort to areas away from the public.	Critical	Spring 2014	Ongoing
Apply for and maintain a USFWS migratory bird depredation permit as appropriate to address hazards posed by species that do not respond to non-lethal harassment techniques. The depredation of such species would be performed under the direction of the park.	Critical	Spring 2014	

Table 5-3. JAC Population Management Actions			
Action	**Priority**	**Target Date**	**Date Completed**
Monitor wildlife populations and patterns within the AOA.	Critical	Spring 2014	
Monitor sage-grouse activities on the airfield and harass to mitigate imminent threats in accordance with a park-approved hazing protocol, especially from March to April and from July to September.	Critical	Spring 2014	
Reduce potential hazards posed by ground squirrel and pocket gopher populations within the AOA following consultation with NPS.	High	Spring 2015	
Monitor and manage foxes/coyotes that enter the AOA.	High	Spring 2015	
Note: Some projects may have already been implemented or completed, but because they require a continued effort (e.g., Maintain a zero-tolerance policy towards hazardous species and events), they are listed as "ongoing".			

5.3 Wildlife Attractants On and Near JAC

FAA defines specific areas based on their distance or relation to aircraft movement areas and regulated airspace. Among these areas are the General Zone and Critical Zone for wildlife hazard management as defined in Advisory Circular 150/5200-33B, "Wildlife Hazard Attractants On and Near Airports."

5.3.1 General Zone

The General Zone is the area within a 5-mile radius of JAC as measured from the nearest location of the AOA (see **Attachment I**). Wildlife attractants in this area, especially those within the approach and departure surface, have the potential to affect aircraft safety. The objective of the WHMP is to actively reduce attractive wildlife habitat on airport property and work cooperatively with other property owners/managers in the General Zone to reduce or discourage land-use practices that might pose wildlife hazards.

Areas identified within the Critical Zone are known to support potentially hazardous wildlife include Phelps Lake, Flat Creek wetlands north of Jackson, Teton and Gros Ventre Range of the northern Rocky Mountains. However, since these resources provide habitat for hazardous species at locations outside of the airport boundaries, they may also serve to dissuade such species from using areas within the airport boundaries.

The Wildlife Coordinator will reach out to project proponents or regulatory agencies whenever new projects or land use changes are proposed in these areas. Working with a FAA-qualified biologist, the Wildlife Coordinator will review proposed project to determine whether they are likely to attract additional hazardous species or cause such species to come closer to aircraft movement areas or protected airspace.

5.3.2 Critical Zone

The Critical Zone is the area within 10,000-feet of JAC as measured from the nearest location of the AOA (see **Figure 5-1**). The management measures presented in the WHMP will focus on the Critical Zone because aircraft within this area typically fly at altitudes of less than 3,000 feet during approach and departure. FAA data indicate that approximately 75% of all wildlife strikes at civil airports occur within 10,000 feet of the airfield from which the aircraft depart or arrive. Attractants within the Critical Zone include:

- Enterprise Ditch,
- Snake River corridor,
- Gros Ventre River corridor,
- Residential ponds, and
- Extensive sagebrush complexes

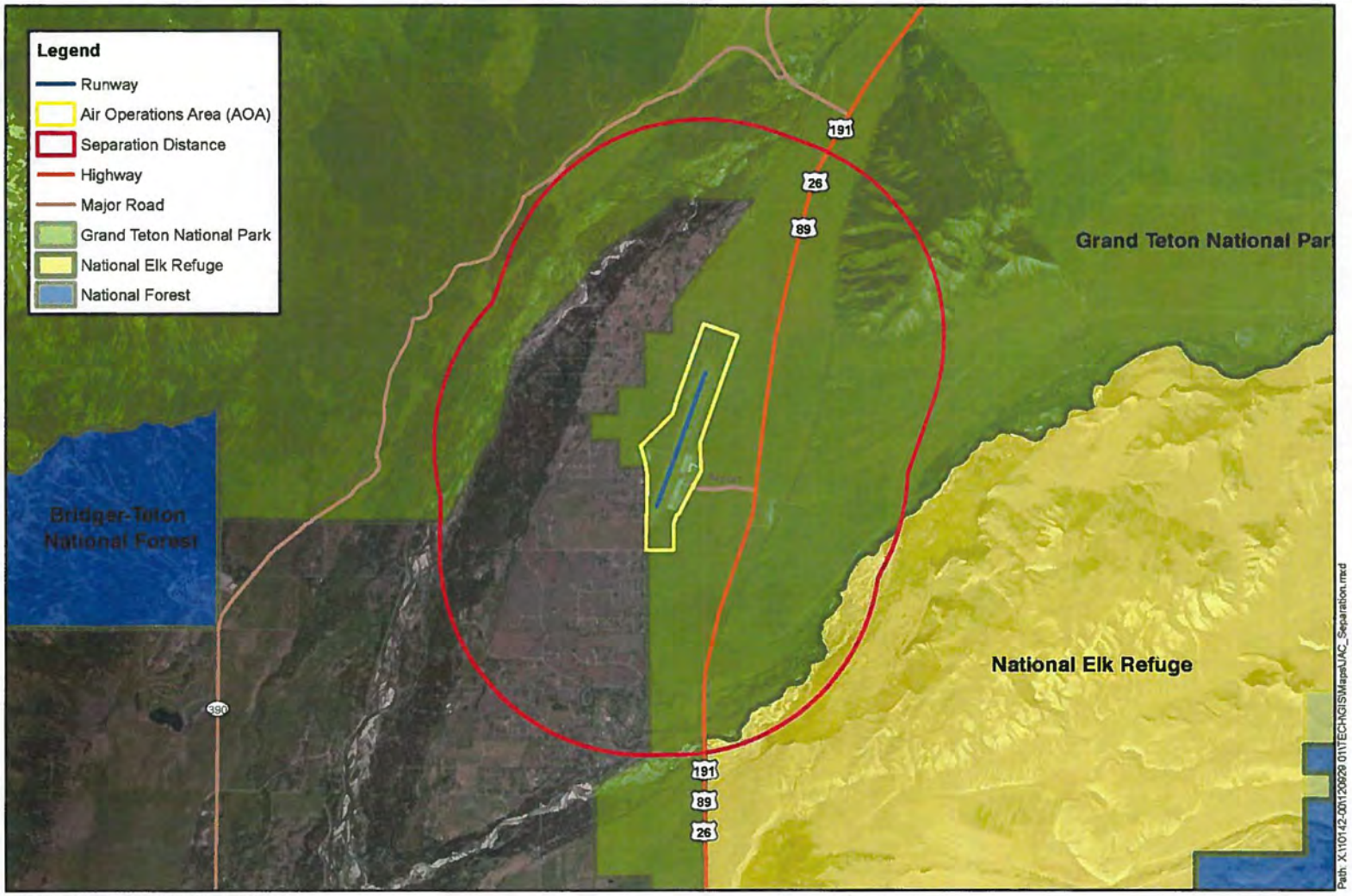
Similar to the General Zone, the Wildlife Coordinator will reach out to project proponents or regulatory agencies whenever new projects or land use changes are proposed in these areas. Working with a FAA-qualified biologist, the Wildlife Coordinator will review proposed projects to determine whether they are likely to attract additional hazardous species or cause such species to come closer to aircraft movement areas or enter protected airspace.

5.4 Structure/Facility Management

Structures can attract potentially hazardous wildlife by providing cover and perches for hunting. Wildlife management should be considered whenever new structures are proposed to prevent the creation of nesting, perching, or roosting sites for birds and to inhibit access by mammals such as rodents and raccoons.

5.4.1 Airfield Structures

Airfield structures, such as runway lights, ramp and taxiway signs, Instrument Landing System (ILS) towers, and light poles, can be used as hunting and loafing perches for birds such as hawks. Lights attract insects at night, which, in turn, attract bats and nighthawks. Structures found to routinely attract birds in a hazardous manner should be fitted with anti-perching deterrents.



JACKSON HOLE AIRPORT
WHA 10,000-foot Separation Distance

Figure 5-1. Critical Zone

0 2,500 5,000 10,000 Feet

N

Data Sources:
Image: (c) 2010 Microsoft Corporation and its data suppliers
Park and Refuge Boundaries: National Park Service, Grand Teton National Park, Science & Resource Management, 2004 (Accessed Jan 2013)
Forest Boundary: US National Forest Service, Administrative Forest Boundaries, 2012 (Accessed Jan 2013).
Roads: ESRI Data & Maps, 9.3

Mead & Hunt

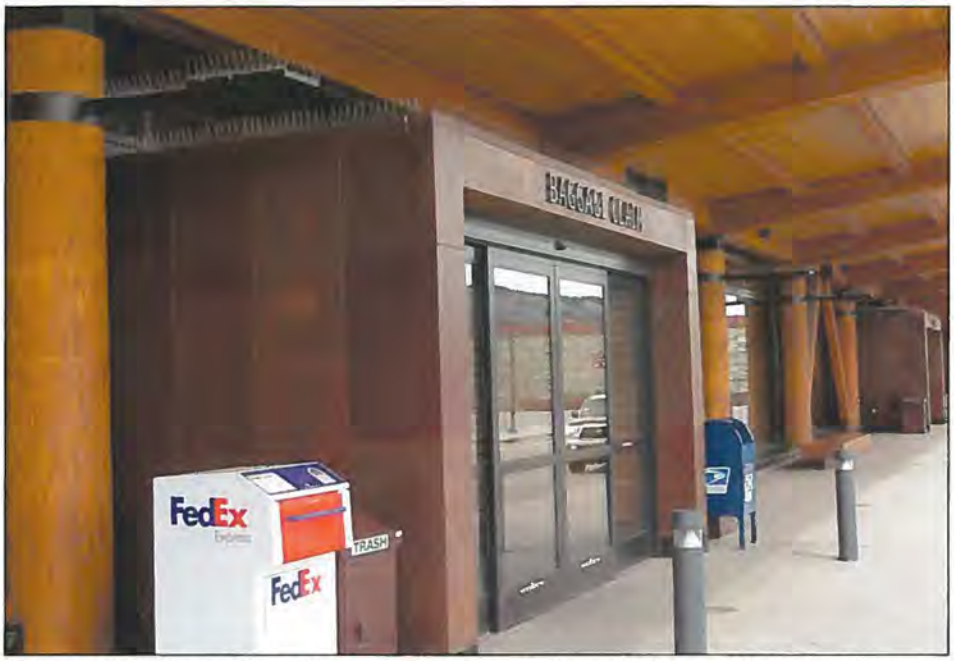


Figure 5-2. Perching deterrents mounted on lights and above doors at JAC to decrease bird use

5.4.2 Perimeter Fence and Gates

The perimeter fence at JAC has worked relatively well for excluding large animals from the AOA. However, sage-grouse and small mammals, such as coyotes and foxes, have gained access through the fence and onto to the airfield. Airport staff have reported that moose have occasionally entered the AOA when significant snow depths compromised the fence.

To prevent future access to the AOA by wildlife, the Wildlife Coordinator will investigate options to install small-diameter wire mesh fencing (5 centimeters or less) around the perimeter of the enclosure from below ground level to a height of 2 feet. The fencing will be installed to prevent smaller mammals and other wildlife from accessing the AOA through the perimeter fence. The additional fence material should be composed of wire of similar gauge and strength as that of the existing fence. Ongoing fence monitoring is necessary to identify conditions that would allow moose access to the AOA. If the frequency of moose incursions increases, the Wildlife Coordinator will pursue the addition of risers to increase the overall fence height in areas likely to accumulate snow at depths that would allow access.

Small mammals, such as coyotes and foxes, can gain entry to the AOA through fence gates. Gaps may form at locations where the gates meet or attach to a post, and these gaps can increase over time due to freeze-thaw action, poor construction, or the use of substandard fence hardware. To prevent access to the AOA by small mammals, gaps beneath gates to allow for ground clearance and the gap between the gate and post must be no greater than 3 inches in any direction. The Public Safety Staff is responsible for monitoring the perimeter fence and gates and performing immediate maintenance to achieve and maintain this standard.

5.4.3 Airport Building Projects

The Wildlife Coordinator will participate in the initial and early phases of all airport building projects. The Wildlife Coordinator will review all plans and solicit input from an FAA-qualified biologist to identify any project features or activities that have the potential to attract potentially hazardous wildlife or increase the risk of wildlife strikes, such as those posed by open water features or landscape changes. Early participation during the project planning and design process is necessary to ensure that new projects and construction activities are designed in a manner that minimizes wildlife attractants prior to detailed design efforts. Additionally, the FAA's Denver Airports District Office (ADO) will review proposed construction activities for potential wildlife attractions when the FAA Form 7460-1 application is submitted for airspace analysis.

5.4.4 Abandoned Structures

Structures that are not pertinent to air operations or no longer in use should be removed, including abandoned structures, sheds, machinery, and light poles. Such structures are attractive to rodents, small birds, and rabbits and, in turn, attract coyotes, hawks, owls, and other predators that can become a significant air hazard. Structures used for crash-fire training are considered to be pertinent to air operations and are generally compatible with safe air operations.

While no abandoned structures were reported in the WHA that would attract potentially hazardous wildlife, the removal of excess structures should be considered a routine maintenance activity in support of WHA efforts. If a structure cannot be removed, it should be inspected routinely to ensure that it does not provide shelter or nesting opportunities for wildlife.

5.4.5 Non-Airport Land-Use Projects

The Wildlife Coordinator will monitor and participate in land use decisions proposed by other agencies or private developers that would occur within the General Zone. For example, the Wildlife Coordinator will ensure that proposed stormwater management facilities and landscaping are reviewed by a qualified biologist to avoid the inadvertent creation of wildlife hazards to aircraft within the General Zone. Such participation will require coordination with the National Park Service, other federal agencies, and local planning agencies to identify and review proposed land-use changes prior to discretionary approvals. If projects cannot be reasonably modified before construction to prevent or mitigate potential wildlife hazards, the Wildlife Coordinator must monitor the project area during and following construction to identify hazardous wildlife activity and to offer recommendations to reduce observed hazards or hazardous conditions.

The FAA's Denver ADO and Safety and Standards Branch of the FAA's Northwest Mountain Region will provide technical guidance to the Wildlife Coordinator in addressing land use compatibility conflicts. JAC staff or the FAA may request assistance from USDA Wildlife Services (USDA-WS) in accordance with the Memorandum of Understanding between the two agencies (**Attachment F**). USDA-WS or a qualified wildlife biologist can provide technical recommendations to address issues or concerns associated with a proposed project or land-use change.

The Airport Director and Wildlife Coordinator will discourage proposed projects that are likely to attract or increase the abundance of potentially hazardous wildlife within the General Zone or suggest potential measures to reduce hazards. Incompatible land uses or infrastructure development within the Critical Zone may include such items as waterfowl preserves/conservation areas, reservoirs, parks with artificial ponds, wetlands and waste handling facilities. These types of land-use changes will be monitored for compatibility by working with the local planning authorities.

5.5 Water Management

Several water features on the airfield provide food and cover to the species observed during the WHA survey period. The southern boundary of JAC is bisected by the Enterprise Ditch and the associated riparian area. Ponds within the Critical Zone include nearly 20 ponds in the residential development west of the airport. Rivers include the Snake and the Gros Ventre. The Wildlife Coordinator will work with local agencies and landowners to address issues associated with hazardous wildlife when they are observed.

5.5.1 Ponds

A pond located at the intersection of East Solitude Road and Solitude Road was monitored during WHA field studies and its location was identified as observation point 2 (**Attachment K**). Although the pond was not observed to attract a significant number of waterfowl, the cumulative or synergistic effect of nearly 20 ponds in the Critical Zone warrants attention from the Wildlife Coordinator and JAC staff. The Wildlife Coordinator will monitor these ponds and associated airspace regularly. Since wildlife movement among ponds and other nearby water features is likely, the development of additional ponds north, east or south of the airport would exacerbate risks to aviation as waterfowl travel between ponds and pass through aircraft movement areas. If wildlife associated with these ponds or others becomes noticeably hazardous to airport operations, JAC's Wildlife Coordinator will work cooperatively with the property owners to deter and/or remove problem animals that pose risks to aviation and the traveling public. Wildlife removal outside of the GRTE would require a state permit.

5.5.2 Ditches

The Enterprise Ditch bisects the southern portion of JAC as noted on **Figure 5-3**. The ditch and associated riparian area create habitat diversity and attract wildlife within aircraft movement areas and airspace.

The Wildlife Coordinator will investigate options to convert and maintain this area as a monoculture using native grasses that are not attractive to hazardous wildlife. To do so, woody vegetation near the ditch will be removed, and the portion of the Enterprise Ditch from North Spring Gulch Road to an area east of the perimeter fence will be enclosed. Since the Enterprise Ditch may be considered jurisdictional waters of the U.S., coordination with the U.S. Army Corps of Engineers and appropriate mitigation may be required. Should in-kind mitigation be required, it will be constructed outside of the Critical Zone.

Until the ditch can be closed, the Wildlife Coordinator will continue to monitor the ditch for flow impediment and wildlife activity. Appropriate species-specific mitigation techniques will be implemented to reduce the potential risks posed by wildlife.

Figure 5-3. Portion of the Enterprise Ditch recommended for enclosure

5.5.3 Temporary Seasonal Water

The south side of the AOA was observed to retain runoff during spring melt events at volumes that exceed the natural drainage capacity and result in the accumulation of standing water for prolonged periods (**Figure 5-4**). Standing water is known to attract birds and waterfowl during migration periods.

In advisory circular 150/5200-33B, "Wildlife Hazard Attractants on and Near Airports," FAA advises airport operators to prevent the creation of standing water for periods greater than 48 hours. The Wildlife Coordinator will investigate options to redesign or divert runoff to prevent water from accumulating or pooling for more than 48 hours and provide ongoing monitoring whenever standing water is present.

Managing standing water can pose challenges as areas that periodically contain standing water can become established as jurisdictional wetlands pursuant to Section 404 of the U.S. Clean Water Act. Once a wet area is identified as wetland under Section 404, efforts to manipulate or eliminate the wetland will require authorization from the U.S. Army Corps of Engineers. **Table 5-4** presents a protocol that was developed to assist the Wildlife Coordinator in the management of "wet areas" within JAC boundaries so that they do not persist and become jurisdictional wetlands.

Table 5-4. Management of Standing Water and Wet Areas within Airport Boundaries

Responsibility	Action
Wildlife Coordinator	Inspect area within JAC boundaries to identify and monitor wet areas, pools, or standing water that has the potential to remain for prolonged periods and develop into jurisdictional wetlands.
Airport Staff	If Airport staff identifies an area that has the potential to become a jurisdictional

Table 5-4. Management of Standing Water and Wet Areas within Airport Boundaries	
Responsibility	**Action**
Wildlife Coordinator	wetland or temporary pool, the airport will engage a wetland biologist to inspect the area to determine whether it is a jurisdictional wetland. • If the area is not a jurisdictional wetland, airport staff will perform routine maintenance procedures, such as minor grading, to promote drainage. • If the area is a jurisdictional wetland, the Wildlife Coordinator will work with an FAA-qualified biologist and NPS staff to identify an appropriate solution and mitigation.
Aviation Director	If an engineering solution is required to improve drainage and eliminate standing water, the Aviation Director will identify an appropriate engineer and funding source.

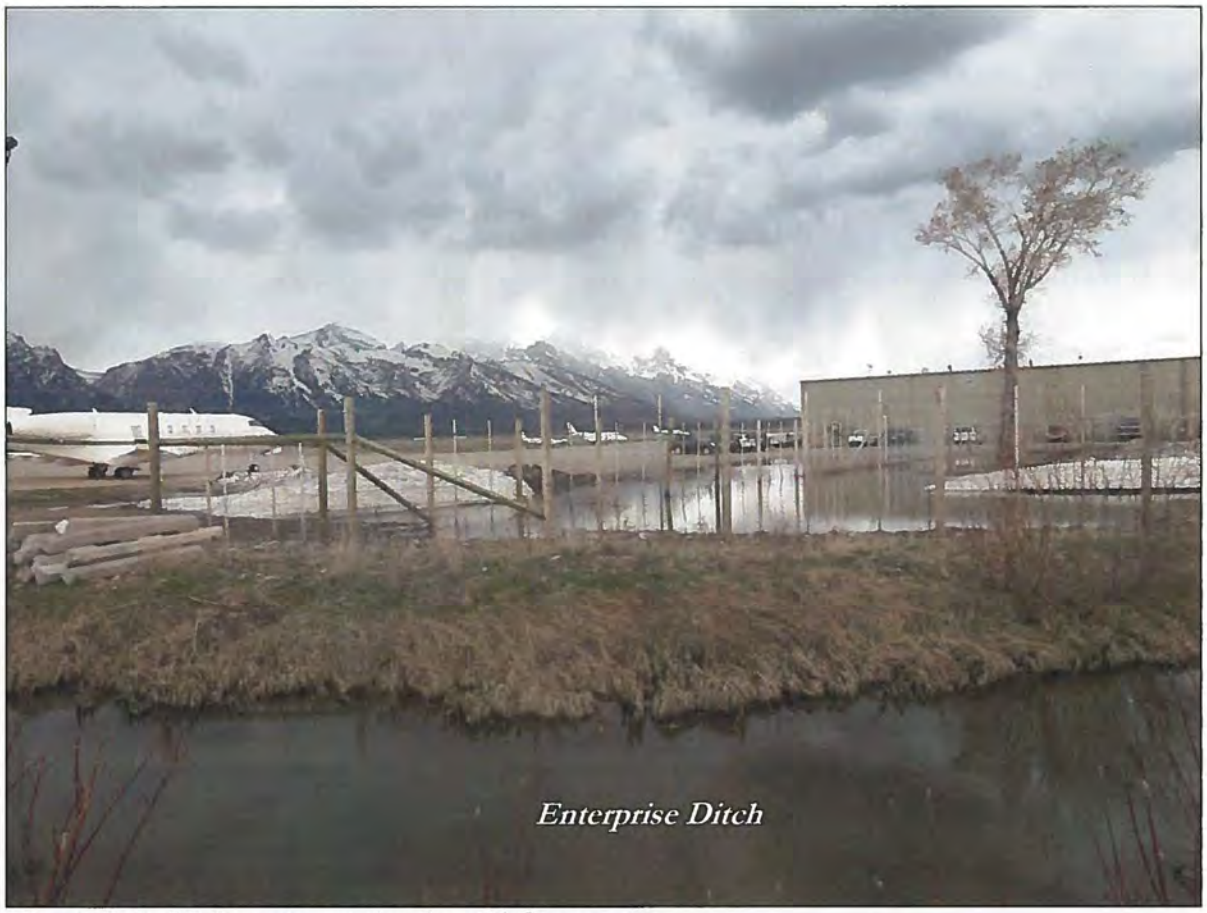


Figure 5-4. Melt water retained on JAC property

5.5.4 Stormwater Management

The topography within the Airport boundaries has a consistent gradual slope that follows the grade of the valley westward toward the Snake River. None of the airport's stormwater features were identified during WHA field studies as attractive to wildlife that could pose a risk to aircraft. The Wildlife Coordinator will continue to monitor these features and take appropriate mitigation measures if wildlife is observed.

Should any new stormwater detention ponds be located in the Critical Zone, the Airport Director or Wildlife Coordinator will review the proposed designs to ensure that they comply with appropriate sections of FAA Advisory Circular 150/5200-33B, "Wildlife Hazard Attractants on and Near Airports." According to Section 2.3b of the Advisory Circular:

> On-airport stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48-hour detention period for the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from the airport's AOA, airport operators should use physical barriers, such as bird balls, wire grids, or netting to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the FAA Airports Division Office. All vegetation in or around detention basins, that provides food or cover for hazardous wildlife should be eliminated.

If, despite these guidelines, any new stormwater structure within the Critical Zone attracts hazardous wildlife, the Wildlife Coordinator will work with the property owner to implement appropriate species-specific management techniques to reduce the potential wildlife threat.

5.6 Vegetation Management

The Airport Board intends to maintain an aesthetically pleasing facility that incorporates native plant species into public areas of the airport to the extent practicable. During WHA field studies, none of the current landscape plan elements were identified as attractive to hazardous wildlife. To further support aviation safety, the JAC Landscape Plan should be reviewed by an FAA-qualified Biologist to ensure that proposed plant materials associated with future projects do not attract potentially hazardous wildlife.

The area within the airport boundary includes diverse vegetation, some of which is highly attractive to potentially hazardous wildlife. As documented in the WHA, approximately 50 percent of the wildlife observed were associated with sage-grouse (803 individuals). Sage-grouse appear to be particularly vulnerable to aircraft strikes during the late summer months when hens return to the airport with their broods. Wildlife biologists knowledgeable of the sage-grouse concluded that the birds are attracted to the AOA because the sage-grouse use the mixture of forbs and insects that are harbored in the mowed areas adjacent to the runways and taxiways. The proximity of the AOA to sagebrush complexes that provide cover is also attractive. Sage-grouse are also vulnerable to strikes during the early spring when they are drawn to the historic lek on the north end of the Runway 19,

which often includes less snow than surrounding areas. The Runway Safety Area (RSA) adjacent to the runway provides the open space necessary for visual displays.

The most effective approach for making the AOA and RSA areas less attractive to sage-grouse is to adjust the airport's mowing regime to include slightly higher grass heights. Maintaining grass at a height of 7 to 14 inches and applying an NPS-approved broad-leaf herbicide to maintained areas to decrease the forb density will make these maintained areas adjacent to airport pavements less attractive to sage-grouse. To further make the AOA less attractive, bare areas, especially those within 250 feet of the runway, will be seeded with an NPS-approved seed mix that is not attractive to hazardous wildlife, and the seeded area will be maintained at heights of 7 to 14 inches.

5.6.1 Grass Management

Other than paved areas, grass and sagebrush mix will remain the primary cover types inside the airport perimeter fence. FAA Certalert No. 98-05 (**Attachment L**) advises, "airport operators should ensure that grass species and other varieties of plants attractive to hazardous wildlife are not used on the airport." For example, grasses that produce large seeds and are known to be attractive to wildlife. Such vegetation will be avoided when planting new areas.

Grass Type

In accordance with FAA guidance, the type of grass used within the perimeter fence and between the runways should produce small or no seeds, but remain capable of generating new growth or re-seed itself to provide a thick, monotypic stand and prevent erosion. The selected ground cover should withstand normal climatic conditions and be somewhat unpalatable to grazers such as geese and wild ducks. The grasses should also harbor relatively few insects and rodents that may attract hawks, owls, starlings, and other hazardous wildlife species.

At JAC, native species must be used to comply with NPS policies. However, the native grass mixtures used at JAC to replant or provide cover during a construction or mitigation project must be reviewed to ensure that the seed mixture is not attractive to hazardous wildlife species present in the airport vicinity.

Grass Height

Grass throughout the airfield will be maintained at a height of 7 to 14 inches throughout the year. Mowing activities will begin when the infield is firm enough to allow equipment access and the grass is sufficiently long to merit cutting.

Mowing

Mowing is attractive to several species of birds and mammals because it exposes food sources such as rodents, insects, worms, and seeds. If mowing is conducted during the day and birds are attracted to the activity, the mowing must stop until the birds have been successfully dispersed from the area. If a pattern of increased wildlife presence is observed during daytime mowing, the Director of Operations staff will consider night mowing to take advantage of reduced air traffic and bird inactivity. Regardless of the schedule for mowing activities, maintenance personnel assigned to

mowing must be trained to identify, respond to, and report wildlife hazards and management activities in the wildlife log.

5.6.2 Ornamental Landscaping

Airport landscaping can affect tourism, business, and the overall impression of a region to visitors. While landscaping at the airport should be aesthetically pleasing, it cannot attract potentially hazardous wildlife to compromise the safety of the traveling public. For example, trees and bushes offer hunting perches, roosting and loafing sites, nesting cover, and food for birds and other wildlife.

In addition to the plant materials included in the Landscape Plan, the Airport will prepare a "Preferred Species List" to identify appropriate landscaping materials and species for use by tenants and others proposing projects within the airport boundary and other development within the Critical Zone. Proposed landscaping plans will be reviewed by the Wildlife Coordinator in consultation with the National Park Service and a FAA-qualified biologist.

5.7 Food/Prey-Base Management

Rodents, ground squirrels, gophers, rabbits, insects and other invertebrates are attractive to many species of birds and mammals and must be managed where feasible. Handouts, trash, and scattered debris also provide food for wildlife. The modification or management of habitats, such as the removal of attractive vegetation and abandoned structures, will reduce populations of potentially hazardous wildlife by limiting cover, reducing the available prey-base, and making the area less attractive to predators.

5.7.1 Rodents

Mice, ground squirrels, and pocket gophers can attract hawks and coyotes. In addition, burrowing rodents are known to chew through wires and cause damage to lighting and navigational aids. Managing grass throughout the airfield at a height of 7 to 14 inches may increase small mammal populations. Small mammal surveys will be conducted to determine areas and habitats in which rodents occur in higher densities.

Ground squirrels and pocket gophers will be managed through an integrated pest management system that includes habitat management strategies and ongoing monitoring. If the presence of rodents persists and poses hazards to aviation, the Wildlife Coordinator will work with NPS staff at GRTE to identify an appropriate method to remove or mitigate potential conflicts with rodents in identified areas within the airport boundary. If rodent populations increase, population management measures will be increased as necessary in consultation with NPS staff.

5.7.2 Insects and Other Invertebrates

Insects and other invertebrates (e.g., crickets, grasshoppers, spiders, etc.) may attract many species of wildlife at JAC, particularly sage-grouse. Insect populations will be monitored periodically by the Wildlife Coordinator to determine if they are present in sufficient numbers to attract wildlife. If management is deemed necessary, NPS staff can provide assistance through the use of integrated

pest management techniques. Although habitat management can help to reduce populations, the airport will continue to monitor these populations for outbreaks.

5.7.3 Trash, Debris, and Handouts

Human trash and debris often attract species such as ravens, crows, and pigeons. JAC staff will continue to perform regular airfield inspections to remove trash and foreign object debris (FOD), especially following periods of high winds.

The airport will establish and firm policies regarding wildlife feeding and prevent airport employees, tenants, and the public from feeding birds or mammals. If people are observed feeding birds, Public Safety staff will provide appropriate education and post signs to discourage such behavior. Tenants and vendors who feed wildlife or do not manage trash appropriately shall be issued warnings and receive disciplinary action for persistent violations.

5.8 Non-Lethal Control Techniques and Available Tools

As identified in **Table 4-1**, several non-lethal control devices are available for use at JAC. These non-lethal methods will be applied in accordance with protocols that are developed through coordination with NPS. Non-lethal control techniques are expected to vary as new technologies become available.

5.8.1 Auditory Frightening Techniques

Auditory frightening devices, such as audio distress/predator vocalizations, can be effective for managing avian species and some mammals. However, most wildlife will become acclimated to frightening devices if these methods are not augmented or reinforced with the use of other devices or lethal techniques.

Hazing and harassment are the primary methods used to clear wildlife from the AOA in response to the immediate safety needs of arriving and departing aircraft. However, each species will react differently to auditory stimuli. Techniques that may be used to disperse birds include the use of vehicle air horns, sirens, crackers, etc. Frightening or harassment techniques can quickly repel birds and mammals from the airfield, but the results are short term. Waterfowl usually disperse immediately. Blackbirds and starlings will usually form a tight flock and move away from the noise, but they may circle and return. Hawks usually move away from the noise but will return. Pigeons will often scatter in all directions.

Auditory harassment will be used only on an as-needed basis to address imminent hazards so as to retain their effectiveness.

5.8.2 Bioacoustics

Bioacoustics are devices that amplify distress alarm calls from relevant bird species and loud, irritating sounds, such as barking dogs. Each bird species has a distinctive distress call that it uses when it is injured or caught by a predator. Amplifying these calls will disperse some bird species, while other species will investigate the sources as a group to respond to the predatory threat.

Bioacoustics are effective only if they are used infrequently and if the source of the alarm or distress call is moved frequently so that wildlife do not become habituated to the noise. Unlike other types of auditory frightening techniques, the noise levels associated with bioacoustics are much lower. However, the bioacoustic noise can be overwhelmed by aircraft operations. Alarm calls featuring bird-in-distress or other irritating sounds are available commercially.

5.8.3 Laser Technology

Lasers can be used to frighten and disperse birds from their roosts or loafing areas. Recent tests by the National Wildlife Research Center indicate that several guilds or species of birds, including waterfowl, geese and crows, will avoid laser beams. Lasers are most effective under low-light conditions, generally between sunset and dawn, and when targeting structures or trees near roosting birds, thereby reflecting the laser beam. Habituation to lasers has not been observed. Although lasers are extremely damaging to the human eye, no damage to the avian eye has been identified because the avian eye filters most damaging radiation.

Training and extreme care are necessary when implementing laser management techniques. Lasers shall be used only by trained airport operations or NPS staff.

5.8.4 Long-Range Acoustical Devices (L-RAD)

Long Range Acoustic Devices (L-RAD) are capable of providing for the controlled delivery of bioacoustics at variable volumes in a tight beam at ranges of up to approximately 3,000 feet. This technology may be desirable because it provides for targeted management measures. In addition, L-RAD devices can be used to broadcast a wide variety of tones and variations in sound, which can prevent birds from becoming habituated to repetitive noises, such as those produced by pyrotechnic devices, and the technology is considered to be humane.

5.8.5 Nest Removal

Nest removal includes the removal of nest materials during the construction phase of the nesting season and before eggs are laid. Nest removal procedures must be performed in consultation with biologists to prevent the take of non-target species. Measures to prevent nesting would reduce the number of animals that would imprint on the airfield, and thereby reduce the number of birds that would return the following year. Nest removal at JAC would be appropriate for species, such as starlings, crows, and waterfowl, following NPS authorization.

5.9 Lethal Control

Lethal control is a necessary management measure that is used to optimize the effectiveness of non-lethal techniques. It is used sparingly to reinforce non-lethal techniques rather than replace them. The infrequent and judicious application of lethal control measures will make the aircraft operation area appear to be inhospitable as a result of human use.

The purpose of lethal control is to remove a bird or mammal that has become habituated to non-lethal techniques or to euthanize a critically injured animal. Typically, a bird or mammal that encounters an unpleasant stimulus will respond favorably by leaving the area. After repetitive exposure, however, the animal may disregard or ignore the unpleasant stimulus. When an animal has become habituated to non-lethal management measures and is determined to pose a threat to aircraft operations based on criteria such as size, species, location, and air traffic, the JAC operations staff shall request assistance from NPS staff at GRTE to either provide immediate support to assist with lethal removal or request authorization for trained operations staff to remove the animal. Following risk abatement, the JAC Operations staff will record the management action in the Wildlife Log and provide a copy of the Wildlife Log to NPS.

Although lethal management is not usually performed in national parks, Section 4.4.2 of the *2006 Management Policies* allows NPS to intervene to manage individuals or populations of native species when such intervention will not cause unacceptable impacts to the population of the species or to other components and processes of the ecosystems that support them, and when it is necessary "to maintain human safety when it is not possible to change the pattern of human activities." The proposed use of lethal management at JAC would comply with NPS policy based when it is implemented using the following criteria:

- Lethal management must *not* be performed on species that receive federal protection pursuant to the federal Endangered Species Act, such as the sage-grouse;
- Lethal management will be performed only when an individual has become habituated to non-lethal management measures or poses an imminent threat to human health and safety or aircraft operations;
- Lethal management will be performed by appropriately trained NPS staff or by Airport Operations staff following consultation with NPS staff; and
- Lethal management will likely be performed only within airport boundaries.

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Section 6 – Laws and Regulations

FAR Part 139.337(f)(3) Requirements for and, where applicable, copies of local, state, and Federal wildlife management permits.

Federal, state and local governments administer laws and regulations to protect wildlife and its habitat. Many laws affect wildlife management at airports, and the regulatory environment associated with JAC is complex based on its presence within a national park. (Refer back to Section 2 for a discussion of National Park Service [NPS] laws, regulations, and policies, and the contractual relationship between the Airport Board and NPS.)

Airport staff charged with wildlife management responsibility must understand the regulatory environment associated with wildlife management to ensure ongoing compliance with federal, state, and local laws and regulations. In general, the harassment and "taking" (lethal control) of most wildlife are regulated through a permit process overseen by federal or state agencies. However, wildlife and wildlife management actions conducted within the airport boundaries and adjacent areas of the park are governed solely by federal laws, regulations, and policies.

The Wildlife Coordinator is responsible for obtaining and maintaining (renewing) all necessary permits and authorizations required for wildlife hazard management. The Wildlife Coordinator is also responsible for making sure that any reporting requirements associated with permits or authorizations are submitted to permitting agencies in accordance with regulatory requirements.

6.1 Airport Location and Legal Framework

Although the Jackson Hole Airport is located wholly within a national park, the geographic area associated with wildlife management extends beyond the park and into off-site areas that are not regulated solely by federal laws and regulations. As discussed in Section 5.2, "Wildlife Attractants On and Near the Jackson Hole Airport" and shown in **Figure 5-1**, "Critical Zone" and **Attachment I,** "General Zone Map of the Jackson Hole Airport", FAA requires airport operators to consider the hazardous wildlife attractants within the airport boundaries, the area within 10,000 feet of AOA ("Critical Zone") and the area within 5 miles of approach departure areas ("General Zone"). The laws and regulations that would apply to a wildlife management action vary based on the location of the wildlife attractant and management action.

On-Site Wildlife Hazard Management Actions

JAC is located wholly with GRTE, and wildlife hazard management actions performed within airport boundaries must comply with federal laws, regulations and policies set forth by the National Park Service, USWFS, U.S. Army Corps of Engineers, and others federal agencies as necessary. In all cases, federal laws and regulations will pre-empt those set forth by state and local agencies.

Off-Site Wildlife Hazard Management Actions

If a wildlife attractant or proposed management action were associated with an off-site location within GRTE or the National Elk Refuge, the action would be subject only to federal laws, regulations and policies. However, if a proposed wildlife attractant or a proposed management action occurs outside of federal lands, the management action will be subject to State of Wyoming wildlife management laws, regulations, and policies as well as applicable local laws, regulations, and policies.

6.2 FAA Advisory Circulars and Certalerts

The FAA is the federal agency responsible for developing and enforcing air transportation safety regulations. Many Federal Aviation Regulations (FARs) are codified in Title 14 of the Code of Federal Regulations (14 CFR). Regulations associated with wildlife management are codified at 14 CFR Part 139.337, "Wildlife Hazard Management." The FAA also publishes a series of guidelines for airport operators to follow called Advisory Circulars (ACs), several of which are referenced in the WHMP. The ACs in FAAs 150 series address airport safety issues, including wildlife hazards.

In addition to FARs and ACs, the FAA periodically issues certalerts for internal distribution and to provide recommendations pertaining to specific issues for inspectors and airport personnel. FAA regulations, ACs, and Certalerts are frequently updated, and their current status should be verified on a regular basis. All ACs and certalerts are available on the FAA website (www.faa.gov).

6.3 Federal Wildlife Regulations

In addition to the Organic Act of 1916 and NPS regulations and policies (see Chapter 2), several federal laws and their implementing regulations apply to wildlife management on and near JAC. Such laws include, but are not limited to the following:

- Migratory Bird Treaty Act (MBTA),
- Lacey Act,
- Endangered Species Act of 1973, as amended
- Eagle Protection Act,
- Clean Water Act,
- Federal Insecticide, Fungicide, and Rodenticide Act, and
- National Environmental Policy Act of 1969 (NEPA) (see **Section 2**)

Federal wildlife laws pertaining to wildlife are typically administered by the USFWS, many of which are associated with migratory birds and federally listed threatened and endangered species.

6.4 State and Local Wildlife Laws and Regulations

Several Wyoming State agencies have regulations that affect wildlife management at airports. Since JAC and a large portion of the adjacent land are located within GRTE, the following statues and regulations apply only to wildlife attractants and associated management actions that would occur outside of the park or other federal lands.

- *Wyoming Statute 23-1-302(a)(viii)* authorizes the chief game warden or his designee to kill any wildlife in Wyoming when, in the judgment of the commission, the killing is necessary or when the animals or birds cause substantial damage to property. The animals or birds so killed may be sold or otherwise disposed of within Wyoming.

- *Wyoming Game and Fish Commission Chapter 52 and 56* Regulations govern the lethal taking of big game or trophy game animals, game birds and nongame wildlife. The taking of wildlife is authorized when a determination is made by Department personnel that the taking is necessary because there exists a threat to human life, health, or safety.

State wildlife laws governing resident birds, mammals, reptiles, and amphibians, as well as State-listed threatened and endangered species generally are administered by the Wyoming Game and Fish Department. Pesticide use is regulated by the Wyoming Department of Agriculture.

6.5 Wildlife Categories

Federal regulations (CFR Title 50) and Wyoming Statutes 23-1-101 and 11-5-102 define categories of wildlife and regulations associated with their management. For the purposes of this document, feral and free-ranging dogs, cats, and other domestic animals are considered "wildlife" because of the hazards they may pose to aircraft operations, but their management is defined by local laws. The wildlife categories presented in **Table 6-1** include migratory and resident, game and non-game, and threatened and endangered species. Wildlife management personnel must know the category associated with a species requiring management and the location of the management action to determine compliance requirements.

As previously discussed the location of wildlife or a wildlife attractant and location where the management action will be conducted will determine compliance requirements. Wildlife management actions that occur on federal land must comply with federal laws and permit regulations, whereas management actions that occur on non-federal land must comply with federal, state, and local laws and regulations.

Table 6-1. Wildlife Categories and Necessary Permits for Their Management

Category	Species	State Permit Required[2]	State Permit Obtained[2]	Federal Permit Required	Federal Permit Obtained
Game Birds	Quail, pheasant, grouse, partridge, ptarmigan, wild turkey, and migratory game birds	Yes	No	No	N/A
Predacious Birds	Starling, house sparrow,	No	N/A	No	N/A
Migratory Game Birds	Ducks and geese, migratory game birds protected under federal law	Yes	N/A	Yes	No

Table 6-1. Wildlife Categories and Necessary Permits for Their Management

Category	Species	State Permit Required[2]	State Permit Obtained[2]	Federal Permit Required	Federal Permit Obtained
Nongame Birds	Songbirds, raptors, etc. and migratory birds protected under federal law	Yes	N/A	Yes	No
Depredation Order Birds(3)	Crows, magpies, blackbirds, and cowbirds	No	N/A	No	N/A
Domestic Birds	Poultry, ducks and geese	No	N/A	No	N/A
Big Game Animals(2)	Deer, moose, elk, bighorn sheep, antelope, and mountain goat	Yes	No	No	N/A
Trophy Game Animals(2)	Black Bear, grizzly bear, mountain lion, and gray wolf	Yes	No	No	N/A
Small Game Animals	Cottontail rabbit, snowshoe hare, gray fox, grey and red squirrels	Yes	No	No	N/A
Furbearers(2)	Beaver, bobcat, , pine martin, badger, mink, muskrat, and weasels	Yes	No	No	N/A
Predatory Animal	Coyote, jackrabbit, porcupine, red fox, skunk, and stray cat	No	N/A	No	N/A
Nongame Animals	Marmot, pocket gopher, and ground squirrels	No	N/A	No	N/A
Feral and Domestic Animals	Dogs and livestock	No - Call local animal control, Jackson Police Department	N/A	No	N/A
Nongame Reptiles and Amphibians	All reptiles and amphibians except those listed as threatened or endangered (see **Table 6-2**)	Yes	No	No	N/A

Table 6-1. Wildlife Categories and Necessary Permits for Their Management					
Category	**Species**	**State Permit Required[2]**	**State Permit Obtained[2]**	**Federal Permit Required**	**Federal Permit Obtained**
Federally Protected Wildlife[(4)]	Threatened and Endangered and species (see **Table 6-2**)	Yes	No	Yes	No

[1] All nongame birds in Wyoming are protected under the federal Migratory Bird Treaty Act, with the exception of the non-native Rock Pigeon, Eurasian Collared-Dove, European Starling, and House Sparrow.
[2] State permit requirements do not apply to management actions performed on federal lands. Management actions requiring a state permit should be coordinated through the local WGFD-wildlife management personnel.
[3] May be taken without permits "when concentrated in such numbers and manner as to constitute a health hazard or other nuisance" (50 CFR §21.43).
[4] Persons may take threatened or endangered wildlife in defense of their life or the life of others.

6.6 General Regulations for Wildlife Management

Since JAC is located wholly within a national park, wildlife management will be performed through careful coordination with the National Park Services (NPS) staff at Grand Teton National Park (GRTE) and in accordance with NPS laws, regulations and policies. Although the NPS does not usually support lethal management and the use of firearms is prohibited in national parks, NPS policy allows lethal control in some cases (see **Section 2.2**). If lethal management measure is necessary within the airport boundary or adjacent GRTE property, it will be performed by trained NPS staff in accordance with appropriate federal laws and permit authorizations or by trained JAC staff with authorization from NPS staff at GRTE.

In the event that lethal management is necessary in off-site (off-airport) areas that do not occur on federal property, the actions must be performed by authorized persons in compliance with state laws, regulations and permit authorizations.

6.6.1 Birds

Game Birds

Game birds (e.g., wild turkey, quail, etc.) are non-migratory species. Although game birds are not managed by the Migratory Bird Treaty Act (MBTA) and no federal permit is required for take, they are protected by state law and a state permit is required if they are taken outside of GRTE or other federal land.

Predacious Birds

The State of Wyoming has classified the European starling and the house sparrow as predacious birds. Both are exotic species introduced to the U.S. They are not protected by state or federal laws, and there are no permit requirements associated with lethal control.

Migratory Game Birds

Migratory game birds (e.g., wild ducks and geese, coots, gallinules, snipe, and mourning doves, etc.) are regulated under federal law by the USFWS through regulations contained within the MBTA. The regulations permit the harassment of migratory birds when the birds are damaging to property or pose a safety concern, but a Migratory Bird Depredation Permit (MBDP) is required for lethal control. MBDPs are not valid for eagles or for threatened and endangered species, which require separate permits for harassment and lethal control.

If lethal management of migratory game birds is performed outside of GRTE or other federal land within the critical zone or general zone, the State of Wyoming will require the Airport to obtain an additional permit (Chapter 56) for migratory game birds that are already regulated under federal law.

Migratory Bird Depredation Permit. If lethal management of federally protected migratory birds is determined to be necessary to protect the traveling public at JAC, the Wildlife Coordinator will be responsible for obtaining a Migratory Bird Depredation Permit from the USFWS. The Wildlife Coordinator will be responsible for preparing a Federal Fish and Wildlife Permit Application Form (Form 3-200). The USFWS will require the applicant to obtain a Migratory Bird Damage Project Form (WS Form 37) prepared by USDA Wildlife Services to accompany the permit application. If the management action will occur outside of GRTE or other federal land, the Wyoming Game and Fish Department will also require a depredation permit from the State. If the depredation is to occur within airport boundaries or adjacent park land, the Wildlife Coordinator would only proceed with permit applications following consultation with NPS, as lethal control is not usually permitted by NPS.

Reporting Management Actions to USFWS and WFGD. The Wildlife Coordinator will be responsible for applying for and renewing the permits annually. The Wildlife Coordinator will submit a report to the USFWS within 10 days of the expiration date to identify the species and number of animals taken under the permit.

If depredation permits are obtained for management actions at JAC or adjacent federal land, the Airport will receive a MBDP annual report form from USFWS each year. The Wildlife Coordinator must prepare and submit a report of all birds taken and request permit alterations to USDA-WS to fulfill the requirements of the federal permit. USDA-WS will complete a Migratory Bird Damage Report and forward it with JAC's annual report to the USFWS. This report could be generated from a computerized database containing all wildlife management actions on JAC. If a state-permit is held, the JAC Wildlife Coordinator must provide the WGFD with an annual report detailing the prior calendar year's take of permitted birds and mammals and request alterations and renewal. The specific guidance to apply for and use a MBDP is presented within CFR 50 Part 21.41 and presented in **Figure 6-1**, Management of Depredating Birds.

