

National Park Service
U.S. Department of the Interior



Jackson Hole Airport Use Agreement Extension

Draft Environmental Impact Statement

Grand Teton National Park Wyoming



March 2009

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DRAFT Environmental Impact Statement
Jackson Hole Airport Use Agreement Extension

GRAND TETON NATIONAL PARK

Teton County, Wyoming

The 533-acre Jackson Hole Airport is entirely within the boundaries of Grand Teton National Park. The Jackson Hole Airport Board operates the airport under a 1983 use agreement with the U.S. Department of the Interior. The use agreement must be renewed to provide the airport with continued eligibility for Federal Aviation Administration funding beyond April 2013. The proposed action would be an administrative action and would not involve construction or development of any facilities. This environmental impact statement considered two alternatives for the use agreement:

Alternative 1: No Action: The airport would not be eligible for Federal Aviation Administration funding after April 2013, but would continue operations under the existing use agreement. When the agreement expired in April 2033, the airport would be closed and the site would be restored to natural conditions.

Alternative 2: Preferred Alternative: The existing use agreement would be extended for two 10-year terms, until April 2053.

The alternatives were considered for their effects on natural soundscape; visitor use and experience; visual quality and dark skies; water quality and hydrology; wildlife and their habitats, including special concern, threatened, and endangered species; park and airport operations; public health and safety; socioeconomics; and surface and air transportation. The analysis determined that Alternative 1 would have major impacts on natural soundscape, airport operations, socioeconomics, and surface and air transportation. Alternative 2 would have major impacts on natural soundscape and airport operations. Except for airport operations under Alternative 2, all of the major impacts would be adverse.

If you wish to comment on the environmental impact statement, you may mail comments to the park superintendent at the address below or post comments online at <http://parkplanning.nps.gov/grte>. This environmental impact statement will be available for public review for 60 days.

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EXECUTIVE SUMMARY

Purpose and Need for Action

Purpose. The Jackson Hole Airport is on 533 acres within Grand Teton National Park. The airport operates under the terms of a 1983 agreement between the Jackson Hole Airport Board and United States (U.S.) Department of the Interior. Within the Department of the Interior, the National Park Service (NPS) administers the agreement. The purpose of the proposed action is to enable continued air transportation services at the Jackson Hole Airport by ensuring that the terms of the agreement between the Jackson Hole Airport Board and the Department of the Interior do not unnecessarily foreclose Federal Aviation Administration grant eligibility after 2013.

Need. An extension to the use agreement is needed to ensure that the Jackson Hole Airport will remain eligible for federal funding beyond the year 2013. The current use agreement authorizes operation of the airport until April 27, 2033. However, under Federal Aviation Administration funding regulations, an airport must own its land or have more than 20 years remaining on its lease or use agreement. Because the Jackson Hole Airport is on land owned by the U.S. government, the airport will lose its eligibility for Airport Improvement Program funding on April 27, 2013, 20 years before the use agreement expires.

Airport Improvement Program grants cover 95 percent of eligible costs for airfield capital improvement or repair projects that enhance airport safety, capacity, or security or address environmental concerns. Over the past decade, this program funded almost \$25 million in projects at the Jackson Hole Airport. Similar funding will be needed in the future to enable the airport to maintain the federal certification that allows the airport to be used for scheduled passenger service.

Background. The Jackson Hole Airport was created by the town of Jackson at its present location in the 1930s, before the site was part of Grand Teton National Park. When the airport site and surrounding lands were merged into Grand Teton National Park in 1950, continued operation of the airport was authorized by a Department of the Interior Airports Act decision. Since then, the airport has operated under a series of permits and use agreements between the Department of the Interior and Jackson Hole Airport Board.

The current use agreement was signed on April 27, 1983. The term of the agreement was for 30 years, with two 10-year renewal options, both of which have been exercised. As a result, the agreement expires on April 27, 2033. Some of the important provisions of the use agreement are as follows.

- The airport must meet stringent noise standards that are specified in the use agreement. The Jackson Hole Airport Board must continuously seek to identify and incorporate technological advances that will further reduce aircraft noise impacts in Grand Teton National Park.
- The Jackson Hole Airport Board is allowed to construct buildings and other improvements only within the 28.5-acre development subzone. All such facilities must be directly related to airport operations. No construction (except the tower) can exceed the height of the 1983 buildings.
- The Jackson Hole Airport Board and National Park Service must cooperate and confer on a continuing basis in matters that affect the park, proposed airport improvements, protection of natural and cultural resources, annual inspections to determine maintenance and repair needs, crimes and public safety incidents, and airport financial status.
- The Jackson Hole Airport Board pays the National Park Service for the use of the land, based on a percentage of airport operating receipts.

The use agreement has been amended twice. The July 29, 1985 amendment updated administrative provisions regarding noise control plan implementation and time allowed to resolve out-of-compliance situations, if any occurred. The July 30, 2003 amendment was needed to establish the interagency helibase within the airport boundary north of the development subzone.

The Jackson Hole Airport is the most important airport in Wyoming, accounting for more than 30 percent of all aviation-related jobs in the state, 40 percent of total annual expenditures of the state's general aviation visitors, and almost 75 percent of scheduled passenger enplanements (Wyoming Department of Transportation 2004; Bishop 2009). The airport averages 90 flights per day on a year-round basis, but in the summer peak it handles about 150 daily flights, with a few days above 200 flights. Five carriers provide scheduled passenger service on 12 to 15 outbound flights per day using aircraft ranging in size up to the 188-seat Boeing 757. The remaining airport use is by general aviation.

The closest airport with scheduled passenger service is in Idaho Falls, Idaho. This airport, which is 90 miles west of the town of Jackson, handles about half as many scheduled passenger flights as the Jackson Hole Airport. In good weather, the drive to the Idaho Falls Regional Airport from Jackson requires more than 2 hours on primarily two-lane, mountain roads.

Alternatives

Two alternatives were evaluated. The evaluation period extended through 2033 when the airport either would close (the no action alternative) or would require additional action, such as another use agreement extension, to maintain certification to provide scheduled passenger service.

Alternative 1: No Action/Continue Current Management. Regulations for implementing the National Environmental Policy Act require that the alternative of no action be included in all environmental evaluations. Accordingly, under Alternative 1, the no action alternative, the current use agreement would stay in effect until 2033, and then expire.

Under this alternative, on April 27, 2013, the airport would lose its entitlement to federal funding for acquisition, repair, and replacement of airport infrastructure. Without federal funding, the Jackson Hole Airport Board would have difficulty maintaining the airport's federal certification to support scheduled passenger aviation. Without this certification, scheduled passenger service providers would have to terminate their service to the airport. This analysis assumed that loss of certification and associated scheduled passenger service would occur before 2015.

Between 2015 and 2033, the airport would continue operations under the existing use agreement. General aviation would be the primary airport use, and pilots would rely on their own judgment regarding whether to continue to use the airport.

On April 27, 2033, the use agreement would expire and the airport would close. Within six months, the Jackson Hole Airport Board would remove the terminal and restore its site to as nearly a natural condition as possible. After that date, the National Park Service would remove any remaining facilities and manage the airport site as a part of Grand Teton National Park.

Alternative 2: Preferred Alternative. Alternative 2 is the preferred alternative. Alternative 2 would consist of an administrative action to add two 10-year terms to the existing use agreement so that it would expire on April 27, 2053. Alternative 2 would not make any other changes in the use agreement, and would not involve any construction or development of new facilities. Development activi-

ties in the development subzone would continue in accordance with existing use agreement provisions.

The Environmentally Preferred Alternative. The environmentally preferred alternative is defined as “the alternative that will best promote the national environmental policy expressed in the National Environmental Policy Act’s Section 101.” This generally is interpreted to mean the alternative that causes the least adverse effect on physical, biological, and cultural resources, but the policy also considers beneficial use of the nation’s resources.

Alternative 1 would best promote the park’s natural and cultural components. However, on a regional scale, Alternative 2 would better protect these resources by continuing the use of an existing facility rather than indirectly causing new construction outside the park for replacement facilities and supporting infrastructure. This alternative also would be more effective in balancing resource use with the environment, because the social and economic benefits provided by the airport would continue without any additional degradation of the natural and cultural resources in the park or the region.

Affected Environment

The existing environment in the vicinity of the Jackson Hole Airport is described, with emphasis on natural resources and visitor resources of Grand Teton National Park, park and airport operations, public health and safety, socioeconomics, and surface and air transportation. In conformance with Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act, the description of the affected environment is limited to resources in and outside Grand Teton National Park that potentially could be affected by implementing one or both alternatives

Environmental Consequences

Impact topics that were considered, and major impacts associated with the alternatives are as follows. No impairment or unacceptable impacts on park natural or cultural resources would occur.

Natural Soundscape. Both alternatives would continue the existing major, indirect, long-term, adverse effects on the park’s natural soundscape in 2015 and 2025. The effects would be most evident within a few miles of the airport, and would mostly affect areas in the south part of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being a negligible impact. With Alternative 1, effects of the airport on the natural soundscape of the park would cease once the airport closed in 2033. With Alternative 2, the effects would continue at least until 2053. Both alternatives would continue to achieve compliance with the noise requirements in the use agreement.

Visitor Use and Experience. Neither alternative would have major impacts on visitor use and experience.

Visual Quality and Dark Skies. Neither alternative would have major impacts on the visual quality of Grand Teton National Park or the area’s dark skies.

Water Quality and Hydrology. Neither alternative would have major impacts on water quality or hydrology.

Wildlife. Neither alternative would have major impacts on wildlife and their habitats, including special concern, threatened, and endangered species.

Park and Airport Operations. Under Alternative 1, long-term, indirect, adverse impacts of major intensity on airport use and operations patterns would result from the loss of about 45 percent of the current average daily air traffic, all scheduled passenger service, and ground services other than those supporting general aviation. Alternative 2 would have moderate to major, long-term, indirect impacts on airport facilities within the development subzone to accommodate more passenger traffic from scheduled commercial flights.

Public Health and Safety. Under Alternative 1, long-term, indirect, adverse effects on safety of moderate intensity would result from the inability of the airport to install upgraded navigational aids; purchase major pieces of safety equipment; and maintain rescue training. Alternative 2 would not have any major impacts on public health and safety.

Socioeconomics. Alternative 1 would cause long-term, indirect, adverse impacts of major intensity for the town of Jackson and Teton County, Wyoming with regard to:

- Winter recreation outside the park;
- Economic impacts from on- and off-airport losses of jobs, purchases, and services;
- The end of locally available scheduled passenger service for area residents and businesses; and
- The loss of at least 90 percent of the airport's operating revenue and 70 percent of its funding for facility maintenance and capital improvements.

Alternative 2 would continue generating long-term, indirect socioeconomic benefits to the town of Jackson and Teton County, Wyoming.

Surface and Air Transportation. Alternative 1 would result in long-term, indirect impacts of major intensity on regional transportation systems from Jackson to Idaho Falls, and on Wyoming and Idaho transportation agencies.

- Impacts on visitors who arrive by air in the winter would be adverse.
- Changes in community access by air travel would be adverse.
- Impacts on levels of scheduled passenger air service would be adverse at the Jackson Hole Airport and beneficial at the Idaho Falls Regional Airport.
- Until 2033, growth in the air charter sector at the Jackson Hole Airport would be beneficial for general aviation. Closure of the airport in 2033 would have an adverse effect on general aviation.
- Increased automobile traffic between Jackson and Idaho Falls would be adverse and would cause major, adverse effects on highway capacity in Wyoming and Idaho.

Alternative 2 would not have any major impacts on transportation.

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Chapter 1

Purpose and Need for Action

PURPOSE

The Jackson Hole Airport is on 533 acres within Grand Teton National Park. The airport operates under the terms and conditions of a 1983 agreement between the Jackson Hole Airport Board and the United States (U.S.) Department of the Interior. Within the Department of the Interior, the National Park Service (NPS) administers the agreement.

The use agreement has an expiration date of April 27, 2033. The National Park Service is reviewing a proposal from the Jackson Hole Airport Board to extend the use agreement for two additional 10-year terms. Such an extension would allow the airport to operate until the year 2053.

In accordance with Director's Order #12 (NPS 2001a), the purpose component of an environmental impact statement defines the goals and objectives that are critical to meet if the National Park Service is to consider the proposal successful. Accordingly, the purpose of the proposed action is to enable continued air transportation services at the Jackson Hole Airport by ensuring that the terms of the agreement between the Jackson Hole Airport Board and the Department of the Interior do not unnecessarily foreclose Federal Aviation Administration grant eligibility after 2013.

NEED

An extension to the use agreement is needed to provide assurance that the Jackson Hole Airport will remain eligible for funding from the Federal Aviation Administration beyond the year 2013. The existing use agreement was signed on April 27, 1983. The term of the agreement is for 30 years, with two additional 10-year options, both of which have been exercised. As a result, the current agreement authorizes operation of the airport until April 27, 2033.

The Federal Aviation Administration regulations published in Title 14, Part 152 of the *Code of Federal Regulations* require that an airport that does not own its land must have more than 20 years remaining on its lease or use agreement to be eligible for Airport Improvement Program funds. Therefore, for the Jackson Hole Airport to remain eligible for federal funding, the airport use agreement must be extended by no later than April 27, 2013.

Specifically, the proposed action is needed to:

- Provide certainty into the future for planning and investment, and for safe and efficient airport operations by ensuring that the terms of the agreement between the Jackson Hole Airport Board and the Department of the Interior do not unnecessarily foreclose Federal Aviation Administration grant eligibility after 2013.
- Continue to meet the needs and support the proper performance of the functions of the Department of the Interior. This requirement relates to the 1950 Department of the Interior Airports Act, which is discussed in the next section.

PROJECT BACKGROUND

Establishment of the Jackson Hole Airport

The Jackson Hole Airport was created by the town of Jackson at its present location in the 1930s, before the site was part of Grand Teton National Park. At first, it consisted of an unpaved landing strip. By 1939, parts of the site were leased from the Bureau of Land Management, State of Wyoming, Jackson Hole Preserve, and private landowners.

Beginning in 1941, scheduled passenger air service using DC-3 propeller aircraft was provided at the Jackson Hole Airport. A log terminal building was constructed to provide passenger services (Jackson Hole Airport 2006a).

In 1943, a large portion of the Jackson Hole valley, including the airport site, was designated as Jackson Hole National Monument by presidential proclamation. In 1950, the Jackson Hole Monument was merged into adjacent Grand Teton National Park, which had been established in 1929. As a result of the merger, the airport site was incorporated into the national park. Figure 1 shows the location of the airport within Grand Teton National Park.

On March 18, 1950, Congress passed the Department of the Interior Airports Act. The full text of this act's provisions, from the current version of the *United States Code*, Title 16, Chapter 1, Subchapter I, Sections 7a-7e, is provided in Appendix A. Under this act,

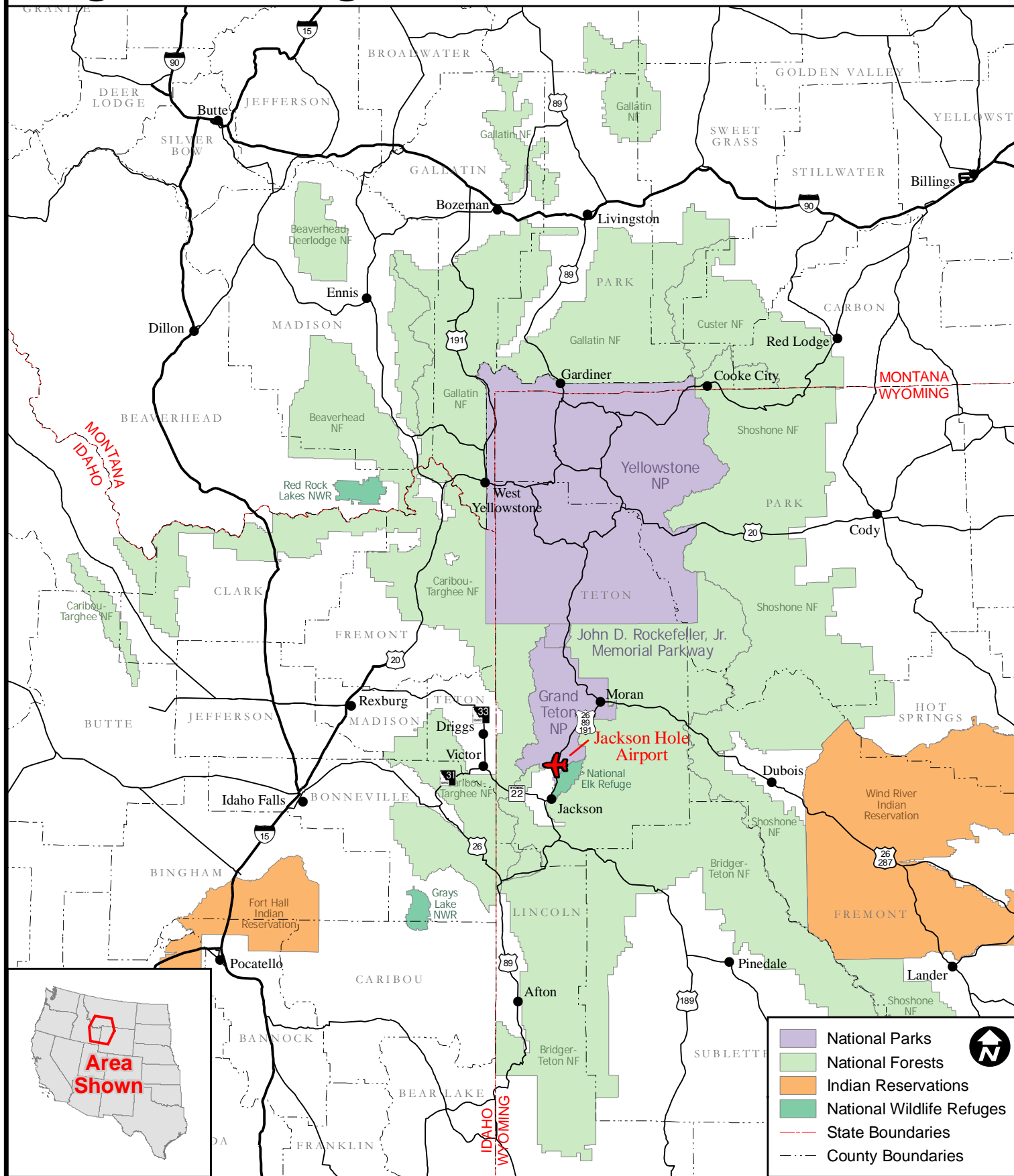
The Secretary of the Interior (hereinafter called the "Secretary") is authorized to plan, acquire, establish, construct, enlarge, improve, maintain, equip, operate, regulate, and protect airports in the continental United States in, or in close proximity to, national parks, national monuments, and national recreation areas, when such airports are determined by him to be necessary to the proper performance of the functions of the Department of the Interior.

The Secretary is authorized to . . . enter into agreements with other public agencies providing for the construction, operation, or maintenance of airports by such other public agencies or jointly by the Secretary and such other public agencies upon mutually satisfactory terms; and to enter into such other agreements and take such other action with respect to such airports as may be necessary to carry out the purposes of [the act].

In April 1955, the Secretary of the Interior granted the Town of Jackson and Teton County a 20-year permit to operate the Jackson Hole Airport within Grand Teton National Park. In 1967, the Town of Jackson and Teton County created the Jackson Hole Airport Board (a joint powers board) to operate the airport. Grand Teton National Park (Jackson Hole Airport) and Cape Cod National Seashore (Provincetown Municipal Airport) are the only units of the national park system that contain airports with regularly scheduled commercial airline service.



Figure I - Region



Use Agreements for the Jackson Hole Airport

Use Agreements Prior to 1983. As mentioned previously, the initial permit to operate the airport was issued in 1955 and had a duration of 20 years. In 1969, the National Park Service provided a renewal clause in the permit.

Another use agreement was signed on August 1, 1979. This agreement reduced the land area of the airport from 760 acres to 533 acres, but reconfigured the airport boundary so that a northerly runway extension to 8,000 feet could be accommodated. The new agreement also called for the Jackson Hole Airport Board to develop a voluntary noise abatement plan to route aircraft away from noise-sensitive areas of Grand Teton National Park.

Use Agreement of April 27, 1983. The 1979 agreement was not scheduled to expire until April 1995. However, to be eligible to receive Federal Aviation Administration funding, the Jackson Hole Airport Board had to meet the requirements of Title 14, Part 152 of the *Code of Federal Regulations* and demonstrate that the land on which the airport was built would be committed to this use for at least the next 20 years. Therefore, a new agreement between the Jackson Hole Airport Board and the Secretary of the Interior was signed less than 4 years later, on April 27, 1983. In the opening paragraph, the agreement states:

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 so set forth more precisely the mutual obligations and responsibilities of the parties.

An extension of the April 27, 1983 use agreement is the subject of this environmental impact statement.

The full text of the existing use agreement is provided in Appendix B. Key provisions include the following. Identification of sections is provided to facilitate comparisons of these brief summaries with the full text in the appendix.

- The primary term of the agreement was for an initial period of 30 years, with two 10-year renewal options, both of which have been exercised. As a result, the agreement expires on April 27, 2033 (Section 1).
- The agreement defines the boundaries of the 533 acres within the airport, plus 4.37 acres that the Jackson Hole Airport Board can use for an access road (Section 2).
- The Jackson Hole Airport Board must pay the National Park Service for the use of the land, based on a percentage of operating receipts (Section 3).
- The Town of Jackson and Teton County own the airport facilities, but the Jackson Hole Airport Board is identified as the operator of the airport and is solely responsible for its operation, management, utilization, and maintenance. The board must consult with the Department of the Interior on matters that may significantly affect the proper performance of the functions of the Department of the Interior (Section 4(b)).

- The Jackson Hole Airport Board was required to prepare a revised noise control plan that would “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.” On a continuous basis, the plan must be reviewed and updated “to incorporate new prudent and feasible technological advances which would allow further reduction in noise impacts on Grand Teton National Park” (Section 4(e)). The airport noise control plan is provided in Appendix C of this environmental impact statement.
- The agreement established cumulative noise standards and monitoring requirements, and states that “Failure to enforce these noise standards shall be a material breach of the agreement.” Under the cumulative noise standard requirements:
 - Acoustical energy associated with airport operations shall not exceed a level of 45 decibels on a day-night average sound level (DNL) for a specified area west and north of the airport (Section 4(f)(1)). This area is shown in Figure 2, the Grand Teton National Park map. (The glossary at the end of this environmental impact statement defines day-night average sound level.)
 - Airport operations will not generate a 55-decibel day-night average sound level noise contour that extends beyond the boundary of the noise-sensitive area of the park, which is shown as the yellow-hatched area on Figure 2 (Section 4(f)(2)).
- The single-event noise standard for aircraft on approach to Jackson Hole Airport was established at 92 A-weighted decibels (Section 4(g)). (This is a certification from the Federal Aviation Administration based on each aircraft make and model operating in a controlled environment, and is not a noise measurement for a single landing event at this airport.)
- The Jackson Hole Airport Board must insert into all aircraft operations subcontracts a provision prohibiting the origination of commercial scenic or charter flights, and aircraft training operations, over the noise-sensitive areas of the park (Section 4(h)).
- The Jackson Hole Airport Board is authorized to “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.” The boundaries of the development subzone, which enclose an area of 28.5 acres, are included in Figure 3. The agreement specifically states that the board may not:
 - Install any improvements other than navigational and safety aids west of the runway;
 - Construct or permit the operation of any commercial overnight lodging facilities, industrial facilities, or other facilities unrelated to direct airport operations; or
 - Construct any facilities other than a control tower that are higher than the existing buildings (Section 7(a)).
- For any proposed improvements, the Jackson Hole Airport Board must notify the Department of the Interior at the preliminary or conceptual stage, and provide the Department with detailed plans and specifications at least 150 days before the start of construction. The Department must provide the board with its written comments, if any, within 60 days (Section 7(a)).
- Cultural resources must be protected during all site improvement activities. As a result, “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” (Section 7(a)).



Figure 2 - Grand Teton National Park

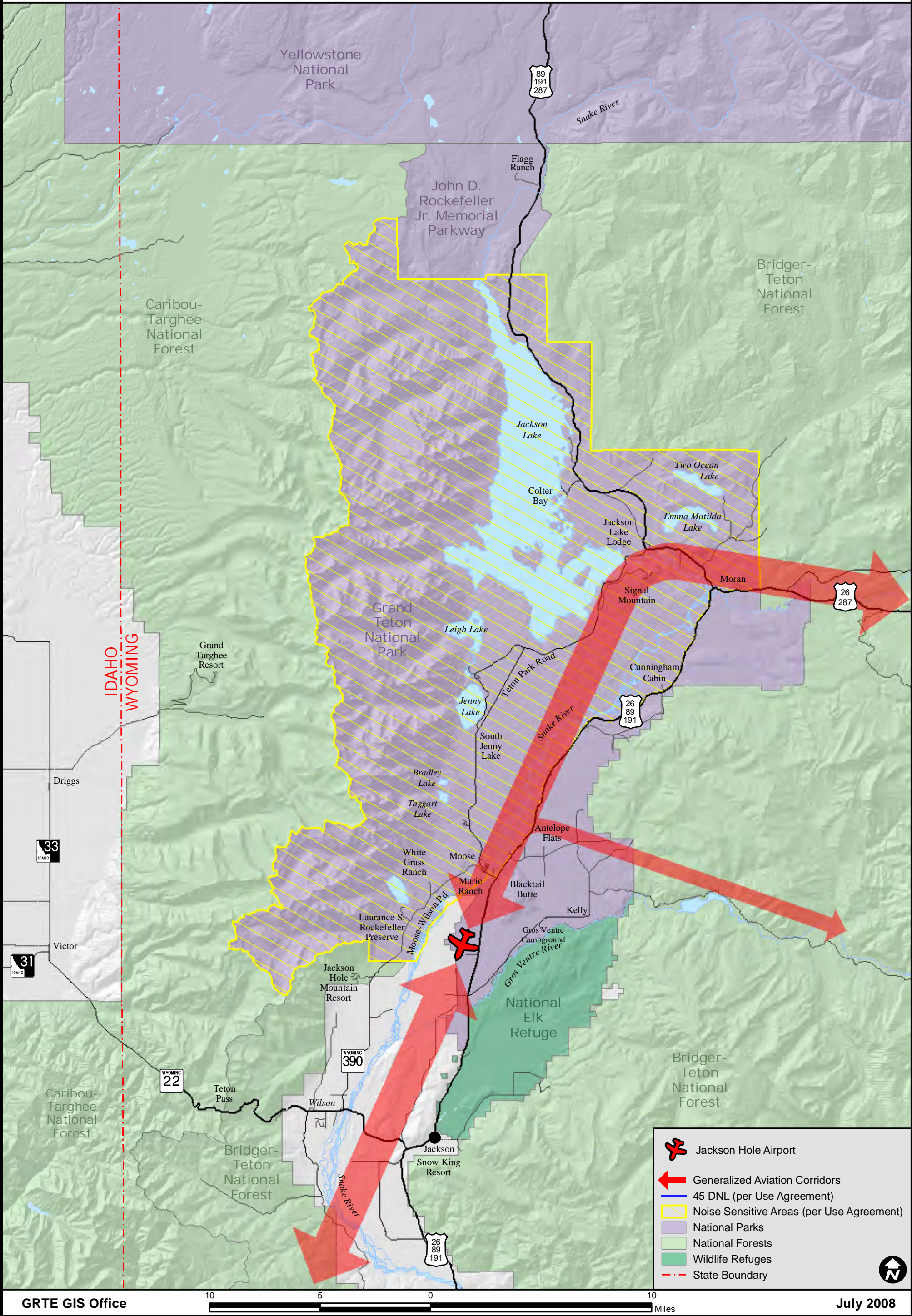
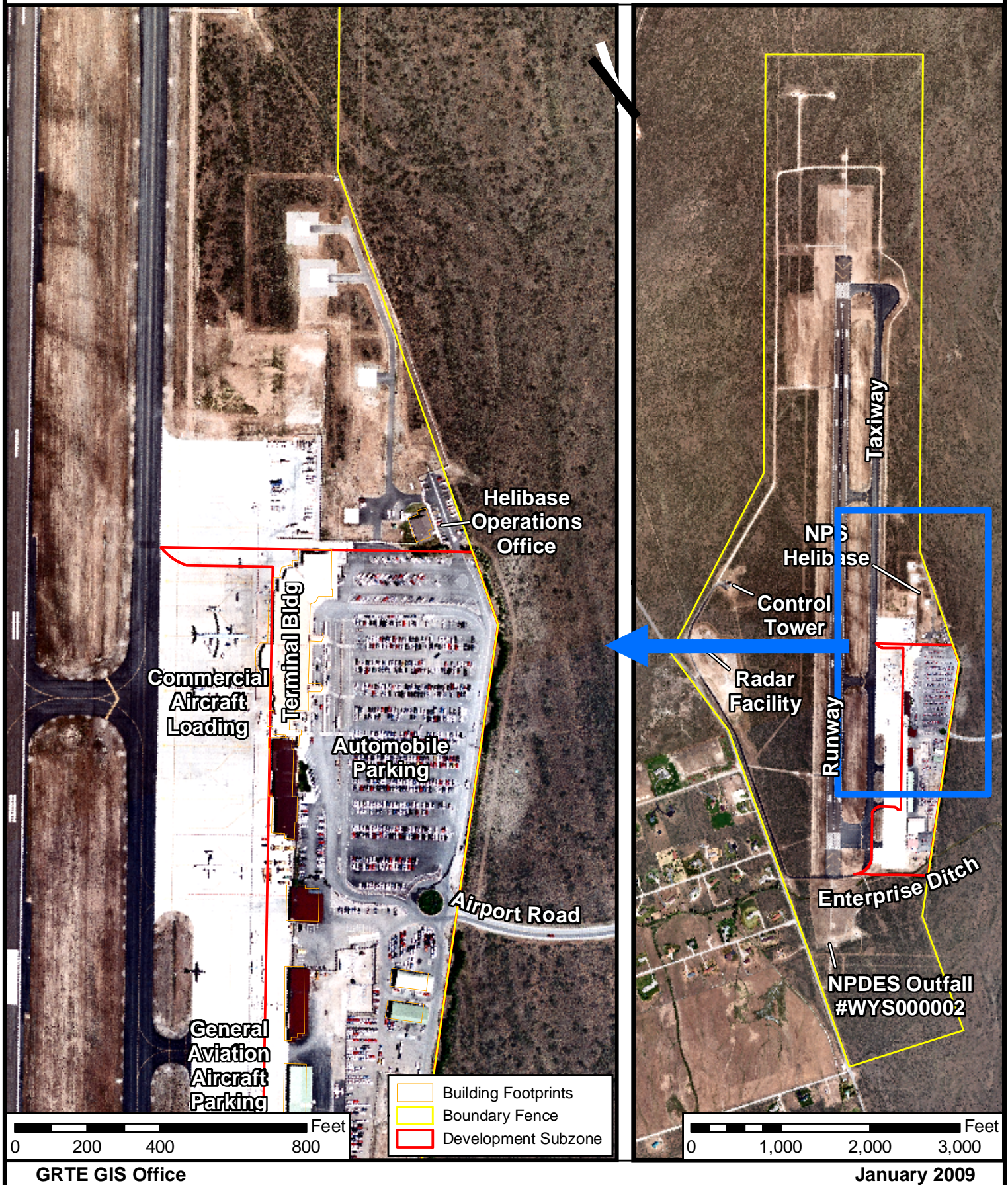




Figure 3 - Jackson Hole Airport



- “This agreement does not authorize the extension of the runway, which can only be accomplished by amendment to the agreement” (Section 7(b)).
- Upon termination or revocation of the permit to use the specified lands, the Jackson Hole Airport Board may remove any buildings, structures, or improvements and must, at the request of the National Park Service, remove the terminal. Any buildings not removed within six months become the property of the United States without compensation (Section 7(d)).
- The Jackson Hole Airport Board is responsible for all maintenance, repair, and housekeeping, and meeting the requirements of the Federal Aviation Administration or other government agencies with jurisdiction. Annual inspections are to be conducted jointly by the Department of the Interior and the board to determine maintenance and repair needs (Section 7(e)).
- Authorized business activities are limited to those listed in Attachment E of the agreement, all of which were ongoing when the agreement was signed, plus other goods and services that “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” (Sections 9(a) and (b)).
- Rates and prices charged to the public for use of the airport must be fair and reasonable. The Department of the Interior must be notified in writing of any proposed rate changes (Section 9(b)).
- The Jackson Hole Airport Board is responsible for public safety, including law enforcement, fire, and rescue. The board must notify the Department of the Interior regarding the occurrence of specified crimes and public safety incidents (Section 11).
- The airport board and Department of the Interior agree to cooperate and confer on a continuing basis relative to any changed circumstances, and to negotiate in good faith (Section 12).
- Department of the Interior representatives have the right of entry at any time throughout the airport, so long as they do not conflict with Federal Aviation Administration security regulations or unreasonably interfere with the board’s use of airport facilities (Section 13(c)). (All parties agree that this provision also applies to compliance with security regulations of the Department of Homeland Security, which did not exist when the use agreement was signed.)
- Each year, the Jackson Hole Airport Board must provide the Department of the Interior with a financial report, and the Department has the right to examine the board’s records to verify reports (Section 13(g)).

Amendments to the Use Agreement of April 27, 1983. There have been two amendments to the existing use agreement between the Department of the Interior and the Jackson Hole Airport Board. The amendments, summarized below with full text provided in Appendix B, would remain part of the use agreement under the proposed action.

The first amendment to the April 27, 1983 use agreement was signed by the Jackson Hole Airport Board and Department of the Interior on July 29, 1985. It modified two provisions:

- The effective date for implementing the noise control plan required in Section 4(e) of the agreement was delayed by up to 2 additional years. The amendment also specified that the noise control plan would be in accordance with the Part 150 Airport Noise Compatibility Planning requirements of the Federal Aviation Administration’s Airports Environmental Program, and provided provisions for revising the plan to secure Department of Transportation approval.

- Section 5 regarding revocation of the agreement if the board failed to meet the agreement's terms and conditions was amended with regard to the length of time allowed to cure a default.

A second amendment to the April 27, 1983 use agreement was signed by the Jackson Hole Airport Board and Department of the Interior on July 30, 2003. The amendment was needed to implement a separate "General Agreement between the U.S. Department of the Interior, National Park Service and the Jackson Hole Airport Board Regarding an Interagency Helibase" that also was signed on July 30, 2003. (The helibase agreement will not change and is not part of the action being evaluated in this environmental impact statement.) The second amendment added two new subsections and an attachment to the April 27, 1983 agreement, as follows.

- New Subsection 7(f) modified the section on "Improvements" to allow the Department of the Interior to construct, operate, and maintain a helicopter facility at the location shown in a new attachment to the use agreement and in Figure 3 of this environmental impact statement.
- New Subsection 4(i) altered the noise requirements in Subsection 4(e) to relieve the board from noise-related obligations in association with helicopter operations from the helibase.

National Environmental Policy Act Compliance for the Use Agreement. The 1983 agreement was supported by an environmental assessment and finding of no significant impact that were prepared by the National Park Service. The environmental assessment was based on conditions that existed at that time, or were reasonably foreseeable.

No additional National Environmental Policy Act compliance action was taken in support of the first amendment. However, this amendment was limited to minor administrative changes in a use agreement that had been evaluated in an environmental assessment two years previously.

An environmental assessment was prepared for the helibase project (NPS 2001b). The new helibase general agreement and the second amendment to the 1983 airport use agreement were included within the proposed action that was evaluated in the helibase environmental assessment.

Existing Facilities at the Jackson Hole Airport

In 1959, the airport's 6,300-foot-long runway was built. The first of several proposals to expand the runway was made in 1965, and would have lengthened the runway to 8,000 feet. The most recent expansion proposal was made in 1992 by the Jackson Hole Airport Board and, in its final form (in 1999), involved a total of 8,100 linear feet of paved runway and safety zones; associated taxiways, taxiway entrances, holding aprons, and runway edge lighting; and a 10,000-square-foot expansion of the terminal building. Despite a Federal Aviation Administration (1999) record of decision to carry out this action, the runway expansion proposal was highly controversial and was not implemented.

Although the runway is maintained at its original length, other improvements have been made at the Jackson Hole Airport. The current airport layout and facilities are shown in Figure 3.

- Facilities built between 1973 and 1976 included a parallel taxiway, instrument landing system (ILS), parking areas, and sewage treatment system.
- Construction of the present terminal began in 1988.
- A rental car facility, apron, and parking lot were built 1990.
- Taxiway rehabilitation and installation of an east boundary fence occurred in 1991.

- The JH Aviation Management and Satellite hangars and an aircraft parking apron were constructed in 1992. The underground south fuel farm was installed concurrent with construction of these facilities.
- The relocation and replacement of boundary fences with animal control fences occurred in 1991 and 1996.
- The aircraft rescue and firefighting (ARFF) building was constructed in 1997.
- The air traffic control tower and 300-foot-long safety areas at each end of the runway were placed in operation in 2000. The runway was translated 300 feet to the north (centered on the pavement by repainting) to achieve a “runway object-free area” at the south runway end that complied with Federal Aviation Administration safety regulations.
- The underground north fuel farm, which is adjacent to the south fuel farm, was replaced and upgraded in 2003.
- The interagency helibase, including three pads and an operations office, was completed in May 2004.
- The very high frequency omnidirectional range (VOR) navigational aid was commissioned in June 2004 and runways were renumbered to 19 and 01.
- Terminal remodeling and expansion were completed in September 2004.
- The aircraft apron was extended to the north by 300 feet in the summer of 2005, and a glycol storage and dispensing system for deicing aircraft was installed north of the terminal building.
- In 2008, the taxiway was again rehabilitated, and a radar system was installed on the northwest part of the airport. The radar ties into the Salt Lake City air traffic control center and provides controllers with information on aircraft within 200 nautical miles of the Jackson Hole Airport.

The helibase pads and support building are owned and operated by the National Park Service. Hangars 4 and 5 and the south fuel farm are owned by the fixed-base operator, and the rental car service buildings are owned by rental car operators. All of the non-NPS facilities will become the property of the Jackson Hole Airport Board after terms of years that are specified in individual contracts (Bishop 2008). All of the other airport features are owned and operated by the Jackson Hole Airport Board (Federal Aviation Administration 1999).

Need for Federal Funding for the Jackson Hole Airport

As described under “Need” on page 1, the airport’s use agreement with the Department of the Interior must be extended by no later than April 27, 2013 for the Jackson Hole Airport to remain eligible for federal funding.

Each year, the Jackson Hole Airport Board must make capital expenditures. Some of these, such as parking lots, landscaping, and control tower equipment, are not eligible for federal grant funding. Other expenditures, such as runway rehabilitation, ramps, taxiways, sound monitoring equipment, navigational aids, and firefighting and rescue vehicles, are eligible for federal grant funding on a basis that involves 95 percent federal funding and 5 percent funding by the airport.

For the year ending December 31, 2007, the airport’s total net revenue was about \$1.18 million, exclusive of federal grants. That year, the Jackson Hole Airport Board also received \$2.69 million in

federal grants for capital improvements and equipment acquisition. In 2006, the value of federal grants received by the Jackson Hole Airport was \$3.48 million.

The airport's current capital improvement plan includes the following construction and rehabilitation projects that are eligible for Federal Aviation Administration grant funding:

- Terminal building expansion;
- Safety planning study;
- Glycol recapture system;
- Runway rehabilitation and centerline lights; and
- Sound monitoring system upgrades

Without federal grant funding, the airport would not have adequate operating and non-operating revenues to fund these projects. Similar funding shortfalls would occur throughout the life of the airport.

Current Use of the Jackson Hole Airport and Other Airports in the Region

Jackson Hole Airport. Jackson Hole Airport supports both scheduled passenger service and general aviation in western Wyoming and eastern Idaho. Based on data from the airport tower, the airport averages approximately 90 operations per day (an operation is a takeoff or a landing), although the number varies from year to year and seasonally. For 2008, the most recent year for which data are available, there were 30,091 operations. July and August were the busiest months, with an average of 138 operations per day and a peak day of 193. April and November were the least-busy periods, averaging 43 operations daily with a peak day of 73. Scheduled passenger aviation (both air carrier and regional/commuter) made up 47 percent of operations. Approximately 52 percent was general aviation. The remaining one percent was military aircraft, primarily associated with visits by Vice President Richard Cheney. Operations for 2006 and 2007 totaled 32,202 and 30,537, respectively.

Data analyzed for this environmental impact statement were collected primarily in 2004 through 2006. For example, the aircraft sound modeling described in Chapters 3 and 4 used data from the period October 2004 through September 2005. During this period, there were 33,005 operations, somewhat higher than during calendar year 2008. The fleet mix in terms of scheduled passenger versus general aviation was about the same as in 2008.

Scheduled passenger service to the Jackson Hole Airport currently is provided by American, Skywest/Delta, Northwest, United/United Express, and Frontier. Depending on the season, there are about 12 to 15 regularly scheduled flights into and out of the airport each day, totaling 24 to 30 operations. The types of aircraft currently in use at the airport include the Airbus A319 (typically about 124 seats); Boeing 737 (124 seats) and Boeing 757 (188 seats); Bombardier CRJ-700 (68 seats); De Havilland Dash-8, commonly known as the Q-400 (70 seats); and De Havilland Canada DH8 (37 seats) (The Boyd Group, Inc. 2007a; Bishop 2008).

The regularly scheduled passenger carriers provide direct, non-stop flights to/from Atlanta, Chicago, Cincinnati, Dallas-Fort Worth, Denver, Minneapolis, and Salt Lake City. From these airports, travelers can connect to flights throughout the nation and around the world. As a result, Jackson Hole Airport serves as an important center for travel to and from the region.

In the decade from 1995 through 2004, there were an average of 190,000 enplanements (see glossary for definition) annually from Jackson Hole Airport. During the first eight years of this period, from 1995 through 2002, enplanements were relatively steady between a low of 169,100 passengers in 1995 and a high of 199,700 passengers in 1998. Since 2002, enplanements have climbed rapidly to slightly more than 300,000 in 2008 (Bishop 2009). Most of the increase is attributed to tourism.

July and August typically are the busiest months and together account for about 30 percent of the annual enplanements. April, May, and November are between the summer and winter tourist seasons and consistently had about 6,000 enplanements per month in 2003 through 2005. This value probably represents the base level of use that would occur if the airport did not provide access to national parks, national forests, and ski resorts, and results in an annual value of about 72,000 enplanements. The remaining enplanements each year are tourism-related.

It is estimated that virtually all tourism-related enplanements were visitors to Grand Teton National Park, even if the visit was limited to a drive through the park that was incidental to a primary destination at a ski resort, Yellowstone National Park, or other nearby public lands. Based on annual recreation visitation during this period to Grand Teton National Park of 2.4 million people, it can be calculated that approximately 6.5 percent of visitors to the park arrive by plane through the Jackson Hole Airport. This correlates well with the survey results from RRC Associates (2005) that approximately 6 percent of summer visitors to Grand Teton National Park arrive by air, but is lower than an older value of 12 percent that was obtained by a survey of park visitors during July 1997 (Littlejohn 1998).

During the peak winter tourism season of January through March, the Jackson Hole Airport averaged about 23,000 monthly enplanements in 2003 through 2005. Primary destinations for most winter visitors who travel by air include the town of Jackson and/or the nearby Snow King Resort, Jackson Hole Mountain Resort, Grand Targhee Resort, White Pine Ski Area, and Yellowstone National Park. However, almost all of these people also visit Grand Teton National Park during their trip. As discussed later in this environmental impact statement, winter visitors arriving through the airport provide an important contribution to the economy of northwest Wyoming.

In 2005, the Jackson Hole Airport supported about 18,000 general aviation operations (nearly 55 percent of all operations). Data are not available regarding how many passengers arrive at the airport via general aviation, but at rates of two and four passengers per aircraft, they would respectively represent about 6 and 12 percent of the number of scheduled passenger service enplanements.

Other Regional Airports. Table 1 lists selected characteristics of the Jackson Hole Airport and other nearby airports with instrument landing procedures. Airports without instrument landing procedures, which typically are smaller and are not suitable for scheduled passenger service aviation or much of the area's general aviation, were not included.

- The closest airport to the Jackson Hole Airport with instrument landing procedures is in Driggs, Idaho. However, this airport does not receive Federal Aviation Administration funding, its instrument approach is not approved by the Federal Aviation Administration, and its existing geometry does not permit its use by passenger service aircraft (Bishop 2008). As a result, this airport is not used for scheduled passenger service, and its general aviation use is about 20 percent that of the Jackson Hole Airport. Although it is 21 miles from the Jackson Hole Airport by air, the road distance is 45 miles over the 8,429-foot-high Teton Pass. The typical summer driving time between the airports is nearly 1.5 hours, and can be considerably longer during winter. Because of these conditions, this airport has a small role in providing air service to the Jackson area.

- The closest airport with scheduled passenger service is in Idaho Falls, Idaho. This airport is served by four airlines and has 13 daily arrivals and departures. After the Jackson Hole Airport, the Idaho Falls Regional Airport is the facility most commonly used by people who travel to the Jackson area by air. About half of the Grand Targhee Resort winter visitors who fly to the area arrive through the Idaho Falls Regional Airport, but most other winter visitors to Jackson and the other area resorts arrive through the Jackson Hole Airport.

Driving time to the Jackson Hole Airport from the Idaho Falls Regional Airport is about 2.5 hours. Some drivers use U.S. Highway 26, which passes through the scenic Snake River Canyon and avoids Teton Pass. However, most prefer to turn north off U.S. Highway 26 at Swan Valley, drive the more mountainous Idaho Highway 31 to Victor, and take Idaho Highway 33 to the state line where it turns into Wyoming Highway 22 and travels over Teton Pass (Cole 2006).

TABLE 1: CHARACTERISTICS OF REGION AIRPORTS WITH INSTRUMENT LANDING PROCEDURES^{a/}
(Distances are from the Jackson Hole Airport^{b/})

Airport (Code)	Air Distance (statute miles)	Road Distance (statute miles) ^{c/}	Aircraft Operations (flights per day)	Scheduled Passenger Aircraft Use (percent)	Runway Length (feet)
Jackson Hole Airport, WY (KJAC)	0	0	90 ^{d/}	45 ^{d/}	6,300
Driggs-Reed Memorial Airport, Driggs, ID (KDIJ)	21	45	21	0	7,300
Rexburg-Madison County Airport, ID (KRXE)	55	90	85	0	4,200
Afton Municipal Airport, WY (KAFO)	63	80	40	0	7,023
Idaho Falls Regional Airport, ID (KIDA)	67	99	131	2	9,000
Ralph Wenz Field Airport, Pinedale, WY (KPNA)	72	102	26	0	7,100
Yellowstone Regional Airport, Cody, WY (KWYS)	77	133	53	3	8,400
Gallatin Field Airport, Bozeman, MT (KBZN)	151	208	184	9	9,000
Salt Lake City International Airport, UT (KSLC)	205	313	1,247	38	12,000

a/ Not all of the instrument landing procedures have been approved by the Federal Aviation Administration, and the airports are not necessarily approved for use by scheduled passenger service aircraft.

b/ Except as noted, all data are from the AirNav, LLC web site at <http://www.airnav.com>. Air distances were converted from the Internet site's nautical miles to the more familiar statute miles.

c/ Road distances are from Google Maps, which is available on the internet at Maps.Google.com. The end destination is the Jackson Hole Airport (1250 E Airport Rd, Jackson, WY 83001 (Jackson Hole Airport-Jac) @43.600965,-110.730178).

d/ Average flights per day for the Jackson Hole Airport are from data provided by the Federal Aviation Administration's tower for the period October 2004 through September 2005.

- Yellowstone Regional Airport in Cody, Wyoming, at a road distance from the Jackson Hole Airport of 133 miles, and Gallatin Field Airport, 208 miles away by road in Bozeman, Montana, are the next closest airports that provide scheduled passenger service. Because U.S. Highway 89/287 through the northern part of the John D. Rockefeller, Jr. Memorial Parkway and into Yellow-

stone National Park is closed in winter, it is impractical for travelers wanting to visit the Jackson area during this season to use these airports. Although both airports can be reached by taking circuitous routes that largely bypass the parks, it is a several-hour-long drive from Jackson to either airport under the most favorable weather and road conditions.

- The largest airport in the region is in Salt Lake City, Utah, which is 313 miles and more than 6 hours from the Jackson Hole Airport by automobile. Most visitors to Grand Teton National Park and/or Jackson who enter the area through the Salt Lake City airport arrive during the summer. Often, they will rent a vehicle in Utah and travel to several destinations, including other national parks and monuments, within the region.

USE AGREEMENT EXTENSION

Request for an Extension of the Existing Airport Use Agreement

On April 25, 2005, the Jackson Hole Airport Board sent a formal request for an amendment to the existing use agreement to the superintendent of Grand Teton National Park. A copy of the letter request is provided in Appendix D. As stated in the letter:

- “Under the requested amendment, the Board would be permitted to exercise two additional 10-year options to renew the term of the Agreement.
- “The amendment proposed by the Board would not authorize the construction of any building or other improvement which is not already authorized by the Agreement, or in any manner different than authorized by the Agreement.
- “The Board proposes no other changes to the Agreement. No new or different construction would be authorized by the proposed amendment. The noise limitations of the Agreement would remain in effect, including the requirement that the Board implement new and prudent technology to further reduce noise impacts on the Park in the future.”

The superintendent responded by letter on June 7, 2005, informing the board that an environmental assessment under the National Environmental Policy Act would be required, and invited the board to participate as a cooperating agency. In a letter dated June 14, 2005, the Jackson Hole Airport Board accepted the position of cooperating agency and stated its commitment “to cooperating and giving significant assistance in the NEPA process.” Copies of these letters are included in Appendix D.

After reviewing preliminary data, the National Park Service determined that its planning process would be better served, and the quality of its decision would be enhanced, by preparation of an environmental impact statement rather than an environmental assessment. The notice of intent to prepare an environmental impact statement was published in the *Federal Register* on August 9, 2007.

Justification for Extending the Existing Airport Use Agreement

Funding Sources. As described in more detail in the “Airport Funding” description of “Socio-economics” in Chapter 3, funding for Jackson Hole Airport comes from several sources.

Operating revenues. Airport operating revenues are derived from scheduled passenger service airline landing fees and ramp rents, general aviation landing fees, parking, rental car fees, and other tenant rents. In most recent years, revenues from these sources minus operating expenses have produced

annual surpluses of about \$600,000 that can be applied to facilities repair, refurbishing, and improvements.

Security screening revenue. The Jackson Hole Airport Board provides security screening for the Transportation Security Administration on a contract basis. It can apply any surplus income from these services to capital improvements.

Federal Aviation Administration grants. The airport receives Federal Aviation Administration grant funds under the Airport Improvement Program and passenger facility charges. Some of these funds are classified as “entitlement” based on passenger numbers, and others are “discretionary” and are based on project priority and need. Because passenger facility charge funds are tied to the Airport Improvement Program, a loss of Federal Aviation Administration funding would result in the loss of eligibility for both funding sources.

At airports like the Jackson Hole Airport that meet Part 139 certification (described below) and fall in the Federal Aviation Administration’s “non-hub, primary” classification, grants cover 95 percent of eligible project costs. Eligible projects enhance airport safety, capacity, security, and environmental concerns through airfield capital improvements or repairs. These funds cannot be used for airport operations or for revenue-generating improvements, such as hangars, parking lots, and non-aviation development.

Between 1995 and 2005, almost \$25 million in projects were funded at the Jackson Hole Airport by the Federal Aviation Administration. The amount of funding received per year was highly variable, ranging from less than \$500,000 in fiscal year 1998/1999 to more than \$6 million in fiscal year 1999/2000. Major improvements that were financed by these grants included apron expansion; construction of runway safety zones; modification of the terminal building, including security enhancements in response to the terrorist attacks of September 11, 2001; construction of the air traffic control tower; acquisition of snowplows and fire trucks; and installation of airport fencing. Taxiway rehabilitation that was funded by this source was completed in 2008.

Part 139 Certification. Each year under Title 14, Part 139 of the *Code of Federal Regulations*, the Federal Aviation Administration performs a certification inspection of airports that support scheduled, passenger-carrying operations and/or unscheduled passenger-carrying operations using aircraft designed for at least 31 passenger seats. Some of the areas of concern include the condition of pavement and other facilities, firefighting equipment, and record-keeping.

As described above, Federal Aviation Administration grants that are tied to maintaining Part 139 certification cover 95 percent of eligible project costs. These grants represent more than 70 percent of all funding that is available to the Jackson Hole Airport Board for facilities operation and for capital improvements (see the funding sources identified above). These grants are essential to maintain a level of safety and security that will support scheduled commercial aviation at the Jackson Hole Airport.

Maintaining a Satisfactory Property Interest. The Federal Aviation Administration needs to ensure that the nation’s taxpayers receive the full benefit of airport improvements, and that costs are appropriately amortized over time. Therefore, in situations such as the Jackson Hole Airport where the airport development sponsor (in this case, the Jackson Hole Airport Board) does not own the underlying land, the sponsor must demonstrate that it has a “satisfactory property interest.” Otherwise, the airport will not be eligible for Federal Aviation Administration funding.

The Airport Aid Program is defined in Title 14, Part 152 of the *Code of Federal Regulation*. Section 152.103 states, “To be eligible to apply for a project for airport development [the sponsor must have] satisfactory property interests in the lands to be developed or used as part of, or in connection with, the airport.” According to the definitions in Section 152.3, satisfactory property interest means “Title free and clear” or “a lease of not less than 20 years granted to the sponsor by another public agency, or the United States, that has title [free and clear].”

As described previously, the existing airport use agreement does not expire until April 27, 2033. However, based on the 20-year requirement, the Jackson Hole Airport would not have a satisfactory property interest, and would not be eligible for Federal Aviation Administration funding, after April 27, 2013. Because of funding cycles that result in long delays between when funds are requested and when they are made available, the effects on airport funding could begin well before that date (Morgan 2006). Therefore, the justification for extending the use agreement is to ensure that the Jackson Hole Airport maintains its eligibility for Federal Aviation Administration funding between now and 2033.

If Federal Aviation Administration funding was eliminated at the Jackson Hole Airport, scheduled passenger service or unscheduled service by aircraft with 31 or more passenger seats could continue, so long as the board was able to maintain its Part 139 certification by passing the annual inspection. However, without this key funding source, conditions eventually would deteriorate to the point where certification could not be maintained. At that time, scheduled passenger service and unscheduled service on larger aircraft would end, and passengers wanting to fly into the area by any method other than small, unscheduled general aviation aircraft would have to use an alternate airport. For consistency, all analyses in this environmental impact statement assume that loss of Part 139 certification would occur in 2015, although the Jackson Hole Airport Board might be able to maintain the certification well beyond that year.

General aviation could continue at Jackson Hole Airport in the absence of Part 139 certification. However, pilots of some aircraft, particularly large planes, might avoid the facility because of concerns about safety and security.

Without a use agreement extension, the Jackson Hole Airport would have to close in April 2033.

PROJECT AREA LOCATION AND DESCRIPTION

The project area primarily consists of the portion of Teton County in northwest Wyoming that is south of Yellowstone National Park. Key features within the project area that could be affected by the proposed action are shown in Figure 2 and are briefly described below. More detailed information on each of these features as they relate to extending the airport use agreement is included later in this environmental impact statement in “Chapter 3, Affected Environment.”

- Grand Teton National Park, which was established in 1929, encompasses more than 310,000 acres of spectacular scenery that includes majestic mountain and surrounding lakes, rivers, forests, and sagebrush flats. Its visitation ranks among the top 10 percent in the national park system and it annually hosts about 2.4 million recreational visitors (NPS 2005a).

Grand Teton National Park provides visitors with an opportunity to experience two linked but distinct settings. The back-country areas of the park occupy a vertical landscape of towering peaks and deep, glaciated valleys. Its wild, challenging terrain is largely roadless and, except for sound from aircraft (including overflights and air traffic associated with the Jackson Hole Airport), is characterized by a natural soundscape. The more accessible front-country area occupies

the valley floor and includes numerous lakes, a major river, and important scenic, cultural, and wildlife resources. Although much of the valley floor is undeveloped, there is often a lower expectation for natural quiet among visitors to this part of the park because of the nearby presence of highways and developed areas.

- The Jackson Hole Airport, which is within the park boundary, was described previously under the heading “Current Use of the Jackson Hole Airport and Other Airports in the Region.”
- The Bridger-Teton National Forest is adjacent to Grand Teton National Park on the east and south, and the Caribou-Targhee National Forest adjoins the park on the west. The national forests provide dispersed recreation opportunities year-round, and several developed winter ski resorts are on national forest lands near the park. These include the Snow King Resort, Jackson Hole Mountain Resort, and Grand Targhee Resort in Teton County, which collectively provide 550,000 to 600,000 skier days of recreation each winter. Approximately 90 percent are non-local skiers who make major contributions to the local economy when they purchase food, lodging, and other goods and services. An estimated 90 percent of the non-local winter visitors arrive in the area through the Jackson Hole Airport (RRC Associates 2005).
- North of Grand Teton National Park are the adjacent John D. Rockefeller, Jr. Memorial Parkway, which is administered by the superintendent of Grand Teton National Park, and then Yellowstone National Park. Both are units of the national park system. These national park units and the area’s national forests all are a part of the greater Yellowstone ecosystem.
- The town of Jackson, which was first settled in the 1880s, is the county’s primary government, commercial, and residential center. Transitory use of the area by people of European descent began when the topographic feature known as “Jackson’s Hole” served as a crossroad for several trapper trails from the 1820s until the 1840s. However, permanent settlement did not occur until more than four decades later. Agriculture predominated until the middle of the 20th century, but the economies of the town of Jackson and Teton County are now strongly based on tourism. These primarily include summer visitation to Grand Teton National Park, Yellowstone National Park, and other federal lands; and winter use of ski resorts and other recreation opportunities on federal lands.

For some impact topics, the project evaluation area extends beyond the boundaries of Teton County. This is particularly true for effects on the regional economy, which is strongly influenced by tourism, and effects on transportation. If an impact topic analysis considers an area smaller or larger than Teton County, the affected area is identified in “Chapter 4, Environmental Consequences.”

SCOPING

Scoping is described in Chapter 5 under the heading “History of Public Involvement.” Briefly, activities included the following.

- Preliminary internal scoping meetings were held in the autumn of 2005.
- In 2005, a newsletter was distributed that described the purpose and need for the use agreement extension and the preliminary alternatives, and solicited public input.
- A public notice with similar information was provided to the press on November 17, 2005.
- A notice of intent to prepare an environmental assessment for the Jackson Hole Airport use agreement extension was published in the *Federal Register* on December 28, 2005.

- A notice of intent to prepare an environmental impact statement for the Jackson Hole Airport use agreement extension was published in the *Federal Register* on August 9, 2007.

PLANNING DIRECTION OR GUIDANCE

This section defines the basis for any actions taken at Grand Teton National Park. Guidance and direction include the core goals and objectives of the park, the goals of the National Park Service as they relate to the park, any park-specific mandates and administrative commitments, and service-wide mandates and commitments that the National Park Service applies to all units under its administration.

Core Goals and Objectives for Grand Teton National Park

This section describes the legislative history of Grand Teton National Park and the park's purpose and significance. It defines why the park was created and why it is special. These are the fundamental criteria against which the appropriateness of all recommendations, operational decisions, and actions are tested.

Park Establishing Legislation. Congress established Grand Teton National Park on February 26, 1929. It was “dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States under the name of Grand Teton National Park of Wyoming” (45 Stat. 1314). The park was enlarged to its present size by Congress on September 14, 1950 (Public Law 81-787, 64 Stat. 849). The expansion was “for the purpose of including in one national park, for the public benefit and enjoyment, the lands within the present Grand Teton National Park and a portion of the lands within the Jackson Hole Monument.”

Park Purpose and Significance. The park's purpose and significance statements are based on legislative history and historic trends, and describe why the area was set aside as a national park unit. The purpose and significance help define management priorities for the protection of the resources and values that are the foundation of the park.

The purpose and significance statements, provided below, were developed as part of the park's foundation for planning and management (NPS 2006c), which is the formal statement of Grand Teton National Park's core mission and provides basic guidance for all decisions to be made about the park.

The purpose of Grand Teton National Park is to:

- Preserve and protect the spectacular scenery of the Teton Range and the valley of Jackson Hole.
- Protect a unique geologic landscape that supports abundant diverse native plants and animals and associated cultural resources.
- Protect wildlands and wildlife habitat within the Greater Yellowstone Area, including the migration route of the Jackson elk herd.
- Provide recreational, educational, and scientific opportunities compatible with these resources for enjoyment and inspiration.

The significance of Grand Teton National Park and the adjacent John D. Rockefeller, Jr. Memorial Parkway includes the following:

- The iconic mountain landscape of the Teton Range rises dramatically above the flat valley of Jackson Hole, creating a compelling view that has inspired people to explore and experience the area for thousands of years. The sudden rise of rugged peaks contrasts with the horizontal sagebrush flats. Glacial lakes at the foot of the mountains reflect and expand the view. Opportunities to view an impressive array of wildlife are extraordinary. The awesome grandeur of the ever-present Teton Range under changing weather and seasons provides the superlative setting for unmatched visitor experiences.
- Grand Teton National Park preserves one of the world's most impressive and highly visible fault block mountain ranges, which abruptly rises 7,000 feet and is juxtaposed with landscapes shaped by glacial processes and braided river geomorphology. The Teton Range is one of the continent's youngest mountain ranges, yet exposes some of the oldest rocks on earth.
- Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway are at the heart of one of the earth's largest intact temperate ecosystems with a full complement of native Rocky Mountain plants and animals, including grizzly bears, wolves, North American bison, pronghorn, and one of the world's largest elk herds.
- The park and parkway represent one of the most notable conservation stories of the 20th century, and continues to inspire present and future generations. The formation of the park, a process that took more than half a century, was a struggle between private economic interests and a concern for conserving the Teton Range and valley floor. From prehistoric times to present day, numerous diverse cultures, cultural trends, and cultural values were influenced by the Teton Range and Jackson Hole valley.
- Within the park and parkway, visitors can easily experience peaceful solitude, wilderness character, and a rare combination of outdoor recreational and educational activities, world-renowned wildlife and landscapes, and the cultural amenities of a vibrant community throughout the year. Visitors of all abilities and interests can enjoy opportunities for physical, emotional, and inspirational experiences in an unspoiled environment.
- As part of the greater Yellowstone ecosystem, the park and parkway offer easily accessible and unparalleled opportunities for scientific research and educational study of temperate-zone natural systems and processes in a range of elevations, and human relationships to these systems. The relatively pristine landscape serves as "control" or baseline for scientific study.

Fundamental Resources and Values. In the Foundation for Planning and Management, the National Park Service has identified nine categories of fundamental resources and values:

- Scenery
- Geologic processes
- Ecological communities
- Aquatic resources
- Cultural history and resources
- Visitor experience in an outstanding natural environment
- Other cultural resources
- Existing assets, and
- Sustainable economic contribution to the regional economy.

Relative to the future operation of the Jackson Hole Airport, the category of "sustainable economic contribution to the regional economy" recognizes that a "significant percentage of local jobs and income [is] attributed to park and related tourism." Desired conditions include contributing to a situa-

tion where “communities in the region and the state have a diverse and robust economy that sustains residents in harmony with the greater Yellowstone ecosystem.”

The importance of the park in providing a “sustainable economic contribution to the regional economy” must be balanced by desired conditions for the other fundamental resources and values that do not benefit from the presence of the airport. Examples of these desired conditions include the following.

- Natural processes continue without additional manipulation, and are restored wherever possible.
- Visitors enjoy a range of recreational activities that are enhanced by the spectacular natural setting and conditions.
- Opportunities to find solitude and experience natural sounds and dark night skies are maintained.
- Park development is the minimum necessary to serve visitor needs and provide for the protection of park resources. Where possible, development is located outside of the park.

NPS Mission and Mission Goals

Organic Act Prohibition against Impairment. The most important statutory directive for the National Park Service is provided by the NPS Organic Act of 1916 (Title 16, *United States Code*, Section 1). The key statement that guides the National Park Service in park management is as follows.

[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified . . . by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

This prohibition against impairment is the cornerstone of the Organic Act and establishes the primary responsibility of the National Park Service (NPS 2006a). All activities and planning of the National Park Service tier from this statement.

The NPS mission is presented in the *National Park Service Strategic Plan* (NPS 2000b). It states:

The National Park Service preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

Mission Goals. Mission goals in the *National Park Service Strategic Plan* (NPS 2000b) articulate the broad ideals and vision that the National Park Service is trying to achieve at all national park units, including Grand Teton National Park. They are written as desired outcomes in keeping with the Government Performance and Results Act (GPRA). Mission goals that probably are applicable to extending the use agreement for Jackson Hole Airport at Grand Teton National Park include the following:

- Ia. Natural and cultural resources and associated values are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context.
- Ib. The National Park Service contributes to knowledge about natural and cultural resources and associated values; management decisions about resources and visitors are based on adequate scholarly and scientific information.
- IIa. Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.
- IIb. Park visitors and the general public understand and appreciate the preservation of parks and their resources for this and future generations.

Special Mandates and Administrative Commitments

Special mandates and administrative commitments refer to park-specific requirements. More than a dozen of these are associated with Grand Teton National Park. The special mandates or administrative commitments that could apply to extending the use agreement for the Jackson Hole Airport are described below.

Continuation of Leases and Permits. The authority for this special mandate is Public Law 81-787, the 1950 act that established the current Grand Teton National Park. This act required that any valid leases, permits, or licenses that were in effect at the time the park was established remain in effect in accordance with their provisions.

Jackson Hole Airport was established and operating at its current site before the land in the vicinity was incorporated into a unit of the national park system. As described earlier in this chapter under the heading “Project Background,” parts of the airport site were leased from the Bureau of Land Management, State of Wyoming, and several other entities. Therefore, Public Law 81-787 preserved the rights of the airport to continue to lease and use the land within Grand Teton National Park. Since the park was established, this right to operate has been maintained under a continuous series of permits or use agreements.

Department of the Interior Airports Act. On March 18, 1950, Congress passed the Department of the Interior Airports Act, sometimes commonly called the Airports in Parks Act. The full text of this act’s provisions, from the current version of the *United States Code*, Title 16, Chapter 1, Subchapter I, Sections 7a-7e, is presented in Appendix A. A summary of its key provisions was included earlier in the “Project Background” section. The determination under this act by the Secretary of the Interior “that the continued operation of the Jackson Hole Airport is necessary to the proper performance of the functions of the Department and that no feasible and prudent alternatives thereto exist” was reaffirmed in the preamble to the 1983 use agreement.

Reverter Clause. In 1949, John D. Rockefeller, Jr. made a gift to the United States of approximately 33,000 acres of land that are now within the boundary of Grand Teton National Park. Because the establishment of the park was not completely assured at the time of his donation, he included a clause, commonly called the “Rockefeller reverter,” that applied to about 14,000 acres of the property. If any part of the lands subject to the reverter clause ever ceased to be part of a national park or national monument, the entire 14,000 acres would revert back to the Jackson Hole Preserve, Inc. or its successors. (Jackson Hole Preserve, Inc. is the company that was established to effect the transfer of lands to the federal government on behalf of John D. Rockefeller, Jr., and that continues to exist today.) Approximately 120 acres of the land within the 533-acre airport boundary are subject to this reverter clause. Therefore, if the park boundary were ever to be modified in such a way as to exclude

the portions of the airport subject to the reverter clause, approximately 14,000 acres of land within the park could be removed from federal ownership, reverting back to the Jackson Hole Preserve, Inc.

Airport Use Agreement. Beginning in 1955, the Department of the Interior entered into a series of use agreements regarding the Jackson Hole Airport. A description of the 1983 use agreement, which currently is in effect, was provided in the “Project Background” section. The complete text of that agreement, including its two amendments, is presented in Appendix B. The use agreement authorizes the use of the Jackson Hole Airport through April 27, 2033.

Service-Wide Mandates and Policies

As with all NPS units, management of Grand Teton National Park is guided by numerous laws, executive orders, policies, and regulations. Some of these laws and executive orders are applicable primarily to units of the national park system. These include the 1916 Organic Act, described earlier, that created the National Park Service; the General Authorities Act of 1970; and the act of March 27, 1978 relating to the management of the national park system. Others have broader application, such as the Endangered Species Act, the National Historic Preservation Act, and Executive Order 11990 addressing the protection of wetlands. The National Park Service must endeavor to meet all of these requirements, regardless of the alternative selected regarding the use agreement for the Jackson Hole Airport.

Other Laws and Executive Orders. Desired future conditions prescribed by national laws and executive orders are relevant to the management of Grand Teton National Park regardless of the alternative selected for the airport use agreement. Therefore, under any management approach for the airport, the National Park Service will, among other actions, strive to protect endangered species, improve water quality, maintain wilderness character, prevent obstruction of floodplains, protect archaeological sites, preserve historic structures, and provide access for citizens with disabilities.

Management Policies. The National Park Service has established policies for all units under its stewardship. These are identified and explained in the NPS guidance manual entitled *Management Policies 2006* (NPS 2006a). Major sections of these policies that relate to the presence and operation of the Jackson Hole Airport within Grand Teton National Park include The Foundation, Land Protection, Natural Resource Management, Cultural Resource Management, Use of the Parks, and Park Facilities.

Appropriate Use. Section 1.5 of *Management Policies 2006*, Appropriate Use of the Parks, directs the National Park Service to ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made that, in the professional judgment of the park manager, it will not result in unacceptable impacts.

Section 8.1.2 of *Management Policies 2006*, Process for Determining Appropriate Uses, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the Service; and
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or to discontinue it.

From Section 8.2 of *Management Policies*, to provide for the enjoyment of the parks, the National Park Service will encourage visitor activities that

- are appropriate to the purpose for which the park was established; and
- are inspirational, educational, or healthful, and otherwise appropriate to the park environment; and
- will foster an understanding of and appreciation for park resources and values, or will promote enjoyment through a direct association with, interaction with, or relation to park resources; and
- can be sustained without causing unacceptable impacts to park resources and values.

Operation of the Jackson Hole Airport within Grand Teton National Park is an appropriate use. The 1950 Department of the Interior Airports Act authorized the Secretary of the Interior to allow the operation of airports within national parks when necessary for the proper performance of the functions of the Department of the Interior. Pursuant to the authority provided in that legislation, the Secretary of the Interior made that determination in the 1983 agreement between the Jackson Hole Airport Board and the Department of the Interior. The analysis of whether this appropriate use can be sustained without unacceptable impacts on park resources and values is found in “Chapter 4, Environmental Consequences” in this environmental impact statement.

Impairment and Conservation of Park Resources and Values. The guidance in *Management Policies 2006* requires analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. Section 1.4.3 of *Management Policies 2006* states that

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States . . . Congress, recognizing that the enjoyment by future generations of the national parks can be enjoyed only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

However, the laws give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within the park, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may, but does not necessarily, constitute an impairment, but an impact would be more likely to constitute an impairment when there is a major or severe adverse effect on a resource or value whose conservation is

- necessary to fulfill specific park purposes identified in the establishing legislation or proclamation of the park; or
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities by concessioners, contractors, and others operating in the park.

Management Policies 2006 recognizes that the impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service will apply a standard that offers greater assurance that impairment will not occur. The National Park Service will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable. A determination on unacceptable impacts and impairment is made in "Chapter 4, Environmental Consequences" for park resources and values evaluated in this environmental impact statement.

Director's Orders and Reference Manuals. These documents are available on the Internet at <http://www.nps.gov/applications/npspolicy/DOrders.cfm>. Director's orders and their associated reference manuals or handbooks provide specific guidance on how to implement the service-wide mandates and policies specified in the Organic Act, other laws and executive orders, and *Management Policies 2006* (NPS 2006a). The National Park Service is continuously updating director's orders and reference manuals based on such features as new or amended laws, technologies that modify best management practice, court rulings, and improvements in adaptive management procedures.

Aviation Laws and Policies

Airport Noise and Capacity Act (ANCA). In 1990, Congress passed the Airport Noise and Capacity Act. Among other things, this act prohibits airport proprietors, including the Jackson Hole Airport Board, from imposing access or capacity restrictions on Stage III aircraft without Federal Aviation Administration approval. Since enactment of this legislation, the Federal Aviation Administration has never granted such approval to any airport. The Jackson Hole Airport Board was successful in obtaining Congressional legislation authorizing it to prohibit the operations of louder Stage II aircraft at the airport, beginning on June 28, 2004. As a result, all certifiable aircraft operating at the airport are Stage III. The airport board cannot impose further access or capacity restrictions on aircraft currently using the airport without Federal Aviation Administration approval. (The glossary at the end of this environmental impact statement defines Stage II and Stage III aircraft.)

Federal Aviation Administration Grant Assurances. In receiving Federal Aviation Administration airport improvement grants, the airport board has signed grant agreements that contain assurances required by 49 *United States Code* Title IV. These assurances remain in effect for the useful life of the projects funded, but not less than 20 years from acceptance of the Federal Aviation Administration grant. Among other things, the airport board has contractually assured the Federal Aviation Administration that it:

- Will not take any action that would deprive it of rights and powers necessary to perform the assurances;

- Will not dispose of any airport property without approval from the Secretary of Transportation;
- Will make the airport available for public use, on reasonable terms without unjust discrimination, to all types, kinds, and classes of aeronautical activities;
- Will not grant any exclusive right for use of the airport by a person providing aeronautical services to the public; and
- Will maintain a fee and rental structure at the airport that will make it as self-sustaining as possible under the circumstances.

IMPACT TOPICS: RESOURCES AND VALUES AT STAKE IN THE PLANNING PROCESS

This section identifies the resources and other values (impact topics) that could be affected by the alternatives. Justifications are provided regarding why there was no need to examine some impact topics in detail. Effects on the remaining impact topics were evaluated in “Chapter 4, Environmental Consequences,” based on the issues that were identified during scoping. For each retained impact topic, the issues of concern from scoping are listed in the methods section in Chapter 4.

Impact Topics Initially Considered

Impact topics focused the planning process and assessment of potential consequences of the proposed action and alternative of no action. The following were used to determine resources and values at stake in the Jackson Hole Airport use agreement extension environmental impact statement:

- Topics that are identified in Section 4.5.F.2 of *Director’s Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a). These include all of the topics that are included in Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act.
- Topics that were identified by NPS or airport personnel as having the potential to be affected by activities at the Jackson Hole Airport.
- Topics of concern to the public or other agencies that were identified during scoping. Activities to solicit public and agency comments were described in Chapter 4. Agency response letters are included in Appendix D.

The National Park Service evaluates all potential impacts by considering the direct, indirect, and cumulative effects of each alternative on the environment, along with connected, cumulative, and similar actions. Impacts are described in terms of their context, duration, type, and intensity.

- The context or extent of the impact is described as localized or widespread.
- The duration of impacts is described as short-term, occurring only during or shortly after a specific action or treatment, or long-term, extending up to 20 years or more.
- Impact type can be beneficial or adverse.
- The intensity of impact is described as negligible, minor, moderate, or major.

The NPS equates the term “major” effects to the term “significant” effects as used in the National Environmental Policy Act and its implementing regulations. The identification of “major” effects would trigger the need for an environmental impact statement. Where the intensity of an impact can be described quantitatively, numerical data are presented; however, many impact analyses are qualitative and use best professional judgment in making the assessment.

Table 2 summarizes the initial list of impact topics that was considered for this environmental impact statement. The table identifies whether each was retained for detailed analysis or dismissed. Justifications for dismissing impact topics from further consideration are provided below. Impact topics that were retained were evaluated in detail with regard to effects from extending the airport use agreement in “Chapter 4, Environmental Consequences.”

Impact Topics Dismissed from Further Consideration

The National Park Service defines “measurable” effects as moderate or greater impacts. It equates “no measurable effect” with minor or lesser impacts. “No measurable effect” is used by the National Park Service in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an environmental assessment or environmental impact statement. This approach concentrates the effort on the issues that are truly significant to the action in question, rather than amassing needless detail, and conforms with Section 1500.1(b) of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act.

The National Park Service generally used “no measurable effects” in this environmental impact statement to determine whether to dismiss an impact topic from further detailed evaluation. However, this environmental impact statement evaluated several impact topics with minor or lesser effects at the request of the Jackson Hole Airport Board or because a high level of concern was indicated during public and/or agency scoping.

This section provides a limited evaluation and explanation regarding why some impact topics were not evaluated in more detail. Impact topics were dismissed from further evaluation in this environmental impact statement if:

- They do not exist in the analysis area;
- They would not be affected by the action, or impacts would not reasonably be expected; or
- Through the application of mitigation measures, there would be minor or lesser effects (that is, no measurable effects) from the action, and there is little controversy on the subject or reasons to otherwise include the topic.

Because there would be no measurable effects on dismissed impact topics, the action’s contribution towards cumulative effects for dismissed topics would be low or absent.

The National Park Service conducted a limited analysis of direct, indirect, and cumulative effects for the impact topics presented below because each resource is found in the analysis area and had issues applicable to one or both alternatives. There is no impairment analysis for the dismissed impact topics because impairment would involve a measurable adverse effect, and typically one of major or severe intensity on the resource.

TABLE 2: SUMMARY OF IMPACT TOPICS INITIALLY CONSIDERED

Impact Topic	Retain or Dismiss
Natural Resources	
Air quality	Dismiss
Ecologically critical areas, wild and scenic rivers, or other unique natural resources	Dismiss
Endangered or threatened plants and animals and their habitats, and other species of special concern	Retain
Natural soundscape	Retain
Prime and unique agricultural lands	Dismiss
Soils	Dismiss
Vegetation	Dismiss
Visual quality and dark skies	Retain
Water quality and hydrology	Retain
Wetlands and floodplains	Dismiss
Wilderness	Dismiss
Wildlife and their habitats	Retain
Cultural Resources	
Important scientific, archeological, and other cultural resources	Dismiss
Archeological resources	Dismiss
Historic structures and buildings	Dismiss
Museum collections	Dismiss
Urban quality, historic and cultural resources, and design of the built environment	Dismiss
Cultural landscapes	Dismiss
Sacred sites and other ethnographic resources	Dismiss
Social and Economic Resources	
Conflicts with land use plans, policies, or controls	Dismiss
Energy requirements and conservation potential	Dismiss
Indian trust resources	Dismiss
Land use	Dismiss
Natural or depletable resource requirements and conservation potential	Dismiss
Noise	Dismiss
Park and airport operations	Retain
Public health and safety	Retain
Recreation	Dismiss
Socially or economically disadvantaged populations (environmental justice)	Dismiss
Socioeconomics	Retain
Surface and Air Transportation	Retain
Visitor use and experience	Retain

Natural Resources

Air Quality. The National Park Service has a responsibility under the Clean Air Act to protect its natural resources from the adverse effects of air pollution. This act also established a national visibility protection goal to eliminate existing and prevent future visibility impairment in Class I areas, which include Grand Teton National Park. *Management Policies 2006* (NPS 2006a) states that the National Park Service will seek to perpetuate the best possible air quality in parks because of its im-

portance to visitor enjoyment, human health, scenic vistas, and the preservation of natural systems and cultural resources.

A year 2000 emissions inventory was prepared for Grand Teton National Park (EA Engineering, Science, and Technology, Inc. 2003). This inventory included emissions from all mobile and stationary sources at the airport, including boilers, storage tanks, aircraft operations, ground support operations, and ground transportation, including automobiles. Based on data presented in Table 14 of that study, uses at the airport, such as mobile sources (including aircraft), tenants, and heating and cooling, are the source of 0.3 percent of particulate emissions in the park, 19.5 percent of nitrogen oxides, 3.4 percent of carbon monoxide, and 3.8 percent of volatile organic compounds. The study confirmed that the county is in attainment for all national and state ambient air quality standards. Its recommendations directed at the airport were limited to the use of 10 percent ethanol in the gasoline for rental car agencies at the airport.

Alternative 1, would eliminate scheduled passenger service in 2015 and close the airport in 2033. This alternative would change the *locations* from which pollutants were emitted by aircraft that provide scheduled passenger service, from the Jackson Hole Airport to an alternate site, such as the Idaho Falls Regional Airport. However, because scheduled passenger and general aviation planes would continue to fly to the area, there would be negligible effects on the *volumes* of pollutants emitted regionally by aircraft. Because the Jackson Hole Airport would stay open until 2033, stationary source emissions from this facility would change very little. Additional air emissions would result from automobiles that were driven to Jackson from the alternate landing site, such as the Idaho Falls Regional Airport (90 miles) rather than the Jackson Hole Airport (10 miles), but the difference would be too small to detect compared to automobile emissions generated by the area's residents and 2.4 million visitors annually. For these reasons, air quality was dismissed from further analysis in this environmental impact statement.

Ecologically Critical Areas, Wild and Scenic Rivers, or Other Unique Natural Resources.

Unique natural resources, including ecologically critical areas and wild and scenic rivers, do not occur within or in the immediate vicinity of the Jackson Hole Airport. Regionally, these resources would not be affected by the alternatives for extending the use agreement. Therefore, this topic was dismissed from further analysis in this document.

Native Vegetation. The native vegetation on and around the airport consists primarily of a sagebrush overstory with an understory of grasses and forbs. Neither alternative would result in construction or other activities that would substantially disturb the existing plant community. Operation activities within the development subzone are permitted by the existing use agreement and generally consist of routine landscape maintenance. Vegetation disturbances associated with separate airport improvements would be addressed by the environmental compliance documents associated with each activity. Regardless of the alternative that is selected as a result of this environmental impact statement, the National Park Service and Jackson Hole Airport Board would continue to work together on such activities as managing invasive species. Therefore, this topic was dismissed from further analysis in this document.