MANAGEMENT OF DEPREDATING BIRDS

Permit requirement. Except as provided in 21.42 through 21.46, a depredation permit is required before any person may take, possess, or transport migratory birds for depredation control purposes. No permit is required merely to scare or herd depredating migratory birds other than endangered or threatened species or bald or golden eagles.

(b) ***Application procedures.*** Submit application for depredation permits to the appropriate Regional Director (Attention: Migratory bird permit office). You can find addresses for the Regional Directors in 50 CFR 2.2. Each application must contain the general information and certification required in §13.12(a) of this subchapter, and the following additional information:

(1) A description of the area depredations are occurring;
(2) The nature of the crops or other interests being injured;
(3) The extent of such injury; and
(4) The particular species of migratory birds committing the injury.

(c) ***Additional permit conditions.*** In addition to the general conditions set forth in Part 13 of this Subchapter B, depredation permits shall be subject to the following conditions:
(1) Permittees may not kill migratory birds unless specifically authorized on the permit.
(2) Unless otherwise specifically authorized, when permittees are authorized to kill migratory birds they may do so only with a shotgun not larger than No. 10 gauge fired from the shoulder, and only on or over the threatened area or area described on the permit.
(3) Permittees may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice birds within gun range.
(4) All migratory birds killed shall be retrieved by the permittee and turned over to a Bureau representative or his designee for disposition to charitable or worthy institutions for use as food, or otherwise disposed of as provided by law. (Note: permits typically authorize on-site burial of birds.)
(5) Only persons named on the permit are authorized to act as agents of the permittee under authority of the permit.

(d) **Tenure of permits.** The tenure of depredation permits shall be limited to the dates which appear on its face, but in no case shall be longer than one year.

Figure 6-1. Management of Depredating Birds

Nongame Birds

Nongame birds (e.g., hawks, ravens, larks, etc.) are protected by USFWS under federal law through the regulations contained within the MBTA. These regulations allow the harassment of migratory birds when the birds are damaging property, but a permit is required for lethal take. MBDPs are not valid for eagles, and threatened and endangered species, which require separate permits for harassment.

If lethal control of non-game birds is determined to be necessary, the Airport will be required to obtain a permit. If the management action will occur outside of GRTE or other federal land, the Wyoming Game and Fish Department will also require the Airport to obtain an additional permit (Chapter 56) for migratory birds that are already regulated under Federal law.

Depredation Order Birds

Depredation order birds (crows, magpies, grackles, blackbirds and cowbirds) are protected under the MBTA but may be taken when they are concentrated in such numbers and manner as to constitute a health hazard or other nuisance (see **Figure 6-2**). Under the Depredation Order (50 CFR § 21.43), no federal permit is required to control these species if they are committing or about to commit depredations on ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner that they are a health hazard or other nuisance. The state of Wyoming recognizes the federal regulations and does not require a state permit under these conditions.

DEPREDATION ORDER FOR BLACKBIRDS, COWBIRDS, GRACKLES, CROWS AND MAGPIES

A Federal permit shall not be required to control yellow-headed, red-winged, and Brewer's blackbirds, bronzed, brown-headed and shiny cowbirds, American, fish and northwestern crows, boat-tailed, common, great-tailed and greater Antillean grackles and black-billed and yellow-billed magpies, when concentrated in such numbers and manner as to constitute a health hazard or other nuisance: ***Provided***

(a) You must attempt to control depredation by species listed under this depredation order using non-lethal methods before you may use lethal control.

(b) In most cases, if you use a firearm to kill migratory birds under the provisions of this section, you must use nontoxic shot or nontoxic bullets to do so. See §20.21(j) of this chapter for a listing of approved nontoxic shot types. However, this prohibition does not apply if you use an air rifle, an air pistol, or a 22 caliber rimfire firearm for control of depredating birds under this order.

(c) If you exercise any of the privileges granted by this section, you must allow any Federal, State, tribal, or territorial wildlife law enforcement officer unrestricted access at all reasonable times (including during actual operations) over the premises on which you are conducting the control. You must furnish the officer whatever information he or she may require about your control operations.

(d) You may kill birds under this order only in a way that complies with all State, tribal, or territorial laws or regulations. You must have any State, tribal, or territorial permit required to conduct the activity.

(e) You may not sell, or offer to sell, any bird, or any part thereof, killed under this section, but you may possess, transport, and otherwise dispose of the bird or its parts.

(f) Any person or agency acting under this depredation order must provide to the appropriate Regional Migratory Bird Permit Office an annual report for each species taken. You can find the addresses for the Regional Migratory Bird Permit Offices in §2.2 of subchapter A of this chapter. You must submit your report by January 31st of the following year, and you must include the following information:
(1) Your name, address, phone number, and e-mail address;
(2) The species and number of birds taken;
(3) The months in which the birds were taken;
(4) The State(s) and county(s) in which the birds were taken; and
(5) The general purpose for which the birds were taken (such as for protection of agriculture, human health and safety, property, or natural resources).

(g) The Office of Management and Budget has approved the information collection requirements associated with this depredation order and assigned OMB Control No. 1018–0146. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number. You may send comments on the information collection requirements to the Service's Information Collection Clearance Officer, U.S. Fish and Wildlife Service, MS 222–ARLSQ, 1849 C Street, NW. Washington, DC 20240.

Figure 6-2. Depredation Order for Blackbirds, Cowbirds, Grackles, Crows and Magpies) (CFR 50 Part 21.43)

Domestic Birds

Currently state and federal laws do not regulate these species (domestic ducks, domestic geese, domestic poultry, etc.) and no permit is required to take them. Domestic waterfowl may become a problem if they are abandoned or live on or nearby airport property. Domestic waterfowl can attract wild waterfowl into critical areas and across JAC flight paths.

If domestic/feral birds or attractants for such species are identified on nearby property located outside of GRTE or other federal land and pose risk to aviation safety, the Wildlife Coordinator will initiate discussions with the property owners to formulate plans to manage, locate or remove the hazardous wildlife and/or attractants. Only wildlife management personnel trained to distinguish

between domestic and wild waterfowl shall manage or remove these species. If other species of feral poultry or exotic birds are observed within the critical zone at JAC, the Wildlife Coordinator should be contacted for assistance with management methods.

Moose in road adjacent to JAC terminal area

6.6.2 Mammals

Big Game and Trophy Animals

Big game and trophy game animals are defined primarily as those species that are hunted for sport, recreation, or food. Deer, elk and moose are found in relatively high numbers adjacent to the AOA, and such animals can pose critical threats to aviation safety when they gain access to the AOA.

The Wildlife Coordinator and airport staff will make every effort to prevent big game and trophy game animals from entering the airport operations area or public areas. For example, bears are often drawn to urban areas when natural food resources are reduced and opportunity exists near humans. Wildlife-resistant refuse receptacles and good housekeeping protocols, such as preventing the feeding of birds and/or wild/feral animals and providing for the proper storage of cooking oils and outdoor grills, will be implemented and monitored on airport property by the Wildlife Coordinator. The perimeter fence was constructed with gate openings that can be used to facilitate the release of large animals. Should a large game animal gain access to areas within the perimeter fence, trained airport staff or NPS staff will seek to persuade the animal to exit the airport perimeter in accordance with an accepted protocol.

Big game and trophy game animals can pose danger to the public when they enter public areas outside of the AOA. Moose are found frequently in areas where airport users might have their attention diverted to travel preparations and not expect to encounter wildlife. When this occurs, Public Safety staff should watch the animal and alert airport users of alternative ways to get to the terminal. They should attempt to persuade the animal east (by vehicle) out of the public use area.

If large game animals that pose hazards are identified in portions of the critical area outside of GRTE or other federal lands, the Wildlife Coordinator will be responsible for procuring a permit from WGFD to perform lethal control.

Small Game Animals

Small Game animals are defined primarily as those species that are hunted for sport, recreation, or meat (rabbits and tree squirrels). None of these were observed during the WHA surveys. Although these animals do not currently pose a direct hazard to aircraft operations, they are known to attract predators (e.g., coyotes, foxes, hawks, etc.) and may merit management efforts if populations were to increase. If small mammals require management, NPS staff will be consulted to assist with the development of a plan to abate or remove small game animals.

Furbearers

Few furbearers are likely to require management at JAC. However, relocation efforts may be required if such animals were identified to pose a hazard to aircraft operations. In such instances, NPS staff will be consulted to assist with a plan to abate or trap and relocate the animal outside of the Critical Zone.

Predatory Animals

The state of Wyoming has classified the coyote, jackrabbit, porcupine, red fox, skunk, and stray cat, and raccoon as Predatory Animals, and neither a federal nor state permit is required to lethally remove any of these species in Wyoming. If predatory animals require management within the airport boundary or on adjacent park land, NPS staff will be consulted to assist with the development of a plan to abate or remove animals.

Nongame Animals

Several species of nongame animals (pocket gopher and ground squirrel) are present at JAC and may need to be managed as described in **Section 5.7.1**. Permits are not required to take (trap or shoot) these species when they damage or could damage property. If nongame animals require management within the airport boundaries or on adjacent park lands, NPS staff will be consulted to assist with the development of a plan to abate or remove animals.

Feral and Domestic Animals

Dogs were observed during WHA surveys, and it is likely that the residential area west of the airport is the source of these animals. If feral or domestic animals pose a risk by entering the AOA, the Teton County Sheriff's Office will be contacted for assistance. (See **Section 11** for contact information.)

6.7 Protected Wildlife

Federal Threatened, Endangered, and Candidate Species

The Federal Endangered Species Act (Sec. 2 [16 U.S.C. 1531]) and WGFD Wildlife Regulations both protect animal and plant species potentially threatened with extinction. These acts classify species as endangered or threatened. An "Endangered Species" is defined as "any species or subspecies that is in danger of extinction throughout all or a significant portion of its range." A "Threatened Species" is defined as "any species or subspecies that is in danger of becoming an endangered species within the foreseeable future throughout or over a significant portion of its range."

A listed threatened or endangered species—whether it is located on federal or non-federal lands--cannot be harassed without a permit from USFWS. Candidate species, such as the sage-grouse, must be treated the same way as a listed species, and any actions due to the implementation of recommendations listed in this document that effect an endangered, threatened or candidate species

will require consultation with the USFWS pursuant to Section 7 of the Endangered Species Act of 1973, as amended.

State Species of Greatest Conservation Need

Wyoming's Species of Greatest Conservation Need (SGCN) are species whose conservation status warrants increased management attention, and funding, as well as consideration in conservation, land use, and development planning. Currently, 180 SGCN have been identified in Wyoming - a complete list is located in **Attachment O**. If a SGCN is identified in an area of the critical zone that is not within GRTE or other federal property, efforts to manage that species to reduce hazards to aviation must be performed through coordination and potential authorization from WGFD. If the species is located on GRTE or other federal land and is neither on the federal list nor a candidate for the federal list, authorization with WGFD is not required.

Table 6-2 identifies protected species for which federal or state authorizations may be required. Few are known to be present or pass through the Jackson Hole Area. If a significant hazard exists with a listed species that jeopardizes air safety, either the USFWS or the WGFD, depending on the protective status of the species involved, should be contacted for assistance. In many cases only personnel from these or other agencies may obtain a permit to take individuals of a specially protected species.

Table 6-2. Endangered, Threatened, Candidate and Protected Species in Wyoming

Common Name	Scientific Name	Status*
BIRDS		
Whooping Crane	*Grus americana*	FE
Least Tern	*Sterna antillarum*	FE
Piping Plover	*Charadrius melodus circumcinctus*	FT
Yellow-billed Cuckoo	*Coccyzus americanus*	FC
Greater Sage-grouse	*Centrocercus urophasianus*	FC
MAMMALS		
Black-Footed Ferret	*Mustela nigripes*	FE
Grizzly Bear	*Ursus arctos*	FT
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	FT
Lynx	*Lynx canadensis*	FT
Wolverine	*Gulo gulo*	FC
*Status Codes: FE = Federally Endangered FT = Federally Threatened FC= Federally Candidate		

6.7.1 Eagle Permits

Eagles are protected under the Bald and Golden Eagle Protection Act, and a specific permit is required to conduct harassment (see **Figure 6-3**). (Eagles are not covered under the Migratory Bird Permit.) If an eagle is observed to pose a threat on or near JAC, the Wildlife Coordinator will be required to obtain a federal permit to harass a bald or golden eagle. Eagles were not observed on JAC property during the course of the WHA survey period or known to use JAC property for nesting. Habitat manipulation to create unfavorable conditions for other identified species of wildlife will not affect eagles.

EAGLE PERMITS - Permits to take depredating eagles.
The Director may, upon receipt of an application and in accordance with the issuance criteria of this section, issue a permit authorizing the taking of depredating bald or golden eagles.

(a) You must submit applications for permits under this section to the appropriate Regional Director—Attention: Migratory Bird Permit Office. You can find addresses for the appropriate Regional Directors in 50 CFR 2.2. Your application must contain the information and certification required by §13.12(a) of this subchapter, and the following additional information:
(1) Species and number of eagles proposed to be taken;

(2) Location and description of property where taking is proposed;

(3) Inclusive dates for which permit is requested;

(4) Method of taking proposed;

(5) Kind and number of livestock or domestic animals owned by applicant, if applicable;

(6) Kind and amount of alleged damage, or description of the risk posed to human health and safety or eagles; and

(7) Name, address, age, and business relationship with applicant of any person the applicant proposes to act for him as his agent in the taking of such eagles.

(b) In addition to the general conditions set forth in part 13 of this subchapter B, permits to take bald or golden eagles under this section are subject to the following conditions:
(1) Bald or golden eagles may be taken under permit by firearms, traps, or other suitable means except by poison or from aircraft;

(2) The taking of eagles under permit may be done only by the permittee or his agents named in the permit;

(3) Any eagle taken under authority of such permit will be promptly turned over to a Service agent or other game law enforcement officer designated in the permit; and

(4) In addition to any reporting requirement on a permit, you must submit a report of activities conducted under the permit to the appropriate Regional Director—Attention: Migratory Bird Permit Office within 10 days following completion of the taking operations or the expiration of the permit, whichever occurs first.

(c) *Issuance criteria.* The Director will not issue a permit to take bald or golden eagles unless the Director has determined that such taking is compatible with the preservation of the bald or golden eagle. In making such determination, the Director will consider the following:
(1) The direct or indirect effect which issuing such permit would be likely to have upon the wild population of bald or golden eagles;

(2) Whether evidence shows that bald or golden eagles have in fact become seriously injurious to wildlife or to agriculture or other interests in the particular locality to be covered by the permit and the injury complained of is substantial, or that bald or golden eagles pose a significant risk to human or eagle health and safety; and

(3) Whether the only way to abate or prevent the damage caused by the bald or golden eagle is to take some or all of the offending birds.

(d) *Tenure of permits.* The tenure of any permit to take bald or golden eagles under this section is that shown on the face of the permit. We will not issue these permits for terms longer than 90 days, except that permits to authorize disturbance associated with hazing eagles from the vicinity may be valid for up to 5 years. We may amend, suspend, or revoke permits issued for a period of longer than 90 days if new information indicates that revised permit conditions are necessary, or that suspension or revocation is necessary, to safeguard local or regional eagle populations.

Figure 6-3. Eagle Permits (CFR 50 Part 22.23)

6.7.2 Habitat Conservation

USFWS and WGFD are responsible for species conservation and recovery plans. These plans require the identification of critical habitat when it is associated with the decline of a species. Habitat alteration and development may be prohibited in areas where critical habitat has been designated or where such changes could result in the inadvertent take of an endangered species. Consultation with USFWS or WGFD biologists will be performed on a case-by-case basis to determine whether critical habitat would be affected by proposed airport projects, and if so, to perform the necessary mitigation in a manner that does not increase hazards to aircraft operations.

Of the 64 wildlife strikes recorded in the FAA database for JAC, 32 involved the Greater sage-grouse (*Centrocercus urophasianus*), which is a candidate species for protection under the United States Endangered Species Act of 1973 and a candidate for state protection. A primary goal of the WHMP is to identify a strategy that will reduce hazards to both aircraft operations and this candidate species. To do so, the Wildlife Hazard Management Plan seeks to increase the separation between aircraft and the sage-grouse through the creation of off-site brood-rearing habitat and the development or restoration of lek sites on previously disturbed national park land. (Refer to **Attachment A**, Greater Sage-Grouse Habitat Restoration Plan in Support of a Wildlife Hazard Management Plan for the Jackson Hole Airport.) The goal of the restoration plan is to provide attractive habitat and lek areas that will draw sage-grouse to more distant areas of GRTE that are outside of the airport boundaries. The plan does not seek to relocate the historic airport lek that is located in the Runway 19 Runway Safety Area or physically relocate sage-grouse.

In accordance with NPS *Management Policies 2006*, the focus of natural resource conservation in all National Park units will be at an ecosystem level, emphasizing natural abundance, diversity, and genetic and ecological integrity of native species in an ecosystem. NPS will not usually intervene in natural biological or physical processes unless the ecosystem's ability to function has been disrupted by human activities or when park-specific legislation authorizes particular activities. NPS policies provide for the intervention of natural biological processes to protect property when it is not possible to change the pattern of human activities or to maintain human safety when it is not possible to change the pattern of human activities.

The restoration of brood-rearing and lek sites in GRTE is consistent with NPS policies. Similar to the efforts undertaken by NPS and USFWS in the recent *Bison and Elk Management Plan*, the proposed sage-grouse habitat restoration efforts will focus on the restoration of previously disturbed areas, such as former agricultural areas, that are in close proximity to existing sage-grouse habitat.

6.7.3 Avoiding Impacts to Threatened and Endangered Species

The purpose of a WHMP is to prevent conflicts between aircraft and wildlife. To do so, the WHMP identifies specific management measures to reduce the risks posed to wildlife, aircraft operations, and the traveling public. Additional measures are required to protect threatened and endangered species as well as candidate species, which are offered the same consideration.

Collisions between wildlife and aircraft nearly always result in the death of the wildlife, and such conflicts can pose serious threats to the traveling public. Consequently, potential habitat on and near the airfield will be altered to the extent possible and in accordance with NPS laws and policies

to prevent conflicts between aircraft and wildlife. The management actions identified in the WHMP include the most appropriate, effective, and biologically sound wildlife management methods available and include general measures, such as "good-housekeeping measures", habitat modification measures, harassment, and population control measures for hazardous species. This approach is known as Integrated Wildlife Damage Management.

Habitat management provides the best long-term approach for reducing wildlife attractants on an airfield. Habitat management measures are discussed in **Section 5** of the WHMP. Direct control efforts generally provide a more immediate response to hazardous situations, but the desired effects are often not as long lasting. Wildlife management and dispersal procedures employed at JAC are discussed in **Section 7**.

Near-term and Long-term Management Measures for the Sage-grouse

The presence of the sage-grouse within the runway safety area and AOA poses hazards to aircraft, and a long-term plan was developed to increase the separation between aircraft and the sage-grouse through the restoration of nearby, off-site (off-airport) brood-rearing habitats and lek sites. Near-term management measures include habitat modification measures that will provide for improved habitat at incrementally greater distances from air movement areas.

The incremental habitat modification measures presented in Attachment A are intended to be protective of the greater sage-grouse and acknowledge its status as a candidate species for federal and state protection. Efforts to disperse sage-grouse on a routine or daily basis from air movement areas include flushing the birds from aircraft movement areas using vehicles. The vehicles are not permitted to exit paved areas, and the use of harassment measures involving screamers, bangers, and pyrotechnic devices is not permitted for use on the sage-grouse. All measures to disperse sage-grouse will be performed using the techniques identified an approved hazing plan.

6.7.4 Pesticide Applicator License

If the use of a pesticide is necessary as part of an integrated pest-management program, the selection of a pesticide and its application shall be determined through careful coordination with NPS Staff at GRTE. Unless expressly authorized by NPS, pesticides shall be applied only by an appropriately trained vendor.

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Section 7 – Wildlife Management Procedures

FAR Part 139.337(f)(5)	***Procedures to be followed during air carrier operations including at least... FAR Part 139.337(f)(5)(i) Assignment of personnel responsibilities for implementing the procedures;*** *(Personnel responsibilities are described and delineated in* **Section 3**.)
FAR Part 139.337(e)(5)(ii)	***Conduct of Physical inspections of the movement areas and other areas critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective;***
FAR Part 139.337(e)(5)(iii)	***Wildlife control measures;***
FAR Part 139.337(e)(5)(iv)	***Communication between wildlife control personnel and any air traffic control tower in operation at the airport;***

Wildlife Hazard Management is performed daily through routine inspections and the implementation of the integrated wildlife hazard management approach described in **Section 5**. **Section 7** provides an overview of the routine, daily inspection and wildlife management measures that must be conducted at JAC, a protocol of responding to imminent hazards, and reporting and analysis requirements. Supporting materials, such as wildlife logs and forms are presented as appendices to this document.

7.1 Wildlife Inspections

7.1.1 Routine Wildlife Inspections

Airport staff including the Airport Project Manager, Director of Security, Fire Chief and Public Safety staff shall monitor and respond to wildlife hazards on the airfield daily. NPS staff also may be called upon to perform wildlife management as necessary. All staff responsible for performing wildlife management actions, including NPS staff, must be trained in airport-specific protocols including wildlife hazard identification, proper management techniques, radio communication, driving within the AOA, and other procedures as outlined in **Section 9** of the WHMP.

All wildlife inspection, management and response actions must be coordinated through the Director of Operations. Clear communications with other Operations staff and the ATCT must be maintained in accordance with FAA radio protocols. All personnel with wildlife management responsibilities should be equipped with radios to contact the ATCT and Operations. Staff who perform wildlife inspections shall use a radio-equipped vehicle and adequate wildlife management supplies (see **Tables 4-1 and 4-2**).

The Airport's Public Safety staff shall inspect aircraft movement areas daily to identify the presence of potentially hazardous wildlife. Additional inspections of the AOA shall be performed by the Airport Project Manager, Director of Security, and Fire Chief. During periods of exceptionally heavy wildlife activity (e.g., sage-grouse breeding and brood-rearing periods), the Director of Operations shall issue a Notice to Airmen (NOTAM) to alert them to the presence of sage-grouse on and near aircraft movement areas.

Each inspection, even those during which no wildlife is observed, shall be documented on the Wildlife Log (**Attachment H**). To provide for a complete record, inspections in which no animals are observed must also be documented in the Airport Daily Log (**Attachment H**). A copy of the Airport Daily Log and the Wildlife Log shall be maintained in the Public Safety Office.

Although the ATCT cannot monitor all wildlife hazards on the airfield while directing air traffic, tower personnel should notify the Airport Operations staff immediately if pilots report hazards or any such hazards are observed from the tower.

7.1.2 Routine Wildlife Hazard Management Measures

Risk factors associated with wildlife will vary based on the species, its location relative to aircraft movement areas, behavior, and number. If a wildlife hazard is determined to exist based on the presence of one or more risk factors, the observer or inspector must take action immediately to reduce or eliminate the hazard.

As mentioned in **Section 5**, the WHMP includes an integrated wildlife management strategy that includes numerous tools and methods for dispersing and managing wildlife. The methods used to reduce the hazard(s) will become increasingly aggressive and used in combination with one another until the wildlife responds favorably or the hazard is abated. In those cases where an animal does not respond to abatement or the hazard increases, lethal removal may be necessary in accordance with NPS policies. Prior to lethal removal staff will make positive identification and ensure that a proper permit has been retained as listed in **Table 6-1**.

Concurrent with the immediate action is a long-term management approach required to resolve reoccurring problems. This long-term approach is composed primarily of managing people (e.g., training, public education, reviewing proposed construction plans) as described in **Section 3**, and managing habitat/prey (e.g., modify vegetation, exclude/remove attractants) as described in **Section 5**. If the frequency of hazardous situations and/or the risks to aviation increase, the WHMP must be revised to include and implement more aggressive actions.

7.2 Responding to Imminent Hazards

If a hazard is observed that might compromise the immediate safety of air traffic, the Airport Operations staff (wildlife inspection staff) should coordinate with the ATCT, and if necessary, detain arriving or departing air traffic until the hazard is eliminated. In extreme cases, the runway may need to be closed temporarily at the discretion of the on-duty Public Safety staff. The Wildlife Hazard Decision Model (**Figure 7-1**) describes the process staff will use when responding to wildlife risks at JAC.

Figure 7-1. Wildlife Hazard Decision Model

Trained airport personnel that encounter a wildlife hazard will use the Wildlife Hazard Decision Model in consultation with NPS to determine the appropriate damage management method(s) to implement based on several factors:

1) Species responsible,
2) Magnitude, geographic extent, frequency, historical damage and duration of the problem
3) Status of target and non-target species
4) Environmental conditions
5) Potential biological, physical, economic, and social impacts
6) Potential legal restrictions and
7) Costs of damage management options

Airport and NPS staff will assess the risk and evaluate the appropriateness of strategies. Hazardous abatement methods must be evaluated for their availability (legal and administrative) and suitability based on biological, economic and social considerations. For example, the use of pyrotechnics would be inappropriate in an area vulnerable to wildfire. After a management strategy has been implemented, monitoring must be conducted and the evaluation must continue to assess the effectiveness of the strategy. Most wildlife hazard management efforts consist of a continuous feedback loop between receiving a management request, monitoring the strategy results, re-evaluating, and revising the strategy as necessary.

Personnel will give first preference to nonlethal methods. They will also consider the costs associated with implementing a particular method(s), but also consider other factors based on social values (selectivity and humaneness), legal factors, the species involved, etc. The goal of the wildlife hazard management program is not necessarily to conduct a program that is as cost effective as

possible but rather to conduct a biologically sound, environmentally safe, and responsive risk management program in an incremental and adaptive manner.

Wildlife management activities, either hazing or lethal, can potentially create a temporarily increased hazard (e.g. flocks departing after management efforts) from the wildlife until it is moved/removed from the airfield. Therefore, wildlife management activities must take into account arriving/departing aircraft.

7.3 Wildlife Reporting and Analysis

All wildlife hazard management observations and management measures must be reported on the Wildlife Log. All wildlife strikes must be reported in FAA's wildlife strike database.

7.3.1 Wildlife Log

Staff shall report all observations of wildlife activity on the Wildlife Log (**Attachment H**). Completed forms will be maintained and kept in the Public Safety Office for frequent review. Routine runway sweeps should be conducted at least twice per day and recorded on the Airport Daily Log (**Attachment H**).

Other wildlife-related activities (e.g., notable hazards, animals dispersed, unusual wildlife behavior, etc.) should be documented on the Wildlife Log. The data recorded in the Wildlife Log will be reviewed at least annually to determine the effectiveness of wildlife hazard management measures. (See **Section 8.3** for more discussion.)

7.3.2 FAA Wildlife Strike Database

The FAA has maintained a wildlife strike database since 1990, which includes records for more than 140,000 wildlife strikes at airports nationwide. Although FAA does not mandate that airports record wildlife strikes, NPS requires that all strikes associated with JAC be reported. The Wildlife Coordinator shall make every effort to make sure that evidence of wildlife strikes associated with JAC are recorded in FAA's wildlife strike database.

To record a wildlife strike, personnel involved in wildlife management shall perform the following:

- Access the database online at: http://wildlife.faa.gov/strikenew.aspx
- The database contains up to 94 fields for data entry. It is not necessary to complete each field, but it is important to complete as many fields as possible.
- Following data entry, click "Submit Strike Report" and record the strike confirmation number.
- On the confirmation page, click the link and print a copy of the report.
- Provide the hard copy of the report to the Wildlife Coordinator for filing with the Wildlife Strike Log.
- If wildlife remains are collected, submit them for analysis so that the strike report can be amended to include species information.

Additional guidance for recording wildlife strikes is presented in Attachment G.

7.4 Discovery and Documentation of Animal Remains

All animal remains found on or within 250 feet of runways and taxiways will be considered the result of a wildlife strike unless the death was obviously due to some other cause. Any unidentifiable bird remains that are found should be placed in a sealed zip-lock bag and labeled (e.g., time and date found, location on runway, the name of person who discovered the remains, etc.).

The presence of any dead animals found from strikes or suspected strikes shall be recorded on Form E5200-7 (**Attachment G**). Airport staff or NPS staff responsible for wildlife management must prepare a strike report as soon as remains are discovered and submit the hard copy of the strike report to the Director of Operations/Wildlife Coordinator so that the situation can be assessed.

Animal remains must be submitted for analysis immediately following discovery. The remains shall be submitted to NPS staff at GRTE for species verification, with assistance obtained from the Smithsonian Institution.

- To submit remains to NPS staff at GRTE following discovery, place the remains in a sealed bag and contact the Teton Interagency Dispatch Center for collection and analysis at (307-739-3301). Following analysis by GRTE staff, Airport staff must update/edit the strike record following species identification.

- If additional assistance to identify remains is necessary, the Smithsonian Institution's Feather Identification Lab is available to analyze the remains of animals involved in wildlife strikes in support of the U.S. Navy, U.S. Air Force, and FAA free of charge. Analyses include feather analyses, blood smear/tissues for DNA analyses, or others depending on the type of sample received. The Smithsonian staff will edit/update the FAA wildlife strike database to correctly identify the species and other data associated with the strike. When sending bird strike remains to the lab for identification, please include a completed FAA Form 5200-7 (PDF) form and contact information. Information is also available at: http://www.faa.gov/airports/airport_safety/wildlife/smithsonian/ .

  When sending materials to the Smithsonian, send the remains using overnight/priority shipping and label them as "Safety Investigation Material". Remains can be sent to:

  Smithsonian Institution
  Feather Identification Lab
  E600, MRC 116
  10th & Constitution Ave., NW
  Washington, DC 20560

7.5 General Wildlife Management

A properly formulated wildlife management plan must be based upon a comprehensive biological evaluation. A primary key to successful wildlife control is persistence, innovation, and a clear understanding of the risks associated with certain species based on their location, size, behavior, and/or number. The initial response for most species will be to haze wildlife using frightening devices, followed by lethal management methods when hazing is unsuccessful. Techniques should be applied based on safety, effectiveness, practicality, and environmental and social considerations. Most management techniques retain their effectiveness when used judiciously and in conjunction with other methods. Some methods, such as the use of pesticides or traps, are only effective and legal for certain species and situations (see **Section** 6). Therefore, the methods will depend largely on the situation and species involved.

As a wildlife population increases in abundance, so does the likelihood that individual members of the population will enter the critical airspace used by arriving and departing aircraft. However, wildlife abundance is not the sole indicator for assessing the strike hazards, rather the entire dynamic of the animals' abundance, body size, and behavioral attributes must be evaluated in combination. Notable attributes of wildlife behavior that should be examined to properly assess the risk to aircraft include the direction and altitude of wildlife movements in relation to aircraft, flocking characteristics, frequency of visits to a given site, duration of visit, and activity while on site (e.g., nesting, loafing, feeding, soaring, etc.).

7.6 Bird Management

Twenty-five species of birds were observed and documented in the Wildlife Hazard Assessment, some of which pose a high risk for damaging wildlife strikes.

7.6.1 Sage-Grouse

Sage-grouse pose the greatest wildlife hazard risk to aircraft and public safety at JAC. As described in **Section 5.6,** the mowed areas at JAC are attractive to sage-grouse and male sage-grouse continue to use the north safety area of Runway 1/19 as a lek each spring. The forbs and insects present in the mowed areas adjacent to the runways and taxiways attract hens with broods in the late summer. The WHWG and Steering Committee have expended considerable resources to develop a plan that provides alternative locations to attract sage-grouse in the hope of reducing the attractiveness of JAC. The alternative brood-rearing habitat and lek sites will be developed to attract grouse to areas more distant from aircraft movement areas. **Attachment A** presents a habitat restoration plan that is a key component of the Wildlife Hazard Management Plan.

The proposed Sage-Grouse Habitat Restoration Plan provides short- and long-term measures and techniques to enhance more distant locations and recommendations to manipulate on-site habitat to be less favorable for sage-grouse use. This plan will be implemented and monitored over several years to be protective of not only the sage-grouse at the airport, but the sage-grouse population throughout the greater Jackson Hole area.

Concurrent with the development and implementation of the sage-grouse habitat restoration plan, the JAC Public Safety staff will respond to the presence of sage-grouse within the airport boundaries and determine whether the sage-grouse present a critical risk to both aircraft operations and the sage-grouse population within airport boundaries. Staff will respond using non-lethal abatement techniques to temporarily relocate the sage-grouse in jeopardy of a wildlife strike in accordance with NPS-approved protocols.

7.6.2 Other Large Avian Species that are Hazardous to Aircraft Operations

Canada geese, mallard ducks, ravens and red-tailed hawks are a concern due to their body density and flocking or soaring tendencies. Juvenile birds may also constitute an unusual wildlife hazard because of their general unfamiliarity with the airport environment. The "Prevention and Control of Wildlife Damage" manual **(Section E)** discusses a number of methods that may be used to haze birds from the airport. As previously stated, an integration of multiple methods should be employed for maximum effectiveness. The techniques discussed in this reference manual should reduce most hazards involving wildlife species; sage-grouse will not be exposed to lethal management techniques at JAC.

7.7 Mammal Management

Potential hazards from the most observed mammal species (coyote) can be reduced through habitat modification directed at sage-grouse, fence maintenance, and the addition of smaller mesh wire over portions of the perimeter fence. Coyotes that continue to frequent JAC should be hazed from the property. The integration of lethal techniques may be necessary to remove individuals that become habituated to humans and harassment.

With the exception of coyotes, large mammals such as bison, moose, deer and elk have been excluded from the airfield by the perimeter/wildlife-resistant fence. Large mammals that gain access to the airfield will be escorted to the nearest gate and released. Large mammals in the public areas will be monitored and escorted to the east as described in **Section 6.6.2**. Small mammals (ground squirrels, pocket gophers) are present on the airfield in low to moderate densities, and can attract larger predators and raptors. The JAC Public Safety staff will consult with NPS to monitor ground squirrel and pocket gopher presence and to authorize/conduct annual or as-needed pesticide applications to minimize predator attractiveness. Refer to **Sections 5 and 6**.

7.8 Animal Control Assistance

The Jackson Police Department provides service and protection to JAC and is available to assist with domestic animal issues. The Animal Control Officer handles the detention of animals. If an animal poses an immediate threat to aviation, wildlife management personnel should attempt to catch or disperse any such animal.

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Section 8 – Plan Evaluation

FAR Part 139.337(f)(6) Periodic evaluation and review of the wildlife hazard management plan

The Wildlife Coordinator shall convene a WHWG to evaluate the WHMP every 12 consecutive calendar months or sooner in response to a triggering event (see **Section 1.1**).

8.1 Wildlife Hazard Working Group.

The Wildlife Coordinator shall convene a WHWG that will be chaired by the Airport Director. The WHWG shall perform the following:

- Evaluate the effectiveness of specific wildlife hazard management measures based on the result of routine inspections and ongoing monitoring,
- Evaluate the effectiveness of the WHMP in reducing the number of wildlife strikes that occurred during the calendar year; and
- Monitor the status of hazard reduction projects, including the completion of specified measures in accordance with the dates and timeframe provided in **Section 5**, **Tables 5-1, 5-2, and 5-3**.

Based on the results of the evaluation, the WHWG will recommend revisions or modifications to the management measures presented in the WHMP. FAA will review and approve each modification to the document.

The WHWG shall include diverse members of the airport staff and others stakeholders. At a minimum, the WHWG shall invite participation from:

- Airport Director
- Wildlife Coordinator
- Airport Operations Staff
- Public Safety
- NPS Staff
- Pilots/airline representatives
- Federal Aviation Staff from the Denver ADO
- FAA ATCT staff
- Wyoming Game and Fish Department

8.2 Working Group Meetings

The WHWG must meet at least once annually in accordance with FAA Part 139.337, but the group may convene more regularly as needed. The Director of Operations shall determine the need and frequency for WHWG meetings through ongoing consultation with the Wildlife Coordinator. Members of the WHWG should be encouraged to report observations to the Wildlife Coordinator and request a WHWG meeting as necessary.

8.3 Wildlife Strike Database

The Airport Operations Staff will maintain an internal (airport-specific) database of wildlife strikes and observed wildlife populations within the airport boundaries and critical area. Information from this database will be used to identify trends and to monitor changes in wildlife hazards and behavior within the airport boundaries. The Wildlife Log entries will provide the data used to construct the database. If unacceptable increases in wildlife hazards are observed, the Wildlife Coordinator will determine the cause of the increase and modify management measures in the WHMP to address the increased hazard.

8.4 Airport Expansion and Construction Projects

The Wildlife Coordinator must be involved in all airport improvement or maintenance projects to identify their potential to affect wildlife activity or create inadvertent wildlife attractants as a result of design or construction processes.

The Wildlife Coordinator/Director of Operations shall review all proposed airport project design and construction plans and consult with an FAA-qualified biologist as necessary (see **Attachment C**). If designs have the potential to attract hazardous wildlife, FAA consultation may also be required. For example, airport improvement plans shall be reviewed to identify:

- Designs that would provide opportunities for nesting perching, or loafing, such as exposed beams or metal work
- Stormwater management facilities that would allow water to accumulate for periods of 48 hours or greater
- Landscaping materials that would attract hazardous wildlife
- Inappropriate storage of trash or other debris

Plans put forth for vendors or other tenants must also be reviewed by the Wildlife Coordinator.

8.5 Federal Aviation Administration (FAA) Involvement in Plan Revision

FAA Regional Certification Inspectors and personnel from the Northwest Mountain Region and FAA's Denver Airports District (ADO) will be invited to review and comment on proposed revisions to the WHMP. FAA representatives will also be invited to participate in WHWG update meetings.

Section 9 – Training

139.337(f)(7) A training program to provide airport personnel with the knowledge and skills needed to carry out the wildlife hazard management plan....

Training is required for all personnel involved in WHMP implementation. The Wildlife Coordinator must ensure that all personnel involved with wildlife hazard management activities receive sufficient training to identify potentially hazardous species and to perform wildlife management measures.

9.1 Wildlife Hazard Training

Airport Operations staff must receive training from a FAA-qualified biologist as defined by AC 150/5200 36A (see **Attachment C**), a firearms instructor, and others as necessary to mitigate wildlife hazards on and near the airport. The training shall include an overview of laws associated with wildlife management, identification of wildlife hazards, techniques used for prey-base reductions, effective use of firearms and pyrotechnics (including hands-on training), and wildlife identification and dispersal techniques.

9.2 Pesticide Use and Application

Pesticide use is part of an integrated wildlife management approach, but pesticides use is well regulated within national parks. Before any pesticide is used within the airport boundary, coordination with NPS will be required. Use of all pesticides must adhere strictly to the pesticide label and should follow U.S. Environmental Protection Agency and Wyoming Department of Agriculture (WDOA) guidelines.

9.3 Firearms Training

Airport staff that use firearms must be trained by qualified State Certificated Hunter Safety Instructors, police officers, firearms instructors or other personnel who have been professionally trained in firearms safety. As stated in FAA 150/5200 36A:

> State Certificated Hunter Safety Instructors, police officers, firearms instructors and other personnel who have been professionally trained in firearms safety should be qualified to teach firearm safety. Airport personnel actively involved with the use of firearms for the mitigation of wildlife hazards should receive and maintain current firearms training from either a licensed National Rifle Association (NRA) instructor or other qualified individual. This training should include type and caliber of weapon used at the airport.

When firearm use is considered or necessary in the national park, the NPS staff will be consulted and requested to respond when a hazardous situation is present on GRTE property.

9.4 Airport Communications and Driver Training

The Wildlife Coordinator must ensure that airport communications and driving training is provided to all employees involved in wildlife management operations in the AOA including NPS staff. Following the completion of initial driver training, recurrent training is required every twelve calendar months. The Director of Operations will maintain a complete record of personnel that have completed training for implementation of the WHMP.

9.5 Available Resource Materials

Several wildlife hazard management resources shall be available in the Public Safety Office to assist with wildlife management at JAC. Specific resources shall include:

- *Wildlife Hazard Management at Airports A Manual for Airport Personnel.* This comprehensive manual for airport staff was prepared by, Edward C. Cleary of FAA and is available from the FAA website at: http://www.faa.gov/airports/airport_safety/wildlife/problem/media/2005_FAA_Manual_complete.pdf

- *Prevention and Control of Wildlife Damage,* which provides a species-specific discussion of dispersal and management techniques. Published by the University of Nebraska Cooperative Extension and USDA/APHIS Animal Damage Control (predecessor of Wildlife Services). The guide is also available at: http://icwdm.org/handbook/index.asp details

- *Wildlife Control Procedures Manual.* Transport Canada produced a valuable reference manual on wildlife management procedures at airports. This manual is available through a link on FAA's website or directly at: http://www.tc.gc.ca/eng/civilaviation/publications/tp11500-menu-1630.htm

Wildlife identification guides and handbooks will be available at the Public Safety Office for site use.

Section 10 – Monitoring Wildlife Hazards

FAR Part 139.337 (b) In a manner authorized by the Administrator, each certificate holder [must] ensure that a wildlife hazard assessment is conducted when any of the following events occurs on or near the airport:

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

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

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

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

Although it is impossible to accurately predict exactly how wildlife population dynamics will change over time or in response to the proposed habitat modification, changes in wildlife behavior and populations are anticipated. Long-term monitoring will be necessary to ensure that a hazardous situation does not develop.

One objective of proposed habitat modification measures is to eliminate habitat already known to attract hazardous wildlife. Therefore, acceptable hazard levels should not be based on existing wildlife populations, but rather on population trends of hazardous wildlife on and near JAC.

10.1 Ongoing Wildlife Hazard Monitoring

FAR 139.337(b) states a Wildlife Hazard Assessment should be conducted after any one of four triggering events occurs. Because one or more of these triggering events occurs at irregular intervals at JAC, it is prudent for JAC to conduct ongoing monitoring. Ongoing monitoring will occur at JAC through monthly surveys throughout the year. The survey would include making five-minute observations surveys at standard locations. The purpose of the ongoing monitoring is to collect standardized data to determine whether any change in wildlife presence or behavior occurs following the application of management measures. Ideally, these surveys will be conducted by an FAA-qualified wildlife biologist; however, members of the Airport Operations staff can be trained to make and record observations. The locations of proposed survey locations are illustrated in **Attachment K**.

10.2 Monitoring Methods and Target Species

Ongoing wildlife monitoring will focus primarily on large, flocking birds because of their mobility and the increased risk that these species pose to aircraft operations. The monitoring will be performed to identify trends and will not provide an absolute estimate of population sizes. Monitoring activities shall focus on the presence and behavior of the predominant types of hazardous wildlife that are attracted to JAC.

Mammal activity will also be monitored and recorded through incidental observations, but due to sampling design, mammals will likely be underestimated by the systematic surveys. Ground squirrels and pocket gophers are of particular interest because they can serve as a food source that attracts avian and mammalian predators. Ideally, such monitoring would be performed by an FAA-qualified biologist, but it may be performed by an NPS biologist or trained airport operations staff.

The data will be reviewed and analyzed by the Director of Operations and Wildlife Coordinator annually. The results of the analysis will be presented to the WHWG to determine whether management strategies have resulted in fewer observations of hazardous wildlife.

Section 11 – Agency Directory

REGULATORY AND ENFORCEMENT

Grand Teton National Park
P.O. Drawer 170
Moose, WY 83012
Phone: (307) 739-3301
(Dispatcher for emergencies)
Fax: 307.739.3438

U.S. Fish and Wildlife Service
(Migratory Bird Permit Office)
P.O. Box 25486
DFC (60154)
Denver, CO 80225-0486
Phone: (303) 236-8171
Email: *permitsR6MB@fws.gov*

U.S. Fish and Wildlife Service
Wyoming Field Office (T&E Species)
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009
Phone: (307) 772-2374

U.S. Fish and Wildlife Service
Office of Law Enforcement
P.O. Box 113
Casper, WY 82602-0113
Phone: (307)261-6365

Wyoming Game and Fish
Jackson Regional Office
420 North Cache
Jackson, WY 83001
(307) 733-2321

Federal Aviation Administration (FAA)
Northwest Mountain Region
Denver Airports District Office
26805 E. 68th Avenue, Suite 224
Denver, CO 80249-6361
Phone: (303) 342-1261

Federal Aviation Administration (FAA)
Federal Contract Tower
Jackson Hole Airport
1250 East Airport Rd.
Jackson, WY 83001
Phone: (307)733-4767

Wyoming Department of Transportation
Aeronautics Division
200 East 8th Ave.
Cheyenne, WY 82001
Phone (307) 777-3952, Fax (307) 637-7352

Federal Aviation Administration (FAA)
Staff Wildlife Biologist, John Weller
Airport Safety and Operations Division (AAS-300)
800 Independence Ave., SW
Washington, DC 20591
Phone: (202) 267-8731

MUNICIPAL AGENCIES

Jackson Police Department
150 E Pearl Ave
Jackson, WY 83001
Phone: (307) 733-1430

Teton County Sheriff's Department
180 South King Street -- P.O. Box 1885
Jackson, WY 83001
Phone: (307) 733-4052
Website: www.tetonsheriff.org

Jackson Hole Airport Administration
1250 E. Airport Rd
Jackson, WY 83001
(307) 733-7682

TECHNICAL ASSISTANCE

U.S. Department of Agriculture, Wildlife Services
Wyoming Wildlife Services State Director
P.O. Box 67
6731 W. Coal Road
Casper, WY 82602
Phone: (307) 261-5336
Website: www.aphis.usda.gov/wildlife_damage

Teton County Weed & Pest District
7575 S. Hwy 89 -- P.O. Box 1852
Jackson, WY 83001
Phone: (307)733-8419

Wyoming State University - Extension
Teton County Extension
57 Antelope Gap Rd
Wheatland, WY 82201
Phone: (307) 322-3667

Wyoming Department of Agriculture (Pesticide Management)
Technical Services Division
2219 Carey Ave.
Cheyenne, WY 82002
Phone: 307.777.7324
Website: tyagric.state.wy.us/divisions/ts

Section 12 – References

2006 Management Policies

Advisory Circular No. 150 / 5200-33B. Hazardous Wildlife Attractants on or near Airports.

Code of Federal Regulations (CFR). Title 14 FAR Part 139.337.b.

Edward C. Cleary (FAA). Wildlife Hazard Management at Airports A Manual for Airport Personnel. http://www.faa.gov/airports/airport_safety/wildlife/problem/media/2005_FAA_Manual_complete.pdf

FAA Wildlife Strike Database. http://wildlife.faa.gov/strikenew.aspx

Transport Canada. Wildlife Control Procedures Manual. http://www.tc.gc.ca/eng/civilaviation/publications/tp11500-menu-1630.htm

USDA Wildlife Services. Prevention and Control of Wildlife Damage. http://icwdm.org/handbook/index.asp details

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ATTACHMENT A – Greater Sage-Grouse Habitat Restoration Plan in Support of a Wildlife Hazard Management Plan for the Jackson Hole Airport

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Attachment A

Greater Sage-Grouse Habitat Restoration Plan

in Support of a

Wildlife Hazard Management Plan for the Jackson Hole Airport

Report prepared by:

The Jackson Hole Airport
Wildlife Hazard Management Plan
Working Group:

- National Park Service
- USDA Wildlife Services
- Wyoming Game and Fish Department
- Craighead-Beringia South
- Mead & Hunt Inc.
- Wyoming Wildlife Consultants, LLC

March 2014

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1. Introduction and Project Background

The Jackson Hole Airport (JAC) is the only commercial-service airport in the United States that is located wholly within a national park. JAC is governed by a five-member Airport Board, whose members are appointed by town and county officials. The Board operates JAC under an Agreement with the U.S. Department of the Interior, National Park Service (NPS), and works closely with NPS staff at Grand Teton National Park (GRTE).

The regulatory environment associated with airport operations is complex; the Airport Board must comply with federal laws, regulations, and policies promulgated by the U.S. Department of Transportation's Federal Aviation Administration (FAA), as well as the laws, regulations, and policies of the NPS. Chapter 1 describes the proposed project and the collaborative approach that the Airport Board, FAA, NPS and other stakeholders have undertaken to provide wildlife hazard management measures that are protective of both the greater sage-grouse (*Centrocercus urophasianus*) and the traveling public. A more detailed discussion of associated laws and policies is presented in Chapter 2.

1.1 Wildlife Hazard Management at JAC

At the request of the FAA, the JAC Board undertook a Wildlife Hazard Assessment (WHA) for JAC to determine the presence and extent of potentially hazardous wildlife on and near the airport. The FAA required the Board to undertake a WHA because air carrier aircraft had experienced multiple wildlife strikes and because wildlife capable of posing hazards to aircraft was observed to have access to the flight pattern or aircraft movement areas. The WHA associated with JAC included surveys of avian and terrestrial wildlife for a 12-month period to identify the presence and abundance of wildlife species, as well as behavior, movement, and migration patterns.

The Airport Board submitted the results of the WHA to the FAA in accordance with Federal Aviation Regulations (FARs) set forth in Title 14, Part 139 of the Code of Federal Regulations (CFR), which is also referred to as FAR Part 139. Based upon the findings presented in the WHA and the number of wildlife strikes reported at JAC, the FAA determined that a Wildlife Hazard Management Plan (WHMP) would be necessary. (Refer to Section 1.1 of the WHMP for a discussion of the regulatory framework governing the conduct of WHAs and WHMPs.)

The Airport Board prepared the *Draft Wildlife Hazard Management Plan for the Jackson Hole Airport* in accordance with FAR Part 139.337 (e) and (f), which identify the requirements of a WHMP and how those requirements must be addressed by an airport operator. (Appendix B of the WHMP presents FAR Part 139.337, "Wildlife Hazard Management.") The WHMP identifies the short- and long-term management measures that must be undertaken to reduce wildlife strike hazards posed by several species identified on and near JAC, assigns responsibility for implementing such measures, and provides a schedule for implementation.

1.2 Species-Specific Management: The Greater-Sage Grouse

As described in the WHA, JAC is surrounded by the abundant natural resources within GRTE. The park land within the airport boundaries and the airport's immediate vicinity provide a combination of vegetation, water, and cover that meet the basic needs of several wildlife species. In some cases, the area provides ideal habitat conditions for resident and migratory species. Specifically, the mowed grass and sagebrush within the airport boundaries attract many birds and mammals. A total of 23 avian species and eight mammal species were observed and documented during the 12-month WHA study period at JAC (USDA 2011). (For a more detailed description of the WHA findings, refer to Section 2 of the WHMP.)

1.2.1 Conflicts Between Sage-Grouse and Aircraft Operations

As documented in the WHA, a total of 64 wildlife strikes associated with JAC were recorded in the FAA's wildlife strike database for the period from 1990 to 2013. Of these, 32 strikes (52 percent) were attributed to the greater sage-grouse (*Centrocercus urophasianus*), herein referred to as the sage-grouse. Twelve of the strikes resulted in damage to aircraft, and four resulted in substantial damage to aircraft. Based on the strike records and field observations made in support of the WHA, the United State Department of Agriculture (USDA) and FAA identified the sage-grouse as a species that poses a hazard to aircraft operations at JAC. As documented in the WHA, a historic sage-grouse lek (strutting area for male sage-grouse) is located within the Runway Safety Area (RSA) north of the Runway 19 approach, and grouse frequent areas on and near runways and taxiways.

In addition to its presence on and near aircraft movement areas, the sage-grouse also poses hazards to aviation due to its size and behavior. Generally, the larger the animal, the greater the risk it poses to aircraft. Recent research by Dr. Richard Dolbeer of the USDA National Wildlife Research Center (retired) identified 21 large avian species that have been associated with ten or more wildlife strikes that resulted in damage to aircraft. Dolbeer considered "large" bird species to be those weighing greater than 4.5 pounds, and he identified the sage-grouse as fourteenth in a list of 21 large avian species known to cause the greatest number of damaging strikes (Dolbeer 2013). Of the 21 species, the sage-grouse was the only species with a decreasing population.

As identified in the FAA wildlife strike database, 83 percent of the sage-grouse strikes at JAC occurred at low altitudes or when aircraft were on the ground during takeoff or landing. Wildlife strikes that occur at low altitudes have the potential to pose the greatest risk to aviation safety as they can have a greater effect on flight or disrupt takeoffs and landings. As documented in available research, sage-grouse generally fly infrequently and at low altitude (Bedrosian, Crandall, and Craighead 2010).

1.2.2 Historic Presence

The sage-grouse lek located in the RSA north of Runway 19 has remained active since the 1940s. Observations made by field biologists for the 2011 WHA identified that the JAC lek contributed to the risk of wildlife strikes, but a greater risk was posed by sage-grouse hens that

would breed at the lek, nest off of the airport to both the north and south, and then return to the airport grounds later in the summer with their young (USDA 2011).

Although the reason that the hens returned to the airport property is unclear, it appears that the airport property is attractive to the hens and their young because the airport environment offers food, primarily forbs that grow on disturbed ground, and possibly insects that are not found in the sagebrush habitat surrounding the airport. Hens and their young were observed feeding on a variety of plant species that grow near the runways, in mowed areas adjacent to runways and taxiways, along the perimeter road, and along unimproved roads used to access airport equipment. The observations indicate that the presence of forbs in maintained areas of the airport are important to the sage-grouse population. Since the greatest number of strikes occurred during the late summer and spring, it appears that the habitat used by the returning hens and young may be a greater contributing factor to wildlife strikes than the lek itself (USDA 2011).

1.3 Sage-Grouse Habitat Restoration Plan

1.3.1 Plan Approach

Based on the presence of the sage-grouse within the RSA, the number of recorded strikes, and the status of the sage-grouse as a candidate for state and federal protection, its species-specific characteristics, and the airport's unique location within GRTE, the FAA and the Airport Board determined that species-specific measures would be required to develop species-specific hazard management measures for inclusion in the WHMP.

To develop species-specific management measures, the Board assembled a Wildlife Hazard Working Group that included numerous stakeholders and a Wildlife Hazard Steering Committee to oversee the working group. Through the help of diverse stakeholders, the Board was able to foster a collaborative approach to sage-grouse management that incorporated agency goals and concerns, private research, and aviation industry expertise.

Wildlife Hazard Working Group

The Board convened a Wildlife Hazard Working Group that included those most knowledgeable of sage-grouse issues in Jackson Hole and those knowledgeable of aviation and wildlife. The Working Group included representatives from the following agencies and stakeholders:

- FAA
- USDA, Wildlife Services
- NPS/GRTE
- Wyoming Game and Fish Department
- Craighead-Beringia South (wildlife research)
- Airport operations staff
- Consultants specializing in aviation planning and wildlife management

The Working Group met three times and collaborated on the proposed plan for an approximately nine-month period from November 2012 to August 2013. Key tasks performed by the Working Group included:

- Reviewing the status of the sage-grouse at JAC and in the Jackson Hole area.
- Compiling and reviewing available knowledge about the presence and behavior of the greater sage-grouse in the airport vicinity.
- Identifying specific approaches and management measures for reducing the hazards associated with the presence of the sage-grouse on JAC and in its immediate vicinity.
- Developing and documenting a sage-grouse management strategy for inclusion in the WHMP.

Wildlife Hazard Steering Committee
A Steering Committee composed of representatives from GRTE and the JAC Board provided review and oversight for all working group efforts. The Steering Committee is responsible for reviewing the WHMP prior to its submission to the Airport Board. When the Airport Board determines that the WHMP is complete and in accordance with FAA guidance, it will submit the WHMP to the FAA for review and acceptance.

1.3.2 Restoration Plan Strategy, Goals and Objectives

The *Greater Sage-Grouse Habitat Restoration Plan* presented in this appendix to the WHMP is an integral, species-specific component of the WHMP, which requires approval from the FAA and environmental review and implementation through a cooperative effort by the Airport Board, the FAA, and led by the NPS.

Overall Strategy
Based on the results of the 2011 WHA, a review of available data (including previous studies of sage-grouse on and near JAC), and subsequent research, the Wildlife Hazard Working Group identified a three-part strategy to reduce the wildlife hazards posed to the traveling public and the sage-grouse. The strategy includes:

- Establishing new food sources and brood-rearing habitat in previously disturbed areas of GRTE, such as brome fields, in an effort to attract sage-grouse hens to improved habitat areas outside of the airport boundaries (Chapter 5).
- Restoring two historic lek sites near the proposed brood-rearing habitat and creating a satellite lek near brood-rearing habitat to attracting breeding sage-grouse to areas outside of the airport (Chapter 6).

- After new sites are established, modifying airport conditions to make them less attractive to sage-grouse than the new sites (Chapter 4).

As a component of the Wildlife Hazard Management Plan for JAC, the proposed *Greater Sage-Grouse Habitat Restoration Plan* strategy will provide preferred habitat to draw sage-grouse away from the airport; it does not include techniques to capture and relocate sage-grouse.

Goal and Objectives

The overall goal of the Wildlife Hazard Management Plan is to enhance safety to the traveling public and those living and working near JAC in accordance with FARs at 14 CFR Part 139. The *Greater Sage-grouse Habitat Restoration Plan*, which is a significant species-specific component of the WHMP, seeks to reduce conflicts between aviation and wildlife for the betterment of both. Specific objectives associated with the plan include:

- Increase the separation between sage-grouse and aircraft movement areas to reduce hazards and potential conflicts in accordance with FAR part 139.

- Recognize the location of the airport within the boundaries of GRTE, the role of the NPS, and associated laws, regulations, and policies in the formulation and implementation of the WHMP.

- Identify wildlife hazard management strategies and measures that recognize the status of the sage-grouse as a candidate for federal protection under the Endangered Species Act of 1973, as amended, and the State of Wyoming's ongoing efforts to conserve its sage-grouse populations.

- Offer a restoration plan that will prove beneficial not only to the JAC population but to the greater Jackson Hole sage-grouse population as a whole.

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2. Regulatory Environment

Chapter 2 presents a summary and discussion of the legal, regulatory, and policy framework that must be considered during the development of the *Greater Sage-Grouse Habitat Restoration Plan*.

2.1 Legal Status of Greater Sage-Grouse

2.1.1 Federal Status and Protection

The United States Fish and Wildlife Service (USFWS) is the federal agency with regulatory authority over migratory birds and species that are offered protection under the Endangered Species Act. Available data indicate that sage-grouse populations have declined throughout the western United States during the last 50 years. In March 2010 the USFWS determined that the sage-grouse warranted protection under the Endangered Species Act of 1973, as amended, but that adding it to the list of Endangered and Threatened Wildlife was precluded by higher-priority listing actions. As a result, the sage-grouse became a candidate species for inclusion on the list of Endangered and Threatened Wildlife. NPS policy requires that candidate species be treated as listed species in the park.

Since that time, the USFWS has entered into a settlement agreement with several environmental groups. The agreement formalized a schedule for making listing determinations on many candidate species nationwide, including the sage-grouse. Based on the court-approved schedule, a decision on whether to list the sage-grouse must be made by September 2015.

As a candidate species, the sage-grouse is not provided statutory protection. However, the USFWS encourages the establishment of partnerships to conserve the species because it may warrant future protection.

2.1.2 State Status and Protection

The sage-grouse is not included on the State of Wyoming's list of threatened and endangered species, but the state has responded to its designation as a federal candidate species and appropriated resources to conserve the state's sage-grouse populations.

The state developed a "Core Population Area" strategy to coordinate statewide conservation efforts. In 2008, Wyoming Governor Freudenthal issued Executive Order 2008-2, which directed state agencies to "focus on the maintenance and enhancement of those greater sage-grouse habitats and populations within the Core Population Areas…." The Executive Order included a map of core population areas, including the Jackson Hole Core Area. The order also directed state agencies to work collaboratively with federal agencies, local governments, and private landowners to maintain and enhance sage-grouse habitats.

Executive Order 2008-2 was superseded by Executive Order 2011-5, which confirms and builds upon the previous order. The 2011 Order presented a revised Core Management Area Map

(version 3) and states that "Absent substantial and compelling information…the Core Population Areas should not be altered for at least five years" (see **Figure 2-1**). The order specifies that new development or land uses within Core Population Areas should be conducted "only when it can be demonstrated that the activity will not cause declines in Greater sage-grouse." However, the order emphasizes that a non-regulatory approach should be used to the extent possible when influencing management alternatives within Core Population Areas.

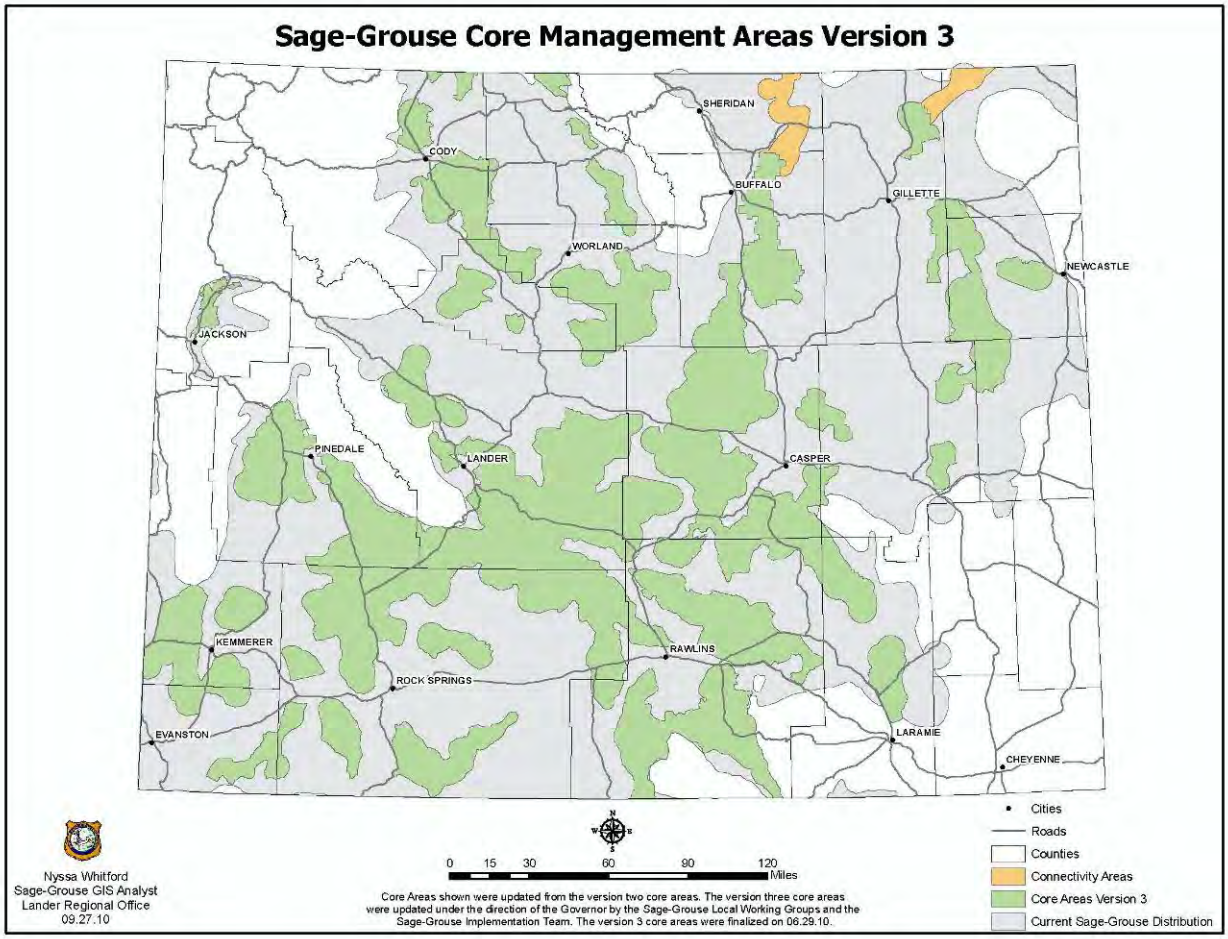


Figure 2-1: State-Designated Sage-Grouse Core Management Areas

2.2 Federal Laws, Regulations, and Policies

JAC was constructed in the 1930s and was included within the boundaries of the national park when Congress established GRTE in 1950. As previously stated, JAC is the only commercial-service airport in the United States that operates within the boundaries of a national park.

2.2.1 Jackson Hole Airport Agreement

JAC is operated by the JAC Board in accordance with an agreement between the United States Department of the Interior and the Airport Board. The Jackson Hole Airport Agreement

(Agreement) was made pursuant to the Department of the Interior Airports Act, enacted on March 18, 1950, which authorizes the Secretary of the Interior to "plan, acquire, establish, construct, enlarge, improve, maintain, equip, operate, regulate, and protect airports in the continental United States in, or in close proximity to National Parks, when such airports are determined by him to be necessary to the proper performance of the functions of the Department of the Interior" (United States Code, Title 15, Chapter 1, subchapter I, Sections 7a-e). The Agreement sets forth the terms and conditions by which the Board is to operate the airport, including language that requires the Board to "comply with all applicable Federal rules and regulations." The provision ensures that operations of JAC will be conducted in a manner consistent with the laws, policies, and regulations pertaining to the NPS and GRTE, as well as with those pertaining to airports and the FAA. The Agreement is administered by the NPS.

The Agreement was entered into on April 27, 1983, and had a primary term of 30 years (through 2013), followed by two 10-year renewal options that were exercised in 1993 and 2003 (through 2033). Following the Airport Board's most recent request to extend the term of the Agreement, the NPS prepared an environmental impact statement and issued a Record of Decision (ROD) in December 2010. In accordance with the ROD, the Agreement was amended to include two additional 10-year renewal options. The eventual exercise of the remaining 10-year option would extend the Agreement term to 2053.

The Agreement includes language that requires the Airport Board "to work in good faith to further reduce and mitigate the impacts of the airport on Grand Teton National Park." The 2010 ROD includes a list of mitigation measures that the Board has agreed to pursue. The following language is germane to the Wildlife Hazard Management Plan:

> **Wildlife.** The Board and the National Park Service will collaborate to develop procedures, methods, and strategies regarding techniques to minimize conflicts between sage grouse and aircraft. The lek at the north end of the runway has been present for decades, despite the presence of aircraft. In cooperation with the National Park Service, the Board will develop procedures, methods, and strategies to minimize conflicts between sage-grouse and airport operations. In addition, the National Park Service and Board will collaborate on funding research studies that could help determine whether the airport is affecting other wildlife, such as gleaning bats and insects that may be sensitive to noise and light emissions.

2.2.2 Applicable NPS Laws and Policies

Within the boundaries of GRTE, including the land upon which JAC resides, all natural and cultural resources, including wildlife, are managed by the NPS in accordance with the laws, policies, and regulations that pertain to the National Park System. The most important statutory directives for the NPS are provided by the interrelated provisions of the NPS Organic Act of 1916 and the NPS General Authorities Act of 1970, as amended. The Service's *2006 Management Policies* and regulations found within Title 36 of the CFR interpret the Organic Act and provide a regulatory framework for management of park resources, including wildlife. In general, the taking or disturbance of wildlife is prohibited.

National Park Service Management Policies (2006)
The NPS *2006 Management Policies* (Management Policies) is a basic policy document implemented by the NPS. The policies flow from the laws that pertain to management of the National Park System, and they provide a detailed interpretation of those laws.

As stated in section 1.4.3 of the Management Policies:

> The fundamental purpose of the national park system…begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources….the laws do give the Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

Section 1.4 of the Management Policies provides guidance for park managers on what constitutes impairment. In planning and implementing plant and animal population management actions, the NPS must follow established planning procedures, including provisions for public review and comment. Following approval of the WHMP by the FAA, the specific measures presented in the plan will be subject to review in accordance with the National Environmental Policy Act of 1969 (NEPA) to determine the potential environmental impacts associated with the management measures proposed in the proposed WHMP. At that time, the NPS will determine whether the proposed management measures would result in an impairment to park resources.

Chapter 4 of the NPS Management Policies addresses natural resource management. In general, resources are managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The NPS does not intervene in natural biological or physical process, except in certain specific circumstances including "when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities. Any such intervention will be kept to the minimum necessary to achieve the stated management objectives" (*2006 Management Policies 4.1*).

Further guidance on the management of native plants and animals is provided in Section 4.4.2 of the Management Policies. The policies allow NPS to intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the population of the species or to other components and processes of the ecosystems that support them. In addition, such management must be necessary for at least one of a number of specific reasons, including:

- To accommodate intensive development in portions of parks appropriate for and dedicated to such development,

- To protect property when it is not possible to change the pattern of human activities, or

- To maintain human safety when it is not possible to change the pattern of human activities.

The Management Policies also address the management of threatened or endangered species within national parks. According to Section 4.4.2.3, Management of Threatened or Endangered Plants and Animals, the NPS will "strive to recover all species…that are listed under the Endangered Species Act." Specific portions of this section that would support the proposed *Greater Sage-grouse Habitat Restoration Plan* include policies that direct the NPS to undertake direct involvement in programs to "monitor, restore, and maintain listed species' habitats" and to "cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species." Although the sage-grouse is not currently included on the list of federally protected species, its identification as a candidate species affords it the same protection by the NPS as listed species.

2.2.3 Federal Aviation Regulation and Policies

The FAA is responsible for establishing and enforcing the FARs, and it establishes policies to enhance public safety at air carrier airports that hold an Airport Operating Certificate under Title 14, Part 139 of the CFR (14 CFR Part 139). To obtain a certificate, an airport operator must agree to certain operational and safety standards which vary depending on the size of the airport and the type of flights available. JAC is a federally obligated air carrier airport that holds an Airport Operating Certificate from FAA.

FAA Part 139 addresses wildlife hazard management because it is a safety issue, and airport operators are obligated to adhere to FAA regulations set forth in Title 14 of the Code of Regulations and subsequent FAA guidance. For more information regarding aviation laws and policies pertaining to the WHMP, refer to Chapter 1 of the WHMP and its subsequent appendices.

2.2.4 National Environmental Policy Act of 1969

The WHMP includes measures that would be performed within GRTE and have the potential to affect the natural and human environment. Following acceptance of the WHMP by the FAA, the measures within the proposed WHMP that have the potential to affect the natural and human environment, including the proposed *Greater Sage-Grouse Habitat Restoration Plan,* will be subject to review pursuant to NEPA.

Section 1.4 of the Management Policies provides guidance for park managers on what constitutes impairment. Following the FAA's approval of the Draft WHMP, but prior to adoption by the Airport Board, the NPS, in cooperation with the FAA, will prepare an environmental document to comply with NEPA. At that time, the proposed wildlife management measures will be reviewed to create a detailed project description and alternatives for evaluation. Public scoping and outreach will be conducted in accordance with NEPA and its implementing regulations. Based upon the NEPA review, the NPS will determine whether the management measures proposed in the WHMP would result in impairment or unacceptable impacts.

2.2.5 Implementation Authority

Only the NPS has the authority to manage resources within park boundaries, including wildlife. Therefore, any management measures proposed in the WHMP can only be undertaken by, or under the direction of, the NPS. The NPS will work with the Airport Board to ensure that airport staff are able to implement the wildlife hazard management measures in a manner that is consistent with the WHMP, and NPS law, policy, and regulations. In addition, the NPS and the Board will cooperate on a funding strategy to ensure that the Board is responsible for funding actions that are necessary as a result of ongoing airport operations.

3. Project-Related Considerations, Opportunities, and Constraints

The sage-grouse is a large gallinaceous upland game bird that depends on sagebrush habitat for much of its annual habitat requirement. Sage-grouse nest on the ground, primarily under sagebrush, and feed on sagebrush, forbs, and insects.

As stated previously, the sage-grouse is the only large avian species associated with damaging aircraft strikes that is experiencing a decline in population. Therefore, the wildlife hazard management measures associated with the JAC WHMP were developed to reduce hazards to aircraft while avoiding and minimizing potential impacts to the small population of sage-grouse currently located in and near the airport boundaries. Chapter 3 describes population trends, species-specific characteristics, and aviation-related concerns, all of which were considered during the development of the *Wildlife Hazard Management Plan for the Jackson Hole Airport*.

3.1 Species Population and Trends

According to the *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* prepared by Connelly et al. (2004), "sage-grouse populations have declined across their range during the past 50 years, as has the quality and distribution of the bird's requisite sagebrush-steppe habitat." In western Wyoming, sage-grouse are found in sagebrush/grassland habitats of the mountain valleys of the Upper Snake River drainage. All of the known strutting grounds or leks associated with these populations in Wyoming are on public lands administered by the NPS, USFWS, or United States Forest Service (USFS) (USRBWG 2008).

The Upper Snake River Basin Sage-grouse Local Working Group (USRBWG) was established in September 2004 in response to a state-wide conservation efforts and as part of a larger conservation effort to address the presence and range of sage-grouse throughout the American West. **Figure 3-1** illustrates geographic areas associated with local sage-grouse working groups in Wyoming.

The USRBWG convened in 2004 to develop a local conservation plan, design projects that benefit sage-grouse and other sagebrush obligate species, and to implement on-the-ground habitat and population-related projects for the species. The group has developed and revised a local conservation plan that identifies strategies and commitments for the purpose of maintaining small, isolated populations of sage-grouse in the Upper Snake River Basin conservation area, including the Jackson Hole population, protecting and managing habitats, and increasing sage-grouse numbers in these small populations. The intent of this range-wide effort is to provide local support and actions to address sage-grouse conservation issues, which, when considered in the context of a larger state and regional effort, will preclude the need for listing the species under the federal Endangered Species Act (USRBWG 2008).

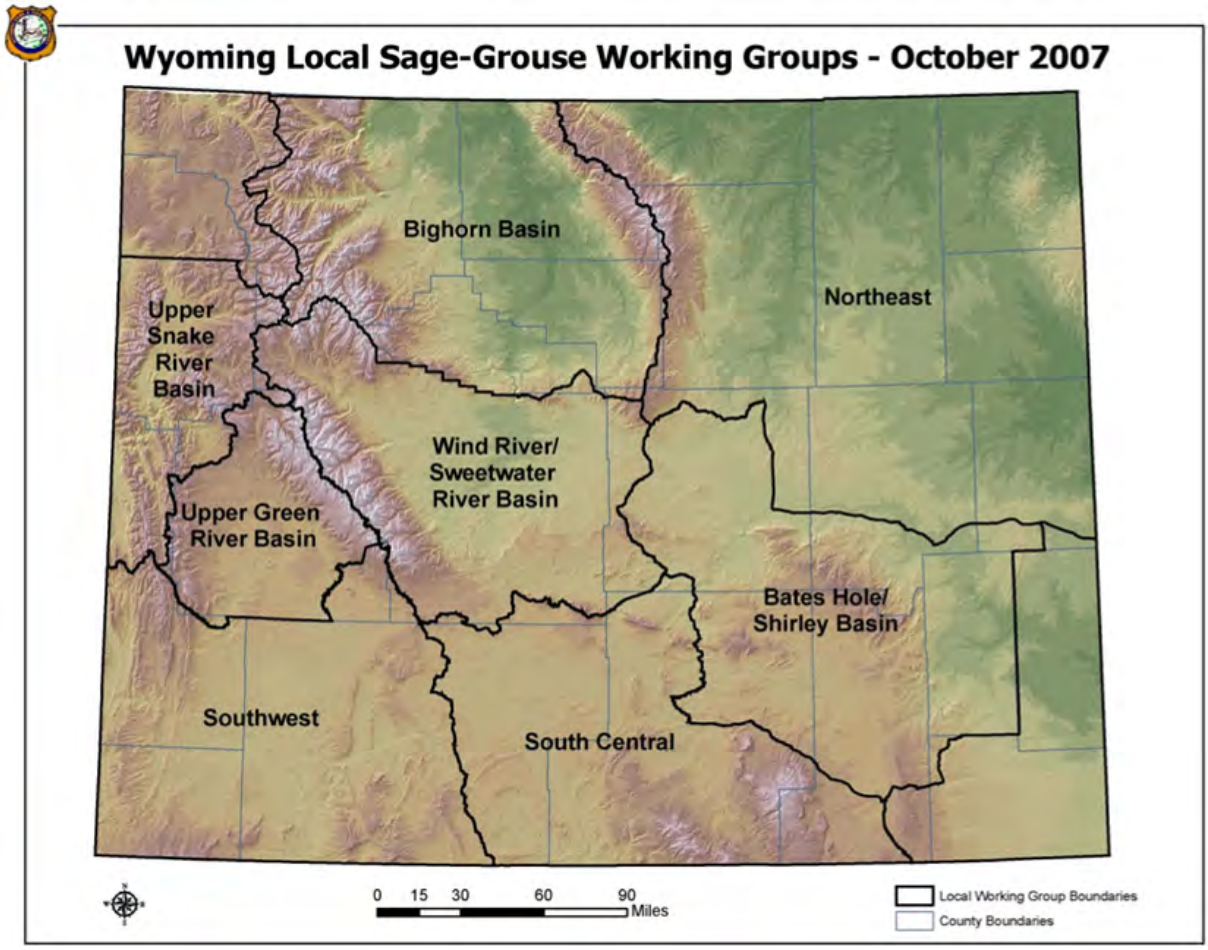


Figure 3-1: Local Sage-Grouse Working Groups and Area Boundaries in Wyoming

The following data pertaining to the status of the Upper Snake River sage-grouse population and the Jackson Hole sage-grouse population were excerpted from the *2011-2012 Draft Annual Report for the Upper Snake River Basin Working Group*.

3.1.1 Known and Historic Lek Sites

Sixteen known or historic leks are associated with the Jackson Hole sage-grouse population, including the Airport lek. Fourteen leks are identified as occupied or active during the past ten years, and two are considered unoccupied (historic leks). (A lek is considered to be active if one male is present during the breeding season.) One lek, the McBride lek, is classified as occupied, but it has been active only sporadically in recent years. (One male was present during the breeding season in 2007). It is unclear whether the Airport Pit lek, which is located near the park's firing range, is actually a lek, a satellite lek, or a sporadic activity center for sage-grouse displaced off the airport lek by airport operations. Both the McBride lek and the Airport Pit lek are identified for restoration as part of the proposed project (see Chapter 6).

3.1.2 Local Sage-Grouse Population Trends

As reported by the USRBWG, no reliable method exists for estimating the sage-grouse population for the Upper Snake River Basin Working Group Area. Both the number of leks and the number of males attending these leks must be accurately quantified to estimate the number of males in the population, population size, and population trend. However, the number of males counted on leks provides a reasonable index of changes in the abundance of sage-grouse populations over time and in response to environmental conditions. The average number of males per active lek considers the number of leks counted each year and may be a more reliable measure of population trends over time.

Table 3-1 provides a long-term perspective of the population starting with the research conducted by Patterson (1952) in 1948. **Figures 3-2** and **3-3** reflect the trends observed since efforts to collect lek data consistently began in 1986, as well as the most recent 10-year period for which data are available. The long-term trend in the lek count data suggests a declining sage-grouse population, which reached low points in 1996 and 2009, with some recovery in the intervening years. The small population in Jackson Hole that is reflected by the total number of male sage-grouse counted annually suggests that this population could be at risk of extirpation from typical annual fluctuations in population size or random events. The average number of males in the Jackson Hole Complex ranged from a high of 214 in 1990 to a low of 47 in 1999. Although there was some fluctuation, with 165 males in 2008 and 128 males in 2012, the overall trend indicates that the population continues to decline (**Table 3-1**).

Analyzing lek data from 1985 to 2007, Garton et al. (2011) estimated the average annual rate of change for the Jackson Hole population at -2.2 percent, which leads to the relatively high probability of populations declining below 50 effective breeders and suggests that the population is at a high risk of extirpation. The analysis estimated the probability of the Jackson population declining below 50 effective breeders at 11 percent and 27 percent in 30 and 100 years, respectively. Based on the analyses, the probability of long-term persistence for populations with less than 500 effective breeding adults is zero, establishing a threshold for an effective breeding population at 500 adult sage-grouse indexed to a minimum count of 200 males on leks since 1992 (Garton et al. 2011). Based on these data, the long-term persistence of this population is in question.

Table 3-1: Sage-Grouse Lek Counts (Maximum Males) for the Jackson Hole, Wyoming Population, 1948-2012

Year	Airport	Beacon	Airpot Pit	CircleEW/3 BarH	McBride	Antelope Flats	Moulton	Spread Creek	Bark Corral	Timbered Island	North Gap	Simpson	Breakneck Flats	Dry Cottonwood	RKO Road	Clark Draw	Total	Average # males/active lek
1948	61			13	15	59	20		36		0						204	34
1949	51			18	14	62	32		14		0						191	31.8
1950	73			9	50	55	16		20		0						223	37.2
1951	61			7	52	46	28		20		12						226	32.3
1985				NC	27	NC	51*		NC		22						NA	NA
1986	25			NC	27	11	51		NC		14	22					150	25
1987	25			NC	18	1	30		NC		NC	NC					74	18.5
1988	26			NC	23	13	85		7		23	NC					177	29.5
1989	30			NC	21	7	91		6		8	NC					163	27.2
1990	52			NC	10	10	63		8		22	NC					214	35.7
1991	63			NC	15	10	48		16		29	NC					207	34.5
1992	51			NC	12	8	37		16		21	NC					168	28
1993	37	21		NC	16	5	24		8		9	54					198	24.8
1994	NC	NC		NC	27	NC	50		NC		7	NC					84	28
1995	18	15		NC	6	4	63		10		6	NC					122	17.4
1996	18	8		NC	4	2	33		8		19	NC					92	13.1
1997	15	1		NC	6	0	48		1		10	NC					81	13.5
1998	14	0		NC	4	0	33		0		7	NC					58	14.5
1999	17	0		NC	0	0	21		0		9	NC					47	15.7
2000	18	NC		NC	0	NC	28		NC		5	NC	21				72	18
2001	15	NC		NC	NC	NC	30		NC		6	NC	19				70	17.5
2002	19	24		NC	NC	NC	28		NC		4	NC	9				84	16.8
2003	25	NC		NC	NC	NC	35		NC	8	3	NC	7				78	15.6
2004	17	NC		NC	NC	NC	54		2	15	4	NC	14				106	17.6
2005	17	NC		NC	NC	NC	49		NC	17	18	0	16	6			123	20.5
2006	26	4	6	0	0	NC	44		0	20	30	0	21	9			157	19.6
2007	23	NC	0	0	1	0	41	4	1	20	9	0	30	4			133	14.8
2008	16	0	0	0	0	0	38	5	10***	26	23	NC	22	13	12**		165	18.3
2009	10	0	2	NC	0	NC	33	4	5	22	11	0	21	1	15		124	12.4
2010	10	0	0	NC	0	NC	40	5	24	18	13	0	24	4	13	13	151	15.1
2011	11	0	0	0	0	0	27	15	10	0	21	0	5	0	10	12	111	13.9
2012	17	0	0	0	0	0	44	0	3	7	18	3	14	0	8	14	128	14.2

* includes males and females

** new lek in 2008 with multiple observations.

*** BarkCorral lek has 2 activity centers which may be separate leks. In the past birds have been observed at both sites but observations have been combined in this report.

In 2008 2 grouse seen at east lek and 8 seen at west lek.

(Grand Teton National Park and Wyoming Game and Fish Department, unpublished data)

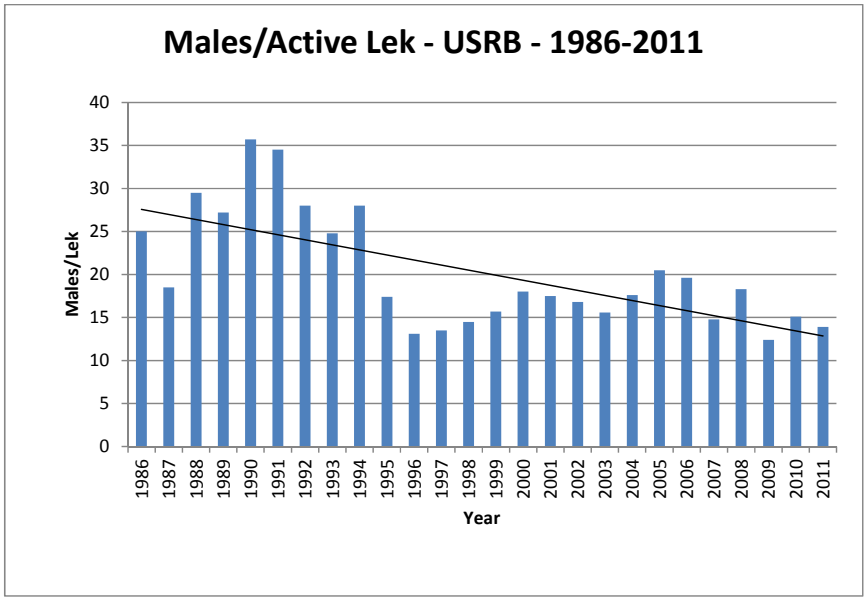


Figure 3-2: Males/Active Lek – Upper Snake River Basin (1986 to 2011)

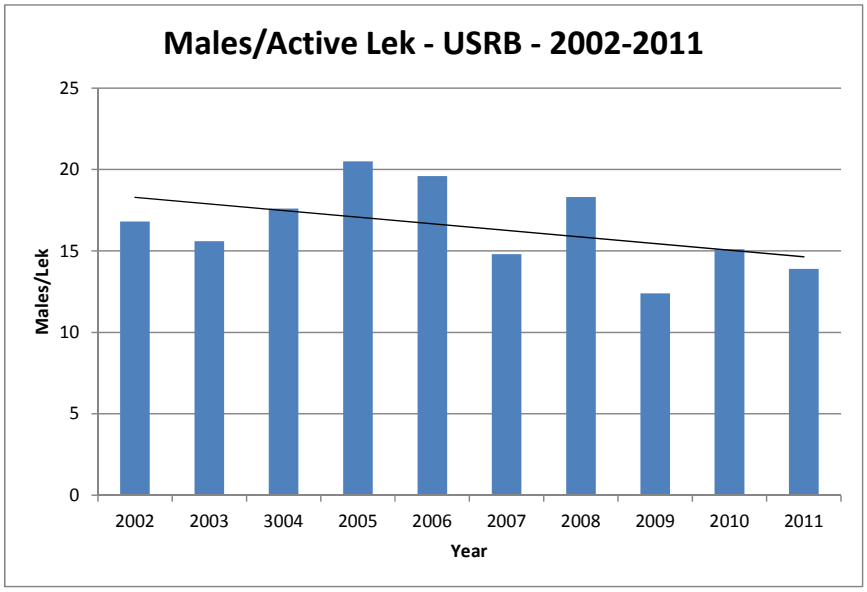


Figure 3-3: Males/Active Lek – Upper Snake River Basin (2002-2011)

3.2 Available Studies

Several studies have been performed in recent years that focus on the Jackson Hole sage-grouse population. The studies were conducted by the local working group, private researchers, and the Airport Board, some of which were performed in conjunction with regional and national sage-grouse conservation efforts. The JAC Wildlife Hazard Working Group reviewed the available research documents that specifically address the Jackson Hole sage-grouse population to inform its approach to managing hazards associated with the sage-grouse. Such documents include, but are not limited to, those described in Sections 3.2.1 through 3.2.5.

3.2.1 Upper Snake River Basin Sage-Grouse Conservation Plan

The USRBWG was convened in 2004 as part of a statewide program initiated by the Wyoming Game and Fish Department. The USRBWG published the *Upper Snake River Basin Sage-Grouse Conservation Plan* in 2008, which provides important background, history, and status of the sage-grouse in the Upper Snake River Basin conservation plan area; a conservation assessment that addresses sage-grouse biology and habitats, factors affecting sage-grouse populations and habitats; and conservation goals and objectives (USRBWG, 2008).

3.2.2 Sage-Grouse Completion Report: 2007 – 2009

Craighead-Beringia South published the results of an intensive field-based study to track a portion of the Jackson Hole sage-grouse population over a three-year period. The purpose of the study was to identify micro-habitat requirements for the species, habitat-correlated productivity limitations, and dispersal. The effort also sought to create long-term monitoring protocols and improved population viability modeling capabilities (Bedrosian *et al.* 2010). The study included equipping individual sage-grouse with radio transmitters, including some from the JAC airport lek. The results obtained from this three-year study were used to inform the proposed sage-grouse habitat and lek restoration strategies presented in Chapters 3 and 4 of this report.

3.2.3 Sage-Grouse Baseline Survey and Inventory at JAC

From 2009 to 2010, Bedrosian and Walker of Craighead-Beringia South performed a study at and near the JAC lek at the request of the Airport Board. The study quantitatively documented current lekking behaviors and available habitats at the airport to identify a baseline for future research. The study documented the strutting behaviors and territory placement of males, the vegetation structure within the airport perimeter during the nesting and brood-rearing phases, current disturbances, and potential changes in male behavior and breeding territory size and configuration following disturbances such as enplanements, predators, and snow depths. The study was performed using the lek count protocol set forth by GRTE.

The study report acknowledged that the airport lek has been one of the valley's largest leks. Although the lek has been active since at least the 1940s (*Patterson 1952*), the study concluded that the lek "poses an anomaly to current disturbance impacts and grouse research" (Bedrosian and Walker 2010). The study results indicated that although activity at the lek has declined in recent years, its use persists despite the presence of an active runway within a few yards, aircraft traffic during the breeding season, and daily enplanements during prominent breeding hours.

Researchers did not identify any predominant factor to explain why sage-grouse are using the airport, and they observed no difference between the immediate nesting habitat on the airport and nesting habitat outside the airport. The report suggested that the ongoing use of the lek "may be a function of historical use. Over the years, small annual increases in disturbances have occurred, likely allowing the strutting grouse to become accustom[ed] to increasing levels of disturbance" (Bedrosian and Walker 2010). The report concluded that it would be "extremely difficult [to] find a viable way to deter sage-grouse use of the area for breeding" (Bedrosian and

Walker 2010), and it recommended future long-term monitoring to assess long-term impacts following new or sustained disturbance to the lek.

3.2.4 Greater Sage-Grouse Conservation Objectives: Final Report

The USFWS convened a Conservation Objectives Team (COT) composed of USFWS and state agency representatives to develop conservation objectives for the sage-grouse. The team was convened to support forthcoming decisions pertaining to the potential listing of the sage-grouse under the federal Endangered Species Act. The final COT report identifies Priority Areas of Conservation (PACs), which were considered "key habitats" that were essential for sage-grouse conservation (USFWS 2013).

The COT report characterizes the sage-grouse population in Jackson Hole, which includes the population at the Airport, as under a present and widespread threat based on its small size, the presence of weeds and invasive annual grasses, and ongoing recreation use (USFWS 2013).

3.2.5 Supplemental Research on Isolation and Genetic Diversity of the Jackson Hole Population

Recent research conducted by Sarah Schulwitz of the University of North Texas (unpublished at the time of this report) and Beringia-Craighead South assessed the degree of isolation and level of genetic diversity associated with the sage-grouse population located in the Jackson Hole Valley (Jackson population). Researchers analyzed blood samples from 300 specimens from eight geographic locations in Wyoming and one location in southeastern Montana.

The Jackson Hole population exhibited significantly reduced levels of neutral or shared genetic diversity compared to the other populations. The study results also indicate that the Jackson Hole population is more isolated compared to the other populations, including the Pinedale population, which is the nearest large population. The study concludes that the reduced genetic diversity is likely due to the dispersal capabilities of the species, natural barriers, and increased habitat fragmentation. Populations with low levels of genetic diversity are typically at risk of losing long-term viability (Schulwitz et al. 2013).

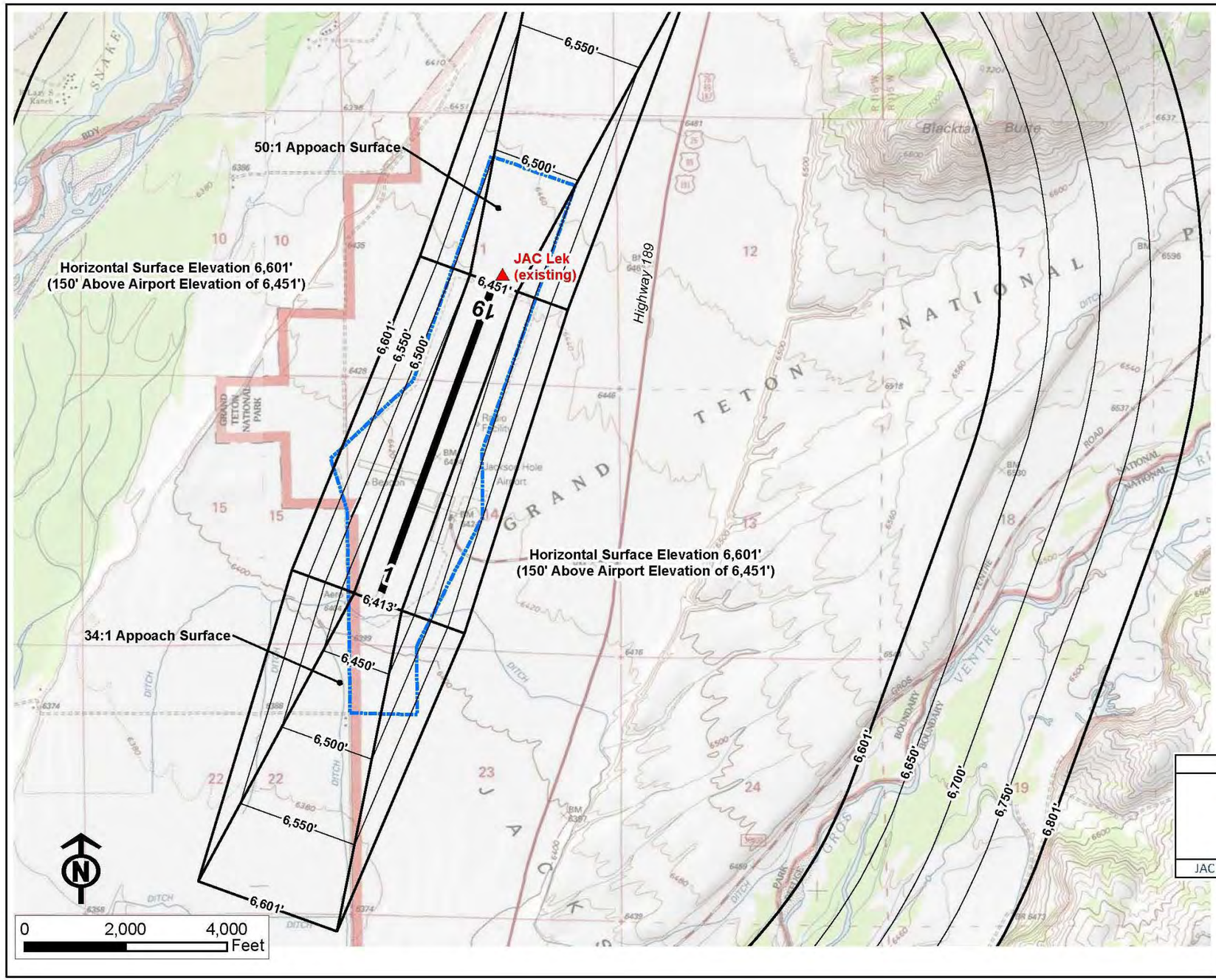
3.3 Opportunities and Constraints

3.3.1 Critical Zone for Wildlife Hazard Management

In its Advisory Circular 150/5200-33B, "Wildlife Hazard Attractants on and Near Airports", the FAA provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. The FAA recommends that airports serving turbine-powered aircraft, such as JAC, provide a minimum separation distance of 10,000 feet between a wildlife attractant and aircraft movement areas.