Prime and Unique Agricultural Lands. Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses (Council on Environmental Quality 1980). The lands within the Jackson Hole Airport have not been available for farming for more than half a century, and neither alternative would result in a change in use that would allow them to be used for agriculture. Therefore, this topic was dismissed from further analysis.

Soils. This impact topic was dismissed because neither alternative for the use agreement would substantially change the extent of soil disturbance associated with the airport. Moreover, because best management practices are routinely used in association with all soil-disturbing activities at the airport, soil losses are minimal.

Wetlands and Floodplains. The Jackson Hole Airport is on an upland site that is underlain by poorly consolidated, rapidly draining glacial deposits. As a result, wetlands have not developed in the vicinity of the airport, and effects on wetlands would not occur from either alternative. Because wetland resources are absent at and near the site, they were dismissed from further consideration.

The upland site on which the Jackson Hole Airport was constructed is well outside the 100-year floodplains of the Snake River, which is about 1.2 miles to the west, and the Gros Ventre River, which is more than 2 miles east of the runway. Because the alternatives for extending the use agreement would not result in any changes within the floodplains of either of these waterways, floodplains were dismissed from further consideration.

Wilderness. Although there are no congressionally designated wilderness areas in the immediate vicinity of the Jackson Hole Airport, the National Park Service in 1978 recommended that Congress include approximately 135,680 acres of the backcountry (almost 44 percent of Grand Teton National Park) in the National Wilderness Preservation System. The recommended wilderness area includes most of the Teton Range within the park and several of the lakes at its base. The National Park Service manages this area as wilderness and maintains its eligibility for future wilderness designation.

There are several designated wilderness areas in the greater Yellowstone area. The closest to the Jackson Hole Airport include the Gros Ventre, Jedediah Smith, Teton, and Winegar Hole Wilderness Areas.

Neither of the use agreement alternatives would have direct effects on designated or proposed wilderness areas inside or outside the park. Indirect impacts on the proposed wilderness area within the park are included in the evaluations of natural soundscape and visitor use and experience. Outside the park, wilderness areas only would experience indirect sound effects resulting from flyovers by aircraft that have taken off from or will be landing at the Jackson Hole Airport. These sounds would be indistinguishable from sound from aircraft using other regional airports and sound from interregional and transcontinental overflights. For these reasons, impacts on wilderness were dismissed from further consideration.

Cultural Resources

Based on Section 1508.27 of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act, NPS guidance in *Director's Order #12 and Handbook* (NPS 2001a) requires consideration of "important scientific, archeological, and other cultural resources, including historic properties listed or eligible for the National Register of Historic Places." This broad category commonly is divided into archeological resources, historic structures and buildings, museum collections, cultural landscapes, and sacred sites and other ethnographic resources. All of these were dismissed from detailed consideration in this environmental impact statement for the following reasons.

Archeological Resources. Archeological resources that potentially are eligible for listing in the National Register of Historic Places are known to occur within the boundaries of the airport and within its development subzone. Because the airport is on federal land, these resources already are protected by the National Historic Preservation Act of 1966, as amended (NHPA) (16 *United States Code*

470 et seq.). Under either alternative, the Jackson Hole Airport Board must continue to ensure their protection. This includes, but may not be limited to:

- Coordinating with the National Park Service, which is required to formally consult with the state historic preservation officer and tribes, as applicable under Section 106 of the National Historic Preservation Act. The state historic preservation officer and/or tribe must then have 30 days to comment.
- Performing archeological surveys prior to any ground-disturbing activities.
- Ceasing all construction activities and notifying the National Park Service if any significant scientific, prehistorical, historical, or archeological resources are discovered during any ground-disturbing activities.

These measures are required for all actions, even those that would be classified as a categorical exclusion under the National Environmental Policy Act. They apply to actions under the current use agreement, and would apply to actions proposed or conducted following an extension of the use agreement. Thus, an extension would not have an adverse effect on archeological resources, as it would not change the method used to comply with the National Historic Preservation Act. Therefore, this impact topic was dismissed from further analysis in this environmental impact statement.

Historic Structures and Buildings. Criteria for identifying historic structures and buildings are included in the National Register Federal Program regulations in Title 36, *Code of Federal Regulations*, Part 60.4. According to this source, potential consideration as “historic” does not begin until the structure or building is at least 50 years old, unless the property is of “exceptional importance.” Properties older than 50 years can be evaluated for their significance in American history, architecture, archeology, engineering, and culture, based on their integrity of location, design, setting, materials, workmanship, feeling, and association. None of the buildings within the Jackson Hole Airport meet the 50-year-old criterion, and none have been identified as meeting any of the significance criteria. Therefore, this topic was dismissed from further consideration.

Museum Collections. Neither alternative for the Jackson Hole Airport use agreement would change the management, display, or vulnerability of any of the park’s museum collections.

Cultural Landscapes. *Director’s Order #12 and Handbook* (NPS 2001a) requires consideration of “urban quality, historic and cultural resources, and design of the built environment,” based on Section 1502.16 of the Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act. In addition to the cultural resource categories dismissed above, this phrase includes cultural landscapes. Cultural landscapes are considered for significance based on the same criteria as historic structures and buildings. That is, they typically must be at least 50 years old and must have significance related to American history, architecture, archeology, engineering, and culture. Because the landscapes at the Jackson Hole Airport do not meet these criteria, they were dismissed from further consideration.

Sacred Sites and Other Ethnographic Resources. Executive Order No. 13007, “Indian Sacred Sites,” requires federal land managers to accommodate access to and ceremonial use of Indian sacred sites by Native Americans, and to avoid adversely affecting the physical integrity of such sites. Procedures applicable to lands in national parks, which include the Jackson Hole Airport, are defined in Part 512, Chapter 3 of the *Department of the Interior Departmental Manual*.

Management of ethnographic resources is addressed in Chapter 10 of *NPS-28: Cultural Resource Management Guideline* (NPS 1998). This identifies ethnographic resources as “variations of natural

resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users.”

American Indians used the Grand Teton vicinity over thousands of years, and the park encompasses many resources important to their descendents. These resources do not always have defined boundaries. However, the 533 acres within the boundaries of the Jackson Hole Airport have not previously been identified by local tribes, including the Crow, Northern Arapaho, Northern Cheyenne, Eastern Shoshone, and Shoshone - Bannock Tribes, as containing or representing ethnographic resources or sacred sites. Therefore, these categories were dismissed from detailed analysis in this environmental impact statement.

The National Park Service will continue to consult with the tribes. In November 2005, they were sent copies of the scoping brochure for National Environmental Policy Act compliance on the Jackson Hole Airport use agreement extension. When the environmental impact statement is released to the public, the tribes will be sent copies with a letter formally asking for their input.

If the tribes identify the presence of sacred sites or other ethnographic resources, appropriate mitigation measures will be undertaken in consultation with the tribes and the state historic preservation officer. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered within the airport, provisions outlined in the Native American Grave Protection and Repatriation Act (25 *United States Code* 3001) will be followed.

Social and Economic Resources

Conflicts with Land Use Plans, Policies, or Controls. This mandatory impact topic is based on Sections 1502.16 and 1506.2(d) of the Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act. The primary land use plans, policies, or controls potentially associated with actions at the Jackson Hole Airport include the Grand Teton National Park master plan, the Jackson/Teton County comprehensive plan, and Teton County’s Jackson Hole Airport resolution.

Provisions of these land use plans, policies, and controls that apply to the airport are identified later in this chapter under the heading “Connected, Cumulative, and Similar Actions.” As described in that section:

- The park master plan seeks to minimize the intrusive effects of the airport. Because neither alternative would involve airport construction or expansion, intrusive effects would be no more obvious than under current conditions, and could be less evident.
- The Jackson/Teton County comprehensive plan states that airport issues are to be addressed in the future. Therefore, neither alternative for the Jackson Hole Airport use agreement would represent conflicts with the existing comprehensive plan.
- The Jackson Hole Airport resolution imposes height and sound regulations outside the park that relate to the airport. Extending the use agreement would not affect these regulations, and an alternative that let the agreement expire would preclude the need for the regulations.

It has been suggested that an alternative that allows the airport use agreement to expire in 2033 is contrary to the Jackson Hole Airport master plan. However, the airport master plan is based on a 20-year timeframe, and the current plan, which was developed between 1992 and 1999, will be revised within the next decade, based on the terms then in effect in the use agreement. The airport master

plan could not apply beyond the term of the use agreement. Therefore, no conflict would exist between the expiration of the use agreement and the airport master plan or any other land use plans, policies, or controls, and this impact topic was dismissed from further consideration.

Energy Requirements and Conservation Potential. Fuel use for scheduled passenger service air travel is highly variable, depending on type of aircraft (larger planes generally move large numbers of passengers more fuel-efficiently), flight distance (long, nonstop trips are more fuel efficient than short hops), and how full of passengers the plane is. However, most sources generally concur with the Geary (2005) that “A typical [Boeing] 737 flight containing 100 people flying a two-hour, 800-mile flight gets 50 miles per person per gallon – about the same as a car that gets 25 miles per gallon carrying two people.” As described in “Current Use of the Jackson Hole Airport and Other Airports in the Region,” air carriers fly many makes and models of aircraft into the Jackson Hole Airport. However, for illustrative purposes, this efficiency for moving people probably is reasonable for the airport, where flights arrive from Atlanta (1,568 miles), Boise (273 miles), Chicago (1,170 miles), Dallas-Fort Worth (1,045 miles), Denver (405 miles), Minneapolis (869 miles), and Salt Lake City (205 miles).

The fuel-use per passenger-mile value indicates that although the use agreement alternatives may change whether fuel is burned in a car or airplane engine, they would have a negligible effect on the amount of energy used for travel to the vicinity. Moreover, changes in energy use associated with the alternatives would not be detectable either locally or regionally when compared to the fuel used annually during 2.4 million recreational visits and 1.6 million non-recreational visits to Grand Teton National Park (NPS 2004a), gasoline consumed by Teton County’s 19,000 residents, or energy used for other purposes, such as heating and lighting. Therefore, differences between the alternatives regarding energy requirements and conservation potential were dismissed from further consideration.

Indian Trust Resources. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. It represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. Key guidance is provided by:

- The Secretary of the Interior’s Secretarial Order No. 3175, “Departmental Responsibilities for Indian Trust Resources,” which requires that any anticipated impacts on Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents;
- Secretarial Order No. 3206, “American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act” which, despite its title, provides direction on carrying out a broad range of resource management responsibilities; and
- Part 512, Chapter 2 of the *Department of the Interior Departmental Manual*, which contains policies and procedures for the identification, conservation, and protection of Indian trust resources.

This impact topic was dismissed because Indian trust resources do not occur within the boundaries of the Jackson Hole Airport.

Land Use. Neither alternative would result in any construction or produce any conversions in land use within the park for at least 25 years. The indirect effects on the availability of scheduled passenger air service on land use outside the park is considered in the “Socioeconomics” section in Chapter 4. Therefore, this impact topic was dismissed from further analysis.

Natural or Depletable Resource Requirements and Conservation Potential. Natural or depletable resources address the quality, recycling, or conservation of petroleum products and other natural resources. The use and conservation of fuels and other energy sources, including petroleum products, was discussed above under energy requirements and conservation potential. Because neither alternative would authorize construction or any substantive changes in the operation of the airport for at least 25 years, differences between the alternatives for this impact topic would be negligible and this impact topic was not analyzed further.

Noise. Noise is defined as unwanted sound that disturbs routine activities or peace and quiet, and perhaps causes a feeling of annoyance (Federal Aviation Administration 2006a). The concerns associated with noise are addressed in this environmental impact statement under the impact topics of natural soundscape and visitor use and experience. As a result, noise was not considered separately as an impact topic.

Recreation. Within the park, the effects on recreation are included in “Visitor Use and Experience” in Chapter 4. The “Socioeconomics” section in Chapter 4 addresses recreation outside the park, such as effects on ski areas.

Socially or Economically Disadvantaged Populations (Environmental Justice): Executive Order 12898, General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Guidelines for implementing this executive order under the National Environmental Policy Act are provided by the Council on Environmental Quality (1997). According to the U.S. Environmental Protection Agency (1998), environmental justice is:

The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

The goal of this “fair treatment” is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.

Minority and low-income populations were evaluated for local communities, the three-county area around Grand Teton National Park, and the states of Wyoming and Idaho. In the most recent census (2000), the minority population in the area of Teton County WY, Lincoln County WY, and Teton County ID was 5.4 percent, compared to 8.1 percent for Wyoming and 9.1 percent for Idaho. The percent minority population ranged from less than 3 percent in Lincoln County to almost 9 percent in Teton County, Idaho.

According to the 2000 census and current U.S. Census Bureau estimates, approximately 8 percent of the population within the three-county area lives below the poverty level. This value is lower than the state-wide averages of approximately 11 percent for Wyoming and Idaho. Approximately 7 percent of the population in the town of Jackson lives below the poverty level.

Based on the characteristics of the populations of the three-county area and its component communities, there is no potential for the use agreement alternatives to have disproportionate adverse effects on minority or low-income populations. Therefore, environmental justice was dismissed as an impact topic.

CONNECTED, CUMULATIVE, AND SIMILAR ACTIONS

This section identifies the connected and similar actions that would be direct or indirect consequence of the alternatives. It also identifies actions that could have an additive impact on environmental resources, regardless of who takes the actions or whether they occurred in the past, are current, or will occur in the reasonably foreseeable future.

Connected and similar actions are defined in Section 1508.25 of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act. To meet the intent of these regulations, this environmental impact statement considers not only actions, but also other plans that could affect or be affected by extending the airport use agreement.

Sections 1508.7 and 1508.25 (a)(2) of the Council on Environmental Quality (1978) regulations require assessment of cumulative effects in the decision-making process for federal actions. Cumulative effects are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (Title 40, *Code of Federal Regulations*, Part 1508.7).

Connected and Similar Actions of the National Park Service

Throughout the past 30 years, the National Park Service has developed numerous plans and implemented a wide range of management actions that could affect or be affected by extending the Jackson Hole Airport use agreement. Plans and actions of the National Park Service are identified below, with a brief description of their potential relevance in association with the proposed action. A more complete analysis of their relevance is included in the cumulative effects analysis for each impact topic.

Grand Teton National Park Master Plan. The park’s master plan (NPS 1976) provides general direction for management of the park. It addresses the Jackson Hole Airport in three locations, as follows:

- In the summary on page 2, the plan identifies management initiatives, which include the intent to “Further reduce unnecessary intrusion on the park by eventually ... minimizing the influences of the Jackson Hole Airport.”
- On page 8, the plan describes commitments by past National Park Service directors “to provide certain improvements for the Jackson Hole Airport.” These were related to the need “to adequately handle twin-engine Convair 580’s in use by commercial airlines.” These aircraft are no longer used by the scheduled passenger service airlines that fly into the airport.
- Management goals for the Valley Zone are provided on page 20. This section states that “Because this area’s resources inevitably receive the heaviest impact, major efforts must be made to keep resource damage to a minimum. Particular care must be taken with respect to the provision of facilities in this zone, because sizeable parts of it should be considered for re-classification when nonconforming uses are terminated. Particularly careful thought must be given to future treat-

ment of the Jackson Hole Airport, because it intrudes directly upon Class III mountain-foreground land, and its air traffic profoundly influences virtually all of the park and its visitors.”

Previous and Current Airport Use Agreement. Beginning in 1955, the Department of the Interior entered into a series of use agreements regarding the Jackson Hole Airport. A description of the 1983 use agreement, which currently is in effect, was provided earlier in Chapter 1. The complete text of the 1983 agreement and its two amendments is presented in Appendix B.

Area Plan and Environmental Assessment for the Craig Thomas Discovery and Visitor Center at Moose. This area plan (NPS 2002b) provided recommendations for improving visitor facilities and the visitor experience at Moose, including construction of the new Craig Thomas Discovery and Visitor Center, which opened in August 2007. Because this area is directly in line with and approximately 1,000 feet below the primary flight path north of the airport, the experience of visitors at this heavily used facility may be affected by the airport.

White Grass Ranch Rehabilitation and Adaptive Use Environmental Assessment / Assessment of Effect. Based on the guidance in this plan (NPS 2004b), the National Park Service is providing rehabilitation and adaptive use of the White Grass Ranch Historic District in Grand Teton National Park. The center will offer instruction on the preservation and rehabilitation of historic structures in the Intermountain West. This historic district is in a rather remote setting about 3 miles west of Moose near the airport’s primary flight path.

Grand Teton National Park Strategic Plan. The strategic plan (NPS 2005b) covers the period from October 2005 through September 2008. It provides a mission statement and long-term goals, and describes how those goals will be accomplished. The annual performance plans tier off the strategic plan. The strategic plan acknowledges that the Jackson Hole Airport presents a unique set of challenges, but does not specifically address integration of the airport with meeting the plan’s enumerated goals.

Winter Use Plans for Yellowstone National Park and Grand Teton National Park. The National Park Service has been involved in winter use planning for Yellowstone, Grand Teton, and the John D. Rockefeller, Jr. Memorial Parkway for many years. Although the National Park Service published the *Winter Use Plans Final Environmental Impact Statement, Yellowstone and Grand Teton National Parks and the John D. Rockefeller Jr. Memorial Parkway* (NPS 2007b) and a final implementing rule in 2007, the decision continues to be the subject of litigation. The winter use plans are applicable to this proposed action because extension of the use agreement would allow the continuation of scheduled passenger service to the Jackson Hole area, which would likely affect the number of visitors to these parks in the winter. It also is relevant because the airport and motorized recreation during the winter produce sound that can affect the winter visitor’s park experience.

Bison and Elk Management Plan for the National Elk Refuge, Grand Teton National Park, and John D. Rockefeller, Jr. Memorial Parkway. The U.S. Department of the Interior, U.S. Fish and Wildlife Service and National Park Service (2007) developed the bison and elk management plan and final environmental impact statement for managing bison and elk herds within the National Elk Refuge and Grand Teton National Park. This airport use agreement evaluation considered the bison and elk management plan in several impact topics, particularly including socioeconomics.

Transportation Plan Final Environmental Impact Statement, Grand Teton National Park. This plan (NPS 2006b) addressed the management of transportation-related issues within the park and proposed a multi-use pathway system in the park. Based on the plan, the National Park Service commissioned several studies to evaluate management options for the Moose-Wilson Road and de-

termine the feasibility of a public transit system within the park and to Jackson. The National Park Service will consider the presence and use of the airport in current and future transportation and transit studies and activities.

Connected and Similar Actions of the Jackson Hole Airport Board and Federal Aviation Administration

Adoption, Implementation, and Improvement of a Noise Control Plan. Section 4(e) of the use agreement required the Jackson Hole Airport Board to prepare a noise control plan to ensure that aircraft noise “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.” The plan should be reviewed and updated continuously “to incorporate new prudent and feasible technological advances which would allow further reduction in noise impacts on Grand Teton National Park.”

The initial version of the plan was completed on March 14, 1985. Consistent with the first amendment to the 1983 use agreement, it was fully implemented within two years after the date of the amendment, by July 29, 1987. The plan, which is provided in Appendix C:

- Establishes maximum noise level limits, including procedures for measurement and enforcement.
- Establishes a cumulative noise standard. This section of the plan includes limits on the number of departures that can occur daily by scheduled commercial aircraft that have published noise levels that exceed specified standards, and provides for monitoring.
- Defines aircraft operating procedures.
- Provides operations specifications for commercial carriers, including service schedules that can only be between 7 A.M. and 9:30 P.M. (These hours of operation for scheduled passenger service are more limiting than the airport’s voluntary curfew for all aircraft, which applies between the hours of 11:30 P.M. and 6:00 A.M. for landing and 10:00 P.M. and 6:00 A.M. for takeoff.)
- Requires use of established noise abatement procedures.
- Defines requirements for aeronautical contractors, including commercial scenic, charter, and training flights. These are inserted into all contracts involving aircraft operations at the Jackson Hole Airport.
- Establishes a noise complaint and inquiry report system.
- Describes educational efforts. These focus on pilots other than those with scheduled passenger carriers (which must meet the noise control requirements by conforming with the Federal Aviation Administration’s operations specifications) and aeronautical contractors (which have contracts specifying noise control requirements).

In accordance with the use agreement’s requirement for updating, the Jackson Hole Airport Board has an ongoing program of reviewing and improving the plan to make it more effective in controlling aircraft sound in the park. Examples of changes that have improved sound abatement are provided in “Chapter 2, Alternatives” under the heading “Mitigation Measures Common to Both Alternatives.”

In its request (provided in Appendix D) for two 10-year extensions of the use agreement, the Jackson Hole Airport Board acknowledged the importance of limiting aircraft noise in the park and commit-

ted to ongoing efforts. Specifically, they state, “The noise limitations of the Agreement would remain in effect, including the requirement that the board implement new and prudent technology to further reduce noise impacts on the Park in the future.”

Airport Improvement and Development Projects. An airport layout plan and airport forecast are prepared by the Jackson Hole Airport Board and must be approved by the Federal Aviation Administration. The airport layout plan is a concise document that presents how the board expects the airport to change over a period of about 20 years.

The details of implementing the changes in the airport layout plan are included in the master plan. The most recent update to the Jackson Hole Airport master plan was completed in 1999. The master plan guides the development of airport facilities, provides a blueprint for layout of the airport, and establishes priorities and phasing schedules for improvements and development actions. The master plan typically is updated every 10 to 20 years, or sooner if circumstances warrant. The master plan is effectively revalidated every year by the capital improvement plan.

The 1999 update to the master plan concluded a process that began in 1992, in which the Jackson Hole Airport Board proposed a variety of airport improvements. Over several years, the proposed improvements were modified to involve limited upgrades that primarily were safety-related. Most notable among these were the construction of an air traffic control tower and the addition of 300-foot-long safety areas at each end of the runway, which involved centering (translating) the runway between the safety areas. The safety areas addressed the relatively high number of aircraft involved in runway excursions (that is, overshooting the end of the runway either on landing or during an aborted takeoff). Other aspects of the master plan, including the layout and location of facilities, remained unchanged.

A functional relationship exists between the 1983 use agreement and the airport master plan. The use agreement frames the terms and conditions under which the Department of the Interior allows the airport to operate within the park, while the master plan provides the specific guidance concerning airport facilities and layout, consistent with the use agreement. The use agreement establishes such parameters as the airport boundaries, development subzone footprint, and runway length. Within these parameters, the master plan provides the specific layout of airport facilities, including those within the development subzone and on the airfield. For example, while the use agreement requires facilities such terminals, hangars, and parking lots to be located within the development subzone, it does not (aside from limiting structure height) specify their configurations, sizes, or locations. The master plan provides those details.

Most improvements authorized under the 1999 master plan update have been completed. In 2004, the terminal was expanded by 12,500 square feet to its current size of 33,000 square feet. This is larger than the 10,000 square feet called for in the master plan, but the Federal Aviation Administration concurred with the need for the increased size to accommodate security improvements that were implemented following the events of September 11, 2001. An air traffic control tower was constructed in 2000, as were the runway safety areas. The parking apron for large aircraft was expanded in 2005, and a new glycol storage and dispensing facility was installed for use in deicing operations.

The Jackson Hole Airport Board is currently developing schematic designs for another expansion of the airport terminal. In recent years, passenger traffic has grown substantially, from 182,000 passengers in 2000 to 289,000 passengers in 2007. As a result, the terminal cannot efficiently accommodate either current or reasonably foreseeable future increases in passenger volumes, especially considering the sharp peaks in volume that result from airline scheduling. The planned expansion will be en-

tirely within the development subzone and existing height restriction. It will extend the footprint of the existing building to the east, into the area currently used for ground transportation and parking.

Other reasonably foreseeable future projects include replacing hangars, constructing a new hangar, relocating the aircraft rescue and firefighting station (firehouse), and installing a glycol recovery system. There also are plans to improve domestic wastewater management.

In 2006, the Federal Aviation Administration and Grand Teton National Park approved a plan to construct a radar facility in the northwest part of the airport. The environmental assessment and finding of no significant impact led to the current construction of the radar, which includes a tower and antenna about 30 feet tall, with lightning rods to a total height of 39 feet. This facility is within the airport boundary.

All of the proposed actions are consistent with the 1983 use agreement. However, some could require an update of the master plan and additional National Environmental Policy Act compliance.

Connected and Similar Actions of Others

Numerous actions and plans have been implemented and/or developed by local, state, and other federal agencies, and by private entities throughout the area. Plans and actions of others that have the potential to be connected and similar actions, as defined in Section 1508.25 of the Council on Environmental Quality (1978) regulations, are briefly described below, and are considered in the cumulative effects analysis for each impact topic.

Bridger-Teton National Forest Management Plan. This document is currently being updated by the U.S. Forest Service. As a federal agency responsible for the management of large areas of nearby land, the National Park Service is providing input to this planning effort.

Land and resources management planning for the Bridger-Teton National Forest is a connected action for several reasons.

- Decisions made regarding recreation use in the forest could affect local demand for air travel. This particularly is true for skiing and other winter sports, most of which occur on national forest land. For out-of-area users, 90 percent of travel to and from the Jackson area for winter recreation is by air (RRC Associates 2005; Jackson Hole Chamber of Commerce 2006).
- U.S. Forest Service staff members rely heavily on the airport for transportation to and from the area. Forest planning assumes the continued availability of this resource.
- The Bridger-Teton National Forest participates in the interagency heliport at the Jackson Hole Airport.

Jackson/Teton County Comprehensive Plan. The comprehensive plan prepared by the Town of Jackson and Teton County (2002) has chapters that address community vision; population, economy, and growth; community character; natural and scenic resources; affordable housing; commercial and resort development; community facilities; transportation; intergovernmental coordination; and agricultural resources. Each section includes issues, goals, implementation strategies, and recommendations.

The Jackson Hole Airport is identified in Section 8, Transportation (which was updated in December 31, 2003) as an issue to be analyzed at a future date (page 8-49 of the plan). Specifically, the plan identifies airport issues to be addressed in the future as:

- Supporting continued service at the airport while minimizing environmental and traffic impacts; and
- Management and coordination of ground transportation.

The comprehensive plan currently is being updated. The new version is expected to be available in 2009.

Jackson Hole Airport Resolution. This resolution was adopted by Teton County on September 1, 1987. It is intended to avoid obstructions to aircraft using the Jackson Hole Airport and to protect and promote public health, safety, and welfare. Its purpose section states concern that “an obstruction may affect existing and future instrument approach minimums of Jackson Hole Airport; and that an obstruction may reduce the size of areas available for the landing, takeoff, and maneuvering of aircraft, thus tending to destroy or impair the utility of Jackson Hole Airport and the public investment therein.” The resolution addresses height restrictions for trees and structures, and sound reduction measures that should be applied during construction of buildings in areas where the day-night average sound level is 65 A-weighted decibels (dBA) or greater.

Laurance S. Rockefeller Preserve. The Laurance S. Rockefeller Preserve is in the southwestern corner of Grand Teton National Park on the shore of Phelps Lake. The 1,106-acre preserve is one of the most pristine, scenic, and wildlife-rich areas in the park. The land was conveyed to the National Park Service by the Rockefellers in November 2007 and the interpretive center at the preserve was opened to the public in June 2008. Mr. Rockefeller intended for the preserve to serve as a catalyst to inspire appreciation and reverence for the beauty and diversity of the natural world, and to foster individual responsibility for conservation stewardship. The National Park Service is committed to managing the preserve consistent with Mr. Rockefeller’s vision and actively seeks to balance public use with preservation of the unique visitor experience at the preserve (Jackson Hole News and Guide 2007; NPS 2008).

Southern Teton Area Rapid Transit (START) Teton Pass Commuter Transportation Plan. The START public bus service recommended in 2000 that a year-round commuter bus program should be implemented connecting Jackson, Wyoming and Driggs/Victor, Idaho. After several years of planning, service on this route began in 2007. Talks recently began regarding providing Southern Teton Area Rapid Transit service the airport. The availability of this service was considered in the cumulative effects analysis.

Expansion of Teton Village and Development of Other Private Land. The Jackson Hole Mountain Resort is operated on U.S. Forest Service land under a special use permit with the Bridger-Teton National Forest. Snake River Associates is developing Teton Village on private land adjoining the resort near the southwest border of Grand Teton National Park. Teton Village facilities currently include hotels, rental homes and condominiums, employee housing, restaurants, and other commercial space. Development expansions were approved by the Teton County Commission in 2005 and 2008, and the resort has several additional development proposals under consideration. Other developments in the vicinity of Jackson and throughout Teton County are in various stages of planning.

Increased residential and commercial development would increase the area’s population and the capacity of the community to provide overnight lodging. These changes could increase demand for scheduled passenger and general aviation services at the Jackson Hole Airport. They also could result in increased population in areas outside the park that are overflowed by aircraft using the airport, and the number of people outside the park who are affected by aircraft sound.

Expansion of Grand Targhee Resort. The Grand Targhee Resort, on the west side of the Teton Range, is operated under a special use permit with the Caribou-Targhee National Forest. Like other area ski resorts, this facility is considering several development proposals.

The Grand Targhee Resort is equally accessible from the Jackson Hole Airport and Idaho Falls Regional Airport. However, many people arrive in the area via the Jackson Hole Airport and ski both the Grand Targhee and Jackson Hole Mountain Resorts. As a result, the effects of extending the airport use agreement would be similar to those described above for the expansion of Teton Village and development of other private land.

Actions Considered in Determining Cumulative Effects

As explained in the NPS' guidance on environmental impact analysis (NPS 2001a), the intent of evaluating cumulative effects is to determine the additive impact of the alternative on each resource of concern. It states "It is irrelevant who takes these actions (i.e., they are not confined to NPS or even federal activities), or whether they took place in the past, are taking place in the present, or will take place in the reasonably foreseeable future."

Cumulative effects were determined by combining the effects of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions at the Jackson Hole Airport, in Grand Teton National Park, and in the surrounding region.

All capital improvements to the airport described under the heading "Existing Facilities at the Jackson Hole Airport" and all of the connected and similar actions that are identified above were considered in conjunction with the alternatives to determine cumulative effects. Other actions considered with the alternatives to extend the airport use agreement to determine possible cumulative effects included the following:

Growth of the Town of Jackson. Jackson, with an estimated year 2004 population of 8,966, is the major population center in Teton County, which had a year 2004 estimated population of 18,964 people (U.S. Census Bureau 2004). The town and county continue to grow, with respective population increases of 84 and 63 percent between 1990 and 2000.

Operation of the Jackson Hole Airport. The Jackson Hole Airport has become a critical component of the economy of Jackson and Teton County, particularly in the winter when 90 percent of non-local users of some area ski resorts travel by plane through this airport. The next-closest airport that provides scheduled passenger services is 90 miles away by road, in Idaho Falls.

Continuation of Overflights. Grand Teton National Park is under the flight routes between cities in the Pacific northwest and cities in the midwest and southeast United States. Overflights also occur by general aviation aircraft based at the Jackson Hole Airport and at other airports throughout the region and nation and, occasionally, by military aircraft. The sound from aircraft overflights is audible throughout the park.

Operation of Grand Teton National Park. Visitation to the park is a major factor in the regional economy, particularly during the peak summer months of June through August, when park visitation can exceed 600,000 visitors per month. Estimates place the number of park visitors who arrive by airplane through the Jackson Hole Airport at between 6 percent (RRC Associates 2005) and 12 percent (Littlejohn 1998) of total park visitation.

Nearby Presence of Yellowstone National Park. Yellowstone National Park draws more than 2.8 million visitors annually to northwest Wyoming (NPS 2005a). This has several effects relating to the Jackson Hole Airport use agreement, such as generating demand in the area for airport services, and increasing the numbers of visitors who are seeking an experience of spectacular mountain views associated with quiet natural soundscapes in Grand Teton National Park.

Operation of National Forests. The Bridger-Teton National Forest is adjacent to Grand Teton National Park on the east and south, and the Caribou-Targhee National Forest adjoins the park on the west. Other national forests in the area include the Gallatin and Custer National Forests in Montana, Beaverhead-Deerlodge National Forest in Idaho, and Shoshone National Forest in Wyoming. Together, they and the national parks support about 16 million recreational visits annually, with many visitors spending time in two or more of these units during their visit to the area (Greater Yellowstone Coordinating Committee 2006). There is extensive coordination between the National Park Service, U.S. Forest Service, and other federal land managers throughout the region.

Operation of Ski Resorts. Three ski resorts operate in Teton County. They include Snow King Resort, Jackson Hole Mountain Resort, and Grand Targhee Resort. White Pine Ski Area is in adjacent Sublette County. Each winter, the Teton County resorts collectively provide 550,000 to 600,000 skier days to mostly nonresident skiers, providing a major boost during what otherwise would be a low-use period for the area's tourism-related industries. An estimated 90 percent of these visitors fly into the area (RRC Associates 2005; Jackson Hole Chamber of Commerce 2006).

Construction and Operation of Major Highways. Topography resulted in the convergence of several major highways in the area of Jackson and the east side of Grand Teton National Park. These include U.S. Highways 26, 89, 191, and 287. The sound produced by automobiles and, particularly, heavy trucks and motorcycles, can carry several miles in areas of flat topography and contributes to the cumulative adverse effect on the natural soundscape of the park.

Helibase Operations. The National Park Service operates an interagency helibase at the Jackson Hole Airport. The 5-acre helibase includes a 2,500-square-foot office building, three helicopter landing pads, and parking. Future plans include the addition of a 5,000-square-foot hangar that will be within the helibase boundary and will not exceed the airport height restriction.

The helibase is critical to the operations of the National Park Service and U.S. Forest Service. It provides safety and resource management functions at Grand Teton National Park and nearby public lands, including wildland fire suppression, search and rescue missions, and emergency medical services. The operation of helicopters from the helibase contributes to the cumulative adverse effect on the natural soundscape of the park.

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Chapter 2

Alternatives

This chapter describes two alternatives regarding the use agreement for the Jackson Hole Airport. It also identifies alternatives or actions eliminated from further consideration. The preferred alternative and environmentally preferred alternative are identified. The important features of the alternatives, their effectiveness in meeting goals of the proposed action, and a summary of the effects of the alternatives are provided.

FORMULATION OF ALTERNATIVES

ALTERNATIVES DEVELOPMENT PROCESS

Sections 1502.14 and 1508.25 of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act require that the alternative of no action be included in all environmental evaluations. Accordingly, the National Park Service developed Alternative 1, the no action alternative, under which the current use agreement would stay in effect until 2033, and then expire.

Alternative 2 is the Jackson Hole Airport Board's proposal. It would extend the existing use agreement for two 10-year terms with no other changes. The April 25, 2005 letter from the board to the superintendent of Grand Teton National Park that describes their vision for Alternative 2 is included in Appendix D.

ALTERNATIVES OR ACTIONS ELIMINATED FROM FURTHER STUDY

Several alternatives or actions suggested during scoping by other agencies or the public were not examined in this environmental impact statement. Consistent with Section 1502.14 of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act, this section identifies those alternatives and actions, and presents the reasons why they were eliminated.

Increase the Use Agreement's Height Restriction for Buildings. It was suggested that increasing in the use agreement's height restriction for buildings by 6 feet would enhance the airport's operational flexibility.

Response: Jackson Hole Airport staff examined the potential for, and benefits of, increasing the height of existing buildings and/or constructing new buildings to a height of 6,443 feet above mean sea level instead of the existing ceiling of 6,437 feet above mean sea level. Staff determined that such an increase in the allowable height of buildings would provide little or no operational benefit. Therefore, this change was eliminated from further consideration.

Close the Airport and Develop Air Service Elsewhere. Suggestions ranged from phased reductions to immediate termination of existing operations at the Jackson Hole Airport. Suggested locations for airport facilities that should be created or expanded to handle air service for the area included Afton, Alpine, Casper, Daniel, Dubois, Driggs, Idaho Falls, Salt Lake City, and Star Valley. A related suggestion included exploring a land swap for a replacement airport site on private holdings on Bureau of Land Management or other federal land.

Response: These proposals were eliminated because:

- They conflict with the determination by the Secretary of the Interior that the Jackson Hole Airport is necessary to the proper performance of the functions of the Department of the Interior.
- They are contrary to the terms and conditions of the use agreement, which authorizes the operation of the Jackson Hole Airport in its current location until April 27, 2033. Although the use agreement includes a revocation clause, the agreement cannot be terminated unless the Jackson Hole Airport Board has defaulted on the agreement by failing to meet its terms and conditions.
- The development or improvement of airport facilities is not within the jurisdiction of the National Park Service.

During the 1970s and early 1980s, Jackson Hole Preserve and the Federal Aviation Administration investigated the possibility of relocating the airport to an alternate site. Although many sites were studied, none was considered both feasible and prudent as a replacement for the existing Jackson Hole Airport. A site known as Webb Draw, near Daniel, Wyoming, was investigated most closely. The Federal Aviation Administration concluded that although it was technically feasible to build an airport at the site, airport relocation was not prudent, given the practical and political ramifications (Federal Aviation Administration 1982).

Improve Transportation from Other Airports. These suggestions presumed that operations at the Jackson Hole Airport would be severely limited or terminated and that another airport in the region would be created or expanded to provide replacement air service. Suggestions included enlarging the Snake River Canyon road (U.S. Highway 26) to create a four-lane highway, and building concrete avalanche snow sheds on Teton Pass to keep Wyoming Highway 22 open throughout the winter to accommodate travel from candidate Idaho airport sites to Jackson. It also was suggested that a shuttle bus service should be provided from a new or expanded airport in another community to Jackson.

Response: The improvement of highways and other transportation systems is managed and largely funded by the states and the U.S. Department of Transportation and is outside the responsibility of the National Park Service. Independent of actions associated with the Jackson Hole Airport, the Southern Teton Area Rapid Transit (START) already provides bus service to Driggs, Idaho, which has the closest instrumented airport to the Jackson Hole Airport.

Sign a New Use Agreement. The suggested term of a new agreement was the same as that in the 1983 use agreement: 30 years, with two consecutive, 10-year options. The existing agreement would be replaced with a completely new agreement.

Response: The development of a new or substantially revised use agreement would require the concurrence of both the Jackson Hole Airport Board and the Department of the Interior (through the National Park Service). Because the board has stated that it is simply seeking a change in the length of the term, with no other changes to the use agreement, there is no consensus that a new agreement should be developed. In the event that both parties determine that a new or significantly revised use

agreement is necessary or desirable, a new agreement could be developed, but it is not necessary to accomplish the currently proposed action.

Make Major Modifications in the Use Agreement. Suggested changes included alterations in airport capacity, size of the development subzone, or runway length.

Response: See the response to the preceding item. The Jackson Hole Airport Board has not requested changes in the development footprint of the airport or the length of the runway, either of which would require an amendment to the use agreement. Such an amendment would have to be preceded and supported by an appropriate planning and environmental compliance process involving the Jackson Hole Airport Board, Federal Aviation Administration, and National Park Service. Any actions either proposed or approved by the board or the Federal Aviation Administration that were outside the terms and conditions of the existing use agreement could not occur unless also approved by the National Park Service.

Limit Airport Use. Many comments from the public suggested that the National Park Service should prevent increased use of the Jackson Hole Airport. Specific measures that were suggested included limits on numbers of flights, enplanements, and/or parked planes. It also was suggested that use of the airport should be limited exclusively to emergency services.

Response: The use agreement does not allow the National Park Service to impose direct limits on the numbers of aircraft that may use the airport. However, the physical characteristics of the airport result in some indirect limitations. For example, the weight-bearing capacity of the runway is a major factor in determining the types of aircraft that are suited to use the airport. Neither the Jackson Hole Airport Board nor the National Park Service has the authority to impose limits on the numbers of aircraft using the airspace surrounding the airport; such matters are within the sole purview of the Federal Aviation Administration. Similarly, neither the board nor the National Park Service has the authority to deny aircraft access to the airport.

Limit Aircraft Types. Some commentators wanted to limit airport growth and/or use by restricting the types of aircraft that could use the airport. For example, a prohibition on the use of jets was identified as an effective technique to contain growth.

Response: See the response to the preceding item. The use agreement includes a restriction that no aircraft that has an Federal Aviation Administration certification that exceeds 92 A-weighted decibels (dBA) certificated value on approach may use the airport. In addition, Stage II aircraft (which have louder, earlier-generation jet engines) are prohibited from using the airport. The Airport Noise and Capacity Act of 1990 does not allow the Jackson Hole Airport Board or the National Park Service to impose further restrictions on aircraft use.

Limit Construction in the Development Subzone. It was suggested that airport growth could be limited by not allowing any new facilities within the development subzone, and not allowing any existing facilities to be replaced or expanded. Specific comments opposed replacing the hangars, expanding the parking areas for aircraft and automobiles, providing a taller terminal for modern ramps to scheduled passenger service aircraft, constructing additional buildings, expanding rental car facilities, increasing ramp lighting, and increasing fuel storage.

Response: Section 7(a) of the use agreement authorizes the Jackson Hole Airport Board to “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.” So long as the board conforms with limitations specified in

other sections of the use agreement, it may develop or redevelop the land within the 28.5-acre development subzone as it deems appropriate.

Impose Use Conditions on the Jackson Hole Airport Board. Many of the suggestions in the preceding five groups stated or implied that the National Park Service should unilaterally impose use conditions on the Jackson Hole Airport Board regarding facilities or operations at the airport.

Response: The April 27, 1983 document clearly states that it is an *agreement* between the Jackson Hole Airport Board and the U.S. Department of the Interior. As such, the National Park Service cannot unilaterally change the terms and conditions of the agreement without the concurrence of the board.

Address Regional Carrying Capacity. Because the airport does not substantially affect the carrying capacity of Grand Teton National Park, all of these comments were related to airport carrying capacity or the consideration of regional carrying capacity. Specifically, they mentioned analyzing the area's ability to support the human population without deterioration to the environment and the quality of life that Jackson residents and visitors have come to expect.

Response: Carrying capacity of the airport is addressed in this environmental impact statement in terms of opportunities for changes at the airport under the existing use agreement, such as expansion or replacement of buildings, alternate uses of the current parking areas, and modifications to hangars. Indirect effects of the action on the maintenance of natural and social conditions outside the park and quality of life are considered for multiple impact topics, including dark skies, wildlife, socioeconomic, and transportation.

Maintain Development Subzone and Airport Boundaries. Commentors suggested restrictions on future expansions of the airport. Specifically, they said the National Park Service should not allow any facilities, including wastewater treatment facilities, outside the existing development subzone or airport boundary.

Response: The boundaries of the development subzone and airport are defined in the use agreement. These boundaries would not be changed by either alternative. The current limitations on the installation of facilities outside these boundaries would continue under both alternatives.

Future changes to the development subzone, changes to the airport boundaries, or other changes to the use agreement related to the development of facilities could occur only with an amendment to the existing agreement, supported by an appropriate National Environmental Policy Act process. Any proposal to change boundaries or to install facilities outside the development subzone would require the preparation of an action-specific National Environmental Policy Act compliance document. This would include notification and opportunities for comment by the public and other agencies, consistent with Council on Environmental Quality (1978) requirements and the procedures in *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a).

Change Sound Management. Suggestions for managing aircraft sound included:

- Change the existing noise limits or noise levels. This included a specific suggestion for a reduced single-event noise requirement to match the current restriction on Stage II aircraft.
- Reduce or eliminate nighttime takeoffs and landings at the airport, except for emergency services.

- Prohibit helicopter and small-plane tours of Grand Teton National Park.
- Update the existing noise management plan. Include procedures for monitoring and managing noise levels; a requirement that noise abatement procedures apply to all aircraft, not just the commercial aircraft covered in the current plan; management of noise as a cumulative “noise bucket” that is compared to a “noise bucket capacity” that includes all scheduled passenger service and general aviation flights; better controls on directions of takeoffs and landings; and a ban on aircraft approaches over the park through the contracts airlines sign allowing them to do business at the Jackson Hole Airport.

Response: Sections 4(f) and 4(g) of the existing use agreement established noise standards for the operation of the Jackson Hole Airport. Modifications to these sections of the use agreement are outside the scope of the alternatives.

The Jackson Hole Airport Board has adopted a voluntary curfew between the hours of 11:30 P.M. and 6:00 A.M. for landing and 10:00 P.M. and 6:00 A.M. for takeoff. Under the Airport Noise and Capacity Act of 1990 and its implementing regulations, the board is prohibited from adopting a mandatory curfew. However, to improve compliance with the voluntary curfew, the board records information on aircraft that violate the curfew and notifies their owners by letter, reminding them of the reasons for the curfew and requesting them to refrain from further violations.

The Airport Noise and Capacity Act of 1990 and its implementing regulations also prohibit any reduction in existing noise limits without Federal Aviation Administration approval.

With regard to air tours, Section 4(h) of the 1983 use agreement already prohibits the origination from the Jackson Hole Airport of any commercial scenic or charter flights over the noise-sensitive areas of the park. In addition, there are no known, regularly scheduled, air tour operations over Grand Teton National Park from any other airports.

If an operator wanted to conduct such tours from another airport, the Federal Aviation Administration and National Park Service first would have to implement measures to conform with the requirements of the National Parks Air Tour Management Act of 2000. These would include:

- Establishing an air tour management plan, which would include holding public meetings and complying with the National Environmental Policy Act and Council on Environmental Quality (1978) regulations for its implementation. (For purposes of complying with the regulations, the Federal Aviation Administration would be the lead agency and the National Park Service would be a cooperating agency.) The air tour management plan would include acceptable and effective measures to mitigate or prevent the significant adverse impacts, if any, of commercial air tour operations on the natural and cultural resources and visitor experiences of the park.
- Requiring applications from candidate commercial air tour operators for authority to conduct operations over park lands in conformance with the air tour management plan. The National Park Service would be involved in approving or disapproving applications.

The Federal Aviation Administration and National Park Service have not received any requests for commercial air tour operations over Grand Teton National Park.

The Jackson Hole Airport Revised Noise Abatement Plan (provided in Appendix C) has not been formally updated since 1985. However, the Jackson Hole Airport Board continuously implements measures to manage and reduce sound, consistent with the requirement in Section 4(e) of the use agreement and in accordance with the Part 150 Airport Noise Compatibility Planning requirements of the Federal Aviation Administration’s Airports Environmental Program. For example:

- The board has included language in all leases with scheduled passenger service airlines that requires airlines to ensure that their pilots are made aware of the sound abatement rules and procedures, and to take appropriate action against employees for operations contrary to the noise control plan where there are no valid reason for noncompliance. Similar language is included in the airport's contract with the fixed-base operator, Jackson Hole Aviation. In addition, the contract with Jackson Hole Aviation requires them to insert language into all subcontracts intended to ensure compliance with the noise abatement plan, and to distribute copies of the noise abatement plan to departing pilots.
- On June 28, 2004, the Jackson Hole Airport began enforcing a rule prohibiting the operation of *all* Stage II aircraft. The rule affects a relatively small number of general aviation jet aircraft that contributed disproportionately to impacts on the park's soundscape. Violation of the rule may result in a \$750 fine and mandatory court appearance under the Town of Jackson Municipal Code.
- The airport has developed a good working relationship with the control tower, which is operated by the Federal Aviation Administration. The tower provides information to pilots by radio regarding the noise abatement procedures.

In accordance with Section 4(e) of the use agreement, the Jackson Hole Airport Board intends to review and amend the noise control plan for the Jackson Hole Airport "to incorporate new prudent and feasible technological advances which would allow further reduction in sound impacts on Grand Teton National Park" regardless of the alternative selected for extending the use agreement.

ALTERNATIVE 1: NO ACTION / CONTINUE CURRENT MANAGEMENT

CONCEPT

Alternative 1 would not include any administrative or other type of action. No extension would be granted in the duration of the April 27, 1983 use agreement. It also would not involve construction or development of new facilities, proposals for which would be addressed under separate compliance reviews.

- Because of forward-looking requirements, the Jackson Hole Airport Board's five-year capital improvement planning would begin to be impacted well before 2013 (Morgan 2006).
- On April 27, 2013, the Jackson Hole Airport Board would lose its entitlement to Federal Aviation Administration grant funding. This would eliminate 100 percent of federal funding available for acquisition, repair, and replacement of airport infrastructure.
- On April 27, 2033, the use agreement would terminate and the airport would close. Within six months, the Jackson Hole Airport Board would be required to remove the terminal, restore its site to as nearly a natural condition as possible, and otherwise meet the provisions of Section 7(d) of the use agreement.
- After that date, the National Park Service would remove any remaining facilities and manage the airport site as a part of Grand Teton National Park.

FEATURES

To receive Federal Aviation Administration grant funding, the Jackson Hole Airport Board must have a "satisfactory property interest" in the underlying land. In situations where an airport authority does not own the land, a satisfactory property interest is defined as a use agreement or lease term of not less than 20 years (Title 14, Part 152, Section 3 of the *Code of Federal Regulations*). This provision is applicable to the Jackson Hole airport, which is on land owned by the United States. Accordingly, unless the use agreement term is extended, the Jackson Hole Airport Board will lose its entitlement to Federal Aviation Administration grant funding in the year 2013.

The Jackson Hole Airport Board is required to have a forward-looking, five-year capital improvement plan for Federal Aviation Administration grant funding. Under this plan, rehabilitation of the taxiway was completed in 2008, and upcoming projects include rehabilitation of the runway pavement and upgrade of its electrical system, purchase of plow trucks, and expansion of the passenger terminal. Without an airport use agreement term extension, this planning could be adversely affected well before the funding-loss trigger date of April 28, 2013 (Morgan 2006). This would occur because of the long lead time between funding requests and actual funding.

Projects recently funded by Federal Aviation Administration grants at the Jackson Hole Airport included runway rebuilding and rehabilitation, the acquisition of snowplows and fire trucks, airport fencing, and terminal improvements (Morgan 2006). These funds also are a primary component for

developing and implementing airport security provisions. If Federal Aviation Administration grant funding was no longer available, the amount of money that could be used by the Jackson Hole Airport Board for these purposes would be reduced by more than 70 percent.

Every airport in the United States that provides scheduled passenger service receives Federal Aviation Administration grant funding (Morgan 2006). Without the improvements paid for by these grants, the Jackson Hole Airport Board would have difficulty maintaining the airport's Part 139 certification to support scheduled passenger aviation. Without this certification, scheduled passenger service airlines would have to terminate their service to the airport. This condition would occur sometime after the airport lost its funding eligibility, but the exact timeframe is difficult to predict because of the many variables that could affect the Part 139 certification process. Potentially, such a loss of certification could occur within a few years of the present, or as much as a decade or more later. However, for consistency, the reasonable year of 2015 is used in all of the impact analyses. The period between now and 2015 is referred to in this environmental impact statement as the transition period.

From then until April 27, 2033, the Jackson Hole Airport would continue operations under the existing use agreement. General aviation would be the primary use, and pilots would rely on their own judgment regarding whether they considered the airport safe. This period is referred to in this environmental impact statement as the general aviation period. During this time:

- The Jackson Hole Airport Board would continue to receive funding from airport use fees and, possibly, from the community, state of Wyoming, and/or other non-federal entities that were interested in maintaining the operability of the airport until its mandated closure date. The board would spend that income to support continuing operations.
- There would not be any passenger enplanements, which by definition are associated exclusively with scheduled passenger service.
- Compared to current conditions, general aviation use would increase, provided that pilots perceived that use of the airport was safe. However, without funding from the Federal Aviation Administration, damage to or deterioration of the runway eventually could create a situation that general aviation pilots could judge as unsafe. In that event, general aviation use of the Jackson Hole Airport would decrease or, potentially, end.

Between now and 2033, the Jackson Hole Airport Board would have to continue to meet all of the requirements of the use agreement. In addition, it would continue complying with all federal and Wyoming laws and regulations. Examples include continued compliance with the airport's National Pollutant Discharge Elimination System permit requirements, conformance of the domestic wastewater treatment system with state requirements, and continued management of hazardous materials by the fixed-base operator in conformance with the Resource Conservation and Recovery Act.

Throughout this period, the Jackson Hole Airport Board could continue to install improvements in the development subzone, consistent with Sections 7 and 9 of the use agreement, subject to the Department of the Interior notification and review provisions in these sections. Development would have to conform with all use agreement provisions, such as the height restriction and development subzone boundaries.

After April 27, 2033, the removal provisions in Section 7(d) of the use agreement would become effective. During the following six-month period, the board would have to remove the terminal and restore its site to as nearly a natural condition as possible. Consistent with the Resource Conservation and Recovery Act, the board or other responsible party (such as the fixed-base operator) also would

be responsible for removing any hazardous materials remaining onsite, and cleaning up any contamination of soil or ground water that may have resulted from airport operations. Thereafter, management of the 533-acre airport property, 4.37-acre access road alignment, and all remaining buildings, structures, or improvements would be return to the National Park Service.

The Jackson Hole Airport Board is not required by the use agreement to remove and restore the runway or any infrastructure sites other than the terminal. Therefore, any buildings, structures, or improvements that did not have salvage value probably would be left in place by the board. The board would have to restore the sites of features that were salvaged to as nearly a natural condition as possible.

After the property reverted to NPS management, all remaining airport features, such as pavement, buildings, and fencing, would be removed. The site would be restored to native vegetation, which would consist primarily of an overstory of sagebrush and an understory of grasses and forbs.

The interagency helibase was completed at the Jackson Hole Airport in May 2004. Under Alternative 1, as part of closing the airport in 2033, the National Park Service would remove the helibase and restore its area with the rest of the airport site. A new interagency helibase would be established on or near already-developed land in the region, but not necessarily within Grand Teton National Park.

ALTERNATIVE 2: PREFERRED ALTERNATIVE

CONCEPT

Alternative 2 is the preferred alternative. Alternative 2 would consist of an administrative action to add two 10-year terms to the existing use agreement. It would not involve construction or development of new facilities. Proposals for any such actions that may be proposed at a later date would be addressed under separate compliance reviews.

- The first term would extend the agreement from April 27, 2033 to April 27, 2043, and could be exercised by the Jackson Hole Airport Board on or about April 27, 2013.
- The second term would extend the agreement from April 27, 2043 to April 27, 2053, and could be exercised by the Jackson Hole Airport Board on or about April 27, 2023.

There would not be any other changes in the use agreement.

Alternative 2 would be implemented by enacting Amendment No. 3 to the April 27, 1983 use agreement. This amendment would be signed by representatives of the Jackson Hole Airport Board and the U.S. Department of the Interior. A draft of Amendment No. 3 for Alternative 2 is included as Appendix E.

FEATURES

Alternative 2 would consist of an administrative action. It would extend the April 27, 1983 use agreement and its two existing amendments (signed in 1985 and 2003) for two 10-year terms, to be exercised at the option of the Jackson Hole Airport Board. No other changes would be made in the existing use agreement.

The full text of the existing use agreement, including amendments, that would stay in effect under Alternative 2 is provided in Appendix B. Key provisions of the use agreement were summarized in Chapter 1 under the heading, “Use Agreements for the Jackson Hole Airport.” Some of the features of this agreement that were identified by scoping as important to understanding Alternative 2 include the following.

- All buildings, structures, roads, or other improvements would be limited to the development subzone.
- Section 7(b) regarding the runway would remain in effect. This section states, “This agreement does not authorize the extension of the runway, which can only be accomplished by amendment to the agreement.” If such an action were proposed in the future, it would be subject to the National Environmental Policy Act process to inform and involve the public and to disclose impacts.
- Actions at the airport, including those within the development subzone, would continue to be subject to compliance with the National Historic Preservation Act with regard to archeological or other cultural resources. This would include coordinating with the National Park Service, which is required to formally consult with the state historic preservation officer and tribes, as applicable under Section 106 of the National Historic Preservation Act. It also would include confirming that a site does not include any resources that are eligible for listing in the National

Register of Historic Places prior to any ground-disturbing activities, which could include conducting a resource survey.

- The noise limitations of the use agreement would remain in effect, including the requirement that the board must continue to implement new and prudent technology to further reduce noise impacts on the park in the future.
- The alternative would not authorize the construction of any building or other improvement that is not already authorized by the use agreement, or allow construction in any manner different than that authorized by the use agreement. Specifically, this alternative would not change the existing height restriction on structures or the footprint of the development subzone.
- For any proposed improvements, the Jackson Hole Airport Board would have to continue notifying the National Park Service at the preliminary or conceptual stage, and providing detailed plans and specifications for National Park Service review at least 150 days before the start of construction.

The Jackson Hole Airport Board also would have to continue complying with all federal and Wyoming laws and regulations. Examples of compliance requirements were described for Alternative 1. In addition, these would include compliance with the requirements of the National Parks Air Tour Management Act of 2000, which would involve the National Park Service in establishing an air tour management plan and in approving or disapproving applications for air tour operations.

Within the constraints of the use agreement and Federal Aviation Administration regulations, the Jackson Hole Airport Board would continue to operate the airport in a manner that it found appropriate. For example, the use agreement would not impose any administrative restrictions on the numbers of scheduled passenger service enplanements; the number of general aviation or scheduled passenger service flight operations; or the types, locations, or sizes (except heights) of structures built within the development subzone.

Alternative 2 would ensure that scheduled passenger service at the Jackson Hole Airport could continue until 2033. However, without yet another extension of the use agreement before then, the airport would again have fewer than 20 years remaining on its use agreement. As a result, conditions under Alternative 2 beyond 2033 would be similar to those described for the general aviation period of Alternative 1.

Details of existing (based on 2004 and 2005 records) and forecast plane operations, passenger enplanements, and other operational details that are expected to occur under Alternative 2 are presented in the “Natural Soundscape” and “Park and Airport Operations” sections of Chapter 4.

MITIGATION MEASURES COMMON TO BOTH ALTERNATIVES

Mitigation and best management practices are regularly used to ensure that the cultural and natural resources of Grand Teton National Park are protected and preserved for future visitors without impairment. In the legislation that created the National Park Service, Congress charged it with managing lands under its stewardship “in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (NPS Organic Act, 16 *United States Code* 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of park resources.

Mitigation was included in the 1983 use agreement, and would continue to be implemented with either alternative for the use agreement. For example:

- Section 4(e) of the 1983 use agreement required the Jackson Hole Airport Board to prepare a noise control plan, with regular updates to improve its effectiveness. The noise control plan is provided in Appendix C of this environmental impact statement. Some of the improvements that the board has made since the plan was adopted on March 14, 1985 include:
 - The imposition, beginning on June 28, 2004, of a ban on all Stage II aircraft, which are perceived as being twice as loud as Stage III aircraft. This ban would not have been possible under general provisions of federal law. In 2003, with the assistance of Senator Craig Thomas and the concurrence of the National Park Service, the Jackson Hole Airport Board was successful in obtaining an amendment to the 2003 FAA Authorization Bill that allowed it to enact the ban. Without a concerted effort by the board and Senator Thomas that resulted in an Act of Congress, the board would not have been able to impose this limitation.
 - The adoption of a voluntary curfew on night flights, with a system for notifying owners of aircraft that violate the curfew by letter and requesting them to refrain from further violations. The curfew, which applies to all scheduled passenger service and general aviation aircraft, is between the hours of 11:30 p.m. and 6:00 a.m. for landing and 10:00 p.m. and 6:00 a.m. for takeoff.
 - Making the airport noise abatement procedures widely available to all pilots and aircraft operators through a variety of means, including an insert for pilot notebooks, the airport website, air traffic control broadcasts, aeronautical publications, magazines, and other materials typically used by pilots for flight planning. The procedures indicate that Runway 01 (from the south) is the preferred arrival runway and Runway 19 (to the south) is the preferred departure runway, and request that all pilots stay east of the Snake River and/or U.S. Highway 26/89/191.
 - Establishing a good working relationship with the control tower to inform pilots of the noise abatement procedures and encourage their compliance.
 - Including language in all leases with scheduled passenger service airlines that requires airlines to ensure that their pilots are made aware of the noise abatement rules and procedures and to take appropriate action against employees for operations contrary to the noise control plan where there exists no valid reason for noncompliance.
 - Including similar language in the airport’s contract with the fixed-base operator, requiring the operator to insert language into all subcontracts to ensure noise abatement plan compliance, and requiring them to distribute copies of the noise abatement plan to pilots departing the airport.

- Section 7(a) of the 1983 use agreement requires that cultural resources be protected during all improvement activities and specifies mitigation measures the board must implement. The National Park Service routinely performs archeological surveys prior to ground-disturbing activities at the Jackson Hole Airport.

In addition, the National Park Service and Jackson Hole Airport Board continue to implement mitigation beyond that required by the use agreement. For example:

- Trees have been planted along the eastern airport boundary to provide visual screening from viewpoints along U.S. Highway 26/89/191. Additional trees will be planted in the future. NPS policy requires the use of native seed stock.
- The board has installed a boundary fence around the airport that protects large mammals and prevents their movement into areas of potential conflict with aircraft and public safety.
- Within the terminal, the Jackson Hole Airport Board has provided the National Park Service with space for interpretive displays and for a branch of the Grand Teton Association Bookstore. These facilities provide an important introduction and interpretation mechanism for visitor use and experience.
- The Jackson Hole Airport Board uses compatible colors to finish the exteriors of buildings and other facilities at the airport to decrease their visibility against the natural landscape.

Actions by the Federal Aviation Administration also are helping to mitigate effects from the presence of the airport. For example, the proposed beacon interrogator will enable pilots to follow less intrusive flight tracks during instrument flight rules (IFR) conditions (Federal Aviation Administration 2006c). It also will allow for more efficient use of the airspace, which will enable planes to exit the airspace over the park more quickly. A future enhancement is expected to correlate specific aircraft with specific sound events, allowing better enforcement of sound standards.

Future navigational advances also could reduce aircraft sound in the park. For example, the current instrument landing system (ILS) approach is a straight line along the Snake River. Next-generation approaches based on the global positioning system (GPS) may permit avoidance of much of the park, even under instrument flight rules conditions.

COSTS OF THE ALTERNATIVES

DIRECT CAPITAL AND IMPLEMENTATION COSTS FOR ALTERNATIVES

Both alternatives are administrative actions. Neither would involve any capital improvements. Therefore, at least until 2033, there would not be any direct capital costs associated with either alternative for either the National Park Service or the Jackson Hole Airport Board.

Some changes in operational costs would be associated with the alternatives. For example, for either alternative, the National Park Service and Jackson Hole Airport Board would continue to incur costs associated with the evolving management of the airport. However, the costs of these changes would be negligible to both organizations compared to their current operating costs and could be accommodated with existing staffing resources.

Indirectly, the alternatives would have costs to operate and maintain the airport, at least through the year 2033. These costs would be higher for Alternative 2 because the airport would be maintained to meet Federal Aviation Administration Part 139 certification standards for scheduled passenger service.

INDIRECT CAPITAL COSTS ASSOCIATED WITH ALTERNATIVE 1

All of the values presented here are in 2008 dollars and are only rough estimates. They do not consider feasibility or other factors that could significantly affect cost. Therefore, these estimates should not be used for budgetary purposes; rather, they are presented for comparison between the alternatives.

Airport Removal and Site Restoration

In Alternative 1, the airport would close on April 27, 2033. In accordance with Section 7(d) of the use agreement, Jackson Hole Airport Board must remove the terminal building and restore its site within six months. The National Park Service would then remove all remaining buildings, fencing, and pavement, and restore the site to a near-natural condition.

Costs for removing features from the Jackson Hole Airport and restoring the site were estimated based in part on the actual costs incurred by the City and County of Denver when it closed and restored the site of the former Stapleton International Airport. However, costs were adjusted based on the recognition that there is only a limited market for recycled materials in western Wyoming and eastern Idaho and that transport costs may largely offset salvage value (Danczyk, 2008). Costs at the Stapleton International Airport site provided by Wood (2006), and how they were applied to develop this cost estimate for the Jackson Hole Airport are described below. All costs would need to be adjusted in 2033 to account for inflation and changes in the prices of commodities.

- The Stapleton International Airport runways, taxiways, fences, and roads were all removed at no cost by a recycling company. This firm then made a profit by selling the resulting aggregate, steel rebar, pipes, tanks, and other recovered materials. Although similar materials removed from the Jackson Hole Airport would have some salvage value, it could be minimal because of transporta-

tion costs to move the materials to other markets. Calculations prepared using construction data from RSMeans® indicate a removal cost of about \$3 million (Danczyk, 2008).

- The cost to Denver for removing structures from the 4,500-acre Stapleton site was \$10 million. The Jackson Hole Airport, at 533 acres, is 12 percent of this size. Using this ratio, the cost to remove structures at the Jackson Hole Airport would be about \$1.2 million.
- The Stapleton site had extensive areas that were contaminated with spilled or leaked fuels and solvents, and asbestos-lined pipe had been used on the site. Because Stapleton was scheduled for rapid redevelopment for residential use, large volumes of contaminated soil were excavated and hauled away for offsite disposal. These conditions resulted in a site-wide remediation cost of \$50 million. In contrast, the Jackson Hole Airport site is thought to be free from soil contamination (see “Water Quality and Hydrology” in Chapter 3), and any contamination that was discovered could be remediated using more time consuming but much less costly, in-place methods. Therefore, the estimated cleanup cost for the Jackson Hole Airport would be about \$1 million.

The Jackson Hole Airport was constructed on a flat plain of outwash material deposited by the flow from melting glaciers. Therefore, there would not be any need to recontour the Jackson Hole Airport site to match the surrounding terrain. The site could be allowed to revegetate naturally, or the disturbed areas (about 20 percent of the land within the airport boundary) could be reseeded with a mixture of native plants at a cost of about \$100 per acre. With either approach, the cost for revegetation be minimal.

Based on these values plus 20 percent contingencies, the cost for airport removal and site restoration that would be associated with Alternative 1 would be about \$6 million.

Alternate Airport

Many of the passengers who annually enplane at the Jackson Hole Airport may continue to access the region by air. As discussed in Chapter 4 regarding impacts of Alternative 1, that demand could potentially be met by expanding the Idaho Falls Regional Airport, which is the nearest airport that already offers scheduled passenger service. In 2006, this airport recorded 152,000 enplanements, compared to 274,000 enplanements at the Jackson Hole Airport (Federal Aviation Administration, 2006g).

This approach would require substantial grant funding from the Federal Aviation Administration for capital improvements. Based on information provided by the Federal Aviation Administration, the approximate costs for expanding the Idaho Falls Regional Airport to handle its current passenger traffic plus the passenger traffic that currently uses the Jackson Hole Airport, and the anticipated future growth for both facilities would be about \$50 million (Bishop 2007b).

Highway Upgrades to an Alternate Airport

As described in the “Surface and Air Transportation” section in Chapter 3, many of the highways between Jackson and the Idaho Falls Regional Airport operate year-round near their design capacities and exceed their capacities throughout the summer. Alternative 1 would increase the traffic loads on these highways by about 20 percent. Highway upgrades would be necessary to handle airport-related traffic and would represent indirect capital costs associated only with Alternative 1.

The Alternative 1 analysis in the “Surface and Air Transportation” section includes an estimate of the costs of upgrading the state highways between Jackson and Idaho Falls over Teton Pass to a four-

lane road. Estimates were based on information provided by the District 3 traffic engineer for the Wyoming Department of Transportation (Thomas 2006) and the District 6 engineer for the Idaho Transportation Department (Cole 2006). Calculations showed that the current cost for upgrading the existing, two-lane state highways to four-lane configurations along the Teton Pass route from Jackson to Swan Valley, Idaho, which is east of Idaho Falls, would be about \$280 million. These costs do not include any highway improvements on U.S. Highway 26 between Jackson and Idaho Falls (see Figure 1), because this road has adequate capacity to handle anticipated traffic changes.

Total Indirect Capital Costs Associated with Alternative 1

The indirect costs that would be required to maintain air service in the region if Alternative 1 were implemented would include the following:

- Airport removal and site restoration \$6 million
- Idaho Falls Regional Airport capital improvement costs \$50 million
- Highway upgrades over Teton Pass \$280 million

The total, indirect capital costs for implementing Alternative 1 would be about \$336 million. These costs would not occur with the implementation of Alternative 2.

INDIRECT CAPITAL COSTS ASSOCIATED WITH FEDERAL AVIATION ADMINISTRATION GRANT FUNDS

Alternative 2 would enable the Jackson Hole Airport to maintain eligibility for Federal Aviation Administration grant funding under the Airport Improvement Program and passenger facility charges. As described in the “Socioeconomics” section in Chapter 3, the value of this grant funding to the airport fluctuates from year to year, but has averaged about \$3 million annually over the past decade. Based on this value, a loss of federal funding during the 20 years of the use agreement term from 2013 to 2033 would result in the loss of \$60 million to the Jackson Hole Airport Board and regional economy in federal grant funding.

THE PREFERRED ALTERNATIVE AND ENVIRONMENTALLY PREFERRED ALTERNATIVE

The preferred alternative for extending the airport use agreement is Alternative 2.

The environmentally preferred alternative is defined as “the alternative that will best promote the national environmental policy expressed in the National Environmental Policy Act’s Section 101.” This generally is interpreted to mean the alternative that causes the least adverse effect on physical, biological, and cultural resources. However, the policy also considers beneficial use of the nation’s resources and providing a high standard of living.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferred alternative. The act directs that federal actions should:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.
4. Preserve important historical, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life’s amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The alternatives for the Jackson Hole Airport use agreement extension differ in their abilities to fulfill these criteria. Effects of the alternatives relative to these criteria are described below. A more detailed evaluation of effects is provided in “Chapter 4, Environmental Consequences.”

1. Fulfill the Responsibilities of Each Generation as Trustee of the Environment for Succeeding Generations

Alternative 1, the no action alternative, would remove the Jackson Hole Airport from within Grand Teton National Park after the existing use agreement expired in the year 2033. As a result, it would be most effective in allowing the National Park Service to meet its obligation to future generations as trustee of the environment of Grand Teton National Park.

On a larger scale, a reasonably foreseeable cumulative action that would result from Alternative 1 would be the expansion of an alternate airport elsewhere in the region. Associated with that action would be the major upgrade of the roads leading from the alternate airport to the national parks, national forests, and ski resorts north of Jackson that currently are accessed through the Jackson Hole Airport. Adverse effects may occur at the alternate airport site and, particularly, along the highways from the alternate airport to the Jackson area, which would go over the environmentally sensitive Teton Pass. By maintaining the existing airport, Alternative 2 would enable this generation to be a

better trustee of the environment along approximately 50 miles of mountain roads, with associated wetlands, soils, geologic resources, cultural features, and scenic views, for succeeding generations.

2. *Assure for All Americans Safe, Healthful, Productive, and Esthetically and Culturally Pleasing Surroundings*

With regard to aviation at Jackson Hole Airport, there would be little difference between the alternatives regarding this criterion's goal of safe and healthful surroundings, although they would meet the goal using different approaches. Alternative 2 would promote safety and health for aircraft pilots and passengers by providing facilities and equipment that meet Federal Aviation Administration standards for scheduled passenger service. Alternative 1 would ensure safety by changing Jackson Hole airport operations to allow only general aviation at a level that was considered safe by pilots.

Alternative 2 would continue the benefits of productive surroundings that the Jackson Hole Airport currently provides to the northwest Wyoming region. Alternative 1 would transfer many of those benefits to the community where the alternate airport was located, or to other communities throughout the western United States where potential visitors decided to take vacations because of easier access.

Removing the airport after 2033 under Alternative 1 would best meet the second criterion's goal of providing aesthetically and culturally pleasing surroundings within Grand Teton National Park. However, as described above, a reasonably foreseeable connected action would be the reconstruction and widening of parts of the mountain highways between Jackson and an alternate airport. Major road reconstruction would produce large land disturbances associated with cuts and fills, including disturbances of the extensive wetlands along the highway routes, and would substantially increase the visibility of the road corridors on the landscape. It also would alter the historic alignments of these roads, remove the historic road beds that still are in use in many areas, and result in the removal of any prehistoric or historic cultural resources in the new, enlarged rights-of-way.

3. *Attain the Widest Range of Beneficial Uses of the Environment without Degradation, Risk to Health or Safety, or Other Undesirable and Unintended Consequences*

Alternative 2 would be more effective than Alternative 1 in meeting this criterion's goals. Under this alternative, the airport would continue to function as a key component of the economy of Teton County, northwest Wyoming, and eastern Idaho without any additional degradation of Grand Teton National Park. In contrast, Alternative 1 would have serious undesirable and unintended consequences, described for the previous two criteria, relating to the expansion of another airport to serve the region, widening of environmentally sensitive road corridors, and displacement of economic productivity.

4. *Preserve Important Historical, Cultural, and Natural Aspects of Our National Heritage, and Maintain, wherever Possible, an Environment which Supports Diversity and Variety of Individual Choice*

Within Grand Teton National Park, Alternative 1 would best meet this criterion's goal of preserving important historical, cultural, and natural aspects of our national heritage by, after 2033, restoring the airport site to a natural condition and eliminating airport-related sound. In addition, this alternative could contribute indirectly to the preservation of historical, cultural, and natural resources outside the park by potentially reducing economic incentives to convert private lands that have been used primarily for agriculture into residential or commercial developments.

Regionally, the goal to preserve important historical, cultural, and natural aspects of our national heritage would be better met by Alternative 2. As described previously, Alternative 1 likely would result in construction to expand an alternate airport and the widening or upgrade of mountain highways, including the environmentally sensitive and historic Teton Pass road. These actions would have substantial adverse effects on the surrounding historical, cultural, and natural resources that would not occur with Alternative 2. Pressures to convert private agricultural lands into residential or commercial developments would continue regionally, but would be relocated more to the vicinity of the alternate airport or along the improved road corridors.

With regard to supporting diversity and variety of individual choice, Alternative 2 would promote economic diversity and provide additional choice in modes of transportation to access the region. However, it would limit the ability of individuals to choose to enjoy a natural soundscape within Grand Teton National Park without being affected by airport-related sound.

5. *Achieve a Balance between Population and Resource Use which Will Permit High Standards of Living and a Wide Sharing of Life's Amenities*

Within Teton County and the northwest Wyoming region, Alternative 2 would best meet this criterion's goal of achieving a balance between population and resource use. Without the need for any new construction, the Jackson Hole Airport would remain a key component of the economy and would continue to provide easy access to this otherwise geographically remote area's amenities.

6. *Enhance the Quality of Renewable Resources and Approach the Maximum Attainable Recycling of Depletable Resources*

Alternative 1's reasonably foreseeable outcome of the expansion of an airport elsewhere in the region and the upgrading and widening of roads from that airport to the Jackson area would result in the use of large quantities of depletable resources. As a result, Alternative 2 would be more effective in fulfilling this criterion.

Summary of Ability to Fulfill Criteria

Alternative 1 would best promote the natural and cultural components of the environment within Grand Teton National Park by restoring the 533-acre airport setting to a natural condition and eliminating airport-related sound in the park. On a regional scale, Alternative 2 would better protect the nation's natural and cultural resources by continuing the use of an existing facility rather than indirectly causing extensive new construction in environmentally and historically sensitive settings outside the park. Alternative 2 would be more effective than Alternative 1 in balancing resource use with the environment. The social and economic benefits provided by Jackson Hole Airport would continue without any additional degradation of the natural and cultural resources in the park or the region.

When these factors are weighed with regard to, as stated in the fifth criterion, the ability to "Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities," Alternative 2 is environmentally preferred because it would be most effective in promoting the values expressed in the National Environmental Policy Act.

SUMMARIES

NPS guidance in *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a) requires that environmental impact statements include several summaries to facilitate reader understanding. The important features of each alternative are summarized in Table 3. Detailed descriptions of the features of each alternative were provided earlier in this chapter.

The “Purpose” section in Chapter 1 identified the goal that would need to be met for the proposed action to be considered successful. This goal is to enable continued air transportation services at the Jackson Hole Airport by ensuring that the terms of the agreement between the Jackson Hole Airport Board and Department of the Interior do not unnecessarily foreclose Federal Aviation Administration grant eligibility after 2013. Alternative 1 would not change the existing use agreement and would end eligibility for Federal Aviation Administration funding in 2013. Alternative 2 would ensure eligibility for federal funding by extending the operations term of the airport by 20 years.

Another summary should present “the impacts of each alternative, including a determination of potential improvement to park resources.” Table 4 provides a brief summary of the effects of each alternative on the impact topics retained for analysis (see Table 2).

- The table includes both adverse and beneficial effects of the alternatives and identifies their intensity (negligible, minor, moderate, or major), duration (short-term or long-term), geographic area of effect, and whether they would be direct or indirect.
- The table also includes a summary of whether impairment would occur to the park’s scenery, natural and historic objects, or wildlife such that they could not be enjoyed by future generations, and whether unacceptable impacts on park resources would occur.

The detailed information supporting Table 4 on the effects of the alternatives is provided in “Chapter 4, Environmental Consequences.”

A summary of how each alternative would achieve the requirements of Sections 101 and 102(1) of the National Environmental Policy Act was included above under the heading “The Preferred Alternative and Environmentally Preferred Alternative.” There would not be any conflicts between any of the alternatives and any environmental laws.

TABLE 3: KEY FEATURES OF THE ALTERNATIVES FOR EXTENDING THE USE AGREEMENT FOR JACKSON HOLE AIRPORT IN GRAND TETON NATIONAL PARK

Feature	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Use agreement term	Would maintain the existing use agreement term.	Would amend the existing use agreement to provide two additional 10-year options beyond the current expiration date of April 27, 2033.
Grant funding eligibility	Airport would become ineligible for Federal Aviation Administration grant funding on April 27, 2013.	Airport would maintain eligibility for Federal Aviation Administration grant funding until April 27, 2033.
Airport closure	Airport would close on April 27, 2033.	Airport would close on April 27, 2053.
Scheduled passenger service	Would end when the inability to maintain the airport, caused by the lack of federal funding eligibility, resulted in the airport losing its Part 139 certification. This analysis assumed a date of 2015, but an earlier or later date would have little effect on impacts.	Would continue at least through April 27, 2033.
General aviation	No change until 2033. Would end with the closure of the airport.	No change until 2053. Would end with the closure of the airport.
Direct costs	Would result in negligible increases in administrative costs associated with the evolving management of the airport.	Same as Alternative 1.
Indirect capital costs	<p>Would require about \$6 million for airport removal and site restoration, \$50 million for upgrades for the Idaho Falls Regional Airport, and \$280 million for highway upgrades to the alternate airport.</p> <p>Loss of federal funding during the last 20 years of the use agreement term would result in the loss of \$60 million to the airport board and regional economy in federal grant funding.</p>	No indirect capital costs would occur because existing features, with ongoing maintenance, would continue to be used.

TABLE 4: IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Natural soundscape	<p>There would be major, indirect, long-term, adverse effects until 2033. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible less than 10 percent of the time over approximately 80 percent of the park and, therefore, just at the threshold for the major impact category. The effects would be most evident within a few miles of the airport, and would affect predominantly areas in the southern portions of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being a negligible impact. Effects of the airport on the natural soundscape of the park would cease once the airport closed in 2033.</p> <p>In 2015 and 2025, sound impacts outside the park would decrease slightly compared to current conditions. These changes would not alter the year 2005 findings regarding any of the Federal Aviation Administration’s criteria for marginal or significant effects.</p> <p>No impairment or unacceptable impacts would occur to the park’s natural soundscape.</p>	<p>Effects would be major, indirect, long-term, and adverse. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible greater than 10 percent of the time over approximately 27 percent of the park, which would be within the major impact category. The effects would be most evident within a few miles of the airport, and would affect predominantly areas in the south part of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being negligible impacts. In general, the impacts of Alternative 2 would be slightly greater than would occur under Alternative 1.</p> <p>Sound impacts outside the park would increase slightly from current conditions and, by 2025, could potentially meet the Federal Aviation Administration’s criterion for significance in a small area immediately south of the airport boundary. Other areas under the flight path south of the airport that would experience increases in the day-night average sound level might meet one of this agency’s marginal effects criteria.</p> <p>No impairment or unacceptable impacts would occur to the park’s natural soundscape.</p>
Visitor use and experience	<p>During the general aviation period from 2015 to 2033, non-natural sounds from scheduled passenger aircraft would be absent, resulting in an indirect, negligible to minor, long-term, beneficial impact on visitor experience. After the airport closed, all sounds associated with the Jackson Hole Airport would cease, resulting in an indirect, negligible to minor, long-term, beneficial impact on the experience of park visitors. Changes in the visual scene would have a negligible impact on visitor use and experience during the general aviation period and following airport closure.</p> <p>No unacceptable impacts would occur to visitor use and experience in the park.</p>	<p>In most of the park, impacts on visitor use and experience because of airport visibility and sound would be negligible to minor, indirect, long-term, and adverse. In some areas where sound from aircraft increased visitors’ sense of incongruity with the setting, such as along the Snake River, the intensity of the indirect, long-term, adverse impact could be moderate.</p> <p>No unacceptable impacts would occur to visitor use and experience in the park.</p>

TABLE 4: IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Visual quality and dark skies	<p>Until 2033, negligible effects would occur on the visibility of airport facilities and scenic integrity levels. Following airport closure, there would be long-term, beneficial, indirect effects of minor or moderate intensity in foreground views from within the former development subzone and minor intensity in midground views looking west from observation points along U.S. Highway 26/89/191. Effects on scenic integrity levels of other views, including background views of the Teton Range, would be negligible.</p> <p>The indirect, long-term, beneficial effect on the scenery and the visibility of broad or distant vistas from observation points along U.S. Highway 26/89/191 because of the presence of aircraft in flight would be negligible during the transition and general aviation periods, and minor after the airport was closed.</p> <p>Until 2033, effects on the visibility of dark skies would be negligible. Long-term, indirect, beneficial effects would occur after the airport closed. The intensity of the change would be negligible to minor in the south part of the airport, minor to moderate in the north part of the airport, and moderate in the former development subzone area. Changes in the visibility of dark skies in the remainder of the park would be negligible.</p> <p>Negligible effects would occur on the cumulative changes in visual quality and the visibility of dark skies outside the park.</p> <p>No impairment or unacceptable impacts would occur to the park's visual quality or dark skies.</p>	<p>A negligible effect on the visibility of airport facilities would occur. Increased air traffic would cause indirect, adverse effects of minor intensity for some viewers at observation points along U.S. Highway 26/89/191 between the Teton Point Turnout and airport road intersection.</p> <p>Within the airport boundary, there would be negligible effects on the visibility of dark skies. Along the airport road and highway U.S. Highway 26/89/191 between the airport and Jackson, increased light emissions from headlights associated with increased airport-related traffic would have an indirect, long-term, adverse effect of minor intensity during moonless, cloudless evenings, nights, and early mornings. At other times, impacts would be negligible.</p> <p>There would be negligible cumulative effects on the visibility of dark skies in Jackson or areas of Teton County outside the immediate vicinity of the airport.</p> <p>No impairment or unacceptable impacts would occur to the park's visual quality or dark skies.</p>
Water quality and hydrology	<p>There would be negligible effects on hydrology.</p> <p>Negligible water quality impacts would occur with regard to National Pollutant Discharge Elimination System-permitted outfalls for storm water and septic tanks; fuel spills and/or leaks; glycol deicer use and disposal; aircraft and rental car maintenance operations; and discharges to the Enterprise Canal.</p> <p>No impairment or unacceptable impacts would occur to the park's water quality or hydrology.</p>	Impacts would be the same as those described for Alternative 1.

TABLE 4: IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Wildlife and their habitats, including special concern, threatened, and endangered species	<p>Until 2033, impacts on wildlife at the airport from habitat availability would be negligible. After 2033, when developed areas were restored to native vegetation, there would be a negligible, indirect, long-term, beneficial impact, on wildlife, including migratory birds and raptors. For sage-grouse, the intensity of the beneficial effect would be negligible to minor.</p> <p>The number of bird/aircraft collisions would decrease at the start of the general aviation period and would end when the airport closed. This would have a long-term, beneficial, indirect effect that would be minor for the sage-grouse and negligible for other bird species.</p> <p>Continued aircraft sound until 2033 would continue to have a negligible to minor, long-term, indirect, adverse effect on wildlife. The absence of aircraft sound following closure would have a negligible to minor, long-term, indirect, beneficial effect.</p> <p>Endangered or threatened species would not be affected by continued airport operation or by closure.</p> <p>Wildlife mortality because of collisions with airport ground vehicles and highway traffic would decrease during the general aviation period and after the airport closed, a long-term, indirect, beneficial impact of negligible intensity.</p> <p>Cumulatively, regional adverse effects on sage-grouse habitat would continue, but closure of the airport would restore a small part of this species' habitat, including an area used for lekking.</p> <p>No impairment or unacceptable impacts would occur to the park's wildlife; threatened, endangered, or special concern species; or their supporting habitats.</p>	<p>Because the availability of wildlife habitat would not change, impacts on wildlife would be negligible.</p> <p>The frequency of aircraft/bird collisions would increase with increased aircraft operations. This would result in negligible impacts on migratory birds and raptors and indirect, minor, adverse, long-term impacts on sage-grouse.</p> <p>Continued aircraft sound would continue to have a negligible to minor, long-term, indirect, adverse effect on wildlife.</p> <p>There would be a negligible change in wildlife mortality because of airport ground vehicles. Increases in collisions with automobiles would have an indirect, long-term, adverse effect of negligible to minor intensity.</p> <p>This alternative may contribute to the areawide stresses and population declines of sage-grouse.</p> <p>No impairment or unacceptable impacts would occur to the park's wildlife; threatened, endangered, or special concern species; or their supporting habitats.</p>
Park and airport operations	<p>For the National Park Service, effects would be negligible on the operation of the park, on providing public transit, on ensuring cooperation with the Jackson Hole Airport Board, and on the amount of payments to the U.S. Department of the Interior. Negligible effects would result to interagency helibase operations.</p> <p>For the airport during the transition and general aviation periods, impacts on facilities in the development subzone would be long-term, indirect, adverse, and of moderate intensity. Negligible impacts would occur on development of facilities outside the development subzone. Long-term, indirect, adverse impacts of major intensity on use and operations patterns would result from the loss of about 45 percent of the current average daily air traffic, all scheduled passenger service, and ground services other than those supporting general aviation.</p>	<p>For the National Park Service, effects would be negligible on the operation of Grand Teton National Park, on ensuring cooperation between the National Park Service and Jackson Hole Airport Board, and on the amount of payments to the U.S. Department of the Interior. Minor effects would result to interagency helibase operations, the planning and management for public transit, and the character of the airport.</p> <p>For the airport, effects would be negligible on the construction of facilities outside the development subzone, general aviation use of the airport, and the capacity of the airport. Airport use and operations patterns would experience minor to moderate,</p>

TABLE 4: IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Park and airport operations (continued)	<p>Following airport closure, the impacts on airport facilities, use and operations patterns, and capacity would be long-term, adverse, and of major intensity.</p> <p>No unacceptable impacts would occur to park operations.</p>	<p>long-term, indirect impacts from increases in passenger traffic. Impacts on airport facilities within the development subzone would be moderate to major, long-term, and indirect.</p> <p>No unacceptable impacts would occur to park operations.</p>
Public health and safety	<p>During the general aviation period, long-term, indirect, adverse effects on safety of moderate intensity would result from the inability of the airport to install upgraded navigational aids; purchase snowplows, fire trucks, and other major pieces of safety equipment; and maintain rescue training at current levels. Minor, long-term, indirect, adverse effects would result from reduced maintenance of the runway and taxiway and reduced availability of medical evacuations for non-critical conditions. Life- or health-critical medical evacuations would experience negligible effects.</p> <p>Regionally, there would be a negligible effect on the number of aircraft accidents.</p> <p>Decreases in automobile traffic between the airport and Jackson would have a beneficial, long-term, indirect impact of moderate intensity on highway safety. Increases in traffic on roads between Jackson and the Idaho Falls Regional Airport would have an adverse, long-term, indirect impact of moderate intensity.</p> <p>Negligible effects would occur with regard to medical evacuations for health- or life-critical conditions; flight operations that provide other vital safety links; emergency response services, such as search and rescue and wildland fire fighting; and the handling of hazardous materials.</p> <p>No unacceptable impacts would occur to public health and safety in the park.</p>	<p>Indirect, long-term, beneficial effects of minor intensity would result from the ability to pay for upgraded navigational aids, safety equipment and training, and refurbishing of infrastructure such as the runway and taxiway. All other impacts would be negligible.</p> <p>No unacceptable impacts would occur to public health and safety in the park.</p>
Socio-economics	<p>Long-term, indirect, adverse impacts of major intensity would occur for the town of Jackson and Teton County, Wyoming. Adverse impacts would also occur in Lincoln County, Wyoming, and Teton County, Idaho. Contributing components would include the following.</p> <p>For recreation outside the park, the intensity would be minor in the summer and major in the winter.</p> <p>The economic impact from on-airport losses of jobs, purchases, and services would be major.</p> <p>The off-airport losses of jobs, purchases, and services would have major impacts.</p>	<p>This alternative would maintain the area's existing economic and socioeconomic trends, which would result in long-term, indirect, negligible or minor impacts.</p> <p>No unacceptable impacts would occur to socioeconomic conditions in the park.</p>

TABLE 4: IMPACTS OF THE ALTERNATIVES (CONTINUED)

Impact Topic	Alternative 1: No Action / Continue Current Use Agreement	Alternative 2: Preferred Alternative
Socio-economics (continued)	<p>The end of locally available scheduled passenger service would have moderate to major impacts on most local residents and businesses.</p> <p>The loss of more than 90 percent of the airport's operating revenue and 70 percent of its funding for facility maintenance and capital improvements would have major adverse economic impacts on the airport.</p> <p>Effects on quality of life would depend on personal perceptions.</p> <p>No unacceptable impacts would occur to socioeconomic conditions in the park.</p>	
Surface and air transportation	<p>Adverse, indirect, long-term impacts on visitors who arrive by air would be minor in the summer and major in the winter.</p> <p>Changes in community access by air travel would have major, indirect, long-term, adverse effects on residents and the business community in and around Jackson.</p> <p>Impacts on levels of scheduled passenger air service at the Jackson Hole Airport would be major, indirect, long-term, and adverse. Major, indirect, long-term, beneficial effects would occur at the Idaho Falls Regional Airport.</p> <p>Until 2033, growth in the air charter sector would have an indirect, major, long-term, beneficial effect on general aviation. Closure of the airport would be a major, indirect, long-term, adverse effect on all general aviation sectors. Other airports in the region would experience similar gains in general aviation, a major beneficial effect.</p> <p>Long-term, indirect highway traffic effects would be moderate and beneficial between the airport and Jackson, and major and adverse between Jackson and the alternate site of air service, Idaho Falls. Highway planning in Wyoming and Idaho also would experience major, adverse, indirect, long-term effects.</p> <p>Improved opportunities to promote public transit would have indirect, negligible to moderate, long-term, effects that would be both beneficial and adverse.</p> <p>No unacceptable impacts would occur to surface or air transportation in the park.</p>	<p>Negligible effects would occur on community access by air travel, levels of scheduled passenger air service and general aviation, air traffic levels at other airports, highway use and traffic on U.S. Highway 26/89/191 and other area roads, use of public or commercial transit systems, and highway planning.</p> <p>No unacceptable impacts would occur to surface or air transportation in the park.</p>

Chapter 3

Affected Environment

INTRODUCTION

This chapter describes the existing environment in the vicinity of the Jackson Hole Airport. The emphasis is on natural resources and visitor resources of Grand Teton National Park, park and airport operations, public health and safety, socioeconomics, and surface and air transportation. These topics were selected based on federal laws and regulations, executive orders, NPS and Jackson Hole Airport staff expertise, and concerns expressed by other agencies or members of the public during scoping. The conditions described in this chapter establish the baseline for the evaluation of environmental consequences that is provided in Chapter 4.

The Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act require that the description of the affected environment must focus on describing the resources that might be affected by implementation of the alternatives. Therefore, the description of the affected environment is limited resources within and outside Grand Teton National Park that potentially could be affected by implementing one or both of the alternatives described in Chapter 2.

NATURAL SOUNDSCAPE

INTRODUCTION

This section addresses natural soundscape characteristics of Grand Teton National Park, and the sound emission characteristics of aircraft and other non-natural sources associated with the operation of the Jackson Hole Airport. The natural soundscape is an important natural resource that is protected and managed in the park. Aircraft sound emissions are subject to restrictions under the terms of the use agreement. These topics and their interactions are addressed by this section.

This section only addresses the *physical* properties of sound. The “Visitor Use and Experience” section considers how visitors to the park perceive and react to sound associated with airport operations. The effects of aircraft sound on wildlife are evaluated in the “Wildlife and Their Habitats, Including Special Concern, Threatened, and Endangered Species” section.

Commonly Used Terms

Several acoustical terms and concepts commonly used in natural soundscape descriptions and sound evaluations are briefly defined here for the convenience of the reader. More detailed explanations for many of these terms are provided in the glossary at the end of this volume.

Natural Ambient Sound - The natural sound condition, also called natural quiet, of Grand Teton National Park. It is composed of the sounds that exist in the absence of human-produced sound.

Noise – Unwanted sound.

Decibel (variously abbreviated as dB or db) – A sound-level unit measured on a logarithmic scale. The “A-weighted” decibel scale (dBA) is a widely used weighting system that approximates how the human ear responds to sound levels.

Day-Night Average Sound Level (variously abbreviated as DNL or Ldn) – An energy-average sound level, including a nighttime penalty, that represents the total sound exposure over a specified period of time. Typically, a 24-hour period is used. However, the 15 hours between 7 A.M. and 10 P.M. were used for this analysis to more accurately represent the operations of the Jackson Hole Airport, where night operations are controlled by a voluntary curfew. Therefore, day-night average sound level in this context is the same as Leq (sound level equivalent).

Maximum Sound Level (Lmax) – The maximum sound level of a particular event.

Audible – A sound that can be heard by a person with normal hearing. Sound levels that are audible for humans typically range from 0 to 130 dBA. Not all sounds that are defined as audible will be perceived by humans because, for example, people are not present or they are present but are engaged in activities and are not paying attention to unrelated sounds. Despite this limitation, audibility is useful to quantify the physical energy above background levels that may impact natural ecosystem functions.

Percent of Time Audible – The percent of the total period from 7 A.M. to 10 P.M. that aircraft sound related to operations at the Jackson Hole Airport is audible.

Sound Level Equivalent (Leq) – A single sound pressure level over a given time that would have the same total energy of the actual varying sound levels.

Time above 60 Decibels (TA60) – The total number of minutes that instantaneous sound levels from an aircraft related to operations at the Jackson Hole Airport are above the threshold of 60 dBA, the sound level of a normal conversation at 5 feet.

Characteristics of Sound

Sound Levels. The decibel (dB) is the basic unit of measure for describing sound levels. Because the human ear responds to a wide, dynamic range of sound pressure fluctuations, decibels are measured on a logarithmic scale.

Most sounds consist of many air pressure frequencies. Because the human ear is not equally sensitive to all frequencies, several frequency-weighting strategies have been developed that approximate how the human ear responds to sound levels. The "A-weighted" decibel scale (dBA) is the most widely used. For most people:

- A 1-dBA change is just perceptible;
- A 5-dBA change is clearly perceptible; and
- A 10-dBA change is perceived as being half or twice as loud.

Sound levels decrease as the distance between the sound source and the receiver increases. Generally, sound levels decrease by 6 dB with every doubling of distance from a source. Therefore, as shown in Table 5, when the sound level of a source is specified, the distance from the source also must be given.

TABLE 5: DECIBEL LEVELS OF COMMON SOUND SOURCES ^{a/}

dBA ^{b/}	Perception	Outdoor Sounds	Indoor Sounds
130	Painful	Civil defense siren at 100 feet	
120	Intolerable	Jet aircraft at 50 feet	Oxygen torch
110	Uncomfortable	Jet landing at 150 feet	Rock band
100		Ambulance siren at 100 feet	Blood-curdling scream
90	Very loud	Straight-pipe motorcycle at 45 mph at 50 feet	Hair dryer
80		Approaching thunderstorm	Food blender
70	Loud	Snowmobile traveling at 45 mph at 50 feet	Vacuum cleaner
60		Cessna 172 landing, at 1 kilometer	Conversation at 5 feet
50	Moderate	35 mph automobile traffic at 50 feet	Office building office
40		Snake River at 100 feet	Living room (no TV)
30	Quiet	Snake River at 300 feet	Quiet bedroom
20		Summer wilderness on calm night	Recording studio
10	Barely audible	Faint whisper	
0	None	Threshold of human hearing; winter wilderness	

a/ Source: compiled primarily from Shutt Moen Associates 2002, with tailoring to increase applicability to the Grand Teton National Park and the Jackson Hole Airport. Levels without distances refer to typical distances with use.

b/ Decibels are logarithmic and a difference of 10 decibels is perceived as a halving or doubling of loudness.

Because the dB scale is logarithmic, individual sound levels from different sound sources cannot be added directly to give the combined sound level of the sources. Specifically:

- Two sound sources that produce equal sound levels at a given location will produce a composite sound level that is 3 dBA greater than either sound alone.
- When two sound sources differ by 10 dBA, the composite sound level will be 0.4 dBA greater than the louder source alone.

Table 5 relates decibel levels to common sounds, including some conditions that occur naturally in Grand Teton National Park or that are associated with operation of the Jackson Hole Airport.

Audibility. Sounds can be categorized as audible or inaudible. Audible sounds can be heard by a person with normal hearing. Whether a sound is audible depends not only on its sound level, but also on factors such as the simultaneous presence of other sounds. Moreover, sounds classified as audible may not actually be “heard” because no one is present, or the person is occupied by other thoughts or activities. Despite this limitation, audibility is useful to quantify the physical energy above background levels that may impact the natural ecosystem functions.

Federal Aviation Administration Sound Impact Levels for All Airports and Aircraft Operations

Table 6 summarizes Federal Aviation Administration criteria for considering effects of increases in aircraft sound. The Federal Aviation Administration standards and methods governing airport sound compatibility programs are included in Title 14, *Code of Federal Regulations*, Part 150, Airport Noise Compatibility Planning. This regulation identifies land uses that normally are compatible with various levels of exposure to sound. Section A150.101(d) states that, “For the purpose of compliance with this part, all land uses are considered to be compatible with noise levels less than Ldn [a day-night average sound level of] 65 dB.” Based on criteria in Federal Aviation Administration (2006f) Order 1050.1E, a significant sound impact would occur if an action alternative caused areas that may be sensitive to noise (“residential, educational, health, and religious structures and sites; and parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historical sites”) to experience an increase in the day-night average sound level of 1.5 dBA or more, at or above a day-night average sound level of 65 dBA exposure when compared to Alternative 1 for the same timeframe.

TABLE 6: FEDERAL AVIATION ADMINISTRATION CRITERIA
FOR DETERMINING IMPACTS OF INCREASES IN AIRCRAFT SOUND ^{a/}

Original Sound Exposure in Day-Night Average Sound Level in A-Weighted Decibels	Increase in Day-Night Average Sound Level in A-Weighted Decibels	Level of Impact	Source
45 to 60	5.0 or more	Marginal	Notice N 7210.360 (Federal Aviation Administration 1990)
60 to 65	3.0 or more	Marginal	Federal Interagency Committee on Noise (1992)
65 or above	1.5 or more	Significant	Order 1050.1E (Federal Aviation Administration 2006f) and 14 <i>Code of Federal Regulations</i> Part 150, Section 150.21(2)(d)

a/ Source: Federal Aviation Administration 2006b.

Despite this standard, the Federal Aviation Administration has recognized that “Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within national parks. . . . For example, the DNL 65 dB [day-night average sound level of 65 decibels] threshold does not adequately address the effects of noise on visitors to areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute” (Federal Aviation Administration 2006f). However, the Federal Aviation Administration has not promulgated any regulatory standards to define sound levels that are compatible with these areas.

Analysis by the Federal Interagency Committee on Noise (1992) established that increases of 3 dBA should be considered in areas with a day-night average sound level between 60 dBA and 65 dBA (Federal Aviation Administration 2006b).

Federal Aviation Administration (2006f) Order 1050.1E, *Environmental Impacts: Policies and Procedures*, provides guidance for considering the effects of sound from airports and airway traffic routes. Actions higher than 3,000 feet above ground level (AGL) are normally considered environmentally “categorically excluded” and no further action is required. However, experience demonstrated that some actions above this height can be controversial. As a result, the Federal Aviation Administration (1990) developed Notice N 7210.360, *Noise Screening Procedure for Certain Air Traffic Actions above 3,000 Feet AGL*. Based on implementing this notice, an increase in the day-night average sound level of 5 dBA evolved as the benchmark for indicating “an extraordinary circumstance” and prompting the preparation of an environmental assessment (Federal Aviation Administration 2006b).

In the National Parks Air Tour Management Act of 2000, Congress recognized that the natural soundscapes of national parks required additional protection. Therefore, it made a finding that the Federal Aviation Administration must work with the National Park Service “to preserve, protect, and enhance the environment by minimizing, mitigating, or preventing the adverse effects of aircraft overflights on public and tribal lands.”

The Federal Aviation Administration criteria shown in Table 6 are not directly applicable to this evaluation of Grand Teton National Park. Instead, this environmental impact statement evaluates the impacts of the NPS action (extending the use agreement) on park resources based on the more stringent noise standards in the use agreement. However, this evaluation does consider the Federal Aviation Administration criteria for areas outside the park, and identifies areas that might be characterized as experiencing marginal or significant levels of impacts if this were a Federal Aviation Administration action.

The Federal Aviation Administration criteria in Table 6 apply to *increases* in aircraft sound that result from federal actions. However, they provide useful guidance for evaluating the *decreases* in sound levels outside the park that could be associated with Jackson Hole Airport use agreement extension alternatives.

Additional Sound Management Requirements for the Jackson Hole Airport

Based on the 1983 use agreement, the Jackson Hole Airport has more restrictive sound management requirements than the 65-dBA day-night average sound level used by the Federal Aviation Administration, and some of the most restrictive sound management standards and limitations of any airport in the United States. The use agreement includes designated cumulative and single-event noise standards. The use agreement states, “Failure to enforce these noise standards shall be a material breach of the agreement.”

Under the cumulative noise standard requirements:

- “Acoustical energy associated with airport operations shall not exceed a level of 45 db (Ldn) based on measurement of single event noise levels” west or north of a line specified in the agreement (Section 4(f)(1)). This line is included on Figure 2 and the figures in Appendix F of this environmental impact statement.
- “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 and D, which has been established based on the environmental resource needs of the park” (Section 4(f)(2)). Attachments C and D are presented on pages 331 and 332 in this environmental impact statement. The specified area also is included on Figure 2 and the figures in Appendix F.

In the use agreement, the single-event noise standard for aircraft on approach to Jackson Hole Airport was established at 92 dBA (Section 4(g)). This requirement applies to the Federal Aviation Administration Circular 36 certification status of each aircraft type determined under controlled conditions. It is not a threshold value to be applied against the modeled or monitored sounds levels.

Actions Taken by the Jackson Hole Airport Board to Reduce Airport-Related Sound

The Jackson Hole Airport Board has implemented numerous actions to ensure that aircraft sound is below the use agreement cumulative and single-event requirements. These include, but are not limited to, the following.

Noise Abatement Plan. The Jackson Hole Airport Board’s noise abatement plan is provided in Appendix C. The noise abatement plan was adopted on March 14, 1985 and has been in effect since that date. Major sections of the plan include maximum noise level limit, cumulative noise standard, aircraft operating procedures, operations specifications amendment for scheduled passenger service airlines, requirements for aeronautical contractors, noise complaint/inquiry report system, and educational efforts.

Data Collection and Reporting. The Jackson Hole Airport attempts to collect information for each aircraft takeoff and landing through the use of automated sound monitoring and meteorological instrumentation. Data include aircraft type and air carrier (if applicable), maximum sound level in dBA and the time it occurred, sound exposure level (SEL), and physical parameters that can affect sound, including temperature and wind speed and direction. These data are analyzed to confirm that violations of the standards are not occurring.

Ban on Stage II Aircraft. On June 28, 2004, the Jackson Hole Airport began enforcing a rule prohibiting the operation of the older, louder Stage II aircraft that contributed disproportionately to sound impacts on the park. The Jackson Hole Airport is one of only a few airports in the nation that have been allowed to implement such a ban, and this authorization required an act of Congress. Under the Town of Jackson Municipal Code, violations of the rule result in a mandatory court appearance and fines.

Preferential Runway Use. Section 4(e) of the use agreement requires the board to take all reasonable measures to notify aircraft operators to avoid noise-sensitive areas of Grand Teton National Park, and to encourage aircraft approaches from and takeoffs toward the south. To implement this requirement, the board makes preferential runway use information widely available through the airport website, an insert for pilot notebooks, air traffic control broadcasts, aeronautical publications, magazines, and other materials typically used by pilots for flight planning. The procedures indicate

that Runway 01 (from the south) is the preferred arrival runway and Runway 19 (to the south) is the preferred departure runway. To reduce impacts on the local community, the Jackson Hole Airport and Federal Aviation Administration recently cooperated to develop an instrument flight rules (IFR) departure procedure that includes a turn that reduces sound levels in the nearby residential area.

Voluntary Curfew. Under the Airport Noise and Capacity Act, the Jackson Hole Airport Board cannot unilaterally impose a mandatory curfew. Therefore, the board has adopted a voluntary curfew between 11:30 P.M. and 6:00 A.M. for landing and 10:00 P.M. and 6:00 A.M. for takeoff. Pilots are notified of the curfew using the same media described above for preferential runway use. Pilots also are advised that the airport and tower are not staffed overnight, that fire/rescue and other services are not available during this period, and that in winter, the runway, taxiway, and ramp are not plowed after the last scheduled passenger flight arrives, so that incoming planes risk landing on a snow-covered runway. Owners of aircraft that violate the voluntary curfew are notified by letter, reminded of the reasons for the curfew, and requested to refrain from further violations. During the summer and winter high seasons, an average of six aircraft per month violate the voluntary curfew.

Aircraft Tracking and Reporting. The airport staff monitors arrival of all aircraft with instrument flight rules flight plans through the use of Internet-based flight tracking services. The staff uses this monitoring to identify in advance if any arriving aircraft are of the banned Stage II type, and to identify aircraft that arrive late at night after the voluntary curfew has gone into effect.

Contract Requirements. All contracts between the board and scheduled passenger service airlines require the airlines to ensure that their pilots know the sound abatement rules and procedures and to take appropriate action against employees for noise control plan violations without a valid reason. Similar language is included in the airport's contract with the fixed-base operator. The fixed-base operator must insert language intended to ensure compliance with the noise abatement plan into all subcontracts, and must distribute copies of the noise abatement plan to pilots departing from the airport.

Cooperation with Airport Tower. The airport board has developed a good working relationship with the staff of the control tower, which is operated by contract through the Federal Aviation Administration. The tower personnel provide information to pilots by radio regarding sound abatement procedures and encourage pilot compliance.

THE NATURAL SOUNDSCAPE RESOURCE OF GRAND TETON NATIONAL PARK

An important part of the NPS mission is to preserve or restore the natural soundscape associated with units of the national park system. Natural soundscapes are valued resources at Grand Teton National Park.

- As stated in Section 8.2.3 of *Management Policies 2006* (NPS 2006a), "The natural ambient sound level – that is, the environment of sound that exists in the absence of human-caused noise – is the baseline condition, and the standard against which current conditions in a soundscape will be measured and evaluated."
- Section 4.9 requires that "The National Park Service will preserve, to the greatest extent possible, the Natural Soundscapes of parks ... [and] will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise)."

The natural soundscape of the park varies substantially by location and time. Natural soundscapes vary in settings that extend from the high peaks of the Teton Range to the banks of the Snake and

Gros Ventre Rivers and tributary streams. Sound-producing physical processes such as wind and water, and animal sounds change constantly by location and time of day. Croaking ravens are a nearly constant daytime sound. Soft contact calls from chickadees and other small birds mingle with the harsh notes of Clark's nutcrackers and magpies. Sounds associated with branches and trees rubbing against each other, and popping sounds from wood freezing and thawing during very cold periods, are commonly audible within the forested areas of the park. Near the larger bodies of water, the groaning and cracking of frozen lake waters accompany temperature fluctuations. Spring and summer bring many more biological sounds of birds, mammals, and insects. Flowing water of rivers and waterfalls become more prominent and thunder punctuates many afternoons.

Natural ambient sound levels are low to quiet over much of the park. The sounds levels of 25 dBA and less that often are recorded in natural areas of the park are equivalent to a sound level in a recording studio or quiet bedroom.

NON-NATURAL SOUND SOURCES IN GRAND TETON NATIONAL PARK

Non-natural sounds generated by human activity are superimposed on the natural soundscape. These non-natural sounds are loudest and most common near the Jackson Hole Airport, park developed areas, lakes, and travel corridors. Some of the non-natural sounds in the park include human voices and sounds resulting from many summer- and winter-season visitor activities, utilities in developed areas, wheeled vehicles on roads, motorized watercraft on Jenny and Jackson Lakes, and motorized ice augers used by ice fishers on Jackson Lake. Each developed area produces sounds characteristic of its function and use.

Highway Sound

The road corridors are sources of sounds from automobiles and other wheeled vehicles used by park visitors, airport visitors, workers, traffic passing through the region on major highways, and winter snowplows. Road use occurs around the clock, but is much heavier during the daylight and early evening hours than at night. Sounds from road activity are audible at distances of 5 miles or more, depending on the type of vehicle and the weather conditions. Sound levels are highest immediately adjacent to the road, but the percent of time these sounds are audible is often as high farther from the road corridor because of the additive effects of multiple vehicles separated along the travel corridor.

Road traffic creates loud, extended sound impacts adjacent to park road corridors. During the summer on U.S. Highway 26/89/191 and along the Teton Park Road, vehicle traffic is often audible nearly 100 percent of the time during the daylight hours. As shown in Table 5, traffic sound levels at 50 feet commonly range from 50 dBA (automobile traffic traveling at 35 miles per hour) to 90 dBA (straight-pipe motorcycle at 45 miles per hour). Trucks create sound levels that have been measured at more than 80 dBA at a distance of 100 feet.

Sound from Aircraft not Associated with the Jackson Hole Airport

As in nearly all locations throughout the continental United States, including in national parks, Grand Teton National Park experiences sounds produced by aircraft that overfly the area. These include general aviation aircraft flying at low or moderate elevations between points outside the park, and high-flying commercial aircraft. Their sound would occur regardless of the presence of the Jackson Hole Airport.

Planes transiting the area are the most widespread non-natural sound source in the park. Monitoring by the National Park Service in nearby Yellowstone National Park at Fern Lake, which is a remote, backcountry location that would be little affected by aircraft sound associated with use of the Jackson Hole Airport, shows that in northwest Wyoming, sound from transient aircraft is audible between 5 percent and 10 percent of the time between the hours of 7:00 A.M. and 10:00 P.M.

Sound levels from transient aircraft depend on factors such as aircraft type and the slant angle relative to the observer. For example, aircraft typically are loudest when they are directly overhead. Additionally, sound perception is affected by the topography on the ground (such as a hard-sided canyon or nearby rock cliff that can amplify the sound), or can be attenuated by such features as wind direction and speed. Measured sound levels from transient aircraft in northwest Wyoming, based on the Yellowstone National Park data, typically are in the range of 20 dBA to 40 dBA. Maximum sound levels are in the low 50 dBA range.

Sound from Jackson Hole Airport Use

Machinery used in ground operations contributes to airport-related sound. Maintenance and service vehicles produce sound year-round, and increased sound levels result from winter snowplowing. Utilities add to the non-natural sounds in the immediate vicinity of the airport. Cars, buses, and trucks associated with airport operations have a more widespread impact as they travel to and from the airport on area roads. Airport ground activities create sounds from early morning to late evening hours that often are perceptible several miles from the airport. At White Grass Ranch, 4 miles away, airport ground operations can be audible for most of the daylight period during many days, especially in winter when natural ambient sound levels are lower.

Most of the sound associated with the Jackson Hole Airport results from aircraft starting up, taxiing, taking off, and landing. Aircraft sounds in Grand Teton National Park that are associated with Jackson Hole Airport operations result from scheduled passenger service; NPS and other agency flights for research, rescue, and other land management purposes; and private flights, including charter services. The airport averages 90 flights per day on a year-round basis, but in the summer peak it handles about 150 daily flights, with a few days above 200 flights. Table 7 provides a summary of actual operations at the Jackson Hole Airport from October 2004 through September 2005.

The fleet mix using the Jackson Hole Airport, based on actual operations from October 2004 through September 2005, is included in Table 7. This fleet mix changes continuously, based on factors such as economic conditions, the introduction of new aircraft models and retirement of older planes, aircraft owner preferences, and fuel prices.

Aircraft sound is audible throughout much of the park when aircraft approach and depart the airport. To characterize sound conditions and to later evaluate sound effects of airport-related airplane arrivals and departures, the actual operations in Table 7 were used to estimate sound at 659 points, shown in Figure 4. These points, which are the section corners from the U.S. Geological Survey topographic maps of the area, are 1 mile apart. All are in Grand Teton National Park (489 points) or outside the park within 10 miles of the runway center-point (170 points). Because the grid includes such a large number of modeled points, the percent of points within a specified park area is representative of the percent of the park in that area. Therefore the analysis refers interchangeably to the percent of points or percent of park affected, depending on the context.

**TABLE 7: SUMMARY OF ACTUAL OPERATIONS AT THE JACKSON HOLE AIRPORT,
OCTOBER 2004 THROUGH SEPTEMBER 2005^{a/}**

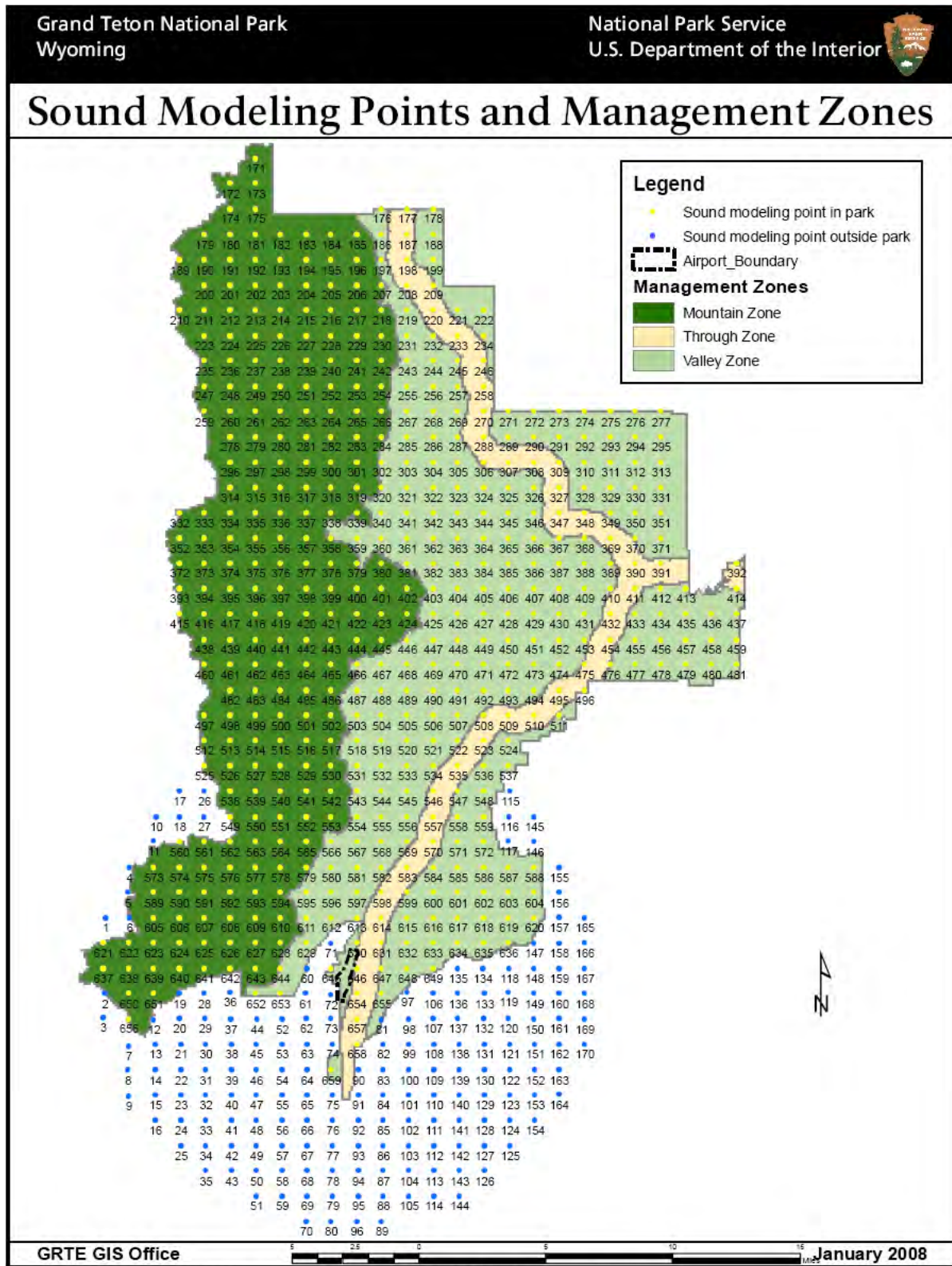
Aircraft Type	Actual Annual	Average Daily^{b/}
Air carrier^{c/}		
Boeing 737	982	2.7
Boeing 757	36	0.1
Boeing 757	594	1.6
Airbus 319	1,290	3.5
Airbus 320	602	1.7
Subtotal	3,504	9.6
Regional carrier		
CRJ7	3,412	9.4
Canadair Regional Jet	228	0.6
Dash 8-100	1,540	4.2
Dash 6	3,147	8.6
Embraer 120 ER	3,147	8.6
Subtotal	11,474	31.4
General aviation		
Gulfstream IV	1,715	4.7
Astra 1125	501	1.4
Lear Jet 35/36	2,961	8.1
Diamond I MU 300-10	50	0.1
Citation III	505	1.4
Citation X	1,005	2.8
Challenger	916	2.5
Citation Bravo 550	4,664	12.8
Baron 58P	268	0.7
Conquest II	432	1.2
Cessna 172R	3,921	10.7
Cessna 206H	234	0.6
Single-engine, fixed-pitch propeller	237	0.7
Single-engine, variable-pitch propeller	618	1.7
Subtotal	18,027	49.4
Total	33,005	90.4

a/ Source: Unpublished operational records from the Federal Aviation Administration tower at the Jackson Hole Airport.

b/ Some values may be slightly off because of rounding.

c/ Air carrier aircraft that use the Jackson Hole Airport have capacities of 100 to 188 passengers. Regional carriers, which also are commonly called commuter aircraft, have capacities of 30 to 86 passengers (The Boyd Group, Inc. 2007a). Both carry passengers according to published flight schedules.

FIGURE 4: GRAND TETON NATIONAL PARK MANAGEMENT ZONES AND SOUND MODELING POINTS



At each point, the Federal Aviation Administration's Integrated Noise Model (INM) version 6.2a was used to calculate the maximum sound level, percent-time audible (in the park only), percent of the time above 60 dBA, and day-night average sound level. A detailed description of the modeling approach is provided later in this section under the heading "Sound Modeling with the Integrated Noise Model (INM)" and in Appendix F. The approach describes the assumptions that were used in modeling and identifies the many limitations that can affect the ability of the model to represent actual conditions. Modeled values for each point are available in tabular form on the Internet at <http://parkplanning.nps.gov> or www.nps.gov/grte/parkmgmt/planning.htm.

Maximum Sound Levels. The figure on page 183 in the Alternative 1 impacts analysis summarizes the modeled maximum sound levels (Lmax), or loudest sound associated with airport-related aircraft, that currently occur at each of the 489 points in the park. These values represent the moment of maximum loudness and do not include a duration element. Because the maximum sound levels are based on characteristics of a particular aircraft flying a particular route, they do not vary with the number of operations of that aircraft. As a result, average-annual and peak-season values are the same. The modeled maximum sound levels may not occur every day, because an aircraft that produce the highest sound level may fly the most impacting route over a particular point only occasionally. The values in the figure show that:

- In fewer than 25 percent of the points in the park, the loudest sound from aircraft is louder than the normal conversation level at 5 feet (60 dBA, see Table 5).
- The loudest aircraft sounds exceed the sound levels typically occurring in an office setting (50 dBA) in less than half the park.
- Sound levels of more than 80 dBA occur in about 1 percent of the points in the park (five points), all of which are under the flight path close to the runway.
- Sound that can be uncomfortably loud (up to 110 dBA) occurs at one of those points.

Percent of Time Audible. The figure on page 182 in the Alternative 1 impacts discussion presents the percent of time audible distribution in the park for aircraft from 2005 airport operations under the airport peak-use conditions of July through September. The following characteristics were calculated from the values in the figure:

- Sound from airport-related aircraft is audible in about 85 percent of the points in the park.
- During the peak season when aircraft arrivals and departures are highest, aircraft using the airport are audible less than 5 percent of a day (or three minutes each hour) in about 62 percent of the points in the park and less than 10 percent of a day (or six minutes each hour) in about 77 percent of the points in the park. On an average-annual basis (not shown in the figure), these values are 67 percent and 81 percent of the points in the park, respectively.

On an average-annual basis, at the 22 highest percent-time-audible points (4.5 percent of 489 points), all of which are close to the runway directly along the flight path, aircraft are audible up to 30 percent of the day (or 18 minutes each hour). During the peak season, aircraft are audible for the longest time (45 percent of the day or 27 minutes each hour) at three sites in the park, all of which are in the immediate vicinity of the airport.

Time above 60 dBA. A bar graph of values for time above 60 dBA for peak-season conditions are shown on page 185 in the Alternative 1 impacts discussion. Data are presented as total minutes within the daily, 15-hour period of airport operations. The sound level of a normal conversation at 5 feet, 60 dBA, was chosen as the loudness at which most visitors would be aware of the sound, and

might alter their actions, ranging from pausing a conversation as an aircraft passed over to choosing another site to recreate. (A discussion on visitor reactions to aircraft sound is included later in this document under “Visitor Use and Experience.”) For time above 60 dBA, there was little difference between the peak-season conditions shown in the figure and average-annual conditions. Data from the peak season indicate that:

- Sound above 60 dBA from aircraft using the airport normally occurs in about 14 percent of the points in the park.
- In about 3 percent of the points in the park, airport-related aircraft sound is above 60 dBA for more than one minute per day. In 1 percent of the points in the park, it is above 60 dBA for more than five minutes per day.
- The maximum time for airport-related sound levels above 60 dBA occurs at the analysis point closest to the runway center-line, where aircraft sound is above 60 dBA for up to 26 minutes daily during the peak season.

Energy-Average Sound Level. The day-night average sound levels for average-annual and peak-season conditions are shown in Figures F-1 and F-2, respectively, in Appendix F. During average-annual and peak-season conditions, the 70 dBA day-night average sound level contour is within the airport boundary. Under peak-season conditions, the 65 dBA day-night average sound levels contour extends outside the airport boundary to the southwest for less than a quarter mile. Day-night average sound levels are below 45 dBA throughout the park and nearby lands except in a corridor about a mile wide surrounding the runway and flight path and extending about 4 miles from each end of the runway.

As shown in the day-night average sound level contours mapped in Figures F-1 and F-2, the Jackson Hole Airport currently is meeting the cumulative noise standards in the use agreement for both average-annual and peak-use conditions. These conclusions are corroborated by field monitoring of airport-related sound conducted by the airport.

Sound Intensity Index. The effect at any park location of sound from an airport-related aircraft is based on a combination of many factors. Some of these include the length of time the sound is audible, sound level profile (that is, the sound over time as the aircraft approaches and recedes), maximum sound level, pitch, and tonal quality. While each metric modeled for the grid points provides partial information on aircraft sound, none individually provides an overall depiction of the sound, or describes what might be experienced at a specified point.

To help illustrate the impact of airport-related aircraft on the park’s soundscape, the National Park Service developed a sound intensity index using two acoustic metrics. For points in the park, the sound intensity index is the product of the modeled percent of time audible and energy average sound levels into a single unit. While this index has no intrinsic value, it allows for a relative comparison of the intensity at each point in the park. The sound intensity index units were imported into Arc-GIS software and mapped as a terrain surface that connected the units at each point. This output is graphically displayed in three dimensions in Figure F-3 in Appendix F for airport operations in 2005 on an average-annual basis and for the July through September peak season. The height of the surface in these figures is unrelated to the underlying topography and represents only the relative values of the sound intensity index throughout the park. Figures F-3A and F-3B display sound intensity index contours in two dimensions relative to park boundaries, the airport, and other landmarks for average-annual and peak-season conditions, respectively.

Percent of time audible data were not available for locations outside of the park. However, sound intensity index values were interpolated through the software for some areas outside the park to provide a more clear representation.

Figures F-3, F-3A, and F-3B show that sound from airport-related aircraft is audible over a large portion of the park. However, although the intensity of the sound impact is high in the immediate vicinity of the airport, it drops rapidly as distance increases. This is evident in the peak-season illustration, where the apex clearly is higher, but the footprints in the sound-intensity zones at the base of the “mountain” are not much larger than the corresponding average-annual zones.

The sound intensity index was not used in determining the impacts of the alternatives on the natural soundscapes of Grand Teton National Park. That determination was based on the amount of the park affected by a specified level of percent-time audible. However, the sound intensity index is useful in visually illustrating the relative intensity of aircraft sound impacts.

There could be many other ways of combining acoustic metrics into a single value to illustrate impacts on the natural soundscapes of the park. However, because virtually all acoustic metrics associated with aircraft diminish with distance from the airport, other combinations of metrics would likely show a similar reduction of impact intensity with distance.

AMBIENT SOUND LEVELS FROM ALL SOURCES IN GRAND TETON NATIONAL PARK

Ambient sound levels and the percent of time that aircraft sounds are audible for selected park locations, based on 41,000 hours of field monitoring, are presented in Table 8. The values in this table are measurement of sound from all sources, including human-caused sound from visitor activities, highway traffic, transient aircraft, and airport-related aircraft; and natural sounds such as, water, weather (for example, wind and thunder), and animals (such as insects and birds).

The minimum sound levels that can be recorded are limited by standard instruments, which produce internal sound and, therefore, cannot measure ambient sound levels below 15 to 20 dBA. Monitoring, using specialized low-noise instruments, shows that away from running water and under calm wind conditions, natural ambient (without human-made) sounds in the park during the winter often are at or below 20 dBA and can be near 0 dBA. The generally higher levels of between 20 dBA and 35 dBA at the same sites in the summer result from sound sources such as rustling leaves, buzzing insects, and the calls of birds and mammals.

The first two data columns in Table 8 present median ambient sound levels on a year-round basis and in the summer. The median is the middle value, above and below which lie equal numbers of values. The median value is useful because it is not usually affected by the instrument limitations described above. Also, unlike a mean (average), it is not skewed upward by a small number of very high values. The median ambient sound levels range from 22 dBA for winter measurements at Colter Bay Village near Jackson Lake to 47 dBA in Moose Village at Park Headquarters during the summer. Summer sound levels consistently are several dBA higher than those in winter, both because of the increased natural sound levels mentioned above and because of increased visitation and visitor activities. At Moose, which is busy year-round, there is little difference in sound levels between the summer and off-peak periods.

TABLE 8: DRAFT ACOUSTIC MEASUREMENTS AT SELECTED LOCATIONS IN GRAND TETON NATIONAL PARK
(ARRANGED FROM NORTH TO SOUTH; PERCENT OF THE TIME AIRCRAFT SOUNDS ARE AUDIBLE INCLUDES ALL AIRCRAFT,
NOT JUST THOSE RELATED TO THE JACKSON HOLE AIRPORT)^{a/}

Park Location	Median Ambient Sound Levels ^{b/} (dBA)		Range of Ambient Sound Levels ^{b/} (dBA)		Percent of the Time Aircraft Sounds Are Audible ^{c/}	
	All Year	Summer	Low	High	All Year ^{d/}	Summer
Flagg Ranch developed area ^{f/}	24	- ^{e/}	<20	88	5	-
Grassy Lake Road ^{g/}	25	-	<18	95	10	-
Colter Bay Village near Jackson Lake ^{f/}	22	-	<21	83	11	-
Jackson Lake north (Cow Island)	28	31	<17	86	8	5
Jackson Lake south (Catholic Bay) ^{f/}	24	-	<20	84	11	-
Signal Mountain area next to Teton Park Road	32	41	<20	104	12	8
Cascade Canyon near mountain stream	-	45	42	65	-	4
Snake River near Cunningham Cabin	-	37	31	90	-	8
Beaver Creek near housing area	25	30	<18	82	-	-
Snake River 2 miles north of Moose	-	35	<22	73	-	13
Moose Village at Park Headquarters ^{h/}	46	47			-	-
White Grass Ranch	29	32	<20	94	24	20
Jackson Hole Airport north of runway ^{i/}	33	36	<22	107	30	43

a/ Time of measurement occurred between 7 A.M. and 10 P.M. These are actual field measurements, not the results from computer modeling that were used in this document's impact analysis. Data are derived from more than 41,000 hours of acoustic data collection from more than 1,600 sample days.

b/ Includes all natural and human-made sounds. Ambient sound levels during mid-day are generally higher than these data show. Away from running water and under calm wind conditions, natural ambient (without human-made sounds) sound levels are often at or below 20 dBA during winter and generally 20 to 35 dBA in the summer.

c/ Includes all aircraft, not just those related to the Jackson Hole Airport. NPS monitoring in Yellowstone National Park shows that regionally, sound from transient aircraft is audible between 5 percent and 10 percent of the time. Most aircraft sound north of the Signal Mountain area probably reflects this use rather than use of the Jackson Hole Airport. Percent of time aircraft are audible depends on highly variable ambient sound levels. Both natural and non-natural sound sources can mask aircraft sounds. All percent of time audible values should be considered minimum values because some aircraft sound is not identified as such, especially at the Jackson Hole Airport site.

d/ Unless other measurement periods are specified in footnotes, data are from year-round.

e/ Dashes indicate that data were not available for that period or were not broken out separately.

f/ Winter measurements.

g/ January to June measurements.

h/ May through October measurements.

i/ April through June measurements.

Monitored sound levels are from below 20 dBA at sites away from water to more than 100 dBA at sites close to machinery, such as motorcycles on roads and aircraft north of the runway. However, even the sites with the highest sound levels can be very quiet when such equipment is not operating.

Interpreting the median ambient sound levels requires considering how often sound is occurring in an area, as well as how loud that sound is. For example, the median ambient sound level in the summer at the sampling point near a stream in Cascade Canyon is nearly twice as loud (45 dBA) as the median ambient sound level north of the runway (36 dBA). However, Cascade Canyon experiences an almost constant sound from running water that never falls below 42 dBA. In contrast, the airport site north of the runway is away from visitor activity and running water, and is quieter than 42 dBA except when aircraft fly over at sound levels up to 107 dBA.

The last two columns include percent-time audible for sound from all aircraft, including transient aircraft and aircraft using the Jackson Hole Airport. These values should be considered minimums, because some aircraft sounds are not identified as such in the sound data.

SOUND LEVELS FROM ALL SOURCES OUTSIDE GRAND TETON NATIONAL PARK

The south end of the Jackson Hole Airport runway is close to the park boundary, and sound from airport use extends into private and public lands outside the park. The Jackson Hole Airport conducts sound monitoring at six locations around the airport. The results are available on the Internet through the Jackson Hole Airport web site (www.jacksonholeairport.com) sound monitoring page or directly at <<http://maps.airportnetwork.com/JAC>>.

Model results were produced for the 170 sites outside the park that are within 10 miles of the runway center-point (see Figure 4). The modeled day-night average sound levels for these areas for average-annual and peak-season conditions, respectively, are included in Figures F-1 and F-2 in Appendix F. Characteristics of airport-related aircraft sound outside the park include the following.

- The highest modeled sound effects occur at the three points that are directly south of the runway on private land, and at a topographic high point to the southeast in the Bridger-Teton National Forest. The maximum modeled sound level outside the park is about 92 dBA.
- As shown in Figure F-2, under peak-season conditions, the modeled 65 dBA day-night average sound level contour extends slightly into private land beyond the airport boundary. It is contained within the airport boundary on an average-annual basis (Figure F-1). The modeled 60 dBA contour extends about a half-mile beyond the boundary, and decreasing energy-average sound level contours occur primarily parallel to and east of the Snake River.
- For existing average-annual and peak-season conditions, about 63 percent of the modeled locations outside the park experience maximum sound levels of 60 dBA or higher.
- For existing average-annual conditions, about 87 percent of the modeled area locations typically have cumulative aircraft sound at or above 60 dBA for less than a minute during the daily 15-hour period of airport operations. The highest value for cumulative time above 60 dBA is 17 minutes per day at two points just south of the runway.
- For existing peak-season conditions, about 84 percent of the modeled area locations typically have cumulative aircraft sound at or above 60 dBA for less than a minute during the daily 15-hour period of airport operations. The highest value for cumulative time above 60 dBA is about 26 minutes per day at two points just south of the runway.

VISITOR USE AND EXPERIENCE

INTRODUCTION

This section describes park visitors, visitation patterns to Grand Teton National Park, and potential effects on the quality of visitor use and experience of the park for each alternative. It considers visitor activities, attitudes, and other factors important to understanding the impacts of the Jackson Hole Airport on opportunities for enjoyment of the park.

The physical impacts of the airport and associated aircraft operations that would result from each alternative were described in the “Natural Soundscape” section of this draft environmental impact statement. It is important to distinguish between the *physical* characteristics of the soundscape (measurable properties, such as percent of the time that aircraft are audible and sound levels in dBA) and how those characteristics, or changes to them, may affect the experiences of park visitors. This section addresses the latter topic.

PARK VISITATION

Over the last 10 years, recreational visits to Grand Teton National Park have ranged between 2.3 million and 2.7 million, with 2.6 million visits recorded in 2007 (NPS 2007a). In addition to recreational visits, each year the park experiences approximately 1.5 million non-recreational visits, primarily consisting of people traveling through the park on U.S. Highway 26, 89, 191, and/or 287. While there may be some recreational component to these visits, their primary purpose is to travel through the park to another destination.

In 2007, the most recent year for which monthly data are available, approximately 77 percent of all recreational visits occurred during the period June through September. By contrast, the six-month winter period of November through April collectively accounted for less than 17 percent of annual recreational visitation to the park (NPS 2007a).

For many summer visitors, Grand Teton National Park is one of several destinations as part of a larger visit to the greater Yellowstone area. Yellowstone National Park, the surrounding national forests, attractions in Jackson Hole, the town of Jackson, and other destinations are often part of such a visit. In winter, visits to Grand Teton National Park are often secondary or incidental to other activities, such as skiing at one of the three nearby ski areas or a snowmobile or snowcoach trip into Yellowstone National Park.

A visitor survey conducted in the park during July 24 through October 26, 2001 by the University of Idaho found that 42 percent of visitors spent less than a day in the park. Just over a quarter of the visitors (26 percent) spent 2 to 3 days, and about 7 percent reported staying from 7 to 13 days (Smaldone 2001).

In 2005, there were approximately 482,000 overnight stays. Of these, about 44 percent were at lodges, including Dornan’s (12 units) at Moose, Jenny Lake Lodge (37 units), Signal Mountain Lodge (79 units), Jackson Lake Lodge (385 units), and Colter Bay Cabins (166 units). Just over 50 percent of overnight stays were in tents or recreational vehicles in the campgrounds at South Jenny Lake (50 sites), Signal Mountain (87 sites), Colter Bay (350 sites), Lizard Creek (61 sites), and Gros Ventre (372 sites). Back country camping accounted for about 5 percent of all overnight stays (NPS 2007a).

VISITOR ACTIVITIES AND ATTITUDES

A survey of park visitors in July 1997 (Littlejohn 1998) found that the most common visitor activities included viewing scenery (engaged in by 98 percent of visitors), viewing wildlife (88 percent), driving for pleasure (71 percent), hiking (63 percent) and stopping at roadside exhibits (59 percent). The most common reasons identified by visitors as their reasons for visiting the park included sightseeing (87 percent), viewing wildlife (75 percent), experiencing wilderness and open space (62 percent), enjoying recreation (50 percent), and enjoying solitude or quiet (45 percent).

In a survey conducted in 2001 by the University of Idaho (Smaldone 2001), the most common visitor activities were sightseeing (engaged in by 88 percent of visitors), wildlife watching (71 percent), day hiking (54 percent), birding (35 percent), contemplation (34 percent), and picnicking (32 percent). The most commonly cited qualities that visitors wanted to see preserved in Grand Teton National Park were naturalness/beauty (34 percent of responses), wildlife (19 percent), large expanses of undeveloped land (8 percent), and the cleanliness and purity of the area (5 percent).

Most visitors said that there were specific places in the park that were special to them, or to which they were attached (53 percent). The five most frequently mentioned places included Jenny Lake, Jackson Lake, the Snake River, the Signal Mountain area, and Cascade Canyon (Smaldone 2001). Other locations that regularly attract visitors include Colter Bay Village, Moose Village, Jackson Lake Lodge, the Moose-Wilson Road, Signal Mountain Summit Road, Flagg Ranch, String Lake, the Antelope Flats / Kelly area, Cunningham Cabin, the Menor's Ferry / Chapel area, and the Two Ocean / Emma Matilda Lakes area (Littlejohn 1998).

FACTORS INFLUENCING VISITOR USE AND EXPERIENCE

Many factors can influence the quality of visitor experiences in a national park. Among these are the type and range of activities and recreational opportunities that are available, ease of access to facilities and activities, the quality of information available, the type and quality of services provided, interactions with park staff and other visitors, the condition of park facilities, and the presence or absence of traffic and parking congestion.

To assist the National Park Service in complying with the Government Performance and Results Act and to determine how well visitors' needs are being met, an annual survey of visitors is conducted by the University of Idaho Cooperative Park Studies Unit. The survey was developed to measure each park's performance related to visitor satisfaction and visitor understanding and appreciation. The surveys ask visitors to rate a variety of services, recreational opportunities, and facilities related to their park experience from very poor to very good. The data are then used to summarize visitor opinions of the overall quality of facilities, services, and recreational opportunities. For each year in the most recent 10-year period, 1998 through 2007, the percentage of visitors to Grand Teton National Park who were satisfied overall with appropriate facilities, services, and recreational opportunities averaged more than 98 percent (University of Idaho Cooperative Park Studies Unit 2007).

Many factors can affect the quality of a visitor's experience, including intrusive sounds. As was reported to the U.S. Congress in the *Report on the Effects of Aircraft Overflights on the National Park System* (NPS 1994), a system-wide survey of park visitors concluded that enjoying natural quiet is about as important as viewing natural scenery as a reason for visiting national parks. More than 90 percent of visitors to national parks indicated that both natural scenery and natural quiet were at least moderately important to their visit. The same survey indicated that system-wide in national

parks, approximately 20 percent of visitors reported hearing or seeing aircraft during their visit, and that 2 to 3 percent of visitors reported impacts on their experience from those overflights.

Table 9 provides the results of a 1997 survey on the attitudes of about 850 visitor groups toward the experience of being in Grand Teton National Park. As shown in the table, 88 percent of visitors surveyed found “quiet” to be a moderately to extremely important feature of the park. Only 11 percent of park visitors rated “quiet” as not important or somewhat important (Littlejohn 1998).

TABLE 9: SURVEY RESULTS ON VISITOR ATTITUDES TOWARD FIVE PARK FEATURES

Feature	Not or Somewhat Important (percent)	Moderately Important (percent)	Very or Extremely Important (percent)	Don't Know (percent)
Native plants and animals	4	8	87	1
Scenic views	1	2	96	0
Recreational activities	22	20	57	2
Solitude	13	23	62	2
Quiet	11	23	65	1

The same survey found that most visitors (86 percent) did not feel that other visitors or activities interfered with their visit. Among the 14 percent of visitors who said that their visit was interfered with, 14 of 159 comments mentioned “noise” and 4 specifically identified “noise of motorboats” (Littlejohn 1998). Aircraft sound was not identified by any visitors in this survey. In addition, none of the visitors identified a feeling of interference because of the visibility of aircraft or the airport.

When visitors were asked, “If you were a manager planning for the future of Grand Teton National Park, what would you propose? Please be specific,” 497 groups of visitors made a total of 1,035 comments. Among these, “Move airport away from park” was mentioned three times (Littlejohn 1998).

PERCEPTIONS OF DIFFERENCES IN SOUND LEVELS

The approximate threshold of human hearing is 0 A-weighted decibels (dBA) (see glossary). An increase of 10 dBA represents a perceived (to human hearing) doubling of loudness. Hence, 20 dBA would be perceived as twice as loud as 10 dBA, and normal conversation at 5 feet, which is about 60 dBA, would be perceived as 32 times as loud as 10 dBA (Ambrose and Burson 2004). Changes in sound of less than about 3 dBA are not generally noticeable outside a laboratory environment (Federal Aviation Administration 2005), although in quiet park settings, changes of less than 3 dBA can be perceived (Burson 2006).

The relationship between sound and visitor experience is not straightforward. In their article, “Soundscape Studies in National Parks,” Ambrose and Burson (2004) observed that “In developed zones, there is often less sensitivity to noise, and a greater incidence of human sound that may be regarded as consistent with or necessary for park purposes. In backcountry or wilderness zones, the soundscape is expected to be natural, with little if any human caused noise.”

An example of the context-sensitive nature of aircraft sound, and the ability of the same aircraft sound to produce different responses based on visitor expectations at different locations, involves the Glacier View Turnout on U.S. Highway 26/89/191, the Snake River in same area, and the historic Bar BC Ranch. These nearby facilities are generally beneath the Jackson Hole Airport flight path at a

point where aircraft approaching the airport from the north are about 2,500 feet above the ground. The soundscape model estimates that during the summer (peak season), aircraft are audible about 25 percent of the time at all three locations, and the maximum aircraft sound (Lmax) at each site is 70 to 75 dBA. This maximum sound level is a momentary occurrence, and sound levels are lower before and after the aircraft passes the listener.

- Visitors stopped at the Glacier View Turnout may have only a general level of awareness of an aircraft's sounds because of the sounds from traffic on U.S. Highway 26/89/191, idling automobile engines, car stereos, and conversations.
- Visitors rafting on the Snake River beside the Bar BC Ranch may have a greater expectation for a natural soundscape because of the naturalness of their setting. Therefore, they may perceive the aircraft and its sound as out of context. However, the sound of the aircraft may be masked to some degree by natural sounds such as flowing water, wind, and rustling leaves, or by conversations with companions, all of which could decrease their perception of the sound or their reaction to it.
- Visitors who have walked into the Bar BC Ranch and are contemplating the scenery and the former lives of a bygone era from a quiet location may hear the aircraft for a longer period than at the other two locations, because there are fewer natural or human-caused sounds to mask the sound of the aircraft. However, the degree to which the sound intrudes on or interferes with their experience depends on their expectations, their tolerance or habituation to aircraft sound, or other factors that affect the intensity and duration of the sound.

In an examination of sound impacts on visitors using protected natural areas, Cressford (1999) acknowledges the importance of context on the effects of sound on visitors. However, he also noted wide variances in visitor reactions to the same sound levels in the same natural settings. As a result, he stated that “The differences between noticing a noise-effect and being bothered by it represent a notable degree of impact tolerance that is not consistent. Where the awareness levels are similar, the proportions of visitors actually bothered often varied considerably, suggesting case-specific degrees of noise tolerance.” Fidell *et al.* (2002) reported that sound levels typically account for less than half of the variance in the prevalence of annoyance caused by environmental sound exposure. Some of the factors that have been identified as influencing whether people are annoyed by, or are merely aware of a sound, particularly in a natural or recreational setting, include the following:

- How commonly the sound occurs (Booth 1999). Sutton (1999 and 2001) found that at the two recreation sites they studied, visitor annoyance with aircraft sound increased rapidly after a threshold of 15 to 18 aircraft overflights per hour was exceeded.
- The pitch of the sound, with high-pitched sounds generally perceived as more annoying (Kariel 1990).
- Whether a sound is continuous or rhythmic, with the latter generally being perceived as more annoying (Kariel 1990). Schomer and Wagner (1996) attributed this to the three-fold increase in *noticeability* of the blade-slap of a helicopter, compared to equally loud sounds from a fixed-wing aircraft or a train, rather than annoyance with the sound level itself.
- The distance from the source, where sound produced by a source farther from a listener is often assessed as less annoying than sound of an identical loudness (to the receptor) that is produced by an identical source that is closer (Preis and Golebiewski 2004).
- The topography, with visitors to side valleys at a popular tourist destination being more sensitive to aircraft activity than are visitors to the main valleys (Sutton 2001).

- The expectations of visitors about their rights to enjoy recreational opportunities in natural areas free from perceived adverse effects of aircraft-related sound (Hunt 1999).
- Whether the sounds are perceived as interfering with a goal, such as getting away, enjoying nature, and/or relaxing (Kariel 1990).
- Whether there is a corresponding visual interference, which tends to increase the perception of annoyance (Pedersen and Wayne 2004).
- The recreationists' noise situation at home (Krog and Engdahl 2005).

Among visitors who report impacts from aircraft sound in national parks, most make a distinction between “interference” and “annoyance” (Miller 1999):

- Interference is perceived as an objective term, describing something that prevents them from doing what they want to do. It is an interruption or a distraction that typically ends when the sound source has passed.
- Annoyance is perceived as having an emotional, evaluative component. Many respondents associate a negative reaction, such as “makes me mad” or “causes my blood pressure to rise” with the term annoyance. Miller surmised that annoyance is the reaction that causes a visitor to evaluate the experience as negative or to consider registering a complaint.

In a national study of sound in NPS units that supported a noise report to Congress, 8 to 14 percent of the surveyed park visitors who *remembered* hearing aircraft reported that they experienced “impacts” from the aircraft sound. Visitors in the study were more likely to indicate that aircraft sound interfered with their appreciation of natural quiet and sounds of nature at the park than that they were annoyed by the sound. Compared to users of developed and other frontcountry areas, backcountry users were twice as likely to remember hearing aircraft, twice as likely to report that it interfered with their enjoyment of the park and/or the park's natural quiet, and three times as likely to feel annoyed (NPS 1994).

AIRCRAFT SOUND AND CURRENT VISITOR USE AND EXPERIENCE

Aircraft approaching and departing the Jackson Hole Airport are encouraged to avoid Grand Teton National Park as much as possible. The airport is close to the park's south boundary, and published sound abatement procedures identify a preferred approach from the south (use of Runway 01) and a preferred departure to the south (use of Runway 19). On flights from or to other directions, aircraft are requested to stay east of the Snake River and/or U.S. Highway 26/89/191 (Jackson Hole Airport Board 2006a). Despite the preference for approaches and departures that minimize flying over the park, factors that include prevailing winds, other weather conditions, and instrument flight procedures result in most approaches being made from the north and about 15 percent of the departures going north.

Six sound monitoring stations in the park and on private lands south of the airport record sound levels from aircraft approaching and departing the airport. They demonstrate that even though many aircraft fly north over the park, the sound control measures implemented by the Jackson Hole Airport Board are effective in managing sound levels in the park in conformance with the requirements in Section 4 of the 1983 use agreement.

As described in the “Natural Soundscape” section, the National Park Service 1976 master plan identified three management zones for Grand Teton National Park (NPS 1976). These zones were devel-

oped to help manage visitor experiences and desired conditions and are shown in Figure 4. The zones include the Mountain Wilderness Zone, Valley Zone, and Through Zone, which includes corridors along the major highways through the park. These zones have different management objectives with regard to aircraft sound.

Modeling of aircraft sound related to the use of the Jackson Hole Airport, using the Integrated Noise Model, is described in the “Natural Soundscape” section. All of the characterizations provided below are based on the July-through-September, peak-use season for the airport, which corresponds with the park’s highest visitor use season.

It is important to note that the modeled sound may sometimes overstate the sound that one would actually hear at a specified location. Sounds associated with wind, moving water, road traffic, conversation, and other sources could mask the aircraft sound so that what was actually experienced by a person was less than indicated by the model. Alternately, the model may sometimes understate the sounds heard at some locations, especially in the backcountry during calm winter conditions, where the natural soundscape can be much lower than the average natural ambient baseline sound levels used in the model.

Sound modeling indicated that during the 2005 peak season, aircraft use of the Jackson Hole Airport was audible in about 84 percent of the park. However, in most (62 percent) of the park, aircraft were audible for less than 5 percent of the time (or three minutes out of an hour). In addition, aircraft sound occurred at a level loud enough to cause speech interference (greater than 60 dBA) in 13 percent of the park, and only about 3 percent of the park experienced aircraft-related sound levels that would cause speech interference for a total of more than a minute a day.

Mountain Wilderness Zone. Within this zone, the maximum sound levels of airport-related aircraft in 2005 ranged from less than 20 dBA at numerous modeled points in the northern part of the park to 58 dBA at a point directly west of the airport across the Snake River valley, about 2 miles south of White Grass Ranch. Most points in the Mountain Wilderness Zone experienced maximum aircraft-related sound between 20 and 40 dBA (comparable to a recording studio and the living room of a house, respectively; see Table 5). During the peak season, aircraft sound was audible 30 percent of the time (almost 20 minutes out of every hour) at the point west of the airport mentioned above. However, aircraft were audible for more than 4 minutes per hour at just 15 of the 220 points modeled throughout the park’s Mountain Wilderness Zone. At most points, aircraft were audible for a minute or less per hour.

Valley Zone. Aircraft sound levels were considerably higher in the Valley Zone than in the Mountain Wilderness Zone. Using 2005 data, the modeled maximum sound levels of aircraft during the peak-use season ranged from less than 40 dBA (the sound level of a typical living room without music or a television playing) at points in the northern part of the park, especially near the Mountain Wilderness Zone, to 102 dBA at the point immediately north of the airport runway. The next loudest points, at 82 dBA, also are close to and in line with the runway. At most points in the Valley Zone, airport-related aircraft sound was audible for less than five minutes per hour. However, at the highest percent-time-audible points, close to the airport, visitors could hear sounds from aircraft taking off and landing for up to 24 minutes each hour. Aircraft sound occurred at a level that might cause speech interference (greater than 60 dBA) in about 10 percent of Valley Zone sites, but in half of this area, the time over 60 dBA totaled only a minute or less per day.

The Gros Ventre Campground is in the Valley Zone, about 3 miles east of the airport. With 360 sites, this is the largest of the six park campgrounds and it provides a third of the park’s campsites. Modeling indicates airport-related aircraft are audible in this area 38 percent of the time, or about 23 min-

utes per hour. Although the maximum aircraft sound level that could be expected at this facility is 64 dBA, airport operations typically do not result in sound above the level of normal conversation (60 dBA).

Speech interference beginning at a sound level of 60 dBA generally is appropriate for conversations between closely spaced people. However, speech interference may be occurring at lower sound levels during outdoor ranger programs and other Valley Zone activities where visitors are less closely spaced.

Sound levels of 45 dBA or lower may cause sleep interruption, especially in areas with low background levels (Berglund *et al.* 1999), such as Grand Teton National Park. Therefore, outside the airport curfew period (which extends from 11:30 P.M. and 6:00 A.M.), some overnight visitors at the Gros Ventre Campground (maximum modeled aircraft sound level of 64 dBA) and Jenny Lake Campground (maximum modeled aircraft sound level of 46 dBA) may experience occasional sleep interruption from the sound of airport-related aircraft. However, the National Park Service rarely receives complaints regarding sleep disturbance because of aircraft noise from campers.

Through Zone. The modeled maximum aircraft sound levels and percent-time audible ranges for this zone were very similar to those described for the Valley Zone. However, aircraft sound in this zone occurs against the background of other sound from highway traffic and activities in developed areas.

Moose Village Area. The Moose area includes lands within the Through Zone and Valley Zone. Moose, which supports large numbers of visitors participating in a wide range of indoor and outdoor activities, is about 2.5 miles north of the airport boundary, directly under the flight path. Aircraft approaching the airport from the north typically pass over Moose at about 1,000 feet above the ground. Among heavy-use areas in the park, Moose is probably the most affected by the presence of the airport because of its proximity to the airport and alignment along the runway's extended centerline.

Visitors at Moose experience maximum sound levels from aircraft of 82 dBA. According to the model results, aircraft are audible at this location for about 22 minutes each hour. However, aircraft sounds in the lower part of the audibility range often are masked by other sound sources in the vicinity. Moreover, expectations for natural quiet or tolerance of non-natural sounds may be different within this busy, developed area than in other, less developed areas of the park.

Within the Craig Thomas Discovery and Visitor Center at Moose, aircraft sound is not sufficiently loud to cause interference with normal speech (threshold of about 60 dBA), although during interpretive programs, it could reduce intelligibility between the raised-voice speaker and participants who are more than about 12 feet distant. During busy periods, with the hum of equipment and numerous conversations, aircraft sound may not be perceived within the building. Outside, the experience of having aircraft pass overhead at a height of about 1,000 feet could be considered by some visitors as inconsistent with the expectation of a national park experience.

Another important site within the Moose area is the Murie Ranch, a National Historic Landmark important for its association with the Murie family and the wilderness movement, including the 1964 Wilderness Act. The ranch is about a half-mile south of the Craig Thomas Discovery and Visitor Center. Aircraft sound at this location is loud enough to interfere with conversation and occurs at fairly frequent intervals, especially during the peak season. Non-natural sounds at this location may be perceived by some visitors as particularly out-of-place because of the rustic and somewhat isolated setting at the end of a gravel road. Other locations within the Moose area where visitors may be

sensitive to aircraft sound include Dornan's, the Chapel of the Transfiguration, and the NPS administrative complex.

JACKSON HOLE AIRPORT AS A GATEWAY FOR VISITORS

Grand Teton National Park is in one of the more remote parts of the continental United States. While many people visit the park and surrounding area as part of an extended driving vacation, others prefer the convenience or time-savings of flying into the area.

In the summer, the Jackson Hole Airport serves a relatively minor, but important, role in providing access to the area for visitors to Grand Teton National Park and Yellowstone National Park. Surveys show that in the summer of 2005, approximately six percent of visitors to Grand Teton National Park arrived by air (RRC Associates 2005).

During the winter, the airport provides access to the area's ski resorts for about 90 percent of winter visitors to the Jackson area (RRC Associates 2005). The Grand Targhee Resort (see Figure 1) can be accessed from either the Jackson Hole Airport or Idaho Falls Airport, but non-local visitors to Snow King Resort and Jackson Hole Mountain Resort arrive almost exclusively through the Jackson Hole Airport. Many of these people also visit the area's national parks as part of their experience. For example, in winter, the south entrance to Yellowstone National Park from Grand Teton National Park is that park's second most heavily used entrance, after West Yellowstone.

VISUAL QUALITY AND DARK SKIES

VISUAL QUALITY

Visual quality is a fundamental resource of Grand Teton National Park. In the *Master Plan, Grand Teton National Park, Wyoming* (NPS 1976):

- The “Purpose” section begins by stating, “Grand Teton was established as a unit of the National Park System to protect the scenic and geologic values of the Teton Range and Jackson Hole.”
- Visual quality is the first subject discussed under “The Resource,” which begins, “Towering 7,000 feet above the sagebrush flats of Jackson Hole, the granite peaks of the Teton Range dominate the park landscape.” It then proceeds to describe some of the visual features that contribute to the outstanding landscape.

U.S. Highway 26/89/191 is the most common viewpoint in the park from which the Jackson Hole Airport is observed. This highway runs generally north-south about a half-mile east of and parallel to the runway. The terminal and other airport buildings are about 0.3 mile from the highway. Therefore, observers from the highway see the airport features in the midground view as they look west or northwest toward the Teton Range peaks. These features blend fairly well with the surroundings in terms of color, form, line, and texture.

- The paved runway, taxiway, and parking areas are below the visual horizon observed from the road. Park visitors traveling on the highway or stopped at turnouts cannot see these large airport features.
- The airport buildings present vertical lines in comparison to the horizontal lines of the landscape. However, except for the tower, the maximum building height is 27 feet. The low heights of the buildings and their distances from the highway serve to diminish the visual effect. The subdued brown, gray, and green colors of the buildings blend with the gray-green of the sagebrush flats that surround the airport. The smooth texture of the buildings is inconsistent with the roughness of the surrounding vegetation, but the difference is not prominent because of the substantial distance from the buildings to observers on the highway.
- The visible airport features appear to follow the land form in their alignment that is generally parallel with the highway, the distant Snake River, and the more distant Teton Range.

From the intersection of U.S. Highway 26/89/191 and the airport road turnoff, a private housing development just south and west of the park boundary is in visual alignment with the hangars and other buildings in the south part of the development subzone. As shown in the photographs on page 93, these private buildings outside the park are visually evident in the mid-ground view beyond the airport structures.

For many observers, the dominance of the Teton Range over the landscape tends to reduce the visual impact of the airport. These massive peaks just 10 miles away draw the eye up and away from the midground airport, which can fade to near invisibility in the minds of some observers.

Movement associated with the airport, particularly the movement of low-flying aircraft that are landing or taking off, increases airport visibility and perception in the landscape. This is particularly true for large jets, which draw attention both because of their size and sound. During each of the large air carrier takeoffs or landings, the visual scene for an observer on the highway may be dominated for a couple of minutes by the aircraft (although the presence of the aircraft in a particular location, such as a picture of the Teton Range that the observer is composing, would last only seconds). Large general aviation aircraft have a similar effect. Depending on their sound emissions and the attentiveness of the observer, smaller, propeller-driven or jet aircraft could have similar dominance over the scene, or could be virtually unperceived in their use of the airport and surrounding airspace.

Measuring Visual Quality

The National Park Service does not have a standard approach for measuring visual quality. Therefore, this analysis used the measures developed and employed by the U.S. Forest Service in its management of visual quality as an important component of national forests. This agency's approach, presented in *Landscape Aesthetics: A Handbook for Scenery Management* (U.S. Forest Service 1995), involves managing areas to meet target scenic integrity levels, which are written to be readily understood and applied by the general public. The scenic integrity levels used by the U.S. Forest Service are:

- Very high: Refers to landscapes where the valued landscape character “is” intact with only minute, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level.
- High: Refers to landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
- Moderate: Refers to a landscape where the valued landscape character “appears slightly altered.” Deviations must remain visually subordinate to the landscape character being viewed.
- Low: Refers to landscapes where the valued landscape character “appears moderately altered.” Deviations begin to dominate the landscape character being viewed but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complementary to the character within.
- Very low: Refers to landscapes where the valued landscape character “appears heavily altered.” Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetation type changes, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.
- Unacceptably low (or no scenic integrity): Refers to landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern, or scale from the landscape character. This level is used by the U.S. Forest Service only to inventory existing integrity and is not used as a management objective.

Visual Quality in Grand Teton National Park near the Jackson Hole Airport

Junction of U.S. Highway 26/89/191 and Airport Road. From the viewpoint at the junction of U.S. Highway 26/89/191 and the airport road, shown in the left photo on page 93, the scenic integrity of the background view in all directions is very high. The scene is dominated by the highly valued natural landscape of the Teton Range to the west and northwest and by the equally undisturbed but less dominating landscape of Blacktail Butte and the Gros Ventre Range east of the highway.

The foreground view at this location has very low to no scenic integrity. The nearby visual scene is dominated by the pavement of U.S. Highway 26/89/191 and the airport road. However, because of the overwhelming scenic presence of the Teton Range and the ubiquity of roads, many observers may not note the adverse effect of the roads on the natural landscape character unless it is pointed out.

The midground view west of the airport road junction includes the airport terminal and other buildings in the development subzone. Because of the distance, low height of the buildings, and use of natural colors, these structures remain visually subordinate to the landscape character being viewed and maintain moderate scenic integrity. North of the development subzone, the area of runways and taxiways generally gives the appearance of an intact sagebrush plain (high scenic integrity).

The midground view to the southwest includes a housing development outside the park. In this area, there has been less concern about blending with the landscape character. However, the contrast with the natural scene is attenuated by distance, and the scenic integrity in this direction is classified as moderate or low.

Viewpoints along the Airport Road and within the Airport Boundary. As observers travel the 0.3-mile-long road from U.S. Highway 26/89/191 to the airport parking lot, the airport-related structures become more visually dominant (photo on right, below and on next page). Within the development subzone, there is no scenic integrity in either foreground or midground views (photo on next page). The background view continues to be dominated by the Teton Range, but the observer must look beyond the nearby, human-altered setting. Nevertheless, captions for photographs of the mountains taken from within the development subzone and posted on the Internet exclaim about the beauty of the background setting and attest to its high scenic integrity, despite the absence of foreground and midground scenic integrity.



Pavements of the U.S. highway and airport road (shown here) dominate foreground views. The airport buildings, in the photo center, are visually subordinate to the natural landscape character.

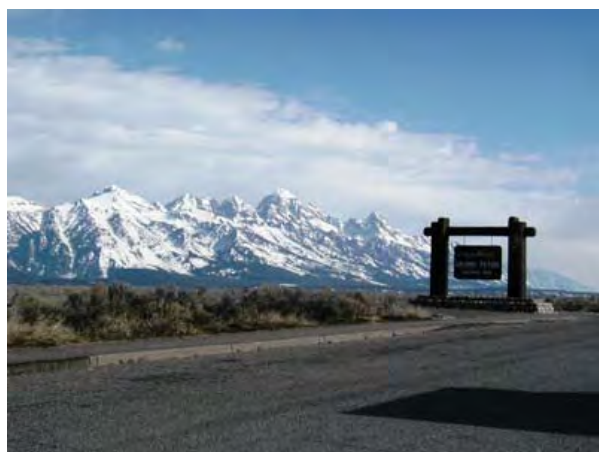


Even at close range, the height restrictions and natural colors used throughout the airport help the buildings blend into the natural landscape.



From viewpoints along the airport road, the 50-foot-tall control tower appears visually consistent with the other buildings. From viewpoints farther north along U.S. Highway 26/89/191, the tower contrasts with the otherwise high scenic integrity of the landscape. Note that the runway and taxiway, which are between the observer and tower, cannot be seen from U.S. Highway 26/89/191 or the airport road.

Viewpoints North of the Airport Road Junction. For observers north of the airport road along U.S. Highway 26/89/191, the foreground view continues to be dominated by the presence of the pavement and has very low to no scenic integrity. The background view in all directions and the midground view to the east are dominated by the very high scenic integrity of the unaltered natural landscape. To the west, the taxiway and runway less than a half-mile distant are not visible (photo above, right) and, except for the presence of the control tower, the area has high scenic integrity. To the southwest, the buildings in the airport's development subzone and in the housing development outside the park visually merge and fade in the distance, providing a moderate level of scenic integrity. These structures have little or no visibility from highway viewpoints beyond the north boundary of the airport, where the scenic integrity of the midground view is high or very high.



The residential development south of the airport is visible in the midground from the park entrance turnout, but the attention of most visitors is focused on the visually dominant Teton Range.



Even within the development subzone where the foreground and midground have no scenic integrity, the Teton Range dominates the landscape.