The FAA and airport operators generally oppose projects that will enhance habitat or attract potentially hazardous wildlife within the 10,000-foot separation distance based on the increased

potential for, and risk associated with, wildlife strikes at low altitudes. As shown on **Figure 3-4**, the Airport lek is located in the RSA at the end of Runway 19. The FAA defines the RSA as the area located adjacent to the runway end to "provide a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots, and veer offs." The airport lek is located in the RSA at an elevation of 6,444 above mean sea level. At this location, the regulated airspace that must remain clear for aircraft use begins at 6,456 feet (12 feet above ground level).



Legend

- Airport Boundary
- Runway
- Grand Teton National Park Boundary
- LEKS
- FAR Part 77 Surfaces
- –6,550'– FAR Part 77 Surface Contour with Elevation

Notes:

1. Jackson Hole Airport (JAC) elevation is 6,451 feet MSL.
2. Federal Aviation Regulation (FAR) Part 77 Surfaces available from JAC Airport Layout Plan, 2012.

Separation Data			
Site	Site Elevation (feet MSL)	Distance below Navigable Airspace (feet)	Distance from Runway Edge (miles/feet)
JAC Lek (Existing)	6,444'	12	0

Figure 3-4

JAC Lek Location and Relationship to FAR Part 77 Surfaces

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Figure 3-5 identifies the utilization of areas in the Runway 19 RSA by sage-grouse based on data obtained by Craighead-Beringia South (Bedrosian et al. 2010). The geographic area with the palest color (yellow) is the area associated with the most intensive use by sage-grouse. The area of greatest use occurs in the northeastern most corner of the RSA, with some use adjacent to the runway itself.

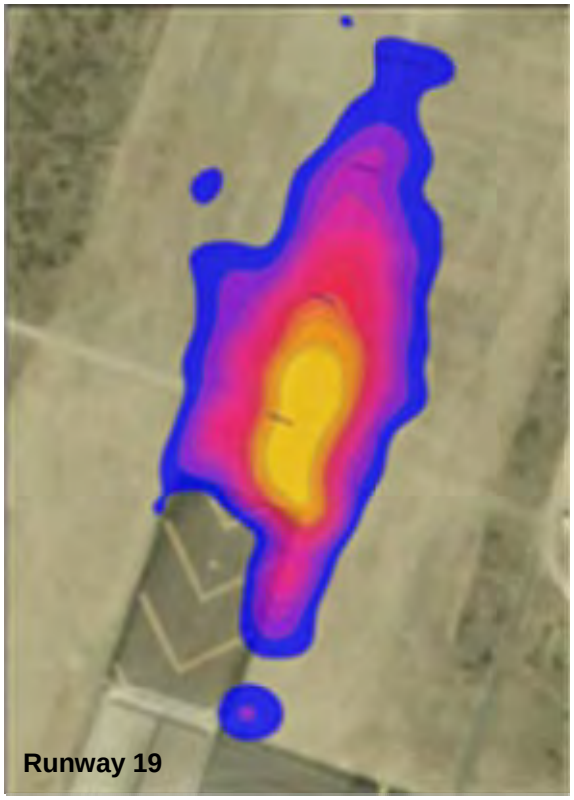

Figure 3-5: Utilization and Distribution of Sage-Grouse Locations (Male and Female) for the 2009 Lekking Season at JAC (Bedrosian 2009)

Areas directly adjacent to the runway and taxiways attract hens with broods during the summer months. Sage-grouse strikes reported in the FAA database indicate that 32 strikes have occurred at JAC, and 24 records identify the aircraft altitude at the time of the strike. Of the 32 strikes, 83 percent occurred at zero altitude (while the aircraft was still on pavement or at low attitude), and it appears that the strikes likely occurred when the grouse attempted to elude aircraft.

The 10,000-foot separation distance identified in FAA guidance may vary based on biological and airport-specific circumstances. The FAA may consent to some variation or flexibility regarding the 10,000-foot separation criterion. In the case of constructed wetlands, the FAA may consider exemptions to the separation criteria if a wetland provides unique ecological function, such as critical habitat for threatened or endangered species or groundwater recharge, when those conditions cannot be replicated at a distance of 10,000 feet or more.

A similar situation may occur in association with the sage-grouse; as a candidate for the federal threatened and endangered species list, the sage-grouse requires consideration as if it were a listed species. The Board may request an exemption or variance from the 10,000-foot separation criterion to provide restored habitat areas and lek areas as alternatives to the airport for leks and brood-rearing.

3.3.2 Species-Specific Behavior and Characteristics

Distribution of Sage-Grouse in Jackson Hole

As noted previously, the distribution of sage-grouse and its habitat use have been documented by Craighead-Beringia South through the analysis of thousands of locations through a process known as kernel analysis. Using this protocol, the juxtaposition and spatial relationships of sage-grouse locations obtained by telemetry (i.e., collared birds) are plotted to illustrate areas where locations are grouped to indicate habitat use on a large scale. Within Jackson Hole, five relatively high-use areas are interspersed throughout the valley. As shown on **Figure 3-6,** one of the major habitat use areas for sage-grouse in the valley surrounds JAC. This area also includes the primary winter habitat for the majority of the Jackson Hole sage-grouse population. The proposed lek and brood-rearing habitat restoration areas proposed in association with the WHMP would be established in close proximity to these areas (see Chapters 4 to 6).

Sage-grouse exhibit great fidelity to most of their seasonal habitats, indicating that individuals are poor pioneers of new or changed habitats. Moreover, when sage-grouse travel between new or changed habitats, they are unlikely to move far. Local research indicates that a hen with chicks typically moves less than 500 meters (1,640 feet) from its nest site to brood-rearing areas in Jackson Hole (see **Figures 3-7** to **3-10**). Habitat manipulations intended to attract hens from the clusters of nests located both north and south of the airport must consider these distances.

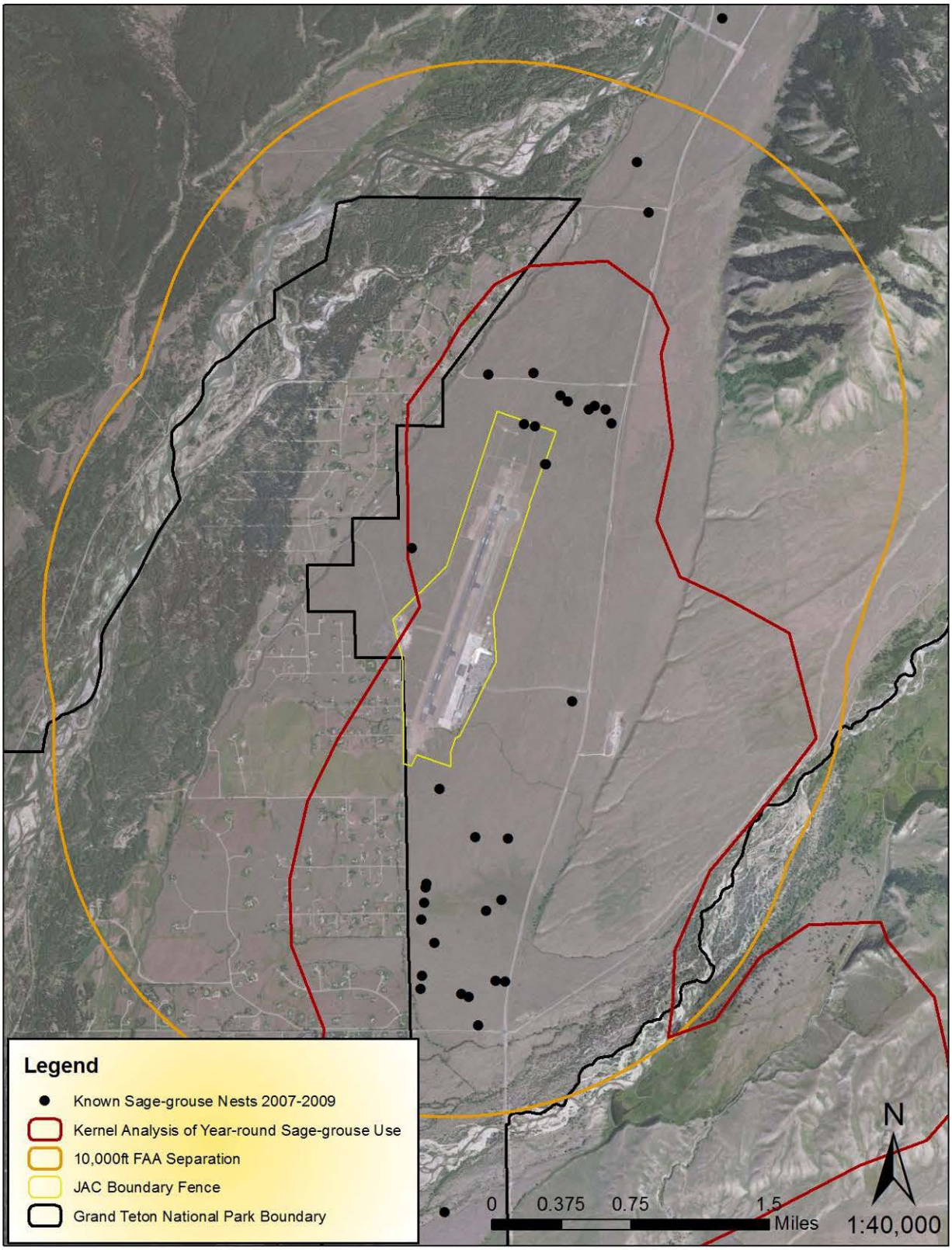

Figure 3-6: Kernel Analysis of Year-round Sage-grouse Use and Relationship to 10,000-foot Separation Distance

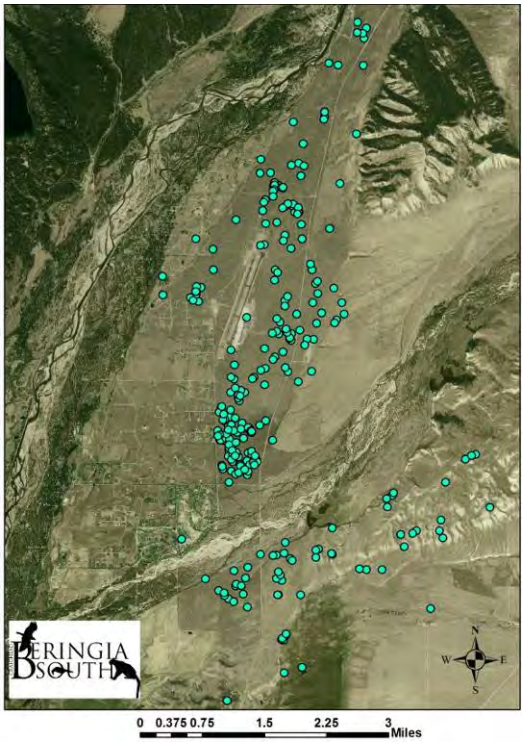

Figure 3-7: Spring Sage-Grouse Habitat use near JAC

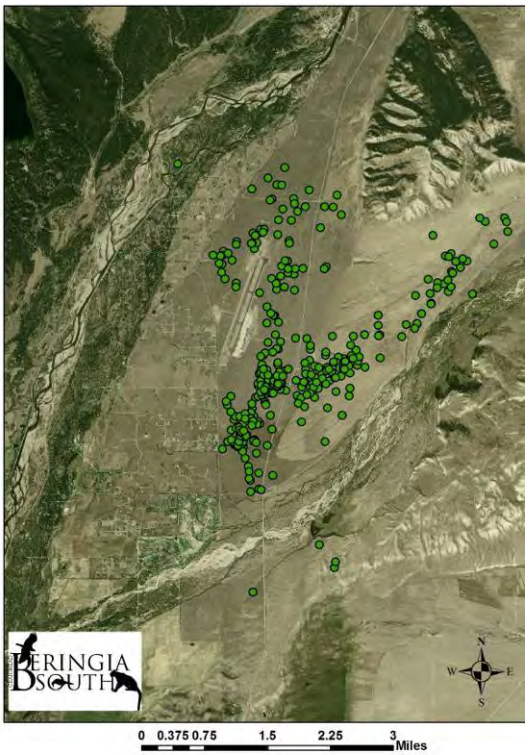

Figure 3-8: Summer Sage-Grouse Habitat use near JAC

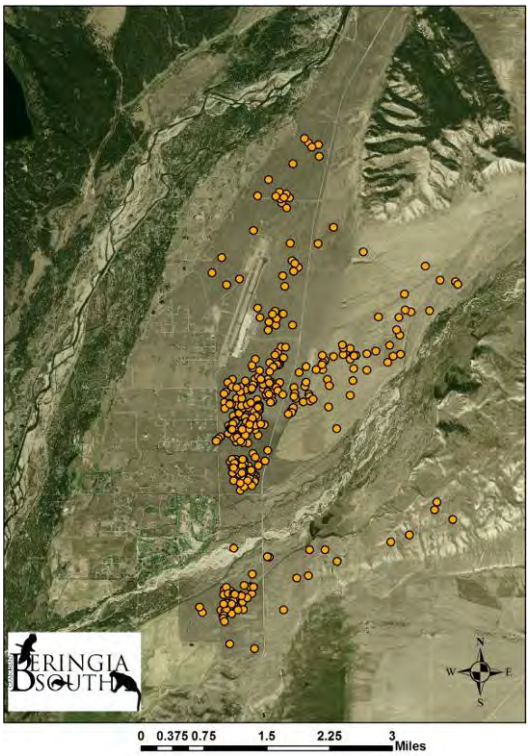

Figure 3-9: Autumn Sage-Grouse Habitat use near JAC

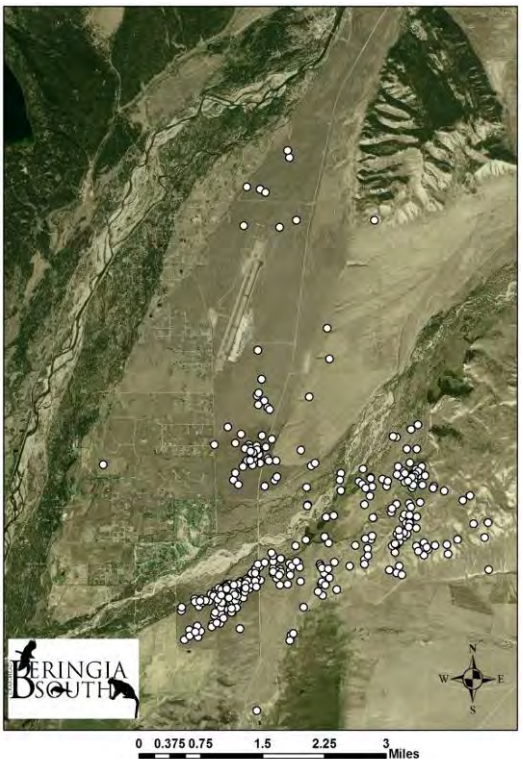

Figure 3-10: Winter Sage-Grouse Habitat use near JAC

4. Near-Term Management Measures

Near-term management efforts can be implemented by the JAC Airport Operations staff immediately following any necessary environmental approvals to reduce the risk to aircraft strikes within the airport boundaries. These measures are designed to incrementally increase the separation between aircraft and sage-grouse. They may be implemented singly or in combination to reduce the risk of wildlife strikes.

4.1 Runway Habitat Management Near Runways and Taxiways

The principal strike hazard documented at JAC is posed by female sage-grouse with broods of chicks along the runways and taxiways. These birds have been observed foraging in the vegetation kept short by frequent mowing and to maintain grass heights of 6 inches or less. Frequent mowing promotes the growth of succulent forbs and enhances insect diversity and abundance, both of which are attractive to sage-grouse. The primary goal of near-term management is to identify available measures that will dissuade birds from using areas adjacent to the RSA and encourage them to move incrementally to more distant areas of the airport.

4.1.1 Option 1: Revise Mowing Regimes within the AOA

Sage-grouse have been observed adjacent to the runways, and they appear to be attracted to areas containing forbs and short grass despite the proximity to moving aircraft. Airport mowing regimes could be altered to maintain lower-growing vegetation in areas more distant from the runway ends and from the runway centerline, such as areas adjacent to the perimeter road. Non-linear lobe areas containing shorter vegetation could be created in these more distant areas within the airport boundaries to attract sage-grouse (see **Figure 4-1** for potential mowing areas).

To make the RSA less attractive to sage-grouse, the grass adjacent to the runway could be maintained at the maximum height possible (12 to 14 inches). Care would be required so as not to disturb navigation equipment, such as runway or taxiway lights. Another alternative would be to treat the areas adjacent to the runway with herbicide and keep this area free from vegetation or treat the RSA with selective herbicides that target broadleaf plants only. To make the current lek area less attractive to sage-grouse, the grass at the north end of Runway 1/19 could be maintained at a height of 12 inches.

Altering the mowing regime is a feasible management measure as long as the following issues are monitored and avoided:

- *Introduction of Invasive species.* Nearby NPS efforts to create firebreaks within 20 feet of local roads has resulted in the introduction of cheat grass and other invasive species. To date, invasive species have not been present on the airport because airport mowers are used only within airport boundaries. Nevertheless, mowed areas should be monitored to prevent the introduction of invasive species and mowers should be thoroughly washed if they are taken off airport for use or repair.

- *Elimination of sagebrush.* Sagebrush should not be eliminated as a result of the new mowing regime. To prevent the elimination of sagebrush, mowing will take place in previously disturbed tracks.

- *Mortality.* Sage-grouse mortality has been observed adjacent to roads and as a result of fence collisions. Mowing near fences should be avoided to the extent practicable.

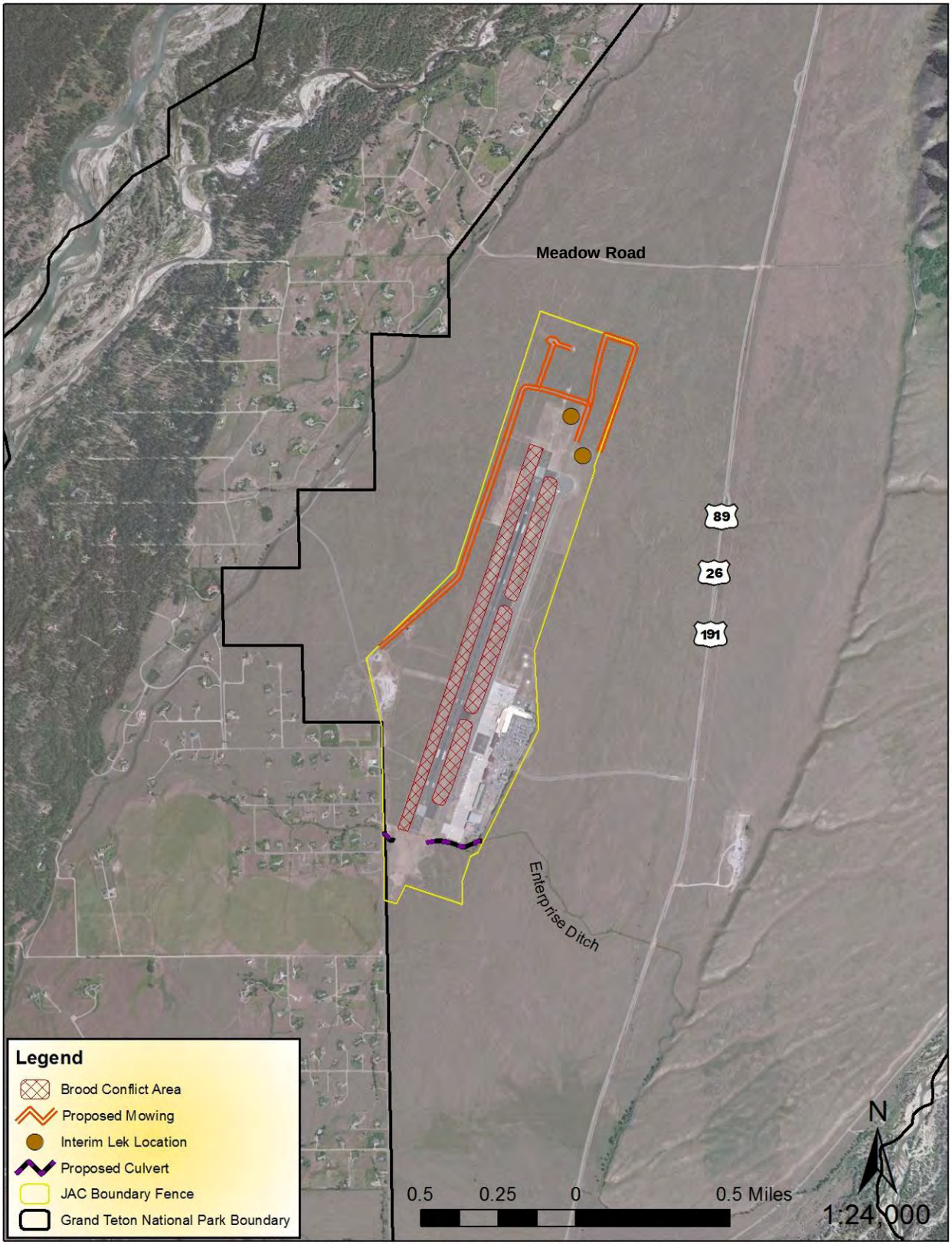

Figure 4-1: Near Term Management Measures

4.1.2 Option 2: Cultivate Forbs in Distant Areas of the Airport

Sage-grouse appear to feed on forbs in maintained areas adjacent to the runway. Providing irrigation that would enhance the presence of forbs in more distant areas within the airport boundary may draw sage-grouse farther from the RSA. Low-intensity burns could also be performed, but they may prove less precise in terms of targeting and maintaining specific areas.

4.2 Airport Lek Management

The Airport lek is located in the Runway 19 RSA. The distance between the area in which the birds strut and the runway may be increased incrementally by attracting sage-grouse to interim/short-term lek sites within the perimeter fence. To do so, the grass would be mowed to a height of 3 inches in two areas north and east of the runway centerline. To encourage the use of these more distant areas, snow could be removed from these areas during the early spring to make them more available and attractive to sage-grouse before the Airport lek area adjacent to the runway becomes snow-free. If the sites attracts sage-grouse, they could be further enhanced by the addition of soil to create a raised center.

Table 4-1 summarizes additional near-term management measures that would be used to draw male sage-grouse to alternate lek locations in more distant areas of the airfield. These interim measures would be used to increase the separation between the birds and aircraft incrementally until new, permanent habitat and lek sites can be established outside of the airport boundary (see Chapters 5 and 6). After the interim lek sites have been established, a horizontal monofilament grid can be installed approximately 12 to 18 inches aboveground to disrupt lekking behavior in the RSA.

Table 4-1: Proposed Near-Term Runway Lek Management Measures, Jackson Hole Airport

Timing	Task
Year 1	Maintain vegetation in currently mowed areas at heights of 12 to 14 inches
	Encourage a monotype grass culture in non-native areas through the application of herbicide to reduce forb component.
	Create snow-free areas north and east of the RSA to encourage use by grouse in late March.
	Following establishment of the alternative habitat/lek areas within the airport boundary, install a grid system and implement passive harassment techniques to encourage grouse use of the alternative sites early in the breeding season (March).
Year 2	Remove snow from areas north and east of the RSA in late March.
	Install grid system and implement passive harassment techniques in the vicinity of the RSA to encourage grouse use of alternative sites in late March.
Year 3	As off-site areas containing forbs are developed and become available, install smaller dimension wire along the bottom 2 feet of the perimeter fence to exclude wildlife passage.
	Target forbs in mowed area next to runways and taxiways with for NPS-approved treatment.
	Install grid and implement passive harassment techniques to the RSA to encourage grouse use of alternative developed sites.

Note: Near-term measures may be subject to environmental review.

4.3 NEPA Considerations Associated with Near-Term Management Measures

The NPS must perform a NEPA analysis for proposed actions that have the potential to affect resources within airport boundaries, including the mowing, irrigation, and pesticide application as proposed as part of the near-term management strategy. However, these activities could be considered through the prism of previous NEPA decisions associated with airport development and maintenance activities and the relationship of the proposed wildlife management measures to existing airport facilities. For example, the NPS has designated an Airport Development Zone, which includes the terminal facility and adjacent paved areas, and activities proposed in this area may be exempt from further NEPA review. However, the proposed near-term management measures would be performed outside of the Airport Development Zone.

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5. Restoration of Brood-Rearing Habitat

5.1 Available Sage-Grouse Habitat

Located in a constricted, high mountain valley, the physical environment of Jackson Hole limits the area available for occupation by sage-grouse. In GRTE, approximately 39 percent (40,425 acres) of the area within approximately 6 miles of JAC contains sagebrush habitat (see **Figure 5-1**). Some of the sagebrush habitat is suitable for sage-grouse nesting and brood-rearing, while other areas include a large proportion of non-native grasses or other vegetation that sage-grouse do not use for food or security habitat. Other areas within this approximately 6-mile radius of JAC have been burned as result of wildfires or prescribed burn events. Since sagebrush generally requires at least 30 years to re-establish following a fire, the burned areas might not be available to provide the vegetative cover needed by sage-grouse for several decades.

5.2 Locations Considered for Brood-Rearing Habitat

Sagebrush habitats throughout Jackson Hole, as well as those in the immediate airport vicinity, are critical for local sage-grouse populations. By proposing the development of brood-rearing habitat on previously disturbed sites, sagebrush-dominated habitats would not be altered, minimizing the negative risk associated with proposed actions. Within GRTE, habitat alterations that lend themselves to potential restoration for sage-grouse include those that have been manipulated for agricultural purposes.

5.2.1 Former Agricultural Areas

Multiple areas surrounding the airport and other areas in GRTE were formerly manipulated as hayfields during their use by private parties prior to ownership by the NPS. On most of these sites, some level of soil manipulation to improve agricultural processes likely occurred.

The Kelly Hayfields comprise approximately 4,000 acres east of Blacktail Butte that were homesteaded in the late 1800s and early 1900s prior to the establishment of GRTE. During the homesteading era, native rangeland vegetation was cleared and non-native grasses were planted to feed livestock. Most of the hayfields are now dominated by a few exotic species, primarily smooth brome (*Bromus inermis*) and bluegrass (*Poa compressa*). Proposing the development of brood-rearing habitat within the former Kelly Hayfields is consistent with national park policy, as it would not affect an existing natural area and would further ongoing restorations efforts in the former agricultural area.

5.2.2 Burned Areas

Since 1985, 28 fires have occurred within 6 miles of the airport that affected 7,198 acres (see **Figure 5-1**). Although the NPS generally views wildfires and subsequent restoration as natural processes that do not require intervention, several of the burned areas near JAC include previously disturbed areas, such as former agricultural areas, that would be appropriate for restoration. The 2003 Blacktail Fire burned 2,652 acres that consisted included sagebrush and exotic grasses. The site of the 2003 fire provides an excellent opportunity to restore the native sagebrush community to a condition that is suitable for sage-grouse nesting and brood-rearing, and its restoration would be compatible with NPS policy.

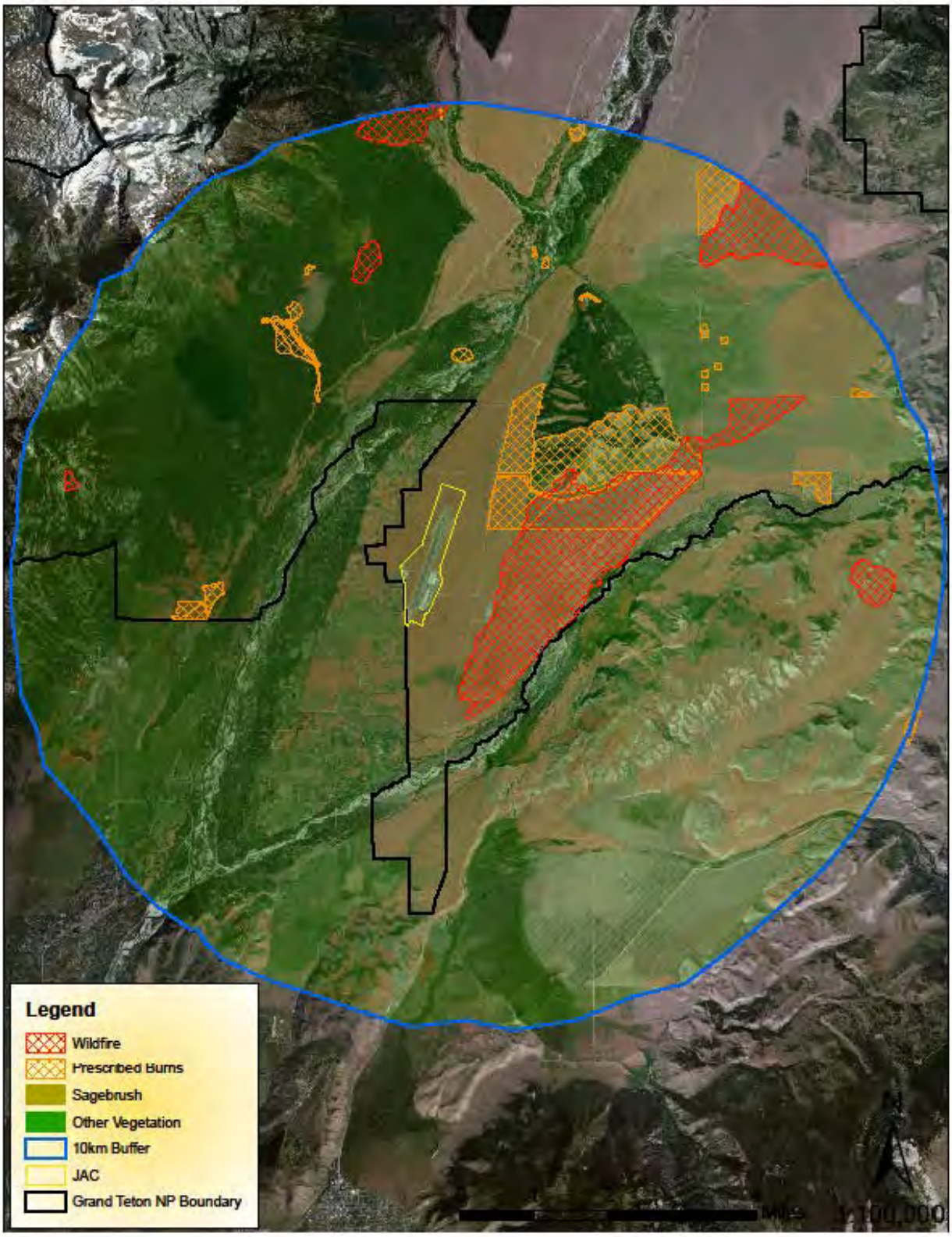

Figure 5-1: Vegetation and Burn Locations within 6 miles of JAC

5.2.3 Restoration Opportunity Areas

Sage-grouse brood-rearing habitats are characterized by a variety of herbaceous plants, particularly forbs, which typically occur early in successional trends and in close association with sagebrush cover. Forbs are generally all flowering plants in a rangeland community other than shrubs or grasses, and their presence is critical as a food source for young sage-grouse chicks. Vegetation near feeding areas that provides cover for hiding is also important for brood-rearing areas. Sagebrush typically provides such cover.

Exotic brome grasses were planted for hay crops on several of the agricultural areas. These grasses have a sod-forming habit that limits the potential establishment of native plants. Such areas do not provide food or cover for sage-grouse. GRTE has embarked on an effort to restore portions of these former hayfields to native plants on a park-wide scale. These established goals and protocols can be refined to provide enhanced habitat for sage-grouse brood-rearing and lek areas in support of the WHMP. **Figure 5-2** identifies the location of proposed brome field areas that could be targeted for restoration and the development of sage-grouse brood-rearing habitat.

5.3 Site Selection

Based on the biological characteristics of the sage-grouse, its observed behavior, and local landscape patterns, several areas were considered for habitat enhancement/restoration but eliminated for further analysis. One site was located west of the airport along Solitude Road, but it was eliminated for further consideration based on the potential for grouse to cross the airport operations area to access the restored habitat area. Another site was located north of the airport west of Meadow Road. The site was initially considered because it included a high density of sage-grouse nests, but it was dismissed from further consideration based on its proximity to the runway and location within the extended runway centerline. These sites are not illustrated or discussed further in this document.

Based on discussions and analyses performed by Working Group members, three previously disturbed areas were identified as proposed brood-rearing habitat restoration sites (see **Figure 5-3**):

- The McBride Brome Field, which is an approximately 100-acre site immediately adjacent to the McBride lek southeast of the airport, includes a historic sage-grouse lek.

- The South Blacktail Brome Field, which is an approximately 160-acre site located on a bench south of Blacktail Butte, occurs approximately 1.5 miles due east of the airport. A portion of the area may be suitable for restoration.

- The Meadow Road East site is a 103-acre site located immediately east of the junction of Meadow Road and Highway 89. The site was associated with a prescribed burn.

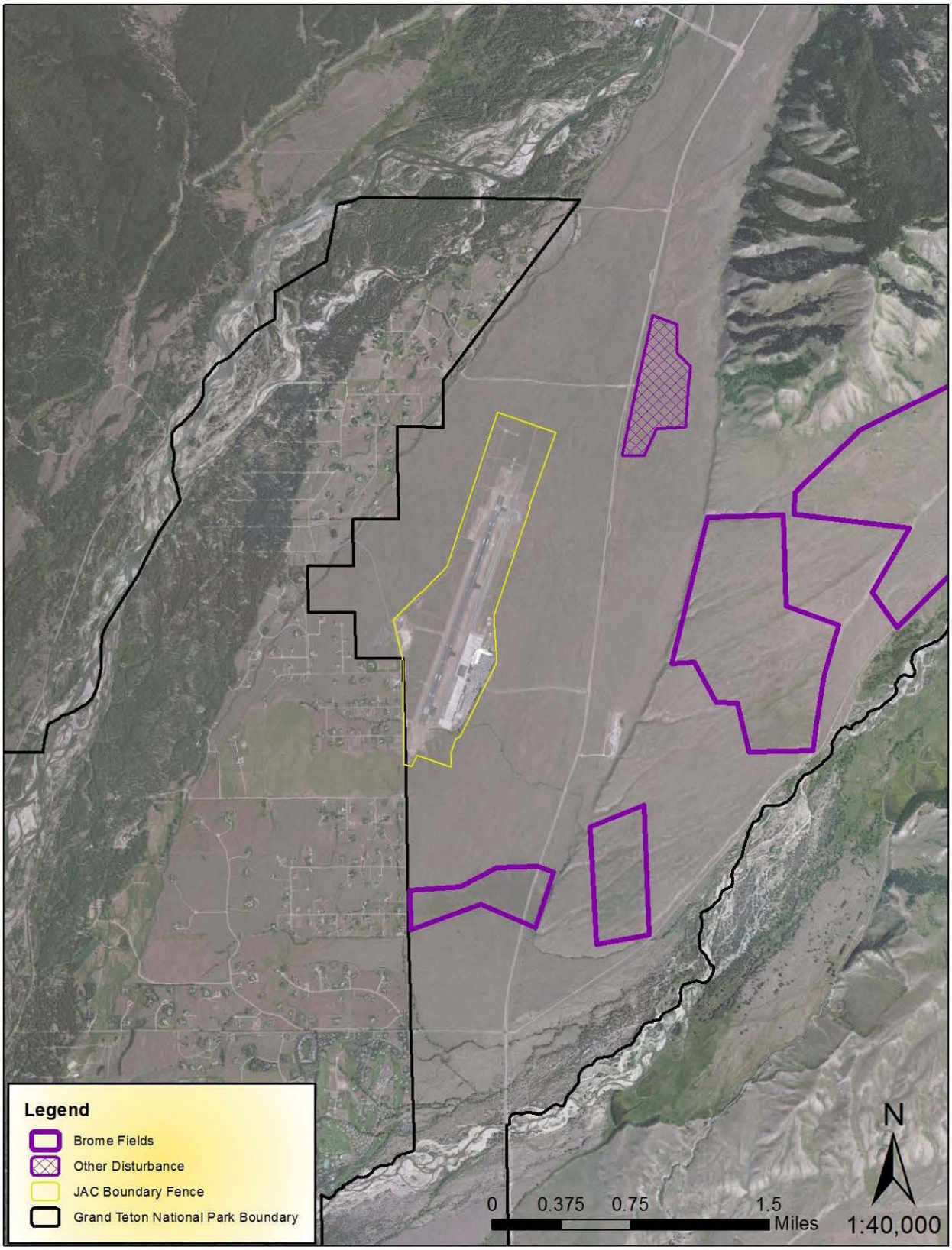

Figure 5-2: Disturbed Vegetation Near JAC

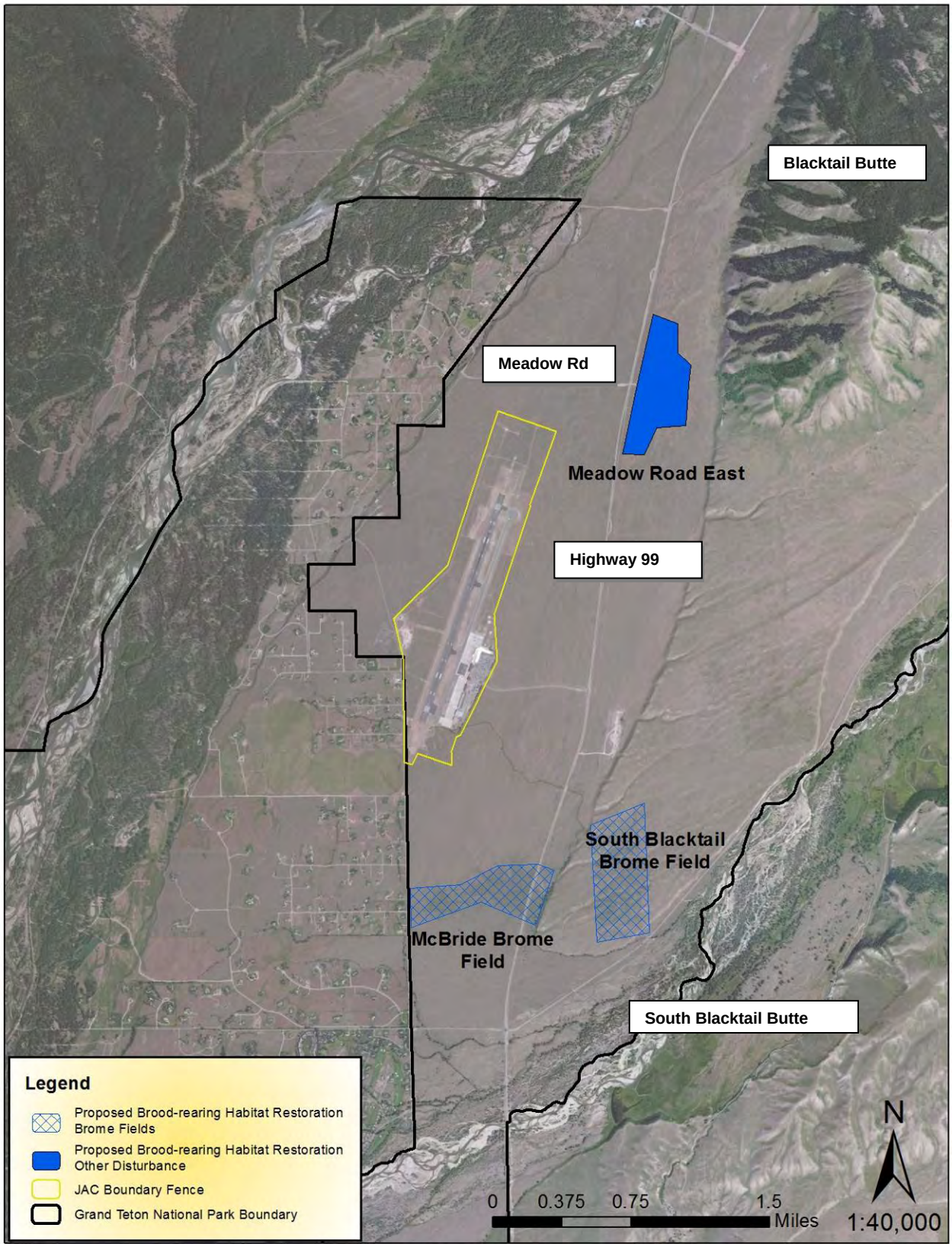

Figure 5-3: Proposed Brood-Rearing Habitat Restoration Sites

The proposed McBride habitat restoration site is located south of JAC and dominated by exotic brome grasses, but some sagebrush is colonizing a 70-acre area within the site. The surrounding area includes some of the highest nest densities documented for the Jackson Hole sage-grouse population, and the historic McBride lek is adjacent to this site. The presence of the historic lek and high density of nests in the immediate vicinity increases the likelihood that restored habitat will be attractive to and used by sage-grouse.

The proposed Meadow Road East site is located east of Highway 89 and the junction of Meadow Road. The Meadow Road East site is disturbed, but it was not formerly cultivated and already contains some suitable brood-rearing habitat. A high density of nests occurs to the west of the site, and the presence of the nests will help to draw hens with broods to the new habitat restoration area (see **Figure 5-3**). A historic lek north of Meadow Road was noted in Patterson (1952), but the area was not observed to be active and has not been documented by recent observers. The Meadow Road East site also offers opportunity to serve as a lek restoration site.

The South Blacktail Butte site includes several former agricultural areas with high densities of brome grasses on the bench south of Blacktail Butte. The areas have generally similar extant conditions and habitat management potential (see **Figure 5-3**). Nearly all the areas have been recently burned; therefore, the initial focus needs to be on expediting the re-establishment of sagebrush. Following sagebrush re-establishment, restoration of historic hayfields on the bench could follow the methodology proposed for the McBride Hayfields.

The McBride and South Blacktail Butte sites must be thoroughly evaluated for their stage of vegetative recovery prior to developing a targeted planting design, and the Meadow Road East site must be evaluated to identify the measures necessary to attract grouse to the improved habitat. The McBride site includes evidence and patterns of sagebrush re-colonization, some of which would be incorporated into the design of the restoration planting plan to produce a mosaic of young sagebrush plants interspersed with a rich forb component.

5.4 Site Development Approach

Since 2008, GRTE has undertaken the restoration of a former agricultural area known as the Kelly Hayfields. The NPS has undertaken efforts to restore native vegetation in this area in association with the *Bison and Elk Management Plan* (USFWS and NPS 2007). The preferred alternative identified in the EIS involved the restoration of approximately 4,500 acres of previously cultivated areas within the park to native plant communities. The portion of the Kelly Hayfields Restoration that is underway as a result of this unrelated project could result in the creation of approximately 4,000 acres of sagebrush plant community during the next 15 to 20 years. The coordination and completion of both projects could offer synergy by enhancing the quality and quantity of habitat for sage-grouse throughout the valley.

The Kelly Hayfields Restoration Program recently undertaken by NPS could provide insight and serve as a model for restoring selected areas to native vegetation in an effort to provide sage-grouse brood-rearing habitat. **Table 5-1** presents the list of native species that was developed for the Kelly Hayfields Restoration Program that could be used as a base list to develop the proposed brood-rearing habitat sites identified in Section 5.3. The list was created to initiate a relatively complete native plant community. To attract brood-rearing hens, the seed mix would be modified to include a greater percentage of forbs and a lesser percentage of grasses and shrubs.

Table 5-1: Seed Mix Used in Kelly Hayfield Restoration Project

Species Name	Common Name	Percentage of Mix
Achillea millefolium	White yarrow	5
Artemisia tridentata vasey.	Big sagebrush	1
Balsamorhiza sagittatta	Arrowleaf balsamroot	5
Bromus marginatus	Mountain brome	8
Elymus spicatus	Bluebunch wheatgrass	10
Elymus trachycaulus	Slender wheatgrass	35
Eriogonum umbellantum	Sulfur buckwheat	2
Helianthella uniflora	One-flowered sunflower	2
Leymus cinereus	Basin wild rye	18
Poa secunda	Sandberg bluegrass	4
Purshia tridentata	Antelope bitterbrush	0.5
Viguiera multiflora	Showy goldeneye	5
Stipa nelsonii	Needlegrass	1
Penstemon procerus	Small flowered penstemon	2
Potentilla glandulosa	Sticky cinquefoil	2

Approximately three years would be required to develop the proposed brood-rearing sites associated with the WHMP. **Table 5-2** identifies the tasks and milestones associated with the initial three-year implementation period following necessary environmental approvals. As discussed in Chapters 7-8, ongoing monitoring would be required to determine the effectiveness of the proposed habitat restoration and offer opportunities to modify the process as necessary.

Table 5-2: Proposed Brood-Rearing Habitat Restoration Process Steps	
Timing	**Task**
Year 1	**Spring or fall:** Conduct a prescribed burn to remove above ground biomass. Burning optimizes herbicide contact on new plant growth and assists with the depletion of smooth brome root reserves. (This step is not always required and is dependent on above-ground biomass amounts.) At the Meadow Road East site, identify methods to attract grouse to the available habitat, such as the use of recorded calls, etc.
	June: Apply a precisely timed glyphosate herbicide to smooth brome in **the 4-5 leaf stage**. The timing of this step is critical.
	Late August or early September: Plant a cover crop of winter rye in late August or early September to compete with exotic plant species and provide soil enhancement.
Year 2	**June:** Apply a second treatment of glyphosate to areas which brome mortality was not successful.
	October: Drill native grass, forb, and shrub seed mix (Table 1) into restoration area. Seed mix consists of seeds collected in the park and raised at an off-site farm or nursery.
Year 3	Target exotic species with herbicide treatments within the restoration area.

6. Restoration of Lek Areas

The effort to create or restore additional lek areas to draw sage-grouse from the airport will be implemented in two separate, but linked, field projects: the restoration of brood-rearing habitat and the development or restoration of lek areas. Both are predicated on the thesis that sage-grouse are attracted to the airport lek because of the presence of landscaping (e.g., maintained vegetation) and because the area near the end of the runway becomes snow-free earlier in the spring compared to surrounding areas as a result of aircraft operations.

The proposed lek restoration associated with the WHMP would provide for the targeted creation of suitable lekking habitat in former agricultural sites or other previously disturbed areas, including former leks. The restoration efforts would focus on replacing the vegetation in the disturbed areas with low-growing cover that would be suitable for a lek.

The proposed lek restoration would be designed with the knowledge that young male sage-grouse visit multiple leks prior to establishing a breeding territory, and that females typically visit multiple leks each season. The adult males that have established territories on the current airport lek would likely continue to attend this site for the remainder of their lives, which is typically three to five years.

6.1 Site Selection for Proposed Lek Restoration

The areas proposed for restoration are either historic leks, where sage-grouse have been documented to strut in the past (McBride and Airport Pit), or areas situated within “satellite” distance of active and historic leks (Meadow Road East). The areas are described in **Table 6-1** and illustrated on **Figure 6-1.**

6.1.1 Historic Lek Sites

Both the McBride and Airport Pit lek sites have been used previously by sage-grouse as strutting areas, and both have been disturbed. Lek restoration at both sites would comply with NPS policy.

The McBride lek is associated with a remnant agricultural field that was modified during the early settlement of the valley, but agricultural practices, including seasonal mowing and irrigation, have ceased since the area was incorporated into GRTE. Plant succession and competition have resulted in a vegetative community that is dominated by exotic grasses, with some sagebrush seedlings pioneering at the edges. Sage-grouse were observed strutting at the historic McBride Lek consistently through the late 1990s, and a single male was observed on the site in 2007. Because this site is south of the airport, traffic-related disturbance may complicate lek restoration. Therefore, the proposed lek restoration must include features that encourage grouse to occupy areas while remaining at a safe distance from the road.