Viewpoints South of the Airport Road Junction. Beginning at the park entrance turnout on U.S. Highway 26/89/191 about 4 miles from the airport road junction, the landscape is dominated by the very high scenic integrity of the Teton Range. Midground views to the west and southwest between this turnout and the Airport Road Junction, especially north of Gros Ventre Junction, include

the residential development outside the park boundary and have low scenic integrity. Toward the northwest, the natural colors of the airport buildings blend with the landscape and maintain moderate scenic integrity. Midground views to the east include the National Elk Refuge which, depending on the season, can appear as a high-integrity natural meadow or a heavily grazed field with moderate scenic integrity. North of the elk refuge, the scenic integrity of the midground landscape to the east is high to very high. The foreground view has very low to no scenic integrity and is dominated by the road pavement and the tall wire fence that prevents animals on the National Elk Refuge from wandering onto the road.

DARK SKIES

Sources of Light Pollution

For the Native Americans and early pioneers who inhabited the Jackson Hole and Grand Teton National Park area, the natural lightscape was dominant throughout the night. The area's high elevation, with the entire park more than 6,000 feet above sea level, and the dry climate contributed to the clarity of the night sky.

Until the 1930s, the natural lightscape was little changed from its historic character. However, since then, the use of electric lights has proliferated in concert with the development of the area. Important sources of artificial exterior lighting include the following.

- The Jackson Hole Airport, where exterior lighting for navigation must be directed skyward. External lighting also is used on some buildings, particularly around doorways, in parking areas for automobiles and aircraft, and along pedestrian walkways. The Jackson Hole Airport Board is aware of concerns about fugitive light and has taken cooperative measures with the National Park Service to limit light losses. For example the board:
 - Installed a system that enables pilots turn on the runway lights by radio. The lights stay on for 15 minutes and then turn off.
 - Reduces light emissions from the automobile parking lot by turning off three of the four rows of lights at about 9:30 p.m.
 - Recently (2007) installed 4-inch light-shield boxes on all of the ramp lights except to the west (the direction facing approaching aircraft). Ramp lights must be on all night for security.
 - Routinely requests that an NPS lighting specialist review all proposed changes in exterior lighting and then makes modifications to reduce light emissions based on the expert's recommendations.
- The Town of Jackson, where exterior lighting primarily is associated with streets, outdoor recreation facilities such as ball fields, and commercial development, including parking lots and signs. Chapter 4 of the *Jackson/Teton County Comprehensive Plan* (2002) has a general recommendation that exterior lighting be controlled to protect scenic vistas. Detailed requirements to control fugitive light emissions are included in Appendix A, Section 49370 of the Town of Jackson Municipal Code.
- The Snow King Resort on the south side of the town of Jackson. During the winter, this resort has lighted night-skiing runs and uses nighttime grooming equipment, making it highly visible to passengers on aircraft flying overhead.

- The Jackson Hole Mountain Resort and Teton Village at its base. These developments are off the Moose-Wilson Road approximately 5 miles west of the Jackson Hole Airport. Exterior lighting is particularly evident in winter and primarily illuminates parking lots and commercial facilities. Jackson Hole Mountain Resort, Teton Village, and all other areas of commercial and recreational development outside the town limit of Jackson are subject to the fugitive light control requirements in Section 49370 of the Teton County Development Regulations.

For a relatively isolated community like Jackson, the artificial illumination of the night sky at a 45-degree angle in the direction of the city varies as the inverse 2.5 power of distance from the city (Walker 1977).

Appendix A, Section 49370 of the Town of Jackson (1995) Municipal Code contains external lighting and glare standards to control fugitive light emissions. Similar requirements are included in Section 49370 of the Teton County Development Regulations (Teton County 1994). For most sources, the standards limit the height of light fixtures to 18 feet or less. They also require total cut-off of light at an angle of less than 90 degrees, complete shielding of the light source from direct view at the perimeter of the lighted area, and containment of the light entirely onsite. Exceptions are provided by the town and/or county for outdoor recreation facilities such as ball diamonds, outdoor rinks, ski areas, and tennis courts, and for some commercial development such as gas stations. However, even these areas are limited to a maximum light-pole height of 40 feet, the light source must be shielded, and the light must meet all of the other standards in the current edition of the Illuminating Engineering Society of North America's *IESNA Lighting Handbook*. Flickering or flashing lights, search lights, and strings of lights other than decorative lighting during designated seasons around Christmas are prohibited by the town and county.

The town and county standards have been in effect since the mid-1990s. Although neither requires compliance from fixtures installed before then, most large commercial establishments have installed light emissions controls because they upgraded their exterior lighting in the past 10 years. As a result, virtually all large, illuminated commercial sites in Jackson, such as store parking lots and automobile dealerships, currently meet the town's control standards for lighting (Grubb 2006).

Automobile headlights are mobile sources of light pollution that are associated with the airport. This is particularly true during the winter, when the sun sets before 5:00 P.M. (compared to summer sunsets that occur after 9:00 P.M.). Automobiles of airport passengers and workers also represent a much greater percentage of the vehicles on the road during the winter, when there are few other night drivers in the park. Automobile headlights can create a noticeable impact on the natural lightscape when an observer is aligned with a road. However, nighttime automobile traffic on northwest Wyoming roads is intermittent and is restricted to road corridors. As a result, except along highways, automobile headlights do not contribute substantially to reductions in dark skies.

The interagency helibase is the only NPS-owned light source in the airport area. The lights at this facility are turned off except when this facility is actively supporting safety and resource management activities, such as fire suppression or search and rescue missions. Except for aircraft operations lighting, all light fixtures at the helibase meet NPS standards for preventing fugitive light emissions. As a result, NPS facilities are a minor source of light pollution in the airport vicinity.

Measuring Light Pollution

The system for describing the visual magnitude (brightness) of astronomical objects dates back to Greek astronomers who rated brightness on a scale of 1 to 6, with the brightest being 1. The system is

still used today, although with a mathematical definition: a star of a specified apparent visual magnitude is slightly greater than 2.5 times brighter than the next fainter magnitude (Kaler 2005).

The National Park Service recently developed a standard approach for measuring light pollution (Duriscoe *et al.* 2007). However, baseline data collection for Grand Teton National Park is not expected until 2011 or 2012 (Moore 2008). Other large land management agencies, such as the U.S. Forest Service or Bureau of Land Management, also do not have techniques that could be readily adapted to this analysis. Therefore, this analysis used a light pollution measurement technique developed by the International Dark-Sky Association (1997) that is based on the apparent visual magnitude of stars. They used the magnitude of visible stars to define levels of light-polluted “sky,” an approach that can be readily understood and applied by the general public. Under this system:

- A magnitude +7.0 sky occurs at an extraordinarily dark site, where up to 7,000 stars as faint as visual magnitude +7.0 can be seen by experienced observers with good eyes.
- A magnitude +6.0 sky is a reasonably good sky, with approximately 2,400 stars visible to the unaided eye. There is some light pollution, and it is usually enough to illuminate clouds so that they no longer appear utterly black against the sky as with a magnitude +7.0 sky. The brighter parts of the Milky Way are readily seen.
- A magnitude +5.0 sky is affected by moderate light pollution, with approximately 800 stars visible. The Milky Way is barely visible, if at all.
- In a magnitude +4.0 sky, fewer than 250 stars are visible and the Milky Way cannot be seen. Light pollution is a serious problem.
- A magnitude +3.0 sky shows fewer than 50 stars, and light pollution is severe. This is the typical sky encountered inside a major city.
- A magnitude +2.0 sky will show fewer than 25 stars and is typical of central regions of cities.

Light Pollution at Grand Teton National Park and the Jackson Hole Airport

Despite the sources of light pollution identified previously, night skies in Grand Teton National Park in the Jackson Hole Airport area continue to have excellent visibility. The International Dark-Sky Association’s DarkSky map, on the Internet at http://www.darksky.org/darksky/darksky_map.html, shows a limiting magnitude of +6.7 or +6.8 for all of the 25 sites listed within about 10 miles of the Jackson Hole Airport. These findings correlate well with the analysis of sky quality reported by Albers and Duriscoe (2001), which indicates that 99.5 percent of Grand Teton National Park has a zenithal limiting magnitude between +6.76 and +6.81.

- Within and immediately adjacent to the airport’s development subzone, there is substantial light pollution that greatly reduces the visibility of night skies. In lighted areas such as parking lots, few stars are visible and the sky is rated at about magnitude +3.0 or +4.0.
- In a zone beyond the actual lighted areas, the visibility rating of the night sky at the airport is about magnitude +5.0.
- Near the south end of the airport, which is adversely affected by light pollution from development outside the park boundary, the visibility rating of the night sky is about magnitude +5.0.
- Areas within the airport boundary that are more distant from the development subzone, including many areas north of the development subzone, have visibility ratings of magnitude +5.5 to +6.0.

WATER QUALITY AND HYDROLOGY

SURFACE WATER FEATURES AND HYDROLOGY OF THE AIRPORT

The Jackson Hole Airport is on a flat outwash plain between the Snake and Gros Ventre Rivers. The area slopes gently down from north to south, with a 38-foot drop over the 6,300-foot-long runway (0.6 percent grade).

The only water feature within the airport boundary is the Enterprise Canal, an irrigation ditch near the south end of the runway. It flows east-west from the Gros Ventre River, across the airport, to lands to the west that hold the water rights. Surface water from the airport does not enter the Enterprise Canal. Instead, water from the airport's ramp drainage and treatment system (described below) is routed under the Enterprise Canal and into an area of sagebrush flats about 200 yards south of the canal. There are no direct surface water discharges from the airport property to the Snake River or Gros Ventre River.

The runway, taxiway, parking areas, buildings, and airport road represent large, impervious surfaces that can produce runoff from warm-season storms. However, the long, narrow configurations of many of these features and the flat topography minimize the volumes of runoff that are discharged to any location. Moreover, once it moves off the impervious surfaces, storm water rapidly infiltrates into the highly permeable glacial outwash that underlies the airport. The absence of runoff channels or surface soil erosion, despite the 65-year presence of the airport, indicates that adequate runoff control is occurring.

The ramp area is the area where water is most likely to come in contact with pollutants such as gasoline, oils, and greases. Therefore, all of the runoff from this area flows by gravity into drains that lead through four oil/water separators. If a spill is known to have occurred, the drain system can be blocked at a number of points, and the substance and any water it has contaminated are retained on the upgradient, impervious surface until they can be collected and treated.

Snow starts accumulating in the airport area in late autumn. Snowplowing is used to remove the snow from the operational surfaces of the airport throughout the winter. Chemical deicers are not used for surface snow removal anywhere on the airport property. The snow is piled in designated storage areas, located on the north and south ends of the ramp and in areas east of the hangars, east of the fixed-base operator building, and east of the passenger parking area along the airport boundary. By the end of winter, these piles can collectively cover 2 acres or more.

The snow piles melt throughout the spring and often into the early summer. Snowmelt from most of the piles is quite clean. Therefore, it is allowed to run off the paved surface and percolate into surrounding soils. Any sediment or gravel left on the pavement is swept up and disposed of properly.

Snowmelt from the piles at the north and south ends of the ramp area includes propylene glycol from aircraft deicing (although much of this chemical evaporates or biodegrades to simple, nontoxic compounds, primarily methane and carbon dioxide (Johnson *et al.* 2001)). It also contains the accumulated drips of oil and other substances that have occurred throughout the winter. Therefore, these piles are located so that all of their runoff enters the ramp drainage and treatment system described previously. Typically, some surface melting occurs before the drains thaw. As a result, the water collects in a pool up to 1.5 feet deep atop the pavement at the south end of the ramp. The paved surface area is adequate to collect this melt water, and untreated water does not flow off the ramp.

WATER QUALITY STANDARDS

Wyoming water quality standards are available on the Internet at the Wyoming Department of Environmental Quality site at http://deq.state.wy.us/wqd/WQDrules/Chapter_01.pdf. Wyoming Water Quality Rules and Regulations include numeric standards for surface water but not for ground water.

The entire length of the main stem of the Snake River upstream from the Wyoming Highway 22 bridge (Wilson Bridge), including the river stretch near the Jackson Hole Airport, is classified as “Class 1, Outstanding Waters.” The Snake River is about 1.5 miles west of the airport.

The Gros Ventre River upstream from its confluence with the Snake River is designated by Wyoming as Class 2AB for cold water game fisheries. The Gros Ventre River is about 2 miles east of the airport.

Within the Wyoming Water Quality Rules and Regulations, an antidegradation standard is included in Section 8 of Chapter 1, Wyoming Surface Water Quality Standards. Under a permit system, it allows for some decrease in water quality as long as specified conditions continue to be met. However, the antidegradation standard does not apply to the Snake River in the vicinity of the airport because no further degradations of Class 1 waters are allowed.

Under the antidegradation standard, surface waters (other than Class 1) whose quality is better than the standards they are required to meet must be maintained at that higher quality. However, the state may issue a permit for a project or development to increase levels of water pollution as long as the resulting water quality is not below the standards, existing water uses are maintained and protected, best management practices are implemented, and important economic or social benefits are produced. The Gros Ventre River near the airport could be subject to these antidegradation standards.

REGIONAL SURFACE WATER RESOURCES

Surface Water Hydrology

The Snake River is the principal stream in Teton County and the park. It flows generally from north to south, and its flow is regulated by Jackson Lake Dam, about 25 miles north of the airport.

Mean discharge in the Snake River upstream from the airport at Moose is 3,011 cubic feet per second for water years 1995 through 2005. During this time, daily flows ranged from a low of 600 cubic feet per second in February 2003 to a high of 24,500 cubic feet per second in June 1997. The typical flow pattern generally includes a flow of about 1,000 cubic feet per second for the period from October through March. Spring and early summer snowmelt and rain increase flows to between 5,000 and 10,000 cubic feet per second, but much higher flows can occur for short periods. By mid-summer, flows are about 2,500 cubic feet per second, and they gradually decrease until they stabilize for the winter season (U.S. Geological Survey 2005).

The gauging station downstream from Flat Creek (and the airport) has a period of record from 1976 through the present. At this site, the Snake River carries the discharge of the Gros Ventre River, Flat Creek, and several smaller tributaries. Mean flow at this site is 3,576 cubic feet per second with a range from 690 cubic feet per second in January 1988 to 30,200 cubic feet per second in June 1997. The annual flow pattern at this site is similar to that described for the Moose gauge (U.S. Geological Survey 2005).

The Gros Ventre River is a tributary of the Snake River. The gauging station on this river is about 2 miles upstream from its confluence with the Snake River and about 4 miles south (downstream) of the airport. The discharge record for this waterway dates back to 1917 but is incomplete, with no winter record. Flows range from no flows on many days in some years, particularly during the winter and early spring, to 6,710 cubic feet per second in June 1997 (U.S. Geological Survey 2005).

Surface Water Quality

Woods and Corbin (2003) characterized surface water quality in the Snake River at Moose based on existing data, while Clark *et al.* (2004) performed new water quality sampling and analyses. Both papers evaluated data sets of about 30 samples, and both had similar conclusions. The following statements are from Clark *et al.* (2004):

- Monitoring at sites on the Snake River in Grand Teton National Park during water years 1998-2002 indicate that water generally is of good quality.
- Concentrations of nutrients generally were low. Concentrations of dissolved ammonia, nitrite, and nitrate in all samples collected from the Snake River were less than the water-quality criteria for surface waters in Wyoming.
- Concentrations of trace metals were low in samples collected from the Snake River.
- Concentrations of all analyzed pesticides were less than the reporting level in 27 samples from the Snake River.

Because there are no significant sources of water pollution between Moose and the airport, the Snake River closest to the airport would be expected to have similarly high water quality.

REGIONAL GROUND WATER RESOURCES

Ground Water Hydrology

The Jackson Hole Airport is constructed on alluvium that occurs as flood plain deposits of well-sorted beds of silt, sand, and gravel. The alluvium is outwash material that was deposited by the flow from melting glaciers. Outwash deposits are quite permeable and yield water easily to wells. In contrast, moraine deposits contain more clay and silt, resulting in better retention of soil moisture and nutrients. Consequently, the moraines are heavily forested, while outwash plains such as the airport site are covered by sagebrush (Woods and Corbin 2003).

Ground water in the vicinity of the Jackson Hole Airport is hydraulically connected to Snake River. The U.S. Geological Survey's geologic map of Grand Teton National Park identifies the plain on which the airport is located as "abandoned channel" with a direction of ground water flow that is parallel to the flow of the Snake River (Love 1992).

Records for selected wells in Teton County were provided by Nolan and Miller (1995). These included four wells in the quarter section that includes the airport's development subzone. All four wells had depths to water, measured in July 1992 or July 1993, between 31 and 36 feet below ground surface. Estimated discharges were provided for two of the wells and ranged between 80 and 100 gallons per minute.

Ground Water Quality

Virtually all domestic, municipal, and commercial water supplies in Teton County utilize ground water (Jorgensen Engineering and Land Surveying, P.C. 1999). This includes the town of Jackson, which supplies its citizens from seven wells in the alluvial aquifer, and the Jackson Hole Airport. The ground water quality is excellent, and consistently meets or exceeds federal and state standards for drinking water (Town of Jackson 2006).

WATER QUALITY AND WATER PROTECTION MEASURES AT THE JACKSON HOLE AIRPORT

Since the 1930s, chemicals that have the potential to affect water quality have been stored and used at the Jackson Hole Airport. Primarily, these include fuels, propylene glycol aircraft deicer, lubricants, and solvents for cleaning. Domestic wastewater and wash water are produced by the airport car rental facility.

All of these substances have a low potential to pollute surface waters because of the long distances to water bodies (1.5 miles to the Snake River and 2 miles to the Gros Ventre River) and the flat topography. Management measures that are implemented to prevent pollution of ground water are presented below.

National Pollutant Discharge Elimination System Permits for the Airport

Section 402 of the Clean Water Act prohibits the point-source discharge of pollutants into waters of the United States unless a permit is obtained. Point sources are discrete conveyances such as pipes or man-made ditches. In Wyoming, National Pollutant Discharge Elimination System permits are issued by the Department of Environmental Quality. Each permit specifies the types and amounts of pollutants that may be discharged at the specified discharge point.

Two National Pollutant Discharge Elimination System permits allow discharges in association with the operation of the Jackson Hole Airport:

- Permit #UIC99-125 allows the discharge of up to 7,514 gallons of wastewater per day to the Snake River aquifer through septic tank and leach field systems at the Jackson Hole Airport. These wastewaters must have received treatment in an adequately designed and maintained septic tank and leach field system prior to discharge to the aquifer.
- Permit #WYS000002 is for the discharge of storm water. There is no volume associated with this permit because of the variable nature of storm water runoff. This discharge permit is for the runoff from the ramp area, which is collected in drains and routed through four oil/water separators. The discharge point is about 200 yards beyond the Enterprise Canal, south of the runway.

There have not been any violations relating to either of these permits.

Hazardous Materials Management Plans

A hazardous materials management plan is included in the Jackson Hole Airport procedures manual. This document provides general approaches for the proper management of hazardous materials that are being used at the airport, identification of responsibilities for spill cleanups, and reporting requirements for spills, including reporting to the Wyoming Department of Environmental Quality.

The hazardous materials management plan is supplemented by more detailed procedures in a spill prevention, control, and countermeasure plan that conform with Title 40, *Code of Federal Regulations*, Part 112. This plan, which was last updated in March 2003, includes such information as the types and volumes of materials stored at the airport, discharge prevention measures that have been implemented to prevent spills or leaks during routine handling of products, discharge drainage controls, measures for response and cleanup, methods for disposal of recovered materials, contact lists and phone numbers, training, designation of accountable personnel, and security.

The National Park Service prepares a park-wide environmental management system plan that functions like a hazardous materials management plan. This plan for all park facilities, including the interagency helibase at the airport, was updated in November 2005. It also is supported by a spill prevention, control, and countermeasure plan that is specific to the helibase operations.

Fuels Management

Fuels for aircraft and automobiles are delivered in bulk and stored in underground tanks in four fueling systems at the airport.

- The south fuel farm, which was installed in 1991, and the separate but adjacent north fuel farm, which was upgraded in 2003, store several types of aviation fuel. Both fuel farms are within the development subzone and are managed by the fixed-base operator.
- Gasoline for rental cars is stored in an underground tank system within the development subzone west of the aviation fuel farms.
- The underground fuel storage system for the interagency helibase was installed north of the development subzone in 2004 and is operated by the National Park Service.

All of these are modern systems that conform with the design, construction, operation, and monitoring requirements of the Wyoming Department of Environmental Quality storage tank rules in Chapter 17 of the state's water quality rules and regulations and the U.S. Environmental Protection Agency requirements in Title 40, *Code of Federal Regulations*, Parts 280 and 281. Monitoring wells within the fuel farms and at downgradient locations to the south and southwest are tested and reported in conformance with Wyoming Department of Environmental Quality requirements. Inventory control records and monitoring results confirm the integrity of these systems and the absence of leaks that could contaminate ground water.

Any spill of more than 25 gallons must be reported promptly to the Wyoming Department of Environmental Quality. Engineered components of the fueling systems such as automatic cut-off switches and overfill protection have almost completely eliminated such spills. Two reportable spills have occurred over the past 15 years, one of about 100 gallons and one involving several hundred gallons of fuel. Both spills were caused by deliberate tampering to circumvent dead-man's switches. Each incident resulted in immediate job loss by the offending individual, and the switches have been redesigned to make them more tamper resistant.

For each spill, a representative of the Wyoming Department of Environmental Quality provided on-site direction regarding the excavation and treatment of the contaminated soil. All remediation was completed in accordance with their instructions and to their satisfaction.

The site of the larger spill was completely excavated several years later when the north fuel farm was upgraded in 2003. Also during that upgrade, a small area of contaminated soil was found under one of the old tanks that was being replaced. All soil with evidence of staining was removed and replaced

with clean fill before the new system was installed. There was no indication that fuel from the earlier spill or from the tank leak had migrated through the vadose zone into the ground water system.

Industry-recognized best management practices are used from the time fuel is brought onto the airport property until it is dispensed into aircraft or automobiles. Despite these practices, fuel spills of 5 gallons or less occur occasionally, particularly in association with the transfer of fuel from trucks to aircraft. All of the fuel trucks carry absorbent materials capable of handling these situations. The spent absorbent is disposed of properly offsite. Because these incidents occur on impervious surfaces, the fuel does not enter the soil or underlying ground water. Any residual fuel that was not cleaned up or that did not evaporate and that was picked up by storm water runoff would be removed when the water passed through the oil/water separators.

All personnel involved in the management of fuels at the Jackson Hole Airport receive extensive training, in conformance with Federal Aviation Administration requirements. Additional training is required for personnel in supervisory positions for fuels handling.

The fueling systems at the Jackson Hole Airport are subjected to a rigorous annual inspection by the Federal Aviation Administration, with participation by the National Park Service. Some of the many features that are inspected include labeling, valves, fire extinguishers, protective fire walls, and potential ignition sources. The fixed-base operator at the Jackson Hole Airport consistently has high scores, and did not receive any violations or notices in the most recent inspection.

Propylene Glycol (Deicer Fluid) Management

In the winter, the Jackson Hole Airport staff uses propylene glycol to remove the snow and ice from aircraft. Deicer use at the airport is limited exclusively to aircraft. All snow and ice removal from pavement and other surfaces is accomplished by mechanical means, such as plowing and sweeping.

Some other airports use a similar compound, ethylene glycol, as a deicer, and both propylene glycol and ethylene glycol are commonly called “glycol.” However, numerous health risks are associated with exposure to large amounts of ethylene glycol. As a result, the U.S. Environmental Protection Agency has set a drinking water guideline for ethylene glycol of 7,000 micrograms per liter of water for an adult person. In contrast, propylene glycol is so safe that it is classified by the Food and Drug Administration as an additive that is acceptable for use in food (Agency for Toxic Substances and Disease Registry 1997), and there is no drinking water standard. Because of the difference in safety, the Jackson Hole Airport Board has elected to use only propylene glycol at the airport.

Propylene glycol is not likely to exist in large amounts in air, where it has a half-life of one or two days. The compound breaks down within several days to a week in water and soil (Agency for Toxic Substances and Disease Registry 1997). Propylene glycol degradation products are primarily methane and carbon dioxide, which have low levels of environmental toxicity.

Propylene glycol deicers also contains small amounts of additives, which vary among manufactures and typically are proprietary. Despite the presence of additives, soil application has been proposed as a means of disposal for propylene glycol-based aircraft deicing fluids. Bausmith and Neufeld (1999) found that biodegradation of solutions of less than 20 percent by weight could be degraded in the soil profile.

Propylene glycol deicer is stored in an aboveground, double-walled, 20,000-gallon tank north of the terminal. There is no secondary containment (such as a berm or dike) around the deicer storage tank. However, its aboveground configuration makes it easy to inspect to confirm that it is in good

condition with no leaks. In the event of a breach, such as an impact by a truck, the deiced compound would flow onto the gently sloping, paved ramp and into the ramp drainage system for collection and treatment.

In the winter of 2005/2006, 93,000 gallons of concentrated propylene glycol deicer were used for aircraft deicing at the airport. Prior to use, the propylene glycol is mixed with water to create a concentration specified by the airline, usually 50/50 or 60/40. Several hundred gallons of the deicing fluid can be sprayed on a single, large plane that is sitting on the ramp, ready for takeoff.

The U.S. Environmental Protection Agency currently does not regulate the use of glycol deicers at airports, but it is considering a rulemaking. To support this action, it conducted a survey, which the Jackson Hole Airport participated in, regarding deicer use in the winter of 2005/2006.

The survey by the U.S. Environmental Protection Agency prompted the Jackson Hole Airport Board to investigate methods for reclaiming or reducing the use of deicing fluids (Hatch 2006). Since the winter of 2007/2008, used deicing fluid at the Jackson Hole Airport has been collected using a vacuum truck and recycled offsite. That year it was sent to a Michigan recycler, but plans currently are being implemented to obtain this service in Salt Lake City. The propylene glycol is separated from contaminants using reverse osmosis and distillation, and can be used for any purpose other than in food products. Because propylene glycol is relatively expensive, there is a strong economic incentive for the Jackson Hole Airport to maximize used deicing fluid recovery and recycling.

Any remaining deicing fluid flows across the ramp by gravity to the area of the drainage system. However, because the drains often are frozen in winter, it typically flows on the pavement surface to the low, south part of the ramp. It accumulates there, along with meltwater from the intermittent thawing as the pavement heats in the sun, in a sometimes-frozen pool that can be up to 1.5 feet deep. Throughout this time, much of the remaining propylene glycol evaporates or biodegrades to carbon dioxide and methane. In the spring when the drains thaw, the remaining propylene glycol is routed, along with large volumes of snowmelt water, through the oil/water separators for treatment and then into the sagebrush flat south of the runway.

Despite this product's low environmental toxicity and short half-life, concerns have been raised by airport neighbors regarding the potential for deicing fluid to affect nearby ground water resources. The airport is cooperating with the Wyoming Department of Environmental Quality in testing soils south of the ramp area for the presence of propylene glycol and deicer additives. It is also working with the U.S. Geological Survey to determine if there is any transport of deicing fluid constituents off the airport site.

Management of Oils, Greases, and Solvents

Performing aircraft maintenance, such as changing oil, has been prohibited on the airport ramps for more than 20 years. This has eliminated the dumping of used oil. Some maintenance may still be performed behind closed doors in the T-hangars, but these facilities have concrete floors and no drains. Therefore, it is unlikely that improper disposal of oils, greases, or solvents is occurring in these buildings.

Any small amounts of material that is dripped or leaked onto the ramp (including the areas of the hangars) that is not cleaned up or does not evaporate, photodegrade, or biodegrade eventually is carried by storm water or snow melt into the ramp drain system. All drainage is routed through four oil/water separators, which receive regular maintenance. Airport personnel report that known discharges, such as small spills that occasionally occur during aircraft refueling, are readily apparent in

the oil/water separators. Any unauthorized discharges would be similarly obvious, and would be captured as effectively.

Aircraft engine oil changes are among the services provided by the fixed-base operator. Used oil is collected, stored in closed containers, and combusted in burners to heat the hangars. Used oil also is burned for heating at the interagency helibase.

All storage, use, and disposal is performed consistent with best management practices. This includes, but is not limited, to the following.

- Detergents and hot water preferentially are used by the fixed-base operator for cleaning, and solvents are employed only when detergents are ineffective.
- Solvents are selected based on avoidance of human health and environmental hazards and ozone depletion, the latter in conformance with the U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) Program.
- A parts washer recycling unit allows solvent to be reused several times.
- Spent solvents that are listed as hazardous waste are drummed and shipped offsite by a commercial service, where they are handled in conformance with Resource Conservation and Recovery Act (RCRA) requirements for recycling and/or disposal.

Automobile engine oil changes are performed at the car rental facility, and the used oil is transported offsite by a commercial service to a recycling facility. The hauler and recycler conform with the U.S. Environmental Protection Agency's standards for the management of used oil in Title 40, *Code of Federal Regulations*, Part 279. The car rental facility septic tank and two downgradient monitoring wells are tested for volatile and semi-volatile organic hydrocarbons and the results are reported annually to the Wyoming Department of Environmental Quality. The most recent samples for which results are available, collected in September and December 2005, were below the detection limits for the heavy metals cadmium, chromium, and lead. They also were below detection limits for the entire suite of 67 volatile and semi-volatile organic hydrocarbons that were tested in accordance with U.S. Environmental Protection Agency Method 8260.

Best management practices for all ignitable chemicals are included in the annual Federal Aviation Administration inspection of the airport. Beyond that, the staff of the fixed-base operator, car rental companies, and Jackson Hole Airport recognize the environmental responsibilities associated with operating an airport within a national park and, individually and collectively, take measures to ensure that chemicals used at the airport do not degrade the resources within or outside the airport boundary.

Domestic Wastewater and Wash Water Management

Four septic tank and leach field systems treat domestic wastewater and the wash water from the car wash at the car rental facility.

- Domestic wastewater from the terminal and most other buildings in the development subzone is treated in a system south of the T-hangars close to the east boundary of the airport. This system includes two 10,000-gallon septic tanks and two leach fields. Effluent discharge is regularly rotated between the two leach fields to ensure that neither becomes saturated.

Restaurant workers in the terminal receive training on the correct disposal of cooking oils and greases and the importance of not discarding these substances into drains. A grease trap that is

regularly maintained prevents improperly disposed oils and greases from entering the septic system.

- A separate septic system, installed in 1999, services the car washing facility. The discharge permit for this facility stipulates that “No detergents, solvents, or additives are to be used in the car wash except biodegradable soaps and no washing of engine components is allowed.” Most of the water that is used in the car wash is captured, filtered, and reused. The septic tank and two down-gradient monitoring wells are tested regularly to ensure that pollutants are not entering the ground water system.
- A septic tank and leach field receives wastewater from the toilet and sink in one of the hangars. This building is on its own system because it is downgradient from the septic system that serves the terminal and most other buildings. A monitoring well downgradient from the hangar septic system provides assurance that improper dumping of chemicals such as oils or solvents is not occurring into this system. This well also provides effective monitoring of ground water for the entire development subzone.
- A septic tank and leach field was installed at the tower to treat the sanitary wastewater produced by the occupants of this facility. Because of the low volumes of waste entering this system, this septic tank is pumped out only once per year. All of the other septic tanks are pumped two or three times annually.

WILDLIFE AND THEIR HABITATS, INCLUDING SPECIAL CONCERN, THREATENED, AND ENDANGERED SPECIES

Grand Teton National Park provides habitat for a variety of wildlife species, including 61 mammals, four reptiles, six amphibians, 19 fish, and 299 birds (NPS 2000a). Among the most popular for wildlife viewing by visitors are its six native ungulate species, which include elk, moose, mule deer, bison, pronghorn, and bighorn sheep.

The Jackson Hole Airport includes 533 acres of sagebrush steppe on the valley floor east of the Snake River in Grand Teton National Park. Within the airport boundary, the development subzone occupies 28.5 acres, and about 100 acres are overlain by runways, taxiways, and other impervious surfaces. These areas offer limited or no wildlife use values. The remaining 400 acres of the airport site is vegetated by sagebrush and antelope bitterbrush with an understory of grasses and forbs.

Outside the airport perimeter fence, elk, moose, bison, and other mammals graze the sagebrush steppe community of the park and National Elk Refuge. Crucial moose winter range exists in adjoining Snake River corridor and along its tributaries. In areas of the refuge where ungulates moderately graze the sagebrush shrub community, conditions are listed as “good” or “fair,” and where over-browsing is experienced, range conditions are described as “poor” (U.S. Department of the Interior, U.S. Fish and Wildlife Service and National Park Service 2007).

Large mammals, particularly elk, seasonally migrate along the Snake River corridor between summer and winter ranges. The airport site formerly was part of this broad migration corridor. However, since development began in the 1930s, most elk have tended to avoid the airport. In the 1990s, an 8-foot-high, chain-link perimeter fence that is effective in keeping out all larger mammals was constructed. Because the migration corridor is more than 5 miles wide in the airport vicinity, and because U.S. Highway 26/89/191 is the only other development in this part of the migration corridor, the fenced airport has not adversely affected elk populations or wildlife migrations.

Elk and other large mammals, including mountain lion, bobcat, black bear, bison, pronghorn, bighorn sheep, moose, mule deer, and white-tailed deer, were omitted from detailed consideration in this environmental impact statement. This was based on the small area (533 acres compared to 310,000 acres in the park) within the airport perimeter fence, the absence of high-value wildlife habitat on the airport site, the continued availability of the migration corridor, and the effectiveness of the fence in protecting wildlife from collisions with aircraft on runways or taxiways.

Despite the fence, birds and small mammals can readily enter the airport site. Within the airport, rodents are abundant and include Uinta ground squirrels, mice, voles, shrews, chipmunks, and northern pocket gophers. Larger mammals found within the perimeter fence include coyotes, badgers, long-tailed weasels, short-tailed weasels, red foxes, skunks, and raccoons.

The absence of permanent ponds, rivers, streams, or wetlands at the airport allow wildlife groups typically associated with these features to be dismissed from detailed analysis. The only aquatic feature within the airport is the Enterprise Canal, an irrigation ditch that crosses the airport south of the runway and flows intermittently, typically from May through September. Because of the intermittent flows, the canal does not support an aquatic community or wildlife species associated with aquatic communities.

MIGRATORY BIRDS

Most bird species in the airport's sagebrush-dominated community are protected by the Migratory Bird Treaty Act, 16 *United States Code* 703. This act protects migratory birds, their parts, and nests or eggs from taking, except as permitted. The U.S. Fish and Wildlife Service, to scoping for this project, recognized the presence of migratory birds and raptors within the project area (Kelly 2005).

Migratory birds include raptors, songbirds, and shorebirds that breed in North America but migrate to Mexico, Central America, or South America for the winter. In Wyoming, 162 bird species are considered neotropical migrants (Cеровski *et al.* 2001). Peak migration periods occur in May and then again from September through early October. Nesting typically occurs from mid-June to mid-July.

Migratory birds are of concern to wildlife managers because they have been experiencing severe population declines throughout North American (Askins *et al.* 1990). Habitat fragmentation and loss of winter range are among factors causing these declines (Hutto 1988, Robbins *et al.* 1989).

Studies have not been conducted on the airport property to inventory the occurrence or relative abundance of migratory birds. However, migratory bird species expected to be present include, but are not limited to, savannah sparrow, Brewer's sparrow, vesper sparrow, green-tailed towhee, mountain bluebird, horned lark, western meadowlark, American robin, sage thrasher, Brewer's blackbird, common nighthawk, mourning dove, tree swallow, cliff swallow, and common raven.

The airport was constructed predominantly within sagebrush steppe, although other disturbed zones and small clusters of deciduous trees are present along the south and east edges of the project area. The sagebrush-dominated communities throughout the park tend to be co-dominant and often intermixed with antelope bitterbrush, with an understory of grasses and forbs. Multiple breeding bird surveys conducted in sagebrush-dominated communities in the park inventoried a total of 20 species, with an average of slightly more than seven species per count site (Wolff 2006b).

The airport may attract many other migratory bird species. Because the perimeter fence protects the vegetation from native grazers and browsers, areas within the fence may support a somewhat higher number of birds, particularly including those associated with older-growth sagebrush. Species that capture insects in flight commonly use the fence for perching and foraging. Grassland songbirds that tend to flock in open spaces may use the airport pavements. Species such as swallows, which place nests under eaves or in sheltered crevices, may use the airport buildings for this purpose.

Raptor occurrences at the airport are low because of the absence of attractive habitats such as woodlands that provide nesting habitat, forest edges that provides foraging area, or aquatic features. The airport also has no aboveground electrical power infrastructure or exposed wires that would encourage raptor nesting or intensive hunting activities. Colonial small mammals or other prey are not present in high enough numbers to attract more than the occasional raptor.

Raptors that use arid shrubland and grassland habitats of Jackson Hole during the summer include the American kestrel, Swainson's hawk, red-tailed hawk, northern harrier, short-eared owl, prairie falcon, and golden eagle. These principally eat small mammals and sometimes forage within the airport boundary. Rough-legged hawks winter in Wyoming and also may hunt over the airport area.

Nesting habitat for most raptors within the project area is lacking, as they tend to use nests constructed of sticks and vegetative material placed in trees or on exposed cliff or rock faces. Locally common raptors seldom nest on the ground, except for short-eared owls and harriers. There is a report of a red-tailed hawk nesting in a small tree south of the runway in 2006 (Crowe 2006).

SPECIAL-CONCERN SPECIES

The *Comprehensive Wildlife Conservation Strategy*, a collaborative effort developed by the Wyoming Game and Fish Department (2005) and experts throughout Wyoming, identifies species of greatest conservation need. From this statewide list, a park-wide list of special-concern species was prepared by park wildlife biologists (Wolff 2006b). Relevant park-wide special-concern species are those that occupy habitats within the airport area and are not effectively excluded by the perimeter fence. Input regarding special-concern species also was obtained from the U.S. Fish and Wildlife Service (Kelly 2005) and Wyoming Game and Fish Department (Wichers 2006) during scoping.

The primary special-concern species is the greater sage-grouse (*Centrocercus urophasianus*). Mammalian special-concern species that could occur at the airport include the Uinta ground squirrel, 10 bat species, and 2 shrew species. The common garter snake and northern sagebrush lizard may also be present on or near the airport. Of this group, the greater sage-grouse was identified as a species of interest during the scoping process.

Greater sage-grouse populations across the species' entire North American range have been in decline for nearly 20 years. These declines have resulted in the petitioning for listing under the Endangered Species Act of certain species, subspecies, and distinct population segments. The U.S. Fish and Wildlife Service determined that listing the greater sage-grouse as threatened or endangered was unwarranted in a recent finding (70 *Federal Register* 2244, February 12, 2005). However, in a December 4, 2007 ruling, the U.S. District Court for the District of Idaho directed the U.S. Fish and Wildlife Service to reconsider its decision.

Greater sage-grouse are year-round residents of Wyoming, and numbers of breeding sage-grouse were estimated in excess of 20,000 in 1998 (Braun 1998). However, greater sage-grouse populations throughout the West, including Wyoming, have experienced an average 33 percent decline since 1985 (Braun 1998). This species is listed as a Level 1 Priority Species in the *Wyoming Bird Conservation Plan*, suggesting that sage-grouse statewide require applied conservation action (Cеровski *et al.* 2001). In response to these concerns, the Wyoming Game and Fish Department (2003) prepared the *Wyoming Greater Sage-Grouse Conservation Plan*.

Sage-grouse populations in Jackson Hole are considered to be remnant and at risk of extirpation (McDonald 2006). This local population, as measured by male and female attendance on leks (see glossary for definition), has declined by more than 70 percent in some years since 1990 (Wolff 2006a), compared to an approximate decline of 30 percent elsewhere in Wyoming. The local population counted at leks reached a low in 1999, when 47 male sage-grouse were identified. Since then, the number of males counted at leks has increased to 149 in 2006 (Hatch 2007b). Based on as-yet unpublished data, more than 400 birds (including males and females) were counted during a winter 2007-2008 survey conducted by Beringia South, a local non-profit research group that began a grouse project in early 2007. Some of the birds tallied in the winter reside in the Gros Ventre hills and are not counted during springtime lek surveys.

Reasons for the population changes are being investigated both on the Jackson Hole Airport and in surrounding valley areas. The Jackson Hole Airport Board contributed about \$30,000 in October 2007 to support sage-grouse population and habitat investigations (Hatch 2007a). The state of Wyoming is supporting the local sage-grouse project conducted by Beringia South, which is sponsored by the Upper Snake River Sage-Grouse Working Group.

The causes of sage-grouse population declines and the recent population increase in Jackson Hole have not been conclusively identified. Suspected factors include permanent loss, degradation, frag-

mentation, and other changes of key habitats, as well as low nest productivity. Any substantial changes to the existing suitable habitat or survival rates of sage-grouse may seriously imperil the continued existence of the Jackson Hole population (McDonald 2006).

Sage-grouse in the Jackson Hole region, including the airport, belong to a resident, non-migratory population (Holloran and Anderson 2004). Sage-grouse research has confirmed the presence of this species within the airport boundary fence throughout the year, including during reproductive, brood-rearing, and wintering phases of the annual life-cycle (Holloran and Anderson 2004; Wolff 2005; Federal Aviation Administration 2006e; Hatch 2007b).

Nine historical greater sage-grouse leks are known to occur within the eastern and southern portions of the park. However, in recent years, sage-grouse used only three of these, including the Moulton, Jackson Hole Airport, and Timbered Island leks.

Over the past decade, an annual average of about 18 males and 19 females has been recorded at the airport lek (Figure 5). This lek is north and west of the runway adjacent to a sagebrush area. Male attendance at the airport lek inside the fenced area has been recorded since 1948, when more than 60 males were regularly observed (Wolff 2005). This lek experienced the second highest mean attendance rate of known leks throughout the occupied habitat north of Jackson during this 10-year time period, and is very important to this segment of the local sage-grouse population. However, the number of males at the airport lek has declined over the last 10 years and remains below average (Wolff 2006c).

In 2006, a satellite lek was located about a half-mile east of the airport, where a small number of grouse were counted sporadically. No birds were observed there in 2007 (Wolff 2006c, 2007).

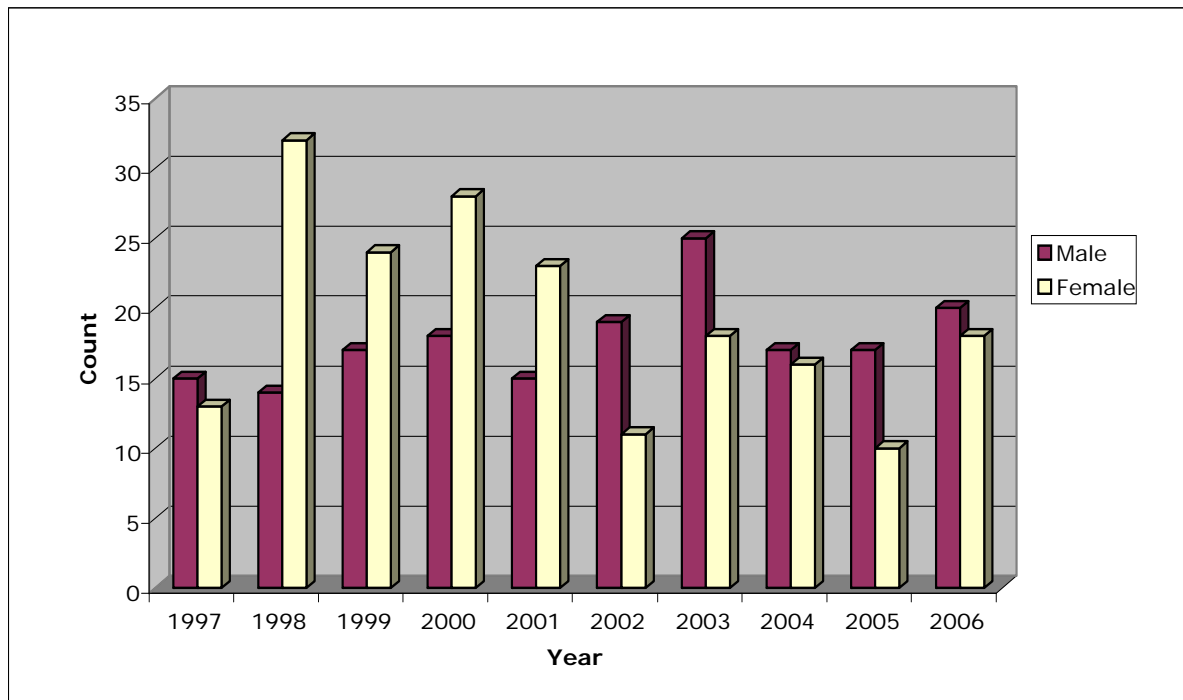
No sage-grouse nests have been recorded within the airport perimeter fence. However, one recorded nest attempt was within 300 feet of the northwest corner of the airport area.

Early brood-rearing hens in the Jackson Hole region remain within about 0.6 miles of their nests. Based on the incidence of nesting near the airport and frequency of reported flocks of grouse along the runway and taxiways during brooding and summer months, sage-grouse apparently use the airport as early and late brood-rearing habitat. Federal Aviation Administration records include numerous reports of sage-grouse through mid- and late summer, and these observation likely involve hens with and without broods, as well as males (Federal Aviation Administration 2006e).

Five winter locations within the airport boundary were confirmed between 1999 and 2003 by radio telemetry (Holloran and Anderson 2004). Recent unpublished information gathered by Beringia South also confirmed that grouse occupy the airport in winter months.

Habitat requirements for sage-grouse change somewhat during the breeding, nesting, brood-rearing, and wintering periods. However, throughout the year, sage-grouse require large expanses of sagebrush habitats containing a diverse, substantial understory of native grasses and forbs needed for food and cover. Sage-grouse use a variety of vegetation conditions and communities in the fall including both sagebrush and meadows, and recently burned areas. Recent studies have identified the north end of the National Elk Refuge, the sagebrush flats around Kelly, an area south of Blacktail Butte, and Wolff Ridge as important winter range (Holloran 2002).

FIGURE 5: JACKSON HOLE AIRPORT LEK ANNUAL MAXIMUM GREATER SAGE-GROUSE COUNTS, 1997-2006 (SOURCE: GRAND TETON NATIONAL PARK.)



Sage-grouse have a high fidelity to seasonal ranges and return to historical lek and nest sites year after year (Fischer *et al.* 1993). Breeding activity begins in mid-March when grouse gather on leks in open areas, low sagebrush zones, ridgetops, and old lakebeds surrounded by denser sagebrush cover (Connelly *et al.* 1981). Breeding and lek attendance at the airport have been observed into late May during some years.

After breeding is completed, females disperse to nesting areas characterized by relatively dense, tall, mature sagebrush stands (Connelly *et al.* 2000, Holloran and Anderson 2004). Nests are typically shallow depressions lined with grass, twigs, and feathers under the tallest shrub in the given sagebrush stand (Keister and Willis 1986). Most nests occur within 2 to 4 miles of the lek, but some nests may be more than 12 miles away (Autenrieth 1981, Wakkinen *et al.* 1992). Sage-grouse nests in the park are, on average, 2.8 miles (range 1.4 to 6.2 miles) from active leks (Holloran and Anderson 2004) and are located throughout Antelope Flats, Ditch Creek, Baseline Flats, the Potholes, and north of the airport. Known brood-rearing locations in the park include Antelope Flats, Baseline Flats, the area north of the airport, within the airport fence, and the area southwest of Lost Creek Ranch.

Some researchers describe winter habitat as probably the most limiting seasonal habitat (Patterson 1952; Eng and Schladweiler 1972; Beck 1977) and perhaps the most critical (Remington and Braun 1985). Winter habitat exists within the project area, as determined from radio-telemetry data collected between 1999 and 2003 (Holloran and Anderson 2004) and from as-yet unpublished locations recorded by Beringia South in the winter of 2007-2008. Sage-grouse select dense, tall stands of mature sagebrush during the winter where they find both food and cover. During this season, they use low sagebrush stands on open windswept knolls as feeding sites. Sage-grouse are widely dispersed over wintering areas during mild weather, but concentrate in areas with exposed sagebrush as snow depth increases. Major wintering concentration areas in the park include relatively flat south- to west-facing slopes in areas south of Blacktail Butte and on Wolf Ridge, exposed sagebrush near Lost

Creek Ranch, the Potholes, and areas near the town of Kelly and Teton Science School (Holloran and Anderson 2004) and Spread Creek.

The U.S. Fish and Wildlife Service, Wyoming Game and Fish Department, and the Upper Snake River Basin Sage-Grouse Working Group each identified sage-grouse concerns during scoping. They:

- Recognized the decline in the local population and the importance of the Airport Lek to local population persistence.
- Noted that concerns for sage-grouse population status, trends, and threats persist.
- Expressed concern that airport operations may impact sage-grouse, and suggested limiting disturbance of sage-grouse habitats during breeding activities at the Airport Lek, and during nesting, and brood-rearing phases of the annual cycle (March–August).
- Recommended that activities that may exacerbate habitat loss or degradation should be avoided, and that measures should be implemented to reduce the potential of all bird and aircraft collisions.

THREATENED AND ENDANGERED SPECIES

The scoping letter from the U.S. Fish and Wildlife Service is included in Appendix D. This letter provided comments and identified species that should be considered in the environmental analysis (Kelly 2005). Based on the letter, this environmental impact statement considered the species presented in Table 10. Among the other species mentioned in the letter, the grizzly bear was not considered because it is effectively excluded from the airport area by the boundary fence. The bald eagle was not considered because it has recovered sufficiently to be removed from the list of threatened or endangered species.

TABLE 10: FEDERALLY LISTED THREATENED OR ENDANGERED WILDLIFE SPECIES OCCURRING OR POTENTIALLY OCCURRING IN GRAND TETON NATIONAL PARK^{a/}

Wildlife Species	Federal Status	Habitat Affinity
Black-footed ferret, <i>Mustela nigripes</i>	Endangered	Prairie dog colonies
Canada lynx, <i>Lynx canadensis</i>	Threatened	Montane forests, forest mosaics
Gray wolf, <i>Canis lupus</i>	Experimental / non-essential; population	Varies throughout greater Yellowstone area

a/ Source: Kelly 2005.

The occurrence of each species within the airport area was reviewed in the context of the proposed action. As described below, the review determined that no threatened or endangered species are expected to be present.

Black-Footed Ferret. The black-footed ferret, listed as endangered by the U.S. Fish and Wildlife Service in 1967, is a member of the weasel family. Ferrets occupy underground burrows excavated by prairie dogs (*Cynomys spp.*). Black-footed ferrets have been extirpated across most of their historic range, primarily as a result of prairie dog eradication. It is estimated that 100 to 150 acres of occupied prairie dog habitat are required to sustain a ferret (NatureServe 2006).

Prairie dog colonies are not present in the park or within the project area (Cerovski *et al.* 2004). Because of the close association of large prairie dog complexes and black-footed ferrets, and the absence of prairie dogs in the park, black-footed ferrets are not expected to be present at the airport. There have been no reported observations of the black-footed ferret at the airport.

Canada Lynx. The Canada lynx was listed as threatened under the Endangered Species Act in April 2000. The U.S. Fish and Wildlife Service determined the lynx population in the lower 48 states was at risk as a result of human alteration and fragmentation of montane and boreal forests, low numbers as a result of past exploitation, inter-specific competition for prey with bobcats and coyotes, and elevated levels of human access to their habitat. There is no federally designated critical habitat throughout the portion of Canada lynx range in the greater Yellowstone area.

In Wyoming, the Canada lynx has been protected as a non-game species with no open season since 1973. It is rare in the state (Ruediger *et al.* 2000) and is classified as a Native Species Status 1-Species of Special Concern by the Wyoming Game and Fish Department (2005). This designation indicates that habitat is declining or vulnerable and populations are physically isolated or at extremely low densities.

Lynx management areas, called Lynx Analysis Units, have been identified in Grand Teton National Park (Ruediger *et al.* 2000). Mapping of Lynx Analysis Units in the park was based primarily on vegetative characteristics. Five areas totaling about 150,000 acres provide 96,000 acres of potential lynx habitat. None of these areas includes the airport.

Information on lynx abundance and distribution within the park is limited. Park records include 12 anecdotal lynx observations (NPS 2002a), but the validity of these reports is unknown and none have been confirmed. Three years of surveying within and around the park failed to detect lynx presence. Low habitat quality (for example, low densities of snowshoe hares) make it likely that Canada lynx, if present, would also occur at very low densities, perhaps only as transients (Cain 2002).

Based on the rarity of the species, lack of suitable prey or habitat, and perimeter fence at the Jackson Hole Airport, Canada lynx are not expected to occur within the airport. There have been no reported observations of the Canada lynx at the airport.

Gray Wolf. The subspecies of the northern Rocky Mountain wolf was initially listed as an endangered species in 1973 (38 Federal Register 14678). There has been no critical habitat designated for northern Rocky Mountain gray wolves. The existing population, designated experimental under Section 10(j) of the Endangered Species Act (although it is treated as a threatened species in national parks), was reintroduced into its historic range.

Wolf distribution varies depending on prey abundance. Habitat includes a variety of vegetation cover types. The most important habitat components for wolves are an adequate ungulate prey base and tolerance by humans (Jimenez 2001). Small mammals provide an important source of food during the non-winter months.

In recent years, the Teton Pack used the park consistently, although observations of other wolves with unknown pack affiliations occurred regularly. However, recent information suggests that the Teton Pack may no longer exist as a reproducing pack. Five other wolf packs (Gros Ventre, Flat Creek, Buffalo, Pacific Creek, and Driggs/Teton) are known in the vicinity and may use the park to some degree. There is no consistent wolf activity in the southern part of the park, but confirmed wolf sightings have occurred in the vicinity of Signal Mountain Lodge and Elk Ranch (Cain 2002). The

proximity of the southern part of the park to the National Elk Refuge makes it highly likely that wolves use this area.

Occurrence of wolves in the vicinity of the airport is incidental and rare. Moreover, the perimeter fence surrounding the Jackson Hole Airport probably would be effective in excluding this mid-sized mammal, just as it prevents entry by the wolf's large prey species. As a result, gray wolves are not expected to occur within the project area.

AIRCRAFT/BIRD COLLISIONS

Aircraft/wildlife strikes are a hazard to human safety, equipment, and wildlife at all airport facilities. As directed under a memorandum of agreement, signatory federal agencies are coordinating efforts to address current and future environmental conditions leading to aircraft-wildlife strikes (Cleary and Dolbeer 2005). The memorandum of agreement is intended to improve the internal management of the Executive Branch to address conflicts between aviation safety and wildlife.

Airport sponsors and managers are required to ensure that each airport facility maintains a safe operating environment. Because of past wildlife strikes at the Jackson Hole Airport, an assessment of the risk and magnitude of the wildlife strike problem is underway through the Wildlife Services Division of the U.S. Department of Agriculture in accordance with Title 14, *Code of Federal Regulations*, Part 139.337.

Concern has been expressed regarding the presence of lekking sage-grouse near the runway as a potential safety hazard to humans. However, no aircraft collisions or near misses have been recorded during the strutting season. It is the current practice for airport staff to physically haze sage-grouse from the runway and taxiway early every morning to ensure the birds are not flushed or otherwise forced into an aircraft flight path (Carpenter 2007). The tower directs ground crew response to move wildlife whenever a pilot reports the potential for a wildlife encounter. The local sage-grouse working group conservation plan recommends not hazing sage-grouse because it could cause birds to fly and become a hazard, and it could disrupt lek activity.

The Federal Aviation Administration estimates that, nationwide, nearly 80 percent of wildlife/aircraft collisions go unreported. This suggests that the occurrence of such collisions at the Jackson Hole Airport is higher than the total in the Federal Aviation Administration's National Wildlife Strike Database. Data from this source show that in the 12 years from 1994-2005, 24 bird strikes were reported for the Jackson Hole Airport. Four of these caused substantial damage to aircraft. Eight of the incidents (33 percent), all of which occurred in March, June, or July, were likely with sage-grouse (Federal Aviation Administration 2006e).

There are no records in the Wildlife Strike Database of collisions with animals other than birds at the Jackson Hole Airport. It is believed that, rather than underreporting, this occurs because the fence around the airport is effective at excluding large mammals.

Airport operations include written procedures for perimeter checks, which are accomplished every three hours. These procedures include wildlife monitoring and regular observation to ensure that large wildlife species are not within the perimeter fence, and that smaller species that are not stopped by a fence, such as raptors and coyotes, are not near the runway (Bishop 2008). In addition, airport tower personnel communicate any danger they observe to ground crews, who then address the problem. On the rare occasions when deer or other large animals are found within the perimeter fence, they are herded out an open gate (Johnstone 2006).

There is no aboveground electrical infrastructure at the airport, or threat of electrocution for birds or other wildlife. Plans for additions or improvements to facilities will continue to be reviewed to ensure that they will not increase the potential for aircraft/wildlife strikes. New structures or facilities will be designed to discourage nesting or roosting of raptors or migratory birds at the airport.

SOUNDS FROM AIRPORT OPERATIONS

The wildlife within the airport fence is exposed daily to sound from numerous aircraft types, with no set numbers of daily flights or departure and arrival patterns. Details of the 2004 to 2005 aircraft fleet mix and number of operations are presented in, and general timing of flights are summarized in, Table 7 in the Natural Soundscape section. During this period, approximately 33,000 aircraft operations were recorded. In addition to aircraft sound, wildlife on and near the airport are exposed to daily sound from baggage tugs, snowplows, maintenance trucks, and other equipment associated with airport operations.

Six sound monitors near the airport in the town of Jackson (two sites) and Grand Teton National Park (four sites) have been recording aircraft sound levels since 2004. The closest monitoring site to the airport, the Moulton Loop station, is at Zenith Drive and Spring Gulch Road just south of the runway outside the park. The closest national park site is the Moose station, which is north of the runway and east of the Craig Thomas Discovery and Visitor Center along the Snake River corridor.

Typical daytime ambient sound levels at the Moulton Loop station generally range from the low 50 dBAs to the low 60 dBAs. At the Moose station, they typically range from the low to upper 40 dBAs. The Moose station is farther from the runway and aircraft are higher above the ground at this location than at the Moulton Loop station.

The monitoring stations also log and report the maximum sound level (Lmax) for each sound event of aircraft operations. These indicate the maximum exposure of wildlife to aircraft sound, and vary widely, based on factors such as time of year and location. For example:

- July 5, 2006 was representative of a peak operations day. At the Moulton Loop station, there were 299 reported sound events that ranged from 62.0 to 101.3 dBA. At the Moose station for the same day, there were 46 recorded events that ranged from 63.2 to 82.5 dBA. (The data, which recorded six times more sound events south of the airport than at Moose, also show the effectiveness of the preferred runway procedures that have been implemented by airport managers for sound level reduction.)
- On January 16, 2005, which is during a slower travel time of the year, there were 42 reported Lmax sound events from the Moulton Loop station that ranged from 62.1 to 91.3 dBA. On the same day, the Moose station recorded 30 sound events that ranged from 58.2 to 81.7 dBA.

PARK AND AIRPORT OPERATIONS

The Department of the Interior Airports Act was passed on March 18, 1950 and is part of the *United States Code*, Title 16, Chapter 1, Subchapter I. Section 7a of this act, which is included in Appendix A, states that:

The Secretary of the Interior is authorized 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, national monuments, and national recreation areas, when such airports are determined by him to be necessary to the proper performance of the functions of the Department of the Interior.

The 1983 use agreement says:

“The Secretary of the Interior has determined that the continued operation of [the Jackson Hole Airport] is necessary to the proper performance and function of the Department and that no feasible and prudent alternatives thereto exist.

The use agreement then defines the terms and conditions under which the Jackson Hole Airport must operate. Key points are summarized in Chapter 1 under “Use Agreements for the Jackson Hole Airport.”

NATIONAL PARK SERVICE OPERATIONS

Coordination with and Oversight of the Jackson Hole Airport Board

The 1983 use agreement provides opportunities for the National Park Service, acting on behalf of the Department of the Interior, to function in an oversight role with the Jackson Hole Airport Board. Specifically:

- While the Jackson Hole Airport Board is identified as the operator of the airport, it must consult with the National Park Service on matters that may significantly affect Grand Teton National Park.
- For any proposed improvements, the Jackson Hole Airport Board must notify the National Park Service at the preliminary or conceptual stage, and provide detailed plans and specifications at least 150 days before the start of construction. The National Park Service must provide the board with its written comments, if any, within 60 days.
- The National Park Service must participate in annual joint inspections with the board to determine maintenance and repair needs.
- The National Park Service is to receive an annual financial report, and has the right to examine the board’s records to verify reports.
- Coordination with the National Park Service is required to ensure conformance with the National Historic Preservation Act and National Environmental Policy Act. Except within the development subzone, where National Environmental Policy Act compliance requirements were met by the 1983 use agreement environmental assessment, both acts apply to all actions at the airport.

These activities result in daily interaction between the airport and the NPS' lead contact, and collectively require about one full-time-equivalent NPS position in a normal year. That value can increase during special circumstances, such as the preparation of this environmental impact statement on extending the use agreement. However, even under these conditions, the NPS' coordination and oversight activities represent a tiny fraction of the labor associated with its employment at the park of almost 200 people in the winter and 300 during the summer season.

Management of the Area around the Jackson Hole Airport

The National Park Service manages the sagebrush flat outside the airport boundary for wildlife and other natural ecological processes. The staff commitment required to implement this management approach in this area would not change with implementation of either alternative.

Transit Business Study

The record of decision for the *Transportation Plan Final Environmental Impact Statement, Grand Teton National Park* (NPS 2006b) was signed in March 2007. A transit business study is currently being developed that will evaluate the feasibility of establishing community partnerships to provide public transit service within the park and between Jackson and the park. Transit services could potentially be provided in partnership with another entity, such as the Southern Teton Area Rapid Transit (START).

Interagency Helibase Operations

In 2004, the National Park Service and U.S. Forest Service constructed a permanent, interagency, helibase operations center at the Jackson Hole Airport. Factors contributing to the selection of this site included the availability of utilities infrastructure, absence of commercial or residential buildings that could interfere with flight operations, proximity to primary locations for search and rescue missions, adequate safety clearances, and the compatibility of the proposed facility with existing visual and sound conditions and visitor expectations (NPS 2001b).

The helibase, shown in Figure 3, is north of the terminal, outside the development subzone. The 5-acre site includes an office building, underground fuel storage, parking, security fencing, and three helicopter pads, each with a 90-foot safety circle and the ability to accommodate medium (Type 2) helicopters. Future development could include a 5,000-square-foot aircraft hangar.

The helibase water, sewer, and electrical systems are connected to those of the airport. All other functions, such as fuel storage, parking, and site snowplowing, are independent from airport operations (although the agencies benefit from the airport staff's plowing of snow from the access road from U.S. Highway 26/89/191 to the airport). Helibase flight operations are coordinated with the tower, which is operated by the Federal Aviation Administration, during activities such as wildland fire suppression and search and rescue. Helibase flight operations do not include helicopter medical evacuations which, as described under "Public Health and Safety," fly directly from the originating city to the helipad at St. Johns Medical Center.

JACKSON HOLE AIRPORT OPERATIONS

Facilities

Facilities at the Jackson Hole Airport were shown in Figure 3. The asphalt runway, designated 1/19 (indicating a nearly north-south alignment), is 6,300 feet long and 150 feet wide, with 300-foot-long, paved safety areas on each end. The runway is stress-weighted for 300,000 pounds. The north end of the runway is 6,451 feet above mean sea level and the south end is 38 feet lower, at 6,413 feet. The runway is served by a full, parallel, 75-foot-wide taxiway along its east side. The center-to-center separation between the runway and taxiway is 400 feet.

Consistent with the use agreement, improvements west of the runway are limited to navigation and safety aids. These include the airport beacon, segmented circle and wind tee, 50-foot-high air traffic control tower, and very high frequency omnidirectional range (VOR) navigational aid. The VOR is about 1,500 feet north of the end of the runway, slightly to the west of its center line.

Based on an environmental assessment and finding of no significant impact, the Federal Aviation Administration (2006c) and National Park Service approved a plan to construct a radar facility on the northwest part of the airport. The Air Traffic Control Beacon Interrogator, Model 6 radar system was constructed and began operation in 2008. It is tied to the Salt Lake City Air Route Traffic Control Center and provides controllers with information on aircraft within 200 nautical miles of the Jackson Hole Airport. The system includes a tower supporting a rotating radar sail and antenna that, with lightening rods, extends 39 feet above the ground surface. The radio transmitter and electronic equipment is in a 27-foot by 30-foot shelter next to the tower. The facility enhances the safety of flight operations and the efficiency of air traffic control by providing radar coverage that was previously not available for aircraft using the Jackson Hole Airport

Almost all other airport facilities are within the 28.5-acre development subzone. These include the terminal, aircraft rescue and fire fighting (ARFF) building, rental car facility, hangars, automobile parking lots, fixed-base operator buildings, fuel storage in underground tanks, internal roads, septic tank and leach field systems for wastewater treatment, and most of the aircraft parking area.

All buildings within the development subzone are within the 1983 use agreement's requirement that they cannot be "at an elevation height in excess of the existing buildings." The National Park Service and Jackson Hole Airport Board have agreed that this elevation is 6,437 feet above mean sea level.

The interagency helibase is north of the terminal outside the development subzone. This NPS facility is authorized at this location under the July 30, 2003 amendment to the 1983 use agreement. In 2005, the aircraft apron was extended to the north by 300 feet and a 20,000-gallon storage facility for concentrated propylene glycol for aircraft deicing was installed north of the terminal behind the helibase.

The Jackson Hole Airport Board has an ongoing program of facilities improvements. Many of the actions taken at the airport over the past 20 years are listed under the heading, "Existing Facilities at the Jackson Hole Airport" in Chapter 1. Improvements that were recommended in the airport master plan environmental assessment (P&D Environmental Services 1997) that could be implemented in the future include:

- Replacement of the Jackson Hole Aviation office and conventional hangar with a single building;

- Removal of two of the northerly Jackson Hole Aviation buildings, and replacement of the T-hangars with a single hangar at the same location;
- An addition to the aircraft rescue and fire fighting (ARFF) building; and
- Addition of a conventional hangar in the area of the Jackson Hole Aviation office.

All of these facilities upgrades would be constructed within the boundary of the development sub-zone and would conform with the height restrictions in the use agreement. They also would require consultation for compliance with Section 106 of the National Historic Preservation Act.

Enplanements

The data on enplanements (see the glossary for a definition) shown in Table 11 were provided by the Jackson Hole Airport Board (2006c) and Bishop (2008) for the 15-year period from 1993 through 2007. Changes from year to year varied widely, with decreases in enplanements between 5 years and increases between 9 years. Enplanements in 1993 and 2002 were nearly identical, at about 190,000 per year. Since then, enplanements have increased in most years, resulting in an all-time high of more than 289,000 enplanements in 2007.

TABLE 11: ENPLANEMENTS AT THE JACKSON HOLE AIRPORT, 1993 THROUGH 2007

Year	Number of Enplanements	Percent Change
1993	193,982	--
1994	181,080	-6.6
1995	169,062	-6.6
1996	180,120	+6.5
1997	191,113	+5.7
1998	199,694	+4.5
1999	173,358	-13.2
2000	182,013	+5.0
2001	176,764	-2.9
2002	190,416	+7.7
2003	217,729	+14.3
2004	215,587	-1.0
2005	250,165	+16.0
2006	274,031	+9.5
2007	289,000	+5.5

Enplanements show two seasonal peaks (Jackson Hole Airport Board 2006c):

- The higher peak occurs in July and August, each of which has about 15 to 20 percent of the annual enplanements per month. Much of this air traffic is associated with summer visitation to the area's national parks.
- The second peak begins in December and builds to a high in March, a month that typically has about 12 percent of annual enplanements. Most of these people are drawn to the area by winter sports activities, particularly skiing.

- April and November have the lowest numbers of enplanements, with numbers in these months that consistently are about 3 or 4 percent of annual enplanements. These numbers probably represent the base level of scheduled passenger service air travel that would occur from area residents and from business activity not directly related to the recreation industry. For the 10-year period, 1993 through 2002, this represented about 5,000 to 7,500 enplanements per month.

The development of the two distinct travel seasons at the Jackson Hole Airport has occurred gradually since 1970, when the only significant air travel was during the summer months. By 1980, a pronounced winter travel peak was developing, and by 1990, the winter travel level was approaching summer numbers (P&D Environmental Services 1997).

Airport Flight Operations

Currently, 52 aircraft are based at the Jackson Hole Airport. These include 36 single-engine airplanes, 3 multi-engine airplanes, 11 jet airplanes, and 2 gliders (AirNav, LLC 2008).

Table 12 shows aircraft operations (see the glossary for a definition) at the Jackson Hole Airport for the period from 1999 through 2005.

**TABLE 12: OPERATIONS AT THE JACKSON HOLE AIRPORT,
1999 THROUGH 2005 AND ESTIMATED 2025**

Year	Air Carrier	Regional Carrier	Itinerant General Aviation	Local General Aviation	Military	Total	Percent Change
1999 ^{a/}	2,200 (9.9%)	7,129 (32.0%)	10,035 (45.0%)	2,784 (12.4%)	130 (0.6%)	22,278	--
2000 ^{a/}	1,945 (5.4%)	7,605 (21.2%)	21,769 (60.6%)	4,454 (12.4%)	123 (0.3%)	35,896	+61.1
2001 ^{a/}	2,128 (5.2%)	12,413 (30.5%)	21,633 (53.1%)	4,037 (9.9%)	505 (1.2%)	40,716	+13.4
2002 ^{a/}	1,982 (5.5%)	13,094 (36.4%)	17,095 (47.5%)	3,418 (9.5%)	389 (1.1%)	35,978	-11.6
2003 ^{a/}	3,642 (10.9%)	11,180 (33.3%)	13,941 (41.5%)	4,470 (13.3%)	330 (1.0%)	33,573	-6.7
2004 ^{a/}	2,824 (8.9%)	11,575 (36.4%)	13,729 (43.1%)	3,497 (11.0%)	192 (0.6%)	31,817	-5.2
2005 ^{a/}	3,779 (11.4%)	11,033 (33.3%)	14,415 (43.5%)	3,586 (10.8%)	293 (0.9%)	33,106	+4.1
Estimated 2025 ^{b/}	4,529 (12.4%)	4,791 (13.1%)	27,286 (74.5%)	--	--	36,606	+3.5 in 15 years from 2010 to 2025

a/ Source: Records from the Jackson Hole Airport Board (2006c).

b/ Source: The Boyd Group (2007a). General aviation was not divided into itinerant versus local. Military operations were deemed insignificant and excluded by The Boyd Group.

The counting system for airport operations changed somewhat in the year 2000 when the air traffic control tower was installed, creating an artificial increase of more than 60 percent between 1999 and 2000. However, 1999 may also have been an unusually low year, as evidenced by an operations count that year that was lower than those recorded using the same system for all four years, 1988 through 1991, that were described in the 1997 master plan environmental assessment (P&D Environmental

Services 1997). In 2005, the airport had a total of 33,106 operation, or an average of about 90 aircraft operations per day.

The airport master plan environmental assessment noted that a change was occurring in the type of aircraft using the Jackson Hole Airport. It observed a decrease in single-engine engine aircraft based at the airport and a shift to larger, turbine-powered aircraft (P&D Environmental Services 1997).

In their landings and takeoffs, pilots are requested to minimize aircraft sound over the noise-sensitive portions of the park, as defined in the use agreement. The airport is close to the park's south boundary, and published sound abatement procedures identify a preferred arrival approach from the south (use of Runway 01) and a preferred departure to the south (use of Runway 19). However, despite the preference for approaches and departures that avoid overflight of the park, factors that include prevailing winds, other weather conditions, and instrument flight procedures result in most approaches being made from the north and about 15 percent of the departures going north. On these flights, pilots are requested to stay east of the Snake River and/or U.S. Highway 26/89/191 (Jackson Hole Airport Board 2006b), but levels of conformance vary.

When pilots are flying in from the north under instrument flight rules (IFR), the air traffic control system routes aircraft into the area from the north or east toward a point about 15 miles north of the airport above Jackson Lake. At this location, aircraft are at an elevation of 11,000 feet above sea level, or approximately 4,200 feet above the ground surface. From there, they fly south at a glide slope of 3 degrees in an alignment with the runway that generally runs along the Snake River corridor between the base of the mountains and the highway. Landing aircraft are at a height of about 3,000 feet above ground level just west of the Teton Point Turnout on U.S. Highway 26/89/191 and fly over the Moose area at a height of about 1,000 feet above the ground.

Weather permitting, pilots leaving the Jackson Hole Airport are requested to make a takeoff toward the south. Aircraft flying in this direction cross the park boundary shortly after takeoff and are requested to bear left (east) as soon as practical to avoid overflight of the residential area. When a takeoff to the north is required, aircraft are requested to stay east of U.S. Highway 26/89/191 as soon as practical after takeoff, and to avoid climbs to the northwest over the park.

The Jackson Hole Airport Board has implemented a range of actions to minimize sound from aircraft operations. These were discussed in Chapter 2 under the heading "Mitigation Measures Common to Both Alternatives" and under the impact topic "Natural Soundscape." Some of these include a ban on the louder Stage II aircraft, enforced through Jackson Municipal Code 12-16-210B; traffic patterns that avoid the park, including preferential runway use; and a voluntary nighttime curfew that pilots are requested to observe except in emergencies. About six letters are issued per month to the owners or operators of aircraft for landings during the voluntary nighttime curfew period during the summer. During the winter, because of the shorter days, there are more operations, particularly arrivals, after dark (but before the beginning of the curfew at 11:30 P.M. for landings). However, few people are outside after dark during the winter. Therefore, there is a relatively low level of exposure to aircraft sound in the evening during the winter season.

A summary of the schedule for passenger airline service at the Jackson Hole Airport is available on the Internet at http://www.jacksonholeairport.com/flightinfo_schedules.html. On a typical weekday:

- About six scheduled passenger service aircraft park overnight at the Jackson Hole Airport, but this number varies between summer and winter, by day of the week, and from year to year. Saturday nights tend to have the most overnight aircraft parking, with as many as 9 or 10. Usually, these aircraft depart for destinations around the nation between 7:00 A.M. and 9:30 A.M.

- Ten scheduled passenger service aircraft land and takeoff between 10:15 A.M. and 7:20 P.M. These operations are relatively evenly distributed throughout the day. Most turn-around times between the landing and takeoff of an aircraft are 20 to 40 minutes.
- Between 6:15 P.M. and 9:30 P.M. there are landings of the about six scheduled passenger service aircraft that park overnight at the airport.

General aviation flights are not on a fixed schedule. However, they generally conform to the following traffic pattern:

- Most general aviation flights, summer and winter, occur during the middle of the day. During this mid-day period during the peak season, an operation (a takeoff or landing) occurs approximately every 4 minutes.
- A substantial number of landings of aircraft that originated at other airports occur around noon.
- The period between 2:00 P.M. and 4:00 P.M. is a popular time for takeoffs for itinerant general aviation.
- A substantial number of arrivals occur between 5:00 P.M. and 9:30 P.M. These aircraft typically are parked overnight at the airport.

Information on sound relating to airport use is included in the natural soundscape section. As described there, current airport operations meet all noise requirements in the use agreement, and the Jackson Hole Airport Board is committed to continued improvement in the management of sound. Therefore, it is not expected that the sound and environmental management aspects of the alternatives would affect future airport operations or functionality.

Airport Ground Operations

In accordance with Section 4(b) of the 1983 use agreement, the Jackson Hole Airport 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 operations, management, utilization and maintenance thereof.” The exception is the interagency helibase, which is operated by the National Park Service in accordance with its general agreement with the Jackson Hole Airport Board and the July 30, 2003 amendment to the use agreement.

Under contract to the Jackson Hole Airport Board, Jackson Hole Aviation, LLC has been the fixed-base operator at Jackson Hole Airport for nearly 20 years. Products and services provided by the fixed-base operator include aviation fuel, aircraft maintenance, ground equipment maintenance, private aircraft hangars, flight instruction, and charter service. The airport’s contract with the fixed-base operator includes requirements for conformance with noise control measures. The contract also requires the operator to insert language into all subcontracts to ensure noise abatement plan compliance, and requiring them to distribute copies of the noise abatement plan to pilots departing the airport.

Scheduled passenger air service at Jackson Hole Airport was described in Chapter 1 under the heading “Current Use of the Jackson Hole Airport and Other Airports in the Region.” The number of operations varies by season, but generally involves between 12 and 20 takeoffs and a similar number of landings each day. All of the Jackson Hole Airport Board’s leases with scheduled passenger service airlines require them to ensure that their pilots are aware of the sound abatement rules and procedures and to take appropriate action against employees for operations contrary to the noise plan where there is no valid reason for noncompliance.

Terminal services include ticketing, check-in, baggage handling, and security for scheduled passenger service travelers. The Jackson Hole Airport Board is responsible for security under a contract with the Transportation Security Administration, and is one of the few entities nationwide to provide this service on a contract basis. The terminal also houses the administrative offices of the Jackson Hole Airport Board, airlines, and car rental companies.

Food services at the terminal are provided through a contract with a local restaurant. The large gift shop is operated by the Grand Teton Natural History Association, and proceeds help support educational, interpretive, and scientific programs in Grand Teton National Park. A smaller gift shop in the terminal helps support the National Wildlife Art Museum north of Jackson.

About a quarter of the development subzone is committed to automobile parking for scheduled passenger air service. Short-term parking is free, and long-term parking costs \$8.00 per day. Additional parking areas that are used primarily for rental cars and general aviation are east of the hangars and in the southeast corner of the development subzone. Parking generally is readily available, although the number of spaces can be reduced substantially in the winter when parts of parking areas are used for storage of removed snow.

Four car rental companies have on-airport locations and collectively can have 200 or more automobiles parked at the airport within the development subzone. Onsite activities include the washing and refueling of vehicles and basic maintenance such as oil changes. As described in the “Water Quality and Hydrology” section, the used oil is hauled offsite and recycled. The tanks that collect sludge from the car wash are pumped out several times each year and the sludge is trucked offsite for proper disposal.

Ground transportation also is provided by several taxi services, shuttle services, and car rental companies. All taxi and shuttle services and the off-airport car rental companies utilize the courtesy telephone and park in assigned traffic lanes.

Aircraft and automobile fuels are stored in underground storage tanks that conform with Wyoming Department of Environmental Quality storage tank rules in Chapter 17 of the state’s water quality rules and regulations and the U.S. Environmental Protection Agency requirements in Title 40, *Code of Federal Regulations*, Parts 280 and 281. In addition to fuels, the chemicals that are handled at the airport include propylene glycol for the winter deicing of aircraft, lubricating oils, and small volumes of solvents used for cleaning. Management of these substances was addressed under “Water Quality and Hydrology.”

As a joint powers board created by the Town of Jackson and Teton County, the Jackson Hole Airport Board responds to emergencies at the airport on behalf of the county. Fire trucks and other emergency equipment are housed in the aircraft rescue and firefighting (ARFF) building south of the terminal. Personnel from the airport and National Park Service coordinate in fire rescue. Regular training and drills help ensure that appropriate emergency response is available.

All of the wastewater produced by airport operations in the development subzone flows by gravity to one of the three septic tank and leach field treatment systems in this zone. A separate septic tank and leach field was installed with the control tower and treats wastewater from this facility. Additional information on wastewater treatment is in the “Water Quality and Hydrology” section.

The Jackson Hole Airport Board contracts for a variety of other services that are needed to maintain operations at the airport. For example, snowplowing of parking lots is obtained from a commercial service, and Teton County provides herbicide application for weed control. These and other activi-

ties are coordinated with the National Park Service to ensure protection of park resources, such as obtaining NPS confirmation that all herbicides and other pesticides to be applied onsite are on the NPS-approved list.

During most winters, substantial volumes of snow are removed from the airport runway, taxiway, ramps, and parking areas. Currently, the Jackson Hole Airport has eight major pieces of snow removal equipment, and 12 people who can be assigned to snow removal so it can proceed around the clock. In winter 2006/2007 the cost of snow removal was about \$600,000, which was paid for primarily by scheduled passenger service. Airport snow removal and management practices were described in the “Water Quality and Hydrology” section.

Payments to the U.S. Department of the Interior

Section 3 of the 1983 use agreement specifies annual payments from the Jackson Hole Airport Board to the U.S. Department of the Interior equal to the sum of 1 percent of the first \$200,000 of operating receipts (excluding grants and revolving funds), and 1.5 percent of all additional operating receipts. Payments made to the U.S. Department of Interior under this section have ranged between \$30,000 and \$50,000 annually, with payments totaling \$371,000 over the last 10 years.

FEDERAL AVIATION ADMINISTRATION INVOLVEMENT WITH THE JACKSON HOLE AIRPORT

The Federal Aviation Administration is the lead federal agency for all aviation-related regulatory activities at the Jackson Hole Airport. The Jackson Hole Airport Board coordinates closely with the Federal Aviation Administration to ensure that all aspects of airport operations conform with federal rules and regulations. The National Park Service participates when decisions could affect the land on which the airport is constructed or other resources of Grand Teton National Park.

The Federal Aviation Administration is responsible for compliance with the National Environmental Policy Act relating to airport facilities or operations that are federally funded through its programs. However, all actions that are subject to National Environmental Policy Act compliance by the Federal Aviation Administration must comply with the terms and conditions of the use agreement, and may require the concurrence of and/or additional environmental compliance by the National Park Service.

Part 139 Certification

Each year under Title 14, Part 139 of the *Code of Federal Regulations*, the Federal Aviation Administration performs a certification inspection of airports that support scheduled passenger aviation services. Some of the areas of concern include the condition of pavement and other facilities, fire-fighting equipment, fuel storage, training, and record-keeping.

Personnel from the Jackson Hole Airport Board, National Park Service, and fixed-base operator coordinate to ensure that all aspects of airport operations meet Federal Aviation Administration requirements. As a result, the airport consistently receives high scores. For example, the 2005 inspection found the airport in complete conformance and did not result in any deficiencies or notices for improvements.

Because Federal Aviation Administration grants to the Jackson Hole Airport represent more than 70 percent of all funding that is available to the airport for facilities maintenance and capital improvements, these grants are essential to maintain a level of airport safety and security that will support scheduled passenger service aviation. Under the current use agreement, the Jackson Hole Airport will lose its eligibility for these grants in 2013. Without this funding source, at some time in the future, the airport will no longer be able to maintain its Part 139 certification. At that time, all scheduled passenger service to the Jackson Hole Airport would cease.

Airport Classification

The National Plan of Integrated Airport Systems identifies 3,344 existing airports that are significant to national air transportation and, therefore, are eligible to receive grants under the Federal Aviation Administration Airport Improvement Program. Of these, 383 are classified as primary, with more than 10,000 annual passenger enplanements. The remainder are classified as commercial, reliever, and general aviation airports.

Based on the enplanements criterion, the Jackson Hole Airport (with at least 160,000 enplanements in each of the past 13 years) is classified as a primary airport. Primary airports annually receive at least \$1 million in Airport Improvement Program funds, with the amount determined by the number of enplaned passengers. Based on 2006 enplanements, the Jackson Hole Airport received \$1.7 million in Airport Improvement Program funds. Additional Airport Improvement Program funds may be made available to the airports based on need. The “Socioeconomics” section provides more information under the heading “Airport Funding.”

Among primary airports, small hubs are defined as airports that enplane 0.05 percent to 0.25 percent of all annual passenger enplanements (or at least 369,500 of the total 739 million enplanements in 2005). Primary airports like the Jackson Hole Airport that enplane fewer passengers (250,165 enplanements at the Jackson Hole Airport in 2005) are categorized as non-hub primary airports. Collectively, the 247 primary airports in the non-hub category provide 3.1 percent of the nation’s enplanements (Federal Aviation Administration 2004).

Airport Funding

Federal Aviation Administration funding is the most important source of revenue available to the Jackson Hole Airport Board. Money from the Federal Aviation Administration varies substantially by year, but overall it represents more than 70 percent of all funding that is used by the airport board for facilities maintenance and capital improvements. Detailed information on Federal Aviation Administration grant funds under the Airport Improvement Program and passenger facility charges are provided in the affected environment description of “Socioeconomics.”

USE TRENDS

The Jackson Hole Airport is the most important airport in Wyoming, accounting for more than 30 percent of all aviation-related jobs in the state, 40 percent of total annual expenditures of the state’s general aviation visitors, and almost 75 percent of scheduled passenger service enplanements (Wyoming Department of Transportation 2004, Bishop 2009). However, as shown in Table 12 (the flight operations table) use of the airport has been highly variable from year to year. For example, for the years 1999 through 2005:

- Use of the airport generally increased, but that growth was not steady. Operations increased in three years and decreased in three years, and 2005 total operations were almost 20 percent *lower* than total operations in 2001 (but higher than in 1999).
- *Scheduled passenger service operations* likewise had 3 years of decreased operations and 3 years of increased operations, but their pattern did not correlate with the total operations pattern.
- The component of use represented by *local general aviation* remained fairly constant, ranging between about 10 and 13 percent of total use. *Commercial air carrier* use was more variable, representing from 5 to 11 percent of airport use.
- *Itinerant general aviation* consistently accounted for the greatest number of operations, but ranged between 41 percent and 61 percent of total use, with no steady pattern.

Total airport operations in 2005 were 41 percent higher than the levels of about 23,000 operations per year that prevailed throughout the late 1980s and early 1990s (P&D Environmental Services 1997). Airport use demonstrated slower growth than occurred in the area's population: based on U.S. Census Bureau data presented in the "Socioeconomics" section, Teton County's population increased by 70 percent during this time and Jackson's population increased by 47 percent.

Existing conditions already constrain use of the Jackson Hole Airport. These conditions will continue into the foreseeable future and include:

- The size of the aircraft ramp. The availability of aircraft parking is limited by the size of the ramp area, which could only be expanded by taking space away from other uses within the development subzone. The lack of ramp space already restricts the number of general aviation aircraft that can park at the airport. The airport employs a parking reservation system during busy periods, such as around holidays in July and December, to provide pilots with assurances that they will be able to park their planes. Pilots who cannot obtain parking reservations must either choose another destination or drop off their passengers and fly out.
- The operational constraints of the single runway, particularly in instrument flight rules (IFR) conditions.

The airport is underutilized in the off-seasons of late autumn and early spring, but significant growth in these months is not expected.

The economy of the area and, therefore, the use of the Jackson Hole Airport, depends heavily on recreation, primarily including visits to national parks in the summer and to ski resorts in the winter. Some of the factors affecting recreational travel in the United States include the economy; gasoline prices; demographic changes, such as the aging of baby boomers; changes in popularity of foreign travel; and the growing popularity of home entertainment, including video games, Internet use, and the ability to watch movies at home (Pergams and Zaradic 2006). All of these probably contribute to the year-to-year changes that can be seen in airport operations at the Jackson Hole Airport and all will continue to affect the numbers of operations and enplanements in the future.

FORECASTS OF AIRCRAFT OPERATIONS

Aviation Industry-Wide Forecast

The U.S. Department of Transportation recently published its 12-year aviation forecasts for the years 2006 through 2017 (Federal Aviation Administration 2006d). Features of the forecast that potentially relate to future use of the Jackson Hole Airport are as follows.

- Domestic market enplanements on scheduled passenger service air carriers are expected to increase by an average of 3.2 percent per year for most of the analysis period.
- General aviation hours flown also are expected to increase by 3.2 percent per year for most of this period.
- There are projected to be about 535,000 active general aviation pilots (excluding air transport pilots) in 2017, an increase of 1.1 percent yearly over the forecast period.
- General aviation is expected to receive a boost from relatively inexpensive twin-engine microjets, with the addition of about 100 of these aircraft to the fleet in 2006 and 500 per year by 2017. In 2017, an estimated 4,950 of these aircraft will be in service.
- Other factors expected to contribute to general aviation include increases in corporate jet flights and in fractional ownership of aircraft.
- Starting in 2005, the Federal Aviation Administration created a new category of aircraft called “light sport.” This new category is projected to total roughly 14,000 aircraft in 2017.
- The number of piston-powered aircraft (including rotorcraft and light sport aircraft) will increase by about 1 percent per year from the current 193,098 aircraft to 218,415 in 2017.

The Federal Aviation Administration observes that in the short term, its forecast errors tend to be modest. However, it acknowledges that errors for 10-year forecasts are larger because of unanticipated external events that affect the aviation system. It also recognizes that its long-term forecasts consistently have been too high and it is exploring ways to eliminate its bias toward growth.

Forecast of Airport Operations The Boyd Group, Inc.

The modeling associated with this environmental impact statement required a more detailed forecast of operations at the Jackson Hole Airport than was available from other sources. Therefore, the Jackson Hole Airport Board contracted with The Boyd Group, Inc. (2007a) to prepare a detailed forecast of operations in 5-year increments from 2010 through 2025. The factors that were considered by The Boyd Group, Inc. are described in the Alternative 1 analysis in Chapter 4 in the “Natural Soundscape” analysis under “Methods.” Details of their forecasts, including numbers of operations by aircraft type and model for the years 2015 and 2025, are provided in that same location.

The Boyd Group, Inc. concluded that changes in fleet mix will slow future growth in number of operations by scheduled passenger carriers at the Jackson Hole Airport. In particular, an increase in the average size of regional carrier aircraft will increase capacity while reducing the number of operations. As a result, aircraft operations over their forecast period from 2010 through 2025 would experience an increase of 3.5 percent. They predicted that in the year 2025, itinerant general aviation, consisting of business jet (45 percent), turboprop (15 percent), and piston (15 percent) aircraft, would represent almost 75 percent of airport operations. Regional carriers would represent 13 percent of operations, and major air carriers would account for 12 percent of operations.

The Boyd Group, Inc. also provided a caution about the reliability of forecasts because of rapid developments in the field of small aircraft. In particular, they state that, “The new breed of very light jets may render historical data and assumptions regarding business and general aviation useless in projections.”

JACKSON HOLE AIRPORT CAPACITY

Scoping identified concerns regarding the capacity of the existing airport area to accommodate the anticipated growth in operations. Studies have not been conducted to determine the airport’s long-range operational capacity. However, comparisons to current conditions can be used to make reasonable projections regarding capacity.

The most restrictive conditions at the Jackson Hole Airport occur when pilots are flying under instrument flight rules (IFR). Under these conditions, aircraft operations are spaced at three-minute intervals, which limits the airport to 20 operations per hour.

- Currently, as was shown in Table 7, the airport averages about 90 operations per day. The Boyd Group, Inc. forecasts only modest growth in Jackson Hole Airport operations between now and 2025. Therefore, the capacity to handle operations on the typical day should not be a problem well into the future.
- On a few peak days around holidays, the Jackson Hole Airport handles more than 200 daily operations. This already results in crowding around popular times, particularly when instrument flight rules are in effect. However, with appropriate coordination among pilots, tower personnel, and airport staff, the airport will have adequate daily capacity to handle peak demand beyond the 2033 timeframe of this environmental impact statement.

Ramp space for general aviation aircraft parking already is a limiting factor on peak days around holidays. As a result, the Jackson Hole Airport Board has implemented a reservation system for ramp parking. This situation has little effect on fractional ownership or charter services, where the passengers are dropped off and the aircraft departs to provide service to others. Pilots who wanted to park but who could not obtain a reservation would continue to be inconvenienced by the parking limitations.

As described previously, 6 to 10 aircraft that provide scheduled passenger service park overnight at the Jackson Hole Airport and make early morning departures. Based on forecasts from The Boyd Group, Inc. (2007a), these numbers are not likely to change between now and 2025. However, if it was justified by demand, the Jackson Hole Airport Board could increase the amount of the ramp area available for scheduled passenger service aviation by decreasing the amount available for general aviation. Because of the availability of this option, overnight parking capacity at the airport for scheduled passenger service aircraft would not be a limiting factor until well after 2033.

PUBLIC HEALTH AND SAFETY

This section describes the existing conditions and issues related to public health and safety of airport operations, including public health and safety in the park and at the Jackson Hole Airport, community health and safety and emergency response related to the airport, highway safety related to airport vehicle traffic, and airport storage and use of hazardous materials. It also presents the potential impacts on public health and safety for each alternative. Because the airport has regional significance and influence, public health and safety related to airport operations is addressed for the park and regionally.

PUBLIC HEALTH AND SAFETY IN NATIONAL PARKS

Section 8.2.5 of *Management Policies 2006* (NPS 2006a) states that the National Park Service “will seek to provide a safe and healthful environment for visitors and employees . . . [and] will strive to identify and prevent injuries from recognizable threats to the safety and health of persons and to the protection of property by applying nationally accepted codes, standards, engineering principles, and the guidance contained in Director’s Orders #50B [Occupational Safety and Health Program], #50C [Public Risk Management Program], #58 [Structural Fire Management], and #83 [Public Health], and their associated reference manuals.” The visitor safety and emergency response provisions in *Management Policies 2006* apply to all allowable activities and congressionally designated purposes and mandates within national parks, including the Jackson Hole Airport within Grand Teton National Park.

JACKSON HOLE AIRPORT SAFETY REQUIREMENTS

The Jackson Hole Airport is a class 1 airport with regularly scheduled air carrier service. The airport is fully certified under Title 14, *Code of Federal Regulations*, Part 139. As part of this certification, the airport maintains an airport certification manual and airport emergency plan that outline the specific measures it uses to comply with the Part 139 health and safety requirements.

A safety self-inspection program requires personnel to assess compliance with the airport certification manual and airport emergency plan twice daily. These inspections include assessing the condition and operation of the airfield’s fueling equipment, emergency response equipment, emergency response personnel, navigational aids, pavement, markings, lighting, signage, unpaved safety areas, vegetation, obstructions, wildlife, and construction affecting the operation of aircraft. These daily inspections are confirmed by an onsite annual inspection by the Federal Aviation Administration’s Airports Division based in Renton, Washington.

When non-compliant items are found, they must be corrected. Documentation of the discovery of non-compliant items and their correction are kept for 24 consecutive months. If a combination of non-compliant items causes the airport to be in violation of its certification, the airport operator must notify the Federal Aviation Administration, as well as airmen and air carriers using the airport, by issuing a notice to airmen or NOTAM. If the non-compliant items are not corrected, the airport could lose its Part 139 certification.

For aircraft rescue and firefighting (ARFF), the Federal Aviation Administration categorizes airports into indexes. An airport’s index determines the number of emergency vehicles, and the amount and type of firefighting agent/s required. The ARFF index for the Jackson Hole Airport is “C.”

The airport employs 16 full-time firefighters to respond to all fire, hazardous material, and medical emergencies on the airport. Of these, five have additional duties as law enforcement officers. In addition to patrolling the property, they respond to security, criminal, and disturbance calls.

Despite the measures to ensure a safe operating environment at the Jackson Hole Airport, accidents and incidents occur. As defined by the Federal Aviation Administration's "Notification and Reporting of Aircraft Accidents or Incidents" in Title 49, *Code of Federal Regulations*, Part 830.2:

"Aircraft accident means an occurrence associated with the operation of an aircraft . . . in which any person suffers death or serious injury, or in which the aircraft receives substantial damage."

"Incident means an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations."

"Serious injury means any injury which: (1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface."

"Substantial damage means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered 'substantial damage' for the purpose of this part."

Title 49, *Code of Federal Regulations*, Part 830.5 "Immediate Notification" states:

"The operator of any civil aircraft, or any public aircraft . . . shall immediately, and by the most expeditious means available, notify the nearest National Transportation Safety Board field office when:

"(a)An aircraft accident or any of the following listed incidents occur:

"(1) Flight control system malfunction or failure;

"(2) Inability of any required flight crew member to perform normal flight duties as a result of injury or illness;

"(3) Failure of structural components of a turbine engine excluding compressor and turbine blades and vanes;

"(4) In-flight fire; or

"(5) Aircraft collide in flight.

"(6) Damage to property, other than the aircraft, estimated to exceed \$25,000 for repair (including materials and labor) or fair market value in the event of total loss, whichever is less.

"(7) For large multi-engine aircraft (more than 12,500 pounds maximum certificated takeoff weight):

“(i) In-flight failure of electrical systems which requires the sustained use of an emergency bus powered by a back-up source such as a battery, auxiliary power unit, or air-driven generator to retain flight control or essential instruments;

“(ii) In-flight failure of hydraulic systems that results in sustained reliance on the sole remaining hydraulic or mechanical system for movement of flight control surfaces;

“(iii) Sustained loss of the power or thrust produced by two or more engines; and

“(iv) An evacuation of an aircraft in which an emergency egress system is utilized.

“(b) An aircraft is overdue and is believed to have been involved in an accident.”

The National Transportation Safety Board’s interactive website entitled “Accident Database and Synopses” is available on the Internet at <http://www.nts.gov/nts/query.asp>. This website was queried to obtain information on aircraft accidents reported in association with the Jackson Hole Airport from January 1, 1990 through July 1, 2008 (18.5 years). During this period, a total of 28 aircraft accidents were reported. Not all of these accidents involved operations at the airport, but it was the nearest airport and, therefore, was listed on the National Transportation Safety Board investigation reports. For example, several of the accidents involved crashes into the mountainous terrain up to 40 miles from the Jackson Hole Airport.

- Twelve years had accidents that met reporting criteria of the National Transportation Safety Board. The greatest numbers of accidents occurred in 2000 and 2001, with four accidents each year.
- General aviation accounted for 22 of the 28 accidents. Air taxi and commuter aircraft were involved in three accidents. Two accidents, which involved agency firefighting aircraft, were classified as public use. One of the accidents involved scheduled passenger air service.
- Pilot error was a primary or contributing factor in at least 19 accidents. In seven cases, poor weather conditions were cited. These included wind shear or gusts, poor visibility, and ice or snow. Mechanical or maintenance problems were the source of eight accidents.
- The area’s steep terrain poses hazards. Three of the four fatal accidents resulted from crashes into mountains.
- Two collisions caused four of the reported accidents. During firefighting operations in 2001, one helicopter was entangled in the cable and bucket of another. The other collision occurred on the ground in 1994 and involved two taxiing, fixed-wing aircraft.

In addition to the accidents listed above, the Jackson Hole Airport maintains records on incidents that do not meet the immediate notification criteria of 49 *Code of Federal Regulations* Part 830.5. From January 1998 through June 2008 (10.5 years), excluding the accidents cited above, a total of 43 incidents were recorded.

- Aircraft incidents occurred in every year. The greatest number of incidents occurred in 2005 and 2006, with seven incidents in each year. The average annual number of incidents for the time period is 4.1 per year.
- General aviation accounted for 36 of the 43 incidents. Seven of the incidents involved scheduled passenger air service.
- Mechanical failure or tire failure was the primary emergency in 18 of the incidents. Seven were caused by smoke or fire on board the aircraft (of which two were commercial). Seven were runway over-runs (of which three were commercial). Seven incidents were caused by cockpit indica-

tions of unsafe systems. A bird strike caused one incident (commercial). Pilot error was the major contributing factor to two incidents.

- Among the above-listed incidents, scheduled passenger service aircraft were involved in one mechanical incident, two incidents involving smoke or fire, three runway excursions (overruns), and one bird strike.

COMMUNITY HEALTH AND SAFETY (EMERGENCY RESPONSE)

The town of Jackson and the surrounding communities, national parks and forests, and resorts are in a relatively isolated setting in western Wyoming. During public scoping for this environmental impact statement, concern was expressed about transportation from the Jackson Hole Airport as it relates to community health and safety.

The Jackson area is served by a network of state and federal highways that provide access from the:

- South along U.S. Highways 89, 189, and 191;
- West along U.S. Highway 26 and Wyoming Highway 22;
- North along U.S. Highways 26, 89, and 191; and
- East along U.S. Highway 26 and 287.

In addition, Interstate 15 is about 100 miles west of Jackson and Interstate 80 is about 200 miles south of the town.

All of these roads are well maintained by the Wyoming Department of Transportation, Idaho Transportation Department, or local governments. They function effectively year-round as conduits to the area for food, fuel, medicine, and other goods.

The town of Jackson is served by St. Johns Medical Center, a 108-bed hospital that is fully approved by the Joint Commission on Accreditation of Healthcare Organizations (St. Johns Medical Center 2006). St. Johns Medical Center is the primary regional medical institution for northwest Wyoming, and its campus on the northeast side of the town includes a medical evacuation helicopter landing pad. Other medical resources in the area include much smaller facilities in Driggs, Idaho (36 miles away) and Afton, Wyoming (70 miles away). The nearest large facility is the 340-bed Eastern Idaho Regional Medical Center in Idaho Falls, more than 90 miles and more than 2 hours distant by car.

Data on all medical evacuations from Jackson were compiled and provided by St. Johns Medical Center (Boss 2006). There consistently are about 140 medical evacuations by air per year from the Jackson area. Characteristics are as follows.

- Approximately 10 percent of patients for air evacuations are prone and 90 percent are ambulatory.
- There usually are 50 to 60 helicopter evacuations each year. These helicopters do not use the Jackson Hole Airport or the interagency helibase. Helicopters from Idaho Falls or Salt Lake City can make the round-trip flight without refueling, while helicopters arriving from greater distances refuel at the Eastern Idaho Regional Medical Center in Idaho Falls before stopping at the helipad at St. Johns Medical Center to pick up the patient and return to their home facility.

- There are 90 to 110 medical evacuations by fixed-wing aircraft each year from the Jackson Hole Airport. A few are private charters, but most are emergency medical tickets on scheduled passenger service flights.
- Many medical evacuations, usually involving fixed-wing aircraft, are for visitors to the area who, after the resolution of a medical problem, are trying to catch up to their tour groups.

PUBLIC HEALTH AND SAFETY ON HIGHWAYS

Wyoming is among the most dangerous states in the nation for automobile travel, based on data from *Traffic Safety Facts 2004: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System* (U.S. Department of Transportation 2004). Specifically, traffic fatalities per 100,000 population and fatalities per 100,000 licensed drivers are more than twice the nationwide values. Wyoming also has a much-higher-than-average rate of fatalities per 100 million vehicle miles of travel:

- In 2004, the Wyoming rate was 1.77 traffic fatalities per 100 million vehicle miles of travel, which is 23 percent higher than the national average of 1.44.
- Wyoming's non-Interstate rural roads, which had a 2004 fatality rate of 2.13 per 100 million vehicle miles of travel, were more dangerous than its Interstate or urban roads (1.49 fatalities per 100 million vehicle miles of travel) (TRIP 2006).

For the 5-year period from 2000 through 2004, three road segments in Teton County were identified among the top 25 Wyoming roads with the highest fatality and serious injury rates (TRIP 2006). Table 13 provides information on these road segments. None of these roads are near or provide access to the Jackson Hole Airport.

TABLE 13: TETON COUNTY ROADS AMONG THE 25 WYOMING ROADS WITH HIGHEST FATALITY AND INJURY RATES, 2000 THROUGH 2004 a/

Rank	Route and Location	Length (miles)	Fatalities	Injury	Average Daily Trips
4	Wyoming 22 west of Jackson to the Idaho state line	17	7	37	7,238
12	U.S. Highway 26/89/191 between Hoback Junction and Jackson	14	4	29	9,353
25	U.S. Highway 26/89 between Alpine Junction and Hoback Junction	23	5	21	3,487

a/ Source: TRIP 2006. An injury is an condition that required medical treatment.

The injury-to-fatality ratio that can be calculated for these three road segments ranged between 4.2- and 7.2-to-1, and averaged 5.3 injuries per fatality. This fatality ratio is much worse than the 65.3 injuries per fatality that can be calculated from the 2004 national statistics of 94 injured persons and 1.44 fatalities per 100 million vehicle miles traveled (U.S. Department of Transportation 2004).

The Wyoming Department of Transportation (Adams-Gierisch 2006) provided data for all crashes that occurred on three road stretches of interest for the 5-year period of 2001 through 2005. A summary of the data, with all values standardized to incidents per 100 million miles traveled, is provided in Table 14.

The nature of accidents differed between areas close to Jackson and other areas.

- Close to Jackson, most accidents involved two or more motor vehicles and most commonly occurred at intersections. Accident causes included improper turning, failure to yield the right-of-way, following too closely, and inattentive driver.

TABLE 14: ACCIDENT RATES FOR ROAD SEGMENTS OF INTEREST, 2001 THROUGH 2005 a/

Highway Stretch	Length (miles)	Annual Average Per 100 Million Miles Traveled			
		Crash Rate	Total Crashes	Persons Injured	Persons Killed
U.S. Highway 26/89/189/191/287 from Hoback Junction (milepost 141.30) to Moose (milepost 170.00)	28.7	245	206	77.8	1.7
Wyoming Highway 22 from Idaho state line (milepost 0.00) to Jackson (milepost 17.49)	17.5	224	105	88.2	3.6
U.S. Highway 26/89 from Hoback Junction (milepost 141.29) to Alpine Junction (milepost 118.32) plus Alpine Spur (milepost 0.0 to 2.37)	25.3	145	45	61.9	3.9

a/ All rates per 100 million miles traveled were calculated from the data provided by the Wyoming Department of Transportation (Adams-Gierisch 2006)

- Greater percentages of single-vehicle accidents occurred outside the Jackson area. Following too closely and inattentive driver again were often-cited contributing factors, as were unsafe speed and driving under the influence of alcohol or drugs. Approximately a third of accidents involved more than one motor vehicle; a third involved collisions with fixed objects; and a third involved impacts with animals, most commonly including deer and elk and less frequently with moose and horses.

HAZARDOUS MATERIALS STORAGE AND USE AT THE AIRPORT

Public health and safety concerns in association with the storage and use of hazardous materials at the airport were identified during scoping. The management of fuels, glycol deicer, lubricants, and solvents that are classified as hazardous, or that can be perceived as posing a threat to human health and welfare or the environment was described in the “Water Quality and Hydrology” section. As described there, these materials are stored, used, and disposed at the Jackson Hole Airport in strict compliance with federal and state laws and regulations to ensure that they are not polluting surface or ground water. Annual inspections by the Federal Aviation Administration confirm the safe management of fuels and other flammable or explosive substances.

SOCIOECONOMICS

The geographic area considered for the analysis of socioeconomic conditions and environmental consequences consists of the three-county region of Teton County, Wyoming; Lincoln County, Wyoming; and Teton County, Idaho. The communities of Jackson and Alpine, Wyoming, and Driggs and Victor, Idaho, also are included in the analysis. Within this area, the primary focus is on Teton County, Wyoming and the town of Jackson. Some of the features that affect the socioeconomic setting include the following.

- The town of Jackson is a primary gateway community, providing year-round visitor lodging and other services, for Grand Teton National Park and Yellowstone National Park, two of the most popular units in the national park system.
- Summer is the peak tourist season. During this time, the area offers many recreational opportunities, such as viewing scenery and wildlife, driving for pleasure, hiking and backpacking, whitewater rafting, and horseback riding.
- During the winter, the area provides world-class downhill skiing opportunities at the Jackson Hole Mountain Resort, Snow King Resort, and Grand Targhee Resort, and additional recreation in national forests, particularly including the Bridger-Teton and Caribou-Targhee National Forests.
- Seasonal residents with second homes in the area represent an important component of visitation to Teton County and Jackson.

GROWTH-RELATED CONCERNS OF THE PROJECT AREA

In the late 1970s, Jackson began to experience rapid growth as a result of increased tourism. According to the *Jackson/Teton County Comprehensive Plan* (2002), some of the issues that developed in association with this growth included sustaining development and growth management, preserving quality of life, maintaining and enhancing community and rural character, balancing community and economy, and ensuring affordable housing. The *Jackson/Teton County Comprehensive Plan* was adopted in 1994 and has been updated, most recently in 2002, with a new revision currently underway. The plan identifies growth-related issues, establishes goals and objectives, and provides guiding principles and strategies to address the issues.

Operations at the Jackson Hole Airport have increased to support the growth in local tourism and the development of the resort industry. Although scheduled passenger service began in 1941, until the 1970s the airport primarily served local general aviation that used propeller-driven aircraft. Now, jets used by scheduled passenger air carriers and regional carriers, and itinerant general aviation consisting largely of corporate and private jets, represent nearly 90 percent of annual flight operations (see Table 12 in the “Park and Airport Operations” section). The issues that have developed with this increase in scheduled passenger service and private air travel are included in the diverse impact topics that are being evaluated in this environmental impact statement.

DEMOGRAPHICS

Population

Population trends and projections in the three-county area are shown on Table 15. In 2000, the total population of the three-county area was 38,823 people, a 43 percent increase from the 1990 population. This rate of population growth greatly exceeded the rates for the states of Wyoming (9 percent) and Idaho (28 percent) during this period. Teton County, Wyoming had the greatest absolute growth, while Teton County, Idaho had the greatest relative increase (74 percent). Teton County, Wyoming accounted for more than 60 percent of the population growth in the three-county area during the 1990 to 2000 period.

Jackson almost doubled in population during this period, and accounted for a third of the population growth within the three-county area. The populations of the much smaller communities of Alpine and Victor almost tripled. Part of the population and housing growth in Driggs, Victor, and Alpine is the result of service workers who live in these communities and commute to Jackson.

TABLE 15: POPULATION TRENDS AND PROJECTIONS

County/City	1990 Population ^{a/}	2000 Population ^{a/}	Percent Change (1990 to 2000)	2004 Population Estimates ^{b/}	2010 Projected Population ^{c/}
Teton County, Wyoming	11,173	18,251	63	18,964	22,352 ^{c/}
Lincoln County, Wyoming	12,625	14,573	15	15,626	16,466 ^{c/}
Teton County, Idaho	3,439	5,999	74	7,253	9,550 ^{d/}
Total	27,237	38,823	43	41,843	48,368
Alpine	200	550	175	769	
Driggs	846	1,100	30	1,137	not available
Jackson	4,708	8,647	84	8,966	not available
Victor	292	840	188	1,216	not available
Wyoming	453,588	494,782	9	505,887	519,886 ^{f/}
Idaho	1,006,749	1,293,953	28	1,395,140	1,517,291 ^{e/}

a/ Source: U.S. Census Bureau 2000.

b/ Source: U.S. Census Bureau 2004b.

c/ Source: Wyoming Department of Administration and Information 2004.

d/ Source: Estimated; population projections not available for Idaho counties.

e/ population projections are not made at this geographic level.

f/ Source: U.S. Census Bureau 2005.

As shown in Table 15, continuing population growth is expected in the area. However, future development and population growth in Teton County, Wyoming will be somewhat constrained because only three percent of the land is in private ownership. The rest of the county is federally owned.

Because the census is completed in April, resort areas such as Jackson and Teton County typically are undercounted. During this time, seasonal employees have left the resorts, permanent employees may be on vacation, and seasonal residents are living in their primary homes. To address these undercounts, local planners typically use a combination of existing housing units, building permits, and

household population factors to more accurately estimate the population. In addition to the resident population, Teton County, Wyoming can have a tourist population that is more than twice the resident population. Tourists contribute an additional 35,000 or more to the population of this county during the peak summer season.

Housing

There were almost 20,000 housing units in the three-county area in 2000, more than half of which were in Teton County, Wyoming. The number of housing units increased by 40 percent during the 1990-to-2000 period. Most (70 percent) are single-family residential structures (U.S. Census Bureau 2000).

Housing is least available, and therefore least affordable, in Teton County, Wyoming. For example, the median value of owner-occupied housing in 2000 was \$344,000 in Teton County, Wyoming, compared to \$132,000 in Teton County, Idaho and \$92,000 in Lincoln County, Wyoming (U.S. Census Bureau 2004a). In 2003, the average price of a single-family home in Teton County, Wyoming was \$968,000, and the average price of a condominium was \$437,000 (Teton County Multiple Listing Service 2006).

Table 16 portrays county-to-county, residence-to-workplace daily commuter flows (U.S. Census Bureau 2000). Residents of eight counties in Wyoming and Idaho commute to workplaces in Teton County, Wyoming. More than 70 percent of these commuters reside in Teton County, Idaho and Lincoln County, Wyoming. This commuting pattern is the result of job creation by the resort and tourist industry and the lack of affordable housing in Teton County, Wyoming.

Calculations using Bureau of Economic Analysis (2004) data for personal income show the same pattern as Table 16. In Teton County, Wyoming, earnings outflow to people residing in other counties far exceeds earnings inflow. The outflow of personal income from this county increased from 2.9 percent in the 1980s (Sonoran Institute 2002) to 10.7 percent in 2000 (Bureau of Economic Analysis 2004), indicating that job commuting to Teton County, Wyoming has increased substantially during the last two decades.

TABLE 16: RESIDENCE-TO-WORKPLACE COMMUTER FLOWS, 2000^{a/}

Residence County	Workplace County	Number of Commuters
Inflow from		
Teton County, Idaho	Teton County, Wyoming	1,014
Lincoln County, Wyoming		895
Sublette, Fremont, and Natrona County, Wyoming		213
Bonneville, Fremont, Bingham, and Madison County, Idaho		218
Other		337
Total inflow		2,677
Outflow from		
	Teton County, Idaho	101
	Other Wyoming, Idaho, and Utah counties	91
Teton County, Wyoming	Other	154
Total outflow		346
Net inflow		2,331

a/ Source: U.S. Census Bureau 2000.

There has been substantial residential development throughout the three-county area. Supportive commercial development has occurred, primarily along the highways in and near Jackson. The highly desirable scenic, wildlife, and outdoor recreation resources of the area have stimulated development to support seasonal tourism, plus non-resident, second-home development. The U.S. Census Bureau in year 2000 census results classified 21 percent of all housing units in Teton County, Wyoming as “seasonal use” units that typically are used by non-residents as second homes. This residential development has resulted in rapidly rising real estate values, conversion of working ranches to residential developments, and lack of affordable housing.

Between 1998 and 2004 in the three-county area, building permits were issued for more than 5,000 housing units, for an average of more than 700 units annually. More than 40 percent of the residential building permits during this period were for Teton County, Wyoming. However, residential construction has increased recently in the other two counties because they offer more affordable housing.

ECONOMICS

Labor Force and Employment

Based on place of residence, the average annual civilian labor force in the three-county area in 2004 was 26,400. In the five years from 1999 to 2004, this labor force increased by 20 percent, compared to an eight percent increase for the labor force for the state of Wyoming (Bureau of Labor Statistics 2005).

Just over half (53 percent) of the three-county labor force is in Teton County, Wyoming, where monthly employment levels are seasonal and vary widely. June through August is the highest employment period and March through May is the lowest employment period. The percentage of local employment in the accommodation and food services sector in Teton County is almost four times greater than the national level; in the construction sector, it is more than two times greater. The annual unemployment rate in 2004 for the three-county area was 3.4 percent, compared to 3.9 percent and 4.7 percent, respectively, for the states of Wyoming and Idaho (Bureau of Labor Statistics 2005).

Table 17 identifies the major employers in Teton County, Wyoming. The resort/tourist industry dominates, and six of the eight largest employers are directly associated with this industry. As shown in the table, employers in this sector have strong seasonal employment peaks, and employment during the summer peak tourist season is approximately 50 percent greater than during the winter peak season.

Teton County, Wyoming ranks first in the state with regard to median household income and per capita personal income (\$73,897 in 2003). In 2003, this county had a total personal income of \$1.382 billion. Total 2003 total personal incomes for Lincoln County, Wyoming and Teton County, Idaho were \$414 million and \$146 million, respectively, with per capita incomes of \$27,156 and \$20,633, respectively.

Income and Tax Revenues

Compensation of employees for each Teton County, Wyoming industry sector that represented at least 5 percent of the county total in 2003 is shown in Table 18. Accommodations and food services dominated, accounting for almost 20 percent. Construction, at more than 15 percent, indicates the

TABLE 17: MAJOR EMPLOYERS, TETON COUNTY, WYOMING ^{a/}

Employer	Number of Employees	
	Summer	Winter
Grand Teton Lodge Company	1,000	40
Grand Teton National Park	330	140
St. John's Hospital	500	500
Teton County School District	50	380
Snow King Resort	222	270
Signal Mountain Lodge	140	6
Jackson Hole Mountain Resort	200	940
Grand Targhee Resort	125	325

a/ Source: Jackson Hole Chamber of Commerce 2006. Year-round employment at the Jackson Hole Airport is about 485 full-time-equivalent positions, but these people work for multiple employers, some of which include the airport, fixed-base operator, airlines, car rental agencies, stores, and restaurant.

TABLE 18: COMPENSATION OF EMPLOYEES BY INDUSTRY SECTOR, TETON COUNTY, WYOMING, 2003 ^{a/}

Industry Sector	Total Wage/Salary Compensation (\$million)	Percent of Total
Accommodations and food services	127.0	19.7
Construction	\$100.7	15.6
Government	98.8	15.3
Retail trade	57.7	9.0
Professional/technical services	47.6	7.4
Finance/insurance	36.2	5.6
Total for county	\$642.4 ^{a/}	100.0 ^{a/}

a/ Source: Bureau of Economic Analysis 2004. Values do not add up to total because smaller industry sectors were omitted.

high degree of development activity. Government, also at more than 15 percent, reflects the federal ownership of 97 percent of the land in the county and the presence of land managers and interpretive staff.

Sales and use tax generated by Teton County, Wyoming increased from \$47.7 million in 2001 to \$52.6 million in 2005 (Wyoming Department of Revenue 2006), a total increase of 10 percent over the 5-year period. The retail trade and accommodations/food services business sectors account for about 70 percent of the total sales tax generation in Teton County, Wyoming.

Property Values

Although some changes in property valuations result from annual reassessments, most property value increases in Teton County, Wyoming reflect real property and improvements through new construction of buildings and facilities that are added to the tax rolls. Therefore, property valuation trends are a good indicator of construction activity and economic growth in the area.

From 2001 through 2005, Teton County, Wyoming registered a 35 percent increase in total real property assessed values, or an average of 8 percent per year. Residential and commercial valuations

accounted for virtually the entire increase. Residential property represents 85 percent of the total real property assessed valuation in the County. The increases in assessed valuation have led to increased property tax revenues.

TOURISM AND RECREATION

In Teton County, Wyoming, employment, earnings, and business volumes are dominated by industry sectors that serve tourism. Most of the development in Teton County and Jackson reflects the supportive services associated with the tourist/resort industry, and with meeting the needs of non-residents who are interested in or are establishing seasonal residence. The local national parks, wildlife refuge areas, ski resorts, scenic attractions, and seasonal activities provide passive and active recreational activities and opportunities throughout the year.

Tourism Modes of Travel

According to the Jackson Hole Chamber of Commerce (2006), approximately 90 percent of summer visitors to the Jackson area arrive by car, while 90 percent of winter visitors arrive by air. A survey conducted in July 1997 indicated that 12 percent of the summer visitors to Grand Teton National Park arrived by air (Littlejohn 1998). Surveys conducted in the summer of 2005 and winter of 2004/05 (RRC Associates) indicated that approximately 6 percent of summer visitors to Grand Teton National Park arrived by air, while 90 percent of winter visitors arrived by air.

The average winter stay in the Jackson area is 5.7 days, compared to an average stay of 7.2 days in summer (RRC Associates). Major sites that attract visitors include Grand Teton National Park, the National Elk Refuge, and the three ski resorts in the Jackson area.

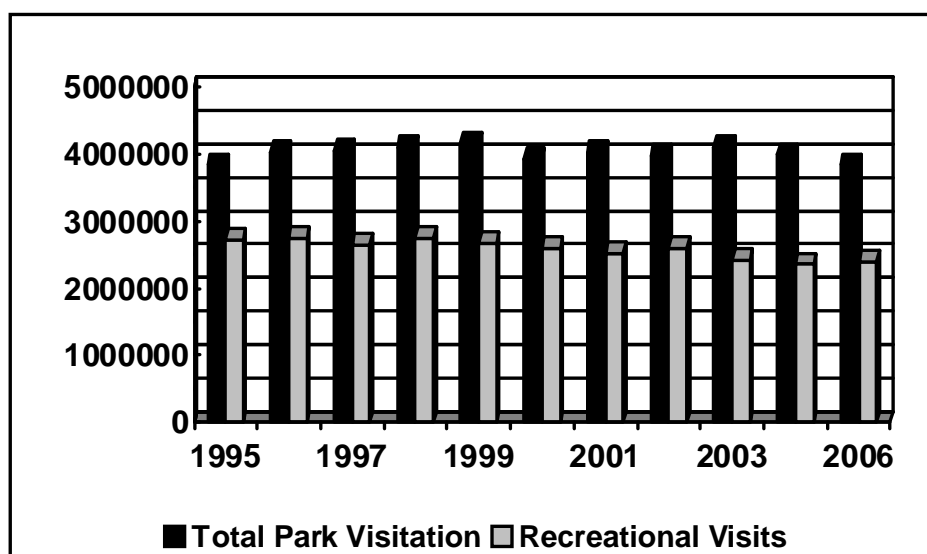
Grand Teton National Park

Figure 6 portrays annual visitation at Grand Teton National Park during the 1995 through 2006 period. Annual visitation has remained relatively stable throughout the period. There are approximately 4 million annual visits, including 2.5 million recreational visits. More than 90 percent of the recreational visitors are non-local. Recreational visits are those with a primary purpose of sightseeing or recreating in the park, and do not include the 1.5 million visits involving through-traffic, business purposes, and entrance by residents and employees. Annual fluctuations result from factors such as forest fires, drought, fuel prices, and state of the economy.

As portrayed in Figure 7, seasonal recreational visits vary considerably. The summer season, June through September, typically accounts for 75 percent or more of total annual recreational visits. In 2006, visits during the six month period from November through April accounted for less than 11 percent of the total annual recreational visits. A visitor survey found that 42 percent of visitors spent less than a day in the park. Just over a quarter of the visitors spent 2 to 3 days, and about 7 percent reported staying from 7 to 13 days (Smaldone 2001).

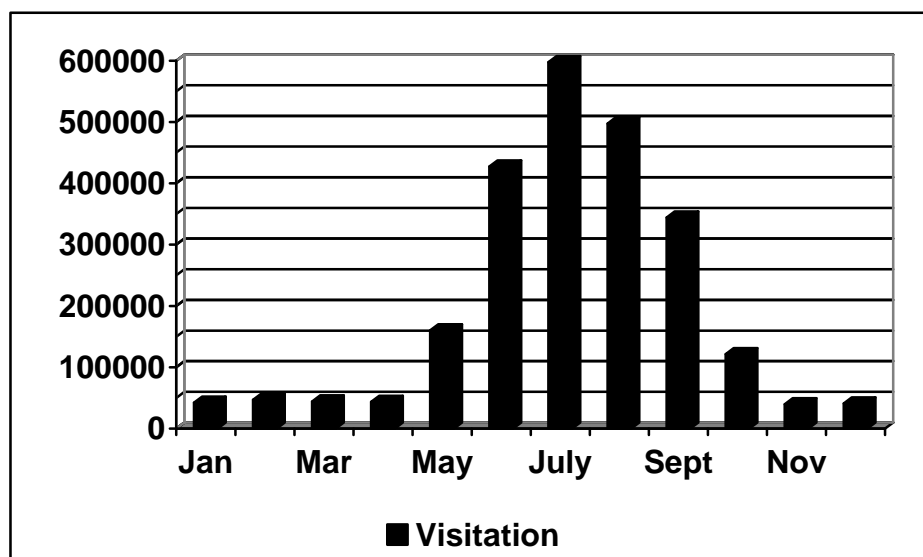
There are more than 20 concessioners providing services in Grand Teton National Park. Collectively, they had annual gross receipts of \$26.5 million in 2004. The concessions include lodging, food services, retail services, campground operations, service stations, marina, medical clinic, and guide operations that include floating and fishing. Lodging generates more than 40 percent of total annual concessioner revenue. Employee housing for 1,000 people at peak season is provided within Grand Teton National Park, with an additional 71 employee recreational vehicle sites.

FIGURE 6: VISITATION TRENDS 1995 THROUGH 2006



Source: National Park Service 2007a.

FIGURE 7: RECREATION VISITS, 2006



Source: National Park Service 2007a.

Major employers within Grand Teton National Park include the National Park Service, the Jackson Hole Airport, and park concessioners (NPS 2006b).

- There are approximately 2,300 employees in the park during the summer. The largest sources of employment are the National Park Service with about 150 permanent employees and 200 seasonal employees; the Jackson Hole Airport, which provides year-round employment for about 485 full-time-equivalent positions; and Grand Teton Lodge Company, which has about 1,000 summer employees. The remaining summer employment is provided by the other concessioners.
- The winter employment of about 635 includes the 150 permanent NPS staff and 485 airport positions.

Visitor survey results (Loomis and Caughlan 2004) show that non-local park recreational summer visitors spent \$77 to \$97 per person per day in the Jackson area. Non-local recreational winter visitors spent \$98 to \$113 per person per day. At current visitation levels, this visitor spending (direct and indirect) would total approximately \$590 million annually in the economies of Teton County, Wyoming and Teton County, Idaho.

- This level of visitor spending directly accounts for \$200.1 million in personal income and 10,658 jobs, representing 19 percent of total local income and 42 percent of local employment.
- Including both direct and indirect impacts, visitor spending accounts for \$306.4 million annually in personal income and 14,200 jobs in the two counties.

Thus, current recreational visitation to Grand Teton National Park accounts for almost 30 percent of total direct and indirect personal income, and 56 percent of direct and indirect employment in the Jackson area (Loomis and Caughlan 2004).

Surveys of airline passengers as they were leaving the area through the Jackson Hole Airport were conducted in winter 2004/2005 and summer 2005 (RRC Associates 2005). The survey was designed to document the airport's impact on the local economy. Results showed that:

- Total summer scheduled passenger service enplanements were about six percent of the summer recreational visits to Grand Teton National Park.
- Eighty-two percent of the non-local visitors visited Grand Teton National Park, while 70 percent visited the National Elk Refuge or participated in wildlife viewing.
- Summer visitors leaving by scheduled passenger air service had spent an average of \$211 per day, which typically included \$183 per day for lodging, food/beverages, shopping, and recreation.

Based on the number of non-local visitor enplaned passengers (114,660) during the 2005 summer season (June through September), it was estimated that the direct impact of the non-local-visitor total aggregate spending was approximately \$174.2 million, based on a 7.2-day average length of stay.

National Elk Refuge

The National Elk Refuge had an average of 850,000 visitors annually during the 1992 through 2001 period, and just over 900,000 annual visitors from 1998 through 2002. A recent exit survey (RRC Associates 2005) of airline passengers indicated that 25 percent of the respondents visited the National Elk Refuge and/or participated in wildlife viewing. However, actual dollars generated from visitation to the refuge are minor relative to the total local economy. Summer and winter visitor surveys (Loomis and Caughlan 2004; Loomis and Koontz 2005) were conducted to estimate the economic impact of the refuge on the area economy. Surveys were conducted of winter sleigh riders and elk hunters. During the last several years, an annual average of about 25,000 visitors have participated annually in winter sleigh rides; more than 90 percent of these are estimated to be non-local visitors.

The results of the above surveys were entered into the IMPLAN input-output economic model to analyze the economic impact of visitor and hunter spending. Based on daily visitor expenditures, it was estimated that winter sleigh rides and elk hunting in the refuge generate approximately \$2.25 million in annual visitor expenditures, \$1.27 million in direct and indirect personal income, and 61 direct and indirect jobs in the Jackson area (Loomis and Caughlan 2004).

Ski Resorts

Table 19 portrays annual skier days for the three ski resorts in the Jackson area for the 1997 through 2004 period. As shown in the table, total annual skier days have remained relatively stable, ranging generally between 550,000 and 600,000 skier days per skiing season. In 2004, the Jackson Hole Mountain Resort had its highest number of skier days since 1999/2000, and accounted for 65 percent of the total skier days for the three ski resorts. All three ski resorts also have summer recreational activities. Surveys indicate that up to 90 percent of the skiers arrive in the Jackson area by air (Southern Teton Area Rapid Transit 1999; Jackson Hole Chamber of Commerce 2006).

TABLE 19: ANNUAL SKIER DAYS^{a/}

Ski Areas	1997 ^{b/}	1998	1999	2000	2001	2002	2003	2004
Jackson Hole Mountain Resort	355,900	356,800	392,000	364,000	352,000	350,000	373,000	397,500
Grand Targhee Resort	114,500	116,900	137,000	132,000	131,000	150,900	135,900	155,000
Snow King Resort	81,200	67,400	61,000	55,000	52,000	50,000	52,000 ^{c/}	52,000 ^{c/}
Total	551,600	541,100	590,000	551,000	535,000	550,900	560,900	604,500

a/ Source: Jackson Hole Chamber of Commerce 2006. Skier day counts include the number of days skied by resident season pass holders, resident day skiers, and tourists.

b/ Date represents the starting year of ski season.

c/ Estimated.

Surveys of airline passengers as they were leaving through the Jackson Hole Airport were conducted in the winter of 2004/2005 (RRC Associates 2005). Survey results showed that:

- Eighty-one percent of the visitors participated in downhill skiing or snowboarding, while 27 percent participated in snowmobiling.
- Skier survey respondents skied an average of 4.2 days.
- Overall length of stay by visitors and non-locals in the Jackson area was 5.7 nights.
- The average per capita daily expenditure was \$281, with a typical winter visitor spending \$94 per day at the ski resorts and \$187 for lodging, food/beverages, shopping, transportation, and other expenses in the Jackson area.

Based on the survey results from Dean Runyan Associates (2005), there were 76,987 non-local visitor enplaned passengers during the 2004/2005 winter season (December through March), and the typical length of their visit was 5.7 days. From this, it can be estimated that the impact of non-local visitor spending approximated \$123 million. Approximately \$90 million of visitor spending resulted from a 4.2-day length of stay, with an estimated \$20 million expended at the ski resorts (RRC Associates 2005).

National Forests

The Bridger-Teton National Forest is adjacent to Grand Teton National Park on the east and south, and the Caribou-Targhee National Forest adjoins the park on the west. Visitors to the area also recreate in the Gallatin and Custer National Forests in Montana, Beaverhead-Deerlodge National Forest in Idaho, and Shoshone National Forest in Wyoming.

According to visitor use monitoring surveys, the top five activities cited by people visiting the area's national forests are viewing natural features and scenery, viewing wildlife, general relaxing, hiking or walking, and driving for pleasure on roads. Other popular activities include bicycling, developed camping, fishing, hunting, picnicking and family day use, water sports, and visiting resorts and cabins (Greater Yellowstone Coordinating Committee 2006).

While winter activities are increasingly contributing to the total recreation use of the area's national forests, more than 90 percent of recreation use still occurs between April and December (Greater Yellowstone Coordinating Committee 2006). Winter recreation primarily consists of downhill skiing on slopes within the national forest that are associated with developed resorts on adjoining private land. Outside the ski resorts, popular winter activities include snowmobiling, cross-country skiing, snowshoeing, and snow play.

Tourism/Recreational Economic Impacts

Table 20 portrays the direct annual travel impacts on Teton County, Wyoming during the 1997 through 2004 period as presented in *The Economic Impact of Travel in Wyoming, 1997-2004: Detailed State and County Estimates* (Dean Runyan Associates 2005). This study documented the economic significance of the travel industry in Wyoming and each of its counties. The Regional Travel Impact Model (RTIM) was used to analyze and estimate the direct economic impacts of travel at the state, regional, and county levels.

TABLE 20: ESTIMATED DIRECT TRAVEL IMPACTS, TETON COUNTY, WYOMING ^{a/}

Impact Category	1997	1998	1999	2000	2001	2002	2003	2004	Average Annual Change (percent)
Travel spending	\$342.2 million	\$368.4 million	\$392.1 million	\$411.5 million	\$424.0 million	\$434.2 million	\$443.2 million	\$470.8 million	4.7
Earnings generated ^{b/}	\$105.0 million	\$113.4 million	\$121.3 million	\$125.8 million	\$130.0 million	\$134.4 million	\$139.1 million	\$152.6 million	5.5
Tax receipts generated ^{c/}	\$16.4 million	\$17.7 million	\$19.2 million	\$20.0 million	\$20.7 million	\$21.2 million	\$21.1 million	\$22.1 million	0.4
Employment generated ^{d/}	\$5,670 million	\$5,790 million	\$5,950 million	\$5,840 million	\$5,850 million	\$5,820 million	\$5,720 million	\$5,990 million	0.8

a/ Source: Dean Runyan Associates 2005. All values are in current dollars, not adjusted for inflation.

b/ Earnings include wage and salary disbursements, earned benefits of employees, other earned income and proprietor income.

c/ Tax receipts include local lodging and sales taxes, one-third of state sales tax allocation, and state gasoline tax. Approximately 60 percent of the total tax receipts consist of tax receipts from locally levied sales taxes.

d/ Employment includes full-and part-time payroll employees and proprietors. Thus, employment estimates are not full-time equivalents.

Direct economic impacts represent the employment and earnings attributable to travel expenditures made directly by travelers at businesses in a county. In 2004, annual direct travel-related spending in Teton County, Wyoming totaled more than \$470 million, generated \$153 million in annual income, and was responsible for employment of almost 6,000 people, representing 25 percent of the county's total employment (Dean Runyan Associates 2005). Accommodations and food/beverage services generally accounted for more than 50 percent of total visitor spending on commodities, and were responsible for 70 percent of the earnings and employment generated by travel spending. Overall di-

rect travel spending and associated travel-related earnings generated increased at an approximate 5 percent annual rate during this period.

The IMPLAN economic model is used for estimating economic impacts on a local economy. This model is described later in this section under the heading “On-Airport Economic Impacts.” The IMPLAN model was applied to the direct travel impacts reported by Dean Runyan Associates (2005) for Teton County, Wyoming to estimate indirect economic impacts. Indirect impacts, when added to direct impacts, result in total estimated economic impacts of travel on the county. Indirect impacts represent the:

- Employment and earnings associated with businesses that supply goods and services to the businesses directly impacted; and
- Employment and earnings that result from purchases for food, housing, transportation, recreation and other goods and services made by travel industry employees and other indirectly affected businesses.

The multipliers applied to each of the economic variables represent a recirculation of dollars in the local economy. Total economic impacts are estimated as follows:

- Travel spending (expenditures) = \$470.8 million X 1.53 = \$720.3 million total impacts.
- Earnings generated = \$152.6 million X 1.53 = \$233.5 million total impacts.
- Employment generated = \$5,990 X 1.35 = \$8,087 total impacts.

Table 21 presents an estimate of the total impacts of the travel industry in Teton County, Wyoming and Teton County, Idaho. The estimated impacts in from the alternatives that are provided later in this section are based on the data contained in the non-local visitor surveys that form the basis for estimating the economic impacts of the Jackson Hole Airport in the subsequent section. IMPLAN multipliers were applied to the direct impacts to estimate indirect impacts. As shown in the table, total impacts for the two-county area includes

- Travel spending (expenditures) of \$775 million to \$900 million total impacts.
- Earnings generated of \$400 million to \$525 million total impacts.
- Employment generated of \$10,125 to \$13,500 total impacts.

JACKSON HOLE AIRPORT

The Jackson Hole Airport is the base for 52 aircraft, which includes 36 single-engine airplanes, 3 multi-engine airplanes, 11 jets, and 2 gliders (AirNav, LLC 2008). In addition to general aviation, several scheduled passenger service airlines serve the airport with daily and/or weekend departing and arriving flights. On-airport services include scheduled passenger service and general aviation flights, aviation fueling, aircraft maintenance, aircraft rental, car rental, and charter flights. Jackson Hole Aviation is the onsite fixed-base operator.

**TABLE 21: ESTIMATED TRAVEL IMPACTS,
TETON COUNTY, WYOMING AND TETON COUNTY, IDAHO 2005**

Economic Variable	Economic Impacts
Expenditures	
Direct ^{a/}	\$520 million to \$600 million
Indirect ^{b/}	\$265 million to \$300 million
Total	\$775 million to \$900 million
Employment	
Direct ^{c/}	7,500 to 10,000
Indirect ^{d/}	2,625 to 3,500
Total	10,125 to 13,500
Income (earnings)	
Direct ^{e/}	\$300 million to \$400 million
Indirect ^{f/}	\$105 million to \$125 million
Total	\$400 million to \$525 million

a/ Estimated. Includes non-local visitor expenditures for goods and services.

b/ An IMPLAN expenditure multiplier of 1.53 was used to estimate indirect expenditures generated by non-local visitor direct expenditures.

c/ Represents direct employment generated by non-local visitors.

d/ An IMPLAN employment multiplier of 1.35 was used to estimate indirect employment generated by direct employment.

e/ Represents direct income (earnings) generated by non-local visitors. Wage/salary of other on-airport employees was estimated based on industry sector employment and average wage/salary for that employment sector.

f/ An IMPLAN earnings multiplier of 1.53 was used to estimate indirect earnings generated by direct earnings (wages/salaries of on-airport employees).

Flight Operations

Table 12 in the “Park and Airport Operations” section provides operations at the Jackson Hole Airport for 1999 through 2005. In 2005 there were 33,106 aircraft operations at this facility.

Employment

There are about 485 full-time-equivalent people employed in on-airport capacities. These people provide administration, airport terminal services, security screening, rental car services, concession services, aircraft maintenance, aircraft services, fixed-base operations, and line service. Employment includes full-time, part-time, and seasonal positions. Construction-related employment associated with periodic facility construction, improvement, and/or repair is not included in this total.

Airport Funding

Funding for Jackson Hole Airport operations is from airport operating revenues. Capital improvements primarily are federally funded.

Operating Revenues. Airport operating revenues are from a number of sources, including scheduled passenger service airline landing fees and ramp rents, general aviation landing fees, hangar rents, on-airport parking, on- and off-airport rental car rents, other rents such as terminal space for the restaurant, operational fees of the fixed-base operator, and gas tax refunds. Scheduled passenger

service is directly or indirectly responsible for 90 percent or more of the airport's total annual operating income.

- In fiscal year 2004/2005, the Jackson Hole Airport received approximately \$700,000 in scheduled passenger service landing fees and ramp rents. Other operating income directly associated with scheduled passenger service approximated \$250,000.
- Other airport operating revenues indirectly result from scheduled passenger service. For example, rental car rent income approximates \$1.4 million annually. Most rental car use is by commercial airline passengers.

In contrast, operating income from general aviation landing fees was only about \$139,000.

In fiscal year 2004/2005, operating revenues totaled \$3.67 million, an approximate 75 percent increase since fiscal year 1995/1996. Operating expenditures in fiscal year 2004/2005 totaled \$3.06 million, resulting in a surplus of \$614,000 for the fiscal year. Over the last 10 years, surpluses have averaged \$590,000 annually.

Annual payrolls account for approximately 40 percent of the airport's annual operating expenses.

In addition to other annual operating revenues, the Jackson Hole Airport Board began receiving Transportation Security Administration funds in fiscal year 2002/2003 to provide security screening. Security screening income has exceeded screening expenses each year, with a surplus of \$443,000 in fiscal year 2004/2005. These surplus funds can be used for capital improvements.

As indicated in Table 22, annual operating income has exceeded operating expenditures each year, with the annual surplus ranging from \$300,000 in 2001/2002 to \$740,000 in 1998/1999. The 1983 use agreement specifies annual payments from the Jackson Hole Airport Board to the U.S. Department of Interior equal to the sum of 1 percent of the first \$200,000 of operating receipts (excluding grants and revolving funds), and 1.5 percent of operating receipts exceeding \$200,000. Use agreement payments to the U.S. Department of Interior have ranged between \$30,000 and \$50,000 annually, with payments totaling \$371,000 over the last 10 years.

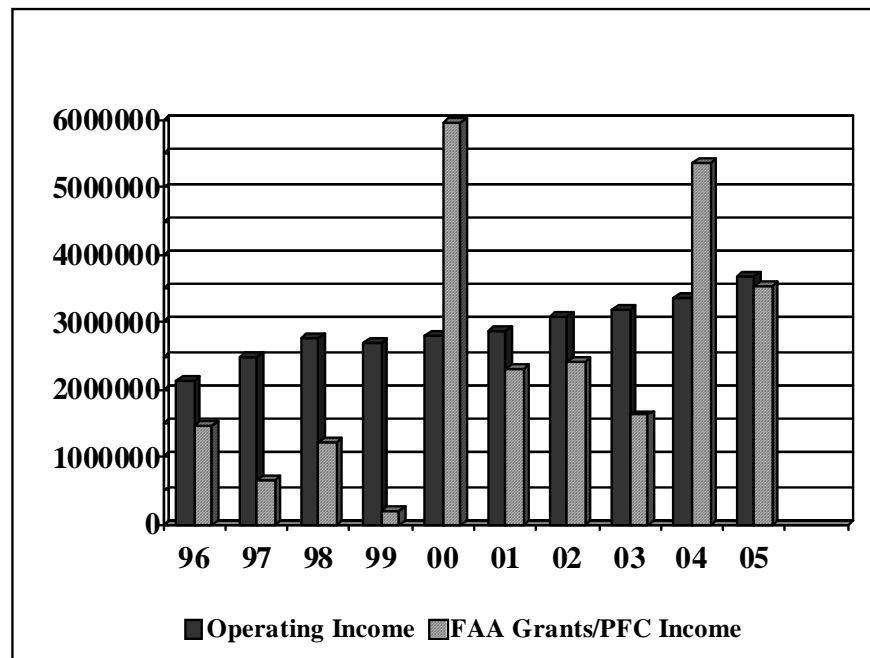
**TABLE 22: JACKSON HOLE AIRPORT OPERATING INCOME/EXPENDITURES,
FISCAL YEAR 1995/1996 THROUGH FISCAL YEAR 2004/2005^{a/}**

	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05
Operating income	\$2.12 million	\$2.49 million	\$2.75 million	\$2.70 million	\$2.81 million	\$2.89 million	\$3.10 million	\$3.29 million	\$3.37 million	\$3.67 million
Operating expenses	\$1.70 million	\$1.76 million	\$2.02 million	\$1.96 million	\$2.12 million	\$2.46 million	\$2.80 million	\$2.46 million	\$2.99 million	\$3.06 million
Surplus	\$0.42 million	\$0.73 million	\$0.73 million	\$0.74 million	\$0.69 million	\$0.43 million	\$0.30 million	\$0.83 million	\$0.38 million	\$0.61 million

a/ Source: Unpublished Jackson Hole Airport financial statements.

Capital Improvements Funds. Federal funding for capital improvements consists of Federal Aviation Administration grant funds under the Airport Improvement Program, and the Federal Aviation Administration-approved passenger facility charges. Figure 8 portrays the distribution of the airport's annual income from operating revenues and combined Federal Aviation Administration grants and passenger facility charge income for 1996 through 2005. While operating income is fairly steady, federal monies fluctuate considerably, based on specific projects that were funded. For example:

FIGURE 8: JACKSON HOLE AIRPORT ANNUAL FUNDING, FISCAL YEARS ENDING 1995 THROUGH 2005



Source: Jackson Hole Airport.

- In fiscal year 2004/2005, Federal Aviation Administration grants and passenger facility charge income totaled more than \$3.5 million, or just under 50 percent of the airport's annual income.
- The federal funding of nearly \$6 million in 2000 represented more than two-thirds of annual income.
- Federal funding of less than \$500,000 in 1999 was less than 20 percent of annual airport income.

The Airport Improvement Program provides grants to public agencies for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). The passenger facility charge is derived from federally approved charges on passenger tickets to and from the Jackson Hole Airport. Because passenger facility charge funds are tied to the Airport Improvement Program, a loss of Federal Aviation Administration funding would also result in the loss of eligibility for passenger facility charges funds.

The Airport Improvement Program grant funds are classified as "entitlement" based on passenger numbers, or "discretionary," which is based on project priority and need. Because the Jackson Hole Airport is classified as a small primary or general aviation airport, grants cover 95 percent of eligible project costs. Eligible projects include those improvements relating to enhancing airport safety, capacity, security, and environmental concerns. Generally, airports can use Airport Improvement Program funds on most airfield capital improvements or repairs, except those for hangars, parking lots, and non-aviation development. Projects related to airport operations and revenue generating improvements are typically not eligible for funding.

Most infrastructure of the Jackson Hole Airport, including all "airside" infrastructure, is maintained and improved with federal funds. Between 1995 and 2005, almost \$28 million in projects were federally funded at the Jackson Hole Airport using \$14 million in entitlement funding, \$7 million in discretionary funding, and almost \$7 million from passenger facility charges.

This represented 46 percent of the airport's total income from operations and Federal Aviation Administration grant / passenger facility charge funds during this 10-year period. More than \$14 million of this amount consisted of Airport Improvement Program entitlement funding, with the remainder consisting of Airport Improvement Program discretionary and passenger facility charge funding. Most of the federal funds were spent on apron construction and expansion, runway safety zones, modifications of the terminal building, security enhancements in the terminal, construction of an air traffic control tower, acquisition of snowplows and fire trucks, and installation of airport fencing.

On-Airport Economic Impacts

The IMPLAN economic model is used for estimating the economic impacts on local economies. The model uses an internally derived database to estimate impacts on major economic variables, such as employment, income, and expenditures. The model is based on an input-output accounting system that calculates commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Impacts are categorized as direct, indirect, or induced. The model calculates a set of multipliers to estimate indirect and induced impacts as a result of the changing of dollars from the original to the final consumer.

For estimating on-airport impacts for the Jackson Hole Airport, direct impacts include only those jobs, income, and sales expenditures generated by on-airport employees. Indirect impacts represent jobs, income, and sales generation that would not occur in the absence of the airport, but that originate from off-airport activities still attributable to the airport and its employees. Indirect economic impacts are the recycling of dollars as a result of the direct impacts and are reflected as an industry "multiplier." On-airport economic impacts do not include the economic impacts of tourism in respect to expenditures, income, and employment generated off-airport. These off-airport impacts are discussed in the subsequent section.

Table 23 portrays the estimated on-airport annual economic impacts of the Jackson Hole Airport on the local economy. These impacts reflect both direct and indirect impacts of on-airport operations on employment, earnings (income), and expenditures for goods and services by the on-airport employees. The IMPLAN multipliers, used in previous economic studies for the Jackson area and the Jackson Hole Airport, provided consistency in estimating the indirect impacts on employment, earnings, and expenditures.

As reflected in Table 23, the estimated total annual economic impact of on-airport operations include expenditures for goods and services by on-airport employees of \$10 million to \$15 million; 470 to 540 jobs; and \$12.5 million to \$16.6 million in earnings. Employment, expenditures, and earnings result from on-airport operations only, and do not include off-airport non-local visitor generated spending, earnings, and employment.

In addition to the above impacts from annual operations, there have been impacts from construction and expansion of on-airport facilities. The construction projects also generate employment, earnings, and additional expenditures for goods and services. Applying the Economic Impact Forecast System model and the IMPLAN multipliers, on-airport construction projects during the 1995 through 2005 period directly and indirectly generated an estimated annual average of 20 to 25 jobs, \$0.54 million in annual income, and \$2.5 million in annual business sales.

**TABLE 23: ESTIMATED ON-AIRPORT
ANNUAL OPERATIONAL ECONOMIC IMPACTS, 2005**

Economic Variable	Economic Impacts
Expenditures	
Direct ^{a/}	\$7 million to \$10 million
Indirect ^{b/}	\$3 million to \$5 million
Total	\$10 million to \$15 million
Employment	
Direct ^{c/}	350 to 400
Indirect ^{d/}	120 to 140
Total	470 to 540
Income (earnings)	
Direct ^{e/}	\$8.5 million to \$10.5 million
Indirect ^{f/}	\$4.0 million to \$6.0 million
Total	\$12.5 million to \$16.5 million

a/ Estimated. Includes expenses for consumer goods and services by on-airport employees.

b/ An IMPLAN expenditure multiplier of 1.53 was used to estimate indirect expenditures generated by on-airport direct expenditures by airport employees.

c/ Jackson Hole Airport personnel estimate total on-airport employment between 350-400.

d/ An IMPLAN employment multiplier of 1.35 was used to estimate indirect employment generated by on-airport direct employment.

e/ The Jackson Hole Airport's annual payroll for its employees was used to estimate annual wage/salary of the airport's payroll employees. Average annual wage/salary of other on-airport employees was estimated based on industry sector employment and average wage/salary for that employment sector.

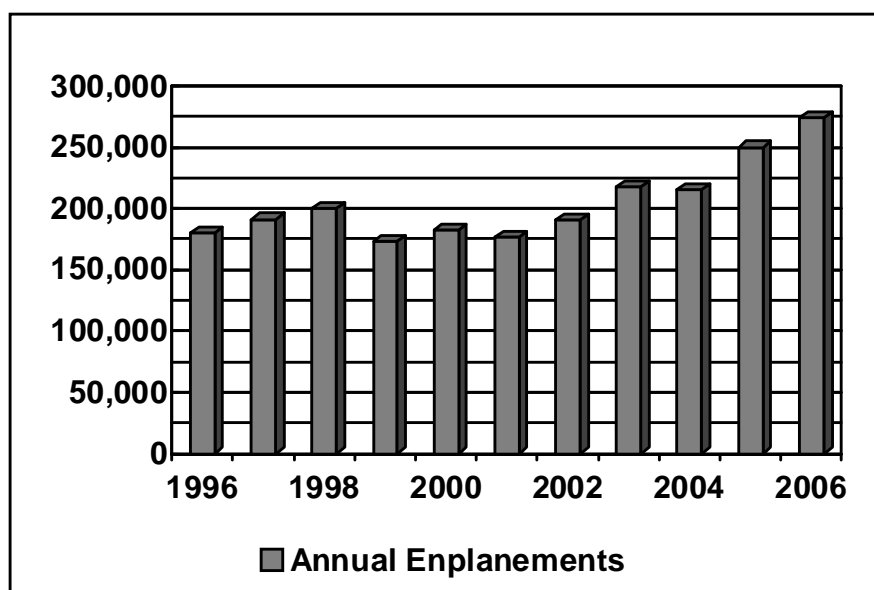
f/ An IMPLAN earnings multiplier of 153 was used to estimate indirect earnings generated by direct on-airport earnings (wages/salaries of on-airport employees).

Off-Airport Economic Impacts

The Jackson Hole Airport accounts for 74 percent of all scheduled passenger service enplanements in Wyoming (Bishop 2008). Annual scheduled passenger service enplanements at the Jackson Hole Airport from the mid-1990s through 2005 were presented previously in Table 12 in the "Park and Airport Operations" section and are shown graphically on Figure 9. Over the past 10 years, annual enplanements increased from 180,120 in 1996 to 274,031 in 2006, representing a 52 percent increase across the 11 years. However, as shown in the table and figure, the growth has not been steady, with increases in enplanements in some years and decreases in others.

The IMPLAN economic model was used to estimate the total off-airport impacts on the local economy. Direct off-airport impacts represent the expenditures, earnings, and employment directly attributable to non-local visitors who arrived by air transportation in the Jackson area. Indirect impacts represent the secondary expenditures, earnings, and employment generated by the initial direct impacts of non-local visitors (for example, businesses that supply goods and services to the businesses that were directly impacted). The induced impacts, which are included in the indirect impacts, represent the employment and earnings that result from purchases for food, housing, transportation, recreation, and other goods and services made by the employees of the other tertiary indirectly affected businesses.

**FIGURE 9: JACKSON HOLE AIRPORT ANNUAL
SCHEDULED PASSENGER SERVICE ENPLANEMENTS 1996 THROUGH 2006**



Sources: Jackson Hole Airport (Federal Aviation Administration for 2006 Value)

Table 24 portrays the estimated off-airport annual economic impacts of the Jackson Hole Airport on the local economy. These impacts reflect off-airport direct and indirect annual impacts on employment, non-local visitor expenditures for goods and services, and earnings (income). The IMPLAN multipliers, used in previous economic studies for Teton County and the Jackson Hole Airport, provided consistency in estimating the indirect impacts on employment, expenditures, and earnings.

TABLE 24: ESTIMATED OFF-AIRPORT ANNUAL ECONOMIC IMPACTS, 2005

Economic Variable	Economic Impacts
Expenditures	
Direct	\$250 million to \$275 million
Indirect ^{a/}	\$130 million to \$145 million
Total	\$380 million to \$420 million
Employment	
Direct	4,300 to 4,700
Indirect ^{b/}	1,500 to 1,600
Total	5,800 to 6,300
Income (earnings)	
Direct	\$97 million to \$106 million
Indirect ^{c/}	\$50 million to \$56 million
Total	\$147 million to \$162 million

a/ An IMPLAN expenditure multiplier of 1.53 was used to estimate indirect expenditures generated by direct expenditures.

b/ An IMPLAN employment multiplier of 1.35 was used to estimate indirect employment generated by direct employment.

c/ An IMPLAN earnings multiplier of 1.53 was used to estimate indirect earnings generated by direct earnings (wages/salaries of on-airport employees).

Non-local visitor survey data collected previously (Loomis & Caughlan 2004; RRC Associates 2005) were used as the basis for the analysis. Data used included number of seasonal and annual enplanements, seasonal and annual recreational visits, visitor expenditures per day, and average length of stay. Survey results varied and, thus, a range of estimated economic impacts was used for each economic variable.

Expenditures, employment and income were calculated separately for the summer and winter seasons, with the additional impacts from the four “shoulder” months pro-rated based on the summer season. All of these were summed to calculate the annual total.

Previous surveys indicated that between 6 percent and 12 percent of non-local summer visitors arrive by air. The estimates for economic impacts were based on the assumption that 10 percent of summer non-local visitors arrive by air, and that 90 percent of winter non-local visitors arrive by air. Length of visitor stay and daily expenditures per person from the previous surveys were inputs into the calculations of the estimates.

The off-airport economic impacts presented in Table 24 reflect impacts directly and indirectly attributable to non-local visitors. Impacts resulting from general aviation operations are not included in these estimates. As shown in the table, off-airport direct economic impacts include annual visitor expenditures of \$250 to \$275 million, \$97 million to \$106 million in local earnings, and 4,300 to 4,700 jobs. Total annual economic impacts, including indirect and induced impacts, are estimated at \$380 million to \$420 million in expenditures, 5,800 to 6,300 jobs, and \$147 million to \$162 million in local income. These impacts reflect those jobs generated directly and indirectly in the local business sectors, direct and indirect expenditures for goods and services by tourists and businesses, and income of those employees directly and indirectly employed in the business sectors impacted by tourism. There will be some leakage of the indirect and induced expenditures, employment, and earnings outside the local area because the source is external to Teton County. It is estimated that 35 percent to 40 percent of the total economic impact of non-local visitors and tourism is the direct result of air transportation to and from the Jackson Hole Airport.

Total estimated off-airport and on-airport economic impacts are shown in Table 25. Total estimated direct and indirect, on-airport and off-airport impacts include \$390 million to \$435 million generated in non-local visitor expenditures, creation of 6,270 to 6,840 jobs; and \$159.5 million to \$178.5 million in local income (earnings). The economic impacts resulting directly and indirectly from the Jackson Hole Airport probably account for 25 percent to 30 percent of the local economy.

In a report entitled *2004 Wyoming Economic Impacts of Aviation* (Wyoming Department of Transportation 2004), it was estimated that the Jackson Hole Airport has the greatest impact on business sales and employment of all the airports in Wyoming. The report used the IMPLAN economic model, which estimated a total of 7,185 direct and indirect jobs created; and almost \$300 million in business sales generated by scheduled passenger service aviation at the Jackson Hole Airport. In addition, total annual expenditures of general aviation visitors who arrive through the Jackson Hole Airport were estimated at \$12.5 million with an estimated 10,865 annual visitors.

TABLE 25: ESTIMATED TOTAL AIRPORT ANNUAL ECONOMIC IMPACTS, 2005

Economic Variable	Economic Impacts
Expenditures	
Direct	\$257 million to \$285 million
Indirect ^{a/}	\$133 million to \$150 million
Total	\$390 million to \$435 million
Employment	
Direct	4,650 to 5,100
Indirect ^{b/}	1,620 to 1,740
Total	6,270 to 6,840
Income (earnings)	
Direct	\$ 105.5 million to \$116.5 million
Indirect ^{c/}	\$54.0 million to \$62.0 million
Total	\$ 159.5 million to \$178.5 million

a/ An IMPLAN expenditure multiplier of 1.53 was used to estimate indirect expenditures generated by direct expenditures.

b/ An IMPLAN employment multiplier of 1.35 was used to estimate indirect employment generated by direct employment.

c/ An IMPLAN earnings multiplier of 1.53 was used to estimate indirect earnings generated by direct earnings (wages/salaries of on-airport employees).

SURFACE AND AIR TRANSPORTATION

AIR TRANSPORTATION

Elements of the existing environment with regard to transportation by air, including current use of the airport to access the area, scheduled passenger service, and general aviation use, were described previously in this environmental impact statement in:

- “Current Use of the Jackson Hole Airport and Other Airports in the Region” in Chapter 1; and
- “Park and Airport Operations,” which was included earlier in this Chapter 3.

Forecasts of future airport use were included in the “Park and Airport Operations” section under the heading “Jackson Hole Airport Operations.” Air-related medical evacuation services were considered under “Public Health and Safety.”

PUBLIC OR COMMERCIAL TRANSIT

Bus service in the Jackson area is provided by Southern Teton Area Rapid Transit, or “START.” The START system is funded partially by the Town of Jackson, Teton County, and the federal government.

START was first implemented in 1987 to provide transportation between Jackson and Teton Village. Other routes now include a 12-mile-long town shuttle, and commuter routes that transport workers from other communities in the morning and take them home in the evening. Service includes commuter routes to Jackson from:

- Star Valley on U.S. Highway 89, which includes a stop in Alpine.
- Driggs, Idaho over Teton Pass on Wyoming Highway 22 and Idaho Highways 33 and 31, which includes a stop in Victor, Idaho.

The START system does not currently include service to the Jackson Hole Airport. However, it has evaluated the potential for this route in the past (Town of Jackson and Teton County 2003). Public interest has increased recently because of higher fuel prices and increased awareness of global warming, and talks began recently about providing START service to the airport.

Nineteen taxi companies, six limousine services, and one shuttle company provide ground transportation service to the airport. The one-way taxi rate from the airport to Jackson for one or two people is \$27 and the rate to Teton Village is \$47. The one-way shuttle service costs \$15 for a one-way trip to Jackson and \$22 for a one-way trip to Teton Village.

ROADWAYS THAT COULD BE AFFECTED BY THE ALTERNATIVES

Roads in Grand Teton National Park

The primary surface route through the park between Jackson and the airport is U.S. Highway 26/89/191. The methods used by the National Park Service to determine visitation at Grand Teton

National Park are described on the Internet at <http://www2.nature.nps.gov/stats/pdf/grteci1992.pdf>. Inductive loop traffic counters record the numbers of vehicles. In the June-through-August period, a multiplier of 2.7 people per vehicle is applied. The multiplier used for the remainder of the year is 2.4 people per vehicle.

July is the heaviest use month at Grand Teton National Park, with combined recreational and non-recreational visitation in 2005 of approximately 758,500 people (NPS 2005a), or about 24,500 people making 9,060 vehicle trips per day. This also was the busiest month in 2005 for enplanements at the Jackson Hole Airport, with 36,176 enplanements (Jackson Hole Airport Board 2006c), or about 1,170 people per day.

It is assumed here that:

- Airport arrivals equal departures (enplanements).
- Most passengers arriving through the airport travel from the site by automobiles. These could be rentals, personal vehicles parked at the airport, or pickup by another driver, including a taxi.
- They have the same vehicle occupancy rate as park visitors.

Airport-passenger-related traffic on a typical July 2005 day represented approximately 868 vehicle trips (434 by arriving passengers and 434 by departing passengers) and 9.6 percent of the traffic in Grand Teton National Park.

March is the month with the greatest traffic contribution by the airport relative to the amount of traffic in the park. Total park visitation in March 2005 was 161,433 people, or about 5,200 people making about 2,170 vehicle trips per day. In that month, there were 26,994 enplanements (871 people per day) from the Jackson Hole Airport. Airport-passenger-related traffic in March 2005 represented approximately 726 vehicle trips and 33.5 percent of the traffic in Grand Teton National Park.

On-airport employment totals about 485 people. If all used their own vehicles to commute to and from work, they would generate 970 vehicle trips daily. If they car-pooled at the same rate as visitors outside the summer season (2.4 people per vehicle), airport employees would generate about 400 vehicle trips per day. A middle number of about 700 vehicle trips per day is most likely. Using this value, automobile trips by airport employees represented 7.5 percent of the total recreational and non-recreational park traffic in July 2005 and 32 percent of total park traffic in March 2005.

When vehicle trips by airport passengers and airport employees are summed, airport-related traffic probably accounted for about:

- One-sixth of the traffic in Grand Teton National Park on a typical July 2005 day.
- Two-thirds of the traffic in the park on a typical March 2005 day.

Roads outside Grand Teton National Park

Traffic counts for roadways outside Grand Teton National Park that could be affected by use agreement alternatives for the Jackson Hole Airport were obtained from the Wyoming Department of Transportation and Idaho Transportation Department. All of these routes are included in Figure 1 in Chapter 1. Table 26 presents the year 2004 average daily traffic counts for these roads, arranged from east to west for common routes. As shown in the table:

**TABLE 26: AVERAGE DAILY TRAFFIC COUNTS
FOR SELECTED ROADS IN WYOMING AND IDAHO, 2004**

Road	Average Daily Traffic
Wyoming Highway 22 east of Wyoming Highway 390, Wyoming	15,374 ^{a/}
Wyoming Highway 22 west of Wilson, Wyoming	4,344 ^{a/}
Wyoming Highway 22 at Targhee National Forest, Wyoming	4,150 ^{b/}
Idaho Highway 33 at Wyoming state line, Idaho	4,100 ^{c/}
U.S. Highway 26 Alpine Junction, Wyoming to state line	1,740 ^{b/}
U.S. Highway 26 state line to Palisades, Idaho	1,600 ^{c/}
U.S. Highway 26, Palisades, Idaho to Swan Valley, Idaho	2,300 ^{c/}
U.S. Highway 26, Swan Valley, Idaho to Idaho Falls, Idaho	3,500 ^{c/}
Idaho Highway 31, Victor, Idaho to Swan Valley, Idaho	1,800 ^{c/}

a/ Source: Calculated from Wyoming Department of Transportation 2005

b/ Source: Thomas 2006

c/ Source: Idaho Transportation Department 2005

- Close to Jackson, Wyoming Highway 22 supports more than 15,000 average daily traffic trips. West of Wilson, traffic decreases by more than two-thirds. At the state line, the daily count is about 4,150 vehicles.
- U.S. Highway 26 at the state boundary carries about 1,700 vehicles per day. The traffic count increases to 3,500 vehicles per day east of Swan Valley as this highway approaches the city of Idaho Falls.
- Idaho Highway 31, which is an important connector between Idaho Highway 33 at Victor and U.S. Highway 26 at Swan Valley, carries 1,800 vehicles per day.
- Wyoming Highway 22 west of Jackson is the busiest two-lane highway in the state.