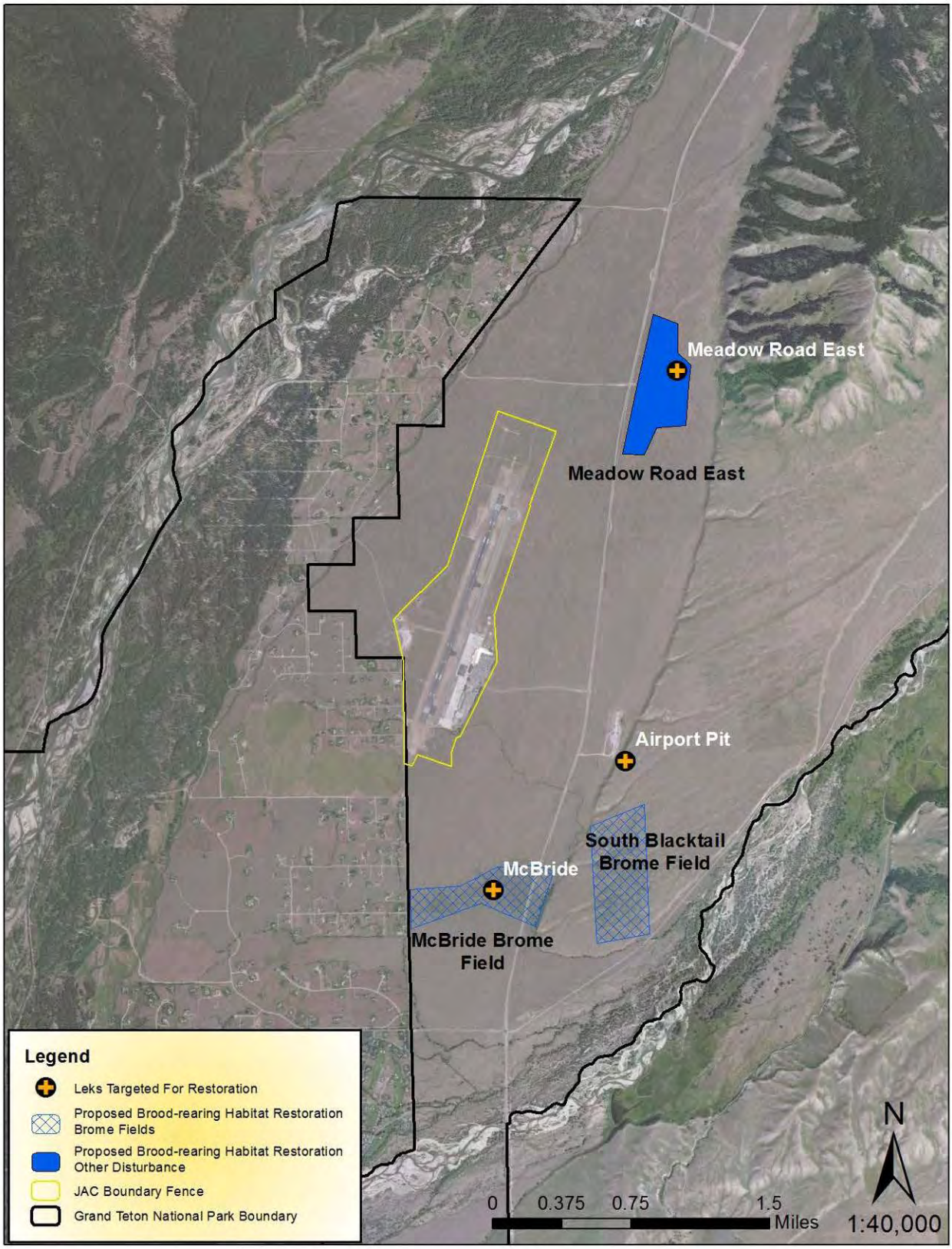

Figure 6-1: Proposed Lek Restoration Areas

The former Airport Pit Lek is located in an area from which sagebrush has been removed. The site was used as a small gravel pit and later converted to a gun range. Sage-grouse have been observed both on the old gravel pit and in more recent years on the bench above the gun range prior to moving to the Airport Lek during snow melt. Much of the habitat surrounding the Airport Pit Lek site has been burned, and the lack of daytime roosting cover and surrounding nesting cover may complicate the development of a lek on this site.

6.1.2 Potential Satellite Lek Site

The Meadow Road East site is the site located nearest to the Airport lek, and it is the only proposed lek restoration area located north of the airport. This site is likely to experience less traffic-related disturbance compared to the other two proposed locations. However, the site is located near forested habitats on Blacktail Butte, which may limit use by sage-grouse as the species is known to avoid vertical structure including forests. Compared to the proposed McBride Lek and Airport Pit sites, the Meadow Road East site is less disturbed and already provides some suitable brood-rearing habitat, which will complement the proposed satellite lek.

The manipulation of undisturbed sites is inconsistent with park policy, and the use of ongoing measures to develop a satellite lek at the Meadow Road East site, such as regular mowing or irrigation, could be inconsistent with NPS policy. However, the use of less intrusive or infrequent measures, such as the creation of a raised area through the one-time application of additional soil to create a domed area, may be permissible as they would encourage lekking and support NPS policies associated with the conservation of a candidate species as set forth in Section 4.4.23 of the 2006 Management Policies. As previously stated, all proposed measures would be evaluated by NPS to determine their potential environmental effects pursuant to NEPA and their compliance with NPS policy.

Table 6-1: Proposed Lek Restoration Areas Opportunities and Constraints

Name	Advantages	Disadvantages
Historic McBride Lek	Historic use as a lek into 1990s	Existing anthropogenic noise and other disturbances in all four directions is substantial and will increase over time
	Location in area of high nesting density	Site is close to the highway and has may pose risks of vehicle collisions
	Surrounding sagebrush provides escape cover	
	Restoration of previously cultivated land is consistent with Elk and Bison EIS and NPS vision	
	Potentially better soils for establishment and maintenance of forbs as component of complementary brood-rearing habitats	
	In line between North Gap lek potentially used as "staging" lek by males using Airport Lek, thereby may "intercept" males on their way to Airport Lek	

Table 6-1: Proposed Lek Restoration Areas Opportunities and Constraints		
Name	**Advantages**	**Disadvantages**
Airport Pit	Contemporary use when snow covers Airport Lek.	Lack of nesting hens immediately surrounding the lek reduces potential to establish lek.
	Second lowest in terms of extant and future anthropogenic disturbances, including traffic to airport.	Old burns in area limit current nesting and brood-rearing habitat.
	In line between North Gap lek potentially used as "staging" lek by males using Airport Lek, thereby may intercept males on their way to Airport Lek.	Lack of nearby sagebrush for escape cover may limit use by grouse.
		Location on gravelly bench may limit potential for forb establishment as component of complementary brood-rearing habitats.
		Site is near an operational firing range.
Meadow Road East	Location in close proximity to area of high nesting density.	Marginally higher snow load of the three sites considered.
	Close to existing Airport Lek and in general area of historic Patterson lek	Surrounding area more constricted than other sites.
	Lowest in terms of extant and future anthropogenic disturbances, including traffic to airport.	Trees associated with Blacktail Butte may reduce use by grouse.
	Suitable brood-rearing habitat exists in this area, and little manipulation is required.	Ongoing disturbance of this area to create a lek may be inconsistent with NPS policy.
		Site is near to the highway and may pose risk of vehicle collisions.

6.2 Implementation Process

One of the environmental factors that must be addressed is associated with the typical snowpack encountered during winters in Jackson Hole. Field observations and airport use patterns suggest that the reduced amount of snow that is present at the airport early in the breeding season compared to the amount of snow in the airport vicinity may contribute to the use of the airport by sage-grouse. When most of the surrounding areas are covered by several feet of snow, portions of the airport are free of snow or have snow at a lesser depth. Aircraft movement areas are plowed, and exhaust from engine run up as well as heat radiating from the blacktop may accelerate snow melt in areas adjacent to paved areas. To make the proposed lek restoration sites attractive to sage-grouse, it may be necessary to provide snow removal. Access routes to the proposed McBride and Airport Pit leks will need to be developed to allow sage-grouse to reach these areas during the early spring.

One option for reducing or eliminating snow cover at lek restoration sites would involve the application of a dark substance to the surface of the snow to facilitate melting. Two potential materials have been identified to date that could be applied to the surface of the proposed lek areas:

- *Powdered charcoal*. The NPS has applied powdered charcoal to maintain use of the Tioga Pass Road in California's Yosemite National Park

- *Black landscaping sand.* The 3-Creek Ranch Golf Course in Jackson, Wyoming, applies black landscaping sand to the greens to accelerate snow melt

Both charcoal and black sand are used to promote snow melt on golf courses across the northern portion of the United States. These substances are applied with a small fertilizer spreader and have the added advantage that they can be applied by a field crew on snowshoes or by snow machines, thereby eliminating the need to access sites with snow-removal equipment. Snow removal will be necessary on an annual basis at the selected lek restoration/development sites.

Each potential lek restoration site would be equipped with features to make it more attractive to breeding sage-grouse (**Figure 5-2**). These methods used to enhance the attractiveness of the proposed sites would generally follow the techniques identified by Eng *et. al.* 1979, which include the use of on-site decoys and broadcasting locally-collected recordings of sage-grouse booming. This portion of the effort would be continued until sage-grouse initiate use at the enhanced leks (two to three years) and would be suspended after sage-grouse start to use these sites regularly.

Procedures for surface manipulation and reclamation would follow extant NPS protocols developed for agricultural areas. (See Section Chapter 5 for a discussion of the Kelly Hayfields restoration project.)

6.3 Lek Restoration Timeframe

Procedures and protocols to enhance lek habitats will generally follow and build upon those listed above for restoration of brood-rearing habitats and are adapted from the *National Elk Refuge and Grand Teton National Park Bison and Elk Management Plan,* which was prepared by the USFWS and NPS (2005). **Table 6-2** summarizes the proposed lek development strategy and process steps. All proposed lek development/restoration procedures will be subject to environmental review.

Table 6-2: Proposed Lek Restoration Strategy Process Steps	
Timing	**Task**
Year 1	In October, mow an approximately 4-acre area on the west side of McBride hayfield and Meadow Road East site. (The McBride Hayfield consists almost entirely of brome; mowing activities in this location will not disturb sage brush.) Inspect Airport Pit Lek and clear vegetation if necessary.
	In late March, remove snow from potential lek restoration sites.
	From the last week of March through April, deploy sage-grouse decoys and broadcast locally obtained recordings of grouse displays in mornings and evenings. Deploy remote cameras to document grouse visitation.
	In May, conduct a spring prescribed burn to remove above ground biomass for the McBride and Meadow Road East sites. Burning optimizes herbicide contact on new plant growth and assists with the depletion of smooth brome root reserves. This step is not always required and is dependent on above ground biomass amounts.
	In June, apply a precisely timed glyphosate herbicide to smooth brome in the 4-5 leaf stage in June. The timing of this step is critical.
	Add gravel road base to approximately 0.25 acre to reduce plant growth, minimize long-term maintenance, and provide slightly elevated lek center.
Year 2	Remove snow from potential leks in late March.
	From the last week of March through April, deploy sage-grouse decoys and broadcast locally obtained recordings of grouse displays in mornings and evenings. Deploy remote cameras to document grouse visitation.
	Apply a second treatment of glyphosate in June on select areas where brome mortality did not meet objective.
	In October, drill native grass seed mix (modified from Table 3-1) into restoration area. Seed mix consists of seeds collected in the park and increased at an off-site facility. Specific seed mix for leks will be of short stature grasses with no forbs or shrubs to maximize long-term vegetative aspect of lek
Year 3	In late March, remove snow from potential leks.
	Last week of March through April, if necessary deploy sage-grouse decoys and broadcast locally obtained recordings of grouse displays in mornings and evenings. Deploy remote cameras for documentation of grouse visitation.
	Target exotic species with herbicide treatments within the restoration area.

7. Long-Term Monitoring

Bohne et al. (2007) emphasize the importance of short-term and long-term post-prescription monitoring of a proactive sage-grouse management project, stating that "Monitoring the post-prescription response of vegetation and sage-grouse populations to habitat manipulation is critical. Monitoring plans require a commitment of manpower and resources; if these resources cannot be committed prior to initiation of management change, then the value of the proposed project should be questioned and the project should be reconsidered or terminated."

Post-prescription monitoring is required to ensure that adaptive management can be effectively implemented. In general, post-prescription monitoring efforts should incorporate the same monitoring methodology that was implemented during pre-prescription to ensure that comparable data are obtained.

To optimize the amount and quality of data obtained during post-prescription monitoring for the proposed *Sage Grouse Habitat Restoration Plan*, field efforts should be coordinated and combined with other ongoing projects. Doing so will increase the likelihood of obtaining information that will be sufficient to withstand the statistical-rigor required. Recommendations to pursue a collaborative effort include:

- The leveraging of extant data through the standardization of post-prescription protocol with those conducted prior, thereby allowing the use of previously collected data as pre-treatment;
- Use of ongoing data collection efforts to assess the success of implemented actions;
- Tying monitoring efforts associated with this plan to those associated with other, ongoing projects to increase field efficiency and facilitate multi-species assessments;
- Combining field efforts to ensure comparison relevance and increased field efficiency.

The potential collaborative aspects of the proposed monitoring efforts are discussed in association with each task and summarized in **Table 7-1**.

7.1 General Approach and Timeframes

The proposed long-term monitoring program should ensure that reference (i.e., control) sites are monitored in conjunction with sites where management prescriptions are implemented so that monitoring data can be analyzed in a before-after control-impact (BACI) design. To provide adequate data, the following timeframes are recommended in conjunction with the proposed WHMP:

- Pre-prescription data should be collected a minimum of 2 years preceding implementation
- Post-prescription monitoring should be collected a minimum of 3 to 5 years post-implementation to account for lags in the response of sage-grouse populations to habitat change

- If vegetation-manipulating habitat treatments are implemented (e.g., prescribed fire, herbicide application, mechanical treatment), post-prescription vegetation and sage-grouse population monitoring may be required regularly (e.g., every 3 to 5 years) for at least 30 years post-implementation to account for the temporal window of the effects of treatments

7.2 Previous Monitoring Efforts

The proposed monitoring strategy should rely extensively on past research to establish baseline conditions and post-prescription monitoring protocols. Sage-grouse populations have been studied in Jackson Hole since the late 1940s; Patterson (1952) conducted the first sage-grouse study in the region during that time. Between 1999 and 2003, Holloran and Anderson (2004) conducted a study to assess sage-grouse seasonal habitat selection and survival. Following the Holloran and Anderson study, Bedrosian *et al.* (2010) conducted a more detailed study to determine population demographics, seasonal movements and habitat use, habitat differentiation by sage-grouse and predators, winter vegetation characteristics, and natal dispersal of sage-grouse. Bedrosian and Walker (2010) also conducted research specific to sage-grouse breeding behavior and habitat selection on JAC in 2009. Additionally, known leks throughout the Jackson Hole area have been counted annually from the late 1940s following standardized methodology (see **Table 3-1**).

Objectives associated with these previous studies that are important to the WHMP include the following:

- Identifying critical seasonal habitats
- Identifying potentially limiting factors for the population
- Providing baseline data for future research of sage-grouse in the Jackson Hole area
- Tracking population trends throughout Jackson Hole

7.3 Proposed Monitoring Strategy

As described previously, one the goals of the proposed *Greater Sage-Grouse Habitat Restoration Plan* is to provide brood-rearing habitat and lek enhancement or restoration at specific locations in an effort to draw breeding and brood-rearing sage-grouse from areas within the airport boundaries to more distant locations. Following the establishment of habitat and lek restoration areas, a series of habitat modification measures would be implemented on the airport property to render it less attractive to sage-grouse.

The following monitoring strategy is proposed to assess the effects of the proposed habitat restoration and on-site modification measures associated with the WHMP on sage-grouse populations and sage-grouse habitats in Jackson Hole. The monitoring strategy associated with the proposed WHMP would be designed to determine the following short-term and long-term objectives, which are described in Sections 7.3.1 through 7.3.6:

- Short-term changes in sage-grouse lek occupancy relative to management actions implemented
- Short-term changes in female sage-grouse habitat selection during the brood-rearing period relative to management actions implemented
- Long-term changes in male sage-grouse lek occupancy relative to management actions implemented
- Long-term changes in female sage-grouse habitat selection during the brood-rearing period relative to management actions implemented
- Long-term changes in sage-grouse use of JAC during breeding and brood-rearing seasons
- Vegetative response of sagebrush habitats to implemented treatments in relation to vegetative conditions suitable for sage-grouse brood-rearing

Monitoring involving radio-telemetry is recommended to address the short-term monitoring objectives (2 to 3 years post-prescription). Seasonal habitat selection data collected by Holloran and Anderson (2004) and Bedrosian et al. (2010) would be used to establish baseline – or pre-prescription – habitat selection. Post-prescription telemetry monitoring and analyses would focus on quantifying changes in habitat selection and demographics relative to the management actions implemented. Radio-telemetry would provide a BACI-designed, rigorous evaluation of the short-term response of sage-grouse to the management measures.

At least 40 sage-grouse (approximately 20 females and 20 males) would need to be captured and equipped with standard very high frequency (VHF) radio transmitters similar to those used pre-treatment. Radio-marked sage-grouse should be captured in a manner that provides for the sampling of the entire project area. Because the treatments are dispersed in the areas surrounding JAC, this would most easily be accomplished by sampling birds from multiple leks dispersed through the southern half of Jackson Hole. The study would be designed to assess sage-grouse use of treatment areas that are focused within the southern half of the valley during the breeding and brooding periods, as previously radio-marked sage-grouse have shown little movement between the northern and southern portions of Jackson Hole during those periods.

Radio-equipped sage-grouse should be located at least twice weekly from time of capture (April) through September (breeding, nesting, early and late brood-rearing, summer and fall) and at least weekly during the winter (October to March). In addition to seasonal habitat locations, demographic information, including nesting propensity, nest success, brood survival, chick fledge rates, and adult survival should be collected. All relocations should be ground-based to ensure location accuracy. Researchers experienced in capture and radio-tagging techniques must perform these monitoring measures.

7.3.1 Objective 1: Determine Short-Term Changes in Lek Occupancy Relative to Management Actions (2 to 3 years Post-Prescription)

The first objective associated with short-term monitoring is to determine changes in male and female sage-grouse lek occupancy following the implementation of lekking habitat restoration measures. As described previously, an approximately three-year time-frame will be required to restore the proposed habitat and lek sites (see **Tables 5-2 and 6-2**).

To monitor the use of leks by radio-equipped male and female sage-grouse, data loggers would be placed at all known leks in Jackson Hole, including the enhanced lek locations. Data loggers should be placed in discrete locations that provide coverage for the entire lek, and all available radio-frequencies (i.e., male and female radio-equipped sage-grouse) should be scanned. Data loggers would be monitored remotely using free wave equipment during the breeding season, and any direct access to data loggers would be conducted between 10:00 and 14:00 hours to avoid and minimize the possibility of influencing breeding sage-grouse. Reference transmitters would be employed approximately 50 meters from each data logger to verify download accuracy. Following the breeding season, data loggers would be collected and data retrieved.

In addition, radio-equipped male sage-grouse should be located at least three times weekly during the breeding season, preferably between sunrise and 1 hour after sunrise; however, day-time locations can be used to inform field crews of potential leks in which a male may be strutting. This is especially important for males that are not monitored by data loggers—or those males that are not established on a known lek. For comparisons, the leks on JAC and the restored leks would be considered “impact leks” whereas other leks in Jackson Hole would be considered “control.” The response of radio-equipped sage-grouse to implemented lek management in terms of breeding season habitat selection would be assessed directly from these data.

To analyze the data, individuals would be separated into “impact” and “control” groups based on breeding season location data obtained by ground-based locations. The differences in survival probabilities between individual males and females in the impact and control groups would be assessed. Survival probability models that can incorporate habitat covariates, such as the selection of restored lek locations, would be used to assess differences in survival.

7.3.2 Objective 2: Determine Short-Term (2 to 3 Years Post-Prescription) Changes in Female Sage-Grouse Habitat Selection During the Brood-Rearing Period Relative to Management Actions Implemented

A primary challenge associated with determining the response of brood-rearing sage-grouse to management actions will be to identify those individuals in the sample that may have been influenced by the management actions. To be influenced, an individual must have selected or avoided areas that were modified relative to areas that were not modified. Since modifications will occur within abandoned hayfields located throughout the southern half of the Jackson Hole core area, an assessment of sage-grouse use of the modified hay field areas will need to be analyzed in the context of the hayfields that have not been modified. The analyses will assume

that individual females whose available brood-rearing/summer range includes portions of modified hayfields or a portion of the habitat included inside the JAC perimeter fence are "impacted", whereas those individuals whose range includes hayfields that have not been modified would serve as "control" individuals.

The available range would be established using extant Geographic Positioning System (GPS) data-based movement patterns that are typical of an individual during the sampling interval. For example, if an individual is located every 3 to 5 days during the early brood-rearing period, then the distribution of early brood-rearing GPS locations from extant data during 3- to 5-day intervals would be used to establish the size of the buffer needed to estimate the scale of available habitats. These assessments need to be made for both pre- and post-treatment individuals monitored with VHF radio transmitters (i.e., the "before-after" component of the BACI design).

Based on the landscapes per individual, Resource Selection Functions (RSFs) will be generated by comparing previously used points to randomly generated points within the available space. Afterward, parameter estimates should be averaged across individuals in a group (i.e., pre-treatment impact; pre-treatment control; post-treatment impact; post-treatment control) to establish global models by group. The response of sage-grouse to management would then be assessed as changes in the probability of selection given management in the impact population as standardized by changes in the probability of selection in the control population.

Similar to breeding season survival assessments, individuals that reared broods in areas where manipulated hayfields, non-manipulated hayfields, no hayfields, and/or the airport were available should be separated, and differences between brood survival, chick fledge rates, and adult survival during the brood-rearing season should be investigated using survival models that can incorporate habitat covariates.

The modeling proposed here requires sufficient and suitable GIS covariate layers for adequate estimates of probabilities of selection. Needed covariate layers should be established *a priori*. If unavailable as either an extant layer or suitable proxy, the layers will need to be generated prior to modeling.

7.3.3 Objective 3: Determine Long-Term Changes in Male Sage-Grouse Lek Occupancy Relative to Management Actions Implemented (Up to 30 Years Post-Prescription)

Lek counts in combination with lek searches would be used to assess the long-term efficacy of the proposed management actions following implementation. Extant data for establishing baseline for monitoring would include lek count data that reliably includes at least three counts annually of the number of male sage-grouse occurring on known leks (see **Table 7-1**).

Leks in the Jackson Hole area should be counted using the protocol outlined by the Wyoming Game and Fish Department's Sage-Grouse Technical Committee (Cheyenne, WY, USA;

Christiansen 2007; also see Connelly *et al*. 2004). Each lek should be visited at least three times between March 20 and May 15; visits should be separated by at least one week. Data recorded during each visit should include:

- Total number of males, total number of females, and total number of unclassifiable sage-grouse
- Ground condition) on lek at time of count (i.e., snow, clear)
- Climate data (i.e., precipitation, such as snow, rain, sleet), percent cloud cover, estimated wind speed, and estimated temperature at time of count
- Time of day
- Other comments relevant to the count

Leks counted following this protocol should include all known leks listed on **Table 3-1**, including the lek on JAC, and the enhanced or restored lek locations associated with implementation of the proposed project (see **Chapter 6**). To a large degree, these data are already collected annually; the additional data required for this monitoring plan includes only those counts conducted on enhanced and constructed lek locations.

Since sage-grouse that move from the airport lek may not establish on existing, restored, or constructed lek sites, lek searches should be conducted at least twice annually every third year, either aerially or from the ground following the protocol established by *Connelly et al.* 2004.

- Searches should be conducted during the peak of the breeding period between 0.5 hour before and 1.5 hours after sunrise.
- If aerial searches are conducted, transects located no more than 1 km apart should be flown along north-south lines. Flights should be limited to days with good visibility and weather, transects should be flown from approximately 100 to 150 meters above ground level. One observer, in addition to the pilot, should participate in each flight to ensure that habitats on both sides of the aircraft are surveyed effectively.
- Lek searches should focus on areas within 18 kilometers of JAC in sagebrush-dominated habitats. Return visits from the ground to all potential new sites should be conducted to confirm a lek location as soon as feasible following flight. If a new lek is found, that lek should be added to the list of known leks and counted annually using the protocol outlined above.

Lek count data should be used to establish changes in the proportion of the male population counted on individual leks. Sage-grouse in Jackson Hole have been documented to move between leks as the snowmelt progresses northward in the spring, so a preferred method of assessing lek attendance would be to use a 3-year moving average of maximum male attendance during the second half of April, when snowmelt is no longer a confounding factor influencing lek choice. A decrease in the proportion of males counted on the leks currently situated on JAC would suggest the males are moving from the leks. Concurrent increases in the proportion of males counted on existing, restored, or newly formed leks would support this conclusion. Extant lek count information can be used to establish "pre-treatment" male proportions by lek and should be calculated from no earlier than 2008 to ensure adequate data at the scale of Jackson Hole.

7.3.4 Objective 4: Determine Long-Term Changes in Sage-Grouse Habitat Selection During the Brood-Rearing Period Relative to Management Actions Implemented (up to 30 Years Post-Prescription)

Pellet surveys can be used to assess the use of brood-rearing habitats, and they may serve as a technique for long-term habitat monitoring following the telemetry study. Pellet transects should be monitored annually for five years post-prescription, and at three- to five-year intervals during the period from six to 30 years post-prescription. To perform pellet surveys, 100- by 2-meter transects would be established to encompass at least 1 percent of the habitat patch in and within 1 kilometer of manipulated hayfields, non-manipulated hayfields, and known late brood-rearing locations. To assess long-term use trends at JAC, transects would be established throughout the airport within the perimeter fence and in at least three randomly generated points in known nesting and late-brood rearing habitats directly surrounding the airport. Known brood-rearing locations and nesting habitats would be identified using telemetry data.

Pellets would be cleared from plots annually following snowmelt, and the number of pellets in plots would be counted twice annually: once in early July and once during the period between the first hard freeze and first snowfall. Pellets would be cleared following counting each period. The July counts would be used to represent early brood-rearing use, and the late fall counts would be used to represent late brood-rearing/summer use.

To determine the use of specified areas during early brood-rearing, the trend in the number of pellets counted on the airport would be compared to the trend in the number of pellets counted in the three randomly generated areas in nesting habitat. To determine the use of specific areas during late brood-rearing/summer, the trend in the number of pellets counted on the airport would be compared to the trend in the number of pellets counted in known late brood-rearing locations directly surrounding the JAC. Similarly, the trends in the number of early brood-rearing pellets counted in manipulated hayfields would be compared to the trends in the numbers counted in non-manipulated hayfields. The trend in the number of late brood-rearing/summer pellets counted in manipulated hayfields would be compared to the trend in numbers counted in non-

manipulated hayfields relative to numbers counted in known late brood-rearing/summer habitats. All comparisons would be made as relative changes through time.

To optimize monitoring efforts, the counting and location of pellet transects should be coordinated with monitored vegetation plots (described below). If the number of pellets counted is insufficient to accurately establish trends after the first few years, this long-term monitoring technique would be re-assessed.

7.3.5 Objective 5: Determine Long-Term Changes in Sage-Grouse Use of JAC During Breeding and Brood-Rearing Seasons (up to 30 Years Post-Prescription)

Time-lapse cameras should be used to systematically monitor known lek locations and the known brood-rearing habitats, especially the habitats used near the runway (e.g., median habitats), on JAC.

To determine changes in sage-grouse use of known lek locations, time-lapse cameras would be placed near the known leks in locations that provide for a view of the entire area used by displaying males. Photos would be taken daily every 15 minutes during the period from 0.5 hour prior to sunrise to two hours post-sunrise throughout the breeding season. Cameras should be situated in a non-easterly direction to reduce glare from the rising sun, and close enough to leks such that individual sage-grouse can be identified to sex. The photos would be used to document the number of male sage-grouse using the lek, and this metric should be used to quantify changes in male occupancy through time. Cameras should be put in place at least one year prior to the initiation of lek restoration to establish baseline conditions.

Cameras also would be placed to photograph all habitats within brood-rearing areas near the runway, and set to take photos daily every hour during the period beginning 0.5 hour prior to sunrise to 0.5 hour after sunset. Cameras would be placed either in high locations or facing north or south to reduce glare from low sun angles. The photos would be used to document the number of sage-grouse using brood-rearing habitats, and this metric would be used to quantify changes through time. Cameras should be put in place at least one year prior to the initiation of brood-rearing habitat enhancement/restoration to establish baseline conditions.

7.3.6 Objective 6: Determine Vegetative Response of Sagebrush Habitats to Implemented Treatments in Relation to Vegetative Conditions Suitable for Sage-Grouse Brood-Rearing

Vegetation surveys would be conducted within manipulated brood-rearing habitats and reference areas for up to 30 years post-treatment or until vegetation objectives in terms of sagebrush overstory levels are achieved. Vegetation plots would be monitored annually to 5 years post-prescription, and at 3- to 5-year intervals during the period from 6 to 30 years post-prescription. The vegetation monitoring methodology should be standardized to both pre-treatment monitoring methods as well as methods being used in other portions of GRTE to facilitate comparison across data sets and target wildlife species. GRTE has established a monitoring protocol to assess

success of re-vegetation efforts and to detect any exotic weeds on the hayfield restoration projects. The NPS protocols are taken from standardized methods (see "Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems" by Herrick et. al., and published by the USDA-ARS *Journal Experimental Range*).

The United States Fish and Wildlife Service (USFWS) and NPS prepared a vegetation monitoring plan in association with the *Bison and Elk Management Plan for the National Elk Refuge and GRTE* and subsequent Environmental Impact Statement (USFWS and NPS 2007). Data collection measures associated with the WHMP should be comparable to those measures but amended for sage-grouse-focus variables. For sage-grouse, the vegetative variables collected would include, at a minimum:

- Sagebrush canopy cover and height to species
- Other shrub canopy cover and height to species
- Forb cover to species
- Grass cover and height to species
- Forb diversity within the total area of the plot (i.e., complete list of forb species within plot area)

A representative number of plots should be included in manipulated hayfields. Vegetation sampling would be stratified to correspond to early brood-rearing (June through mid-July) or late brood-rearing (mid-July through August). Each early brood-rearing plot would be paired with one plot in non-manipulated hayfields and one plot in known nesting habitats, and each late brood-rearing plot should be paired with one plot in non-manipulated hayfields and one plot in known late brood-rearing/summer habitats. Paired plots would occur within the same ecological site as treatment plots and located in the same general vicinity as pellet plots such that sage-grouse use estimates can be attributed to vegetation. Plot location and time of sampling would be assigned randomly each year. Pre-treatment vegetation data would be collected on all areas slated for manipulation.

Vegetation plots would also be established within the airport perimeter fence. The results would be compared to known nesting or known late brood-rearing/summer plots accordingly. The goal of these comparison plots would be to track the efficacy of efforts to reduce and eventually eliminate suitable brood-rearing habitats within the airport perimeter.

Table 7-1 presents a summary of the proposed monitoring efforts that would be undertaken in association with the Jackson Hole Wildlife Hazard Management Plan. The table indicates the

objectives associated with each phase of monitoring, key components and required resources, and the relationship of the proposed monitoring efforts to other wildlife monitoring efforts in Jackson Hole and GRTE.

Table 7-1: Summary of Proposed Monitoring Efforts JAC Wildlife Hazard Management Plan					
Monitoring Type	**Objectives**	**Key Components**	**Frequency and Duration**	**Relationship to Past or Ongoing Monitoring Efforts**	**Required Resources**
Telemetry – Lek Based	Identify changes in lek locations relative to restoration. Determine impacts to survival of use of restored or created lek locations.	Data loggers allowing for constant monitoring of radio-equipped sage-grouse use of restored or constructed lek locations relative to existing leks.	2 to 3 years post-prescription; dependent on battery life of VHF transmitters used.	Designed to compare to extant telemetry data.	Funding for equipment and labor to complete a full-scale telemetry study.
Telemetry – Brood-Rearing Habitat Selection	Determine changes in female sage-grouse use of habitats during brood-rearing periods relative to habitat restoration of smooth brome fields in GRTE. Determine impacts to demographics of use of enhanced habitats.	Change in habitat use based on changes in probability of occurrence as estimated from resource selection functions generated at scale of the range of seasonal use areas.	2 to 3 years post-prescription; dependent on battery life of VHF transmitters used.	Designed to compare to extant telemetry data.	Funding for equipment and labor to complete a full-scale telemetry study; employment of experienced sage-grouse researchers suggested.
Lek Counts	Determine changes in the proportion of male sage-grouse using restored or created alternative lek locations relative to non-manipulated leks.	Lek counts	Up to 30 years post-prescription.	Employ protocol established by Wyoming Game and Fish Department to compare to data collected from the 1940s; much of this data will be collected as part of continued monitoring of sage-grouse populations in GRTE.	Funding for labor to ensure counts of enhanced or created leks.

Table 7-1: Summary of Proposed Monitoring Efforts JAC Wildlife Hazard Management Plan					
Monitoring Type	**Objectives**	**Key Components**	**Frequency and Duration**	**Relationship to Past or Ongoing Monitoring Efforts**	**Required Resources**
Lek Searches	Determine if leks other than those restored or created are formed by sage-grouse moved from the leks on JAC.	Aerially or ground-based lek searches	3 to 5 year intervals for up to 30 years post-prescription	Employ protocol established by Wyoming Game and Fish Department.	Funding for aircraft time and labor.
Pellet Transects	Determine changes in sage-grouse habitat selection during the brood-rearing period relative to habitat restoration of smooth brome fields in GRTE.	Pellet transects cleared twice annually to track changes in relative use through time.	Up to 30 years post-prescription; annually to 5 years post-prescription; 3 to 5-year intervals from 5 years post-prescription	Tie pellet transects to vegetation monitoring to establish a comparison between relative sage-grouse use and vegetation changes resulting from management implemented and to increase field-effort efficiency.	Funding for labor added to vegetation monitoring.
Time-lapse Cameras	Determine changes in sage-grouse use of breeding and brood-rearing habitats on JAC relative to dissuasive techniques employed.	Daily photos of lek through breeding season and brood-rearing habitats through summer used to establish seasonal use through time.	Up to 30 years post-prescription	Unique effort this management plan.	Funding for equipment and labor.
Vegetation Plots	Determine changes in vegetation at manipulated brome fields relative to treatments implemented and sage-grouse seasonal habitat needs.	Vegetation plots in treated and control areas.	Up to 30 years post-prescription; annually to 5 years post-prescription; 3 to 5-year intervals from 5 years post-prescription	Standardize methodology to those used to gather extant sage-grouse data; standardize methodology to those used to monitor vegetation as part of Bison and Elk Management Plan.	Funding for additional labor required to gather sage-grouse-focused variables as part of the monitoring being conducted by GRTE.

8. Implementation and Monitoring Schedule

Table 8-1 identifies the overall timeframe associated with the proposed WHMP, including near-term management measures, habitat restoration measures, and long-term monitoring efforts.

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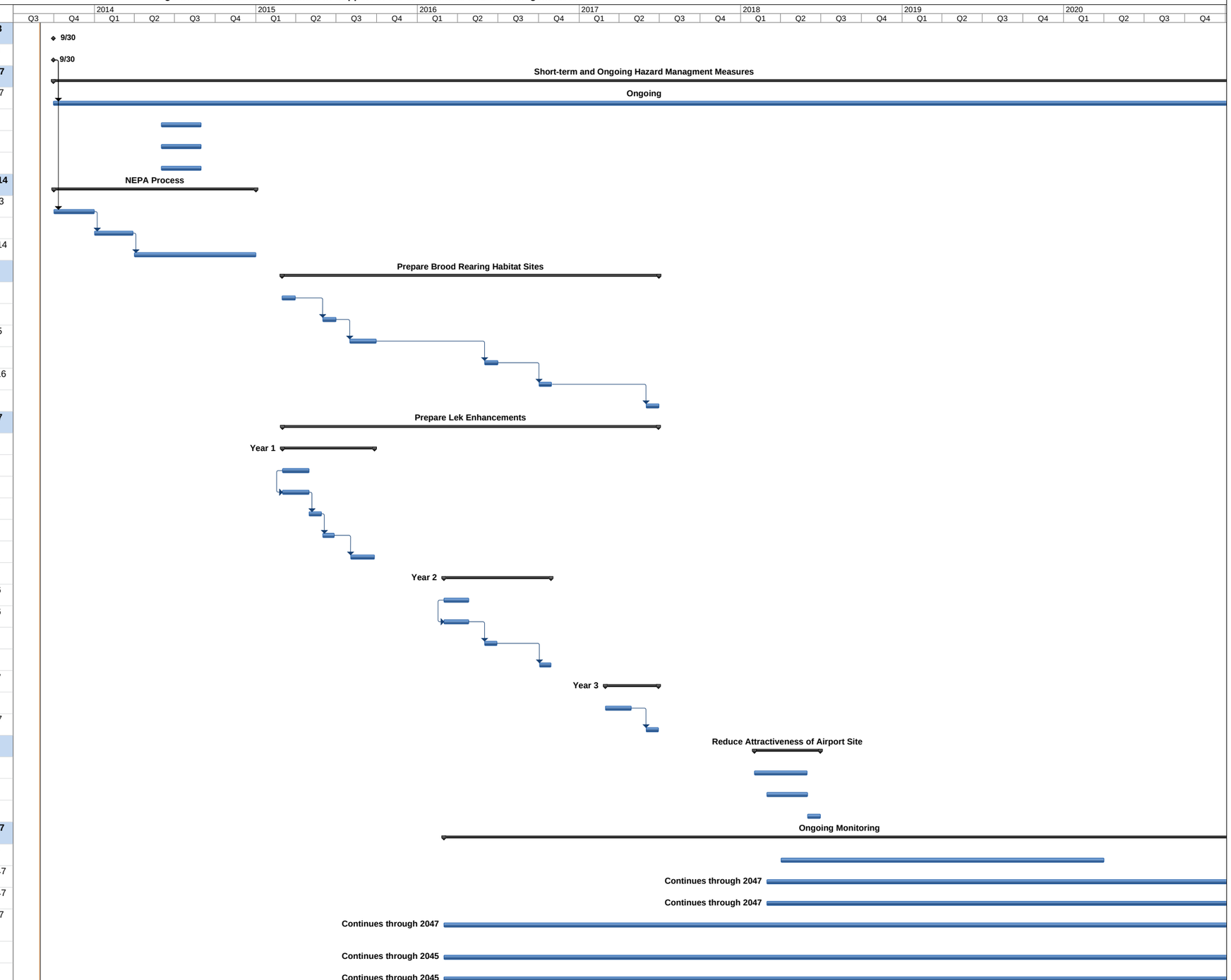
Table 8-1
Project Implementation and Monitoring Timeframes
Sage Grouse Habitat Enhancement in Support of the JAC Wildlife Hazard Management Plan

ID	Task Name	Duration	Start	Finish
1	**1. FAA Accepts Proposed Plan (milestone)**	**0 days**	**Mon 9/30/13**	**Mon 9/30/13**
2	1a. Plan Acceptance or Agreement	0 days	Mon 9/30/13	Mon 9/30/13
3	**2. Short-term and Ongoing Hazard Management Measures**	**8937 day**	**Mon 9/30/13**	**Tue 12/31/47**
4	2a. On-site Monitroing and Harassment as Necessary	8937 days	Mon 9/30/13	Tue 12/31/47
5	2b. Place Enterprise Ditch in Culvert (Assumes Clean Water Act compliance)	3 emons	Sun 6/1/14	Sat 8/30/14
6	2c. Adjust on-site mowing schedule to provide for moderate heights (12 inches)	3 emons	Sun 6/1/14	Sat 8/30/14
7	2d. Install 2-inch by 2-inch mesh perimeter fence as physical barrier	3 emons	Sun 6/1/14	Sat 8/30/14
8	**3. NEPA Process (15 months)**	**327 days**	**Tue 10/1/13**	**Wed 12/31/14**
9	3a. Initiate Process, Project Description	13.1 wks	Tue 10/1/13	Tue 12/31/13
10	3b. Prepare Document	12.6 wks	Wed 1/1/14	Fri 3/28/14
11	3c. Circulate Document and obtain FONSI	39.4 wks	Tue 4/1/14	Wed 12/31/14
12	**4. Prepare Brood Rearing Habitat Sites**	**609 days**	**Sun 3/1/15**	**Fri 6/30/17**
13	4a. Prescribed burn	1 emon	Sun 3/1/15	Tue 3/31/15
14	4b. Apply Glyphsate herbicide	4.4 wks	Mon 6/1/15	Tue 6/30/15
15	4c. Plant cover crop/provide soil enhancement	2 emons	Sat 8/1/15	Wed 9/30/15
16	4d. Apply second Glyphsate Treatment, as necessary	1 emon	Wed 6/1/16	Fri 7/1/16
17	4e. Drill seed mix into restoration area	1 emon	Sat 10/1/16	Mon 10/31/16
18	4f. Treat peristent exotic species with herbicide	29 edays	Thu 6/1/17	Fri 6/30/17
19	**5. Prepare Lek Enhancements**	**608 days**	**Mon 3/2/15**	**Wed 6/28/17**
20	**Year 1**	**150 days**	**Mon 3/2/15**	**Fri 9/25/15**
21	5a. Remove snow from lek sites	44 days	Mon 3/2/15	Thu 4/30/15
22	5b. Deploy grouse decoys, recordings and time-lapse cameras	44 days	Mon 3/2/15	Thu 4/30/15
23	5c. Prescribed burn	4 wks	Fri 5/1/15	Thu 5/28/15
24	5d. Apply Glyphosate herbicide	4 wks	Mon 6/1/15	Fri 6/26/15
25	5e. Plant cover crop/provide soil enhancement	8 wks	Mon 8/3/15	Fri 9/25/15
26	**Year 2**	**174 days**	**Tue 3/1/16**	**Fri 10/28/16**
27	5f. Remove snow from lek sites	8 wks	Tue 3/1/16	Mon 4/25/16
28	5g. Deploy grouse decoys, recordings and time-lapse cameras	8 wks	Tue 3/1/16	Mon 4/25/16
29	5h. Apply second Glyphosate treatment as necessary	4 wks	Wed 6/1/16	Tue 6/28/16
30	5i. Drill seed mix into restoration area	4 wks	Mon 10/3/16	Fri 10/28/16
31	**Year 3**	**86 days**	**Wed 3/1/17**	**Wed 6/28/17**
32	5j. Treat persistent exotic species with herbicide	8.5 wks	Wed 3/1/17	Fri 4/28/17
33	5k. Treat persistent exotic species with herbicide	4 wks	Thu 6/1/17	Wed 6/28/17
34	**6. Reduce Attractiveness of Airport Site**	**107 days**	**Thu 2/1/18**	**Sat 6/30/18**
35	6a. Allow build-up of snow on existing lek	119 edays	Thu 2/1/18	Thu 5/31/18
36	6b. Install flagging (or similar acceptable to Operations) across lek	66 days	Thu 3/1/18	Thu 5/31/18
37	6c Apply broadleaf herbicide to all open areas of airport used by grouse	29 edays	Fri 6/1/18	Sat 6/30/18
38	**7. Ongoing Monitoring in Conjunction with Other Efforts (March 2015 through December 2044)**	**8306 days**	**Tue 3/1/16**	**Tue 12/31/47**
39	7a. Radio Telemetry (minimum 2 years post-management)	522 days	Mon 4/2/18	Tue 3/31/20
40	7b. Lek Counts - 30 years (annually)	7783 days	Thu 3/1/18	Mon 12/30/47
41	7c. Lek Searches - 30 years (3 to 5-year intervals)	7783 days	Thu 3/1/18	Mon 12/30/47
42	7d. Pellet Surveys - 30 years (annually to 5 years post-management; 3 to 5-year intervals from 5 years post-management)	8306 days	Tue 3/1/16	Tue 12/31/47
43	7e. Time-lapse cameras - 30 years (annually)	7784 days	Tue 3/1/16	Fri 12/29/45
44	7f. Vegetation Surveys - 30 years (annually to 5 years post-management; 3 to 5-year intervals from 5 years post-management)	7784 days	Tue 3/1/16	Fri 12/29/45



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9. Summary and Conclusions

Chapter 9 revisits the goal and objectives set forth for the proposed habitat restoration plan and summarizes the ability/likelihood of achieving those goals and objectives.

9.1 Achievement of Planning Goals and Objectives

The *Greater Sage-Grouse Habitat Restoration Plan* presented in this appendix to the WHMP is an integral, species-specific component of the WHMP, which requires approval by the FAA, and subsequent environmental review and implementation led by NPS through a cooperative effort with FAA and the Airport Board. The plan proposes the modification of previously disturbed nearby areas in GRTE as part of an effort to create additional brood-rearing habitat and to restore or establish suitable breeding areas (leks).

Section 1.3.2, "Restoration Strategy, Goals, and Objectives" identified specific objectives for the proposed Habitat Restoration Plan. The following paragraphs describe the ability of the proposed plan to achieve these goals.

Objective: ***Increase the separation between sage-grouse and aircraft movement areas.***
In its Advisory Circular 150/5200-33B, the FAA recommends a separation distance of 10,000 feet between aircraft movement areas and hazardous wildlife attractants. The FAA defines a wildlife attractant as "Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's Air Operations Area (AOA)."

The historic JAC lek is located within aircraft movement areas at JAC, and the FAA wildlife strike database identifies 32 wildlife strikes with sage-grouse, most of which have occurred on the ground or at very low altitudes (12 feet or less). The proposed habitat restoration plan proposes the development or restoration of brood-rearing habitat and lek areas between 0.71 mile (3,750 feet) and 1.17 miles (6,200 feet) of aircraft movement areas. These proposed restoration sites occur at locations where regulated airspace begins at altitudes ranging from 106 to 221 above ground level, compared to the current lek location, where regulated airspace occurs at an altitude of 12 feet above ground level (see **Figure 9-1**).

While these distances do not achieve the 10,000-foot separation criterion, they provide a solution that would greatly reduce the risk of wildlife strikes compared to current conditions, especially when species-specific characteristics and behaviors are considered. As previously discussed, sage-grouse do not travel far seasonally between breeding, nesting, and brood-rearing sites. Recent studies of the local sage-grouse population indicate that sage-grouse remain on the ground approximately 99 percent of the time and fly at low altitudes (Bedrosian et al., 2010). As a result, it is likely attempts to draw grouse to restoration areas located at greater distances from the airport would be less likely to succeed.

Objective: ***Recognize the location of the airport within the boundaries of GRTE, the role of the NPS, and associated laws, regulations, and policies in the plan formulation.***
GRTE staff members have been involved in the development of the WHMP and serve as members of the Wildlife Hazard Assessment Working Group, and the GRTE Superintendent serves on the Wildlife Hazard Management Plan Steering Committee. NPS comments have been considered and integrated throughout the plan development process. In addition, the proposed plan will focus on previously disturbed areas, require minimum maintenance, and restore habitat within park boundaries in accordance with NPS policies.

The proposed plan recognizes NPS resource management policies that strive to "preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities." It also recognizes that the NPS does not intervene in natural biological or physical process, except in certain specific circumstances including "when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities." Moreover, the plan states that the NPS would be responsible for the implementation of any such intervention, and such intervention would be minimized to the extent possible to achieve the proposed management objective in accordance with NPS policies (NPS 2006).

The proposed plan identifies six sites for the restoration of brood-rearing habitat or lek restoration/development (see **Figure 9-2**). Four of the sites have been disturbed by previous agricultural activities or other human disturbances. The proposed Meadow Road East habitat restoration and lek sites were not used previously for agriculture, but the enhancement or restoration of sage-grouse habitat in this area is consistent with the park's policy of preserving individual species, features, and plant and animal communities by offering alternative habitat and satellite lek location is protective of the sage-grouse and seeks to offset its imperiled existence within the airport boundaries.