Information regarding traffic patterns and traffic planning on Wyoming highways was obtained from District 3 of the Wyoming Department of Transportation. According to Thomas (2006):

- Wyoming Highway 22 shows strong traffic peaks in the morning and evening. The peaks are associated with commuter traffic between more affordable housing in the vicinity of Driggs and Victor, Idaho, and jobs in the Jackson area.
- The Wyoming Department of Transportation recently completed a safety upgrade of Wyoming Highway 22 over Teton Pass. This included installing new areas of guardrails, and applying a 2-inch overlay of asphalt on the road surface.
- An upgrade of Wyoming Highway 22 from Wilson to Jackson is planned for the year 2012. Except for ongoing maintenance, there are no other plans for modifying this highway.
- The rule of thumb used by District 3 of the Wyoming Department of Transportation is that a two-lane road like Wyoming Highway 22 can handle an annual average daily traffic count of 5,000 vehicles and maintain an acceptable level of service rating of “C.” (As shown by the data in Table 26, annual average daily traffic levels on all of the highways except in the immediate vicinity of Jackson are below this threshold.)
- Despite an annual average that is below the threshold, existing traffic on the Teton Pass stretch of Wyoming Highway 22 routinely exceeds 5,000 vehicles per day on weekdays throughout June,

July, August, and September. Published Wyoming Department of Transportation (2005) data show that during July 2004, the average weekday traffic count on this stretch was 6,460 vehicles. Any failure effectively closes down the highway, and even basic maintenance will cause a traffic backup of a couple of miles or more.

- The “ballpark” cost for upgrading the steepest 7 or 8 miles of Wyoming Highway 22 probably would be similar to the cost of about \$13 million per mile that was required by the Colorado Department of Transportation (Wilson 2006) to upgrade the very similar U.S. Highway 40 over Berthoud Pass to a four-lane highway. In flatter areas close to Jackson, the construction costs for upgrading to a four-lane highway probably would be \$1 million to \$2 million per mile. However, right-of-way acquisition costs in this area would be very high.
- Relatively few commuters use U.S. Highway 26 west of Jackson, so traffic is more evenly distributed throughout the day than on Wyoming Highway 22. With an average daily traffic count of fewer than 2,000 vehicles, there are no plans to upgrade this highway to add capacity.

District 6 of the Idaho Transportation Department, provided the following characterization of highways in Idaho that could experience changes in traffic, based on the different alternatives for extending the Jackson Hole Airport use agreement (Cole 2006):

- Idaho Highway 33 (which changes to Wyoming Highway 22 at the state line) experiences the same morning and evening commuting-related traffic spikes that were described by Thomas.
- No upgrades are planned for Idaho Highway 33 between Victor and the Wyoming state line.
- This highway needs fairly significant improvements, such as passing opportunities in areas where recreational vehicles labor up the grades. However, because of limited funding, there is no expectation that this will occur in the foreseeable future. The primary environmental constraints along Idaho Highway 33 are related to the protection of the area’s extensive wetlands, and would result in upgrade costs in the vicinity of \$2 million per mile for the 6-mile stretch from Victor to the Wyoming state line.
- U.S. Highway 26 from Idaho Falls east to Swan Valley is in relatively good condition with plenty of passing opportunities. Passing areas are more limited between Swan Valley and the Wyoming state line, but still are considered adequate. Based on existing traffic projections, the Idaho Transportation Department does not foresee any need to upgrade either of these highway stretches.
- Most people traveling between Idaho Falls and Jackson take U.S. Highway 26 from Idaho Falls to Swan Valley and then turn north on Idaho Highway 31 and get on Highway 33 at Victor. This route to Jackson is almost 20 miles shorter (45 miles versus 64 miles) than staying on U.S. Highway 26 for the entire trip.
- The 21-mile-long Idaho Highway 31 from Swan Valley to Victor is very winding and narrow. There are no current plans to upgrade this highway, but a capacity increase probably would cost about \$10 million per mile for about two-thirds of its length. The remaining third probably could be upgraded for \$2 million to \$3 million per mile.
- Their rule of thumb for a single lane in one direction is that more than 1,700 vehicles per design hour will result in congestion. However, this is more applicable to urban areas than the rural and mountain setting west of Grand Teton National Park. In the areas that could be affected by this project, traffic planning focuses primarily on passing lanes and safety issues.

TRANSPORTATION PLANNING

The future plans for upgrades on Wyoming Highway 22, U.S. Highway 26, Idaho Highway 33, and Idaho Highway 31 in the vicinity of Grand Teton National Park were described previously.

The *Transit Development Plan, 2003 Update, Southern Teton Area Rapid Transit* (Town of Jackson and Teton County 2003) describes the existing transit system, establishes transit goals, presents existing use data, identifies alternatives for expanded and improved transit service, analyzes capital needs, outlines a five-year program and budget, examines sources of revenue and funding, and presents a marketing plan. A five-year plan update is prepared each year as part of the annual Southern Teton Area Rapid Transit (START) budget process.

The National Park Service recently completed a transportation plan for Grand Teton National Park (NPS 2006b). A follow-up to that plan will be the preparation of a transit study to determine the need for and feasibility of providing public transit service around the park, and between the park and other locations, including Jackson. Transit services may be provided in partnership with START. The airport is a potential transit service location, but demand for the service beyond 2015 would likely be very different under Alternative 1 than it would be under Alternative 2.

Chapter 4

Environmental Consequences

INTRODUCTION

The National Environmental Policy Act mandates that environmental impact statements disclose the impacts of a proposed federal action. In this case, the proposed federal action is extending the use agreement for Jackson Hole Airport for two 10-year terms, from 2033 to 2053.

This chapter analyzes the potential effects of an alternative for extending the use agreement (Alternative 2), plus the no action alternative (Alternative 1). Effects were considered for each of the impact topics that were identified as retained in Table 2.

The chapter first describes the methods used to analyze impacts of the alternatives, including the general evaluation method and methods used to determine cumulative impacts. Then, for each impact topic, the analysis describes the:

- Applicable regulations and policies, expressed as desired conditions.
- Specific methods used to evaluate the impact topic. These include the:
 - Impact thresholds for intensity and duration of impacts;
 - Geographic area considered for the impact topic; and
 - Issues that were identified during scoping.
- Effects of each alternative relative to the issues identified during scoping. Each analysis includes a determination of cumulative impacts and a summary of conclusions.

An evaluation of unacceptable impacts and impairment is presented after the detailed analysis of the impacts of each alternative. This evaluation is based on guidance provided in Sections 1.4.7 and 8.2 of *Management Policies 2006* (NPS 2006a).

At the end of the chapter is an evaluation of the effects of the alternatives with regard to sustainability and long-term management. This includes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity, irreversible and irretrievable commitments of resources, and unavoidable adverse impacts.

METHODS FOR ANALYZING IMPACTS

GENERAL ANALYSIS METHOD

The National Park Service based impact analyses and conclusions on data from existing literature, information and insights provided by NPS and other agency experts, and professional judgment.

For each impact topic, a brief description of relevant components of the existing condition is provided. This information is then used as a basis for determining the effects of implementing each alternative. The impact analyses involved the following steps.

- Define issues of concern, based on internal and public scoping.
- Identify the geographic area that could be affected.
- Define the resources within that area that could be affected.
- Impose the alternative on the resources within the geographic area of potential effect.
- Identify the effects caused by the alternative, in comparison to Alternative 1, No Action, to determine the relative change. Characterize the effects based on the following factors:
 - Whether the effect would be beneficial or adverse.
 - The intensity of the effect, as negligible, minor, moderate, or major.
 - Duration of the effect, either short-term or long-term. Impact-topic-specific thresholds for each of these durations are provided in each impact topic methods section.
 - The area affected by the alternative, such as the area within the airport boundary, within the park boundary, or within Teton County.
 - Whether the effect would be a direct result of the action or would occur indirectly because of a change to another resource or impact topic. An example of an indirect impact would be increased mortality of an aquatic species that would occur because an alternative would increase soil erosion, which would reduce water quality.
- Determine whether unacceptable impacts or impairment could occur to resources and values considered necessary and appropriate to fulfill the purposes of Grand Teton National Park.
- Determine cumulative effects by evaluating the effect in conjunction with past, present, or reasonably foreseeable future actions for Grand Teton National Park and the region.

Impact Topic Thresholds

The impact-topic-specific thresholds that were used to define the intensity of effects are provided in each impact topic methods section. Threshold values were developed based on the guidance in Sections 4.5.G.4. and 4.5.G.5. of *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a). The goal was to apply thresholds that were accurate, scientifically credible, quantified as much as possible, and understandable to a lay readership.

The National Park Service does not have standardized impact thresholds for National Environmental Policy Act documents. Instead, it uses the guidance outlined in *Director's Order #12* to develop park- and project-specific impact thresholds, taking into consideration existing conditions

within that park, the type of action proposed, and the context, intensity, duration, and timing of potential impacts. All of the impact thresholds for every impact topic evaluated in this environmental impact statement were developed using this park- and project-specific approach.

In evaluating the intensity of effects on each impact topic, the National Park Service characterizes those effects as negligible, minor, moderate, or major. The National Park Service defines “measurable” effects as moderate or greater impacts. It equates “no measurable effect” with minor or lesser impacts. “No measurable effect” is used by the National Park Service in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an environmental assessment or environmental impact statement. This approach concentrates the effort on issues that are truly significant to the action in question, rather than amassing needless detail, and conforms with Section 1500.1(b) of the Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act.

The National Park Service equates the term “major” effects (or impacts) to the term “significant” as used in the National Environmental Policy Act and its implementing regulations. It thus distinguishes between proposed actions and their associated effects that would require the preparation of an environmental impact statement, versus those that may require only preparation of an environmental assessment and finding of no significant impact. The term major, by itself, does not, and is not intended to have, a specific meaning in the context of the NPS Organic Act. Specifically, the term “major” does not by itself indicate an impact that rises to the level of impairment or that is “unacceptable” as described in *Management Policies 2006* (NPS 2006a). However, effects that are determined to be “major” are always evaluated as to whether they are unacceptable or rise to the level of impairment.

Analyses by Time Period

This environmental impact statement evaluated actions between now and late 2033, which would include closure and removal of the airport in Alternative 1. Within this analysis period, the following comparisons were made.

- For the period from now until 2015, Alternative 2 was compared to the Alternative 1 transition between current airport operations and a general aviation facility.
- From 2015 until 2033, Alternative 2 was compared to an airport that was used exclusively for general aviation under Alternative 1.

Projections for airport use, expressed as numbers of aircraft operations and associated impacts for each alternative, were made for the years 2015 and 2025. The earlier date reflected conditions that would occur shortly after the start of the general aviation period. The later date estimated the maximum use levels that likely would occur under Alternative 1, before the deterioration of key airport facilities led some pilots to avoid the airport because they considered it unsafe.

UNACCEPTABLE IMPACTS AND IMPAIRMENT ANALYSIS METHOD

As described in Chapter 1, the National Park Service must prevent any activities that would impair park resources and values. The impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service applies a standard that offers greater assurance that impairment will not occur. This involves avoiding impacts that the National Park Service determines to be unacceptable; that is, they fall short of impairment, but are still not acceptable within a particular park’s environment. Because park managers cannot allow uses that would cause unacceptable

impacts, they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

By preventing unacceptable impacts, park managers ensure that the proposed use of park resource will not conflict with the conservation of those resources. In this manner, park managers ensure compliance with the Organic Act's separate mandate to conserve park resources and values.

CUMULATIVE EFFECTS ANALYSIS METHOD

The Council on Environmental Quality (1978) regulations for implementing the National Environmental Policy Act require the assessment of cumulative impacts in the decision-making process for federal actions. Cumulative impact "is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (Title 40, *Code of Federal Regulations*, Part 1508.7). Cumulative impacts were considered for both the no action and action alternatives.

Cumulative impacts were determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, and reasonably foreseeable future actions within Grand Teton National Park and in the surrounding region. Other actions that have the potential to have a cumulative effect in conjunction with alternatives for extending the use agreement for the Jackson Hole Airport were identified in "Chapter 1, Purpose and Need for Action" under the heading "Connected, Cumulative, and Similar Actions."

ALTERNATIVE 1

NATURAL SOUNDSCAPE

Regulations and Policies

Sound regulations of the Federal Aviation Administration that relate to the use of all airports nationwide were summarized previously, along with the additional requirements for the Jackson Hole Airport that are included in Section 4 of the 1983 use agreement. In addition, NPS policies indicate the following desired conditions in Grand Teton National Park with regard to natural soundscape relative to the presence and operation of the Jackson Hole Airport.

Desired Condition	Source
The Federal Aviation Administration, which has sole authority to control airspace over the United States, preserves, protects, and enhances the environment by minimizing, mitigating, or preventing the adverse effects of aircraft noise on Grand Teton National Park.	National Parks Air Tour Management Act of 2000
The natural ambient sound level – that is, the environment of sound that exists in the absence of human-caused noise – is the baseline condition, and the standard against which current conditions in a soundscape in Grand Teton National Park will be measured and evaluated.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service preserves, to the greatest extent possible, the natural soundscapes of Grand Teton National Park and restores to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise).	<i>Management Policies 2006</i> (NPS 2006a)
The atmosphere of peace and tranquility, or the natural soundscape, is maintained in wilderness, natural, and historic locations within the park.	<i>Management Policies 2006</i> (NPS 2006a)
In other areas, the National Park Service preserves, to the greatest extent possible, the natural soundscapes and protects them from degradation caused by noise (undesirable, human-caused sound). However, the superintendent is mindful of the setting, and recognizes that the frequencies, magnitudes, and durations of acceptable levels of unnatural sound vary and are generally greater in developed areas. The practicability of achieving a natural soundscape at various park locations is considered as part of the management process.	<i>Management Policies 2006</i> (NPS 2006a)
The best available technology, within available resources, is used to restore degraded natural soundscapes in national parks.	<i>Management Policies 2006</i> (NPS 2006a)
The least sound-impacting equipment, vehicles, and transportation systems are used, consistent with public and employee safety.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service monitors human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service takes action to prevent or minimize all noise that adversely affects the natural soundscape, or that exceeds levels that have been identified through monitoring as being acceptable to or appropriate for visitor uses at the sites being monitored.	<i>Management Policies 2006</i> (NPS 2006a)
For the general public and for aviation interests, the National Park Service develops educational materials describing the importance of the natural soundscape and tranquility to park visitors, and the need for cooperation from the aviation community.	<i>Management Policies 2006</i> (NPS 2006a)

Desired Condition	Source
The National Park Service works closely with the Federal Aviation Administration and with general aviation organizations to ensure that general aviation operations are conducted in accordance with applicable Federal Aviation Administration advisories and “fly-friendly” techniques and procedures designed to help pilots minimize impacts. The National Park Service seeks the assistance of these organizations in problem resolution if aviation concerns arise at the park.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works with the Jackson Hole Airport Board and fixed-base operator to prevent, reduce, or otherwise mitigate the effects of aircraft operations. The objective is to minimize noise and other impacts and confine them to the smallest and most appropriate portion of Grand Teton National Park, consistent with safe aircraft operations.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Modeling with the Integrated Noise Model (INM)

Modeling with Integrated Noise Model version 6.2a was used to estimate the energy-average sound level, maximum sound level, and percent-time audible effects from aircraft arrivals and departures from the Jackson Hole Airport. The model evaluates aircraft sound impacts in the vicinity of airports using A-weighted and one-third octave band decibel levels. The Federal Aviation Administration and John A. Volpe National Transportation Systems Center (the developer of the model), which is part of the U.S. Department of Transportation’s Research and Innovative Technology Administration, provided technical consultations throughout the modeling process. Control tower staff, who operate under a contract with the Federal Aviation Administration, furnished key inputs, including actual aircraft flight tracks for the Jackson Hole Airport.

At the time of this analysis, the Integrated Noise Model version 6.2a was the best available approach for estimating sound caused by aircraft. The model was developed and sanctioned by the Federal Aviation Administration, and is used worldwide for assessing impacts associated with airport operations. However, all computer models have limitations in accurately representing reality. Model validation not was conducted in this study, and the results should be considered an approximation of actual conditions.

Models are best used to evaluate the *relative effects* of alternatives rather than to make absolute depictions of reality. Therefore, the soundscape described in the “Affected Environment” section was based on modeled results of recent airport operations. This modeling of existing operations, rather than actual sound measurements for those operations, provided the most meaningful basis for predicting *changes* in the soundscape that would occur with the airport operations that were forecast for each alternative.

Limitations of the Model

Many model inputs are averages rather than the constantly varying, real values. These averages, such as temperature, humidity, and natural ambient sound level, by definition create inaccuracies in the model results. Other conditions that affect sound propagation or attenuation, sometimes strongly, are also not included in the model. Examples of these conditions include temperature inversions and vegetation.

In calculating percent-time audible, the model used an unrealistic, though necessary, input that aircraft operations occur at evenly spaced intervals throughout the day and that the sound associated

with each operation is a unique event. In practice, aircraft operations for general aviation are clustered during the middle of the day, as demonstrated on the FlightAware.com Internet site. During busy periods, sounds from two or more aircraft often overlap. Because these actual conditions would reduce the percent of time during the day that aircraft sound is audible, the model produces an overstatement of this sound characteristic. Therefore, the percent-time audible results should be interpreted with the understanding that actual percent-time audible could be lower.

The overlap of sound from more than one aircraft would produce a sound measurement that was louder than either plane alone. As a result, the maximum sound levels (L_{max}) calculated by the model sometimes could be understated. However, as described under “Characteristics of Sound” at the beginning of this “Natural Soundscape” section, the composite sound level would be no more than 3 dBA greater than the louder sound alone. While this difference would be perceptible to most people, it would not substantially alter the application of the modeling results to determining effects on park areas.

Most aircraft sounds occur during the day when, particularly in high-activity areas of the park, there are many other human-caused sounds. Examples include sounds from road vehicles, building utilities, and human voices. These other human-caused sounds are not accounted for in the model and, whenever they were present, they would reduce the percent-time audible for aircraft using the airport. Impacts from other sources of human-caused sounds are addressed qualitatively in the cumulative impacts discussion for each alternative.

Some areas of the park, particularly sites in windy locations or along a river or creek, have a substantial level of naturally occurring sound. Transient natural sounds, such as thunder, also occur. In these circumstances, the modeled percent-time audible values for aircraft that use the airport would be overstated. In undeveloped areas of the park that are much quieter than the average natural ambient sound level used in the model, the model would underestimate the effects of aircraft.

The airspace over the park is regularly used by many types of aircraft ranging from general aviation aircraft making local flights a few thousand feet above the ground to transcontinental aircraft flying at an elevation of several miles. The only controlled airspace is within 3,000 feet above the ground and within 5 miles of the tower. The model does not account for flights by transient aircraft not associated with operations at the airport. Instead, the effects of transient aircraft are included in the discussion of other human-caused sound in the cumulative impacts for each alternative.

Eight model runs were used to evaluate the alternatives. These include four runs to determine average-annual day and peak-season day conditions in 2015 and 2025 for the no action alternative, and four similar runs for the action alternatives. Modeling used a 15-hour day (7 A.M. to 10 P.M.) for averaging. Other approaches, such as evaluating percent of time audible for multiple periods of the day, would have produced a more precise representation of actual conditions, but would have required many additional model runs and would have produced different results for different periods, all of which would have to be interpreted. It was decided that such an approach would not substantially change the understanding of impacts from the alternatives.

The model does not account for new technology, such as quieter engines, that could reduce aircraft sound by 2015 or 2025, or major advances in aircraft technology because there is no known method for accurately estimating the reductions. It also did not incorporate possible future navigational advances, such as those described in Chapter 2 under “Mitigation Measures Common to Both Alternatives.” As stated by The Boyd Group, Inc. (2007a) in their forecast of airport operations, new technologies “may render historical data and assumptions . . . useless in forward-looking projections.”

The model did not consider the effects of major social shifts, such as population segments massively entering or leaving the Jackson housing (and travel) market, or upwardly spiraling fuel costs that make recreational travel too expensive for most households. The model results must be interpreted with the understanding that these types of factors could substantially alter the findings.

The limitations of the model identified here do not invalidate the results, particularly because the analysis involves comparing existing conditions and alternatives that were all modeled within the same limitations. However, these limitations should be understood when evaluating the model results.

Model Inputs

This model required specific information to forecast sound conditions with the different alternatives. Model inputs are described in Appendix F and included:

- Aircraft fleet mix and numbers of operations by aircraft type for each year modeled;
- Flight track information, including aircraft arrival and departure paths;
- All-year and peak-season natural ambient sound profiles;
- Topographic conditions of the areas being modeled; and
- Sound footprints for each aircraft used in the model.

As shown in Figure 10 from Shutt Moen Associates (2002), the takeoff and landing sound footprints among classes and models of aircraft vary widely. In addition, the general aviation aircraft: business jet footprints illustrate how sound footprints have been reduced in more modern aircraft.

Therefore, it was important for model inputs to include the best possible estimates of the numbers and models of aircraft that will be using the Jackson Hole Airport during the modeled period.

The aircraft fleet mix and use rates that were used for modeling the alternatives in 2015 and 2025 were based on *Jackson Hole Airport Aircraft Operations Forecast: 2010-2025*, which was prepared by The Boyd Group, Inc. (2007a). Supplemental information on fleet mix was provided in an email (The Boyd Group, Inc. 2007b). However, some of the aircraft identified by The Boyd Group, Inc. were not among the selections available within the model. Therefore, the Federal Aviation Administration was contacted to identify appropriate surrogates. The resulting aircraft types and use rates that were used in modeling are presented in Table 27.

Many model inputs were based on actual data and did not involve the use of assumptions. These inputs included the flight tracks, number of operations in the year 2005, characteristics of each aircraft that result in sound generation, and topography of the area throughout the park and within 10 miles of the Jackson Hole Airport center-line.

Assumptions Used in Developing Airport Operations Forecasts

In its forecast of airport operations, The Boyd Group, Inc. (2007a) used the following assumptions.

- Virtually no changes in seasonality are expected between now and 2025. Specifically, the peak tourism season will continue to be in the summer, a secondary peak will continue to occur during the winter ski season, and growing ownership of vacation or second homes will not substantially change the seasonality of the market.

FIGURE 10: SOUND FOOTPRINT OF SELECTED AIRCRAFT (SOURCE: SHUTT MOEN ASSOCIATES 2002)

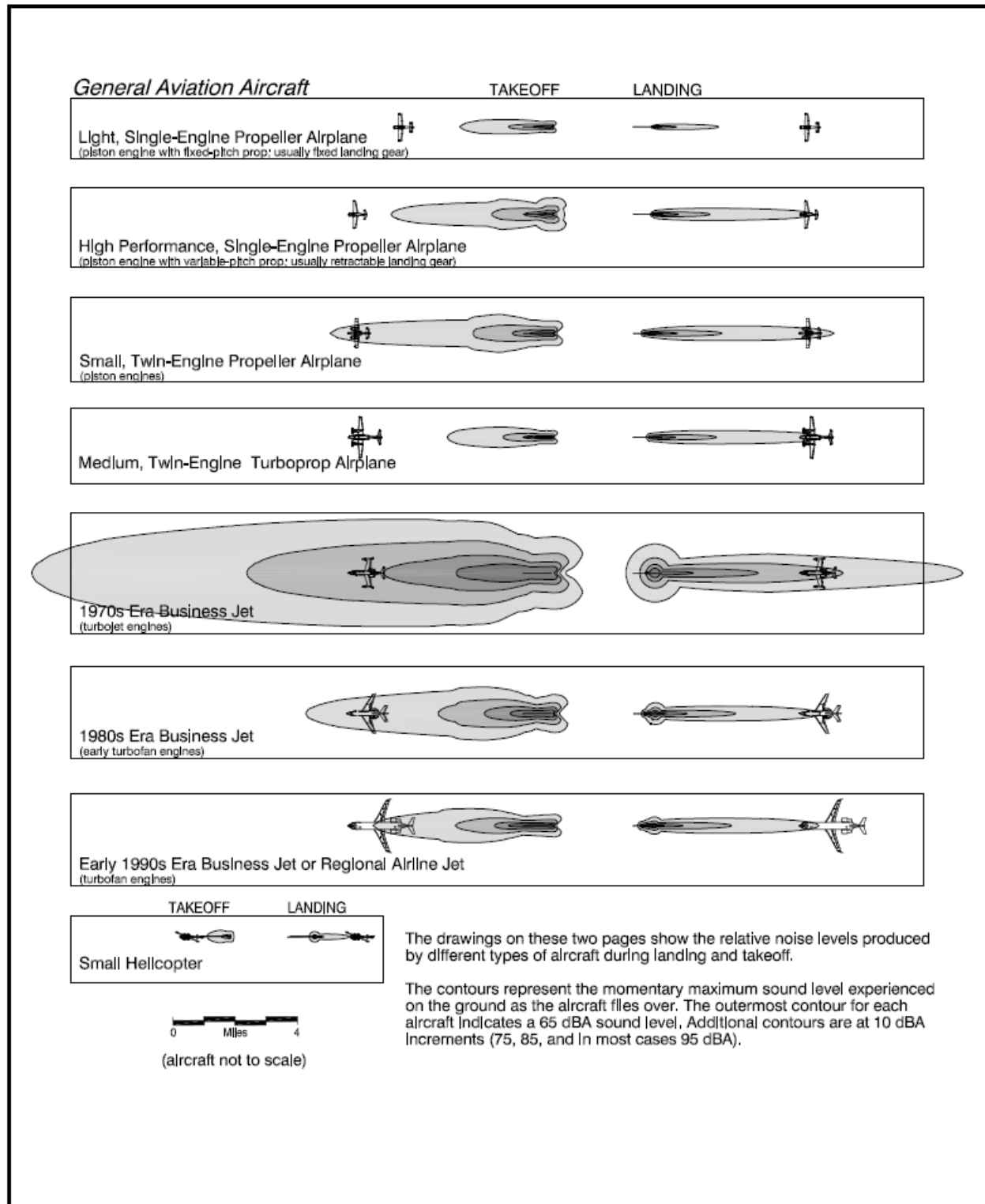
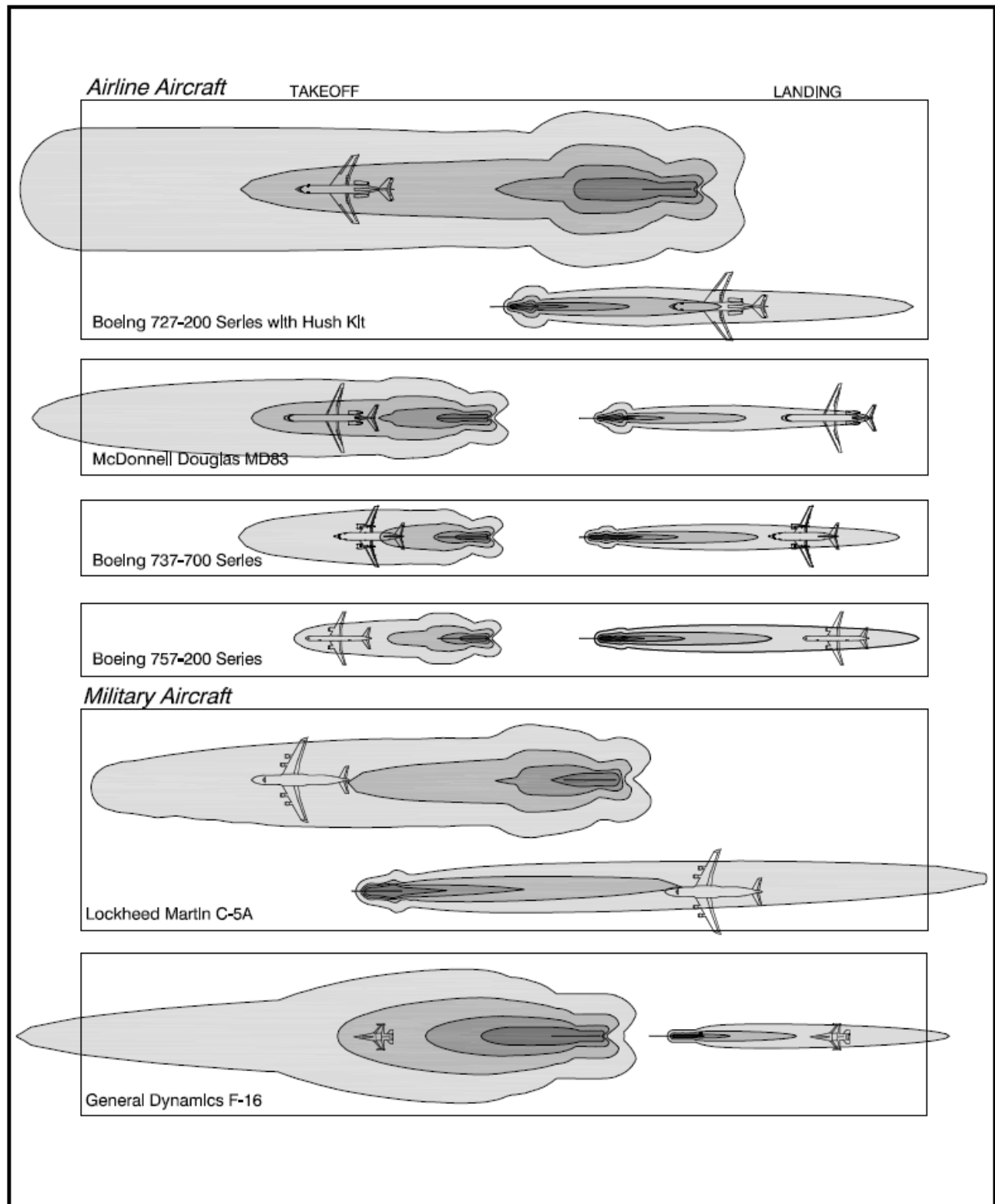


FIGURE 10: SOUND FOOTPRINTS OF SELECTED AIRCRAFT (CONTINUED)



**TABLE 27: FORECAST ANNUAL AND AVERAGE DAILY OPERATIONS
AT THE JACKSON HOLE AIRPORT IN 2015 AND 2025^{a/}**

Aircraft Type	2015		2025	
	Annual ^{b/}	Average Daily ^{b/}	Annual ^{b/}	Average Daily ^{b/}
Air carrier				
Boeing 737-300	525	1.4	174	0.5
Boeing 737-700/800	655	1.8	827	2.2
Boeing 757	610	1.7	610	1.7
Airbus 319	1,271	3.5	1,381	3.8
Airbus 320	660	1.8	671	1.8
Embraer 190/195	783	2.1	866	2.4
Subtotal	4,504	12.3	4,529	12.4
Regional carrier				
CRJ 900	1,613	4.4	1,834	5.0
CRJ 700	267	0.7	279	0.8
Dash 8-100	247	0.7	94	0.2
Dash 8 Q400	2,334	6.4	2,585	7.1
Embraer 120 ER	665	1.8	0	0.0
Subtotal	5,126	14.0	4,792	13.1
General Aviation				
Large Business Jets				
Gulfstream IV	1,622	4.4	1,729	4.7
Citation X	811	2.2	864	2.4
Challenger	811	2.2	864	2.4
Dassault Falcon 900	405	1.1	432	1.2
Global Express (CRJ700)	405	1.1	433	1.2
Mid-Size Business Jets				
Hawker 800	1,304	3.6	1,397	3.8
Dassault Falcon 50	931	2.6	998	2.7
Lear Jet 40/40	1,490	4.1	1,597	4.4
Small Business Jets				
Beechjet	2,244	6.2	2,255	6.2
Citation CJ	1,402	3.8	1,409	3.9
Citation Encore	1,122	3.1	1,127	3.1
Embraer Phenom	841	2.3	846	2.3
Very Light Jets				
Eclipse 500 ^{c/}	1,081	3.0	1,238	3.4
Cessna Mustang ^{c/}	1,081	3.0	1,237	3.4
Twin Turboprops				
Conquest II	1,679	4.6	1,499	4.1
King Air	1,679	4.6	1,498	4.1
Single Turboprops ^{d/}				
Cessna 172R	1,062	2.9	1,154	3.2
Cessna 206H	1,061	2.9	1,153	3.2
Piston Twins				
Baron 58P	262	0.7	231	0.6
Piston Single				
Single-engine, variable- pitch propeller	5093	14.0	5,325	14.5
Subtotal	26,386	72.4	27,286	74.8
Total	36,016	98.7	36,607	100.3

a/ Source: The Boyd Group, Inc. 2007a and 2007b.

b/ Some values may be slightly off because of rounding.

c/ This aircraft type was suggested by the Federal Aviation Administration as a surrogate for an aircraft identified by The Boyd Group, Inc. that is not available within Integrated Noise Model (INM) version 6.2a.

d/ INM 6.2a does not include any single turboprop aircraft in its database. Therefore, the numbers of aircraft in this class were accounted for in the modeling as these two single-piston aircraft types.

- There would not be any important changes to Jackson Hole Airport operations. For example:
 - The voluntary curfew would remain in effect, and operations would not occur between 11:30 p.m. and 6:00 a.m.
 - The ban on Stage II aircraft would continue, but no additional bans would occur during the forecast period.
 - There would not be any substantial increase in the capacity of the fixed-base operator or changes in ramp parking space for aircraft.
- There would not be any major changes to Jackson Hole economic base or visitor demographics.
- With regard to fleets and strategies of scheduled passenger service operations at the Jackson Hole Airport:
 - Changes in fleet mix will slow future growth in number of operations by scheduled passenger carriers. In particular, an increase in the average size of regional carrier aircraft will increase capacity with little change in the number of operations. As a result, aircraft operations over the forecast period from 2010 through 2025 would experience a total increase of just 3.5 percent.
 - The new breed of very light jets may render historical data and assumptions regarding business and general aviation inappropriate for projections.

The Boyd Group, Inc. (2007a) also considered such factors as fleets and operations for air carriers and regional carriers; business jet sales, demand, and activities, including fractional ownership; changes in the general aviation turboprop and piston fleets; and macro factors affecting aviation, including Federal Aviation Administration funding formulas, security requirements for general aviation, and fuel costs.

No attempts were made to forecast or model the period beyond 2025, and future values are increasingly uncertain. Because changes in the economy, geopolitical situation, and technology sector often have major, unforeseeable effects on the aviation industry, the Federal Aviation Administration (2006d) typically extends its annual *FAA Aerospace Forecasts* only for 12 years. The values provided by The Boyd Group, Inc. (2007a) for 2025 represent best professional judgments, but estimates beyond 2025 would have such a high degree of uncertainty as to be too speculative.

Jackson Hole Airport staff believe that general aviation use of the airport could increase by an amount greater than that predicted by The Boyd Group, Inc. (2007a) if scheduled passenger service ended. Factors supporting this premise include the following.

- During busy seasons, the airport's parking area for general aviation aircraft is full and is subject to a reservation system. This indicates that during these periods, there is unmet demand for general aviation use. If scheduled passenger service and its associated overnight parking ended, about twice as much ramp space would be available to park general aviation aircraft, and increased busy-season use associated with the currently unmet demand would occur.
- Some of the general aviation aircraft that currently are based at other public and private airstrips in the region might relocate to the Jackson Hole Airport if additional ramp space was available.
- The Jackson Hole Airport is used by an unusually high proportion of very wealthy people. If scheduled passenger service ended, some of these people probably would charter general aviation flights to the area. Particularly during busy seasons, this would increase general aviation traffic.

The National Park Service recognizes that the forecast of general aviation use that is used as a model input affects the modeled results. Therefore, although values from The Boyd Group, Inc. (2007a) were used in modeling, the National Park Service acknowledges that different results would occur with different forecasts, and that the higher general aviation use between 2013 and 2033 that is anticipated by the Jackson Hole Airport staff would result in a smaller difference between the action alternative and no action alternative with regard to percent of the time aircraft were audible.

Modeling Procedures and Outputs

Alternatives were modeled for average-annual and peak-season (July through September) conditions in the years 2015 and 2025. In addition, the model was run for average-annual and peak-season conditions using actual flight operations information obtained from the Federal Aviation Administration at the airport tower for the period October 2004 to September 2005. This model run provided a representation of existing conditions and was the baseline against which the results for Alternative 1, no action, were compared. Aircraft sound from Alternative 2 was compared to aircraft sound that would result during the same time period from Alternative 1. Each of the modeled alternative results also was compared to natural ambient conditions (natural ambient sound levels were used to calculate percent-time audible and percent of park audible).

Modeling was based on a 15-hour day (7 A.M. to 10 P.M.) to correspond with typical operations, and the period during which most aircraft arrivals and departures occur. A total of 13 approach and eight departure flight tracks were modeled, based on actual flight tracks that were provided by the Federal Aviation Administration's contract control tower. While individual aircraft may vary from these tracks because of weather conditions, pilot preference, or other air traffic, the flight tracks provide a representation of air traffic in the vicinity of the Jackson Hole Airport.

The complete suite of aircraft presented in Table 27 was used to model sound under Alternative 2. Sound modeling for Alternative 1 in the years 2015 and 2025, which would not include scheduled passenger service, used only the data for general aviation aircraft that are presented in each table. Because Integrated Noise Model version 6.2a does not include any single turboprop aircraft in its database, the numbers of aircraft in this class from The Boyd Group, Inc. (2007a) forecast were accounted for in the modeling by using two single-piston aircraft types.

Under Alternative 1, the loss of scheduled passenger traffic would make ramp parking space available for general aviation aircraft that is currently occupied overnight by air carrier and regional carrier planes. However, the amount of available ramp space limits general aviation only a few days each year, mostly around holidays. Therefore, loss of scheduled passenger traffic would have a minimal affect on general aviation traffic most of the year and was not considered in the model.

All model outputs involving levels of sound are expressed as A-weighted decibels. For both all-year and peak season conditions, modeling produced the following information for 659 grid point locations, shown in Figure 4, within and around Grand Teton National Park:

- Maximum sound level (Lmax);
- Percent-time audible (only for locations within the national park);
- Total time in minutes within a 15-hour operations day that aircraft sound above 60 dBA occurs; and
- Energy-average sound level, labeled as the day-night average sound level.

Appendix F, Integrated Noise Model (INM) 6.2 Methods and Results, provides details of the sound modeling process and procedures. It also presents the model results for day-night average sound levels and provides the sound intensity index representations in map form. Modeled values for each point are available in tabular form on the NPS' Internet site at <http://parkplanning.nps.gov> or www.nps.gov/grte/parkmgmt/planning.htm.

Impact Thresholds and Issues

As described above, modeling provided information on several metrics that can illustrate the potential effects of aircraft using the Jackson Hole Airport on the natural soundscape of Grand Teton National Park. The data from each modeled point can be used to determine the amount of the park that is affected by aircraft using the Jackson Hole Airport, and also was used to calculate a sound intensity index, which was described in Chapter 3.

Although each metric is useful in understanding the effects of aircraft sound, they each have limitations. For example, the Lmax metric is useful in describing the maximum sound level that might be experienced at a location, but provides no information regarding the duration or frequency of the sound, or information about aircraft sounds that are less than the maximum. Similarly, the modeled data can be used to understand in how much of the park aircraft using the Jackson Hole Airport are audible. However, that information provides little insight into the magnitude of those effects at any point. It merely provides information about how much of the park has modeled audibility at some non-zero level, even if it is less than one percent of the time. Some areas of the park, such as those nearest the airport, would experience relatively loud sounds and relatively high percent-time audible, while other areas more distant from the airport would experience aircraft sound only infrequently and at very low sound levels.

The manner in which aircraft travel through the airspace above the park also is important. Aircraft are moving sound sources and are not constrained by the location of roads, developed areas, or other features on the ground (except terrain). They travel freely through the airspace, although along flight paths that are generally predictable and well-established. Because of this, a relatively small number of aircraft determine the area of the park that is affected; increasing the number of aircraft would have only a limited effect in increasing the amount of the park affected, but would tend to increase the amount of time that aircraft are audible. The data presented later in this section illustrate that point. Therefore, using the area of the park affected by itself is not necessarily a good way of distinguishing between the effects of alternatives, unless it is combined with some other measure that illustrates the magnitude of the effects.

Like other areas of northwest Wyoming, virtually the entire park is affected to some degree by high-altitude aircraft that are transiting the airspace. NPS unpublished data show that the sound levels associated with these aircraft typically are low, but are audible approximately 5 percent to 10 percent of the time.

The impact thresholds used in this analysis are based on how much of the park is affected to a certain degree. Specifically, the thresholds for impacts that are deemed negligible, minor, moderate, or major are based on how much of the park is affected by aircraft sound 10 percent or more of the time. The criteria described below were selected for several reasons.

First, the percent of time that aircraft sounds are audible at any point is, to some extent, a proxy for sound levels that would be experienced. Aircraft are moving sound sources generally traveling to and from a single location in the park (that is, the airport), all the while changing altitude and power settings. All other things being equal, the louder a moving sound source is, the longer it will be audible

from a particular location. Thus, areas with higher percent-time audible values will generally also experience higher sound levels. This relationship is evident in the modeling data.

Second, the 10 percent audibility threshold approximates the percent of time that transient aircraft (that is, those that are not using the airport and are simply transiting the airspace, often at high altitude) are audible over Grand Teton and Yellowstone national parks. Most of these aircraft result in relatively low sound levels, but on any day, the sounds of transient aircraft may be audible over virtually the entire park. Because of the relationship between percent-time audible and sound levels, areas of the park that experience modeled audibility greater than 10 percent would also experience generally higher sound levels than those resulting from transient aircraft. Thus, areas of the park with modeled audibility greater than 10 percent would be distinguishable from the “background” in terms of both audibility and sound level.

The analysis presents data in a variety of ways that are intended to help the reader understand the impacts on the natural soundscapes of the park. For example, pie charts are used to illustrate the distribution of modeled points, corresponding to the amount of the park, where certain levels of audibility occur. For the purpose of determining the overall impact of each alternative on the natural soundscapes, only the park-wide metric is considered. The park-wide metric is used for the impact determination because the National Park Service is responsible for protecting the natural soundscape of the entire park, rather than just certain portions of it, such as where visitors would be most likely to be present. The park-wide metric also recognizes the fact that aircraft travel over the park unconstrained by the location of roads or developed areas, and that aircraft sounds are distributed over a wide area of the park. The impact analysis considered only the peak season modeling results for each alternative, because this represents the period when the impacts would be greatest.

Modeling results, including the tabular data for each of the modeled points, average annual conditions, and impacts for each of the three management zones identified in the park’s master plan (NPS 1976), are available online at either <http://parkplanning.nps.gov> or www.nps.gov/grte/parkmgmt/planning.htm.

The impact thresholds for natural soundscapes presented below were developed using best professional judgment of park planners and resource professionals, with guidance from the NPS’ Natural Sounds Program in Fort Collins, Colorado, and from the NPS Intermountain Regional Office Environmental Quality Division.

Negligible: An action that may affect the natural soundscape or potential for its enjoyment by resulting in aircraft sound that is audible 10 percent or more of the time over less than 5 percent of the park. Conversely, aircraft noise would be audible less than 10 percent of the time over at least 95 percent of the park.

Minor: An action that may affect the natural soundscape or potential for its enjoyment by resulting in aircraft sound that is audible 10 percent or more of the time over less than 10 percent of the park. Conversely, aircraft sound would be audible less than 10 percent of the time over at least 90 percent of the park.

Moderate: An action that may affect the natural soundscape or potential for its enjoyment by resulting in aircraft sound that is audible 10 percent or more of the time over less than 20 percent of the park. Conversely, aircraft sound would be audible less than 10 percent of the time over at least 80 percent of the park.

Major: An action that may affect the natural soundscape or potential for its enjoyment by resulting in aircraft sound that is audible 10 percent or more of the time over 20 percent or more of the park. Conversely, aircraft noise would be audible less than 10 percent of the time over less than 80 percent of the park.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with an particular activity such as construction. Long-term effects also include events of short duration, such as the sound from an aircraft taking off or landing, that occur regularly, such as daily, over an extended period of time.

The analysis includes 489 modeled points in Grand Teton National Park, plus an additional 170 points outside the park but within a 10-mile radius of the runway centerpoint. Only the points in the park were used in determining the impacts on the natural soundscape of the park.

For areas outside the park that could be affected by changes in aircraft sound from the alternatives, the Federal Aviation Administration criteria in Table 6 were generally applied. However, these criteria were only used as indicators because:

- They apply to *increases* in sound levels, and the alternatives include *decreases* in aircraft sound.
- The policy of the National Park Service, which is the lead agency for this environmental impact statement, is to make findings of significance only in the record of decision. In contrast, the Federal Aviation Administration criteria in Table 6 inherently assign significance.

Because the National Park Service does not use the Federal Aviation Administration approach for evaluating aircraft sound, it will not make findings of marginal or significant impacts that are included in Table 6. As a result, even an alternative that the National Park Service determines would have a major, adverse impact on the natural soundscape would not necessarily meet the Federal Aviation Administration's standard for "significant." However, consistent with the intent of Federal Aviation Administration procedures, this analysis will consider areas that are predicted by modeling to have a day-night average sound level of at least 45 dBA against the criteria shown in Table 6.

Six issues relating to aircraft sound were identified during scoping. Three focused primarily on changes in airport operations that could result from an extension of the use agreement and included:

- Effects on sound levels in the park. This includes effects from changes in air traffic levels, the sizes of aircraft, airport ground operations, and any mitigation measures; and changes in the ability to meet the noise requirements of the use agreement.
- Effects on sound audibility in the park.
- Effects on sound levels on private land in Teton County.

The other issues considered sound from the airport in association with sound from other sources, plus changes in sound that could occur from improvements in technology. These issues are evaluated as cumulative impacts and include:

- Effects on sound from aircraft overflights not associated with the Jackson Hole Airport, plus interagency helibase flights.
- Effects of airport sound in conjunction with sound from all other sources, including highway sound and sound from projects on public and private lands in the vicinity.

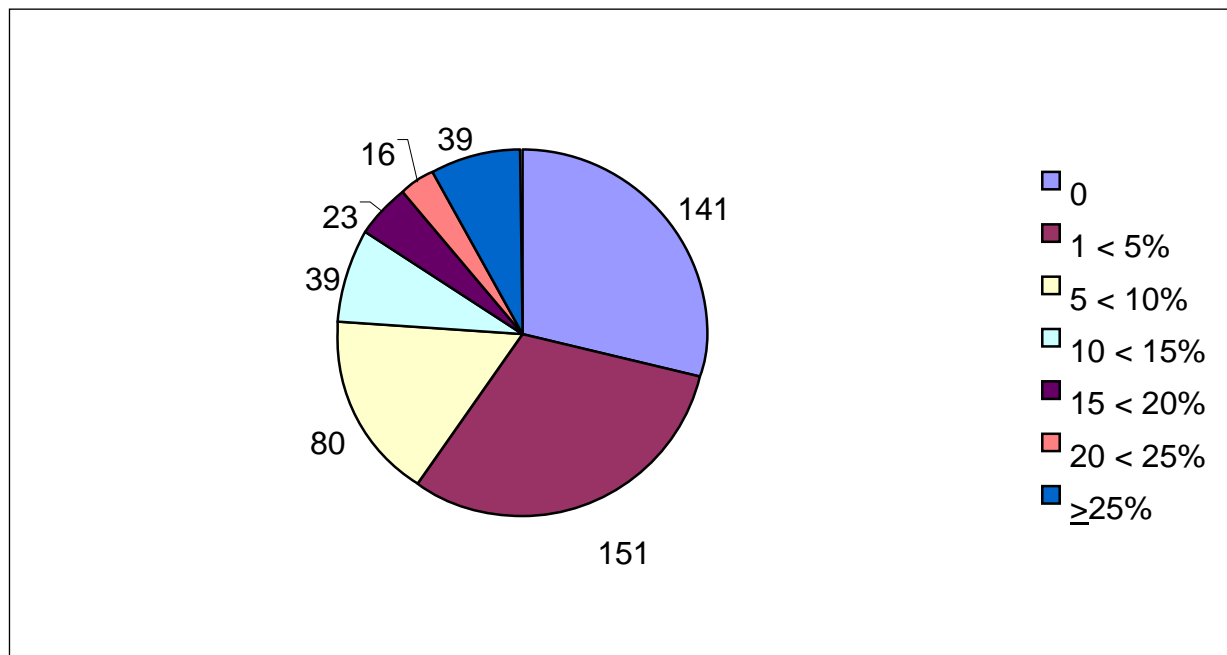
- Effects of anticipated technological advances on sound levels from the alternatives.

The methods and impact thresholds used for the soundscapes analysis in this environmental impact statement are appropriate for the particular circumstances at Grand Teton National Park, but would not necessarily be appropriate in other circumstances. The location of the airport within the park, the fleet mix, the number and types of operations, and characteristics of the flight routes (that is, arrivals and departures from a fixed location) result in a set of conditions that may be substantially different from those that exist in other national parks or areas where aircraft are present. Air tours, for example, would likely involve a very different fleet mix and use of the airspace and would, therefore, potentially warrant a different analysis method or set of impact topics. Similarly, the geography, topography, and other characteristics of other areas might also warrant a different approach or set of impact thresholds.

Analysis

Figure 11 presents the distribution and number of the 489 modeled analysis points in the park in each percent-time audible category under existing (2005) peak-season conditions. For example, during the 2005 peak season, aircraft using the Jackson Hole Airport were audible between 1 percent and 5 percent of the time at 151 of the modeled 489 points (31 percent) in the park. Based on these values, aircraft were audible less than 10 percent of the time at 372 points (76 percent of the park). In about 8 percent of the park (39 points), aircraft using the airport were audible more than 25 percent of the time. Most of these points are within 3 miles of the airport, and all but four are within 5 miles. Figure 11 represents the baseline condition to which Alternative 1 was compared.

**FIGURE 11: NUMBER OF POINTS IN GRAND TETON NATIONAL PARK
BY MODELED PERCENT OF TIME AUDIBLE FOR THE 2005 PEAK SEASON**



Under Alternative 1, the Jackson Hole Airport is presumed to have lost its Federal Aviation Administration Part 139 certification by 2015. Therefore, scheduled passenger air carriers and regional carriers would no longer provide service to the airport, although general aviation would continue through the period of analysis.

Figures 12 and 13 illustrate the modeled results for park-wide percent of time audible under Alternative 1 for the 2015 and 2025 peak seasons, respectively. The percent of time audible data are based on a 15-hour daily period (7:00 A.M. to 10:00 P.M.), which closely corresponds to the period during which most aircraft arrivals and departures occur. The figures indicate that aircraft percent of time audible would decrease slightly from current conditions. The area of the park where aircraft would be audible more than 10 percent of the time would be 20 and 19 percent in 2015 and 2025 respectively, compared to 24 percent of the park in 2005. The amount of the park where aircraft would be audible 25 percent or more of the time would be 7 percent in both 2015 and 2025, as opposed to 8 percent in 2005.

As noted previously, areas of the park for which percent of time audible is relatively low also experience sound levels that are relatively low. For the 2015 peak season:

- In areas of the park where aircraft would be audible less than 10 percent of the time, 77 percent of the modeled points would have a maximum sound level of less than 60 dBA, and 65 percent of the points would have a maximum sound level of less than 50 dBA. For points where percent of time audible would be less than 10 percent but maximum sound level would be greater than 60 dBA, the average time above 60 dBA would be 0.05 minutes per day.
- Conversely, areas of the park where aircraft percent of time audible would be relatively high also would experience higher sound levels. For the 2015 peak season, areas of the park where aircraft would be audible 20 percent or more of the time (41 points, or 9 percent of the park), maximum sound levels would range from 40 to 106 dBA, with an average value of 66 dBA. Time above 60 dBA for these points would range from zero to 33.6 minutes per day, with an average of 3.3 minutes; 18 of the 41 points would have zero time above 60 dBA.

Figure 14 presents the modeled results for aircraft percent of time audible for current (2005) conditions, and in 2015 for Alternatives 1 and 2. These are the same data shown in Figures 11 and 12, but they are provided in bar chart format, and include data from Alternative 2. This format facilitates comparison of the data from the two alternatives and current conditions. Figure 15 provides the corresponding information for 2025.

The modeled results for Alternative 1 show that conditions in 2015 and 2025 would be similar to current conditions.

- There would be a change of less than 1 percent in the area of the park in which airport-related aircraft sound would not be audible. For example, under average-annual conditions in 2015, airplane sound would not be audible in about 17 percent of the points in the park and in 2025 it would not be audible in about 16 percent of the points in the park.
- Compared to current conditions, the area of the park in which aircraft using the airport would be audible 5 percent or less of the time (or three minutes each hour) would increase (park would become quieter). In both 2015 and 2025, the increase on an average-annual basis would be by about 10 percentage points, to almost 60 percent of the points in the park. Increases of about 5 percentage points would occur during the peak-use seasons to more than 50 percent of the points in the park.

FIGURE 12: NUMBER OF POINTS IN GRAND TETON NATIONAL PARK BY MODELED PERCENT OF TIME AUDIBLE FOR 2015 PEAK-SEASON CONDITIONS UNDER ALTERNATIVE 1

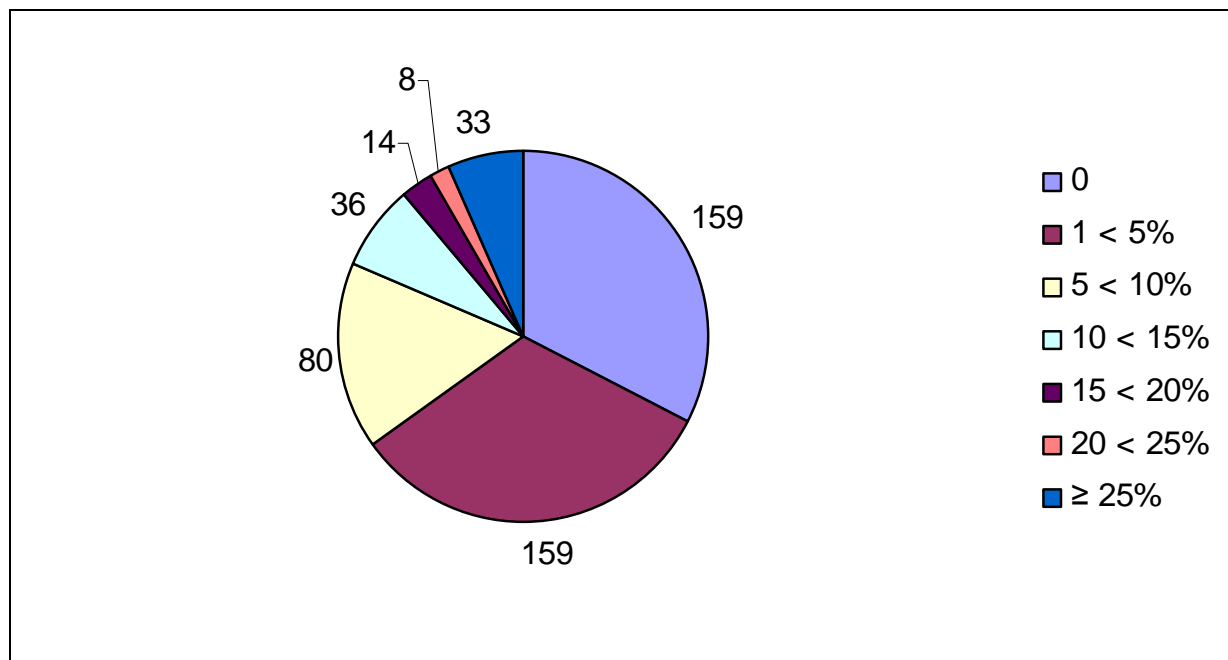


FIGURE 13: NUMBER OF POINTS IN GRAND TETON NATIONAL PARK BY MODELED PERCENT OF TIME AUDIBLE FOR 2025 PEAK-SEASON CONDITIONS UNDER ALTERNATIVE 1

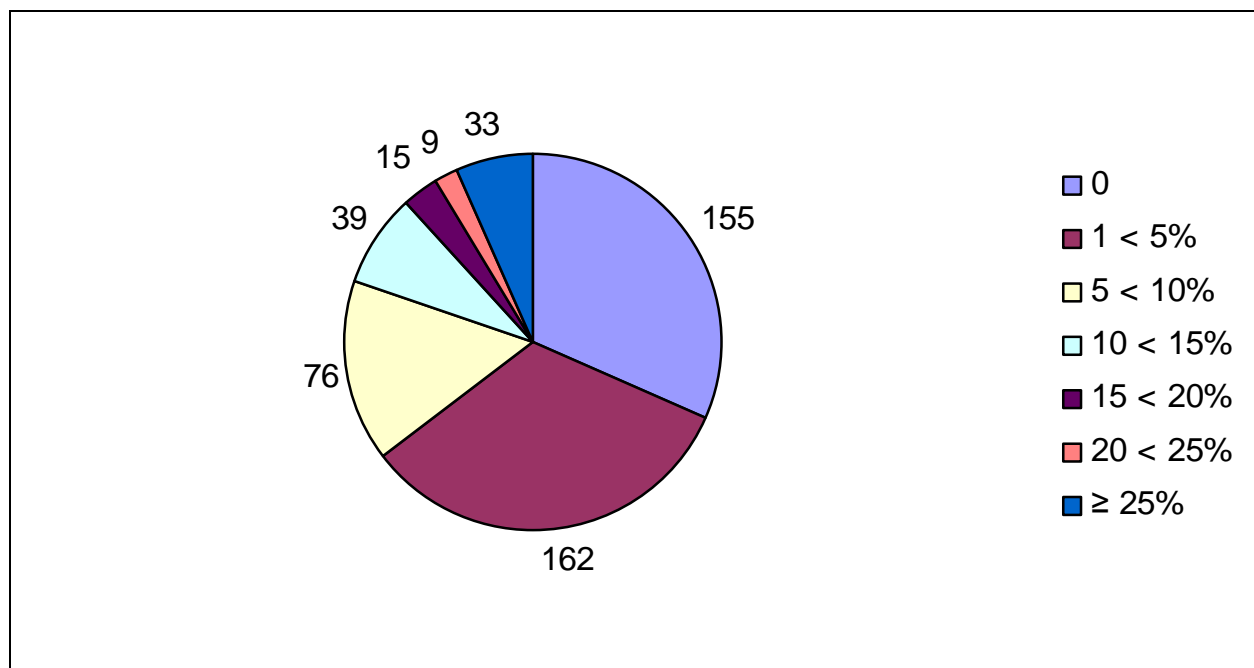


FIGURE 14: DISTRIBUTION OF DAILY PERCENT OF TIME AUDIBLE IN GRAND TETON NATIONAL PARK FROM AIRCRAFT USING JACKSON HOLE AIRPORT IN 2005 AND 2015 FOR PEAK-SEASON CONDITIONS

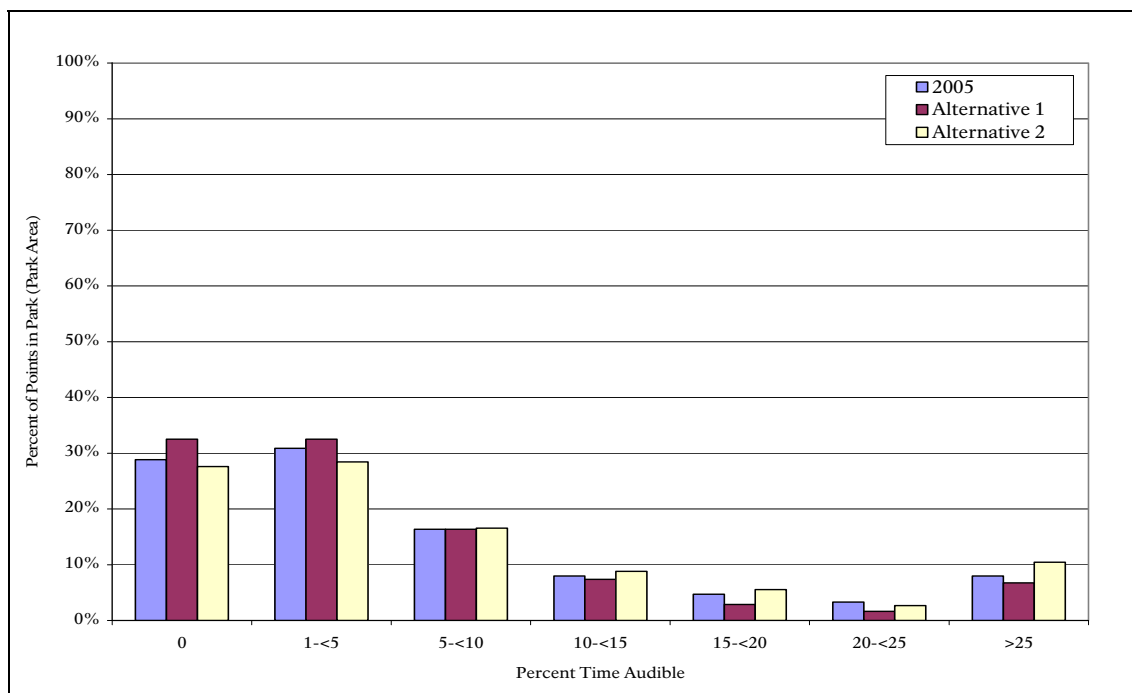
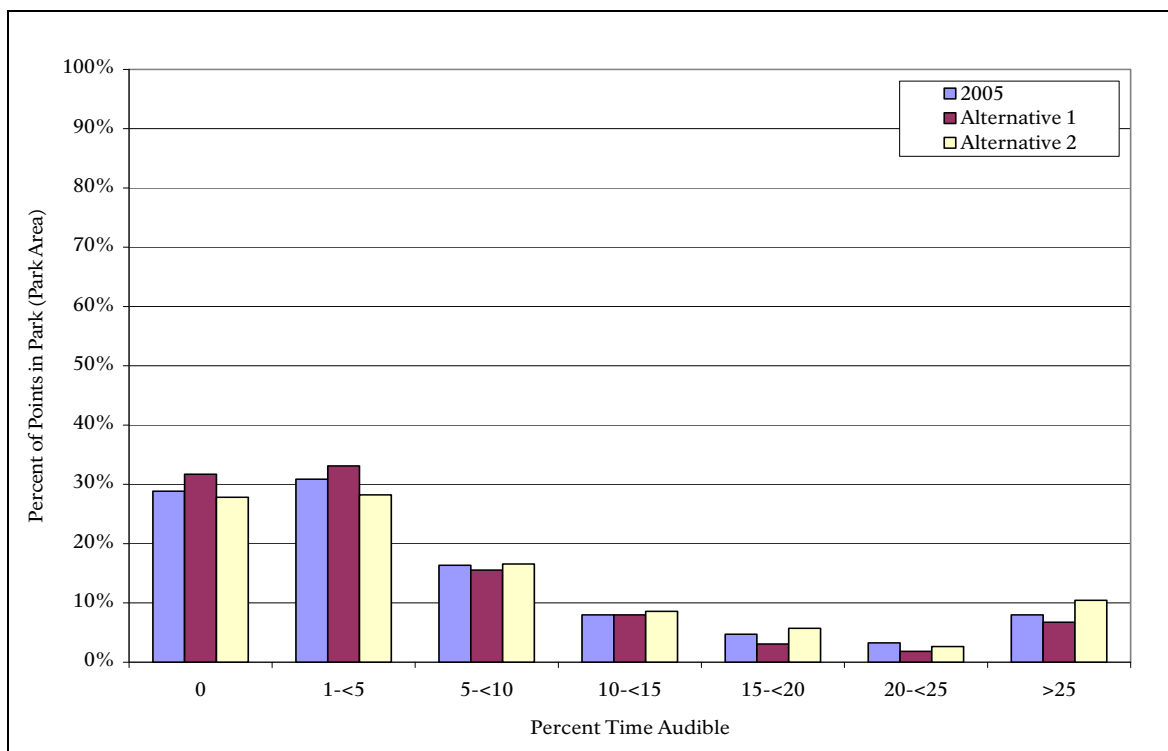


FIGURE 15: DISTRIBUTION OF DAILY PERCENT OF TIME AUDIBLE IN GRAND TETON NATIONAL PARK FROM AIRCRAFT USING JACKSON HOLE AIRPORT IN 2025 FOR PEAK-SEASON CONDITIONS



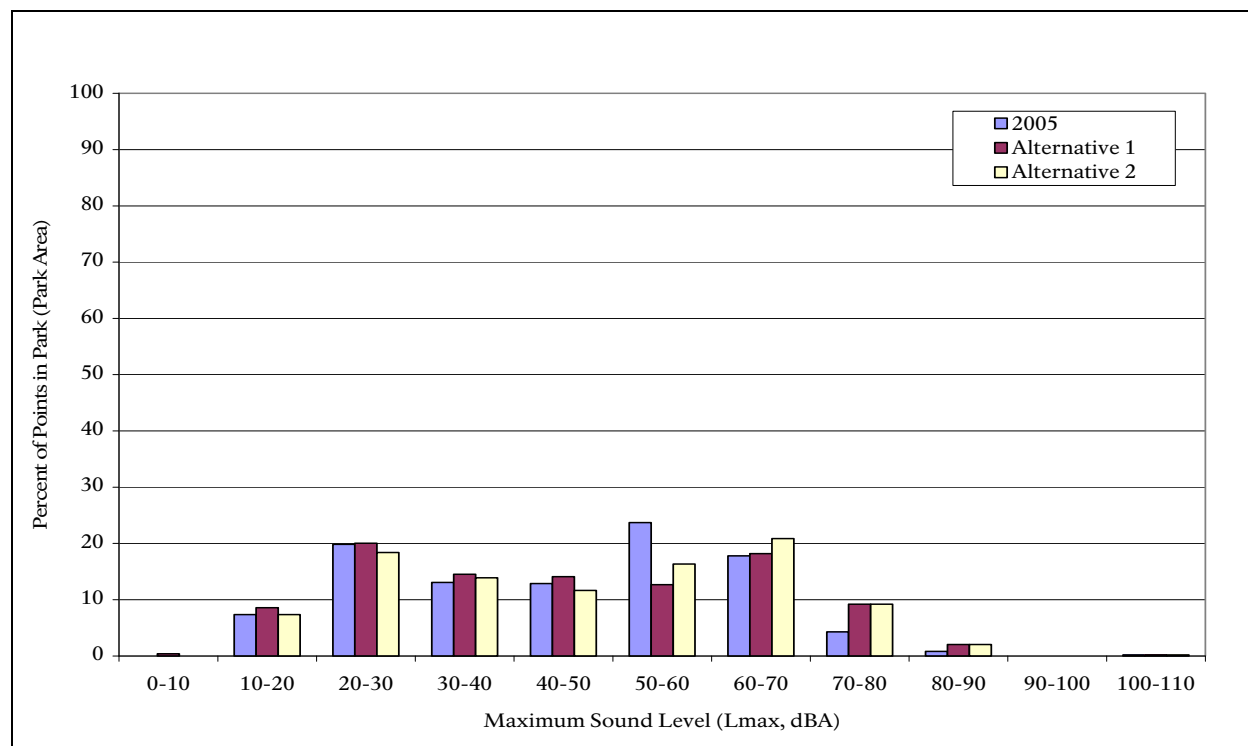
- The distribution of all other percent of time audible values would be within one or two percentage points of those currently occurring.
- For locations nearest the airport, the highest percent-time audible values would continue to be 30 percent of the time (or 18 minutes each hour) for average-annual conditions and 45 percent of the time (or 27 minutes each hour) during peak-season conditions.

For Alternative 1 in 2015 and 2025, the greatest impacts on the natural soundscape would occur closest to the airport. With increasing distance from the airport and aircraft flight paths, the intensities of aircraft sound emissions would diminish, becoming negligible in the north part of the park. This situation would not represent a change from the existing condition.

Maximum Sound Levels in Grand Teton National Park. The modeled maximum sound levels (Lmax) for airport-related aircraft at locations in the park for Alternative 1 in 2015 and 2025 are shown in Figure 16. The maximum sound levels at any location depend on the proximity and type of aircraft in the fleet, and not on the number of operations carried out by those aircraft. Because the fleet mix and modeled flight routes do not change between 2015 and 2025, the predicted maximum sound levels would be identical.

As shown in Figure 11, there is no clear pattern regarding maximum sound levels compared to current conditions. The shift in the fleet mix that would occur with Alternative 1 would cause a decrease in maximum sound levels at some sound ranges in the park and would increase levels in others. However, as a whole, the maximum sound levels that would be experienced in the park would not be substantially different from current (2005) conditions.

FIGURE 16: DISTRIBUTION OF MODELED MAXIMUM SOUND LEVELS (LMAX) FROM JACKSON HOLE AIRPORT OPERATIONS WITHIN GRAND TETON NATIONAL PARK IN 2005 AND 2015 (2025 WOULD BE IDENTICAL TO 2015, SEE TEXT)



Day-Night Average Sound Levels. Maps showing the day-night average sound level, based on a 15-hour day (7 A.M. to 10 P.M.), that would be associated with Alternative 1 are provided in Appendix F.

The patterns of day-night average sound level would be similar between average-annual and peak-use seasons, and between current conditions, 2015, and 2025. For example, in all situations, the 65 dBA day-night average sound level contour north of the runway would remain within the airport boundary.

For average-annual conditions in 2015 and 2025, the 65 dBA day-night average sound level contour south of the runway would end close to the airport's south boundary. Under peak-season conditions in 2015 and 2025, this contour would extend less than a quarter-mile into private land beyond the south airport boundary. The 45 dBA to 60 dBA day-night average sound level contours outside the park would be similar to those currently occurring (see Figures F-1, F-2, and F-4 through F-7). Based on these relatively small changes, none of the Federal Aviation Administration criteria in Table 6 would be expected to apply.

Compliance with the Noise Requirements in the Use Agreement. Figures F-4 through F-7 include the areas of the park where the day-night average sound level associated with airport operations cannot exceed 55 dBA (shown with blue hatching), and the 45 dBA boundary (shown as a purple line) specified in the use agreement. None of the average-annual or peak-season conditions associated with Alternative 1 in 2015 or 2025 would result in day-night average sound level contours that would violate these use agreement requirements.

Time above 60 dBA. The predicted values for percent of the time above 60 dBA at locations in the park for Alternative 1 in 2015, based on a 15-hour day (7 A.M. to 10 P.M.) during the peak season, are presented in Figure 17. Corresponding data for 2025 are presented in Figure 18. The modeled results for Alternative 1 show that conditions in 2015 and 2025 would be very similar to current conditions, and that none of the distribution values would change by more than 2 percentage points from year 2005 data.

Sound Intensity Index. Maps of the sound intensity index for Alternative 1 are provided in Appendix F. Because the sound intensity index is calculated by multiplying values, it tends to accentuate differences among conditions. As a result, the following features become clear based on the sound intensity index.

- Based on a comparison of sound intensity indexes (Figures F-8, F-8A, F-10, and F-10A) calculated for a 15-hour day (7 A.M. to 10 P.M.), there would be little difference between annual-average conditions in 2015 and 2025. Similarly, peak-season effects in 2015 (Figures F-9 and F-9A) and 2025 (Figures F-11 and F-11A) would be similar.
- When compared to the 2005 conditions in Figures F-3 and F-3A, average-annual sound impacts would decline under Alternative 1 in both 2015 and 2025. A somewhat smaller decline would occur between 2005 peak-season effects and those in 2015 and 2025.

Sound Effects on Lands Outside the Park. Based on the analysis of 170 points outside the park, sound effects of Alternative 1, based on a 15-hour day (7 A.M. to 10 P.M.), were compared to current conditions. Results would be as follows:

- Day-night average sound levels for areas outside the park were discussed above.
- The maximum sound levels outside the park in both 2015 and 2025 would be 95 dBA, about 3 dBA louder than 2005 maximums.

FIGURE 17: DAILY PERCENT OF THE TIME ABOVE 60 dBA IN GRAND TETON NATIONAL PARK FROM AIRCRAFT USING JACKSON HOLE AIRPORT IN 2005 AND 2015 FOR PEAK-SEASON CONDITIONS

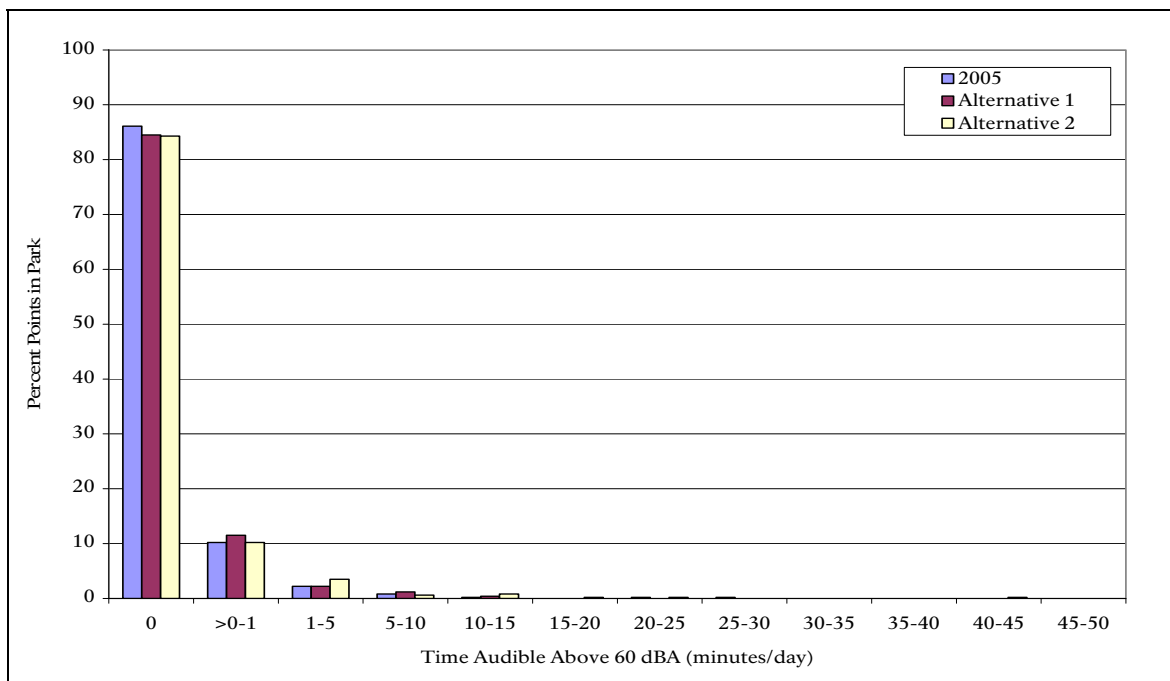
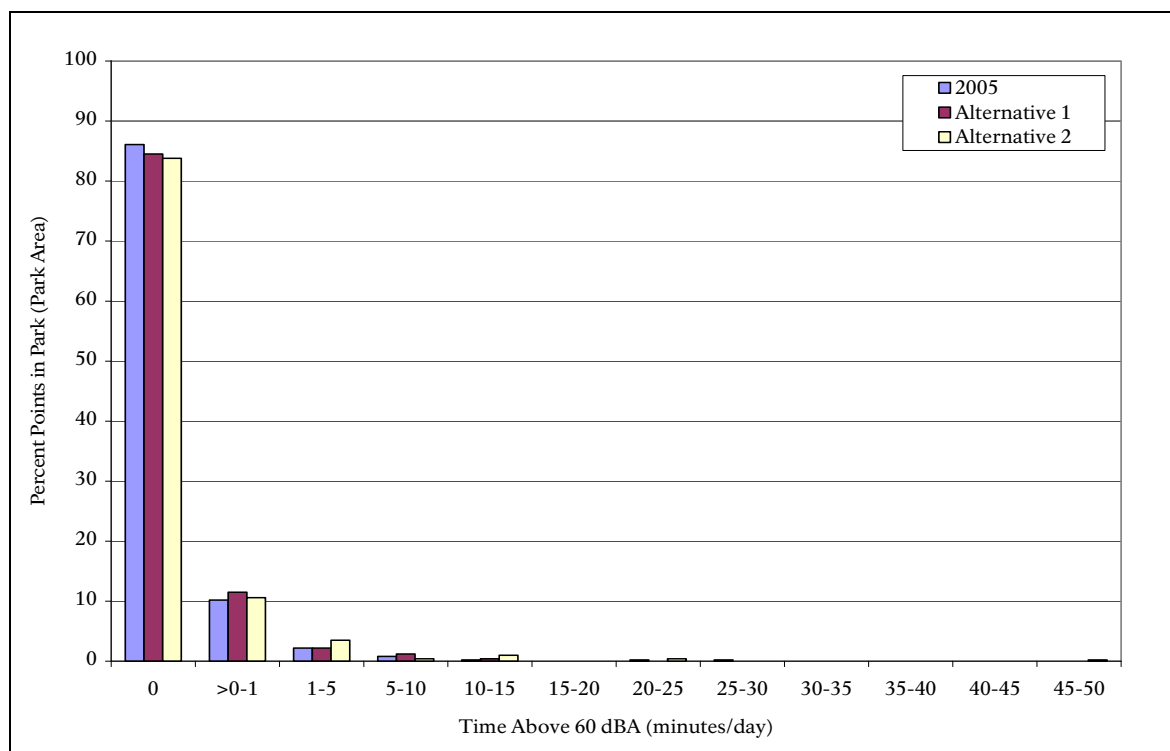


FIGURE 18: DAILY PERCENT OF THE TIME ABOVE 60 dBA IN GRAND TETON NATIONAL PARK FROM AIRCRAFT USING JACKSON HOLE AIRPORT IN 2025 FOR PEAK-SEASON CONDITIONS



- For average-annual conditions in 2015, the area in which aircraft sound was below 60 dBA would decrease by about 4 percentage points, from 57 percent to 53 percent. The area in which aircraft typically would be at 60 dBA or more for less than a minute during the daily period of airport operations would increase slightly, from 30 percent to 32 percent. The highest values for time above 60 dBA would increase from the current 17 minutes to 21 minutes per day.
- Average-annual and peak-season conditions in 2015 would be very similar with regard to percentage distribution of the modeled areas for time above 60 dBA. However, the highest value for time above 60 dBA for peak-season conditions would be 26 minutes per day.
- In 2025, average-annual conditions would be nearly identical to those in 2015. However, during the 2025 peak season, the area in which aircraft sound was below 60 dBA would decrease to 50 percent of the points in the modeled area, and the highest value for time above 60 dBA would be 34 minutes per day.

Post-Closure. Under Alternative 1, the Jackson Hole Airport would close in 2033. At that time, all airport-related sound would end. The change would be measurable throughout the 85 percent of the park in which aircraft sound is audible, but would be most apparent in the areas close to the airport that are shown by the peaks and ridges of the sound intensity index (Appendix F figures).

Closure of the airport would have a long-term, beneficial impact on the natural soundscape of the park by eliminating sound from airport-related aircraft and ground operations.

Based on the impact threshold definitions, the effects of Alternative 1 on the natural soundscape of Grand Teton National Park would be major, indirect, long-term, and adverse until 2033. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible less than 10 percent of the time over approximately 80 percent of the park, just at the threshold for the major impact category. The effects would be most evident within a few miles of the airport, and would affect predominantly areas in the southern portions of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of becoming negligible impacts. Effects of the airport on the natural soundscape of the park would cease once the airport closed in 2033.

Cumulative Impacts

The cumulative effects analysis examined the incremental impacts of Alternative 1 on the natural soundscape condition of the park, which already is affected by non-airport-related sound sources, and could be affected in the future by technological changes.

Flights by transient aircraft represent an existing sound source that would continue regardless of the status of the Jackson Hole Airport. These aircraft include both commercial and general aviation aircraft passing over or near the park at varying altitudes. In general, transient aircraft are audible 5 percent to 10 percent of the time at sound levels that typically are below 40 dBA and rarely are greater than 55 dBA. These sounds represent an adverse effect on the natural soundscapes of the park. In some areas of the park, such as the north and west portions of the Mountain Wilderness Zone and the north parts of the Valley Zone, aircraft sounds may be the only non-natural sound that occurs. In other parts of the park, such as in developed areas or along road corridors, the sounds may be masked by other natural or non-natural sounds.

The interagency helibase, operated by the National Park Service and U.S. Forest Service from a location north of the development subzone at the Jackson Hole Airport, would continue operating until at least 2015 and perhaps until 2033. Aircraft operations associated with fire suppression, search and rescue, research, and resource management would continue, and would adversely affect the natural

soundscapes of the park. By 2033, the helibase would be relocated to another area, either in or outside of the park. Regardless of location, helicopter operations over the park would continue.

Highway traffic is another important sound source in the park, especially along road corridors and in developed areas. Unpublished data from the National Park Service show that within the turnouts along U.S. Highway 26/89/191, the sound level from a diesel truck 50 feet away traveling at 45 miles per hour can be up to 80 dBA. Other sources that contribute to the cumulative sound levels within and near road corridors and developed areas include automobiles and motorcycles, car stereos, and human voices. Close to roads, and especially along major travel corridors, these sources result in adverse effects on the natural soundscape. Similarly, adverse impacts on the natural soundscape occur in lake areas where motorized watercraft are used and, during the winter, in areas used by snowmobiles. These impacts would continue regardless of the status of the airport.

In all of these areas, sound from sources not related to the airport would mask the sounds of aircraft, thereby decreasing the percent of time in which aircraft were audible, but nevertheless continuing to present a non-natural soundscape. For example, at the busy park headquarters in Moose Village, aircraft sound would not be audible until the plane was close enough that its sound exceeded the sound from other sources. Listeners might then suddenly be aware of a “loud” aircraft sound that would fade just as quickly. Natural sources of sound, such as a cascading waterfall, could create the same effect.

The development and deployment of quiet-technology aircraft will likely have a beneficial effect on the natural soundscapes of the park. However, the modeling that was done for the soundscape analysis was based on aircraft that are currently available. Therefore, it is possible that the model results somewhat overstate the sound effects of aircraft, particularly for the 2025 timeframe.

Other airports in the region could be affected by the implementation of Alternative 1. Discontinuation of scheduled commercial air service at the Jackson Hole Airport would result in an increase in demand at other airports, particularly Idaho Falls and Salt Lake City. Thus, commercial service that now serves Jackson could be displaced to these other airports, adding to the noise impacts in those locations. In addition, closure of the Jackson Hole Airport in 2033 would displace general aviation to other private and public airports throughout the region.

The cumulative effects of Alternative 1 would be major, indirect, long-term, and adverse.