Objective: ***Identify wildlife hazard management strategies and measures that recognize the status of the sage-grouse as a candidate for federal protection under the Endangered Species Act of 1973, as amended, and the State of Wyoming's ongoing efforts to conserve its sage-grouse populations.***
The proposed plan recognizes the greater sage-grouse as a candidate species for federal and state protection. None of the proposed components of the plan would lead to the direct "take" of individuals or techniques that would result in capture or relocation. In addition, the proposed plan was developed in consideration of the "Core Population Area" approach set forth and revised by the Governor of Wyoming through executive orders. The plan incorporated the work of the local USRSWG, as it would provide for the restoration of brood rearing habitat and former lek sites to support the sage-grouse population present in the Jackson Hole Valley as illustrated through a kernel analysis (see **Figure 9-2**).

9.2 Conclusions

The overall goal of the WHMP is to enhance safety to the traveling public and those living and working near JAC in accordance with Federal Aviation Regulations at 14 CFR Part 139. The *Greater Sage-grouse Habitat Restoration Plan,* which is a significant species-specific component of the WHMP, seeks to reduce conflicts between aviation and wildlife for the betterment of both.

Based on wildlife strike records in FAA's wildlife strike database, the location of aircraft movement areas and regulated airspace, and species-specific considerations, efforts to increase separation between aircraft and sage grouse are likely to reduce hazards associated with the sage-grouse at JAC. However, no previous effort to create alternative brood-rearing habitat or lek sites for voluntary relocation by this species has been documented. Long-term monitoring will be essential to determine whether the alternative habitat and lek sites are being used by birds formerly associated with the JAC airport lek and nearby brood-rearing areas. Based on the results of the site monitoring, adaptive management techniques would be adopted to promote project success.

Despite the uncertainty associated with the proposed habitat restoration plan and its attempt to attract individuals from locations within the airport boundaries to restored, off-site areas, the proposed plan will promote or expedite the restoration of brood-rearing habitat within areas of GRTE that have been disturbed previously by human activity or fire. By restoring brood-rearing habitat and developing/restoring suitable breeding areas, this proposed plan strives to be supportive of the greater Jackson Hole sage-grouse population and to comply with NPS policies that seek to "preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities."

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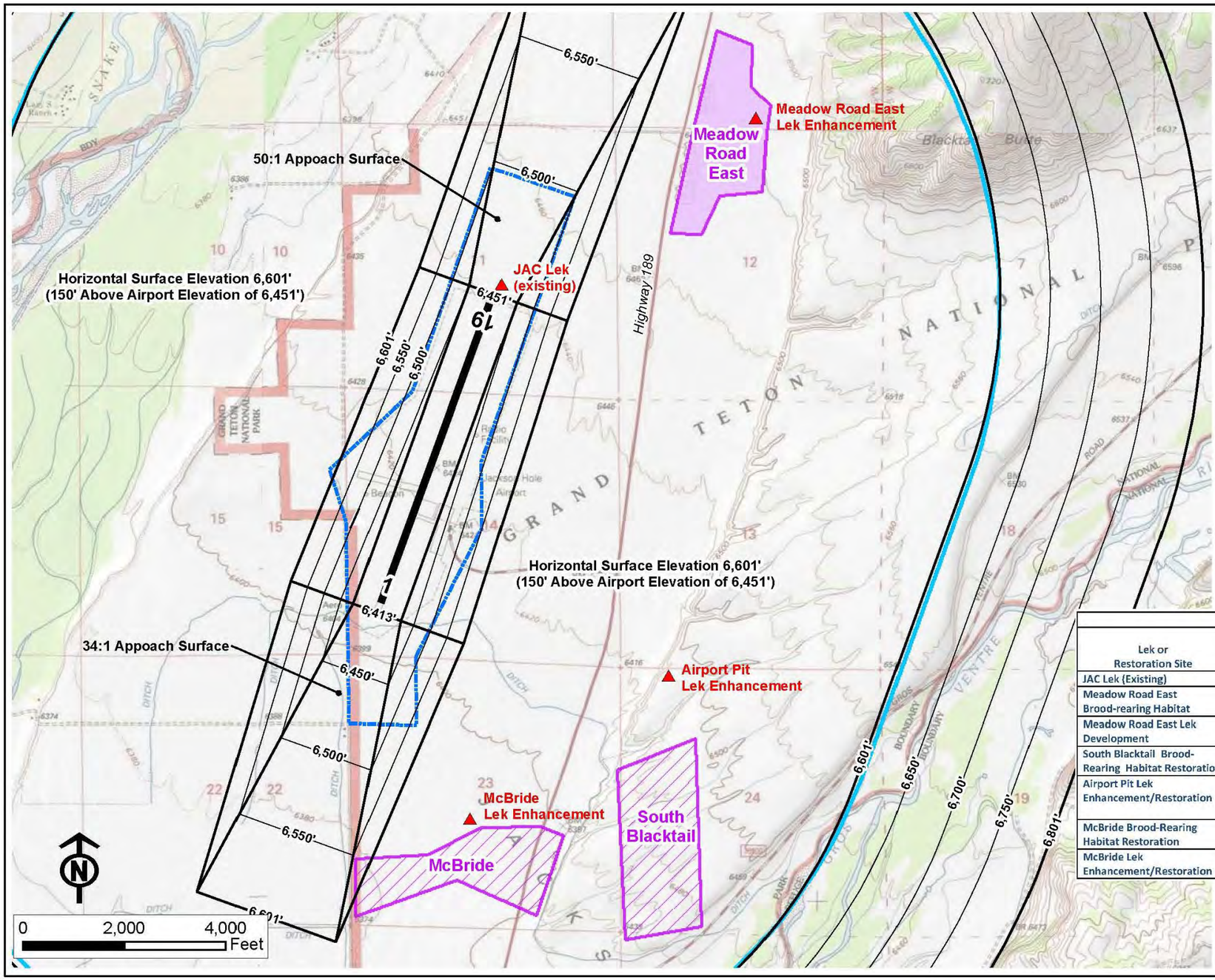

Legend

- Airport Boundary
- Runway
- Grand Teton National Park Boundary
- LEKS
- Available Habitat
- Potential Brome Field Restoration/Brood Rearing Habitat
- FAR Part 77 Surfaces
- 6,550' FAR Part 77 Surface Contour with Elevation
- 10,000-foot lateral separation from aircraft movement area

Notes:

1. Jackson Hole Airport (JAC) elevation is 6,451 feet MSL.

2. Federal Aviation Regulation (FAR) Part 77 Surfaces available from JAC Airport Layout Plan, 2012.

3. Multiple historic lek areas and proposed brome field restoration areas were identified and dismissed from further consideration based on their location with regard to the airport and flight paths or proximity to aircraft movement areas.

Site and Separation Data

Lek or Restoration Site	Site Elevation (feet MSL)	Distance below Navigable Airspace (feet)	Distance from Runway Edge (miles/feet)
JAC Lek (Existing)	6,444'	12'	0
Meadow Road East Brood-rearing Habitat	6,495'	106'	0.71 mile/3,750 feet
Meadow Road East Lek Development	6,490'	111'	1.17 mile/ 6,200 feet
South Blacktail Brood-Rearing Habitat Restoration	6,495'	106'	1.04 mile/5,500 feet
Airport Pit Lek Enhancement/Restoration	6,485'	116'	1.08 mile/5,700 feet
McBride Brood-Rearing Habitat Restoration	6,395'	221'	0.87 mile/4,600 feet
McBride Lek Enhancement/Restoration	6,391'	210'	0.85 mile/4,500 feet

Figure 9-1
Brood-Rearing and LEK Restoration Areas and Relationship to FAR Part 77 Surfaces

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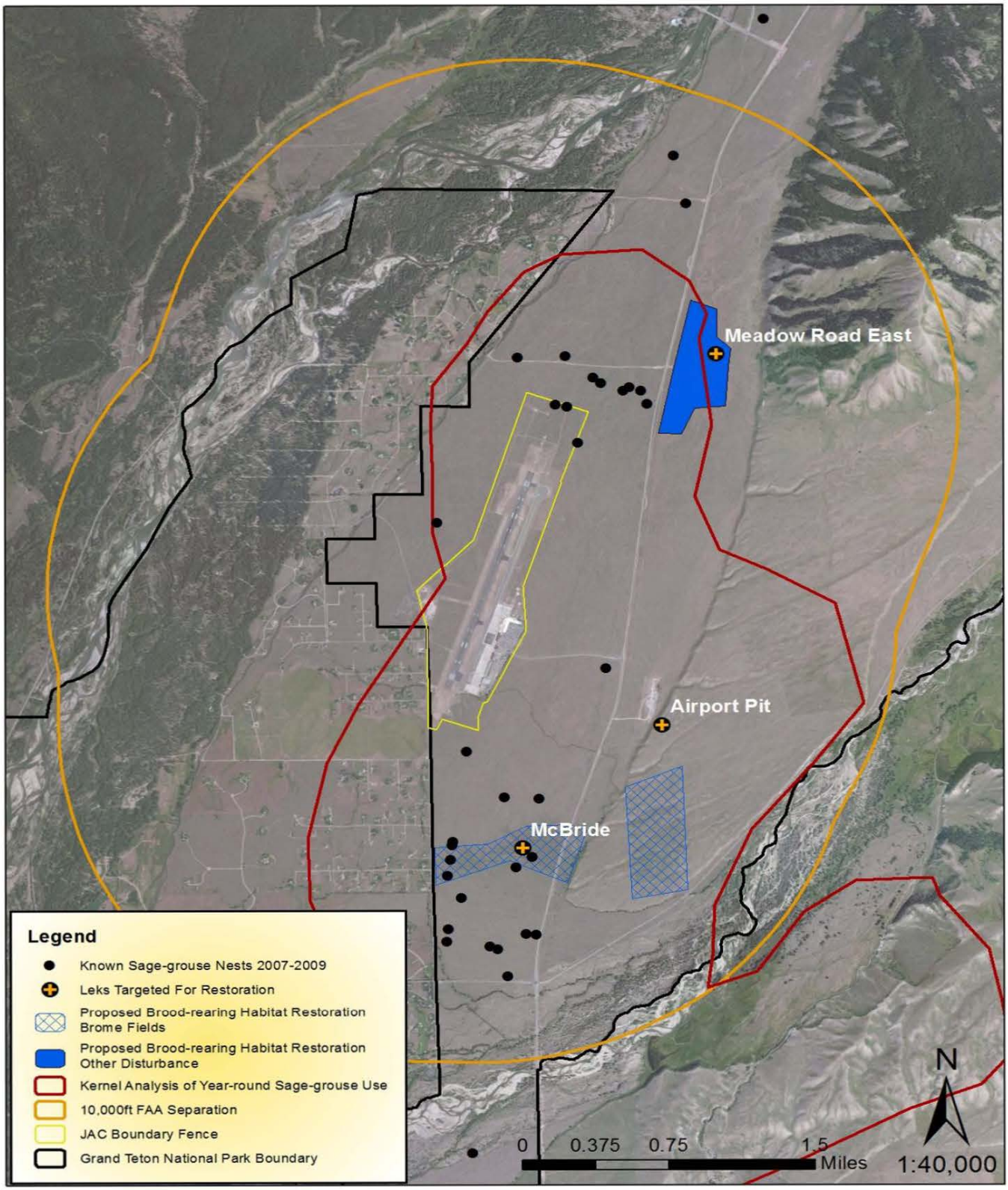

Figure 9-2: Sites for the Restoration of Brood-rearing Habitat or Lek Restoration/development

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11. List of Preparers

Table 11-1 identifies the individuals who contributed the Sage-Grouse Habitat Restoration Plan component of the Jackson Hole Wildlife Hazard Management Plan.

Table 11-1: List of Preparers

Name	Title	Organization
Peter Hahn	Lead Certification Safety Inspector, Northwest Mountain Region	Federal Aviation Administration
John Bauer	Manager, FAA Denver Airports District Office	Federal Aviation Administration
Gary Pollock	Management Assistant	Grand Teton National Park
Steve Cain	Senior Wildlife Biologist	Grand Teton National Park
John Stephenson	Wildlife Biologist	Grand Teton National Park
Mike Pipas	Wildlife Damage Biologist	United States Department of Agriculture
Joe Bohne	Wildlife Biologist, Retired Member, Emeritus (non-voting)	Wyoming Game and Fish Department Upper Snake River Sage-Grouse Working Group
Douglas Bromeyer	Wildlife Biologist	Wyoming Game and Fish Department
Bryan Bedrosian	Research Biologist	Craighead-Beringia South
John Dahlke	Research Biologist	Wyoming Wildlife Consultants, LLC
Matt Holloran	Research Biologist	Wyoming Wildlife Consultants, LLC
Eli Rodemaker	GIS Analyst	Wyoming Wildlife Consultants, LLC
Gregg Shedd	Research Biologist	Wyoming Wildlife Consultants, LLC
Craig Logan	Operations Manager	Jackson Hole Airport
Lisa Harmon	Aviation/Environmental Planner	Mead & Hunt, Inc.
Daniel Hirchert	FAA-qualified Biologist	Mead & Hunt, Inc.

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ATTACHMENT B – Code of Federal Regulations (CFR) Title 14
FAR Part 139.337

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(1) Two-way radio communications between each pedestrian or vehicle and the tower;

(2) An escort with two-way radio communications with the tower accompanying any pedestrian or vehicle without a radio; or

(3) Measures authorized by the Administrator for controlling pedestrians and vehicles, such as signs, signals, or guards, when it is not operationally practical to have two-way radio communications between the tower and the pedestrian, vehicle, or escort;

(d) When an air traffic control tower is not in operation, or there is no air traffic control tower, provide adequate procedures to control pedestrians and ground vehicles in movement areas or safety areas through two-way radio communications or prearranged signs or signals;

(e) Ensure that each employee, tenant, or contractor is trained on procedures required under paragraph (b) of this section, including consequences of noncompliance, prior to moving on foot, or operating a ground vehicle, in movement areas or safety areas; and

(f) Maintain the following records:

(1) A description and date of training completed after June 9, 2004 by each individual in compliance with this section. A record for each individual must be maintained for 24 consecutive months after the termination of an individual's access to movement areas and safety areas.

(2) A description and date of any accidents or incidents in the movement areas and safety areas involving air carrier aircraft, a ground vehicle or a pedestrian. Records of each accident or incident occurring after the June 9, 2004 must be maintained for 12 consecutive calendar months from the date of the accident or incident.

§ 139.331 Obstructions.

In a manner authorized by the Administrator, each certificate holder must ensure that each object in each area within its authority that has been determined by the FAA to be an obstruction is removed, marked, or lighted, unless determined to be unnecessary by an FAA aeronautical study. FAA Advisory Circulars contain methods and procedures for the lighting of obstructions that are acceptable to the Administrator.

§ 139.333 Protection of NAVAIDS.

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

(a) Prevent the construction of facilities on its airport that, as determined by the Administrator, would derogate the operation of an electronic or visual NAVAID and air traffic control facilities on the airport;

(b) Protect—or if the owner is other than the certificate holder, assist in protecting—all NAVAIDS on its airport against vandalism and theft; and

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

§ 139.335 Public protection.

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

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

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

(b) Fencing that meets the requirements of applicable FAA and Transportation Security Administration security regulations in areas subject to these regulations is acceptable for meeting the requirements of paragraph (a)(1) of this section.

§ 139.337 Wildlife hazard management.

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

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

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

(2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or

structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;

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

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

(c) The wildlife hazard assessment required in paragraph (b) of this section must be conducted by a wildlife damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual. The wildlife hazard assessment must contain at least the following:

(1) An analysis of the events or circumstances that prompted the assessment.

(2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.

(3) Identification and location of features on and near the airport that attract wildlife.

(4) A description of wildlife hazards to air carrier operations.

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

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

(1) The wildlife hazard assessment;

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

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

(4) The views of the certificate holder;

(5) The views of the airport users; and

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

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

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

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

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

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

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

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

(i) Wildlife population management;

(ii) Habitat modification; and

(iii) Land use changes.

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

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

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

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

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

(iii) Wildlife hazard control measures; and

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

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

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

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

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

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

§ 139.339 Airport condition reporting.

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

(a) Provide for the collection and dissemination of airport condition information to air carriers.

(b) In complying with paragraph (a) of this section, use the NOTAM system, as appropriate, and other systems and procedures authorized by the Administrator.

(c) In complying with paragraph (a) of this section, provide information on the following airport conditions that may affect the safe operations of air carriers:

(1) Construction or maintenance activity on movement areas, safety areas, or loading ramps and parking areas.

(2) Surface irregularities on movement areas, safety areas, or loading ramps and parking areas.

(3) Snow, ice, slush, or water on the movement area or loading ramps and parking areas.

(4) Snow piled or drifted on or near movement areas contrary to § 139.313.

(5) Objects on the movement area or safety areas contrary to § 139.309.

(6) Malfunction of any lighting system, holding position signs, or ILS critical area signs required by § 139.311.

(7) Unresolved wildlife hazards as identified in accordance with § 139.337.

(8) Nonavailability of any rescue and firefighting capability required in §§ 139.317 or 139.319.

(9) Any other condition as specified in the Airport Certification Manual or that may otherwise adversely affect the safe operations of air carriers.

(d) Each certificate holder must prepare and keep, for at least 12 consecutive calendar months, a record of each dissemination of airport condition information to air carriers prescribed by this section.

(e) FAA Advisory Circulars contain methods and procedures for using the NOTAM system and the dissemination of airport information that are acceptable to the Administrator.

§ 139.341 Identifying, marking, and lighting construction and other unserviceable areas.

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

(1) Mark and, if appropriate, light in a manner authorized by the Administrator—

(i) Each construction area and unserviceable area that is on or adjacent to any movement area or any other area of the airport on which air carrier aircraft may be operated;

(ii) Each item of construction equipment and each construction roadway, which may affect the safe movement of aircraft on the airport; and

(iii) Any area adjacent to a NAVAID that, if traversed, could cause derogation of the signal or the failure of the NAVAID; and

(2) Provide procedures, such as a review of all appropriate utility plans prior to construction, for avoiding damage to existing utilities, cables, wires, conduits, pipelines, or other underground facilities.

(b) FAA Advisory Circulars contain methods and procedures for identifying and marking construction areas that are acceptable to the Administrator.

§ 139.343 Noncomplying conditions.

Unless otherwise authorized by the Administrator, whenever the requirements of subpart D of this part cannot be met to the extent that uncorrected unsafe conditions exist on the airport, the certificate holder must limit air carrier operations to those portions of the airport not rendered unsafe by those conditions.

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ATTACHMENT C – "Advisory Circular No. 150 / 5200-36A, Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports"

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U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

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

Date: 01/31/2013
Initiated by: AAS-300

AC No: 150/5200-36A
Change: 1

1. Purpose.

This Change adds language requiring certificated airports to maintain documentation of airport wildlife biologist qualifications. This change is in response to an Office of the Inspector General safety recommendation.

2. Principal Changes.

This Change adds a new Paragraph 6(f) on page 4 and removes a single sentence from Section 1 on page 1. We have marked changed text with vertical bars in the margins.

Page Control Chart

Remove Pages	Dated	Insert Pages	Dated
1	1/31/2012	1	1/31/2013
4	1/31/2012	4	1/31/2013
5*	1/31/2012	5	1/31/2013

* Page break change only.

Michael J. O'Donnell
Director of Airports Safety and Standards

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U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports	**Date:** 01/31/2012 **Initiated by:** AAS-300	**AC No:** 150/5200-36A **Change:** 1

1. Purpose.

This Advisory Circular (AC) has two purposes. First, this AC describes the qualifications for wildlife biologists who conduct Wildlife Hazard Assessments (WHA) for airports certificated under Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139), and at non-certificated airports funded by a Federal Aviation Administration (FAA) Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) Program. We recommend that airports, at a minimum, consult with a qualified airport wildlife biologist when developing a Wildlife Hazard Management Plan (WHMP).

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

2. Applicability.

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

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

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

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

3. Cancellation.

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

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

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

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

(iii) Other training acceptable to the FAA Administrator.

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

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

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

(3) Supervise the Wildlife Hazard Assessment report production.

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

f. Holders of Airport Operating Certificates issued under Part 139 must retain records documenting the airport wildlife biologist(s) qualifications to conduct Wildlife Hazard Assessments and Wildlife Hazard Management Plans. These records must be retained for 10 years. If an airport conducts another WHA before the ten year expiration, the airport must maintain the qualification records for the previous WHA one year after the new WHA is completed.

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

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

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

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

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

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

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

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ATTACHMENT D – FAA Certalert No. 97-09, "Wildlife Hazard Management Plan Outline"

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C E R T A L E R T

ADVISORY * CAUTIONARY * NON-DIRECTIVE

FOR INFORMATION, CONTACT AIRPORT WILDLIFE SPECIALIST, AAS-317 (202) 267.3389

DATE: **17 November, 1997** **No. 97-09**

TO: **AIRPORT CERTIFICATION SAFETY INSPECTORS**

TOPIC: **WILDLIFE HAZARD MANAGEMENT PLAN OUTLINE**

An increasing number of questions are being received concerning the preparation and content of a FAA approved airport wildlife hazard management plan. Title 14 Code of Federal Regulations, part 139.337, *Wildlife Hazard Management,* prescribes the specific issues that a wildlife hazard management plan must address for FAA approval and inclusion in the ACM.

A wildlife hazard assessment, defined as an ecological study in part 139.337 (a), conducted by a wildlife damage management biologist, provides the scientific basis for the development , implementation, and refinement of a wildlife hazard management plan. Though parts of the wildlife hazard assessment may be incorporated directly in the wildlife hazard management plan, they are two separate documents. Part of the wildlife hazard management plan can be prepared by the biologist(s) who conducts the wildlife hazard 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. Airport management may request the wildlife biologist to review the finished plan.

The wildlife damage management biologist's primary responsibilities are:

- to provide information on the wildlife attractants that have been identified on or near the airport,
- to identify wildlife management techniques,
- to prioritize appropriate mitigation measures,
- to recommend necessary equipment and supplies, and
- to identify training requirements for the airport personnel who will implement the wildlife hazard management plan.

It is often helpful for the airport manager to appoint a Wildlife Hazard Management Group that has responsibility for the airport's wildlife management program. The biologist should assist the Wildlife Hazard Management Group with periodic evaluations of the plan and make recommendations for further refinements or modifications.

The following details the requirements of part 139.337 (e) and (f) and how those requirements should be addressed in a FAA approved wildlife hazard management plan.

FAR 139.337 REQUIREMENTS	WILDLIFE HAZARD MANAGEMENT PLAN CONTENTS
139.337(e). The (wildlife hazard management) plan shall include at least the following :	The wildlife hazard management plan must include, and/or identify the responsibility of, and/or actions to be taken, –
139.337(e)(1). The persons who have authority and responsibility for implementing the plan.	Specific responsibilities for various sections of the wildlife hazard management plan must be assigned or delegated to various airport departments such as: Airport Director Operations Dept. Maintenance Dept. Security Dept. Planning Dept. Finance Dept. Wildlife Coordinator Wildlife Hazard Group Local law enforcement authorities that provide wildlife law enforcement and other support also have a role to play: State Fish and Game U. S. Fish and Wildlife Service City police County Sheriff
139.337(e)(2). Priorities for needed habitat modification and changes in land use identified in the ecological study with target dates for completion.	Attractants (food, cover, and water) identified in wildlife hazard assessment, with priorities for mitigation and completion dates. Attractants can be grouped by areas and ownership. (A list of completed habitat modification or other projects designed to reduce the wildlife/aircraft strike potential can be included, and provides a history of work already accomplished.) Airport property: Aircraft Operations Area (AOA). Within 2 miles of aircraft movement areas. Within 5 miles of aircraft movement areas. Airport structures Non-airport property Within 2 miles of aircraft movement areas. Within 5 miles of aircraft movement areas. Structures

FAR 139.337 REQUIREMENTS	WILDLIFE HAZARD MANAGEMENT PLAN CONTENTS
Habitat/population management recommendations	Management plans for specific areas, attractants, species, or situations, as identified in ecological study (wildlife hazard assessment). This section may include any or all of the following: Food/Prey-base Management Rodents Earthworms Insects Other prey Trash and debris - handling, storage. Handouts Species specific population management i.e. deer, gulls, geese, coyotes Repelling Exclusion Removal Habitat Management Vegetation Management AOA vegetation Drainage ditch(s) vegetation Landscaping Agriculture Water Management Permanent Water Wetlands Canals/drainage ditches Detention/retention ponds Sewage (glycol) treatment ponds Other water areas Ephemeral water Runways, taxiways, & aprons. Other wet areas Airport Buildings Airfield structures Abandoned structures Terminal Airport construction Resource Protection Exclusion Repelling Chemical Auditory Visual

FAR 139.337 REQUIREMENTS	WILDLIFE HAZARD MANAGEMENT PLAN CONTENTS
139.337(e)(3). Requirements for and, where applicable, copies of local, state and Federal wildlife control permits.	Wildlife can be protected at all levels of government – city, county, state, federal, or may not be protected at all, depending on location and species. Therefore the section should address the specific species involved and their legal status. Wildlife management permitting requirements and procedures (spelled out) Federal - 50 CFR parts 1 to 199. State - Fish and Game Code (or equivalent) City, county - ordinances If pesticides are to be used, then the following are also needed. Pesticide use regulations Federal- [Federal Insecticide, Fungicide, and Rodenticide Act, as amended (FIFRA)] State (varies by state) City/county (if applicable) Pesticide use licensing requirements State regulations
139.337(e)(4). Identification of resources to be provided by the certificate holder for implementation of the plan.	Lists identifying what the airport will supply in terms of: Personnel Time Equipment, (i.e. radios, vehicle(s), guns, traps). Supplies (i.e. shellcrackers, mylar tape) Wildlife Patrol Personnel Vehicle(s) Equipment Supplies Pesticides Restricted/non-restricted Application equipment Sources of Supply
139.337(e)(5). Procedures to be followed during air carries operations, including at least…	
139.337(e)(5)(i). Assignment of personnel responsibilities for implementing the procedures;	Who, when, what circumstances Wildlife Patrol Wildlife Coordinator Operations Dept. Maintenance Dept. Security Dept. Air Traffic Control
139.337(e)(5)(ii). Conduct of physical inspections of the movement areas and other areas critical to wildlife hazard management sufficiently in advance of air carrier operations to allow time for wildlife controls to be effective;	Who, when, how, what circumstances -- Runway(s), taxiway(s), and ramp(s) sweeps, AOA monitoring Un-mitigated attractants

FAR 139.337 REQUIREMENTS	WILDLIFE HAZARD MANAGEMENT PLAN CONTENTS
139.337(e)(5(iii). Wildlife control measures;	Who, what circumstances, when, how is the Wildlife Patrol contacted. Wildlife Patrol Bird Control repel capture kill Mammal control repel capture kill
139.337(e)(5)(iv). Communication between wildlife control personnel and any air traffic control tower in operation at the airport.	Communication procedures Training in communication procedures Equipment needed Radios, mobile phones, etc. Lights
139.337(e)(6). Periodic evaluation and review of the wildlife hazard management plan for:	At a minimum the airport operator should hold annual meetings, or after an event described in 139.337(a)(1 to 3), with representatives from all airport departments involved in the airport's wildlife hazard management efforts and the wildlife damage management biologist who did the original ecological study (wildlife hazard assessment).
139.337(e)(6)(i). Effectiveness in dealing with the wildlife hazard;	Input from all airport departments, ATC, wildlife biologist, as to effectiveness of plan. Good records are a must for evaluating the effectiveness of a program. Therefore need to know what records are kept, by whom, how, where, and when.
139.337(e)(6(ii). Indications that the existence of the wildlife hazard, as previously described in the ecological study, should be reevaluated.	Wildlife seen on AOA Request for wildlife dispersal from Tower, pilots, or others Wildlife strike database and other records. Good records are a must.
139.337(e)(7). A training program to provide airport personnel with the knowledge and skills needed to carry out the wildlife hazard management plan required by paragraph (d) of this section.	Wildlife Patrol personnel training All airport personnel - wildlife hazard awareness training Pesticide use training and certification

FAR 139.337 REQUIREMENTS	WILDLIFE HAZARD MANAGEMENT PLAN CONTENTS
139.337(f). Notwithstanding the other requirements of this section, each certificate holder shall take immediate measures to alleviate wildlife hazards whenever they are detected.	Although not required as part of wildlife hazard management plan, this information should be included to fulfill part 139 requirements. Procedures and personnel responsibilities for notification regarding new or immediate hazards by and to: Wildlife Patrol Operations NOTAM issuance/cancellation criteria and procedures Maintenance Security Air Traffic Control Others Rapid response procedures for new or immediate hazards by: Wildlife Patrol Operations Maintenance Security Air Traffic Control Others
139.337(g). FAA Advisory Circulars in the 150 series contain standards and procedures for wildlife hazard management at airports which are acceptable to the Administrator.	AC 150/5200--33 Hazardous Wildlife Attractants on or Near Airports.

OSB

Benedict D. Castellano, Manager
Airport Safety and Compliance Branch

ATTACHMENT E – Advisory Circular No. 150 / 5200-33B,
"Hazardous Wildlife Attractants on or near Airports"

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U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

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

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

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

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

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

a. Technical changes to paragraph references.

b. Wording on storm water detention ponds.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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SECTION 1.

GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

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

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

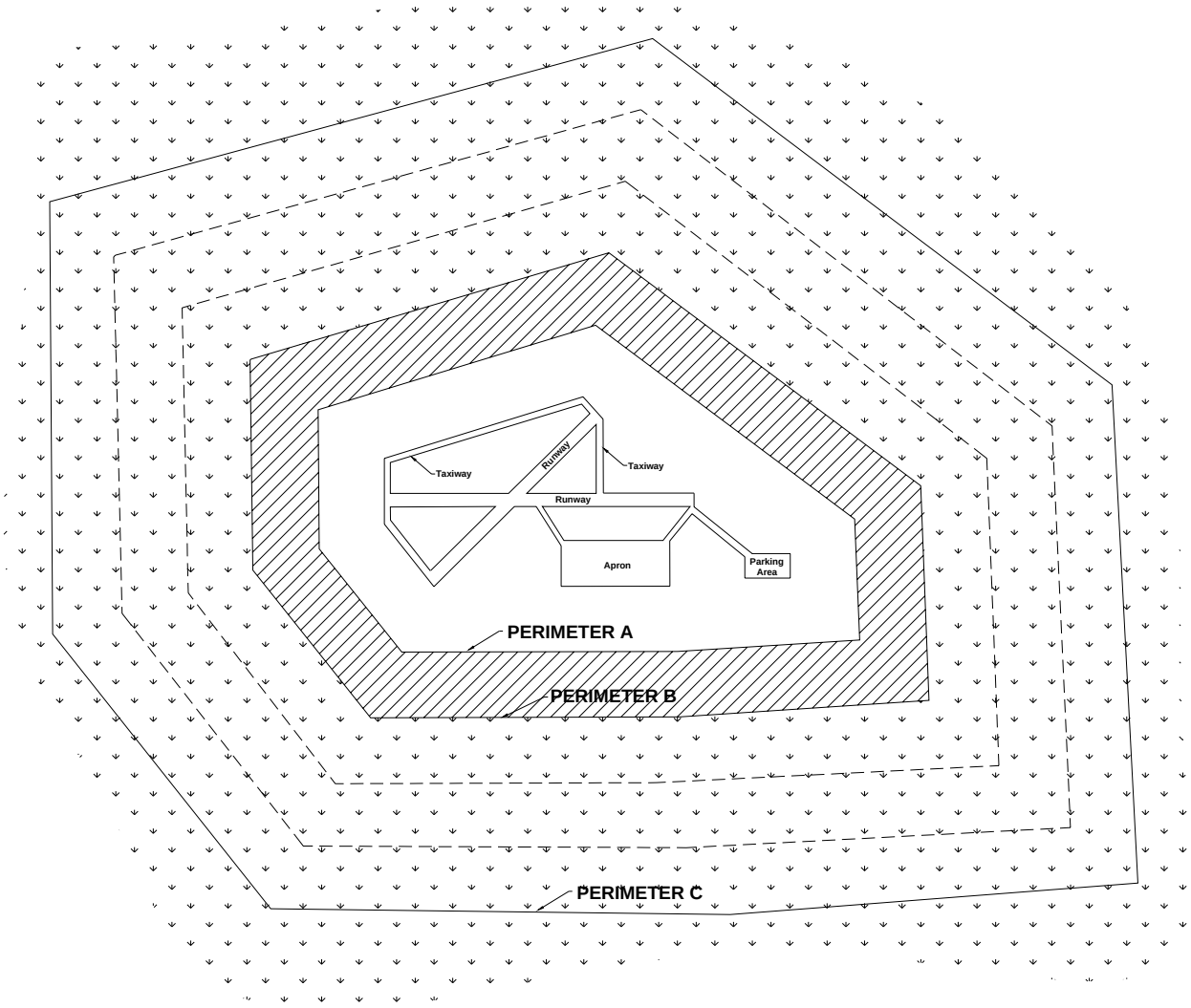
The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet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

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

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

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

Figure 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



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

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

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

SECTION 2.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

b. New storm water management facilities. The FAA strongly recommends that off-airport storm water management systems located within the separations identified in Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES. There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations;

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

SECTION 3.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 4.

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

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

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

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

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

4-2. WASTE MANAGEMENT FACILITIES.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. RESERVED.

ATTACHMENT F – Memorandum of Understanding (MOU) between FAA and USDA-WS

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No. 12-34-71-0003-MOU

Memorandum of Understanding between the United States Department of Transportation Federal Aviation Administration and the United States Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services

ARTICLE 1

This Memorandum of Understanding (MOU) continues the cooperation between the Federal Aviation Administration and Wildlife Services (WS) for mitigating wildlife hazards to aviation.

ARTICLE 2

The FAA has the broad authority to regulate and develop civil aviation in the United States[1]. The FAA may issue Airport Operating Certificates to airports serving certain air carrier aircraft. Issuance of an Airport Operating Certificate indicates that the airport meets the requirements of Title 14, Code of Federal Regulations, part 139 (14 CFR 139) for conducting certain air carrier operations. The WS has the authority to enter agreements with States, local jurisdictions, individuals, public and private agencies, organizations, and institutions for the control of nuisance wildlife[2]. The WS also has the authority to charge for services provided under such agreements and to deposit the funds collected into the accounts that incur the costs[3].

14 CFR 139.337 requires the holder of an Airport Operating Certificate (certificate holder) to conduct a wildlife hazard assessment (WHA) when specific events occur on or near the airport. A wildlife management biologist who has professional training and/or experience in wildlife hazard management at airports, or someone working under the direct supervision of such an individual, must conduct the WHA required by 14 CFR 139.337. The FAA reviews all WHAs to determine if the certificate holder must develop and implement a wildlife hazard management plan (WHMP) designed to mitigate wildlife hazards to aviation on or near the airport. These regulations also require airport personnel implementing an FAA-approved WHMP to receive training conducted by a qualified wildlife damage management biologist.

[1] Federal Aviation Act of 1958, 49 U.S.C. § 40101, et. seq.
[2] The Animal Damage Control Act of March 2, 1931, as amended, 46 Stat. 1468; 7 U.S.C. 426 – 426b.
[3] The Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, as amended, 426c to U.S.C. 426 – 426b.

ARTICLE 3

The FAA and the WS agree to the following.

a. The WS has the professional expertise, airport experience, and training to provide support to assess and reduce wildlife hazards to aviation on and near airports. The WS can also provide the necessary training to airport personnel.

b. Most airports lack the technical expertise to identify underlying causes of wildlife hazard problems. They can control many of their wildlife problems following proper instruction in control techniques and wildlife species identification from qualified wildlife management biologists.

c. Situations arise where control of hazardous wildlife is necessary on and off airport property (i.e., roost relocations, reductions in nesting populations, and removal of wildlife). This often requires the specialized technical support of WS personnel.

d. The FAA or the certificate holder may seek technical support from WS to lessen wildlife hazards. This help may include, but is not limited to, conducting site visits and WHAs to identify hazardous wildlife, their daily and seasonal movement patterns and habitat requirements. WS personnel may also provide:

i. support with developing WHMPs including recommendations on control and habitat management methods designed to minimize the presence of hazardous wildlife on or near the airport;

ii. Training in wildlife species identification and the use of control devices;

iii. Support with managing hazardous wildlife and associated habitats; and

iv. Recommendations on the scope of further studies necessary to identify and minimize wildlife hazards.

e. Unless specifically requested by the certificate holder, WS is not liable or responsible for development, approval, or implementation of a WHMP required by 14 CFR 139.337. Development of a WHMP is the responsibility of the certificate holder. The certificate holder will use the information developed by WS from site visits and/or conducting WHA in the preparation of a WHMP.

f. The FAA and WS agree to meet at least yearly to review this agreement, identify problems, exchange information on new control methods, identify research needs, and prioritize program needs.

ARTICLE 4

The WS personnel will advise the certificate holder of their responsibilities to secure necessary permits and/or licenses for control of wildlife. This will ensure all wildlife damage control activities are conducted under applicable Federal, State, and local laws and regulations.

ARTICLE 5

This MOU defines in general terms, the basis on which the parties will cooperate and does not constitute a financial obligation to serve as a basis for expenditures.

Request for technical, operational, or research assistance that requires cooperative or reimbursable funding will be completed under a separate agreement.

ARTICLE 6

This MOU will supersede all existing MOUs, supplements, and amendments about the conduct of wildlife hazard control programs between WS and the FAA.

ARTICLE 7

Under Section 22, Title 41, U.S.C., no member of or delegate to Congress will be admitted to any share or part of this MOU or to any benefit to arise from it.

ARTICLE 8

This MOU will become effective on the date of final signature and will continue indefinitely. This MOU may be amended by agreement of the parties in writing. Either party, on 60 days advance written notice to the other party, may end the agreement.

OSB Woodie Woodward
Associate Administrator for Airports
Federal Aviation Administration
Date June 20, 2005

OSB William H Clay
Deputy Administrator for Wildlife Services
Animal and Plant Health Inspection Service
Date June 27, 2005

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ATTACHMENT G – Circular 150/5200-32B,"Reporting Wildlife Aircraft Strikes" and Web Base FAA Wildlife Strike Incident Report Form (E5200-7)

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U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Reporting Wildlife Aircraft Strikes

Date: 5/31/2013
Initiated by: AAS-300

AC No: 150/5200-32B
Change:

1. Purpose.

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

2. Applicability.

The FAA provides the standards and practices in this AC as guidance for all public-use airports, aviation industry personnel (e.g., Air Traffic Control, pilots and airline personnel, and engine manufacturers), and others who possess strike information. The FAA strongly recommends that the above aviation representatives and others possessing strike information participate in reporting.

3. Cancellation.

This AC cancels AC 150/5200-32A, Reporting Wildlife Aircraft Strikes, dated December 22, 2004.

4. Background.

The FAA has long recognized the threat to aviation safety posed by wildlife strikes. Each year in the United States, wildlife strikes to U.S. civil aircraft cause about $718 million in damage to aircraft and about 567,000 hours of civil aircraft down time. For the period 1990 to 2011, over 115,000 wildlife strikes were reported to the FAA. About 97 percent of all wildlife strikes reported to the FAA involved birds, about 2 percent involved terrestrial mammals, and less than 1 percent involved flying mammals (bats) and reptiles. Waterfowl (ducks and geese), gulls, and raptors (mainly hawks and vultures) are the bird species that cause the most damage to civil aircraft in the United States, while European starlings are responsible for the greatest loss of human life. Vultures and waterfowl cause the most losses to U.S. military aircraft.

Studies have shown that strike reporting has steadily increased over the past two decades; however, strike reporting is not consistent across all stakeholders (pilots, air carriers, airport operators, air traffic control personnel, etc.) in the National Airspace System. Although larger 14 CFR Part 139 airports and those with well-established wildlife programs have improved strike reporting, there is a wide disparity in overall reporting rates between Part 139 airports and general aviation (GA) airports in the National Plan of Integrated Airport Systems (NPIAS). Less than 6 percent of total strike reports come from NPIAS GA airports, whose reporting rates average less than 1/20th the rates at Part 139 airports. Most Part 139 airports (97 percent) have

reported at least one strike into the database through 2011, while only 43 percent of NPIAS GA airports have documented a strike into the database.

While overall reporting rates are much higher for strikes at Part 139 airports than at NPIAS GA airports, there is also a major disparity in reporting rates among Part 139 airports. Larger Part 139 airports, especially those with well-established wildlife hazard management programs, have reporting rates about four times higher on average compared to other Part 139 airports. The pattern of disparity in strike reporting among Part 139 airports is also found in reporting rates for commercial air carriers. However, the FAA believes the current voluntary reporting rate is adequate to track national trends in wildlife strikes, to determine the hazard level of wildlife species that are being struck, and to provide a scientific foundation for FAA policies and guidance about the mitigation of risk from wildlife strikes.

Ultimately, improvements can be made in the quantity and quality of strike reporting. In addition to the above-mentioned gaps in reporting to the NWSD, there is an overall bias toward the reporting of damaging strikes compared to non-damaging strikes, especially for NPIAS GA airports and certain Part 139 airports. The quality of data within a strike report can also be improved by providing as much information as possible, including species struck and cost of strike.

The FAA has initiated several programs to address this important safety issue, including the collection, analysis, and dissemination of wildlife strike data. The effectiveness of a Wildlife Hazard Management Plan (WHMP) to reduce wildlife hazards both on and near an airport and the reevaluation of all facets of damaging/non-damaging strikes from year to year requires accurate and consistent reporting. Therefore, every WHMP should include a commitment to document and report to the NWSD all wildlife strikes that occur within the separation distances described in sections 1-2 and 1-3 of Advisory Circular 150/5200-33, Hazardous Attractants On or Near Airports (current version), to better identify, understand, and reduce threats to safe aviation.

5. Types of Animals to Report if Involved in a Strike with Aircraft.

a. All birds.

b. All bats.

c. All terrestrial mammals larger than 1 kg (2.2 lbs) (e.g., report rabbits, muskrats, armadillos, foxes, coyotes, domestic dogs, deer, feral livestock, etc., but not rats, mice, voles, chipmunks, shrews, etc.). If in doubt, report the incident with a note in the comment section, and the Database Manager will determine whether to include the report into the NWSD based on body mass.

d. Reptiles larger than 1 kg (2.2 lbs).

6. When to Report a Wildlife Aircraft Strike.

A wildlife strike has occurred when:

a. A strike between wildlife and aircraft has been witnessed.

b. Evidence or damage from a strike has been identified on an aircraft.

c. Bird or other wildlife remains, whether in whole or in part, are found:

(1) Within 250 feet of a runway centerline or within 1,000 feet of a runway end unless another reason for the animal's death is identified or suspected.

(2) On a taxiway or anywhere else on or off the airport that you have reason to believe was the result of a strike with an aircraft. Examples might be:

(i) A bird found in pieces from a prop strike on a taxiway.

(ii) A carcass retrieved within 1 mile of an airport on the final approach or departure path after someone reported the bird falling out of the sky and a report of a probable wildlife strike.

d. The presence of birds or other wildlife on or off the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, or the aircraft left pavement area to avoid collision with wildlife).

7. How to Report a Bird/Wildlife Strike.

The FAA strongly encourages pilots, airport operations, aircraft maintenance personnel, Air Traffic Control personnel, engine manufacturers, or anyone else who has knowledge of a strike to report it to the NWSD. The FAA makes available an online reporting system at the Airport Wildlife Hazard Mitigation web site (http://www.faa.gov/go/wildlife) or via mobile devices at http://www.faa.gov/mobile. Anyone reporting a strike can also print the FAA's Bird/Other Wildlife Strike Report Form (Form 5200-7) at the end of this AC or download it from the web site to report strikes. Paper copies of Form 5200-7 may also be obtained from the appropriate Airports District Offices (ADO), Flight Standards District Offices (FSDO), and Flight Service Stations (FSS) or from the Airman's Information Manual (AIM). Paper forms are pre-addressed to the FAA. No postage is needed if the form is mailed in the United States. It is important to include as much information as possible on the strike report.

Note: These forms are to be used to report strikes that do not have bird remains associated with them (instructions with addresses for sending remains to the Smithsonian Institute Feather Identification Lab are discussed in Paragraph 11, Instructions for Collecting and Submitting Bird/Wildlife Remains for Identification, of this AC). Please do not send bird remains to the FAA.

8. FAA National Wildlife Strike Database Management and Data Analysis.

The FAA NWSD Manager edits all strike reports to ensure consistent, error-free data before entering a single, consolidated report into the database. This information is supplemented with non-duplicated strike reports from other sources. About every six weeks, the FAA posts an updated version of the database on the web site. Annually, the FAA sends a current version of the database to the International Civil Aviation Organization (ICAO) for incorporation into ICAO's Bird Strike Information System (IBIS) Database. Also, the FAA prepares and makes available a report summarizing wildlife strike results from 1990 through the most current year online at http://www.faa.gov/airports/airport_safety/wildlife/.

Analyses of data from the FAA NWSD have proved invaluable in determining the nature and severity of the aviation wildlife strike hazard. The database provides a scientific basis for identifying risk factors, justifying and implementing corrective actions at airports, and judging the effectiveness of those corrective actions. Table 1 below depicts the ranking of 50 bird and mammal species or groups by their relative hazard to aircraft in airport environments. The data for the analysis are from the NWSD. The database is invaluable to engine manufacturers, aeronautical engineers, and wildlife biologists as they develop new technologies for the aviation industry. Each wildlife strike report contributes to the accuracy and effectiveness of the database. Moreover, each report contributes to the common goal of increasing aviation safety and reducing the cost of wildlife strikes.

9. Access to the FAA National Wildlife Strike Database.

On April 24, 2009, the FAA made the NWSD available to the public. The FAA began systematically analyzing wildlife strike data in the 1990s for use by the FAA's Office of Airports, academia, and researchers as a means of improving airport safety and reducing wildlife hazards. The NWSD web site (http://www.faa.gov/go/wildlife) was retooled to make it more user-friendly and to allow more advanced data mining. The site has search fields that enable users to find data on specific airports, airlines, aircraft, and engine types, as well as damage incurred, date of strike, species struck, and state without having to download the entire database.

10. Bird/ Wildlife Identification.

Accurate species identification is critical for wildlife-aircraft strike reduction programs. The identification of the exact species of bird struck (e.g., ring-billed gull, Canada goose, mallard, mourning dove, or red-tailed hawk as opposed to gull, goose, duck, dove, or hawk) is particularly important. This species information is critical for airports and biologists developing and implementing wildlife hazard management programs at airports because a problem that cannot be measured or defined cannot be solved. Wildlife biologists must know what species of wildlife they are dealing with in order to identify local attractants and to make proper management decisions within the framework of the Migratory Bird Treaty Act and state and local regulations. The FAA, the U.S. Air Force, the U.S. Navy, and the U.S. Department of Agriculture – Wildlife Services work closely with the Feather Identification Lab at the Smithsonian Institution, Museum of Natural History, to improve the understanding and prevention of bird-aircraft strike hazards. Bird strike remains that cannot be identified by airport personnel or by a local biologist can be sent (with FAA Form 5200-7) to the Smithsonian Museum for identification. Remains may also be submitted to the Smithsonian for verification of the field identification and for long-term storage of the evidence.

Bird strike identification using feathers, DNA, or other body parts or materials from birds involved in bird-aircraft strikes will be provided free-of-charge to all U.S. airport operators, all U.S. aircraft owners/operators (regardless of where the strike happened), and to any foreign air carrier if the strike occurred at a U.S. airport.

11. Instructions for Collecting and Submitting Bird/Wildlife Remains for Identification.

Please observe the following guidelines for collecting and submitting feathers or other bird/wildlife remains for species identification. These guidelines help maintain species identification accuracy, reduce turn-around time, and ensure a comprehensive FAA National Wildlife Aircraft Strike Database. Many airports have found it beneficial to construct strike reporting kits for use by airport personnel and aircraft operators. Having pre-made kits available improves strike reporting and encourages the sampling of strike remains. A kit suitable for collecting remains from most strikes would include the following materials stored in a 1-quart, re-sealable plastic bag: (1) collection instructions, (2) a pre-packaged alcohol hand-wipe for softening/removing tissue/blood ("snarge"[1]) off of the aircraft, (3) a Whatman FTA® collection card for preserving blood/tissue for DNA identification, and (4) a pair of disposable gloves.

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[1] Snarge is the term used for the residue and feathers left on an aircraft after an animal (typically a bird) collides with it.

a. Collect and submit remains from known/suspected bird strikes or strike remains that involved an unknown animal from each impact location as soon as possible and send to the Feather Lab (Smithsonian). If remains are known to be other than those of birds, please contact the Smithsonian before mailing them at (202) 633-0801. Collect remains using the criteria listed in item c below. If you cannot send the remains as soon as possible, refrigerate or freeze them in a sealed plastic bag until you can mail them.

b. Provide complete information about the incident.

(1) Fill out FAA Form 5200-7 – Bird/ Other Wildlife Strike Report.

(i) Print a copy of Form 5200-7 at the end of this AC or download a copy at http://www.faa.gov/go/wildlife.

(ii) File a report online and print a copy to send with the remains.

(2) Mail the report with feather material (see address below).

(3) Provide your contact information if you wish to be informed of the species identification.

c. Collect as much material as possible in a clean plastic/ Ziplock® bag. (Please, do not send whole birds.)

(1) Pluck/pick a variety of many feathers representing color or patterns from the wings, tail, and body.

(2) **Do not** cut off feathers. This removes the downy region needed to aid in identification.

(3) Include any feathers with distinct colors or patterns.

(4) Include any downy "fluff".

(5) Include beaks, feet, and talons if possible.

(6) Where only a small amount of snarge material is available, such as scrapings from an engine or smears on wings or windshields, send all of it.

(i) **Dry material** – Scrape or wipe off into a clean re-sealable bag **or** wipe the area with pre-packaged alcohol wipe **or** spray with alcohol to loosen material then wipe with clean cloth/gauze. Include the alcohol wipe or piece of cloth in the bag. (Do not use water, bleach, or other cleansers – they destroy or degrade DNA.)

(ii) **Fresh material** – Wipe the area with alcohol wipe and/or clean cloth/gauze **or** apply fresh tissue/blood to an optional Whatman FTA® DNA collecting card.

(1) **Do not** use any sticky substance such as tape or post-it notes to attach feathers.

(2) Collect remains from each impact location and place them in separate, labeled bags. Indicate the location on aircraft from which each sample came (i.e., windshield, radome, etc.) on the bag.

Please send whole feathers (tip and base) whenever possible as diagnostic characteristics are often found in the downy barbules at the feather base. Wings, as well as breast and tail feathers, should be sent whenever possible. Beaks, feet, bones, and talons are also useful diagnostic materials. Even blood smears can provide material for DNA analysis. Do not send entire bird carcasses through the mail. However, photographs of the carcasses can be very useful supplemental documentation.

If you send fresh blood/ tissue samples frequently for DNA identification, you may want to consider getting Whatman FTA® DNA cards. The material is sampled with a sterile applicator and placed onto the surface of the card that "fixes" the DNA in the sample. For more information about ordering these items, contact the Feather Lab. Otherwise, if you only occasionally send blood/ tissue samples, consider using a paper towel soaked with alcohol or an alcohol wipe to collect this type of material. Ethanol is the preferred type of alcohol.

Additional information on sending bird remains to the Smithsonian is available at http://www.faa.gov/go/wildlife.

d. Mail the Bird/Other Wildlife Strike Report and collected material to the Smithsonian's Feather Identification Lab. The lab will forward the report to the National Wildlife Strike Database Manager.

For Material Sent via Express Mail Service:	**For Material Sent via US Postal Service:**
Feather Identification Lab Smithsonian Institution NHB, E600, MRC 116 10th & Constitution Ave NW Washington DC 20560-0116 (This can be identified as "safety investigation material".)	Feather Identification Lab Smithsonian Institution PO Box 37012 NHB, E600, MRC 116 Washington DC 20013-7012 (Not recommended for priority cases.)

The species identification turn-around time is usually 24 hours from receipt if sufficient material is submitted and unless the sample is submitted for DNA analysis. DNA results usually take 6 to 10 days. Once processed, the lab sends the reports and species identification information to the Database Manager for entry into the FAA National Wildlife Strike Database. Persons wishing to be notified of the species identification must include contact information (e-mail, phone, etc.) on the report.

For more information contact the FAA National Wildlife Biologist at (202) 267-8731 or the Smithsonian's Feather Identification Lab at (202) 633-0801.

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

FORM APPROVED OMB No. 2120-0045
Exp. 7/31/2013

BIRD / OTHER WILDLIFE STRIKE REPORT

U S. Department of Transportation
Federal Aviation Administration

Paperwork Reduction Act Statement: The information collected on this form is necessary to allow the Federal Aviation Administration to assess the magnitude and severity of the wildlife-aircraft strike problem in the U.S. The information is used in determining the best management practices for reducing the hazard to aviation safety caused by wildlife-aircraft strikes. A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0045. Public reporting for this collection of information is estimated to be approximately 6 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. The information collected is voluntary. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the FAA at: 800 Independence Ave. SW, Washington, DC 20591, Attn: Information Collection Clearance Officer, AES-200.

1. Name of Operator

2. Aircraft Make/Model

3. Engine Make/Model

4. Aircraft Registration

5. Date of Incident
/ /
Month Day Year

6. Local Time of Incident
☐ Dawn ☐ Dusk __HR __MIN
☐ Day ☐ Night ☐ AM ☐ PM

6A. Flight Number

6B. Wildlife/Bird Remains:
☐ Collected ☐ Sent to Smithsonian

7. Airport Name/ID

8. Runway Used

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

10. Height (AGL)

11. Speed (IAS)

12. Phase of Flight

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

13. Part(s) of Aircraft Struck or Damaged

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

Bird(s) Ingested? ☐ Yes

Specify if "N. Other" is checked:

14. Effect on Flight

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

15. Sky Condition

- ☐ No Cloud
- ☐ Some Cloud
- ☐ Overcast

16. Precipitation

- ☐ Fog
- ☐ Rain
- ☐ Snow
- ☐ None

17. Bird/Other Wildlife Species

18. Number of birds seen and/or struck

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

19. Size of Bird(s)

- ☐ Small
- ☐ Medium
- ☐ Large

20. Pilot Warned of Birds ☐ Yes ☐ No

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

DAMAGE / COST INFORMATION

22. Aircraft time out of service
_____ hours

23. Estimated cost of repairs or replacement (US $)
$

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

Reported by *(Optional)*

Title

Date

Email

Phone

U.S. Department of Transportation

Federal Aviation Administration

800 Independence Ave SW
Washington DC 20591

Official Business
Penalty for Private Use, $300

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 12438 WASHINGTON D.C.

POSTAGE WILL BE PAID BY FEDERAL AVIATION ADMINISTRATION

Federal Aviation Administration
Office of Airport Safety and Standards, AAS-300
Attn: Wildlife Strike Report
800 Independence Avenue SW
WASHINGTON DC 20591

FOLD AND TAPE HERE

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

1. Name of Operator - This can be an airline (abbreviations okay - UAL, AAL, etc.), business (Coca Cola), government agency (Police Dept., FAA), or if a private pilot, his/her name.
2. Aircraft Make/Model - Abbreviations are okay, but include the model (e.g., B737-200).
3. Engine Make/Model - Abbreviations are allowed (e.g., PW 4060, GECT7, LYC 580).
4. Aircraft Registration - This means the N# (for USA registered aircraft).
5. Date of Incident - Give the local date, not the ZULU or GMT date.
6. Local Time of Incident - Check the appropriate light conditions and fill in the hour and minute local time and check AM or PM or use the 24-hour clock and skip AM/PM.

6A. Flight Number - Self-explanatory.

6B. Wildlife/Bird Remains - If remains were found at the airport or on the aircraft, check “Collected”. If the remains were also sent to the Smithsonian for identification, also check “Sent to Smithsonian”.

7. Airport Name - Use the airport name or 3 letter code if a US airport. If a foreign airport, use the full name or 3 letter code and location (city/country).
8. Runway used - Self-explanatory.
9. Location if En Route - Put the name of the nearest city and state.
10. Height AGL - Put the feet above ground level at the time of the strike (if you don't know, use MSL and indicate this). For take-off run and landing roll, it must be 0.
11. Speed (IAS) - Speed at which the aircraft was traveling when the strike occurred.
12. Phase of Flight - Phase of flight during which the strike occurred. Take-off run and landing roll should both be 0 AGL.
13. Part(s) of Aircraft Struck or Damaged - Check which parts were struck and damaged. If a part was damaged but not struck, indicate this with a check on the damaged column only and indicate in comments (#21) why this happened (e.g., the landing gear might be damaged by deer strike, causing the aircraft to flip over and damage parts not struck by deer).
14. Effect on Flight - You can check more than one. If you check “Other”, please explain in Comments (#21).
15. Sky condition - Check the one that applies.
16. Precipitation - You may check more than one.
17. Bird/Other Wildlife Species - Try to be accurate. If you don't know, put unknown and some description. Collect feathers or remains for identification for damaging strikes.
18. Number of birds seen and/or struck - check the box in the Seen column with the correct number if you saw the birds/other wildlife before the strike and check the box in the Struck column to show how many were hit. The exact number can be written next to the box.
19. Size of Bird(s) - Check what you think is the correct size (e.g. sparrow = small, gull = medium, and geese = large).
20. Pilot Warned of Birds - Check the correct box (even if it was an ATIS warning or NOTAM).
21. Remarks - Be as specific as you can. Include information about the extent of the damage, injuries, anything you think would be helpful to know (e.g., number of birds ingested).
22. Aircraft time out of service - Record how many hours the aircraft was out of service.
23. Estimated cost of repairs or replacement - This may not be known immediately, but the data can be sent at a later date or put down a contact name and number for this data.
24. Estimated other cost - Include loss of revenue, fuel, hotels, etc. (see directions for #23).
25. Reported by - Although this is optional, it is helpful if questions arise about the information on the form (a phone number could also be included).
26. Title - This can be Pilot, Tower, Airport Operations, Airline Operations, Flight Safety, etc.
27. Date - Date the form was filled out.

Table 1. Composite ranking (1 = most hazardous, 50 = least hazardous) and relative hazard score of 50 wildlife species with at least 100 reported strikes with civil aircraft based on three criteria (damage, major damage, and effect-on-flight). Data were derived from the FAA National Wildlife Strike Database.

Wildlife species	% of strikes with:			Mean hazard level[4]	Composite ranking	Relative hazard score[5]
	Damage[1]	Major damage[2]	Effect on flight[3]			
White-tailed deer	84	36	46	55	1	100
Snow goose	77	41	39	53	2	95
Turkey vulture	51	19	35	35	3	63
Canada goose	50	17	28	31	4	57
Sandhill crane	41	13	27	27	5	48
Bald eagle	41	12	28	27	6	48
D.-crested cormorant	34	15	24	24	7	44
Mallard	23	9	13	15	8	27
Osprey	22	7	15	15	9	26
Great blue heron	21	6	16	15	10	26
American coot	24	7	11	14	11	25
Coyote	9	2	21	11	12	19
Red-tailed hawk	15	5	11	10	13	19
Cattle egret	10	3	15	9	14	17
Great horned owl	15	3	6	8	15	14
Herring gull	10	5	9	8	16	14
Rock pigeon	10	4	10	8	17	14
Ring-billed gull	8	3	8	6	18	11
American crow	8	3	8	6	18	11
Peregrine falcon	8	2	5	5	20	9
Laughing gull	5	2	7	5	21	8
American robin	7	1	4	4	22	7
Snow bunting	1	1	9	4	23	7
Red fox	3	0	8	4	23	7
European starling	4	1	5	3	25	6
Amer. golden-plover	4	2	4	3	26	6
Barn owl	4	2	3	3	27	5
Upland sandpiper	4	1	4	3	27	5
Purple martin	5	1	2	3	29	5

Wildlife species	% of strikes with:			Mean hazard level[4]	Composite ranking	Relative hazard score[5]
	Damage[1]	Major damage[2]	Effect on flight[3]			
Mourning dove	3	1	4	3	30	5
Red-winged blackbird	3	0	5	3	31	5
Woodchuck	2	0	4	2	32	4
Northern harrier	2	1	2	2	33	3
Chimney swift	2	0	2	1	34	2
Killdeer	1	0	2	1	35	2
House sparrow	2	0	1	1	35	2
Blk-tailed jackrabbit	1	1	1	1	37	2
American kestrel	1	<1	2	1	38	2
Eastern meadowlark	1	<1	2	1	38	2
S.-tailed flycatcher	0	0	2	1	40	1
Horned lark	1	<1	1	1	41	1
Pacific golden-plover	1	0	1	1	41	1
Barn swallow	1	0	1	1	43	1
Savannah sparrow	1	0	<1	1	43	1
Common nighthawk	1	0	1	1	45	1
Tree swallow	0	0	1	<1	46	1
Burrowing owl	1	0	0	<1	46	1
Western kingbird	0	0	1	<1	48	0
Virginia opossum	1	0	0	<1	48	0
Striped skunk	0	0	0	0	50	0

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

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

[3] Aborted takeoff, engine shutdown, precautionary landing, or other negative effect on flight.

[4] Based on the mean value for percent of strikes with damage, major damage (substantial damage or destroyed), and negative effect-on-flight.

[5] Mean hazard level (see footnote 4) was scaled down from 100, with 100 as the score for the species with the maximum mean hazard level and thus the greatest potential hazard to aircraft.

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Federal Aviation Administration

Airport Technology R&D Branch
Airport Wildlife Hazard Mitigation

Wildlife Strike Reporting

Submit a Wildlife Strike Report

To complete a Wildlife Strike Report:

1. In the form below, complete as many fields as possible.
2. At the bottom of the form, click **Submit Strike Report**. You will see a confirmation page with a Strike Report Confirmation number and a link to your report. Note the confirmation number so you can view, edit, or print your report in the future.
3. On the confirmation page, click the link and then print a copy of your report.
4. If you are reporting a bird strike, please submit bird remains for identification. Please click here for instructions on how to collect remains.

Form Approved OMB No. 2120-0045

1. Name of Operator/Carrier ***Type in a few letters contained within the Operator name or OperatorID.*** *Add more if/as req'd.* ***If found ,click that Operator Name from the listing so that appear in the entry box.*** *If not found, type in the Operator Name and if known, the 3/4 letter Operator ID.*	**2. Aircraft Make/Model**	**3. Engine Make/Model**
4. Aircraft Registration	**5. Date of Incident** **mm / dd / yyyy** Required Field! Invalid Date!	**6. Local Time of Incident** NA : NA NA
6A. Flight Number	**6B. Wildlife/Bird Remains:** Collected Sent to Smithsonian	
7. Airport Name/ID	**8. Runway Used**	**9. Location if En Route and/or Distance from**

Type in a few letters contained within the Airport name or AirportID. *Add more if/as req'd.* ***If found ,click that Airport Name from the listing so that appear in the entry box.*** *If not found, type in the Airport Name and if known, the 3/4 letter Airport ID.*

Airport*(Nearest Town/Reference & State/Airport)*

10. Height (AGL)

ft

Enter a valid Height

11. Speed (IAS)

kts

Enter a valid Speed in knots

12. Phase of Flight

13. Part(s) of Aircraft Struck or Damaged

	Struck	Damaged
A. Radome	☐	☐
B. Windshield	☐	☐
C. Nose	☐	☐
D. Engine #1	☐	☐
E. Engine #2	☐	☐
F. Engine #3	☐	☐
G. Engine #4	☐	☐

Bird(s) Ingested?

☐ (Check for Yes)

13. (Con't)

	Struck	Damaged
H. Propeller	☐	☐
I. Wing/Rotor	☐	☐
J. Fuselage	☐	☐
K. Landing Gear	☐	☐
L. Tail	☐	☐
M. Lights	☐	☐
N. Other	☐	☐

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

14. Effect on Flight

☐ None

☐ Aborted Take-Off

☐ Precautionary Landing

☐ Engine Shutdown

☐ Other (Specify)

15. Sky Condition

16. Precipitation

☐ Fog

☐ Rain

☐ Snow

☐ None

17. Bird/Other Wildlife Species

18. Number Seen and/or Struck

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

19. Size of Bird(s)

☐ Small

☐ Medium

☐ Large

20. Pilot Warned of Birds/Wildlife? ☐ Yes ☐ No

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

DAMAGE/COST INFORMATION

22. Aircraft time out of service

hours

23. Estimated cost of repairs or replacement (US $)

Enter a valid US dollar amount without $ sign

24. Estimated other costs (US $) (e.g., revenue loss, fuel, and aircraft inspection, crew lodging or rescheduling, etc.)

Enter a valid US dollar amount without $ sign

Reported by

Title

Date

03/12/2012

Email

Phone

FAA Form 5200-7 (EFAA Form 5200-7 (EFAA Form 5200-7 (Electronic))

Submit Strike Report | Clear Form

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ATTACHMENT H – Wildlife Log (1 page) and Airport Daily Log

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WILDLIFE LOG

JACKSON HOLE AIRPORT

PAGE ___ OF ___ DATE:

NAME OF STAFF:

TEMPERATURE | **WEATHER CONDITION**

TIME	SPECIES	NUMBER	ACTIVITY	COVER TYPE	GRID LOCATION	ACTION	COMMENTS

WEATHER		**ACTIVITY**				**COVER TYPE**				**ACTION**	
SU	SUN	FD	FEEDING	_____	OTHER (1)	RWY	RUNWAY	PND	POND/BASIN	PYRO	PYROTECHNICS
PS	PARTLY SUN	LF	LOAFING	_____	OTHER (2)	TWY	TAXIWAY	GSH	GRASS-SHORT	HORN	AUTO/AIR
PC	PARTLY CLOUD	RS	ROOSTING	_____	OTHER (3)	RMP	RAMP	GLG	GRASS-LONG	VEH	VEHICLE HARASS
CL	CLOUDY	NS	NESTING			ASP	PAVED SURFACE	SHR	SHRUBS	LT/LZ	LIGHTS/LASERS
RN	RAIN	FL	FLYING			UNP	UNPAVED	WDL	WOODLAND	DSTRS	DISTRESS CALLS
SN	SNOW	CR	CIRCLING			STR	STRUCUTRE	MAR	MARSH/WETLAND	FIREARM	ANY
FG	FOG	RN	RUNNING			DTC	DITCH	CRK	CREEK/STREAM	OTHER	
								TSW	TEMP. STANDNG WATER		

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Jackson Hole Airport Self Inspection Checklist

DATE: _____ DAY: _____

Day Inspector/Time: _____ Night Inspector/Time: _____

RETAIN FOR 12 MONTHS ✓ Satisfactory ✗ Unsatisfactory

FACILITIES	CONDITIONS	D	N	Light #	REMARKS	RESOLVED OR WORKORDER
Pavement Areas	Pavement lips > 3”					
	Hole: 5” diameter 3 “ deep					
	Cracks/spalling/heaves					
	FOD: gravel/debris/sand					
	Rubber deposits					
	Ponding/edge dams					
Safety Areas	Ruts/humps/erosion					
	Drainage/construction					
	Support Equipment/aircraft					
	Frangible Bases					
	Unauthorized objects					
Markings	Clearly visible/standard					
	Runway markings					
	Taxiway markings					
	Holding position markings					
	Glass beads					
Signs	Standard/meet Sign Plan					
	Obscured/dirty/faded					
	Damaged/missing					
	Inoperable					

FACILITIES	CONDITIONS	D	N	Light #	REMARKS	RESOLVED OR WORKORDER
Lighting	Damaged/Missing					
	Obscured/Dirty					
	Inoperable					
	Faulty aim/adjustment					
	Runway edge lights					
	Centerline lights					
	Threshold lights					
	Taxiway lights					
	Pilot control lighting					
Navigational Aids	Rotating beacon operable					
	Wind-socks					
	Wind-tee					
	PAPI					
	MALS-Inground					
	MALS-above ground					
Fueling Operations	Fencing/gates/signs					
	Fuel marking labeling					
	Fire Extinguishers					
	Frayed wires/Grounding clips					
	Fuel leaks					
	Vegetation/trash					

FACILITIES	CONDITIONS	D	N	REMARKS	RESOLVED OR WORKORDER
SNOW AND ICE	Snow bank clearances				
	Lights & sings obscured				
	NAVAID's				
	Fire Access				
ARFF	Equipment/crew availability				
	Communications/alarm				
	Response routes affected				
Public	Fencing/gates/signs				
	Jet blast problems				
WILDLIFE	Wildlife present/locations				
	Complying with WHMP				
	Dead birds				
Obstructions	Obstruction lights operable				
	Cranes/trees				

Comments and Remarks:

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ATTACHMENT I – General Zone Map of Jackson Hole Airport (5 miles)

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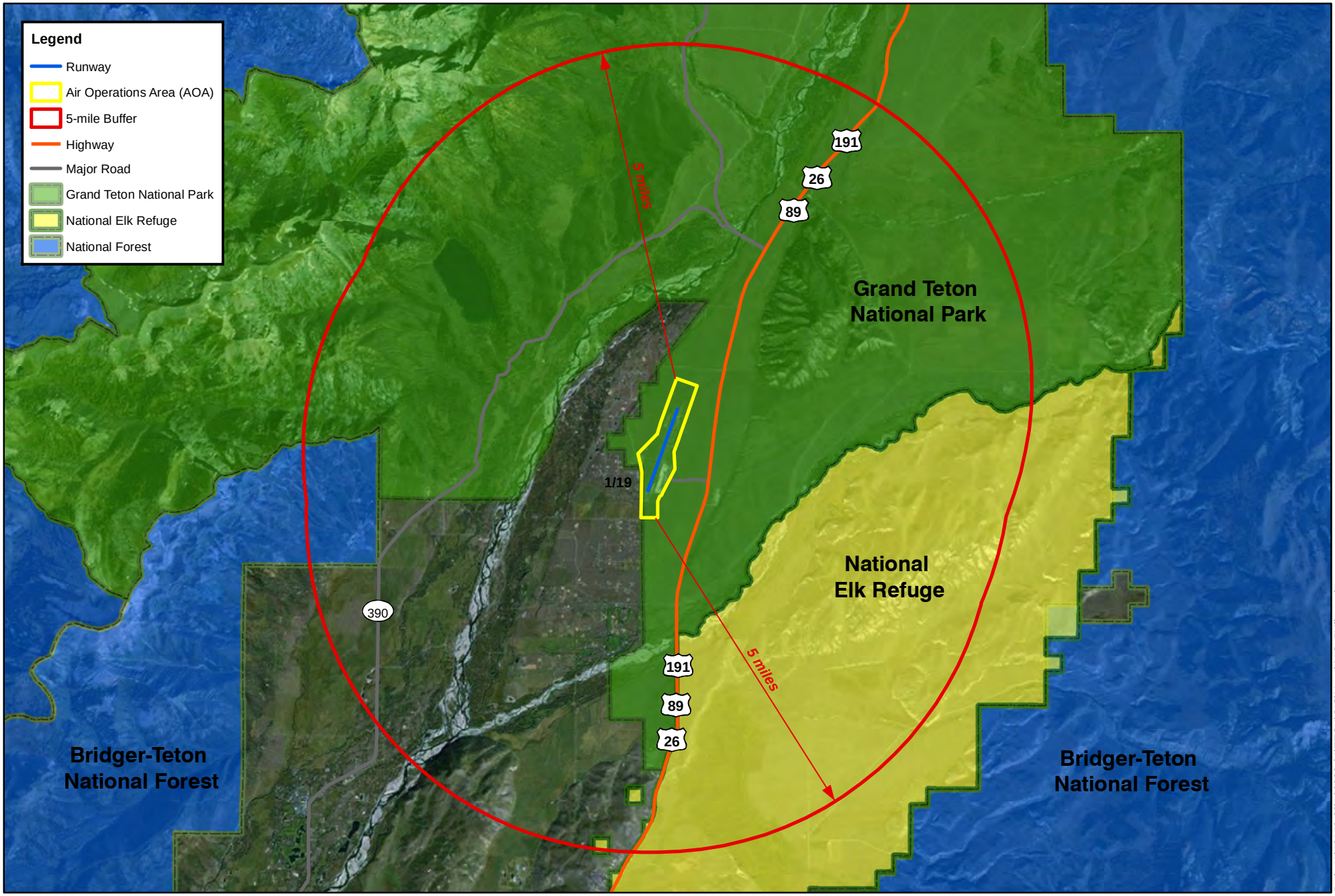

Path: X:\10142-00\120929.01\TECH\GIS\Maps\JAC_5Mile.mxd

JACKSON HOLE AIRPORT

WHA 5-mile Buffer

0 0.5 1 2 3 4 Miles

N

Data Sources:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Mead & Hunt

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ATTACHMENT J – Memorandum of Agreement (MOA) between FAA, US Air Force, US Army, US EPA and USDA-WS

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

PURPOSE

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

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

BACKGROUND

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

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

---

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

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

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

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

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

SECTION I.

SCOPE OF COOPERATION AND COORDINATION

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

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

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

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

1. airport siting and expansion;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION II.
GENERAL RULES AND INFORMATION

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

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

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

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

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

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

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

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

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

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

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

SECTION III. PRINCIPAL SIGNATORY AGENCY CONTACTS

The following list identifies contact offices for each signatory agency.

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

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

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

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

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

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

Signature Page

Associate Administrator for Airports,
Federal Aviation Administration

12/17/02
Date

Chief of Safety,
U. S. Air Force

27 May 2003
Date

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

December 9, 2002
Date

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

1/17/03

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

7/29/03
Date

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

09 January 2003
Date

GLOSSARY

This glossary defines terms used in this MOA.

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

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

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

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

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

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

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

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

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

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

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

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

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

   A. **Class A Mishap:** Occurs when at least one of the following applies:
      1. total mishap cost is $1,000,000 or more;
      2. a fatality or permanent total disability occurs; and/or
      3. an Air Force aircraft is destroyed.

   B. **Class B Mishap:** Occurs when at least one of the following applies:
      1. total mishap cost is $200,000 or more and less than $1,000,000; and/or
      2. a permanent partial disability occurs and/or 3 or more people are hospitalized;

   C. **Class C Mishap:** Occurs when at least one of the following applies:
      1. cost of reported damage is between $20,000 and $200,000;
      2. an injury causes a lost workday (i.e., duration of absence is at least 8 hours beyond the day or shift during which mishap occurred); and/or
      3. an occupational illness causing absence from work at any time.

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

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

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

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

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

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

Birds	No. reported strikes
Ravens	2
Kites	2
Falcons	2
Peregrine falcons	2
Merlins	2
Grouse	2
Hungarian partridges	2
Spotted doves	2
Thrushes	2
Mynas	2
Finches	2
Total known birds	2,612

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

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

ATTACHMENT K – Map of WHA Observation Points

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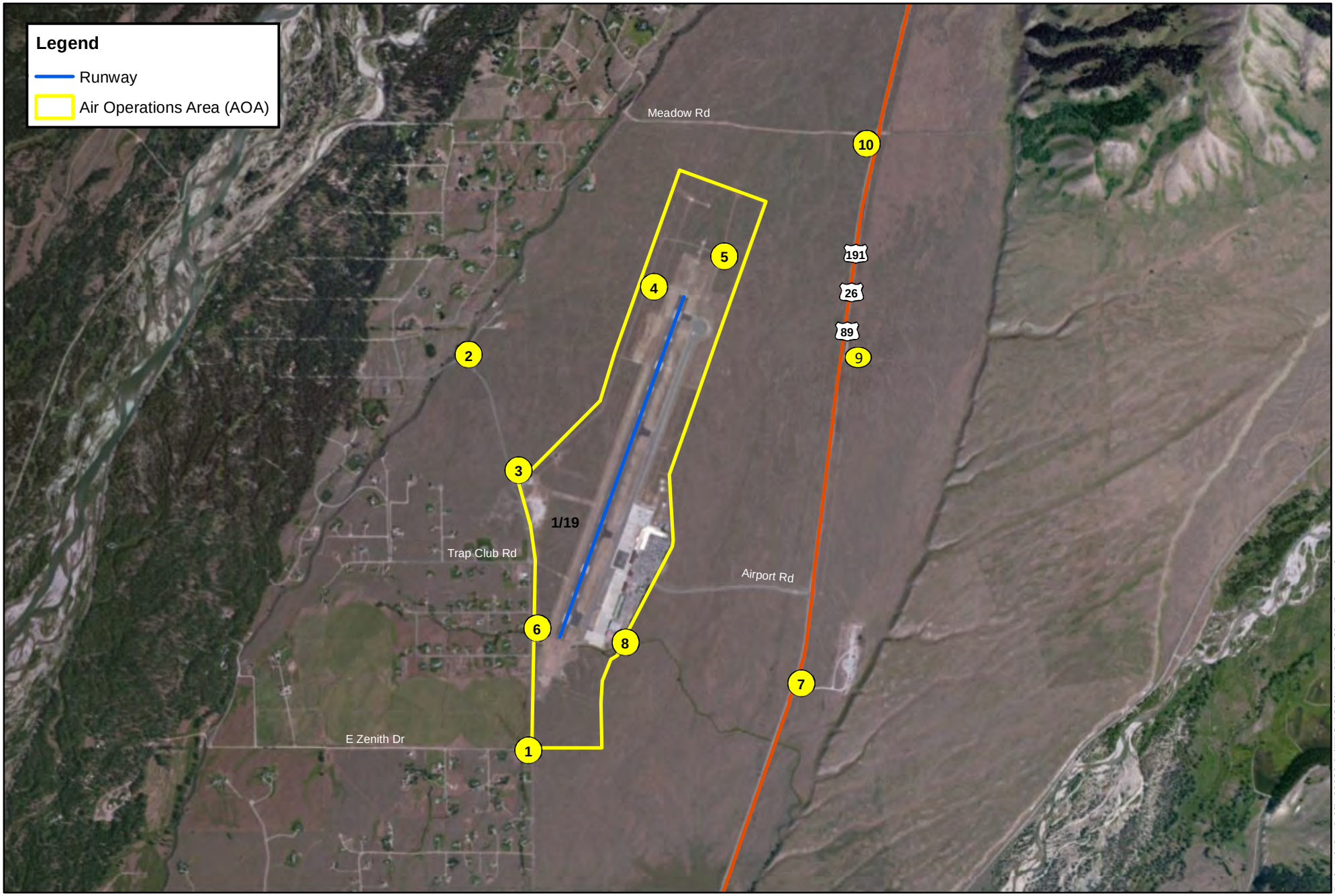

JACKSON HOLE AIRPORT

WHA Observation Points

0 700 1,400 2,800 4,200 5,600 Feet

N

Data Sources:

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Mead & Hunt

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ATTACHMENT L – FAA Certalert No. 98-05, "Grasses Attractive to Hazardous Wildlife"

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C E R T A L E R T

ADVISORY CAUTIONARY NON-DIRECTIVE

FOR INFORMATION, CONTACT AIRPORT WILDLIFE SPECIALIST, AAS-317 (202) 267.3389

DATE: **September 21, 1998** **No. 98-05**

TO: **Airport Operators,**
FAA Airport Certification Safety Inspectors

TOPIC: **Grasses Attractive To Hazardous Wildlife**

Recently, several reports have been received of airport owners or airport contractors planting disturbed areas (construction sites, re-grading projects, etc) with seed mixtures containing brown-top millet. All millets are a major attractant to doves and other seed eating birds.

Doves can be a major threat to aircraft safety. In the United States, between 1991 and 1997, doves were involved in 11% of all reported bird/aircraft strikes, 8% of the reported strikes that resulted in aircraft down time, and 8% of the reported strikes causing aircraft damage or other associated monetary losses.

Airport operators should ensure that grass species and other varieties of plants attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass.

For airport property already planted with seed mixtures containing millet or other large-seed producing grasses, it is recommended that disking, plowing, or other suitable agricultural practice be employed to prevent plant maturation and seed head production.

For specific recommendations on grass management and seed selection, contact the State University Cooperative Extension Service, or the local office of the USDA, Wildlife Services.

Benedict D. Castellano, Manager
Airport Safety and Compliance Branch

September 21, 1998

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ATTACHMENT M – Airport Operating Agreement with the United States Department of the Interior, National Park Service

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AGREEMENT BETWEEN THE

UNITED STATES DEPARTMENT OF THE INTERIOR

AND THE

JACKSON HOLE AIRPORT BOARD

This agreement is entered into pursuant to the Act of March 18, 1950, 16 U.S.C. 7a-7e, by the United States of America acting through the Department of the Interior (Department) as represented by the Secretary of the Interior, and the Jackson Hole Airport Board (Board) which is an organization created under the laws of the State of Wyoming by Resolution of the Board of County Commissioners of Teton County, Wyoming and Ordinance of the Town of Jackson, Wyoming.

The Board has operated, and is presently operating an airport in Grand Teton National Park under permits with the U.S. Department of the Interior, National Park Service, presently scheduled to expire on April 25, 1995. 1/

The Secretary of the Interior has determined that the continued operation of such airport is necessary to the proper performance of the functions of the Department and that no feasible and prudent alternatives thereto exist. It is, therefore, the desire of the parties that this agreement be executed to extend the term of the present permit to provide a mechanism to facilitate the qualification for Federal Aviation Administration grants-in-aid and for appropriate amortization of improvement costs, to make necessary changes in the terms thereof, and to set forth more precisely the mutual obligations and responsibilities of the parties.

1/ Special Use Permits Nos. 14-10-217-146, April 29, 1955 and 1450-9-9022, August 1, 1979.

TERMS AND CONDITIONS

1. TERM OF AGREEMENT.

(a) Term. This agreement shall be effective upon the date of the last signature hereto and for a primary term of 30 years thereafter; provided, that at the end of the 10th year of said 30-year term and at the end of each 10-year period thereafter the Board shall have an option to renew this agreement for an additional 10-year term if the Board has substantially and satisfactorily complied with all of the essential terms and conditions of this agreement. The term of this agreement, as extended, shall not exceed 50 years.

(b) Extensions and Modifications. Further extensions, amendments or modifications may be negotiated by the parties on mutually satisfactory terms. Furthermore, upon expiration of the agreement the Parties agree to negotiate in good faith a mutually satisfactory extension of the agreement.

2. DESCRIPTION OF LAND.

During the term of this agreement the Board is authorized to use the following described land in Grand Teton National Park, to wit:

> Beginning at the SW corner of the NW 1/4, NW 1/4, Section 23, T. 42N., R. 116W., 6th Principal Meridian, running northward along the section line to the NW corner of the SW 1/4, Section 14. Then northwest to a point 280 feet south and 310 feet west of the NW corner of the SW 1/4, NW 1/4, Section 14; thence NE to the NW corner of the SW 1/4, NW 1/4, Section 14. Then NE to the NE corner NW 1/4, NW 1/4, Section 14, and then NE to a point 500 feet north and 250 feet east of the SW corner of the NW 1/4, NE 1/4, Section 11. Then in an easterly direction to a point 550 feet east of the SW corner of the NE 1/4, NE 1/4, Section 11; thence southward to the NW corner SW 1/4, NE 1/4, Section 14; then along the 1/4 section line to the center 1/4 corner of Section 14. Then southwesterly to the NE

corner, NW 1/4, NW 1/4, Section 23, and then south to the SE corner, NW 1/4, NW 1/4, Section 23, and then west to the point of beginning.

Said area contains ± 533 acres for the purpose of operating a public airport facility pursuant to the Act of March 18, 1950, as amended, supra.

In addition to those lands legally described above, additional lands, approximately 4.37 acres, are hereby assigned for the purpose of allowing the Airport Board to use and maintain the access road from U.S. Highway 26/89 that serves the airport. The extent of this additional land shall be 30 feet on each side of the center line for the sole purpose of maintenance and operation of the existing access road, which is approximately .6 mile in length. Maximum paving width on any future repaving shall not exceed a total of 24 feet. In advance of any reconstruction of the road, plans shall be reviewed by the National Park Service in accordance with section 7 of this agreement.

3. PAYMENTS.

In consideration of the permission to use the land described above and the other terms and conditions herein specified, the Board shall perform snow removal services for the airport access road and parking lots and maintain the access road as set forth in Section 7(e) of this agreement (which services were formerly performed by the Department), and pay to the United States the sum of one percent of the first $200,000 of Operating Receipts of the Board (excluding grants and revolving funds, as listed in Attachment A) and one-and-one-half percent of any Operating Receipts of the Board exceeding $200,000. "Operating Receipts" as used in this subparagraph means those funds received by the Board as the result of operations carried on at the airport and do not include federal, state or local grants, loan receipts, revolving funds, interest income or receipts from the Town of Jackson or Teton County, Wyoming. This fee shall be payable within sixty (60) days following the close of the Board's fiscal year and shall be paid to the Superintendent of Grand Teton National Park.

An interest charge will be assessed on overdue amounts for each 30 day period, or portion thereof, that payment is delayed. The percent of interest charged will be based on the current value of funds to the United States Treasury which is published quarterly in the Treasury Fiscal Requirements Manual.

4. REGULATIONS AND AIRPORT OPERATION.

(a) General. In the operation of the airport, the Board shall comply with all applicable Federal rules and regulations. The Board will be notified and afforded an opportunity to comment on any regulations proposed by the Department affecting airport operations.

(b) Management Responsibility. The Board is deemed the operator of the airport as defined in the applicable Department of Transportation regulations, and, as such, is solely responsible for the operation, management, utilization and maintenance thereof. The Board shall consult with the Department on such matters as may significantly affect the proper performance of the functions of the Department.

(c) Federal Aviation Administration Regulations. Airport operations must comply with the regulations of the Federal Aviation Administration governing operations of airports of this class and size.

(d) Federal Aviation Administration Special Use Permits. Special Use Permits issued to the Federal Aviation Administration for ILS/DME Clear Zones, Localizer Facility Sites, TVOR, RCAG and VASI facilities and related facilities, some within and other outside the established Airport boundary, as specified in the attached map (Attachment B), take precedence over other airport uses.

(e) Noise Control Plan. The Board's existing noise control plan will remain in effect, except as specifically modified by this agreement. Within twenty (20) months of the effective date of this agreement, the Board shall complete a revised plan based upon Federal Aviation Administration regulations, FAR Part 150, (14 C.F.R. Part 150) which utilizes the latest in noise mitigation technology and procedures. The revised plan will be developed in a comprehensive study to consider all of the relevant environmental, economic, and operational considerations.

The primary objective of the revised plan shall be to ensure that future airport operations are controlled in such a manner that aircraft noise exposure will remain compatible with the purposes of Grand Teton National Park and will result in no significant increase in cumulative or single event noise impacts on noise sensitive areas of the Park. See Attachments C (Figure 1) and D (Figure 2). The revised plan shall also seek to ensure

that airport operations are conducted in such a manner that aircraft noise exposure will be reasonably compatible with other adjacent land uses.

The Board shall implement all measures contained in the revised plan, as approved by the Department of Transportation, as soon as is practicable thereafter, but no later than two (2) years from the effective date of this agreement. The Board, on a continuous basis thereafter, will review and amend the plan to incorporate new prudent and feasible technological advances which would allow further reduction in noise impacts on Grand Teton National Park, and such amendments shall be implemented by the Board as soon as is practicable following approval by the Department of Transportation.

The Board will take all reasonable measures to notify aircraft operators to avoid noise sensitive areas of Grand Teton National Park. The Board will maintain records of complaints of aircraft violating the FAA airspace advisory of 2,000 feet above ground level over Grand Teton National Park and notify the appropriate FAA Flight Standards Office of all such complaints. Further, to the extent feasible, the Board will limit airport approaches from and departures to the north, and encourage pilots taking off to or approaching from the north to maintain a course east of U.S. Highway 26/89 north of Moose.

(f) Cumulative Noise Standards. The cumulative noise standards specified below will be enforced as soon as practicable after the effective date of the agreement, but no later than two (2) years. Failure to enforce these noise standards shall be a material breach of the agreement. Compliance with the noise standards will be determined through the collection of noise measurement data over the periods identified and locations specified in this agreement.

(1) Acoustical energy associated with airport operations shall not exceed a level of 45 dB (Ldn), as determined by calculations set out below, based on measurement of single event noise levels, west of a line drawn between the southwest corner of Section 3, Township 42 North, Range 116 West, and the northeast corner of Section 30, Township 44 North, Range 115 West, and no further north than the north section line of Sections 26, 27, 28, and 29, Township 44 North, Range 115 West. Monitoring station(s) shall be located approximately along the line described above in this paragraph.

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Determinations of the 45 dB (Ldn) levels will be made using the following methods and calculation procedures:

a. Noise Metrics/Noise Measurement Equipment: Single event noise levels shall be measured using a Type 1 Precision Integrating Sound Level Meter (PISLM) or equivalent system capable of displaying:

1. Sound Exposure Level (SEL), the single event acoustical dose (also expressed L_{AE}).

2. Maximum A-Weighted Sound Level (dBA), measured using SLOW dynamic response, (also expressed as L_{ASm}).

3. All measurement equipment and measurement practices shall comply with International Electrotechnical Commission Publication 651 (IEC-651).

b. Data Reporting: For each single event aircraft noise measurement it is necessary to provide the following:

1. Aircraft type, air carrier identification
2. Type of operation (landing or takeoff)
3. dBA
4. SEL
5. Graphic Level Time History (optional)
6. Time of maximum dBA occurance
7. Airport reported wind, direction and speed temperature.

c. Determination of Statistical Average Sound Levels for Aircraft Type.

1. For each aircraft type within the airport mix determine a mean SEL and dBA value along with standard deviation for both approach and departure operational modes. These mean values must in each case reflect a statistical population of events which in turn reflect the yearly average airport operational characteristics including low wind (i.e., less than 10 knots), average temperature, and representative trip length.

2. For each determination of average sound exposure level ($\overline{SEL}$) it is necessary to acquire a population sample size necessary to achieve a 90% confidence interval of $\pm$ 1.5 dB.

d. Noise Calculation Matrix: As the first step in estimating the yearly average Day-Night Sound Level (Ldn) it is necessary to develop the following tables.

Takeoff

A/C Type	$\overline{SEL}$	N*	ANTILOG(SEL/10) x N
			Sum = T

Approach

A/C Type	$\overline{SEL}$	N*	ANTILOG(SEL/10) x N
			Sum = A

* N is the effective yearly-average daily number of operations. N=Nd+(10xNn), where Nd is the number of operations between 7 a.m. and 10 p.m., and Nn is the number of operations between 10 p.m. and 7 a.m.

The estimate of the yearly-average Day-Night Sound Level (Ldn) is then calculated as follows:

$$Ldn = 10 \log (A+T) - 49.4$$

(2) Further, airport operations will not generate a 55 Ldn noise contour which extends beyond the boundary of the noise sensitive areas of the park as set forth in Attachments C (Figure 1) and D (Figure 2), which has been established based on the environmental resource needs of the park.

The 55 Ldn contour will be determined from the FAA Integrated Noise Model, Version 3.8, using the most current airport operations, including aircraft operation, flight tracks and time of operation. The noise contour shall then be validated using a measured estimate of the yearly average Ldn. The estimate shall be based on a sample of measured 24-hour Ldn values for not less than ten (10) days, each day characterized by nominal yearly-average operational characteristics. The estimate shall be reported along with the 90% confidence interval (CI). If the 90% CI exceeds 1.5 dB, the sample size shall be increased until a 90% CI of 1.5 dB is attained. Noise data shall be measured using appropriate acoustical engineering methodology as defined in American National Standards Institute (ANSI) and International Electrotechnical Commission (IEC) publications, and at location(s) agreed to by the Airport Board and the National Park Service.

(g) Single Event Noise Standard. No aircraft will be permitted to operate at the Jackson Hole Airport which has a single event noise level which exceeds 92 on the dBA scale on approach.

The single event noise standard specified above will be enforced as soon as practicable after the effective date of the agreement, but no later than 6 months. Failure to enforce this noise standard shall be a material breach of the agreement.

Compliance with the single event noise standard above will be determined by reference to Federal Aviation Administration Advisory Circular 36-3B, or the version of that document currently in effect. No adjustments for gross weight will be allowed. Aircraft types and models which are not listed in Advisory Circular 36-3B will be allowed to operate if the FAA determines that the aircraft type and model would meet the noise limits stated below if it were tested according to FAA procedures and the operator obtains approval from the Airport Board certifying that operation of the aircraft is compatible with conditions for operation of the airport.

(h) Commercial Scenic, Charter, and Training Flights. The Board agrees that it will insert in all subcontracts involving aircraft operations, and take reasonable measures to enforce, a provision prohibiting the origination of commercial scenic or charter flights, as well as aircraft training operations, over noise sensitve areas of the park, (see Attachments C (Figure 1) and D (Figure 2)), except when instrument operations are required to or

from the north by weather conditions or for instrument flight training, or are desirable for night time operations and except when required to utilize Victor (VOR-Federal) airways; provided, however, the above instrument operations not specifically required by weather conditions must be conducted under Instrument Flight Rules (IFR) and cleared through FAA Air Traffic Control, and Victor airways must be intercepted outside the noise sensitive areas of the park at the minimum en route altitude prescribed for the airway and aircraft must maintain at least that altitude over the noise sensitive areas of the park.

5. REVOCATION.

In the event the Board shall be in default due to its failure to perform any of the terms and conditions set forth in this agreement, the Department shall be entitled to terminate this agreement. The agreement may not be terminated without giving the Board an opportunity for a hearing on the merits as to the alleged default and without providing the Board a reasonable period within which to cure the alleged default. This reasonable period shall be such time as will be sufficient to provide the Board with an opportunity to cure the alleged default and, shall, in any event, not be less than ninety (90) days.

6. ASSIGNMENT.

This agreement may not be assigned or transferred without the written consent of the Department, provided, however, this provision shall not be construed to prevent assignments for the purpose of obtaining financing, transfers by operation of law, or to successor governmental authorities.

7. IMPROVEMENTS.

(a) General Construction. The Board may construct or install upon the lands included in this agreement such buildings, structures, or other improvements and build or construct such roads as are necessary and desirable for the operations permitted hereunder in the development subzone as marked on Attachment B. In addition, the Board may construct additional aircraft parking in the area marked on the attached map. The Board may not, however, do any of the following:

(1) Install any improvements other than navigational and safety aids west of the existing runway.

(2) Construct or permit the operation of any commercial overnight lodging accommodation facilities.

(3) Construct or permit the operation of any industrial or other facilities unrelated to direct airport operations.

(4) Construct any facilities (other than a control tower) at an elevation height in excess of the existing buildings.

All such structures or improvements will be compatible in architectural style and appearance with existing structures. The Board will be solely responsible for securing funds and carrying out any construction project. The Board will notify the Department of any proposed construction when and if preliminary or conceptual plans are developed. In addition, the Board will provide the Department with copies of proposed, detailed plans and specifications at least 150 days prior to planned initiation of construction and the Department will provide the Board with its written comments, if any, within 60 days thereafter.

The Board agrees to immediately cease all construction activities and notify the Department if any significant scientific, prehistorical, historical, or archeological data is being or may be irrevocably lost or destroyed as the result of such construction. Once construction has been discontinued, the Board agrees it will not be resumed prior to approval from the Department.

(b) Runway Extension. This agreement does not authorize the extension of the runway, which can only be accomplished by amendment to the agreement.

(c) Signs. All signs constructed or authorized by the Board shall be compatible with signs utilized by the National Park Service in Grand Teton National Park.