Conclusions

The effects of Alternative 1 on the natural soundscapes of Grand Teton National Park would be major, indirect, long-term, and adverse until 2033. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible less than 10 percent of the time over approximately 80 percent of the park and, therefore, just at the threshold for the major impact category. The effects would be most evident within a few miles of the airport, and would affect predominantly areas in the southern portions of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being a negligible impact. Effects of the airport on the natural soundscape of the park would cease once the airport closed in 2033.

In 2015 and 2025, sound impacts outside the park would decrease slightly compared to current conditions. These changes would not alter the year 2005 findings regarding any of the Federal Aviation Administration's criteria for marginal or significant effects.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 1 would not result in unacceptable impacts on or impairment of the natural soundscapes of Grand Teton National Park for several reasons. First, most of the park would be substantially unaffected by aircraft sounds, which would occur only infrequently and at low sound levels. By 2015, aircraft would be audible less than 10 percent of the time over approximately 80 percent of the park, and less than 5 percent of the time over 65 percent of the park. These values are for impacts during the peak season of aircraft operations, and the number of aircraft using the Jackson Hole Airport is much lower during a substantial portion of the year, notably the spring and fall. Consequently, the impacts during those times would be substantially less than for the peak period. Although a large area of the park would be affected to some degree, the magnitude of those effects at any given point would be small over most of the park. The effects would be slightly less than those that occur at present, and there is no indication that the current impacts affect the fulfillment of the park’s purpose or the potential for its enjoyment by current or future generations.

VISITOR USE AND EXPERIENCE

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in the park with regard to visitor use and experience relative to the presence and operation of the Jackson Hole Airport. In addition, three requirements regarding sound levels are associated with provisions of the 1983 use agreement. These are described under “Use Agreements for the Jackson Hole Airport” in Chapter 1.

Desired Condition	Source
Grand Teton National Park resources are conserved unimpaired for the enjoyment of future generations. The National Park Service does not allow any activities that would cause derogation of the values and purposes for which Grand Teton National Park was established except as directly and specifically provided by Congress.	Organic Act General Authorities Act <i>Management Policies 2006</i> (NPS 2006a)
Opportunities are provided for appropriate, high-quality public enjoyment. Visitors have the opportunity to enjoy the superlative natural resources found in Grand Teton National Park. This includes having ample opportunity for inspiration, appreciation, and enjoyment through personalized experiences.	Organic Act General Authorities Act <i>Management Policies 2006</i> (NPS 2006a)
Human activities do not unreasonably interfere with the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within Grand Teton National Park.	<i>Management Policies 2006</i> (NPS 2006a)
Natural sounds form a valued part of the visitor experience. The natural quiet and natural sounds associated with the physical and biological resources of Grand Teton National Park are preserved. The National Park Service will restore to the natural condition wherever possible those park soundscapes that have become degraded by unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works constructively and cooperatively with the Federal Aviation Administration to ensure that authorized aviation activities affecting Grand Teton National Park do not cause unacceptable impacts on park resources and values and visitor experiences. Aviation operations are conducted in accordance with Federal Aviation Administration advisories, and “fly-friendly” techniques and procedures help pilots minimize impacts on Grand Teton National Park.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on visitor use and experience were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for visitor use and experience are as follows.

Negligible: Changes in visitor use and the visitor experience would not occur. There would not be any perceived change in visitor experience or in defined indicators of visitor satisfaction or behavior.

Minor: Changes in visitor use and/or experience would be small but detectable. Visitors could be aware of the effects, but the changes would not appreciably alter critical characteristics (considered to be viewing of scenery and wildlife, and experiencing solitude or quiet) of the visitor experience, visitor satisfaction, or levels of use at park facilities.

Moderate: Some changes in critical characteristics (considered to be viewing of scenery and wildlife, and experiencing solitude or quiet) of the park experience would be readily apparent, or the number of visitors engaging in an activity or in the use of areas within the park would be substantially altered. Most visitors would be aware of changes, and many would be able to express an opinion regarding the difference. Visitor satisfaction would change as a result of the impact.

Major: Changes in multiple critical characteristics (considered to be viewing of scenery and wildlife, and experiencing solitude or quiet) of the desired experience would be readily apparent. Most visitors would be aware of the effects and would likely express a strong opinion about the changes. Participation in desired experiences or in park visitation would be considerably altered, and would result in substantial changes in the defined indicators of visitor satisfaction or behavior.

Short-term: Effects on visitor enjoyment and recreational or educational opportunities would be associated with a discrete activity with a defined term, such as construction or a treatment action. The effect would end concurrent with or shortly after the end of the specified activity.

Long-term: Effects on visitor enjoyment and recreational or educational opportunities would not be associated with a discrete activity with a defined term, and the effects of the change would be evident for a period exceeding five years.

For most issues, the geographic area evaluated for impacts on visitor use and experience included the lands within the park boundary. However, the analysis of the role of the airport in providing access to other recreation in the area, such as ski resorts, national forests, and other national parks, considered the effects throughout Teton County.

Visitor use and experience issues identified during scoping and addressed in the impact analysis included:

- Effects on the general character of the experience of a national park for the people using the park.
- Effects of sound on the frontcountry versus the backcountry experience, including the expectation for natural quiet in a national park.
- Effects on in-park recreation.
- Cumulative effects on the national park experience in conjunction with all other projects on public and private lands in the vicinity.

Scoping also identified concerns about effects on the ability of visitors to come to the area so they could take part in area activities, including visiting Grand Teton National Park and participating in winter sports. The “Surface and Air Transportation” section addressed this concern under the heading “Community Access by Air.” The economic effects of changes in the ability of visitors to come to the area were discussed in the “Socioeconomics” section.

Scoping comments also indicated concern about non-park recreation in the area, such as ski areas outside the park. The analysis of effects on recreation that is occurring outside Grand Teton National Park was included in the “Socioeconomics” section.

Analysis

Under Alternative 1, visitors would continue to have the same range of opportunities to enjoy Grand Teton National Park that is currently available. Many factors would continue to contribute to the quality of visitor use and experience, including the number and type of activities available, the condition of park facilities, interactions with park staff and other visitors, and the conditions of roads and traffic. Other sources of non-natural sounds would continue to affect the quality of the experience for some visitors.

By 2015, non-natural sounds associated with scheduled passenger flights at the Jackson Hole Airport would cease, although sounds associated with general aviation would continue. The impacts of this change in the numbers and types of aircraft operations are described in the “Natural Soundscape” section in terms of maximum sound levels, percent-time audible, day-night average sound levels, and time audible at or above a level that interferes with normal conversation.

As noted in Chapter 3, surveys taken over the past 10 years have consistently indicated an extremely high level of visitor satisfaction with experiences in Grand Teton National Park. Despite the presence of airport-related sound in much of the park, there is little indication that aircraft sound has substantially reduced the quality of the experience enjoyed by park visitors. Therefore, the decrease in aircraft sound that would occur during the general aviation period would have very little effect on the satisfaction of most park visitors with the quality of their park experience.

For many visitors, the effect of airport-related, non-natural sounds on the quality of their experience would continue to be context-sensitive. For example, visitors hiking or camping in the backcountry, or visiting historic sites away from roadways, may be more sensitive to non-natural sounds while in those settings than they would be in settings along busy roads or in developed areas where their expectations for a predominantly natural soundscape are lower. However, based on the small differences in percent-time audible, percent-time audible above 60 dBA, and maximum sound levels that would occur in the general aviation period, compared to current conditions (see the “Natural Soundscape” section), the beneficial impact on visitor experiences would be negligible to minor, and would be unlikely to affect patterns of use. The changes in sound that would result from the end of scheduled passenger service by 2015 would be less than the seasonal fluctuations in sound from aircraft operations that already occur.

In 2033, the Jackson Hole Airport would close, and all airport-related sounds would cease, resulting in beneficial effects on the natural soundscape of the park. However, this change would occur against the backdrop of other sources of non-natural sounds. Given the current, high level of visitor satisfaction with the high-quality opportunities within the park, the absence of airport-related sounds would be unlikely to have more than a minor, indirect, long-term, beneficial effect on visitor use and experience.

As described in the “Natural Soundscape” section, the impacts of the airport on the natural soundscape of the park are generally greatest in areas where most visitors would have lower expectations of natural quiet, because of the presence of development or transportation corridors and the sounds associated with those features. For example, the area of the park most affected by the presence of the airport in terms of percent-time audible and maximum sound level is the extreme southern part between Moose and the south boundary. While this area of the park experiences high levels of visitation, most of it occurs in places where there would be a high expectation of non-natural sounds, such as along U.S. Highway 26/89/191, in the Moose developed area, or at the airport itself. In addition, the non-natural sounds associated with these areas also tend to mask the sounds of aircraft to some degree. Thus, for many visitors, the decrease and ultimate absence of airport-associated sounds would take place against the backdrop of substantial levels of other non-natural sounds in an area where there is an expectation of non-natural sound. It would, therefore, be likely to have little effect on their experience.

Visitors engaged in different activities in the Moose area may have different expectations or levels of awareness regarding non-natural sounds, depending on the type or location of their activities. For example, visitors to the Murie Ranch National Historic Landmark may find aircraft sounds particularly incongruous with their expectations, especially in light of the significance of the site to the preservation of wilderness values. The site has the feel of a remote, isolated setting, despite its location only a half-mile from the Craig Thomas Discovery and Visitor Center and immediately below the final approach and departure tracks for the airport. The decrease and eventual elimination of airport-related sounds would result in a long-term, minor, indirect, beneficial impact at this site. Visitors to other nearby areas, such as the Gros Ventre Campground, Laurance S. Rockefeller Preserve, and Mormon Row, would experience similar effects, although less pronounced than in Moose.

As described in “Natural Soundscape,” airport-related sound decreases north of Moose. Correspondingly, changes in effects on visitor experience because of decreased airport use and eventual closure would be lower. This particularly would be true in the Valley and Through Zones, where most visitor activities occur along and near roads and in developed areas, where other sources of non-natural sound are prevalent.

Along the Snake River, float trips and fly fishing are popular activities. Although the river is generally within a mile or two of U.S. Highway 26/89/191, it is screened from the road by topography and vegetation, providing a sense of isolation. Despite the proximity of the river to airport approach and departure routes, the NPS receives few if any complaints or comments regarding aircraft sound from either visitors or river guides. In conjunction with the documented high level of visitor satisfaction, this suggests that existing adverse impacts on the visitor experience of river users are negligible or minor. Therefore, the decrease and eventual elimination of aircraft sounds under Alternative 1 would result in, at most, a minor beneficial impact on visitor experience, and would be unlikely to alter patterns of use.

As described in “Natural Soundscape,” changes within the Mountain Wilderness Zone would be smaller than in the Valley and Through Zones in terms of percent-time audible, maximum sound level, and the other metrics used in the analysis. At the same time, expectations for natural quiet and solitude generally are greatest in this part of the park. As evidenced by the high levels of visitor satisfaction and absence of complaints about aircraft sound, the impacts of airport-related sounds appear to be minor. As a result, the decrease and eventual elimination of this source of non-natural sound would result in an indirect, long-term, beneficial impact on visitor experience with an intensity that would be no greater than minor.

Changes relating to the presence of airport facilities within the scenic view would have little effect on visitor use and experience. During the general aviation period, the airport buildings would remain visible in the distance from a few viewpoints in the south part of the park, including some locations along U.S. Highway 26/89/191. The runway and taxiway would remain completely screened by vegetation. Most visitors in this area would continue to be drawn visually to the Teton peaks to the north, with little or no perception of the airport buildings in their visual scene. Therefore, the visual impact of the airport facilities on their park experience would be negligible. Similarly, the impact on visitor experience of removing the facilities after 2033 would be negligible.

During the general aviation period, there would be little change in visitor experience from the presence of aircraft moving across the scene. Aircraft that followed the preferred patterns of an approach from the south and takeoff toward the south would not be flying across park scenic views, and would continue to have no effect on visitor experiences. When aircraft approached from or made takeoffs toward the north, few if any visitors would perceive a difference between the daily average of 72 (in 2015) or 75 (in 2025) aircraft compared to the current 90 aircraft per day (see Tables 7 and 27). The elimination of aircraft flying across the visual scene following airport closure in 2033 may be perceived as beneficial by some park visitors, but would not be sufficient to alter their overall quality of their park experience. As a result, the impact would be negligible.

Cumulative Impacts

Most of the area surrounding Grand Teton National Park is federally owned, including the Bridger-Teton National Forest, National Elk Refuge, and Yellowstone National Park. Only three percent of Teton County, Wyoming is in private ownership, and most of the private land is in the southern part of the county, particularly in and around Jackson. Visitors to the area, as well as local residents, often recreate on public lands throughout the area and the region.

The Bridger-Teton National Forest is in the early stages of updating its forest plan, which will guide its management of lands and resources. No changes in the general character of the region that would affect park visitor experiences are expected from the plan revisions. Oil and gas development south of Teton County, near Pinedale and Bondurant, could potentially change land uses and the natural soundscape of those areas, but is not expected to have any effect on visitor experiences in Grand Teton National Park.

Sound from aircraft transiting the area, but unrelated to the Jackson Hole Airport, would continue to be audible within the park. Sound levels from these aircraft, which typically peak around 30 to 40 dBA for aircraft flying at altitudes between 20,000 and 40,000 feet, may be perceived by some visitors, particularly those in areas where other sources of natural or non-natural sound are absent. Transiting aircraft would continue to be audible 5 to 11 percent of the time, as shown in the Table 8 values for park locations north of the Signal Mountain area.

Improvements in aviation technology may result in quieter engines on most aircraft. Such changes could reduce sound levels from aircraft, including those using the Jackson Hole Airport and those transiting the park. All of the analyses presented here are based on flight routes and sound profiles of the aircraft models currently in use. Advances in aircraft technology and potential future changes to air traffic control could substantially reduce the amount of sound exposure for the park and surrounding areas, but these factors were not included in this analysis. Such improvements would have long-term, indirect, beneficial impacts of minor intensity on visitor experience.

Conclusions

During the general aviation period from 2015 to 2033, non-natural sounds from scheduled passenger aircraft would be absent, resulting in an indirect, negligible to minor, long-term, beneficial impact on visitor experience. After the airport closed in 2033, all sounds associated with the Jackson Hole Airport would cease, resulting in an indirect, negligible to minor, long-term, beneficial impact on the experience of park visitors. Changes in the visual scene would have a negligible impact on visitor use and experience during the general aviation period and following airport closure.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 1 would not result in any unacceptable impacts on visitor use and experience of Grand Teton National Park. The effects on visitor use and experience under this alternative would not be unacceptable because the potential impacts are anticipated to be beneficial to the experience of park visitors.

VISUAL QUALITY AND DARK SKIES

Regulations and Policies

Protecting the visual quality of the national parks’ scenery and providing for the enjoyment of that scenery is the first-mentioned charge of Congress to the National Park Service in the Organic Act. Specifically, 16 *United States Code*, Chapter 1 (with **bolding** added) states that:

*[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks [to] conform to the fundamental purpose of the said parks, which purpose is to **conserve the scenery** and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.*

The National Park Service considers the experience of a naturally dark night or a pristine, starry night sky as important elements of the “scenery” within national park units that the Organic Act directs should be conserved (NPS 2003).

Based on the Organic Act, Section 1.4.6 of *Management Policies 2006* (NPS 2006a) identifies park resources and values that are subject to the no-impairment standard of the Organic Act and the General Authorities Act. As shown below (with **bolding** added), scenery and other visual resources are again listed first, demonstrating their importance in the purpose of the national parks and the NPS’ mission:

*The “park resources and values” that are subject to the no-impairment standard include the park’s **scenery**, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; **scenic features**; **natural visibility, both in daytime and at night**; **natural landscapes**; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals.*

Current laws and NPS policies identify the following desired conditions in Grand Teton National Park with regard to visual quality and dark skies relative to the presence and operation of the Jackson Hole Airport.

Desired Condition	Source
The National Park Service understands, maintains, restores, and protects the inherent integrity of highly valued scenic views. This includes the condition of views that would occur in the absence of human dominance over the landscape. On sites from which previous development is being removed, landscape conditions altered by human activity are restored to a natural condition by removing constructed features and revegetating with native park species.	Organic Act <i>Management Policies 2006</i> (NPS 2006a)
Facilities are integrated into the park landscape and environs with sustainable designs and systems to minimize environmental impact. Development does not compete with or dominate park features.	<i>Management Policies 2006</i> (NPS 2006a)
When installations such as landing sites and airstrips are necessary, they are located and designed to minimize their impact on resources and their intrusion on the visitor experience.	<i>Management Policies 2006</i> (NPS 2006a)
The natural darkness of the park is preserved. The National Park Service cooperates with park visitors, neighbors, and local government agencies to prevent or minimize the intrusion of artificial light into the night scene.	Organic Act <i>Management Policies 2006</i> (NPS 2006a)
Use of artificial lighting is restricted to those areas where security, basic human safety, and specific cultural resource requirements must be met.	<i>Management Policies 2006</i> (NPS 2006a)
Minimal impact lighting techniques are used. Artificial lighting is shielded to prevent the disruption of the night sky.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on visual quality and dark skies were evaluated using the process described in the “Methods for Analyzing Impacts” section. The National Park Service does not have standardized thresholds for analyzing changes either to visual quality or dark skies. Therefore, because they can be readily understood by everyone from professionals to the general public:

- The U.S. Forest Service scenic integrity levels that were described in the “Affected Environment” section under “Measuring Visual Quality” were adapted for use as visual quality thresholds.
- The light-polluted sky levels that were developed by the International Dark-Sky Association (1997) and described in the “Affected Environment” section under “Measuring Light Pollution” were adapted for use as dark sky impact thresholds.

Impacts were indicated by changes between levels. For example, a change in the scenic integrity from moderate to high would be considered a one-step change. A change in the visibility of the night sky from a magnitude +5.0 sky to a magnitude +3.0 sky would be a two-step change. Impact threshold definitions for visual quality and dark skies are as follows.

Negligible: Visual quality and natural lightscapes (dark skies) would not be affected, or effects would not be perceptible or measurable (a no-step change in scenic integrity or a no-step change in the observable magnitude of the night sky).

Minor: Observers who were familiar with the scene from a specified viewpoint would note a one-step change in scenic integrity of foreground and/or midground views. For example, the scenic in-

tegrity in these views would change from high to very high on the measurement scale provided previously under the heading “Measuring Visual Quality.” The change would be based on descriptors such as contrast of color, form, line and texture with the natural landscape; tendency to draw the eye from the scenery; consistency with the character of the area; and/or obstruction of views. No change in the scenic integrity of background views would be perceived by these observers.

Effects on natural lightscapes (dark skies) would be perceived in the immediate vicinity of project-related artificial light sources and would result in a one-step change in the observable magnitude of the night sky. For example, visibility would change from a magnitude +5.0 sky to a magnitude +6.0 sky on the measurement scale provided previously under the heading “Measuring Light Pollution.” Outside the immediate vicinity of project-related artificial light sources, the change in the observable magnitude of the night sky that could be perceived by trained observers would be less than one step.

Moderate: Observers who were familiar with the scene from a specified viewpoint would note a two-step change in scenic integrity of foreground or midground views. For background views, a one-step change in the scenic integrity of landscapes would be noted by these observers. Many visitors would be able to express an opinion regarding the difference and for some, the quality of the viewing experience would be altered.

Effects on natural lightscapes (dark skies) would be readily apparent in the immediate vicinity of project-related artificial light sources and would result in a two-step or greater change in the observable magnitude of the night sky. Outside the immediate vicinity of project-related artificial light sources, a one-step change in the observable magnitude of the night sky could be perceived by trained observers. However, regional effects on dark skies would not occur.

Major: Observers who were familiar with the scene from a specified viewpoint would note a three-step or greater change in scenic integrity of midground views. For background views, a two-step or greater change in the scenic integrity of landscapes would be noted by these observers. The satisfaction of many members of the public with the viewing experience would be substantially altered.

Effects on natural lightscapes (dark skies) would be readily apparent outside the immediate vicinity of project-related artificial light sources, and a two-step or greater change in the observable magnitude of the night sky would be observed. Regionally, trained observers would note a one-step or greater change in the apparent magnitude of the night sky.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with an particular activity such as construction.

The geographic area considered for visual quality and dark skies is bounded on the east by U.S. Highway 26/89/191, on the west by the Teton Range crest, on the north by Moose, and on the south by Jackson.

Three issues relating to visual quality and dark skies were identified during scoping. They include:

- Effects on the visibility of airport facilities from locations within the park.
- Effects on the scenery of the Grand Teton National Park experience, including the visibility of broad or distant vistas.
- Effects on the levels of light emissions at night and the visibility of dark skies.

Analysis

Effects on the Visibility of Airport Facilities

During the transition and general aviation periods, the effects of Alternative 1 on the visibility of airport facilities would be negligible. Prior to 2033, the Jackson Hole Airport Board could make changes within the development subzone, such as replacing existing buildings with new buildings and/or increasing the number of buildings to support changes in general aviation activities. However, all development would continue to be restricted to the development subzone, and the current height restrictions and color scheme would be maintained. As a result, the visibility of airport structures would not change, and the existing scenic integrity levels would be maintained.

Trees have been planted along the east boundary of the airport to provide some visual screening from viewpoints along U.S. Highway 26/89/191 and the airport road. The continued growth of these trees, and any supplemental plantings, may further reduce the visibility of airport structures. However, the midground view of the landscape from U.S. Highway 26/89/191 would continue to appear slightly altered, and the moderate scenic integrity of the landscape would not change.

Following closure of the Jackson Hole Airport in 2033, all of the airport facilities would be removed and the airport site would be returned to a natural condition. The interagency helibase also would be removed, and a new facility would be established on or near already-developed land in the region (but not necessarily within Grand Teton National Park). Following restoration of the airport, helibase, and airport road sites:

- Foreground views would, in time, be restored to high scenic integrity. This would be a long-term, beneficial, indirect effect of moderate intensity.
- Because the housing development to the south and west outside the park would continue to represent deviations from the intact natural condition, effects on midground views would be similar to those described above, with a long-term, beneficial, indirect effect of minor intensity.
- Background views of the Teton Range would not be altered and effects on the scenic integrity levels of background views would be negligible.

Effects on the Scenery and the Visibility of Broad or Distant Vistas

As described above, the facilities associated with the Jackson Hole Airport affect scenic integrity only in foreground and midground views. Therefore, effects of Alternative 1 on the scenery of the park, including the visibility of broad or distant vistas, would only be indirect. These effects would result from changes in the visibility of flying aircraft, and their tendency to draw the viewer's attention away from the scenery to the aircraft itself and to the airport in the midground view.

Scheduled passenger service at the Jackson Hole Airport would decrease during the Alternative 1 transition period and would end in 2015 at the beginning of the general aviation period. At that time, the current schedule of about 30 daily scheduled passenger operations at the airport, some of which use large jets such as the Airbus A319 and Boeing 737, would cease. The absence of their relatively low-level flights on final approach or takeoff just north of the airport would decrease the number of events in which aircraft movement would draw the viewer's attention away from the scenery.

In recent years, there has been an increase in the number of large, privately owned jets that use the Jackson Hole Airport. This trend could continue throughout the general aviation period. However, it is unlikely that, by 2033, there would be 30 daily operations by private jets in the size class of the Air-

bus A319 and Boeing 737. Therefore, compared to current conditions, there would be a reduction in the number of the largest, and therefore most visible, aircraft using the airport.

Barring an event that would render the runway unusable, general aviation use of the Jackson Hole Airport probably would increase between 2015 and 2033. Most of the increase is expected in smaller aircraft, such as microjets and traditional piston-driven aircraft. Because of their small size, these aircraft are not as visible against the landscape, and there is less tendency for their movement to catch the eye of the typical park visitor and divert it from the scenery.

Effects on the scenery of Grand Teton National Park primarily would occur from viewpoints along U.S. Highway 26/89/191 between the Teton Point Turnout and airport road intersection. (Viewpoints along the airport road were not considered, because this road primarily is used for travel to the airport rather than scenery viewing. Viewpoints along the Teton Park Road were not considered because most aircraft fly east of this road, rather than between the road and the Teton Range peaks.) Based on the changes in aircraft numbers and sizes discussed above, Alternative 1 prior to 2033 would have an indirect, long-term, beneficial effect of negligible to minor intensity when compared to current conditions.

Closure of the airport in 2033 would eliminate all aircraft movement between observers on U.S. Highway 26/89/191 and the Teton Range about 10 miles to the west. The result would be an indirect, long-term, beneficial effect on the scenery. The intensity would be minor, based on the low level of disturbance of broad or distant vistas that occurred previously because of flying aircraft.

Effects on Light Emissions and the Visibility of Dark Skies

Throughout the transition and general aviation periods, there would be little change in light emissions from the Jackson Hole Airport or in the visibility of dark skies. Navigational lighting and exterior lighting would not change substantially. Improvements in reducing fugitive light emissions would be made whenever light fixtures were replaced or upgraded, but the difference would not change the visibility of the night sky in lighted areas, or improve the visibility outside of the lighted areas. As a result, the effects on the visibility of dark skies would be negligible.

Light emissions from automobile headlights along the airport road and U.S. Highway 26/89/191 between the airport and Jackson would be reduced, particularly during the winter. However, many of the passengers who formerly flew into the Jackson Hole Airport on scheduled airline service probably would access the area through another airport. As a result, the location of headlight use might change, but the net effect on dark skies would be indirect and negligible.

In 2033, the Jackson Hole Airport would be closed and all lighting associated with the airport would be removed. As a result, Alternative 1 would have the following effects.

- The visibility of the night sky in and near the previously lighted areas of the former development subzone would change from current magnitudes of +3.0 to +5.0 to about magnitude +6.0. Light from the housing development adjacent to the park boundary would prevent this area from achieving the extremely high-quality dark-sky conditions that prevail farther north in Grand Teton National Park. The effect in this area on dark skies would be long-term, indirect, beneficial, and of moderate intensity.
- There would be a limited effect in the south part of the former airport, which would continue to be adversely affected by light pollution from the housing development outside the park boundary. The long-term, indirect, beneficial effect in this area would be of negligible to minor intensity.

- The visibility of dark skies throughout the northern half of the former airport area would improve from current ratings of magnitude +5.5 or +6.0 to ratings approaching the magnitude +6.7 skies that are common throughout the undeveloped areas of the park. The effect in this area on dark skies would be long-term, indirect, beneficial, and of minor to moderate intensity.

Regional changes in the visibility of dark skies as a result of the closure and removal of the Jackson Hole Airport after 2033 would be negligible.

Cumulative Impacts

Visual Quality

Residential and, possibly, commercial development is expected to continue on the private land between the park boundary and the Snake River that is visible from U.S. Highway 26/89/191. The Jackson area has a strong market for primary and second homes and the commercial services that support them. Residential development already has occurred outside the park boundary west and southwest of the airport, and additional construction is expected in this area between now and 2033. Because of the distance from observation points along the highway to the park boundary, this development would occur only in midground views.

- Additional development located in views that currently have low to very low scenic integrity would have a long-term, adverse effect of negligible intensity on visual quality.
- Development in views that currently have moderate scenic integrity would have a long-term, adverse effect of minor intensity.

None of these changes would be affected by changes in visual quality that would be associated with the general aviation or post-closure periods of Alternative 1. Cumulative impacts would not occur on views in other directions from observation points along U.S. Highway 26/89/191 because developable private land is beyond the range of visibility.

Alternative 1 would result in the diversion of scheduled passenger service traffic to other airports in the region. Most of this traffic probably would use the Idaho Falls Regional Airport, about 90 miles from Jackson. To handle the number of additional enplanements that currently are occurring at the Jackson Hole Airport, facility improvements would be required to approximately triple the passenger capacity of the Idaho Falls airport. These changes would result in perceived increases in the visibility of Idaho Falls airport facilities, and may decrease the scenic integrity and visibility of broad or distant vistas. However, scenic integrity of the area already has been substantially altered by existing airport facilities, other structures associated with Idaho Falls, and surrounding land uses, such as agriculture. As a result, the long-term, adverse impacts on visual quality at this alternate airport site would be of negligible or minor intensity.

Dark Skies

In the Jackson area, recreation facilities would continue to be important sources of fugitive light emissions, particularly during the evening. Almost all of these are seasonal, and include baseball diamonds and soccer fields in the spring and summer, the football field in the autumn, and the Snow King Resort in the winter (Grubb 2006). Lights at these facilities are turned down or turned off after the evening's events have ended; for example, skiing under lights at the Snow King Resort ends at 8:00 P.M. and the lights are turned off after the slopes have been cleared of skiers.

Future development in Jackson and Teton County would add additional sources of outdoor lighting. Although all of these sources would have to meet town or county requirements for controlling fugitive light, they collectively would increase the overall level of light emissions. However, some of this would be offset as existing light sources, particularly at recreation facilities and smaller commercial sites, are upgraded over time to meet town and county fugitive light emissions control standards.

Beneficial changes in lighting in the airport area that would result from Alternative 1 would have a negligible effect on the cumulative changes in visibility of dark skies that will occur in Jackson or areas of Teton County outside the immediate vicinity of the airport.

At an alternate airport site, such as the Idaho Falls Regional Airport, additional lighting would be required for the new facilities, such as parking, that would be needed to handle the approximately three-fold increase in passenger traffic. However, the impact would be limited because all new lighting would have to meet the standards in the current edition of the Illuminating Engineering Society of North America's *IESNA Lighting Handbook*. Moreover, the Idaho Falls Regional Airport is near an urban area where extensive fugitive light emissions already have reduced the visibility of dark skies. As a result, the long-term, adverse impacts on dark skies at the alternate airport would be of negligible or minor intensity.

Conclusions

During the transition and general aviation periods, Alternative 1 would have a negligible effect on the visibility of airport facilities and on scenic integrity levels. Following closure of the airport in 2033, there would be long-term, beneficial, indirect effects of minor or moderate intensity in foreground views from within the former development subzone and minor intensity in midground views looking west from observation points along U.S. Highway 26/89/191. Effects on the scenic integrity levels of other views, including background views of the Teton Range, would be negligible.

The indirect, long-term, beneficial effect on the scenery and the visibility of broad or distant vistas from observation points along U.S. Highway 26/89/191 because of the presence of aircraft in flight would be negligible during the transition and general aviation periods, and minor after 2033 when the airport was closed.

During the transition and general aviation periods, the effects of Alternative 1 on the visibility of dark skies would be negligible. Long-term, indirect, beneficial effects would occur following the closure of the airport in 2033. The intensity of the change would be negligible to minor in the south part of the airport, minor to moderate in the northern part of the airport, and moderate in the former development subzone area. Changes in the visibility of dark skies in the remainder of the park as a result of the closure and removal of the Jackson Hole Airport after 2033 would be negligible.

Alternative 1 would have negligible effects on the cumulative changes in visual quality and the visibility of dark skies that will occur in Jackson, areas of Teton County outside the immediate vicinity of the airport, or areas around the Idaho Falls Regional Airport.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under "Methods for Analyzing Impacts," Alternative 1 would not result in any unacceptable impacts on the visual quality and dark skies of Grand Teton National Park. The effects under this alternative would not be unacceptable because the impacts on visual quality and dark skies are anticipated to be beneficial.

WATER QUALITY AND HYDROLOGY

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park for water quality and hydrology relative to the presence and operation of the airport.

Desired Condition	Source
The surface and ground water resources of Grand Teton National Park are managed in a manner that will leave them unimpaired for the enjoyment of future generations.	Organic Act <i>Management Policies 2006</i> (NPS 2006a)
Surface and ground water resources are maintained or restored such that water quality as a minimum meets all applicable Wyoming water quality standards. The National Park Service works with appropriate governmental bodies to obtain the highest possible standards available under the Clean Water Act for the protection of park waters.	Clean Water Act Executive Order 12088 <i>Management Policies 2006</i> (NPS 2006a) Wyoming Water Quality Rules and Regulations
The Jackson Hole Airport is maintained and operated to avoid pollution of surface and ground water. Wastewater is adequately treated so that on its return to natural water systems, it meets or exceeds applicable state and federal water quality standards.	Clean Water Act Executive Order 12088 <i>Management Policies 2006</i> (NPS 2006a) Wyoming Water Quality Rules and Regulations
Water and wastewater systems are as unobtrusive as possible and have the least possible resource impact. Water is used efficiently and sustainably. Water systems are designed to maximally conserve water and the energy used in its distribution. Water efficient devices are installed in any remodeled or new structures.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service and Jackson Hole Airport Board maintain up-to-date hazardous materials management plans and associated equipment and training to prevent releases of hazardous materials and to provide prompt, appropriate response to incidents that could pollute surface or ground water resources. All necessary actions are taken to control or minimize such releases when they occur.	<i>Management Policies 2006</i> (NPS 2006a)
Waste reduction, reuse, and recycling programs minimize the generation and disposal of hazardous waste. Waste management at the airport demonstrates environmental leadership and serves as a model for others to follow in managing wastes and contaminants.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on water quality and hydrology were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for water quality and hydrology are as follows.

Negligible: Impacts would not be measurable. Water quality parameters would be well within all water quality standards for the designated use. Quality and flows would be within historical normal variability conditions.

Minor: Measurable changes from historical norms would occur, but quality and flows would be within the range of historical variability. All water quality parameters would be within water quality standards for the designated use. State water quality antidegradation policy would not be violated.

Moderate: Water quality or flows would be outside the range of normal variability. However, while changes to water quality or flows would be readily apparent, water quality parameters would be within water quality standards for the designated use. Mitigation would probably be necessary to offset adverse effects and would likely be successful. State water quality antidegradation policy would not be violated.

Major: Changes to water quality or flows would be readily apparent and, in the case of adverse effects, some water quality parameters for the designated use periodically would be equaled or exceeded. Flows would be outside the range of normal variability, and could include complete dewatering or unusual flooding. Extensive mitigation would be needed to offset adverse effects, and its success would not be assured. State water quality antidegradation policy may be violated.

Short-term: Effects would primarily exist during active implementation of a management action, such as construction. Effects would cease within a year following implementation of the action.

Long-term: Effects would extend more than a year beyond implementation of a management action.

The geographic area considered for impacts on water quality and hydrology primarily included the area within the airport boundary. Effects on the Snake and Gros Ventre Rivers, 1.5 and 2 miles distant, also were considered.

Two issues relating to water quality and hydrology were identified during scoping. They included:

- Effects on surface or ground water as a result of activities such as discharges from
 - National Pollutant Discharge Elimination System-permitted outfalls, including wastewater and oil/water separator discharges;
 - Fuel spills and/or leaks;
 - Glycol deicer storage, use, and disposal;
 - Aircraft and rental car maintenance operations; and
 - Ramp drainage to the Enterprise Canal.
- Cumulative water quality and hydrology effects from the airport in conjunction with all other projects on public and private lands in the vicinity.

Analysis

Surface Water

Activities at the Jackson Hole Airport currently do not adversely affect area surface water quality or hydrology. The long distances to water bodies (1.5 miles to the Snake River and 2 miles to the Gros Ventre River), the flat topography, the absence of direct surface water discharge from the airport to any surface water feature, and the highly permeable soils prevent runoff from the airport site from reaching these streams. During the general aviation period, these conditions would not change.

Except for navigational aids, all development would continue to be restricted to the airport's development subzone. Most of this area is already covered by pavement or highly compacted soil. While the development subzone might be reconfigured to, for example, eliminate the parking that formerly was used by scheduled commercial service passengers and increase parking for general aviation aircraft, there would not be changes in the area of impervious surface. The effects of the general aviation period on surface area hydrology would be negligible.

After 2033, localized changes in surface water runoff volumes would occur when the runway, taxiway, ramp, and other impermeable surfaces were removed. However, the effects would be negligible because:

- Under pre-2033 conditions, surface water runoff from these facilities rapidly infiltrated into the soil after leaving the impermeable surfaces and did not cause problems such as soil erosion or gully-ing;
- There would not be any changes in runoff volumes throughout the airport area, and localized changes would not be measurable; and
- There would not be any detectable changes in surface water quality, and all parameters would remain within the Class 1 (Snake River) or Class 2AB (Gros Ventre River) water quality standards.

National Pollutant Discharge Elimination System-Permitted Outfalls

Site-wide changes in water volumes associated with permitted outfalls would not occur under Alternative 1. All of the water that currently is discharged in accordance with the airport's two National Pollutant Discharge Elimination System permits originates as onsite precipitation. While the volumes flowing through the discharge points could change during the general aviation period and following airport closures, there would not be any changes in surface or ground water volumes across the airport site.

During the general aviation period, the volumes of wastewater requiring treatment in septic tank systems with subsequent discharge through permitted leach fields would decrease substantially. The elimination of scheduled passenger service would eliminate the toilet flushing and other water use by 6,000 to 40,000 people per day, or more than a quarter million people per year. Domestic sewage production by terminal employees and the restaurant also would be reduced. People using the airport for general aviation would likely produce only a small fraction of the wastewater that would be eliminated by the absence of scheduled passenger operations.

Wastewater associated with the permitted outfall for the car wash at the car rental facility would decrease. Most rental cars are used by scheduled commercial aviation passengers, and the demand for rentals from this group, with an associated need for car washing, would be eliminated.

The effect on ground water quality from reduced discharges of domestic sewage and wash water would be negligible. As demonstrated by current testing, concentrations of heavy metals, volatile organic compounds, and semi-volatile organic compounds in wastewater discharges are below detectable levels. Therefore, reducing the wastewater discharges would not produce measurable effects or change the ability to meet water quality standards.

Following closure of the airport in 2033, most discharges of treated sewage and wastewater at the airport would cease. However, the effect on water quality would be negligible because there would

not be any measurable changes in concentrations of contaminants that were entering the ground water system.

During the general aviation period, discharges from the permitted storm water discharge point would not change from current conditions. Best management practices for fuels, oils and greases, and solvents, and the routing of all ramp drainage through regularly maintained oil/water separators would continue to ensure that discharges did not contain pollutants that could adversely affect ground water quality.

Storm water discharge would be eliminated following airport closure in 2033. The impact would be negligible because pollutants would not have been entering the water system through this discharge point.

Fuel Spills and/or Leaks

The airport's modern, well-maintained fuel storage systems and the ongoing implementation of measures specified in the airport's spill prevention, control, and countermeasure plan have been effective in preventing contamination of area water resources by fuel spills and leaks. These features would continue to protect water quality throughout the general aviation period. As a result, changes in water quality at the airport because of fuel spills or leaks would be negligible.

Fuel spills or leaks would be eliminated as a potential source of contamination following airport closure in 2033. However, because no contamination of water resources from fuel spills or leaks would have occurred during airport operations, the effects on water quality of eliminating these potential sources would be negligible.

Glycol Deicer Storage, Use, and Disposal

Most use of propylene glycol deicer at the Jackson Hole Airport is associated with scheduled passenger service aviation and cargo carriers such as Federal Express. General aviation typically has more discretion in scheduling, and many pilots and/or their passengers may elect to stay in the Jackson area for an extra day or two rather than taking off during inclement weather that requires deicing. As a result, the storage and use of propylene glycol deicer at the Jackson Hole Airport probably would drop substantially during the general aviation period.

There is no evidence that current levels of deicer use are causing environmental problems or resulting in any contamination of water resources. Therefore, the reduced use of propylene glycol deicer during the general aviation period would not cause measurable impacts or changes in the ability to meet water quality standards, and would have a negligible effect on water quality.

Airport closure in 2033 would eliminate propylene glycol deicer as a potential source of water contamination. However, because no adverse effects on water resources from the use of this deicer would have occurred during airport operations, the effects on water quality would be negligible.

Aircraft and Rental Car Maintenance Operations

During the general aviation period, aircraft maintenance at the Jackson Hole Airport could increase, if the number of general aviation flights grew over time. Throughout this period, it is expected that the fixed-base operator would maintain its record of controlling the use and disposal of oils, greases, and solvents, and ensuring that these materials did not enter the ground water from spills, leaks, or

illicit dumping. Because effective control would be maintained, the effect on water quality would be negligible.

There would be less demand for car rentals with the end of scheduled passenger service, and a corresponding decrease in oil changes performed at the airport. However, rental agencies that remained onsite would continue using measures to collect and recycle all used engine oil. Because effective control of used oil would be maintained, the effect of its decreased use would be negligible.

Airport closure in 2033 would eliminate oils, greases, and solvents as potential sources of water pollution. Because adverse effects on water resources did not occur from the use of these materials throughout the life of the airport, the effects on water quality of eliminating their use at the site would be negligible.

Ramp Drainage Discharges to the Enterprise Canal

The Enterprise Canal would continue to be unaffected by operations at the Jackson Hole Airport. Routing of treated water from the ramp under the canal would continue throughout the general aviation period, and the effects of this alternative on the canal would be negligible. Similarly, negligible changes in canal flows or water quality would result from airport closure in 2033.

Cumulative Impacts

Alternative 1 would have a negligible effect on area-wide changes in hydrology. As described above, all water used at the airport would continue to originate onsite as precipitation or well water. Both during the general aviation period and following airport closure, all of that water would continue to infiltrate back into the soils and underlying hydrologic system before leaving the airport site.

Alternative 1 also would have a negligible cumulative effect on area-wide water quality. During the general aviation period, best management practices would continue to be implemented to ensure that contaminants did not enter the water system. Following airport closure, the airport would be eliminated as a potential source of contamination of area waters.

Alternative 1 would result in the diversion of scheduled passenger service traffic to other airports in the region. Most of this traffic probably would use the Idaho Falls Regional Airport, about 90 miles from Jackson. Because this airport has enacted the same types of stringent water protection measures that are employed at the Jackson Hole Airport, it would be able to handle a major increase in aircraft operations with negligible impacts of water resources.

Conclusions

Alternative 1 would have a negligible effect on hydrology during the general aviation period and after airport closure.

Because the use of best management practices would continue to prevent water pollution, during the general aviation period Alternative 1 would have a negligible effect with regard to National Pollutant Discharge Elimination System-permitted outfalls for storm water and septic tanks; fuel spills and/or leaks; glycol deicer storage, use, and disposal; aircraft and rental car maintenance operations; and discharges to the Enterprise Canal. Effects on water quality following airport closure would be negligible.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 1 would not result in any unacceptable impacts on water quality and hydrology resources of Grand Teton National Park. The effects on water quality and hydrology resources under this alternative would not be unacceptable because the potential impacts are anticipated to be negligible in intensity and, thus, would not rise to the level where unacceptable impacts could occur. Because no unacceptable conditions would result, there would be no impairment of water quality and hydrology resources (by definition, impairment is worse than unacceptable impacts) under this alternative.

WILDLIFE AND THEIR HABITATS, INCLUDING SPECIAL CONCERN, THREATENED, AND ENDANGERED SPECIES

Regulations and Policy

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park with regard to wildlife, their habitats, and special-concern, threatened, and endangered species relative to the presence and operation of the Jackson Hole Airport.

Desired Conditions	Source
Federal and state listed threatened and endangered species and their habitats are sustained.	Endangered Species Act; <i>Management Policies 2006</i> (NPS 2006a)
Migratory birds, their parts, nests and eggs are protected.	Migratory Bird Treaty Act
Populations of native animal species function in as natural a condition as possible except where special management considerations are warranted.	<i>Management Policies 2006</i> (NPS 2006a)
Biological resources are maintained by minimizing human impact and preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native populations and communities and ecosystems in which they occur.	<i>Management Policies 2006</i> (NPS 2006a)
The Jackson Hole Airport resolves wildlife hazard issues by conducting an ecological study and implementing a wildlife hazard management plan.	Wildlife Hazard Management, Title 14, <i>Code of Federal Regulations</i> , Part 139.331
Except under specified conditions, the taking, possession and sale of bald and golden eagles is prohibited.	Bald and Golden Eagle Protection Act

Methods

Wildlife impacts were evaluated as described in the “Methods for Analyzing Impacts” section. Factors used to assess impacts on threatened and endangered species are different than the factors used to assess general wildlife effects. For the purposes of National Environmental Policy Act analysis, a “no effect” determination is equated with a “negligible” impact threshold. The *Endangered Species Consultation Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998) indicates a “not likely to adversely affect” determination is appropriate when the effects on listed species are expected to be discountable, insignificant, or completely beneficial. It further defines discountable effects as those that cannot be meaningfully measured.

The following impact concepts were used for the wildlife resource evaluations:

Population Level Impact – The extent to which a change in habitat, reproductive success, habitat fragmentation, or direct or indirect mortality would be likely to occur.

Human-caused Disturbance - Implementation and perpetuation of all or part of an alternative would cause or prevent the displacement of individuals.

Potential For “Take” – For endangered or threatened species (black-footed ferret, Canada lynx, and gray wolf), the potential for a “take” to occur is the primary impact measure examined. According to the Endangered Species Act, the term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Impact threshold definitions are as follows for wildlife resources, including migratory birds, raptors, and special-concern, threatened, and endangered species:

Adverse impacts: Impacts could be direct and/or indirect and may involve the loss of individuals and degradation or loss of habitat. Impacts may affect individuals or populations at a local or regional scale.

Beneficial impacts: Impacts would include increased conservation of individual animals and populations and their habitats on a local and regional scale.

Negligible: *General Wildlife* - Wildlife would not be affected or the effects would be at or below the level of detection and the effects would be so slight that they would not be of any measurable or perceptible consequence to the population. Mitigation measures are not warranted. *Threatened and Endangered Species* - No federally listed species would be affected, or the alternative would affect an individual of a listed species or its critical habitat, but the effects would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a “no effect” determination in Endangered Species Act terms.

Minor: *General Wildlife* - Effects on individual animals and/or their respective habitats would be detectable, although the effects would be localized, and would be small and of little consequence to the species’ population. Mitigation measures may be needed and would be successful in reducing adverse effects. *Threatened and Endangered Species* - Individuals(s) of a listed species or its critical habitat may be affected, but the effect would be relatively small. Minor would equate with a “may affect” determination in Endangered Species Act terms and would be accompanied by a statement of “may affect but not likely to adversely affect” the species.

Moderate: *General Wildlife* - Effects on individual animals and their habitat would be readily detectable, with consequences occurring at a local population level. Mitigation measures would likely be needed to reduce adverse effects and would likely be successful. *Threatened and Endangered Species* - An individual or population of a listed species, or its critical habitat would be noticeably affected. The effect could have some long-term consequence to the individual, population, or habitat. Moderate would equate with a “may affect” determination in Endangered Species Act terms and would be accompanied by a statement of “likely” or “not likely to adversely affect” the species.

Major: *General Wildlife* - Effects on individual animals and their habitat would be obvious and would have substantive consequences on a population level. Extensive mitigation measures would be needed to reduce any adverse effects and their success would not be guaranteed. *Threatened and Endangered Species* - Individuals(s) of a listed species or its critical habitat would be noticeably affected. The effect could have some long-term consequence to the individual, population, or habitat. Major

would equate with a “may affect” determination in Endangered Species Act terms and would be accompanied by a statement of “**likely to adversely affect**” the species.

Short-term: Impact has a duration less than or equal to one year.

Long-term: Impact has a duration greater than one year.

The geographic area considered when evaluating the effects of the proposed action on wildlife resources consisted of the airport and all land within the airport perimeter fence.

The following issues of concern were identified during scoping:

- Direct, indirect, and cumulative effects on wildlife and threatened and endangered species populations, and associated habitats;
- Effects on the frequency of aircraft collisions on birds;
- Effects of aircraft sound on special concern species and other wildlife; and
- Effects on the number of collisions between birds and aircraft at the airport.

Analysis

Associated Habitat Effects

General habitat effects under Alternative 1 through the end of the general aviation phase would include maintenance of slightly better range conditions inside the perimeter fence. The perimeter fence effectively excludes browsing by elk, moose, and bison within the airport area. Range conditions within the airport are estimated as good. Effects of browsing on forbs and shrubs vary in accordance with season, duration, and intensity, yet it is apparent that the sagebrush stand within the airport boundary is healthy and mature.

Closure of the airport in 2033 would result in two notable habitat-related changes to the airport: restoration of about 128 acres of disturbed and developed area to sagebrush steppe, and removal of perimeter fence. Reclamation of the disturbed area would result in increased available shrub cover, while fence removal would lead to increased area access by elk, mule deer, bison, moose, and pronghorn. The impact of producing a gain in sagebrush steppe habitat would be long-term, indirect, beneficial, and of negligible to minor intensity.

Higher-quality sagebrush habitat within the airport fence would continue to be available to migratory birds, especially breeding birds, through the general aviation period. After 2033, about 128 acres of developed areas would be converted to sagebrush conditions similar to those now outside the perimeter fence and removal of the perimeter fence. The combined habitat effects on migratory birds from these changes under Alternative 1 would be beneficial but negligible.

Raptor use of the airport grounds is limited to occasional foraging and transient flights by resident species. Rare occurrences of ground nesting by short-eared owls or northern harriers may occur. The only other available nesting habitat for raptors is in the short, widely spaced deciduous trees on the southern portion of the airport. Until 2033, there would be no change to raptor foraging conditions or nesting habitat availability. After 2033, restoring sagebrush steppe conditions would not substantially improve foraging conditions, so raptor use of the airport area would not change perceptibly. As a result, Alternative 1 would have negligible beneficial impacts on raptor habitat.

Changes to the existing sage-grouse habitat and lek (see glossary for definition) site would not occur with this alternative. The sagebrush steppe in the airport would continue to be used year-round by sage-grouse and provide high conservation value for the species. Sagebrush habitats associated with year-round occupancy of sage-grouse would not be altered or disturbed through the end of the general aviation phase of Alternative 1.

In 2033, fence removal would lead to an increase in herbivory and a possible reduction in range condition. In the long term, restoration of an additional 128 acres of developed area to sagebrush steppe would be a negligible to minor beneficial effect on sage-grouse habitat availability and lek uses.

Collisions between Birds and Aircraft

There would be little change to number of aircraft/bird collisions at the airport through 2032. Collisions would be expected to continue occurring primarily from March through September, when migrants are in the area. Approximately half of all reported aircraft strikes at the Jackson Hole Airport apparently involved migratory birds, which is consistent with national patterns characterized by Dolbeer's (2006) analysis of the incident records in the Federal Aviation Administration's National Wildlife Strike Database for Civil Aviation for the period 1990-2004.

Based on reported aircraft incidents, raptor collisions are quite rare at Jackson Hole Airport. There is local evidence that jets of any size are more likely than propeller driven aircraft to strike birds. The anticipated fleet mix changes under Alternative 1 would likely have negligible beneficial effects on migratory birds, as the ratio of propeller- to jet-propelled aircraft in use at the airport increased at the start of the general aviation phase. There would be a beneficial effect on migratory birds after 2033, because aircraft would no longer use the area, but the intensity would be negligible because of the low number of bird strikes that had occurred previously.

The eight collisions reported with probable sage-grouse in the past 12 years mostly involved jets, plus one large twin-propeller plane. Aircraft/sage-grouse collisions would probably decrease with the transition and general aviation phases, based on the lower numbers of aircraft and the elimination of scheduled passenger service jets. After 2033, aircraft operations would cease and aircraft collisions with sage-grouse would be eliminated, an indirect, long-term, beneficial impact of negligible intensity.

Airport lek attendance is monitored annually, and used as a coarse estimate of survivability. The loss of a few individual birds per year over time would be detectable through annual lek monitoring. Impacts on sage-grouse because of aircraft collisions would be indirect, minor, adverse, and long-term through the end of the general aviation phase. Following the end of airport operations in 2033, aircraft collisions would no longer occur. Minor population benefits could result to sage-grouse because this source of mortality would be removed.

Aircraft Sound Effects

Determining the effects of sound on wildlife is a complicated matter because wildlife responses and apparent impacts vary among species and between individuals of the same species. Variable responses relate to factors such as the characteristics of the sound and its duration, the perception capabilities of the species, habitat, activities at the time of exposure, and past exposure history to sound (NPS 1994, Report to Congress). Furthermore, very few investigations have isolated the effects of sound on wildlife from the combined effects of human presence, vehicle traffic, and sound, and even fewer have studied the species of interest at the Jackson Hole Airport. Applicable studies include Weisenberger *et al.* (1996) for mule deer and mountain sheep, and Krausman *et al.* (2004) and Luz

and Smith (1976) for pronghorn antelope. Finally, very few quantitative thresholds or benchmarks are available for comparing sound levels to wildlife species tolerances and impacts.

The Wyoming Game and Fish Department (2004) suggested 10 dBA above natural ambient sound as a guideline for protecting sage-grouse habitat for lek, nesting, and brood-rearing uses from man-made sound effects of gas and oil field development. Similarly The Bates Hole/Shirley Basin Sage-grouse Working Group (2007) in Wyoming proposed a threshold of “49 decibel (10 A-weighted decibels above background noise)” (probably referring to mean average ambient sound levels) to protect sage-grouse lek use from oil and gas field compressor station sound. However, the basis for these specific sound thresholds was not defined.

The results of exposing mule deer and mountain sheep to low-altitude jet aircraft flights (less than 400 feet above ground level) where animal heart rates and sound measurements were made during the overflights indicated elevated heart rates from sound levels as low as 72.5 dBA. Rates returned to resting levels within two minutes after overflights that produced sound levels that ranged from 92 to 112 dBA (Weisenberger *et al.* 1996). All animals quickly became habituated to the sound of low-flying aircraft. There were no significant changes in behavior or activity budgets.

The NPS’ Natural Sounds Program prefers the term “learned deafness” rather than “habituation,” because it indicates that animals learn to ignore a sound that they normally would respond to but, in the process, risk the masking of other important sounds. Learned deafness and masking can have negative effects on some species. For example aircraft sound can:

- Mask communication between ungulate individuals, possibly affecting courtship and breeding behavior; or
- Affect predator-prey response, such as masking the sound of an approaching predator (Marin, 2008).

For two years, Krausman *et al.* (2004) monitored the reactions of endangered Sonoran pronghorn antelope to sound from low-altitude military jet overflights, sound from ordnance, and disturbance because of the presence of other military activities. During the same period, they also monitored a control group of pronghorn antelope at another location. Pronghorn rarely responded to military aircraft, but often moved more than 30 feet when people or vehicles were in the vicinity. Behavior of pronghorn individuals exposed to military activity was similar to behavior of individuals not exposed to regular military activity.

Sound levels ranged up to 121 dBA. The average sound pressure level on days with military activity was 65.3 dBA compared to 35.0 dBA on days without military activity. Hearing thresholds measured for pronghorns and desert mule deer were similar, and demonstrate that desert ungulates do not hear sound pressure levels generated from these aircraft (F-16s and A-10s) as well as do humans.

These literature reports suggest that large mammals would be only temporarily affected by loud sound events of aircraft operations and that they quickly acquire a learned deafness to those stimuli. However, Landon *et al.* 2003, found that pronghorn used areas with noise levels below 45 dB more than expected, and areas with noise levels above 55 dB less than expected. Therefore, airport-related noise could be affecting whether some ungulates choose to use some areas in the southern part of the park.

Similar quantitative relationships between sage-grouse and aircraft sound levels were not located. However, the airport lek site continues to be used annually despite current aircraft operations and sound emissions that probably range from 85 to 100 dBA on a regular basis during takeoff. As noted

above, lek attendance has remained low but relatively stable over the past 10 years. As the day-night average sound level model results and contour maps for 2005 indicate, the day-night average sound level on an average-annual basis is about 70 to 75 dBA along the airport runway and would remain in this range with this alternative until the aircraft operations ended in 2033. Peak-season aircraft operations would increase the highest day-night average sound levels in a small area near the runway by 5 to 10 dBA, while retaining most of the sagebrush areas north of the runway in the 70 to 75 dBA zone. As a result, differences in exposure to sound between 2005 and future conditions under Alternative 1 would be small.

The low levels of wildlife reactions to sound that are reported in scientific literature, and the apparent learned deafness of area wildlife to sound from aircraft using the Jackson Hole Airport, suggest that continued aircraft sound associated with Alternative 1 until 2033 would continue to have a negligible to minor, long-term, indirect, adverse effect on area wildlife in general and the sage-grouse in particular. The absence of aircraft sound following closure of the airport in 2033 would result in a negligible to minor, long-term, indirect, beneficial effect on wildlife.

Compliance with the Endangered Species Act

The Endangered Species Act requires an examination of impacts on all federally listed threatened or endangered species. The affected environment section provides background information for the species (black-footed ferret, Canada lynx, and gray wolf) identified by the U.S. Fish and Wildlife Service as relevant to the proposed action.

Because of the limited geographical extent of the analysis area, absence of suitable habitats in the airport, a perimeter fence to prevent movement of large mammals onto the property, and absence of any physical site alterations from the alternatives, the listed federally listed threatened and endangered species would not be affected by either of the proposed alternatives. For both alternatives, threatened and endangered species would experience negligible effects, the equivalent of a U.S. Fish and Wildlife Service “no effect” determination. No direct or indirect negative effects on any federally listed threatened or endangered species or their designated critical habitats are expected to result from conditions associated the alternatives.

Effects of Airport Ground Vehicles and Traffic

Because the perimeter fence excludes most wildlife from the airport area, effects from ground vehicles would be limited to small and mid-sized animals. Airport service, security, maintenance, and other ground vehicles are restricted to established roads and work areas within the airport to ensure aircraft and worker safety. Speed limits are strictly enforced. Because of the low presence of wildlife within the airport and standard vehicle safety practices, wildlife vehicle-kill within the airport would continue to be uncommon and would have a negligible impact. Closure of the airport in 2033 would have a negligible beneficial impact by eliminating this source of wildlife mortality.

The traffic analysis indicates that, on closure of the airport in 2033, traffic volume along the 10-mile stretch of highway between the airport and the town of Jackson would decline because of reduced traffic volume to the airport. The highway into and out of Jackson Hole intersects important deer, elk, and pronghorn antelope migration routes and winter ranges. Several wildlife-vehicle collision hotspots exist along this highway. There would likely be a negligible to minor, long-term, beneficial decrease in wildlife-vehicle collisions as a result of lower traffic volume.

Cumulative Impacts

At the airport-specific level, this alternative would not affect the existing sage-grouse lek area. During construction of the airport tower a portion of the lek area was lost (NPS 2001b).

Sagebrush steppe acreage is expected to continue declining on private lands south around Jackson and throughout the greater Yellowstone area. The Jackson Hole area has a strong market for primary and second homes and the commercial services that support them. Considerable residential development already has occurred west and southwest of the airport, and additional construction and associated wildlife habitat loss would be expected in this area.

Sage-grouse populations in Jackson Hole are remnant and at risk of local extirpation. Over the long term, the local population has declined by more than 70 percent. In 1999, local population numbers were at a low point of 47 male sage-grouse, but have recently increased to about 149 male birds in 2006 (Hatch 2007a). The cause of their decline and recent increase in Jackson Hole has not been identified, but suspected causes include permanent loss, degradation, and fragmentation of key habitats, plus low nest productivity.

Alternative 1 would result in the diversion of scheduled passenger traffic to other airports in the region. Most of this traffic probably would use the Idaho Falls Regional Airport, about 90 miles from Jackson. Wildlife management practices at that airport would not be expected to change with the increased number of aircraft operations, and wildlife impacts at that site would be negligible.

Conclusions

Until 2033, impacts on wildlife at the airport from habitat availability would be negligible. After 2033, when the airport perimeter fence was removed and developed areas were restored to native vegetation, there would be a negligible, long-term, indirect, beneficial impact on wildlife in general, including migratory birds and raptors. For sage-grouse, the intensity of the beneficial effect would be negligible to minor.

The number of bird/aircraft collisions would decrease at the start of the general aviation period and would end when the airport closed. This would result in a long-term, beneficial, indirect effect that would be minor for the sage-grouse and negligible for other bird species.

Continued aircraft sound until 2033 would continue to have a negligible to minor, long-term, indirect, adverse effect on wildlife. The absence of aircraft sound following closure would have a negligible to minor, long-term, indirect, beneficial effect.

Endangered or threatened species would not be affected by continued airport operation or by closure.

Wildlife mortality because of collisions with airport ground vehicles and highway traffic accessing the airport would decrease during the general aviation period and after the airport closed. The intensity of the long-term, indirect, beneficial impact would be negligible.

Cumulatively, regional adverse effects on sage-grouse habitat would continue, but closure of the airport would restore a small part of this species' habitat, including an area used for lekking.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under "Methods for Analyzing Impacts," Alternative 1 would

not result in any unacceptable impacts on wildlife and their habitats, including special concern, threatened, or endangered species in the area. The effects on wildlife resources under this alternative would not be unacceptable because the beneficial and adverse potential impacts are anticipated to be only negligible to minor in intensity and, thus, would not rise to the level where unacceptable impacts could occur. Because no unacceptable conditions would result, there would be no impairment of wildlife (by definition, impairment is worse than unacceptable impacts) under this alternative.

PARK AND AIRPORT OPERATIONS

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park with regard to park and airport operations relative to the presence of the Jackson Hole Airport. Appendix A provides the full text of the Department of the Interior Airports Act.

Desired Condition	Source
The Jackson Hole Airport is determined by Secretary of the Interior to be necessary to the proper performance of the functions of the Department of the Interior.	Department of the Interior Airports Act
Operation and maintenance of the Jackson Hole Airport are in accordance with the standards, rules, or regulations prescribed by the Secretary of Transportation.	Department of the Interior Airports Act
The Jackson Hole Airport is operated as a public airport, available for public use on fair and reasonable terms and without unjust discrimination.	Department of the Interior Airports Act
Authorized aviation activities at Grand Teton National Park occur in a safe and appropriate manner, and do not cause unacceptable impacts on park resources and values and visitor experiences.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works constructively and cooperatively with the Federal Aviation Administration. Cooperation is essential because the Federal Aviation Administration has statutory authorities and responsibilities that must be recognized by the National Park Service.	<i>Management Policies 2006</i> (NPS 2006a)
For the general public and for aviation interests, the National Park Service develops educational materials describing the importance of the natural soundscape and tranquility to park visitors, and the need for cooperation from the aviation community.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works closely with the Federal Aviation Administration and general aviation organizations to ensure that general aviation operations within Grand Teton National Park are conducted in accordance with applicable Federal Aviation Administration advisories and “fly- friendly” techniques and procedures designed to help pilots minimize impacts on the park, and to resolve any problems that develop because of general aviation use of the Jackson Hole Airport.	<i>Management Policies 2006</i> (NPS 2006a)
The Jackson Hole Airport is managed to ensure that its use will have no unacceptable impacts on park resources and values, public safety, or visitor enjoyment.	<i>Management Policies 2006</i> (NPS 2006a)
The Jackson Hole Airport minimizes noise and other impacts, and confines impacts to the smallest and most appropriate portion of the park as possible, consistent with safe aircraft operations.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on park and airport operations were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for park and airport operations are as follows.

Negligible: Park and airport operations would not be affected, or effects would not be perceptible or measurable outside normal variability.

Minor: Effects would be measurable but would not appreciably change park or airport operations. Effects would be perceived by park staff, airport staff, and/or pilots, but probably would not be noted by visitors or scheduled passenger service travelers.

Moderate: Effects would be readily apparent and would result in a substantial change in park or airport operations in a manner that would be noticed by park visitors or scheduled passenger service travelers. Mitigation would probably be necessary to offset adverse effects and would likely be successful.

Major: Effects would be readily apparent and would result in a substantial change in park or airport operations in a manner that would be noticed by park visitors or scheduled passenger service travelers as markedly different from existing operations. Extensive mitigation would be needed to offset adverse effects, and its success would not be assured.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with an particular activity such as construction.

The geographic area considered for impacts on park and airport operations included the 533 acres within the airport boundary, plus the road alignment from U.S. Highway 26/89/191 to the airport.

Issues relating to park and airport operations that were identified during scoping included:

- Effects on the NPS’ operation of Grand Teton National Park.
- Effects on the use of the interagency helibase.
- Effects on the ability of the NPS and Jackson Hole Airport Board to work together.
- Effects on the numbers and types of facilities at the airport within the existing development subzone.
- Potential to expand or construct aboveground or underground facilities outside the current development subzone.
- Effects on airport use and/or operations patterns.
- Effects on the airport’s capacity, including air, passenger, and ground traffic.
- Effects on payments from the airport to the U.S. Department of the Interior.
- As a cumulative effect, the potential to accommodate future runway expansion.

Effects on airport funding were addressed in the “Socioeconomics” section.

Analysis

Operation of Grand Teton National Park

Transition and General Aviation Periods. Prior to 2033, the National Park Service would continue to commit staff time for coordination with the Jackson Hole Airport Board and oversight of airport activities. The level of involvement would continue at the rate of one full-time-equivalent NPS position in a normal year. The need for short-term increases in staff requirements would not be anticipated, because general aviation uses could be accommodated with the existing facilities and there would be no need for additional planning to accommodate growth.

There would not be any changes in the management of the area around the airport. Continued management of this area as sagebrush flats and wildlife habitat would require minimal park staff time.

In future planning for public transit by the National Park Service and a partner, such as the Southern Teton Area Rapid Transit (START), the airport probably would not be designated as a transit stop. During the general aviation period, the airport would support fewer than 80 general aviation operations on a typical day, and most passengers would be unlikely to use bus service that was not conveniently timed to coincide with their plane arrivals and departures. The number of workers required for airport operations would be inadequate to justify a transit stop.

In summary, impacts on NPS operations prior to 2033 would be negligible for:

- Staffing for airport coordination and oversight;
- Management of the area around the airport; and
- Development of public transit services.

Post-Closure. Following the closure of the airport, the need for airport coordination and oversight would be eliminated. This would increase park staff availability by one full-time-equivalent position per year. This change would not be measurable compared to the normal year-to-year variability in the park's staff level of 200 to 300 people and would have a negligible effect on park operations.

Following closure of the airport, facilities would be removed and the site would revert to natural vegetation dominated by sagebrush. Minimal management would be required to maintain this natural ecological system, and the effect on park operations would be negligible.

After 2033, the airport would not be considered in the NPS' management of public transit. Its impact on the continued implementation of these plans or programs would be negligible.

Interagency Helibase Operations

Transition and General Aviation Periods. Negligible changes on the operations of the interagency helibase would occur prior to 2033. Water, sewer, and electricity would continue to be obtained from the airport systems, and other services would be obtained independent of the airport. Agencies using the helibase would continue to coordinate flight operations with the Federal Aviation Administration's tower.

Post-Closure. The helibase would be closed and removed concurrent with closure of the airport in 2033. A new interagency helibase would be established on or near already-developed land in the region, and new infrastructure would be installed to support its operations. There would be a negligi-

ble impact on the operation of the interagency helibase and on park operations, such as search and rescue and wildland fire fighting, that incorporate use of the helibase.

Continued Cooperation

Alternative 1 would have negligible impacts on the effectiveness of the National Park Service and Jackson Hole Airport Board in working together. It would be in the continuing interest of both groups to maintain effective communications and planning to ensure smooth operations throughout the transition and general aviation periods. Such coordination would end in 2033 when the airport was removed from the park.

Airport Facilities within the Development Subzone

Transition and General Aviation Periods. Between now and 2033, the existing facilities within the development subzone probably would be adequate to meet the reduced levels of operations that would be associated with the loss of scheduled passenger service. The Jackson Hole Airport Board may find it appropriate to convert existing buildings, such as the terminal, to other uses. It also would have the option of upgrading or replacing buildings, such as hangars, to meet changing demand, so long as the buildings remained within the height specification of the use agreement. Other infrastructure within the development subzone, such as fuel storage and dispensing, aircraft and automobile parking, administrative space, aircraft rescue and firefighting, and water and sewer, would remain the same or could be reduced to meet the lower demand levels. The impacts on airport facilities would be long-term, indirect, and of moderate intensity. Actions singly or collectively could be perceived as beneficial or adverse, depending on personal viewpoints.

Post-Closure. Following airport closure, all of the airport facilities within the development subzone would be removed and the site would be restored to native vegetation. The impacts on airport facilities would be long-term, direct, adverse, and of major intensity.

Airport Facilities outside the Development Subzone

Section 7(a) of the 1983 use agreement limits “improvements” to the development subzone. The only exceptions include the additional aircraft parking area within the boundary marked on a map attached to the use agreement (all of which has been paved and is in use), and the installation of navigational and safety aids west of the runway.

During the transition and general aviation periods, there would not be any construction or expansion of aboveground or underground facilities outside the current development subzone, except as provided in Section 7(a). Closure of the airport in the year 2033 would permanently preclude the possibility of such development in the future. Therefore, Alternative 1 would result in negligible changes on improvements outside the development subzone.

Airport Use and Operations Patterns

Transition and General Aviation Periods. It is assumed that by the end of the transition period in 2015, the airport would lose its Part 139 certification. In the absence of this certification, air carriers and regional carriers could not use the Jackson Hole Airport and all scheduled passenger air service would cease. (Please see the glossary for definitions of the air carrier and regional carrier categories.) Compared to current conditions, this would involve the elimination of about 10 large air carrier operations and more than 30 regional carrier operations per day (see Tables 7 and 27). This elimination of about 45 percent of the current average daily air traffic, including all scheduled passenger service,

would result in a long-term, indirect, adverse impact of major intensity on the airport's use and operations patterns.

With the loss of all scheduled passenger service, ground services other than those supporting general aviation would end. This would include services such as airline ticketing, baggage handling, and security. It probably would not be economically feasible for the rental car agencies, restaurant, or gift shops to continue operating at the airport. Even the fixed-base operator, which would continue to support general aviation, would experience substantial declines in such areas as fuel sales. The reduction in the number of personnel available for snow-removal, resulting from reduced staff funds, probably would result in 24- to 48-hour delays in airport operations for snow removal during typical winter storms. Longer delays could result from major storms. The result would be a long-term, indirect, adverse impact of major intensity on use and operations patterns of the Jackson Hole Airport.

General aviation would increase at the Jackson Hole Airport throughout the transition and general aviation periods. As shown in Table 7 (existing operations) and Table 27 (year 2025 operations under Alternative 1), general aviation operations would increase from the current 18,027 per year to 27,286 per year in 2025, a 51 percent increase. In 2025, general aviation would average about 75 operations per day, compared to current levels of just under 50 per day. However, because the number of general aviation operations in 2025 would be lower than the current total of about 90 daily operations (which includes general aviation plus air carriers and regional carriers), the effect of the general aviation increase throughout the general aviation period would be negligible.

Post-Closure. Closure of the airport in 2033 would eliminate all airport use. The resulting impact on airport use and operations patterns would be long-term, indirect, adverse, and of major intensity.

Airport Capacity

Until the year 2033, impacts of Alternative 1 on the capacity of the airport would be negligible. The airport would be able to accommodate the forecast number of aircraft operations using the existing facilities, although some use conversions might be appropriate. Closing the airport in 2033 and removing all of these facilities would have a major, long-term, direct, adverse impact on the capacity of the Jackson Hole Airport.

Payments to the U.S. Department of the Interior

During the transition and general aviation periods, respectively, payments from the Jackson Hole Airport Board to the Department of the Interior would be reduced from the current rate by \$30,000 and \$50,000 per year. In 2033, these payments would cease. These payments represent less than one half of one percent of the Grand Teton National Park annual budget of more than \$10 million. Because this change in revenue could not be perceived compared to the normal range of variability in the budget of the park, the effects of losing this revenue stream would be negligible.

Cumulative Impacts

Alternative 1 would initially reduce and eventually end the Jackson Hole Airport's capability to continue operations of airport facilities. The inability to demonstrate a satisfactory property interest after 2013 would end federal funding, which would effectively limit changes at the airport to those required to maintain basic operations. In 2033, the airport would close. The cumulative effect on park operations and staff would be negligible because of the small staff component that would be affected.

Alternative 1 would divert scheduled passenger service traffic to other airports in the region. Most of this traffic probably would use the Idaho Falls Regional Airport, about 90 miles from Jackson. To handle the number of additional enplanements that currently are occurring at the Jackson Hole Airport, facility improvements would be required to approximately triple the passenger capacity of the Idaho Falls airport. Substantial upgrades of the Idaho Falls Regional Airport infrastructure would be required, and many practices would have to be modified to handle the increased aircraft operations load. As a result, there would be both beneficial and adverse, major, long-term, indirect impacts on operations at this alternate airport site. Additional information on impacts on operations at the Idaho Falls Regional Airport is provided in the “Surface and Air Transportation” analysis for Alternative 1.

Conclusions

For the National Park Service, effects would be negligible on the operation of Grand Teton National Park, on providing public transit, on ensuring cooperation between the National Park Service and Jackson Hole Airport Board, and on the amount of payments to the U.S. Department of the Interior. Negligible effects would result to interagency helibase operations.

For the airport during the transition and general aviation periods, impacts on facilities in the development subzone would be long-term, indirect, adverse, and of moderate intensity. Negligible impacts would occur on development of facilities outside the development subzone. Long-term, indirect, adverse impacts of major intensity on use and operations patterns would result from the loss of about 45 percent of the current average daily air traffic, all scheduled passenger service, and ground services other than those supporting general aviation. Following airport closure, the impacts on airport facilities, use and operations patterns, and capacity would be long-term, adverse, and of major intensity.

PUBLIC HEALTH AND SAFETY

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park with regard to public health and safety relative to the presence and operation of the Jackson Hole Airport.

Desired Condition	Source
The safety and health of employees, contractors, volunteers, and the public are core Service values. A safe and healthful environment is provided for visitors and employees. Management actions strive to protect human life and provide for injury-free visits.	<i>Management Policies 2006</i> (NPS 2006a)
The Service works cooperatively with other federal, tribal, state, and local agencies, organizations, and individuals to carry out this responsibility.	<i>Management Policies 2006</i> (NPS 2006a)
Park visitors assume a substantial degree of risk and responsibility for their own safety.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on public health and safety were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for public health and safety are as follows.

Negligible: Health and safety would not be affected, or the effects on public health or safety would not be measurable. Indicators such as numbers of aviation accidents, air medical evacuations for any reason, collisions of aircraft with wildlife, and traffic accidents would be within historical norms.

Minor: Effects would be detectable and would include variations from historical norms for such factors as numbers of air medical evacuations for any reason; and numbers or rates of non-injury, non-fatal aviation accidents, collisions of aircraft with wildlife, and traffic accidents. However, there would not be an appreciable change in public health or safety.

Moderate: Effects could be expressed as changes in numbers of air medical evacuations for health- or life-critical conditions; and numbers or rates of injury-causing (but non-fatal) aviation accidents, collisions of aircraft with wildlife, and traffic accidents.

Major: Changes would be sufficiently large to be readily apparent for such factors as ability to conduct air medical evacuations for health- or life-critical conditions; and numbers or rates of injury-causing and fatal aviation accidents, collisions of aircraft with wildlife, and traffic accidents.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with an particular action such as construction.

The geographic area considered for impacts on public health and safety included the:

- Land within the airport boundary;
- Town of Jackson;
- U.S. Highway 26/89/191 corridor between Jackson and Moose; and
- Snake River Valley highway corridor and Teton Pass highway corridor between Jackson, Wyoming and Idaho Falls, Idaho.

Six issues relating to public health and safety were identified during scoping. Five are addressed in this section, including:

- Potential effect of the alternatives on the level of safety associated with airport flight operations.
- Potential effect of the alternatives on health and safety of the community, including flight operations and emergency services such as medical evacuations.
- Potential effect of the alternatives on emergency response services, such as search and rescue and wildland fire fighting.
- Potential effect of the alternatives on public health and safety on highways.
- Potential effect of the alternatives on public health and safety relating to hazardous materials stored and used at the airport.

The potential effects of the alternatives on accidents resulting from aircraft and wildlife (including bird) collisions were addressed previously in the wildlife section.

Analysis

Safety Associated with Airport Flight Operations

Alternative 1 could affect operational components, including elimination of commercial service, availability and updating of navigational aids, available safety equipment and training, refurbishing of facilities, and potential for accidents and incidents.

Elimination of Commercial Service. Eliminating this segment of airport traffic during the transition and general aviation periods would not change the number of accidents occurring at the Jackson Hole Airport and would have a negligible effect on public health and safety.

Navigation Aids. The Federal Aviation Administration currently operates the tower and other navigation aids that improve operational safety at the Jackson Hole Airport. During the general aviation period, the tower could be removed or staffing of the tower could be reduced, particularly if the airport was not able to maintain its Part 139 certification from the Federal Aviation Administration. However, the Federal Aviation Administration operates towers at some general aviation airports that do not hold Part 139 certification, such as the Front Range Airport in Denver, Colorado. Factors that the Federal Aviation Administration would consider in its analysis of whether to maintain tower operations at the Jackson Hole Airport throughout the general aviation period include, but would not be limited to, number of aircraft operations, types of aircraft, and site hazards (Piñon 2006).

The air traffic control tower at the Jackson Hole Airport was placed in operation in 2000. Based on the accident information from the National Transportation Safety Board that was presented above as “Affected Environment,” there is not an obvious difference in the number of accidents per year in the 10 years prior to the tower and the 6 years since it has been operating.

A more likely safety effect would result from the inability for the Jackson Hole Airport to obtain future navigation system upgrades. Instead, the Federal Aviation Administration would spend the money for such systems at airports where a satisfactory property interest could be demonstrated. In the near term, the effect probably would be negligible. However, as the capabilities of navigational electronics improved, they could represent substantial differences in the ability to prevent accidents. Under visual flight rules conditions, the effect would be negligible. However, when flight conditions were poor, the long-term, indirect, adverse effect on flight safety at the Jackson Hole Airport relative to other airports could be moderate.

Safety Equipment and Training. The absence of Federal Aviation Administration funding relating to the ability to demonstrate a satisfactory property interest would reduce the ability of the Jackson Hole Airport to purchase snowplows, fire trucks, and other safety equipment. Safety and rescue training of personnel also would be reduced as funds were diverted to meet other operational requirements. Following the loss of Part 139 certification, this could result in more accidents associated with aircraft sliding on (or off) icy runways, and less effective response to all types of accidents. The long-term, indirect, adverse effect on safety because of inadequate equipment and training could be moderate.

Refurbishing of Facilities. The absence of Federal Aviation Administration funding could reduce the capability of the Jackson Hole Airport Board to refurbish the runway or taxiway. However, barring major damage such as that caused by an earthquake, the Jackson Hole Airport Board probably could keep these facilities patched sufficiently to allow their use by most general aviation aircraft, particularly smaller models, until 2033. Safety concerns might cause pilots of some larger aircraft to avoid the airport toward the end of the general aviation period, but in addition to improving their own safety, this would improve the safety record of the airport. Because of patching and avoidance,

the long-term, indirect, adverse effect on safety because of deteriorating facilities probably would be minor.

Effects after Airport Closure. Closure of the Jackson Hole Airport in 2033 would eliminate the potential for aviation accidents at this site. However, the potential for aviation accidents would be transferred to the other airports that received additional aviation traffic that formerly used the Jackson Hole Airport. Therefore, although there would be long-term, indirect effects on aviation-related public health and safety at involved airport sites, the net intensity would be negligible.

Community Well-Being

Emergency Resupply. The Jackson area can experience harsh winter weather, such as blizzards. However, the area is well served by state and federal highways, and emergency service providers in the area are experienced in dealing with such conditions and maintaining sufficient supplies to support essential services. While prolonged inclement weather may cause inconveniences, it would not represent a threat to public health and safety because of the inability to obtain vital supplies. Therefore, changes in the ability to conduct flight operations at the Jackson Hole Airport during the transition and general aviation periods and after airport closure in the year 2033 would have a negligible effect on the general well-being of the community.

Medical Evacuations. St. Johns Medical Center in Jackson provides comprehensive medical services that are adequate to treat most medical situations. The 50 to 60 cases per year that require medical evacuations by helicopter do not involve the use of the Jackson Hole Airport. Therefore, changes at the airport, including its closure in the year 2033, would have a negligible effect on health- or life-critical medical evacuations that occur by helicopter.

Each year, there are about 80 or 90 medical evacuations from the Jackson Hole Airport, including emergency medical tickets on scheduled passenger service flights.

- Most of these evacuations are for the convenience of the patient, such as visitors to the area who are trying to catch up to a tour group following the resolution of a medical problem. These could be achieved by traveling by car to another airport, such as Idaho Falls, with scheduled passenger service.
- Evacuations currently occurring from the Jackson Hole Airport that are critical to a patient's health could be accomplished by helicopter.

Alternative 1 would cause inconveniences or additional costs for some patients who desire medical evacuations. However, because the ability to obtain evacuations for health- or life-critical conditions would not change, the long-term, adverse, indirect effect on community well-being would be negligible.

Emergency Response

Emergency response services, such as search and rescue and wildland fire fighting, currently are conducted from the interagency helibase in the airport boundary north of the development subzone. This facility, which functions independently from the airport, would remain in place and operational throughout the transition and general aviation periods. Following closure of the airport, the helibase would be relocated, but its functionality would not be affected. Therefore, Alternative 1 would have a negligible effect on the ability of agencies to provide emergency response to protect public health and safety.

Public Health and Safety on Highways

Consistent with the “Surface and Air Transportation” section of this environmental impact statement, this evaluation assumed the following for visitors who access the area through the airport:

- Airport arrivals equal departures (enplanements).
- All visitors arriving through the airport rent automobiles (as opposed to, for example, joining a bus tour).
- They have the same vehicle occupancy rate as park visitors. In the June-through-August period, the occupancy rate is 2.7 people per vehicle. The occupancy used for the remainder of the year is 2.4 people per vehicle.

Effects on U.S. Highway 26/89/191 between Airport and Jackson. Based on enplanement data from the Jackson Hole Airport and the preceding assumptions, area visitation through the Jackson Hole Airport currently results in about 200,000 vehicle trips each year. There also are about 500 to 600 vehicle trips per day, or about 180,000 to 220,000 vehicle trips annually, by airport employees (see the “Surface and Air Transportation” section for the bases of these values). It is assumed that 90 percent of employee trips are associated with scheduled passenger service aviation and 10 percent are related to general aviation and airport operations. General aviation probably accounts for about 60 vehicle trips per day (one per takeoff or landing operation), or about 22,000 vehicle trips per year. All vehicle trips were assumed to be between the airport and the town square in Jackson, a distance of 9.2 miles.