(d) Removal. Upon termination or revocation of this permit, the Board may remove any such building, structure, or improvement and if removed, shall restore the site thereof to as nearly a natural condition as possible. Any buildings, structures or improvements as have not been removed by the Board within six months following the revocation or termination of this permit shall become the property of the United States without compensation therefor. The Board agrees to remove any terminal facility on the land at its cost within six months after termination or expiration of this permit, if requested to do so by the National Park Service.

(e) Maintenance. The Board will physically maintain and repair all facilities used in the operation, including grounds maintenance and all necessary housekeeping activities associated with the operation, in a safe, sanitary, and sightly condition. Snow removal on the runways, taxiways, parking ramps, public parking lots, and roads including the access road, shall be the responsibility of the Board. Maintenance of the access road will be the responsibility of the Board. In order that a high standard of physical appearance, operations, repair and maintenance will be assured, appropriate annual inspections will be carried out jointly by the Department and the Board to determine such maintenance and repair needs.

The Board shall, at all times, keep the airport on the lands covered by this agreement equipped and maintained in accordance with the requirements of the Federal Avaiation Administration or such other governmental agency or official as may have lawful jurisdiction and authority thereover.

8. INSURANCE.

(a) Insurance on Improvements. The Board shall carry or cause subcontractors and lessees to carry insurance on buildings and improvements against losses by fire or other hazards in an amount satisfactory to the Board. Amounts shall be subject to approval by the Department for facilities constructed with Department funds. In the event of loss, in whole or in part, of any such buildings or improvements as may be insured pursuant to the provisions hereof, such insurance shall be applied toward either (1) the replacement, rehabilitation, or repair of such building or improvements; or (2) the Board may elect to not rebuild and shall thereupon use the proceeds to remove any debris and restore the site; or (3) the construction of other buildings or improvements.

(b) Indemnity Insurance. The Board shall indemnify and hold the government harmless for any and all losses, damages, or liability on account of personal injury, death, or property damage, or claims for personal injury, death, or property damage of any nature whatsoever and by whosoever made, arising out of the activities of the Board, its employees, subcontractors, lessees, or agents.

For the purpose of fulfilling its obligations under this paragraph, the Board will provide the Department with written notice that the Board has obtained insurance, and the Board shall thereafter provide the Department written notice of any material change affecting the insurance program effected by the Board. The Board shall annually provide the Department with certificates of

insurance or other similar documents sufficient to evidence compliance with this section. The amounts of the insurance shall be equal to or greater than what is usually carried by prudent operators of similar airports.

9. SERVICES AND RATES.

(a) Business Activities. The business activities as shown on Attachment E providing services to the public by virtue of subcontracts, all of which activities have in the past and are presently being carried on, are authorized. The Board may provide other goods and services at the airport which are customary and usual for airports of this class and size and which are, to the maximum extent practicable, compatible with the purposes of Grand Teton National Park. When instituted, such activities shall be listed by the Board by written notice to the Department.

(b) Rates and Prices. Pursuant to 16 U.S.C. 7d all rates and prices charged by the Board and its subcontractors and licensees to the public shall be fair and reasonable. Reasonableness shall be judged primarily by comparison with those current for airports of comparable character under similar conditions, with due consideration for length of seasons, availability and costs of labor and materials, a reasonable rate of return on capital invested, and other factors affecting pricing at the Jackson Hole Airport. The Board shall advise the Department in writing of any proposed additional business activities or implementation of any proposed rates prior to institution of such activities or implementation of changes in previous rates, and such activities will also be subject to the provisions of section 7 of this agreement.

10. NON-DISCRIMINATION.

See Attachment F.

11. PUBLIC SAFETY.

(a) Law Enforcement. The board shall be responsible for general airport security and for the prevention of or the investigation of criminal activity on the airport grounds; however, the Department shall be notified immediately of such crimes as burglary, larceny, assault rape or homicide, or any other felony.

(b) Fire and Rescue. The Board shall be responsible for the prevention and suppression of fires which occur on airport grounds including those resulting from aircraft accidents during the hours in which scheduled air carrier (FAR Part 121) operations are in

progress. The Board shall also respond as quickly as possible to fires occurring at all other hours. The Board shall also ensure that a crash truck and sufficient personnel are available to man the crash truck and are trained in the suppression of aircraft fires and the rescue of victims of aircraft crashes. The Department shall be notified of any personal injury accident or fatalities, all fires, and all aircraft accidents.

12. COOPERATION.

The parties agree to confer with each other on a continuing basis during the term of this Agreement relative to any changed circumstances, including, without limitation, any technological advances which are available on a commercially reasonable basis relative to operations at the Jackson Hole Airport and to negotiate in good faith to adopt any reasonable amendment to this Agreement in recognition of any such developments.

13. MISCELLANEOUS PROVISIONS.

(a) Water Rights. The Board will obtain all water rights necessary or proper for use in connection with this agreement. At the end of the term of this agreement or upon revocation, the Board shall assign all water rights obtained to the Department.

(b) Visitor Information Services. The Department through the National Park Service reserves the right to institute information and interpretive activites in the terminal building as deemed desirable in recognition that the Jackson Hole Airport is a visitor entrance to Grand Teton National Park.

(c) Right of Entry. Representatives of the Department shall have the right, at any time, to enter upon any lands, buildings, or structures included within this agreement for any purposes deemed reasonably necessary for the administration of the area and the Government services therein, but not so as to conflict with Federal Aviation Administration security regulations, nor unreasonably interfere with the Board's use of such lands or the improvements thereon.

(d) Payment and Notices of Actions. Payments by the Board and all correspondence hereunder between the parties, including informational notices of proposed actions by either party shall be sent by certified mail, return receipt requested, addressed to the appropriate party at the addresses hereinafter indicated or at such other address as may be hereafter designated in writing by either

the parties: President, Jackson Hole Airport Board, P.O. Box 159, Jackson Wyoming, 83001; and Superintendent, Grand Teton National Park, Moose, Wyoming 83012.

(e) Officials Not to Benefit. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise thereform; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

(f) Termination of Existing Permit. Upon the effective date of this agreement, Special Use Permit No. 1460-9-9022, August 1, 1979, is terminated, by agreement of the parties, in its entirety.

(g) Financial Report. The Board shall submit, not later than sixty (60) days after the close of its fiscal year, a copy of their financial report for the preceding year. The Department shall have the right to examine the Board's records to verify all such reports.

ATTEST:

John W. Richards
Secretary

April 27, 1983
Date

JACKSON HOLE AIRPORT BOARD

By: [illegible]
President

April 27, 1983
Date

THE UNITED STATES OF AMERICA

By: James G. Watt
Secretary of the Interior

Malcolm Wallop → [illegible]
U.S. Senator (Wyo)

Dick Cheney

JACKSON HOLE AIRPORT BOARD BUDGET RECEIPTS

SUBJECT TO FEE'S

The following are specific types of receipts which the parties agree are subject to the fee:

1. Rental for the use of any building or improvement located at the Jackson Hole Airport.

2. Landing fees charged for aircraft utilizing Jackson Hole Airport.

3. License fees received from any fixed base operator.

4. License fees received from auto rental agencies.

5. Rental received from food establishments.

6. Gas tax refund to the extent not redistributed to local governments.

The following are specific types of receipts which the parties agree are not subject to the fee:

(a) Reimbursements received by the Board for providing security and maintenance services.

(b) Gas tax refunds redistibuted to local governments.

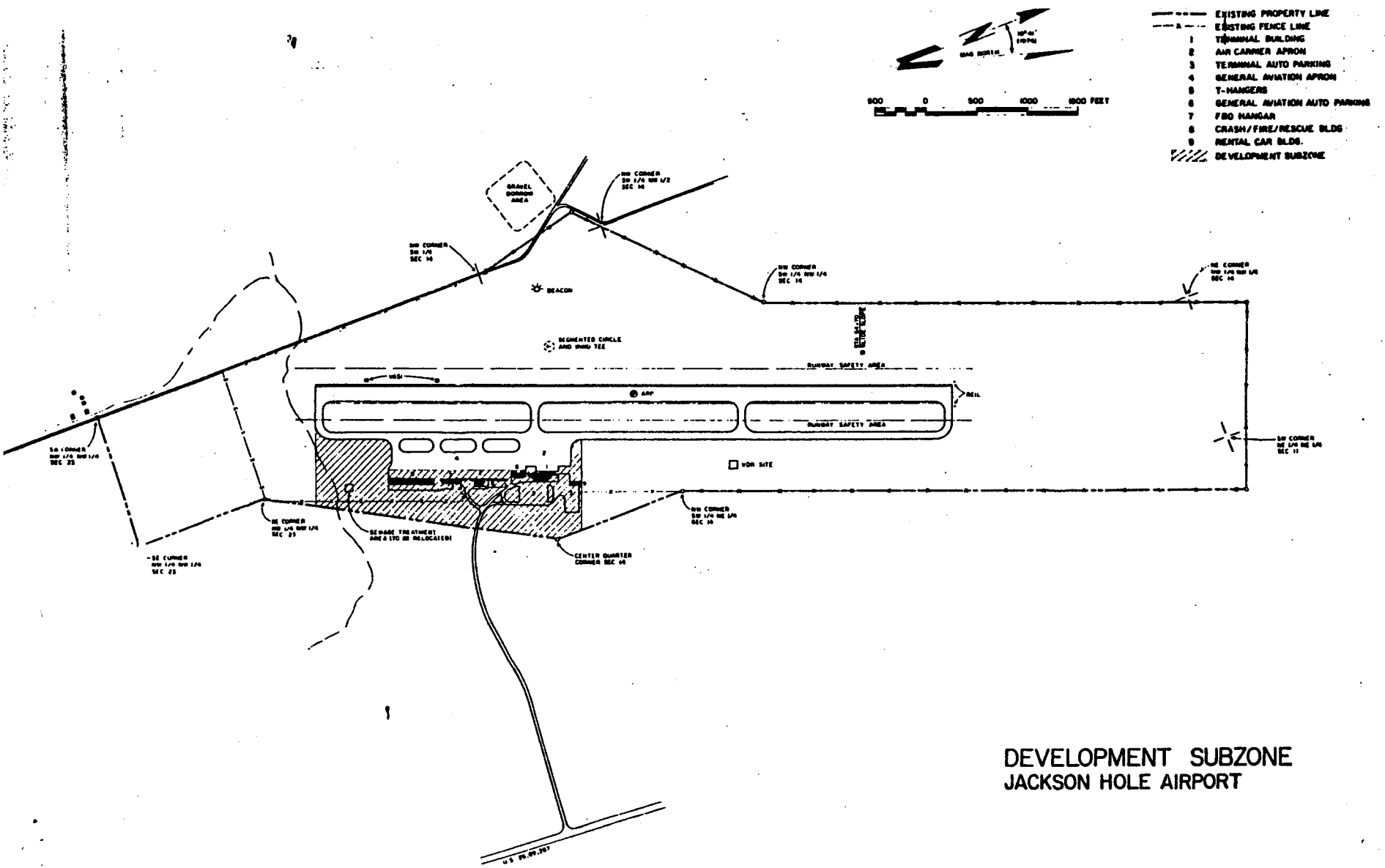
(c) Grants or gifts received by the Board.

(d) Receipts from third parties for the use of the airport photo copy machine on an actual expense basis.

(e) Interest income on investment funds.

(f) Appropriations from the Town of Jackson, Teton County and the State of Wyoming

(g) Loan receipts.



DEVELOPMENT SUBZONE
JACKSON HOLE AIRPORT

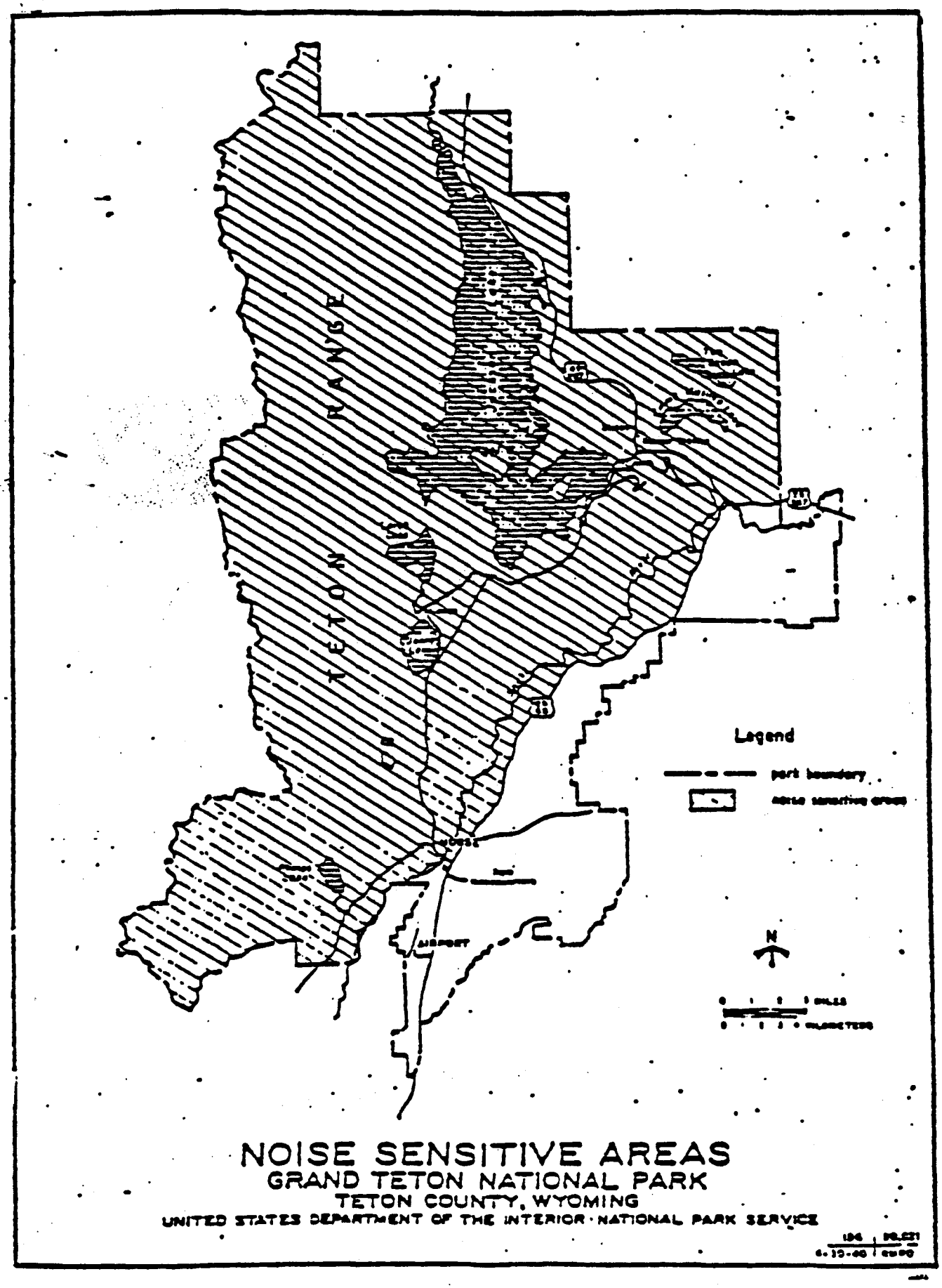

TETON RANGE
Legend
park boundary
AIRPORT
N
NOISE SENSITIVE AREAS
GRAND TETON NATIONAL PARK
TETON COUNTY, WYOMING
UNITED STATES DEPARTMENT OF THE INTERIOR · NATIONAL PARK SERVICE

FIGURE 1.

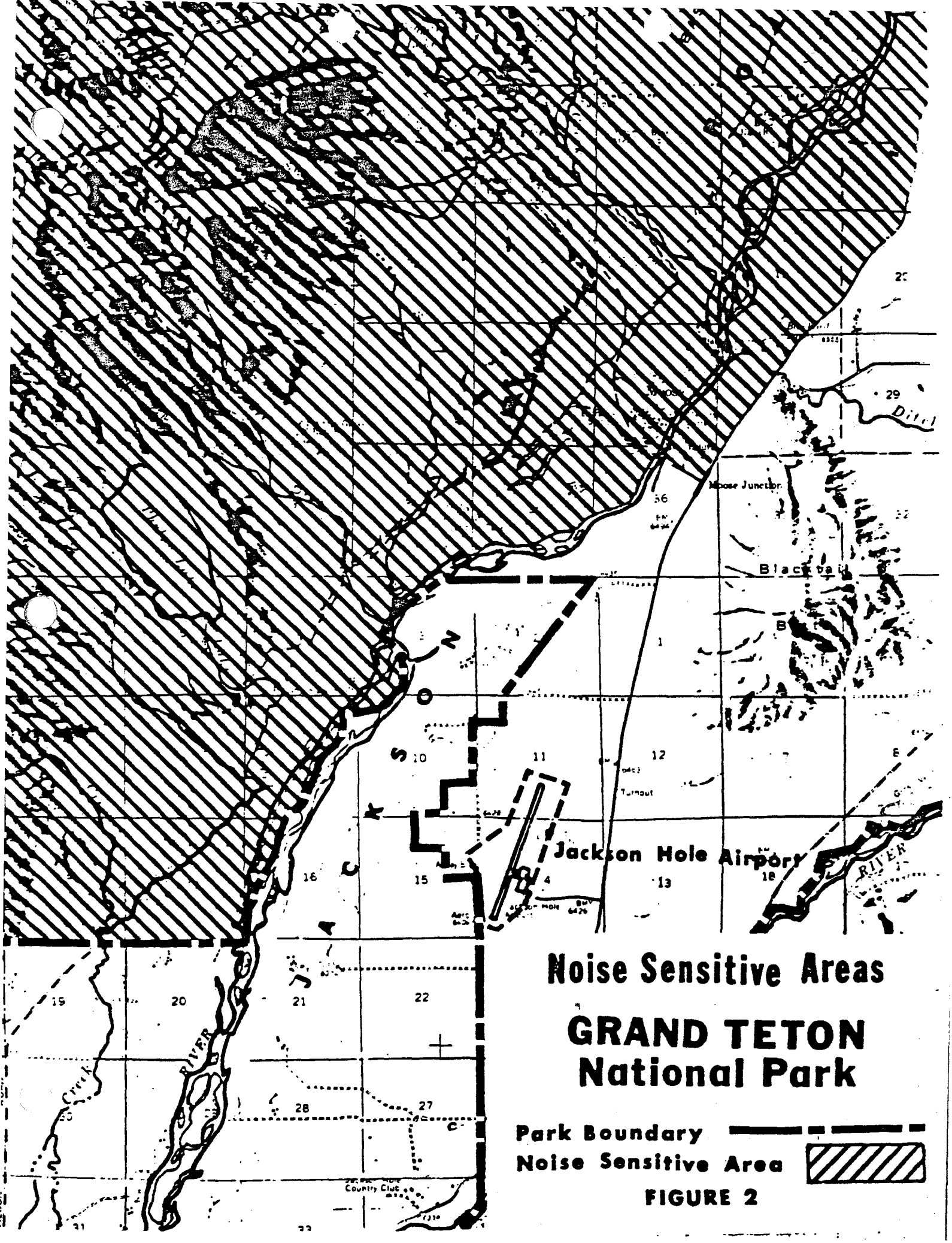

Moose Junction
Jackson Hole Airport
Turnout
Jackson Hole Country Club
RIVER
Creek
Noise Sensitive Areas
GRAND TETON
National Park
Park Boundary
Noise Sensitive Area

FIGURE 2

BUSINESS ACTIVITIES: JACKSON HOLE AIRPORT

The following are the types of activities permitted at the Jackson Hole Airport:

1. FAR Part 121 air carriers, commercial, commuter, air taxi and charter services.

2. Auto Rental Agencies.

3. The following services, alone or in conjunction with a Fixed Base Operaotr operation:

   a) Flight and Ground School

   b) Charter Service

   c) Scenic Flights

   d) Air Ambulance Service

   e) Hangar Space

   f) Fuel and Storage

   g) Service and maintenance facilities for aircraft engine, airframe and avionics.

   h) Soaring

   i) Aerial Spraying

   j) Other operations or activities specifically listed in the September 8, 1977 Airport Use Agreement between the Board and the Fixed Base Operator.

4. Cafe with liquor and malt beverage service

5. Vending machines

6. Airport terminal facilities

7. Automotive parking lot

8. Indoor advertising and courtesy phone system

9. Sundries

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AMENDMENT TO THE
"AGREEMENT BETWEEN THE
UNITED STATES DEPARTMENT OF THE INTERIOR
AND THE
JACKSON HOLE AIRPORT BOARD,"
DATED APRIL 27, 1983

This amendment is entered into pursuant to Section 1(b) and Section 12 of the subject agreement.

The first sentence in the third paragraph of Section 4(e) of the subject agreement is hereby amended to read as follows: T.H.J.L.M.

"The Board shall implement all measures contained in the revised plan as soon as is practicable, but no later than two (2) years from the effective date of this agreement. The Board shall take reasonable, timely, and diligent actions to secure Department of Transportation approval by November 14, 1985, that the revised plan is in accordance with FAR Part 150; shall timely amend said plan if necessary to obtain Department of Transportation approval; and shall implement any such amended revised plan as soon as is practicable after receiving approval, but no later than thirty (30) days thereafter."

Further, Section 5 of the subject agreement is hereby amended to read as follows:

"In the event the Board shall be in default due to its failure to perform any of the terms and conditions set forth in this agreement, the Department shall be entitled to terminate this agreement. The agreement may not be terminated without giving the Board an opportunity for a hearing on the merits as to the alleged default and without providing the Board a reasonable period within which to cure the default. This reasonable period shall be such time as will be sufficient to provide the Board with an opportunity to cure the default and shall be thirty (30) days from receipt of notice of default, or in the case of a default in the requirements of Section 4(f) of this agreement, ninety (90) days from receipt of notice of default; unless the Board shall demonstrate in writing and the Department shall concur, such concurrence not to be unreasonably withheld, that a longer period is necessary to provide the Board with an opportunity to cure the default."

ATTEST:

John W. Richards
Secretary

July 29, 1985
Date

JACKSON HOLE AIRPORT BOARD

By: T. H. Jensen
President

July 29, 1985
Date

UNITED STATES DEPARTMENT OF THE INTERIOR

By: Lorraine Mintzmyer
Regional Director, Rocky Mountain Region
National Park Service

JUL 19 1985
Date

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DRAFT

SECOND AMENDMENT
TO THE
AGREEMENT BETWEEN
THE UNITED STATES DEPARTMENT OF THE INTERIOR
AND THE JACKSON HOLE AIRPORT BOARD

This Second Amendment to the Agreement Between the United States Department of the Interior and the Jackson Hole Airport Board is entered into effective the 1st day of November, 2002 by and between the Jackson Hole Airport Board, a body corporate organized under the laws of the State of Wyoming (the "Board") and the United States of America, acting through the Department of the Interior (the "Department").

WHEREAS, the Act of March 18, 1950, 16 U.S.C. § 7a-7e authorizes the Secretary of the Interior to enter into agreements with public agencies, such as the Board, for the improvement, operation and maintenance of airports within national parks;

WHEREAS, pursuant to said Act, the Department and the Board entered into an Agreement dated April 27, 1983, as amended July 29, 1985 (the "Agreement"), for the operation of the Jackson Hole Airport within Grand Teton National Park;

WHEREAS, Section 7 of the Agreement limits the location of certain improvements on the Airport to a "development subzone" as defined in the Agreement;

WHEREAS, the Department proposes to construct a helicopter facility on the Airport at a location outside the development subzone, and the Board desires to facilitate such construction, under mutually agreeable terms; and

WHEREAS, the Department has complied with the requirements of the National Environmental Policy Act with respect to its proposed construction of a helicopter facility at such location on the Airport.

NOW THEREFORE, for valuable consideration the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. The Agreement is amended by adding a new Section 7(f) as follows:

   (f) Department Helicopter Facility. Notwithstanding anything to the contrary herein, the Board shall be authorized to approve the construction, operation and maintenance of a helicopter facility by the Department, outside the development subzone and at a location generally depicted on the annexed **Attachment G**. Any such approval shall be in writing and pursuant to mutually agreeable terms and conditions.

2. Other then as set forth in Paragraph 1 above, the Agreement shall not be otherwise amended, but shall remain in full force and effect in accordance with its terms.

JACKSON HOLE AIRPORT BOARD

By: _____
President

Date: _____

ATTEST:

_____
Secretary

Date: _____

UNITED STATES DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Rocky Mountain Region, National Park Service

Date: _____

THIRD AMENDMENT TO THE
AGREEMENT BETWEEN
THE UNITED STATES DEPARTMENT OF THE INTERIOR
AND THE JACKSON HOLE AIRPORT BOARD

This Third Amendment to the Agreement Between the United States Department of the Interior and the Jackson Hole Airport Board is entered into effective the 18 day of May, 2011 by and between the Jackson Hole Airport Board, a body corporate organized under the laws of the State of Wyoming (the "Board") and the United States of America, acting through the Department of the Interior (the "Department").

WHEREAS, the Jackson Hole Airport (the "Airport") was established at its present location in the 1930's, has been served by commercial airlines since 1941;

WHEREAS, the Act of March 18, 1950, 16 U.S.C. §§7a-7e authorizes the Secretary of the Interior to enter into agreements with public agencies, such as the Board, for the improvement, operation and maintenance of airports within national parks;

WHEREAS, pursuant to said Act, the Department and the Board entered into an Agreement dated April 27, 1983, as amended July 29, 1985 and July 30, 2003 (the "Agreement"), for the operation of the Airport within Grand Teton National Park (the "Park");

WHEREAS, the Agreement provides for a term of 30 years, and grants the Board two 10-year options to renew, which options have been exercised by the Board;

WHEREAS, to facilitate its qualification for Federal Aviation Administration Grants In-Aid and for appropriate amortization of costs of improvement, including navigation and noise abatement aids, the Board has requested that it be granted two additional 10-year options to renew the Agreement term; and

WHEREAS, the Board is in material compliance with the terms and conditions of the Agreement, and the Department has complied with the requirements of the National Environmental Policy Act with respect to this proposal.

NOW THEREFORE, for valuable consideration the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. The first sentence of Section 1(a) of the Agreement is amended by striking all after the semicolon and substituting the following in lieu thereof: "provided, that at the end of the 10th year of said 30-year term and within 120 days prior to the end of each 10-year period thereafter the Board shall have the option to renew this Agreement for an additional 10-year term, unless the Department has given the Board notice that the Board has not substantially and satisfactorily complied with all of the essential terms and conditions of this Agreement, in which event (a) the Board may not exercise an option until the Department determines that such failure of compliance has been cured by the Board, or (b) the Board has obtained a judicial determination that it is in such compliance. In either of these events, the Board's time for option exercise shall be extended until 30 days after its receipt of either determination."

2. The last sentence of Section 1(a) of the Agreement is amended by striking the word "50" and substituting "70" in lieu thereof.

3. Section 12 of the Agreement is deleted and replaced with the following:

   12. Cooperation, Review of Agreement Terms and Mitigation Measures. The parties agree to confer with each other from time to time during the term of this Agreement relative to any changed circumstances, including without limitation any technological advances which are available on a commercially reasonable basis relative to operations at the Airport. In addition, the parties agree to comprehensively review the terms and conditions of this Agreement, from time to time during any term

of this Agreement, but no less often than every five (5) years, and (a) discuss whether any amendments to this Agreement would result in better ensuring that the Airport remains compatible with the purposes and values of Grand Teton National Park, would improve the safety and efficiency of Park and/or Airport operations, or other such amendments as the parties deem appropriate, and (b) discuss and identify mitigation measures which may then be available to comply with the requirements of Section 4(i) of this Agreement.

4. Section 4 of the Agreement is amended by adding to the end thereof a new paragraph (i) which reads as follows:

   (i) Mitigation of Effects. In addition to meeting the cumulative and single event standards set forth above, the Board shall seek to further reduce noise and other negative environmental impacts associated with the Airport. The Board will act in good faith and in coordination and cooperation with the National Park Service to develop and implement such reasonable and cost-effective mitigation measures as may be available to reduce environmental impacts on the Park to the lowest practicable levels consistent with the safe and efficient operations of the Airport, and with applicable law and contractual obligations.

   Nothing in this paragraph 4 (i) shall require the Board to pursue or implement any mitigation or other measure which would result in a violation of law, or FAA grant agreements and assurances, or the Board's other contractual obligations existing on August 1, 2010, or for which funding is not reasonably available, or which would result in a *de minimis* environmental benefit when compared to costs.

5. Section 13 of the Agreement is amended by adding to the end thereof a new paragraph (h) which reads as follows:

   (h) Biennial Report. By March 31, 2012, and each two years thereafter, the Board shall submit a report to the National Park Service describing the Board's activities and operations for the previous two calendar years, its efforts at reducing negative environmental impacts, and specifically its efforts to reduce its noise impacts on the Park. The National Park Service shall acknowledge receipt of and respond to each such report within 120-days of receipt.

UNITED STATES
DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Intermountain Region,
National Park Service

Date: 16 May 2011

JACKSON HOLE AIRPORT BOARD

By: _____
Clay James, President

Date: 18 May 2011

ATTEST:

_____
Secretary

Date: 18 May 2011

FOURTH AMENDMENT
TO THE
AGREEMENT BETWEEN
THE UNITED STATES DEPARTMENT OF THE INTERIOR
AND THE JACKSON HOLE AIRPORT BOARD

This Fourth Amendment to the Agreement Between the United States Department of the Interior and the Jackson Hole Airport Board is entered into effective the 1st day of September, 2013, by and between the Jackson Hole Airport Board, a body corporate organized under the laws of the State of Wyoming (the "Board"), and the United States of America acting through the Department of the Interior (the "Department").

WHEREAS, the Act of March 18, 1950, 16 U.S.C. §§7a-7e authorizes the Secretary of the Interior to enter into agreements with public agencies, such as the Board, for the improvement, operation and maintenance of airports within national parks;

WHEREAS, pursuant to said Act, the Department and the Board entered into an Agreement dated April 27, 1983, as amended July 29, 1985, July 30, 2003 and May 18, 2011 (the "Agreement"), for the operation of the Jackson Hole Airport within Grand Teton National Park (the "Park");

WHEREAS, Section 3 of the Agreement provides for the Board's payment to the United States of 1% of the first $200,000 in Operating Receipts, and 1.5% of Operating Receipts in excess of $200,000, with Operating Receipts being defined to exclude certain receipts described in Attachment A to the Agreement;

WHEREAS, the Board and the Department agree that the Airport's existence in the Park causes the Department to incur expenses which exceed the amounts received by the Department in accordance with the existing fee payment formula; and

WHEREAS, the Board and the Department agree that the fee formula set forth in this Fourth Amendment is necessary for the Department to recoup such expenses, and does not exceed the value of the services actually received by the Board from the Department in relation to the Airport's existence and operation in the Park.

NOW THEREFORE, for valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. Section 3 of the Agreement is amended by striking the first and second sentences of the first paragraph thereof and substituting the following:

> In consideration of the permission to use the land described above and the other terms and conditions herein specified, the Board shall perform snow removal services for the Airport access road and parking lots, and maintain the access road

as set forth in Section 7(e) of this Agreement (which services were formerly performed by the Department), and pay to the United States a sum equal to three percent (3%) of the first Four Million Dollars ($4,000,000) of Operating Receipts of the Board, and four percent (4%) of any Operating Receipts of the Board exceeding Four Million Dollars ($4,000,000) which are received in any Board fiscal year. "Operating Receipts" as used in this subparagraph shall mean those funds received by the Board as a result of operations carried on at the Airport, but shall not include federal, state or local grants, loan receipts, revolving funds, interest income, receipts from the Town of Jackson or Teton County, Wyoming, receipts from any contract to provide security screening or law enforcement services at the Airport, or other receipts described in the annexed **Attachment A** as not being subject to this fee.

2. The effective date of this Fourth Amendment shall be September 1, 2013. Sums due to the United States under the provisions of this Fourth Amendment with respect to the Board's Operating Receipts during fiscal year July 1, 2013 through June 30, 2014 shall be prorated from the effective date.

3. Except as set forth above, the Agreement shall not be amended hereby, but shall remain in full force and effect.

UNITED STATES DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Intermountain Region, National Park Service

Date: _____

ATTEST:

_____
Secretary

Date: _____

JACKSON HOLE AIRPORT BOARD

By: _____
President

Date: _____

ATTACHMENT N – State Species of Greatest Conservation Need

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Wyoming 2010 Species of Greatest Conservation Need

(SGCN are organized by taxa, conservation, and priority tier and then alphabetized by common name).

Taxa Group	Common Name	Scientific Name	2010 NSS Cell	Tier
Birds	Common Loon	*Gavia immer*	NSS1 (Aa)	I
	Bald Eagle	*Haliaeetus leucocephalus*	NSS2 (Ba)	I
	Greater Sage-Grouse	*Centrocercus urophasianus*	NSS2 (Ba)	I
	Burrowing Owl	*Athene cunicularia*	NSSU (U)	I
	Ferruginous Hawk	*Buteo regalis*	NSSU (U)	I
	Great Gray Owl	*Strix nebulosa*	NSSU (U)	I
	Mountain Plover	*Charadrius montanus*	NSSU (U)	I
	Northern Goshawk	*Accipiter gentilis*	NSSU (U)	I
	Trumpeter Swan	*Cygnus buccinator*	NSS2 (Ba)	II
	American Bittern	*Botaurus lentiginosus*	NSS3 (Bb)	II
	Ash-throated Flycatcher	*Myiarchus cinerascens*	NSS3 (Bb)	II
	Barrow's Goldeneye	*Bucephala islandica*	NSS3 (Bb)	II
	Black Tern	*Chlidonias niger*	NSS3 (Bb)	II
	Black-crowned Night-heron	*Nycticorax nycticorax*	NSS3 (Bb)	II
	Boreal Owl	*Aegolius funereus*	NSS3 (Bb)	II
	Bushtit	*Psaltriparus minimus*	NSS3 (Bb)	II
	Canvasback	*Aythya valisineria*	NSS3 (Bb)	II
	Caspian Tern	*Hydroprogne caspia*	NSS3 (Bb)	II
	Forster's Tern	*Sterna forsteri*	NSS3 (Bb)	II
	Franklin's Gull	*Larus pipixcan*	NSS3 (Bb)	II
	Harlequin Duck	*Histrionicus histrionicus*	NSS3 (Bb)	II
	Juniper Titmouse	*Baeolophus ridgwayi*	NSS3 (Bb)	II
	Lesser Scaup	*Aythya affinis*	NSS3 (Bb)	II
	Long-billed Curlew	*Numenius americanus*	NSS3 (Bb)	II
	Northern Pintail	*Anas acuta*	NSS3 (Bb)	II
	Peregrine Falcon	*Falco peregrinus*	NSS3 (Bb)	II
	Redhead	*Aythya americana*	NSS3 (Bb)	II
	Snowy Egret	*Egretta thula*	NSS3 (Bb)	II
	Virginia Rail	*Rallus limicola*	NSS3 (Bb)	II
	Western Scrub-jay	*Aphelocoma californica*	NSS3 (Bb)	II
	White-faced Ibis	*Plegadis chihi*	NSS3 (Bb)	II
	Bobolink	*Dolichonyx oryzivorus*	NSS4 (Bc)	II
	Brewer's Sparrow	*Spizella breweri*	NSS4 (Bc)	II

Taxa Group	Common Name	Scientific Name	2010 NSS Cell	Tier
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	NSS4 (Bc)	II
	Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*	NSS4 (Bc)	II
	Dickcissel	*Spiza americana*	NSS4 (Bc)	II
	Grasshopper Sparrow	*Ammodramus savannarum*	NSS4 (Bc)	II
	Lark Bunting	*Calamospiza melanocorys*	NSS4 (Bc)	II
	McCown's Longspur	*Calcarius mccownii*	NSS4 (Bc)	II
	Sage Sparrow	*Amphispiza belli*	NSS4 (Bc)	II
	Sage Thrasher	*Oreoscoptes montanus*	NSS4 (Bc)	II
	Short-eared Owl	*Asio flammeus*	NSS4 (Bc)	II
	American Three-toed Woodpecker	*Picoides dorsalis*	NSSU (U)	II
	Black Rosy-Finch	*Leucosticte atrata*	NSSU (U)	II
	Black-backed Woodpecker	*Picoides arcticus*	NSSU (U)	II
	Brown-capped Rosy-Finch	*Leucosticte australis*	NSSU (U)	II
	Clark's Grebe	*Aechmophorus clarkii*	NSSU (U)	II
	Lewis's Woodpecker	*Melanerpes lewis*	NSSU (U)	II
	Northern Pygmy-Owl	*Glaucidium gnoma*	NSSU (U)	II
	Pygmy Nuthatch	*Sitta pygmaea*	NSSU (U)	II
	Swainson's Hawk	*Buteo swainsoni*	NSSU (U)	II
	Upland Sandpiper	*Bartramia longicauda*	NSSU (U)	II
	Greater Sandhill Crane	*Grus canadensis tabida*	NSS4 (Bc)	III
	Willow Flycatcher	*Empidonax traillii*	NSS4 (Cb)	III
	Merlin	*Falco columbarius*	NSSU (U)	III
	Yellow-billed Cuckoo	*Coccyzus americanus*	NSSU (U)	III
Mammals	Black-footed Ferret	*Mustela nigripes*	NSS1 (Aa)	I
	Canada Lynx	*Lynx canadensis*	NSS1 (Aa)	I
	Townsend's Big-eared Bat	*Corynorhinus townsendii*	NSS2 (Ba)	I
	Wyoming Pocket Gopher	*Thomomys clusius*	NSS3 (Bb)	I
	Pygmy Shrew	*Sorex hoyi*	NSS2 (Ab)	II
	Canyon Mouse	*Peromyscus crinitus*	NSS3 (Bb)	II
	Cliff Chipmunk	*Neotamias dorsalis*	NSS3 (Bb)	II
	Dwarf Shrew	*Sorex nanus*	NSS3 (Bb)	II
	Fringed Myotis	*Myotis thysanodes*	NSS3 (Bb)	II
	Great Basin Pocket Mouse	*Perognathus parvus*	NSS3 (Bb)	II
	Hispid Pocket Mouse	*Chaetodipus hispidus*	NSS3 (Bb)	II
	Idaho Pocket Gopher	*Thomomys idahoensis*	NSS3 (Bb)	II

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Mammal	Long-eared Myotis	*Myotis evotis*	NSS3 (Bb)	II
	Long-legged Myotis	*Myotis volans*	NSS3 (Bb)	II
	Northern Myotis	*Myotis septentrionalis*	NSS3 (Bb)	II
	Piñon Mouse	*Peromyscus truei*	NSS3 (Bb)	II
	Plains Harvest Mouse	*Reithrodontomys montanus*	NSS3 (Bb)	II
	Plains Pocket Gopher	*Geomys bursarius*	NSS3 (Bb)	II
	Preble's Shrew	*Sorex preblei*	NSS3 (Bb)	II
	Pygmy Rabbit	*Brachylagus idahoensis*	NSS3 (Bb)	II
	Silky Pocket Mouse	*Perognathus flavus*	NSS3 (Bb)	II
	Spotted Bat	*Euderma maculatum*	NSS3 (Bb)	II
	Water Vole	*Microtus richardsoni*	NSS3 (Bb)	II
	Wolverine	*Gulo gulo*	NSS3 (Bb)	II
	Bighorn Sheep	*Ovis canadensis*	NSS4 (Bc)	II
	Moose	*Alces alces*	NSS4 (Bc)	II
	Northern Flying Squirrel	*Glaucomys sabrinus*	NSS4 (Bc)	II
	Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	NSS4 (Bc)	II
	American Marten	*Martes americana*	NSS4 (Cb)	II
	Big Brown Bat	*Eptesicus fuscus*	NSS4 (Cb)	II
	Little Brown Myotis	*Myotis lucifugus*	NSS4 (Cb)	II
	Olive-backed Pocket Mouse	*Perognathus fasciatus*	NSS4 (Cb)	II
	Swift Fox	*Vulpes velox*	NSS4 (Cb)	II
	Western Small-footed Myotis	*Myotis ciliolabrum*	NSS4 (Cb)	II
	American Pika	*Ochotona princeps*	NSSU (U)	II
	Eastern Red Bat	*Lasiurus borealis*	NSSU (U)	II
	Northern River Otter	*Lontra canadensis*	NSSU (U)	II
	Pallid Bat	*Antrozous pallidus*	NSS3 (Bb)	III
	Plains Pocket Mouse	*Perognathus flavescens*	NSS3 (Bb)	III
	Hayden's Shrew	*Sorex haydeni*	NSS4 (Bc)	III
	Spotted Ground Squirrel	*Spermophilus spilosoma*	NSS4 (Bc)	III
	Uinta Chipmunk	*Neotamias umbrinus*	NSS4 (Bc)	III
	Yellow-pine Chipmunk	*Neotamias amoenus*	NSS4 (Bc)	III
	Vagrant Shrew	*Sorex vagrans*	NSS4 (Cb)	III
	Fisher	*Martes pennanti*	NSSU (U)	III
	Least Weasel	*Mustela nivalis*	NSSU (U)	III

Taxa Group	Common Name	Scientific Name	2010 NSS Cell	Tier
Fish	Bluehead Sucker	*Catostomus discobolus*	NSS1 (Aa)	I
	Flannelmouth Sucker	*Catostomus latipinnis*	NSS1 (Aa)	I
	Kendall Warm Springs Dace	*Rhinichthys osculus thermalis*	NSS1 (Aa)	I
	Roundtail Chub	*Gila robusta*	NSS1 (Aa)	I
	Sturgeon Chub	*Macrhybopsis gelida*	NSS1 (Aa)	I
	Colorado River Cutthroat Trout	*Oncorhynchus clarkii pleuriticus*	NSS2 (Ba)	I
	Yellowstone Cutthroat Trout	*Oncorhynchus clarkii bouvieri*	NSS2 (Ba)	I
	Northern Leatherside Chub	*Gila copei*	NSSU (U)	I
	Finescale Dace	*Phoxinus neogaeus*	NSS2 (Ab)	II
	Hornyhead Chub	*Nocomis biguttatus*	NSS2 (Ab)	II
	Pearl Dace	*Margariscus margarita*	NSS2 (Ab)	II
	Suckermouth Minnow	*Phenacobius mirabilis*	NSS2 (Ab)	II
	Western Silvery Minnow	*Hybognathus argyritis*	NSS2 (Ab)	II
	Bonneville Cutthroat Trout	*Oncorhynchus clarkii utah*	NSS3 (Bb)	II
	Burbot	*Lota lota*	NSS3 (Bb)	II
	Goldeye	*Hiodon alosoides*	NSS3 (Bb)	II
	Iowa Darter	*Etheostoma exile*	NSS3 (Bb)	II
	Plains Minnow	*Hybognathus placitus*	NSS3 (Bb)	II
	Plains Topminnow	*Fundulus sciadicus*	NSS3 (Bb)	II
	Sauger	*Sander canadensis*	NSS3 (Bb)	II
	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	NSS3 (Bb)	II
	Mountain Whitefish	*Prosopium williamsoni*	NSS4 (Bc)	II
	Snake River Cutthroat Trout	*Oncorhynchus clarkii*	NSS4 (Cb)	II
	Brassy Minnow	*Hybognathus hankinsoni*	NSS4 (Bc)	III
	Common Shiner	*Luxilus cornutus*	NSS4 (Bc)	III
	Flathead Chub	*Platygobio gracilis*	NSS4 (Bc)	III
	Bigmouth Shiner	*Notropis dorsalis*	NSS4 (Cb)	III
	Central Stoneroller	*Campostoma anomalum*	NSS4 (Cb)	III
	Northern Plains Killifish	*Fundulus kansae*	NSS4 (Cb)	III
	Orangethroat Darter	*Etheostoma spectabile*	NSSU (U)	III
Amphibian	Boreal Toad	*Anaxyrus boreas boreas*	NSS1 (Aa)	I
	Wyoming Toad	*Anaxyrus baxteri*	NSS1 (Aa)	I
	Great Basin Spadefoot	*Spea intermontana*	NSSU (U)	I
	Woodfrog	*Lithobates sylvaticus*	NSS2 (Ba)	II

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Amphibian	Columbia Spotted Frog	*Rana luteiventris*	NSS3 (Bb)	II
	Great Plains Toad	*Anaxyrus cognatus*	NSSU (U)	III
	Northern Leopard Frog	*Lithobates pipiens*	NSSU (U)	III
	Plains Spadefoot	*Spea bombifrons*	NSSU (U)	III
Reptile	Midget Faded Rattlesnake	*Crotalus oreganus concolor*	NSS1 (Aa)	I
	Northern Tree Lizard	*Urosaurus ornatus wrighti*	NSS1 (Aa)	II
	Great Basin Gophersnake	*Pituophis catenifer deserticola*	NSS2 (Ba)	II
	Northern Rubber Boa	*Charina bottae*	NSS3 (Bb)	II
	Pale Milksnake	*Lampropeltis triangulum multistriata*	NSS3 (Bb)	II
	Smooth Greensnake	*Opheodrys vernalis*	NSS3 (Bb)	II
	Black Hills Red-bellied Snake	*Storeria occipitomaculata pahasapae*	NSSU (U)	II
	Plains Black-headed Snake	*Tantilla nigriceps*	NSSU (U)	II
	Plains Gartersnake	*Thamnophis radix*	NSSU (U)	II
	Plains Hog-nosed Snake	*Heterodon nasicus*	NSSU (U)	II
	Prairie Lizard	*Sceloporus consobrinus*	NSSU (U)	II
	Prairie Racerunner	*Aspidoscelis sexlineatus viridis*	NSSU (U)	II
	Red-Sided Gartersnake	*Thamnophis sirtalis parietalis*	NSSU (U)	II
	Valley Gartersnake	*Thamnophis sirtalis fitchi*	NSSU (U)	II
	Greater Short-horned Lizard	*Phrynosoma hernandesi*	NSS4 (Bc)	III
	Western Painted Turtle	*Chrysemys picta bellii*	NSS4 (Bc)	III
	Western Spiny Softshell	*Apalone spinifera hartwegi*	NSS4 (Bc)	III
	Great Basin Skink	*Plestiodon skiltonianus utahensis*	NSSU (U)	III
	Great Plains Earless Lizard	*Holbrookia maculata maculata*	NSSU (U)	III
	Northern Many-lined Skink	*Plestiodon multivirgatus multivirgatus*	NSSU (U)	III
	Ornate Box Turtle	*Terrapene ornata ornata*	NSSU (U)	III
Crustaceans	Pilose Crayfish	*Pacifastacus gambelii*	NSSU (U)	II
	Calico Crayfish	*Orconectes immunis*	NSS4 (U)	III
	Devil Crayfish	*Cambarus diogenes*	NSSU (U)	III
	Ringed Crayfish	*Orconectes neglectus*	NSSU (U)	III
	Shrimp	Combined account	NSSU (U)	III

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Mollusks	Jackson Lake Springsnail	*Pyrgulopsis robusta*	NSSU (U)	I
	Oreohelix Mountain Snails	Combined account	NSSU (U)	I
	Aquatic Snails	Combined account	NSSU (U)	II
	California Floater	*Anodonta californiensis*	NSSU (U)	II
	Cave Physa	*Physella spelunca*	NSSU (U)	II
	Cylindrical Papershell	*Anodontoides ferussacianus*	NSSU (U)	II
	Fatmucket	*Lampsilis siliquoidea*	NSSU (U)	II
	Giant Floater	*Pyganodon grandis*	NSSU (U)	II
	Land Snails	Combined account	NSSU (U)	II
	Plain Pocketbook	*Lampsilis cardium*	NSSU (U)	II
	Western Pearlshell	*Margaritifera falcata*	NSSU (U)	II
	White Heel Splitter	*Lasmigona complanata*	NSSU (U)	II
	Pill Clams	Combined account	NSSU (U)	III
	Pond snails (Stagnicola)	Combined account	NSSU (U)	III