The end of scheduled passenger service by the start of the general aviation period would annually eliminate about 380,000 vehicle trips, or about 3.5 million miles of driving. Based on the accident data in Table 14 for U.S. Highway 26/89/189/191/287 between Moose and Hoback Junction, fatalities would occur at a rate of 1.7 per 100 million miles traveled and injuries would occur at a rate of 77.8 per 100 million miles traveled. Calculations using these values show that:

- Automobile fatalities between the airport and Jackson would decrease by 0.06 people per year, or an average of one person every 16 years.
- Automobile injuries between the airport and Jackson would be reduced by about 3 per year.

From 2001 through 2005, the number of traffic fatalities along the 29-mile stretch of U.S. Highway 26/89/189/191/287 that includes the road between the airport road and Jackson ranged between zero and four fatalities per year (Adams-Gierisch 2006). The expected decrease of one fatality every 16 years would not be detectable compared to these year-to-year variations.

Between 2001 and 2005, the number of automobile-related injuries along the 29-mile stretch ranged between 57 and 75 per year (Adams-Gierisch 2006), with about a third occurring between the airport road and Jackson. A reduction of about 3 injuries per year would represent a 12 to 15 percent reduction along this 9.2-mile stretch and could be detected compared to historical norms. As a result, Alternative 1 would have a beneficial, long-term, indirect impact of moderate intensity on highway safety between the airport road and Jackson.

Closure of the airport in 2033 would eliminate all remaining airport-related trips between the former airport site and Jackson, or a total of about 0.4 million miles of vehicle travel per year. The changes in the number of injuries and fatalities from automobile accidents on U.S. Highway 26/89/191 between the airport road and Jackson would be so small that they could not be detected compared to histori-

cal norms. As a result, the additional beneficial, long-term, indirect impact on public health and safety on this highway would have negligible intensity.

Effects on Travel between Jackson and Idaho Falls. Demand for scheduled passenger service from the area formerly served by the Jackson Hole Airport could be met by airlines flying from the existing Idaho Falls Regional Airport. To drive between these communities:

- Drivers can travel between Jackson and Idaho Falls entirely on U.S. Highway 26, a distance of 108 miles.
- An alternate route involves traveling northwest on Wyoming Highway 22, which turns into Idaho Highway 33 at the state line; turning southwest on Idaho Highway 31 at Victor; and intersecting westbound U.S. Highway 26 at Swan Valley. The distance from Jackson to Idaho Falls by this route is 90 miles.

The former route is 18 miles longer, but the latter route crosses the 8,429-foot-high Teton Pass. It was observed by the Idaho Transportation Department district engineer that “most” drivers select the shorter route (Cole 2006). Therefore, this impact analysis was performed twice, with all displaced airline passenger traffic using the shorter, steeper route, and with traffic split equally between the two routes.

This analysis used the following assumptions.

- The same number of people would continue to access the Jackson and Grand Teton National Park area using scheduled passenger service and general aviation, and the occupancy rates of automobiles would continue to be 2.7 people per vehicle in June through August and 2.4 people per vehicle for the remainder of the year.
- Employees for this airport would be drawn from the local labor pool, and their commutes would be equivalent to the current commute of Jackson Hole Airport employees. Therefore, trips by airport employees were not included in this analysis.
- All visitors would travel by automobile from their airport of arrival to the Jackson town square. From there, they would travel to the same destinations as if they had arrived at the Jackson Hole Airport. Their return trip to the airport to leave the area would be the same.
- The traffic injury and fatality rates on the 6-mile-long segment of Idaho Highway 33 and the 21-mile-long segment of Idaho Highway 31 are similar to the rates on Wyoming Highway 22. These include an injury rate of 88.2 and a fatality rate of 3.6 per 100 million miles traveled. As a result, the average number of traffic-related injuries and fatalities would be proportional to the numbers on the 17.5-mile-long Wyoming Highway 22 (average of 44 injuries and 1.8 fatalities per year, Adams-Gierisch 2006).
- The traffic injury and fatality rates on the 69-mile-long segment of U.S. Highway 26 in Idaho, from the state line to Idaho Falls, are similar to the rates on the 25-mile-long U.S. Highway 26/89 between the state line and Hoback Junction, Wyoming. These include an injury rate of 61.9 and a fatality rate of 3.9 per 100 million miles traveled. It also would have proportional numbers of traffic-related injuries and fatalities as the highway in Wyoming, which includes an average 19 injuries and 1.2 fatalities per year (Adams-Gierisch 2006).

If all 200,000 vehicle trips per year were made over the 90-mile-long Teton Pass route, traffic-related injuries would increase by 13.5 per year and fatalities would increase by 0.67 per year. If half of the vehicle trips per year involved the longer, less steep route, traffic-related injuries would increase by 13.3 per year and fatalities would increase by 0.72 per year.

The changes in the numbers of traffic-related injuries would be readily apparent for both routes, but the change in numbers of fatalities may not be clearly detectable compared to year-to-year variations. If airline passenger traffic that formerly used the Jackson Hole Airport were to relocate to the Idaho Falls Regional Airport, there would be an adverse, long-term, indirect impact of moderate intensity on public health and safety on highways between the two cities.

Jackson Hole Airport closure in 2033 would cause about 120 additional vehicle trips per day associated with displaced general aviation. Some general aviation might relocate to Idaho Falls, but pilots may also use other public airports or private airstrips throughout the region, or could choose other aviation destinations. As a result, the additional adverse, long-term, indirect impact on public health and safety on highways from airport closure would be of negligible intensity.

Public Health and Safety Relating to Hazardous Materials at the Airport

The Jackson Hole Airport Board and fixed-base operator have an excellent record in the safe handling of hazardous materials, including fuels, at the airport. The airport passes a rigorous inspection from the Federal Aviation Administration each year. Their commitment to safety also is demonstrated by the absence of hazardous materials accidents that threatened public health and safety. Because hazardous materials would continue to be handled in a safe manner throughout the transition and general aviation periods, the effect on public health and safety would be negligible. The effect also would be negligible after the airport closed in the year 2033, because there would not be any measurable change in the number of public-health-threatening accidents relating to hazardous materials storage or use, compared to the expected absence of accidents during the pre-closure period.

Cumulative Impacts

Safety Associated with Flight Operations. Eliminating scheduled passenger flights at the Jackson Hole Airport would have a negligible cumulative impact on safety associated with flight operations. Scheduled passenger air service in the United States is extremely safe, and in many years, no fatalities are recorded. This standard of performance would not change if airlines moved their flights to another airport to continue to meet the demand for air travel to the vicinity.

During the general aviation period, there would be a negligible effect on health and safety associated with general aviation at other airports in the region. This would change to a long-term, adverse effect following closure of the Jackson Hole Airport in 2033, when general aviation would be displaced to other airports. There, pilots would be expected to have accidents at rates similar to those of other general aviation pilots using those facilities. The changes at individual airports probably would be detectable, but the intensity would be negligible because it would not result in changes in the overall number of accidents, injuries, or fatalities associated with general aviation in the region. Because few other airports are so close to such steep terrain, there may be less opportunity for general aviation pilots to crash into mountains, resulting in a decrease in fatal accidents. However, the difference would not be detectable compared to normal variations in the numbers of fatal general aviation accidents that occur regionally.

Community Well-Being. With the end of scheduled passenger service at the Jackson Hole Airport, people using emergency medical tickets, such as visitors to the area who were catching up to a tour group following resolution of their medical problem, would need to obtain the service at another airport. Following closure of the Jackson Hole Airport in 2033, chartered evacuation flights using fixed-wing aircraft also would have to relocate to other facilities. As a result, other regional airports may experience an increase in the number of chartered evacuation flights and/or emergency medical tickets on scheduled passenger service flights, which would be a minor effect. However, because

hospital-to-hospital evacuations by helicopter would continue, changes in medical evacuations would have a negligible impact on public health.

Emergency Response Services. Wildland fire fighting and search and rescue services would continue to be provided from the interagency helibase. The cumulative effect of Alternative 1 on the ability of agencies to provide emergency response throughout the region would be negligible.

Public Health and Safety on Highways. Cumulative impacts on public health and safety on highways would be triggered by the need for passengers who now access the area through the Jackson Hole Airport to fly into another airport and then drive substantial distances to get to Jackson. These cumulative effects would be closely tied to the indirect impacts that were discussed previously under “Analysis.”

Hazardous Materials. The transfer to other airports of scheduled passenger service by 2015 and general aviation by 2033 would result in the increased storage and use of hazardous materials, such as fuels, lubricants, and solvents, at those airports. Those airports are required to meet the same safety standards as the Jackson Hole Airport and to pass the same rigorous inspection from the Federal Aviation Administration each year. Therefore, changes in the location of use of these substances that would result from Alternative 1 would have a negligible effect on public health and safety.

Conclusions

During the general aviation period, long-term, indirect, adverse effects on safety of moderate intensity would result from the inability of the Jackson Hole Airport to install upgraded navigational aids; purchase snowplows, fire trucks, and other major pieces of safety equipment; and maintain rescue training at current levels. Minor, long-term, indirect, adverse effects would result from reduced maintenance of the runway and taxiway and from reduced availability of medical evacuations for non-critical conditions. Life- or health-critical medical evacuations would experience negligible effects.

A long-term, indirect, beneficial effect at the site would result from closing the airport in 2033, because all potential for aircraft accidents would be eliminated. However, because similar numbers of additional aircraft accidents would be expected at the airports that would be handling the former airport's air traffic, the regional effect would be negligible.

Changes in public health and safety on highways would be directly related to changes in automobile traffic volumes. Decreases in traffic on U.S. Highway 26/89/191 between the Jackson Hole Airport and Jackson would have a beneficial, long-term, indirect impact of moderate intensity on highway safety. Increases in traffic on roads between Jackson and the Idaho Falls Regional Airport would have an adverse, long-term, indirect impact of moderate intensity.

Throughout the transition and general aviation periods and following airport closure, Alternative 1 would have negligible effects on public health and safety with regard to medical evacuations for health- or life-critical conditions; flight operations that provide other vital safety links; emergency response services, such as search and rescue and wildland fire fighting; and the handling of hazardous materials.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 1 would not result in any unacceptable impacts on public health and safety in Grand Teton National Park. The effects on public health and safety under this alternative would not be unacceptable because the

potential impacts are anticipated to be negligible to moderate in intensity and, thus, would not rise to the level where unacceptable impacts could occur.

SOCIOECONOMICS

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park with regard to socioeconomics relative to the presence and operation of the Jackson Hole Airport.

Desired Condition	Source
The National Park Service collaborates with industry professionals to promote sustainable and informed tourism that incorporates socioeconomic and ecological concerns and supports long-term preservation of park resources and quality visitor experiences	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works cooperatively with others to address mutual interests in the quality of life of community residents, including matters such as compatible economic development.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on socioeconomics were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for socioeconomics are as follows.

Negligible: The socioeconomic environment would be basically unchanged, with very small or no detectable change in local socioeconomic indicators such as economic activity, employment, and the structure of primary local industry sectors, such as retail, services, and construction.

Minor: Localized, small, but measurable changes in some socioeconomic indicators would occur, such as levels of employment, business sales, personal income, or the structure of primary industry sectors.

Moderate: The effects on socioeconomic indicators would be readily apparent in the local economy and would be measurable in the economy of Teton County, Wyoming. Indirect impacts on socioeconomic resources would occur as a result of the direct economic impacts.

Major: Widespread, readily apparent regional changes would occur in socioeconomic indicators, such as economic activity, employment, income, and/or the structure of primary industry sectors in Teton County.

Short-term: Effects would extend over only a temporary, interim period as a result of the implementation of a given action.

Long-term: Effects would extend over a prolonged period of time.

Direct and indirect: To avoid confusion, it is useful to clarify direct effects and indirect effects (or impacts) as they are used with regard to socioeconomics versus the National Environmental Policy Act.

For socioeconomics, direct effects relate to purchases or payrolls that occur because of an action or project. For example, the purchase of a meal in a restaurant is an action. The direct economic effects include the proprietor's purchase of food, and receipt of wages by the waiter. Indirect effects occur when the waiters purchase their own groceries from their earnings, and when sales tax revenues to governments increase because of the purchases made both by the restaurateur and the waiters.

With regard to the National Environmental Policy Act, a direct effect is immediately related to the action. For projects involving construction, this relationship is similar to that described above for a direct economic effect: the construction involves payments to workers and purchases of goods and services needed to build the structure. However, the proposed extension of the use agreement for the Jackson Hole Airport is an administrative action. Therefore, *all of the socioeconomic impacts associated with the alternatives would be indirect effects* under the National Environmental Policy Act, as illustrated by this chain of events:

- If the use agreement is not extended, the Jackson Hole Airport Board would be unable in 2013 to show a satisfactory property interest, extending at least 20 years, in the land under the airport.
- Under Title 14, Part 152 of the *Code of Federal Regulations*, Section 152.103, the inability to demonstrate a satisfactory property interest would make the Jackson Hole Airport ineligible to receive funding from the Airport Aid Program.
- Without Airport Aid Program funding, which includes grant funds under the Airport Improvement Program and passenger facility charges, the Jackson Hole Airport, in time, would not be able to pass the annual certification inspection from the Federal Aviation Administration that is required under Title 14, Part 139 of the *Code of Federal Regulations*.
- If the airport did not maintain its Part 139 certification, scheduled passenger service air carriers and regional carriers would not fly into the airport.
- If scheduled passenger service air carriers and regional carriers did not transport a visitor to the area, that visitor might not purchase lodging or a meal in a restaurant, with the resultant economic effects.

Geographic area: The primary geographic area considered for impacts on socioeconomics included the town of Jackson and Teton County, Wyoming. Because of their strong economic ties with the primary area, some effects occurring in Lincoln County, Wyoming, and Teton County, Idaho also were included.

Issues: Nine issues relating to socioeconomics were identified during scoping. They included:

- Effects on the economy of Jackson and the region, including growth, income, and contribution to the local economy.
- Effects on recreation outside Grand Teton National Park.
- Effects on airport use and demand for airport services (general).
- Effects on general aviation use of the airport.
- Effects on scheduled passenger service use of the airport.
- Effects on the availability and use of airport services by area residents.
- Effects on the airport's operations revenues.
- Effects on Federal Aviation Administration funding.

- Effects on quality of life factors in Jackson and the region.

Analysis

Effects on the Economy of Jackson and the Region

Maintaining the existing use agreement and not extending its term would result in the transition of the Jackson Hole Airport to general aviation only by about 2015 and airport closure in 2033. The changes associated with both dates would have long-term, indirect, adverse economic impacts of major intensity on the town of Jackson and Teton County.

The largest sector of the area's economy is tourism, and area employment, earnings, business volume, real estate, and construction are dominated by tourism-related activity. Surveys conducted on tourism and visitor spending indicate that 25 percent to 35 percent of total employment and more than 25 percent of total salary and wage income in Teton County is the direct result of tourism. It is estimated that 35 percent to 40 percent of the total economic impact of non-local visitors and tourism is directly related to air transportation through the Jackson Hole Airport.

Between 65 to 75 percent of the economy is not directly related to tourism. However, these segments, which include construction, government, retail trade, professional and technical services, and finance and insurance, also experience substantial benefits from the presence of the airport. Economic modeling shows that the direct and indirect economic effects resulting from the Jackson Hole Airport probably account for 25 percent to 30 percent of the local economy.

Scheduled passenger service at the Jackson Hole Airport would decrease during the transition period and would end around 2015. This would increase the time required to get to the area for the 274,000 annual passengers who currently (2006 data) use the Jackson Hole Airport. As a result, many tourism-related passengers may choose another location for their recreation, particularly during the winter when access to the area by other transportation modes can be challenging (see the "Surface and Air Transportation" section).

The resulting economic impacts would be apparent and widespread throughout the region. The accommodations and food sectors would experience the most immediate effects, followed by the construction, retail trade, and public service sectors. The direct economic impacts would be in the form of decreased business volume, lost personal salary and wage income, and lost employment.

These adverse, direct economic impacts would result in indirect economic impacts on other elements of the local and regional economy. For example:

- The loss of convenient access by air transportation into the region may reduce demand for housing. This would result in reduced housing values.
- The loss of demand for housing and supportive services would reduce activity in the construction and real estate industries.
- Government revenues would be reduced because of the loss of sales taxes and property tax revenues. The reduced government revenue could adversely impact the ability to provide public services, such as police, fire, and rescue, and would reduce funding for the maintenance of existing community infrastructure, such as roads, and construction of new facilities.

Adverse impacts also would occur in Lincoln County, Wyoming, and Teton County, Idaho, primarily in the form of reduced employment and personal income.

During the transition and general aviation periods, the impact on second homes owned and used seasonally by non-residents is difficult to assess. The second-home segment of the housing market in Teton County, Wyoming generally represents high-income individuals. Many of these people may own an aircraft, or may use charter air services to continue to fly into the Jackson Hole Airport. However, because second homes represented more than 20 percent of the total housing inventory in 2000 (see the “Demographics, Housing” section), decreases in desirability of the area because of reduced access by air could have a substantial adverse effect on the county-wide housing market.

Closure of the airport in 2033 would have limited additional effect on tourism. However, the inability to access the area by general aviation would make the area less attractive to some high-income individuals who had continued to fly into the airport in personal or chartered private aircraft. The adverse economic impacts of losing the ability to access the area by general aviation would be most apparent in the construction, real estate, professional and technical services, and finance and insurance sectors.

Table 25 (Estimated Total Airport Annual Economic Impacts, 2005) showed that the economic impact of the Jackson Hole Airport in 2005 included about \$400 million in non-local visitor spending, the existence of more than 6,250 jobs, and more than \$160 million in annual personal income in the form of salaries and wages. Closure of the airport in 2033 could result in the partial or total loss of all of these economic resources, which represent 25 percent to 30 percent of the local economy. Effects would be least apparent in the summer, when the 90 to 94 percent of area visitors who currently access the area by automobile or bus would continue to arrive. Effects would be more severe in the winter, when up to 90 percent of area visitors arrive through the Jackson Hole Airport.

Effects on Recreation outside Grand Teton National Park

Summer. Summer visitation to Jackson is primarily by auto transportation, with surveys indicating that between 6 percent and 12 percent of the area’s summer visitors arrive by air transportation. If the Jackson Hole Airport was not available, many of these visitors might choose an alternate destination for their visit. However, many others would simply choose another airport (such as Salt Lake City, Bozeman, or Idaho Falls) and still visit the area. As a result, Alternative 1 would have a minor, long-term, indirect, adverse impact on summer recreation outside Grand Teton National Park.

Winter. Three ski resorts, including the Jackson Hole Mountain Resort, Snow King Resort, and Grand Targhee Resort, plus the town of Jackson, are the primary winter visitor destinations in the region. Visitors can access the Grand Targhee Resort equally well through the Idaho Falls Regional Airport and Jackson Hole Airport, but about 90 percent of the winter visitors to Jackson and the other two resorts arrive by air using the Jackson Hole Airport during the December through March period. The airport also is an important gateway for visitors recreating in the national forests outside the developed ski facilities, and at the National Elk Refuge. Lower percentages of visitors use the Jackson Hole Airport to access winter recreation at Yellowstone National Park and the White Pine Ski Area south of Jackson. The direct impact of non-local winter visitor spending in Teton County is estimated at \$90 million to \$123 million.

By about 2015, scheduled passenger service at the Jackson Hole Airport would end. This action may have only a minor adverse impact on the Grand Targhee Resort, which would have no change in its current accessibility through the Idaho Falls Regional Airport. However, substantial decreases in non-local visitor winter recreation at the other two resorts and the town of Jackson would occur because of the time required to get to the area. Some people may choose alternate modes of transportation into the area, such as flying to Idaho Falls or Salt Lake City and traveling by road to Jackson (see the “Surface and Air Transportation” section). In addition, some affluent visitors would use private

aircraft, such as charters or their own planes, to fly into the Jackson Hole Airport. However, it is likely that many potential winter visitors to the area would choose another, more accessible destination for their winter vacation.

The Snow King Resort, which is adjacent to Jackson and has a substantial local clientele, probably would continue to operate, although at a reduced level. Other winter recreation-related businesses or operations, such as the sleigh rides at the National Elk Refuge, also may continue at reduced levels. Others may go out of business. The loss of winter visitors could result in a reduction in the permanent population of the area. Loss of employment, especially in the services sectors and at prime destination points (ski resorts), would result in out-migration of workers directly and indirectly employed in tourism-related jobs. Loss of employment would result in related decreases in personal income, business sales, expenditures, and sales tax and other use tax revenues. As a result, beginning during the general aviation period, Alternative 1 would have a long-term, indirect, adverse economic impact of major intensity on winter recreation in Teton County, Wyoming.

After the airport closed in 2033, visitors wanting to participate in winter recreation outside the park would not be able to fly into the area by general aviation. However, because they would represent a very small part of the recreating public, they would have little additional impact on winter recreation in the area.

Effects on Airport Use and Demand for Airport Services (General)

About 33,000 operations (average of 90 per day) occurred at the Jackson Hole Airport in 2005 (see Table 7). With the loss of scheduled passenger service around 2015, the number would decrease to about 26,400 annual general aviation operations or about 72 per day (see Table 27). Scheduled passenger enplanements would decline to zero.

Airport use and services would dramatically change. While use of the airport for general aviation would continue, the fixed-base operator would have decreased demand for aviation fuel, aircraft maintenance, ground equipment maintenance, and other services. The need for ground transportation services would be virtually eliminated, adversely affecting the rental car, taxi, shuttle, and limousine companies that currently serve the airport. The restaurant and gift shop would close. Other tenants at the airport also would be adversely affected by the decline in demand for their products and services. It is estimated that 90 percent of the current onsite employment of 485 people would end (Bishop 2007a). On closure of the airport in 2033, all existing operations would cease.

As described in Table 23 in the “Affected Environment” section, on-airport annual economic activity is responsible for \$10 million to \$15 million in local and regional expenditures, \$12.5 million to \$16.5 million in personal income, and 470 to 540 jobs. On closure of the airport, these economic impacts would no longer be realized by the local and regional economy. The result would be an adverse, indirect, long-term impact of major intensity on the local and regional economy.

Effects on General Aviation Use of the Airport

Some of the demand left by the termination of scheduled passenger air service would be filled by general aviation, such as charters, corporate jets, and personally owned aircraft. Thus, general aviation activity would increase, provided pilots perceived that the use of the airport was safe. In particular, smaller jets and micro jets are anticipated to constitute a larger share of the aviation market during this period. Based on data from The Boyd Group, Inc. (2007a), general aviation operations at the Jackson Hole Airport will increase 46 percent by 2015, and 51 percent in 2025, compared to the number of operations in 2005. This increase in demand for general aviation services would have a

long-term, indirect, beneficial impact of minor intensity on the economy during the general aviation period.

The Jackson Hole Airport receives only a small part of its current annual operating income from general aviation operations. This income includes landing fees, fuel, and maintenance. Landing fees are the largest component, and totaled approximating \$140,000 for general aviation in fiscal year 2004/2005. It is expected that airport revenue from landing fees and other sources related to general aviation would increase throughout the general aviation period, proportionately with the expected increase in general aviation operations at the airport, or by approximately 60 percent by 2025.

The Jackson Hole Airport Board may consider raising its rates and charges to a level that would generate the money necessary to fund capital improvement projects. However, current rates and charges generally are “at market” rates. Substantially raising rates and charges might be challenged as violating the “fair and reasonable” provisions of the airport use agreement.

All revenues from general aviation would be applied to the highest priority maintenance projects to keep the airport operational. However, without Federal Aviation Administration funding, gradual deterioration of the runway and taxiways eventually could create conditions that some pilots would consider unsafe. As a result, general aviation operations may decline toward the end of the general aviation period.

After 2033 the airport would be closed, with all aviation operations and activities ceasing. This would result in the loss of the remaining jobs, estimated as fewer than 50 (Bishop 2007a), that would be associated with the airport in 2033, plus the end of the economic activity that had developed to support the transport of visitors to the area by general aviation charters. The intensity of the resulting long-term, indirect, adverse impact on the economy would be moderate.

Effects on Scheduled Passenger Service Use of the Airport

Currently, scheduled passenger airline service to the airport is provided by six carriers. The number of scheduled passenger flights they provide varies seasonally, but normally includes about 10 large air carrier operations and 30 regional carrier operations per day.

Under Alternative 1, scheduled passenger service would decrease during the transition period and would end around 2015. Between then and 2033, only general aviation operations would occur at the airport. Passenger enplanements, which by definition are associated exclusively with scheduled air carrier and regional carriers service, would not occur. The closure of the airport in 2033 would have no additional impacts on scheduled passenger air service, because such service was terminated around 2015.

The termination and absence of scheduled passenger air carrier service to the Jackson area would have long-term, adverse, indirect impacts of major intensity on the local and regional economy. These impacts were discussed previously under the heading “Effects on the Economy of Jackson and the Region.”

Effects on Availability and Use of Airport Services by Area Residents

When scheduled passenger services ended around 2015, area residents would no longer have convenient access to major cities nationwide through the airport. Because general aviation charters are substantially more expensive, they would not meet the travel needs of most local residents. Therefore, most residents would have to travel by road to another facility, such as the Idaho Falls Regional

Airport to find this service. Winter would be the season that would result in the greatest disruption to travel plans of area residents because of the challenging nature of driving on often-icy mountain roads. The inconvenience could cause some residents and businesses to relocate. The intensity of the long-term, indirect, adverse impact would be perceived as moderate by most area residents, and major for those who felt compelled to move away from the area because of the decreased air service. Closure of the airport in 2033 would not result in any additional effects on the travel inconveniences experienced by these local users.

Despite the cost, use of airport services by chartered general aviation flights and business-related air transportation would increase moderately during the general aviation period. In the space freed up by the loss of scheduled passenger service, the Jackson Hole Airport Board might construct new hangars, or it could refurbish or replace existing hangars to better meet the new demand. This could provide additional operating revenues for the airport. This would result in a long-term, indirect benefit of minor intensity that would end when the airport closed in 2033.

Elimination of convenient access to the rest of the nation by scheduled passenger air service from the Jackson Hole Airport would result in the Jackson area becoming less attractive for future development. In particular, the second home market, which makes up more than 20 percent of the housing inventory, could be adversely impacted.

Effects on the Airport's Operations Revenues

Operating income from scheduled passenger service would decline throughout the transition period and would end around 2015. This loss would represent more than 90 percent of the annual operating budget for the airport. Operating revenues would increase slightly over time as general aviation increased, but the net impact throughout the general aviation period on airport operating revenues would be long-term, indirect, adverse, and of major intensity.

After 2033, there would not be any operating revenues, but the impact would be negligible because the airport would be closed.

After the airport closed in 2033, the Jackson Hole Airport Board would be required to remove the terminal building. If local public revenues were required for its demolition, there would be a minor, short-term, adverse impact. However, the board may be able to negotiate its removal in return for the right to salvage its materials. In that event, the impact would be negligible.

Effects on Federal Aviation Administration Funding

In 2013, the Jackson Hole Airport would lose its entitlement to Federal Aviation Administration grant funding. More than 70 percent of all monies that are available to the Jackson Hole Airport Board for facilities maintenance and capital improvements are from Federal Aviation Administration grant funds under the Airport Improvement Program and passenger facility charges.

Capital improvement projects that are planned between now and 2011 are classified as "maintenance / refurbishment." The Jackson Hole Airport Board just completed (2008) a \$3.2 million rehabilitation of the taxiways. The Jackson Hole Airport Board is now planning to secure Federal Aviation Administration grant funding to repair the runway electric system. Under Alternative 1, these projects probably would not be completed, and other projects would never be considered.

Federal Aviation Administration grant funding for the Jackson Hole Airport averages about \$3 million per year. On a regional basis, the loss of this funding would directly be a minor adverse effect,

but it would trigger the series of actions that would result in the loss of scheduled passenger service at the airport, and the widespread economic effects that were described previously. Before 2033, its loss would result in a major, long-term, indirect, adverse impact on the airport, town of Jackson, and three-county region. After 2033, the airport would have been closed.

Effects on Quality of Life Factors in Jackson and the Region

“Quality of life” is highly subjective, and the same condition can be perceived as adverse, neutral, or beneficial by people who hold different viewpoints. Therefore, this section summarizes some of the long-term changes that could alter perceptions about the overall quality of life in Jackson and the surrounding area without identifying intensities or classifying them as adverse or beneficial.

The termination of scheduled passenger service around 2015 and closure of the airport in 2033 would reduce how often sound was audible, and would reduce and then eliminate the intrusion on the scenic landscape that some people associate with low-flying aircraft.

Removal of the airport in 2033 would eliminate a feature that some consider an intrusion in the scenic landscape and aesthetics of Grand Teton National Park.

Reductions in highway traffic would result from the elimination of traffic directly related to visitors who arrived by scheduled airline service, and traffic that formerly was associated with the workers who provided services to these visitors. This change would be apparent primarily in the winter.

Alternative 1 would reduce salary and wage income, and the number of jobs. This could lead to a population loss as people relocated outside of the area for employment purposes.

Housing values could decrease as a result of increasing market supply that would be caused by such factors as diminished demand, reduced attractiveness in owning a second home in the area, and the relocation of some households outside the area.

Reduced public revenues could result in a reduction and/or deterioration of community and public services, such as police, fire, and rescue.

Travel to other parts of the nation and back would become less convenient for area residents and business employees.

Cumulative Impacts

With the end of scheduled passenger service around 2015, and with the closure of the airport in 2033, many of the economic benefits that currently are accruing to Jackson, Teton County, and the surrounding region from airport operations would be transferred to other communities.

- Demand for scheduled passenger service would be accommodated by another airport in the region, such as the existing Idaho Falls Regional Airport. A discussion of how this demand might be met is included in the “Surface and Air Transportation” section. Although the demand for scheduled passenger service could be lower than the levels that would have occurred at the Jackson Hole Airport, it could be sufficiently large to have a moderate beneficial impact on a large community such as Idaho Falls.
- Any regional airport, including the Idaho Falls facility, would need substantial upgrades to handle the additional passenger traffic that would result from Alternative 1. To meet this need, they

would be expected to receive considerable Federal Aviation Administration grant funding. This funding would have a major beneficial impact on any regional airport. At the larger, community level, it would have a moderate beneficial impact on a large community such as Idaho Falls.

- After the Jackson Hole Airport closed in 2033, demand for general aviation would be met at other public and private airfields in the region. Because this demand would be dispersed among many facilities, the intensity of the beneficial economic impact at any individual site would be negligible or minor.
- After scheduled passenger service ended, many potential winter visitors would choose another, more accessible destination. The selected destinations would receive the economic benefits of the monies spent for such items as travel, lodging, meals, lift tickets, and equipment rentals. It has been suggested that the Big Sky Resort in Montana, and the Alta Ski Area and Park City Mountain Resort in Utah could be potential beneficiaries. However, visitors could choose among many major ski areas in the western United States, or could even decide to take a European vacation. As a result, the intensity of the beneficial economic impact at any individual area probably would be minor.

This analysis assumed the Jackson Hole Airport would lose its Part 139 certification. However, organizations such as the Wyoming Aeronautics Division and Wyoming Business Council might make new funds available to the Jackson Hole Airport Board that would enable the board to maintain the infrastructure adequately to keep its Part 139 certification, at least for a few years.

The planning efforts of public agencies and private entities throughout the region have been based on the continued presence and operation of the Jackson Hole Airport for scheduled passenger service and general aviation. Some of the planning that would be disrupted by Alternative 1 includes, but is not limited, to the following.

- The recently approved expansion of Teton Village and development of other private lands within the Jackson area could be affected by the decrease in demand for housing in the area.
- Increased supportive commercial development within the region may not occur under this alternative because of the decline in demand.
- Construction plans for new lifts, housing, and commercial facilities at the three ski resorts could be delayed under this alternative. The Grand Targhee Resort master plan includes a proposal to more than triple its current skier capacity. The Jackson Hole Mountain Resort and Snow King Resort also have master plans that include expansion of current skier capacity and supportive facilities.
- The National Park Service recently completed a transportation plan for Grand Teton National Park (NPS 2006b) that requires the development of a transit business study. Both may require substantial modifications if Alternative 1 was implemented.
- The *Transit Development Plan 2003 Update* (Southern Teton Area Rapid Transit 2003) has been adopted by the Town of Jackson and Teton County, and includes transit planning for the Jackson Hole Airport. Alternative 1 could eliminate the Jackson Hole Airport from consideration as a transit stop.

There are several land use plans, controls, and policies for the Jackson area that are potentially associated with actions at the Jackson Hole Airport. These include:

- The Jackson/Teton County Comprehensive Plan (2002) states that airport issues are to be addressed in the future, and includes a strategy of supporting continued service at the Jackson Hole

Airport while minimizing environmental and traffic impacts. The plan also contains a number of guiding principles, which include “create conditions for a sustainable visitor-based economy not dependent upon growth.”

- The Jackson Hole Airport Resolution, which is an addendum to the *Jackson/Teton County Comprehensive Plan*, contains special sections on height and noise regulations as related to development in the immediate airport area. Under this resolution, height restrictions for structures are imposed in zones near the airport that are associated with approach, and along instrument and non-instrument runway flight paths.
- The Grand Teton National Park master plan (NPS 1976) seeks to minimize the intrusive impacts of the airport into the surrounding natural environment. This goal would be best accomplished under Alternative 1 with the closure of the airport.
- *The Winter Use Plans Final Environmental Impact Statement, Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr. Memorial Parkway* (NPS 2007b) describes winter recreation activities in the area. Implementation of Alternative 1 for the Jackson Hole Airport use agreement extension would substantially decrease the number of non-local visitors who would travel to the area in the winter to participate in these activities.
- The National Park Service recently prepared the *Final Bison and Elk Management Plan and Environmental Impact Statement for the National Elk Refuge / Grand Teton National Park / John D. Rockefeller, Jr. Memorial Parkway, Teton County, Wyoming* (The U.S. Department of the Interior, U.S. Fish and Wildlife Service and National Park Service 2007). Implementation of Alternative 1 would affect management zoning and other elements of this plan as they relate to visitor experience, resource conditions, and aircraft activities.

Conclusions

Alternative 1 would eliminate scheduled passenger service at the Jackson Hole Airport around 2015 and would result in closure of the airport in 2033. The changes associated with both dates would have long-term, indirect, adverse impacts of major intensity on the town of Jackson and Teton County, Wyoming. Adverse impacts also would occur in Lincoln County, Wyoming, and Teton County, Idaho, primarily in the form of reduced employment and personal income. Socioeconomic components that would contribute to this condition would include the following.

- For recreation that occurs in the region outside Grand Teton National Park, this alternative would have long-term, indirect, adverse impacts. The intensity would be minor in the summer and major in the winter.
- On the airport site, the termination of scheduled passenger service, with its associated jobs, purchases, and services, would have an adverse, indirect, long-term impact of major intensity on the local and regional economy. Additional impacts associated with the subsequent termination of general aviation operations would be moderate, long-term, indirect, and adverse.
- The off-airport loss of jobs, purchases, and services associated with the termination of passenger service would have long-term, adverse, indirect impacts of major intensity on the local and regional economy. Additional losses associated with the subsequent termination of general aviation would be minor to moderate.
- The end of locally available scheduled passenger service would have moderate to major, long-term, indirect, adverse effects on most local residents and businesses.

- The loss of more than 90 percent of the airport’s operating revenue with the termination of scheduled passenger service would be long-term, indirect, adverse, and of major intensity for the airport. After 2033, there would not be any operating revenues because the airport would be closed.
- The loss of more than 70 percent of airport funding for facilities maintenance and capital improvements would have a major, adverse effect on the airport. More importantly, it would trigger the series of actions that would result in the loss of scheduled passenger service at the airport, and the associated, widespread socioeconomic effects.
- The effects on quality of life would depend on personal perceptions.

SURFACE AND AIR TRANSPORTATION

Regulations and Policies

Current laws and NPS policies indicate the following desired conditions in Grand Teton National Park with regard to transportation relative to the presence and operation of the Jackson Hole Airport.

Desired Condition	Source
Transportation solutions at Grand Teton National Park preserve natural and cultural resources while providing a high-quality visitor experience.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service evaluates and manages aircraft landing sites under its jurisdiction to ensure that the use of the sites will have no unacceptable impacts on park resources and values, public safety, or visitor enjoyment. Existing sites that meet these criteria and that have been designated as a result of previously established use may be retained as long as the administrative need for them continues.	<i>Management Policies 2006</i> (NPS 2006a)
The National Park Service works with entities having jurisdiction over landing sites and airports for the purpose of preventing, reducing, or otherwise mitigating the effects of aircraft operations. The objective is to minimize noise and other impacts and confine them to the smallest and most appropriate portion of the park, consistent with safe aircraft operations.	<i>Management Policies 2006</i> (NPS 2006a)

Methods

Impacts on transportation were evaluated using the process described in the “Methods for Analyzing Impacts” section. Impact threshold definitions for transportation are as follows.

Negligible: Local and regional transportation would not be affected, or the effects would not be measurable. Changes in transportation modes, facility locations, traffic volumes, and levels of service would be within the range of variability of historical norms.

Minor: Effects on transportation in the southern part of the park and around Jackson would be detectable and would include measurable variations from historical norms for such factors as transportation modes, facility locations, traffic volumes, and/or levels of service. These changes would not be detectable regionally, for the area defined below.

Moderate: Effects on transportation in the southern part of the park and around Jackson would be readily apparent and would include substantial changes from historical norms for such factors as transportation modes, facility locations, traffic volumes, and/or levels of service. These changes would be detectable regionally, for the area defined below.

Major: Effects on transportation would be readily apparent regionally and would include substantial changes from historical norms for such factors as transportation modes, facility locations, traffic volumes, and/or levels of service.

Short-term: Effects would occur only during and shortly after a specified action or treatment.

Long-term: Effects would persist well beyond the duration of a specified action or treatment, or would not be associated with an particular activity such as construction.

The geographic area considered for impacts on transportation included northwestern Wyoming and eastern Idaho. For illustrative purposes only, it was assumed that in Alternative 1, airport services for the area would be relocated to the existing airport at Idaho Falls, Idaho. Therefore, the regional area in which changes in transportation modes, facility locations, traffic volumes and/or levels of service primarily would occur would include:

- U.S. Highway 26/89/191 between the Jackson Hole Airport and town of Jackson.
- The Snake River Valley highway corridor and Teton Pass highway corridor between Jackson, Wyoming and Idaho Falls, Idaho. This includes several highways, including U.S. Highways 26, 89, and 191; Idaho Highways 31 and 33, and Wyoming Highway 22.

Prior to 2033 for Alternative 1, the relocation of airport services to an assumed Idaho location would include only scheduled passenger flights. After closure of the Jackson Hole Airport in 2033 in Alternative 1, general aviation also would relocate to other facilities.

Effects on air-related emergency services, including medical evacuations, already were considered under “Public Health and Safety.” The other transportation-related issues that were identified during scoping included effects on:

- Community access by air travel using the Jackson Hole Airport and other airports in the region;
- Levels of scheduled passenger service at the Jackson Hole Airport and other airports in the region;
- Levels of general aviation use at the Jackson Hole Airport and other airports in the region;
- Highway use and traffic in the area.;
- Public or commercial transit in the area; and
- Transportation planning.

Analysis

Community Access by Air Travel

Summer Visitors. During the summer, the number of visitors to Grand Teton National Park who arrive by air is estimated to be 6 percent (RRC Associates 2005) to 12 percent (Littlejohn 1998). These visitors usually arrive by scheduled passenger service rather than general aviation. Many of these visitors rent automobiles, while others join bus or van tours. Grand Teton National Park often is one of multiple destinations, which typically also include Yellowstone National Park and the town of Jackson.

For these summer visitors, the availability of flights to the Jackson Hole Airport is a convenience. Many tour operators provide similar services from Idaho Falls, Bozeman, and even Salt Lake City. Rental cars also are readily available in all of these cities.

The elimination of scheduled passenger service by the start of the general aviation period would increase drive times to get from the arrival airport to Grand Teton National Park and other summer attractions around the Jackson area. However, it probably would have minimal effect on visitors' choice of destinations or mode of travel. For summer visitors who arrive by air, Alternative 1 during the general aviation period would have indirect, long-term, adverse effects of minor intensity. The effects on summer visitors who arrive in the area by other transportation modes would be negligible.

Closure of the Jackson Hole Airport in the year 2033 would have little additional effect on transportation of summer visitors. Only a very small percentage of summer visitors would be arriving in the area by general aviation. Also by then, alternate patterns of accessing the area in the summer would have been established. Closure of the airport would have an indirect, long-term, adverse effect of minor intensity.

Winter Visitors. Surveys show that 90 percent of winter visitors to the area arrive by air (RRC Associates 2005). The primary destinations of most of these people are the area's winter recreation resorts or the town of Jackson.

After scheduled passenger services ended by the start of the general aviation period:

- Many winter visitors may choose to travel from other airports to the Jackson area by other modes, such as commercial van, bus, or limousine service, rather than renting vehicles and driving themselves. This would have the secondary effect of changing the transportation mode they use at their destination, such as relying on public transit rather than personal rental vehicles.
- Some may use general aviation, such as air charter services, to continue to access the area through the Jackson Hole Airport. This may particularly occur if the growing use of micro-jets reduces the cost of chartered jet service.
- Some may decide to travel to other destinations, such as ski resorts in California, Colorado, Utah, or even New England or Europe, rather than visiting Jackson.

The loss of direct air service to the Jackson area using scheduled passenger service would be regionally apparent. It would have a major, long-term, adverse, indirect impact on winter visitors.

Indirect effects, including the reduced use of personal rental automobiles and the increased use of air charter service by winter visitors, would be long-term, and their intensity probably would be moderate to major. Their perception as adverse or beneficial would depend on consistency with transportation goals (such as those encouraging the increased use of mass transit) and other considerations, such as personal convenience.

Closure of the Jackson Hole Airport in the year 2033 would eliminate all general aviation flights into and from the airport. The effects would be apparent regionally, particularly if an extensive market for air charter service flying into the Jackson Hole Airport developed in the absence of scheduled passenger service. The resulting long-term, indirect, adverse effect of airport closure on transportation for winter visitors to the area would be major.

Residents. Based on passenger levels that occur during the off-season months of April, May, and November, about 6,000 enplanements per month at the Jackson Hole Airport consist of area resi-

dents and individuals conducting non-seasonal business in the area. This represents nearly a third of the Teton County population of about 19,000 people and demonstrates that the airport provides an important, popular link to metropolitan areas nationwide.

During the general aviation period, area residents would have to drive to another airport to use scheduled passenger air service.

- Currently, the closest airport that provides this type of service is the Idaho Falls Regional Airport, which has 10 flights a day to Boise, Denver, Minneapolis, and Salt Lake City, plus three flights a week to Las Vegas. Under good driving conditions, the 90-mile drive to this airport from the Jackson town square takes about 2.5 hours. Drive times can be considerably longer during snowy or icy conditions.
- Salt Lake City International Airport is 305 miles and 6 hours distant from the Jackson town square under good driving conditions. This airport is served by 15 airlines and provides almost 500 flights per day of scheduled passenger service.

During the general aviation period some area residents and business representatives may use general aviation, such as air charter services, to continue to use the Jackson Hole Airport. This may particularly occur if costs decline with the increased use of micro-jets.

The loss of scheduled passenger service from the Jackson Hole Airport during the general aviation period would result in a regionally apparent change in transportation among residents of Jackson and Teton County. The location from which they obtained this service would change, and they would have to travel much farther by automobile (90 or 305 miles, versus 9 miles to the Jackson Hole Airport) to get to an airport that currently provides scheduled passenger service. While the impact may be somewhat mitigated by the continued availability of air service by general aviation, the intensity of this long-term, indirect, adverse effect on area residents would be major.

Closure of the Jackson Hole Airport in the year 2033 would eliminate general aviation flights at the airport. The effects would be apparent regionally, particularly if, as discussed for winter visitors, an increased market for air charter service developed in the absence of scheduled passenger service. The resulting long-term, indirect, adverse effect on transportation for area residents would be major.

Levels of Scheduled Passenger Air Service

Jackson Hole Airport. By the start of the general aviation period, all scheduled passenger service to the Jackson Hole Airport would end. This would result in a major, indirect, long-term, adverse effect. Closure of the airport in 2033 would have no additional effect on scheduled passenger service at this facility.

Idaho Falls Regional Airport. The airport most likely to be affected by the end of scheduled passenger service at the Jackson Hole Airport would be the Idaho Falls Regional Airport, which is a 90-mile drive from the town square in Jackson.

- This airport has two runways with lengths of 9,000 feet and 4,730 feet (compared to one runway at the Jackson Hole Airport with a length of 6,300 feet). The weight-bearing capacity of the longer runway at Idaho Falls is generally similar to that of the Jackson Hole Airport, although it has a greater rating for single-wheel configurations and a lower rating for double-tandem-wheel configurations (AirNav, LLC 2006). Both airports have instrument landing procedures.
- The Idaho Falls airport already provides scheduled passenger services, including 10 flights a day to Boise, Denver, Minneapolis, and Salt Lake City, plus three flights a week to Las Vegas.

- All of the daily flights are on relatively small, commuter-type aircraft, including the Bombardier Canadair CRJ-700 (70 seats), and De Havilland Canada DH8 (37 seats). The thrice-weekly Las Vegas flights are on the larger (172-seat) MD-83.

Starting with the transition period and continuing after 2033, a substantial volume of the scheduled passenger traffic that formerly used the Jackson Hole Airport probably would transfer to the Idaho Falls Regional Airport.

- During the summer, most of the visitors and Jackson area residents who currently fly into and out of the Jackson Hole Airport using scheduled passenger service would likely continue to access the area by air using the Idaho Falls Regional Airport.
- There may be reduced winter visitation to the Jackson region. The Idaho Falls Regional Airport could experience a substantial increase in scheduled passenger service during the winter. This traffic would include residents of the Jackson area and those visitors who continued to access Jackson and the winter recreation facilities in western Wyoming.

The long-term, indirect effect on the Idaho Falls Regional Airport would have major intensity and could be perceived either as beneficial or adverse.

- The number of enplanements from the Idaho Falls Regional Airport could increase three-fold compared to the current number.
- The airlines probably would change the type of aircraft they use at this airport from smaller, regional carrier planes to larger models, such as the Airbus A319 (124 seats) and Boeing 737 and 757 (124 and 188 seats, respectively) that currently are used at the Jackson Hole Airport.
- The airlines probably would add flights to more cities.
- Additional airlines may enter the Idaho Falls market.

Salt Lake City and More Distant Airports. Beginning with the transition period and continuing after 2033, some of the passengers who formerly accessed the area via the Jackson Hole Airport may instead use the Salt Lake City International Airport or other regional airports. During the summer, the intensity of the indirect, long-term, beneficial effect at the Salt Lake City International Airport would be negligible to minor. During the winter when lower numbers of visitors could choose this approach, the intensity would be negligible.

Levels of General Aviation

Jackson Hole Airport. By the start of the general aviation period, all scheduled passenger service to the Jackson Hole Airport would be terminated. Because the presence of scheduled passenger service does not currently constrain general aviation at this facility, the indirect effect of this action on general aviation would be negligible.

Substantial growth would be likely in the air charter segment of general aviation at the Jackson Hole Airport, as this segment expanded to meet travel demand in the area. This may particularly occur if the use of micro-jets or other technology reduces the cost of chartered jet service. This growth would begin during the transition period and continue until the airport closed in 2033. This growth would have an indirect, major, long-term, beneficial effect on general aviation.

The absence of Federal Aviation Administration funding would challenge the Jackson Hole Airport Board to make substantial repairs, such as refurbishing the runway or taxiway. However, the Jackson Hole Airport Board probably could keep these facilities patched sufficiently to allow their use by

most general aviation aircraft, particularly smaller models, until 2033. During the latter part of the general aviation period, pilots of some aircraft, particularly large planes, might avoid the facility because of concerns about safety or security. This would result in an adverse, long-term, indirect effect of minor to moderate intensity on general aviation.

Closure of the airport in 2033 would end all general aviation at the Jackson Hole Airport. This would produce a major, indirect, long-term, adverse effect on general aviation.

Alternate Airports. During the initial part of the general aviation period, the effect on general aviation at other airports in the region would be negligible. Over time, the deterioration of the runway and other facilities at the Jackson Hole Airport could prompt some pilots, particularly those of large planes, to use alternate airports. During this time, the long-term, beneficial, indirect impacts on general aviation at the Idaho Falls Regional Airport would be minor. The intensity of the impact at Salt Lake City and more distant airports would be negligible.

Closure of the Jackson Hole Airport in 2033 would require that all general aviation use be relocated to other facilities.

- Larger planes primarily would use well-established airports such as those in Idaho Falls and Driggs. Smaller general aviation aircraft could use these facilities, plus any of the small public airports and private airstrips in the region. General aviation at all of these sites would experience major, indirect, long-term, beneficial effects. At the larger facilities, the effect would result primarily from increases in itinerant general aviation, while at smaller facilities the effect probably would be associated with increases in local general aviation.
- After the air charter service that had developed at the Jackson Hole Airport ended, passengers who valued its convenience may continue to use air charter services to/from an alternate airport in the region. However, because most former passengers probably would start using scheduled passenger service at the Idaho Falls airport, the beneficial, long-term, indirect effects on the air charter component of general aviation that flew out of alternate airports would be of minor intensity.
- The intensity of the impact on general aviation at the Salt Lake City International Airport and more distant airports would be negligible.

Highway Use and Traffic

Scheduled-service passengers traveling to or from the Jackson Hole Airport generate about 870 daily vehicle trips during the summer peak month of July. Travel to or from the airport by scheduled-service passengers during the winter peak month of March produces about 730 daily vehicle trips. On-airport employment results in about 700 vehicle trips per day on a year-round basis. In addition, there currently are about 60 vehicle trips per day that are associated with general aviation (one per takeoff or landing operation).

Effects on U.S. Highway 26/89/191. The loss of scheduled passenger service by the start of the general aviation period would eliminate all of the vehicle trips associated with passengers and about 90 percent of the employee trips on U.S. Highway 26/89/191 between the airport and Jackson. During the peak summer month, this change would represent a 17-percent reduction in use on U.S. Highway 26/89/191. The relative change would be greater during the peak winter month, when the average daily traffic volume on this road would be reduced by more than 65 percent.

These changes in traffic counts would be readily apparent compared to historical norms. However, the effects may not be obvious to many drivers for the following reasons.

- Particularly during the summer, traffic on U.S. Highway 26/89/191 between Jackson and the airport road can be more strongly affected by the presence of a large animal close to the road than by traffic volume. Visitors who slow down or stop (sometimes in the middle of the roadway) to observe nearby moose, elk, or bison can cause traffic jams or slow-downs, regardless of the time of day or prevailing traffic levels.
- During the winter, the highway has substantial excess capacity. Traffic reductions associated with ending scheduled passenger service at the airport would not produce a change in the existing, very high level of service, and the availability of additional excess capacity would not be important to highway users.

The change would be limited to the southern part of the park and area around Jackson. Based on this limited geographic area and the two factors listed above, the intensity of the long-term, indirect, beneficial effect on highway use and traffic on U.S. Highway 26/89/191 between the airport road and Jackson would be moderate.

Closure of the airport in the year 2033 would eliminate all airport-related traffic on U.S. Highway 26/89/191 north of Jackson. This would include highway traffic associated with current general aviation use and onsite employment to support that use (total of about 120 vehicle trips per day), *plus* highway traffic that had developed in association with the growth of the air charter segment of general aviation at the site. The perception of effects of the change would be affected by the same factors described above for scheduled passenger service.

- Summer traffic levels against which this change would be compared probably would be similar to or slightly higher than the summer traffic levels that occurred in the year 2005. The decrease in traffic counts, while detectable, would not be readily apparent and would result in a minor, long-term, indirect, beneficial effect on highway use and traffic on U.S. Highway 26/89/191.
- Winter traffic levels would be well below those recorded in 2005, because of the previous loss of traffic associated with scheduled passenger service. Average traffic volumes in 2033 may total around 1,000 vehicles per day. Compared to this volume, the long-term, indirect, beneficial effect on highway use and traffic on U.S. Highway 26/89/191 would be readily apparent and of moderate intensity.

Effects on Roads between Jackson and Idaho Falls. Demand for scheduled passenger service from the area formerly served by the Jackson Hole Airport could be met by airlines flying from the existing Idaho Falls Regional Airport. To drive between these communities:

- Drivers can travel between Jackson and Idaho Falls entirely on U.S. Highway 26.
- An alternate route involves traveling northwest on Wyoming Highway 22, which turns into Idaho Highway 33 at the state line; turning southwest on Idaho Highway 31 at Victor; and intersecting westbound U.S. Highway 26 at Swan Valley.

The former route is almost 20 miles longer, but the latter route crosses the 8,429-foot-high Teton Pass.

It was observed by the Idaho Transportation Department district engineer that “most” drivers select the shorter route (Cole 2006). Therefore, this impact analysis considered two situations, the first with all traffic using the shorter, steeper route, and the second with airport traffic split equally be-

tween the two routes. Trips by Idaho Falls airport employees were not included, because it was assumed that most airport workers would live in the Idaho Falls area.

If all airline passenger traffic took the Teton Pass route, on Wyoming Highway 22 close to Jackson, automobile trips by airline passengers would increase average daily traffic counts by 5.0 percent in the summer and 4.7 percent in the winter. Based on information from the Wyoming Department of Transportation (Thomas 2006), this already is the busiest two-lane highway in the state, with an average daily traffic count that is three times the threshold identified for maintaining an acceptable level of service rating of “C.” In both summer and winter, the additional traffic associated with airline passengers would be detectable. More importantly, it would contribute to an already unacceptable level of service for this stretch of highway.

On the highway stretch over Teton Pass to Victor, Idaho, trips by airline passengers would increase the average daily traffic counts by 21.2 percent in the summer and 17.8 percent in the winter.

- Thomas (2006) stated that traffic on this stretch routinely exceeds the highway’s capacity during the period from June through September, and indicated that traffic flow failed frequently. In the summer, the 21 percent increase in traffic produced by airline passengers traveling between Jackson and Victor would be readily apparent and would increase the already high number of traffic-flow failures.
- Traffic is lighter during winter, but highway conditions can be much more challenging. They often include icy roadways and poor visibility, particularly during the dark hours when passengers on afternoon-arriving or early-morning-departing flights would be on the roadways. Under these conditions, one slow-moving, inexperienced driver can cause major delays and long back-ups of traffic. This condition probably would be relatively common among the 730 daily vehicle trips by airport passengers that would occur during the peak ski season month.

At Victor, the traffic would turn southwest on Idaho Highway 31. On this highway, airport-related traffic would increase the traffic volume by 48.3 percent in the summer and 40.6 percent in the winter, compared to current average daily counts. The 21-mile-long Idaho Highway 31 from Victor to Swan Valley is described by the district highway engineer as “very winding and narrow” (Cole 2006). During the winter, it would be subject to delays caused by inexperienced drivers similar to those occurring on the Teton Pass road, particularly during inclement weather. These effects would be evident on this road to a distance of 45 miles from Jackson. As a result, highway use and traffic on this route would experience long-term, adverse, indirect impacts, and the intensity would be major.

If airline-passenger-related traffic split itself equally between the two routes, changes on the shorter, Teton Pass route would include the following.

- West of Jackson, traffic would increase by 2.0 to 2.5 percent, adding to already overloaded road conditions on this busiest two-lane highway in the state.
- Traffic on the road over Teton Pass would increase by 9 to 10 percent, exacerbating already overloaded (Thomas 2006) summer conditions and causing major delays in the winter from up to 365 additional drivers per day, many of whom probably would be uncomfortable driving on unfamiliar roads, particularly in the dark or during inclement weather.
- Between Victor and Swan Valley, traffic would increase by about 24 percent in the summer and 20 percent in the winter. During the winter, it would be subject to the same types of delays caused by inexperienced drivers that would occur on the Teton Pass road.

The magnitudes of these impacts would be somewhat less than those that would occur if all airline passengers chose the Teton Pass route. None-the-less, the intensity of the long-term, adverse, indirect impacts on highway use and traffic on this route would be major.

Traffic that traveled between Jackson and Swan Valley on U.S. Highway 26 would increase the peak summer month volume compared to average daily counts by 25.0 percent at Alpine Junction, Wyoming; by 27.2 percent at Palisades, Idaho; and by 18.9 percent at Swan Valley. The peak winter month increases compared to average daily counts would be 21.0 percent at Alpine Junction, Wyoming; 22.8 percent at Palisades, Idaho; and 15.9 percent at Swan Valley.

At Swan Valley, all airport-related traffic from the shorter Teton Pass route and the longer U.S. Highway 26 route would be combined for the drive into Idaho Falls. This would cause increases compared to current average daily counts of 24.9 percent in the summer and 20.9 percent in the winter.

The highway engineers for the states of Wyoming and Idaho both indicated that capacity currently was not a problem on U.S. Highway 26 and that there were ample passing opportunities to accommodate slower traffic (Cole 2006; Thomas 2006). Therefore, the level of service on this highway would remain in the acceptable range, despite the addition of airport-related traffic. However, because traffic volume increases of more than 20 percent would be readily apparent at the Idaho Falls city limit more than 80 miles from Jackson, the intensity of the indirect, adverse, long-term impact would be major.

Closure of the Jackson Hole Airport in 2033 would have little additional effect on highway use and traffic along the roadways between Jackson and Idaho Falls for the following reasons:

- Some general aviation pilots and their passengers who wanted to visit Jackson would fly into the Idaho Falls airport and travel the roads between the two communities by automobile. However, the number of individuals would be small compared to existing highway traffic and may not be detectable compared to variations in normal traffic levels.
- Some general aviation pilots may fly into other public general aviation airports or private airstrips in the region and travel different roads by automobile to Jackson.
- Because of the inconvenience of not having a nearby airport, some general aviation pilots or their passengers may choose to visit other communities rather than Jackson.

As a result, the additional effect of airport closure on highway use and traffic would be indirect, adverse, and long-term, but the intensity would be negligible.

Public or Commercial Transit

By the beginning of the general aviation period, visitors who accessed the Jackson area by scheduled passenger airline service would have to arrive through another airport, such as the Idaho Falls Regional Airport. Particularly during the summer, many of these visitors would continue to rent automobiles in their arrival city and drive themselves around the area throughout their stay. However, during the winter, some visitors who were unfamiliar with winter driving could choose to use commercial or public transit for all or part of their ground travel. Common options could include traveling to Jackson by taxi, van, or bus service, and then either renting a car or using bus and taxi services for local travel.

Most visitors appreciate the convenience of personal automobiles. Therefore, many would continue to rent automobiles in their arrival city, despite concerns they might have about the 90-mile-long drive on potentially icy mountain roads. Visitors who were truly concerned about winter driving might choose another winter vacation destination. As a result, although beneficial increases in the use of public or commercial transit modes would occur during the winter season, the intensity of this indirect, long-term impact would only be minor. Changes in the summer probably would be negligible.

Closure of the Jackson Hole Airport in 2033 would have a negligible additional impact on the use of public or commercial transit. Relatively small numbers of visitors would be entering the area by general aviation, and this group would probably be disinclined to use public transit modes or most commercial services (although some may prefer taxis over rental vehicles).

Transportation Planning

Highway Planning. The Wyoming Department of Transportation and Idaho Transportation Department are not planning for substantial traffic increases or associated highway upgrades for the roads between Jackson and other airports, such as the Idaho Falls Regional Airport in Idaho. However, major highway improvements may be necessary if traffic volumes between Jackson and this community increased by 20 percent or more following an end of scheduled passenger service at the Jackson Hole Airport. (See the estimates under the heading “Highway Use and Traffic.”)

Based on the cost data described previously from Cole (2006) and Thomas (2006), the cost for upgrading the existing, two-lane state highways to four-lane configurations along the Teton Pass route from Jackson to Swan Valley would be about \$280 million. This would include about \$105 million in Wyoming and about \$175 million in Idaho. These costs do not include any highway improvements on U.S. Highway 26 between Jackson and Idaho Falls. They also do not include any right-of-way acquisition costs which would be very high for private property close to Jackson.

In comparison to these estimates, the fiscal year 2006 Statewide Transportation Improvement Program funding for *all* highway projects in the:

- State of Wyoming is \$272 million (Wyoming Department of Transportation 2006).
- State of Idaho is \$363 million (Idaho Transportation Department 2006).

Based on this funding, upgrading Wyoming Highway 22, Idaho Highway 33, and Idaho Highway 31 between Jackson and Idaho Falls would require more than 44 percent of the *combined* annual Statewide Transportation Improvement Program highway money for the states of Wyoming and Idaho.

It is more likely that both states would implement selective improvements, such as installing passing lanes and modifying curves. However, even if those improvements cost only 10 percent of the upgrade costs cited above, they would still represent significant portions of the annual highway improvement funding for the states of Wyoming and Idaho. Because improvements of this magnitude would be planned, designed, and implemented over a number of years, Alternative 1 would have a major, adverse, long-term, indirect effect on transportation planning for these two states.

Closure of the Jackson Hole Airport in 2033 would have little additional effect on highway planning for the region. As described previously, the volume of automobile traffic associated with general aviation is so low that changes associated with closing the airport probably could not be detected from normal variation. Moreover, the planning performed previously to accommodate traffic associated with airline passengers also would have considered the contribution from the future loss of gen-

eral aviation. As a result, the additional impact resulting from airport closure in 2033 would be negligible.

Transit Planning. In the transportation plan that recently was completed for Grand Teton National Park (NPS 2006b), the National Park Service has committed to preparing a transit business study. Other entities, such as the Southern Teton Area Rapid Transit, also would participate in this study effort. The transit business study would consider approaches for encouraging increased use of public transit by both residents and visitors; would estimate demand and costs; and would identify potential routes, frequency of service, candidate stops, and supporting facilities.

An important feature that would be new to transit planning in the area could involve providing transit services to popular locations within Grand Teton National Park. Buses or shuttles could connect sites in the park to each other and to sites outside the park, such as stops in the ski areas and Jackson. Candidate sites in the park could include, but may not be limited to, the visitor centers, lodges, marinas, campgrounds, picnic areas, food services sites, trail heads, historic sites, and overlooks. The Jackson Hole Airport also could be evaluated as a transit stop.

Alternative 1 would affect area transit planning and implementation for the long term, beginning during the transition period. The loss of scheduled passenger service would effectively eliminate planning for a transit stop at the Jackson Hole Airport, and would relocate the current 500,000 person-trips per year to and from the airport that would have been candidates for public transit use. However, the improved transit that would result from the planning might encourage visitors who arrived through other airports to take a commercial bus or van service to the Jackson area, and then rely on public transit for their local travel. The effects of Alternative 1 on public transit in the area would be both beneficial and adverse, would be indirect and long-term, and would be of moderate intensity.

Cumulative Impacts

Cumulative impacts on community access by air travel, levels of scheduled passenger air service, and levels of general aviation use would be triggered by service decreases at, and the eventual closure of, the Jackson Hole Airport. None of the airports or private airstrips in the region currently have major expansion plans relating to demand for travel involving Jackson and Grand Teton National Park, because they expect that this demand will continue to be met by the Jackson Hole Airport. If that expectation changed because the airport would close under Alternative 1, the cumulative impacts would be closely tied to the indirect impacts that were discussed previously under “Analysis.”

Because of the high capital and operational costs of constructing and maintaining roads, states and communities need to forecast travel demand accurately. The highway engineers for the states of Wyoming and Idaho (Cole 2006; Thomas 2006) identified only limited highway upgrades for the area over the next 20 years, based on expected future demand from conditions other than the potential for the Jackson Hole Airport to decrease service and then close. Cumulative effects on highway use and traffic, including planning changes, would be triggered by Alternative 1 and would be closely tied to the indirect impacts that were discussed previously under “Analysis.”

Air service decreases at, and the eventual closure of, the Jackson Hole Airport may make the Jackson and Teton County area less attractive for future development. This could reduce the rate of population growth and the associated growth of traffic, although many interdependent factors contribute to changes in population numbers and distribution.

Airport changes may also reduce the attractiveness of the area as a winter resort destination, which could reduce traffic by winter visitors and by the workers who provide services to those visitors. A cumulative effect would be that the current roadways near Jackson could meet traffic demand for longer into the future, particularly during the winter. However, because the area's highway requirements are controlled more by summer visitation than by winter conditions, the intensity of this indirect effect would be negligible to minor.

Public or commercial transit, including planning, is an evolving area where substantial changes are expected regardless of whether the use agreement for the Jackson Hole Airport is extended. The change in established travel patterns that may occur in association with Alternative 1 may change opportunities to promote transit, and the long-term effects would be both adverse and beneficial.

Conclusions

The end of scheduled passenger service, followed by closure of the airport, would have indirect, long-term, adverse effects of minor intensity on summer visitors who arrive by air. The impacts on other summer visitors would be negligible. For winter visitors, impacts would be major, long-term, and adverse, and the indirect impacts would be moderate to major. Changes in community access by air travel would have major, indirect, long-term, adverse effects on residents and the business community.

Impacts on levels of scheduled passenger air service at the Jackson Hole Airport would be major, indirect, long-term, and adverse. Major, indirect, long-term, beneficial effects would occur at the Idaho Falls Regional Airport. The indirect, long-term, beneficial effects at airports in Salt Lake City and more distant locations would be negligible to minor.

Initially, impacts on levels of general aviation at the Jackson Hole Airport would be negligible, but minor to moderate, adverse, long-term, indirect effects could develop during the general aviation period if airport facilities deteriorated and operators of large aircraft became concerned about safety or security.

Growth in the air charter sector would have an indirect, major, long-term, beneficial effect on general aviation at the Jackson Hole Airport. Closure of the airport in 2033 would produce a major, indirect, long-term, adverse effect on all general aviation sectors at the Jackson Hole Airport.

At alternate airports, the long-term, indirect, beneficial effects of Alternative 1 on general aviation would be negligible to minor until 2033. Closure of the Jackson Hole Airport in that year would result in major, indirect, long-term, beneficial effects on general aviation at other airports in the region.

Highway use and traffic would decrease on U.S. Highway 26/89/191 between the airport and Jackson, producing a long-term, indirect, beneficial effect of moderate intensity. Traffic increases on highways between Jackson and the Idaho Falls Regional Airport would increase by 5 to 40 percent, with most changes in the range of 20 percent. Many of these highways already have capacity problems, and the additional traffic resulting from Alternative 1 would have major, adverse, indirect, long-term effects. Highway planning in Wyoming and Idaho to alleviate these adverse effects also would experience major, adverse, indirect, long-term effects.

During the winter, Alternative 1 would have indirect, minor, long-term, beneficial effect on the use of public or commercial transit. The impact during the summer season would be negligible. Because it would change established travel patterns, this alternative could increase opportunities to promote transit, the effects of which would be moderate, indirect, long-term, and both beneficial and adverse.

ALTERNATIVE 2

Regulations and policies that apply to each impact topic and the methods that were used to evaluate each impact topic, including impact thresholds, are the same as those described for Alternative 1.

NATURAL SOUNDSCAPE

Analysis

Under Alternative 2, the agreement between the Jackson Hole Airport Board and the U.S. Department of the Interior would be extended by the addition of two 10-year options that could be exercised by the board. This action would allow the airport to remain eligible for Federal Aviation Administration grants through 2033, and would ensure that sufficient funds were available to maintain and operate the airport consistent with maintaining Part 139 certification for scheduled passenger service operations. Both general aviation and scheduled passenger service would continue through 2033.

Figures 19 and 20 illustrate the modeled results for the percent of time aircraft using the Jackson Hole Airport were audible at each of the modeled locations under Alternative 2 for the 2015 and 2025 peak seasons. To determine the impacts of Alternative 2 compared to the no action alternative, these results were compared to the results shown in Figures 12 and 13.

The figures indicate that percent of time aircraft were audible would increase slightly from Alternative 1 conditions. The area of the park where aircraft would be audible more than 10 percent of the time would be 27 percent in both 2015 and 2025, as compared to 20 and 19 percent in 2015 and 2025, respectively, for Alternative 1. The amount of the park where aircraft would be audible 25 percent or more of the time would be 10 percent in both 2015 and 2025, as opposed to 7 percent in both time periods for Alternative 1.

As noted previously, areas of the park for which percent of time aircraft are audible is relatively low also experience sound levels that are relatively low. Under Alternative 2 for the 2015 peak season:

- In areas of the park where aircraft would be audible less than 10 percent of the time, 83 percent of the modeled points would have a maximum sound level lower than 60 dBA, and 67 percent would have a maximum sound level lower than 50 dBA. For points where percent of time audible would be less than 10 percent but maximum sound level would be 60 dBA or greater, the average time above 60 dBA would be about one second per day.
- Conversely, areas of the park where aircraft percent of time audible would be relatively high also would experience higher sound levels. For the 2015 peak season, areas of the park where aircraft would be audible 20 percent or more of the time (64 points, or 13 percent of the park), maximum sound level would range from 47 to 106 dBA, with an average value of 70 dBA. Time above 60 dBA for these points would range from zero to 45 minutes per day, with an average of 3 minutes; 26 of the 64 points would have zero time above 60 dBA.

Figure 14 included the modeled results for aircraft percent of time audible values at locations in the park for Alternative 2 under 2015 peak-season conditions. Figure 15 provided the corresponding information for 2025. The modeled results for Alternative 2 show that conditions in 2015 and 2025 would be slightly higher than those occurring under Alternative 1.

FIGURE 19: NUMBER OF POINTS IN GRAND TETON NATIONAL PARK BY MODELED PERCENT OF TIME AUDIBLE FOR 2015 PEAK-SEASON CONDITIONS UNDER ALTERNATIVE 2

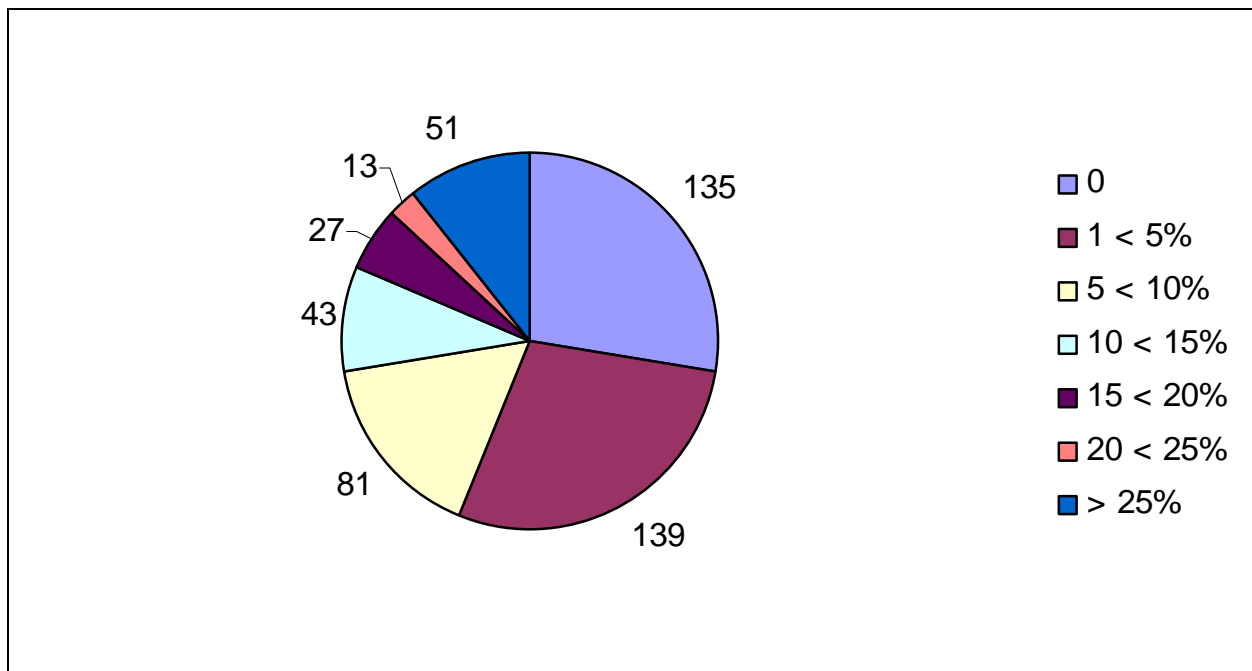
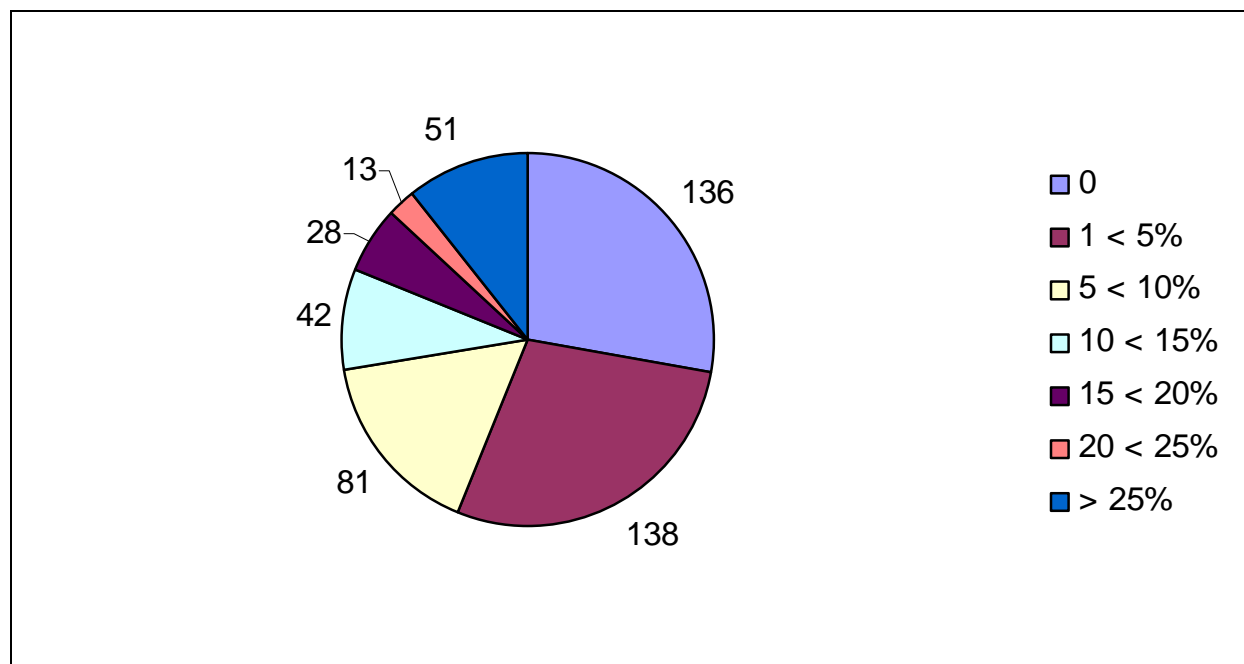


FIGURE 20: NUMBER OF POINTS IN GRAND TETON NATIONAL PARK BY MODELED PERCENT OF TIME AUDIBLE FOR 2025 PEAK-SEASON CONDITIONS UNDER ALTERNATIVE 2



The greatest difference would occur at locations close to the airport, where values for percent-time audible would increase relative to Alternative 1 conditions. By 2025, aircraft would be audible for more than 21 minutes each hour at 31 points, and would be audible for more than 30 minutes each hour at five points. With increasing distance from the airport and aircraft flight paths, the intensities of aircraft sound emissions would diminish to the point of being negligible in the north part of the park.

Maximum Sound Levels in Grand Teton National Park. The modeled maximum sound levels (Lmax) for airport-related aircraft at locations in the park for Alternative 2 in 2015 and 2025 are shown in Figure 16. The maximum sound levels at any location depend on the proximity and type of aircraft in the fleet, and not on the number of operations carried out by those aircraft. Because the fleet mix and modeled flight routes do not change between 2015 and 2025, the predicted maximum sound levels for Alternative 2 would be identical.

Because of changes in the types of aircraft predicted under Alternative 2, a larger percentage of the modeled points would experience maximum sound levels in the range of 50 dBA to 70 dBA (see Table 5 for a comparison of these levels to common sound sources). However, the maximum sound levels between 80 and 110 dBA would be the same as in Alternative 1.

Day-Night Average Sound Levels. Maps that show the day-night average sound level that would be associated with Alternative 2, based on a 15-hour day (7 A.M. to 10 P.M.), are provided in Appendix F.

The 65 dBA day-night average sound level contour north of the runway would remain within the airport boundary. However, the 65 dBA contour south of the runway would extend beyond the current 65 dBA contour and the Alternative 1 contour. The additional area would be small, about a quarter-mile long and an eighth-mile wide, compared to Alternative 1 conditions.

Figures F-12 through F-15 include the areas of the park (shown with blue hatching) where the day-night average sound level associated with airport operations cannot exceed 55 dBA, and the 45 dBA line (shown in purple) specified in the use agreement. None of the average-annual or peak-season conditions associated with Alternative 2 in 2015 or 2025 would result in day-night average sound level contours that would violate these use agreement requirements.

Time above 60 dBA. The modeled values for percent-time above 60 dBA at locations in the park for Alternative 2 in 2015 for peak-season conditions, based on a 15-hour day (7 A.M. to 10 P.M.), were presented in Figure 17. Corresponding data for 2025 are presented in Figure 18.

Despite the changes described above for percent-time audible, there would be almost no change in percent of the time above 60 dBA, even during the 2025 peak season. Two locations close to the north end of the runway, in an area that experiences little if any visitor use, are the only sites where this level of sound would occur for more than 15 minutes per day.

Sound Intensity Index. As described previously, the sound intensity index combines the values for energy average sound level and percent-time audible at each modeled point into a single value. These values for Alternative 2 are displayed as map contours in Figures F-8, F-8B, F-9, F-9B, F-10, F-10B, F-11, and F-11B. The contours help illustrate areas of the park where the effects of aircraft are more intense or less intense by accentuating differences among conditions.

Based on a comparison of Figures F-8, F-8B, F-10, and F-10B, there would be little difference between annual-average conditions for Alternative 2 in 2015 and 2025. Similarly, peak-season effects in 2015 (Figures F-9 and F-9B) and 2025 (Figures F-11 and F-11B) would be similar. This indicates that

the move toward larger air carrier and regional carrier planes to provide scheduled passenger service (see Table 27) would result in limited additional sound effects in the park.

Compared to Alternative 1, the sound intensity index apex would be substantially higher for Alternatives 2 for both average-annual and peak-use seasons in 2015 and 2025. This difference primarily reflects the greater number of flights that would be associated with this alternative. It also shows that the effects are most pronounced in locations closest to the airport.

Sound Effects on Lands Outside the Park. Day-night average sound levels for areas outside the park, based on a 15-hour day (7 A.M. to 10 P.M.), were discussed above in association with Appendix Figures F-12 through F-15. Other effects of Alternative 2, compared to Alternative 1, would be as follows:

- The maximum aircraft sound levels outside the park from airport use would not change from those in Alternative 1, either in 2015 or 2025.
- For average-annual conditions in 2015 and 2025, sound associated with Alternative 2 would be little changed from Alternative 1 with regard to percent of the points in the modeled area in which aircraft sounds were below 60 dBA, or exceeded 60 dBA for less than a minute during a day. The highest values for time above 60 dBA also would be similar, at about 21 minutes per day in 2015 and 22 minutes per day in 2025.
- Peak-season airport use in 2015 and 2025 would increase the area outside the park where airport-related sound was above 60 dBA. About 5 percent more of the modeled points than in Alternative 1 would experience sound levels 60 dBA or higher. Alternative 2 also would increase the highest values for time in 2015 above 60 dBA to 31 minutes per day. By 2025, the highest values would be 35 minutes per day.

Based on the impact threshold definitions, the effects of Alternative 2 on the natural soundscapes of Grand Teton National Park would be major, indirect, long-term, and adverse. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible greater than 10 percent of the time over approximately 27 percent of the park, thereby falling in the major impact category. The effects would be most evident within a few miles of the airport, and would affect predominantly areas in the south parts of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being negligible impacts. In general, the impacts of Alternative 2 would be slightly greater than would occur under Alternative 1.

Cumulative Impacts

Cumulative impacts under Alternative 2 would be similar to those described for Alternative 1, and would be major, indirect, long-term, and adverse. Because Alternative 2 would result in the continuation of scheduled commercial air service, the air traffic control tower would likely remain in operation, and could help prevent aircraft engaged in activities such as scenic or sightseeing flights from inappropriately over-flying the park at low altitudes.

Conclusions

The effects of Alternative 2 on the natural soundscapes of Grand Teton National Park would be major, indirect, long-term, and adverse. In both 2015 and 2025, aircraft using the Jackson Hole Airport would be audible greater than 10 percent of the time over approximately 27 percent of the park. The effects would be most evident within a few miles of the airport, and would affect predominantly ar-

eas in the south part of the park. With increasing distance from the airport and aircraft flight paths, aircraft sounds would diminish to the point of being negligible impacts. In general, the impacts of Alternative 2 would be slightly greater than would occur under Alternative 1.

Sound impacts outside the park would increase slightly from current conditions and, by 2025, could potentially meet the Federal Aviation Administration's criterion for significance in a small area immediately south of the airport boundary. Other areas under the flight path south of the airport that would experience increases in the day-night average sound level might meet one of this agency's marginal effects criteria.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under "Methods for Analyzing Impacts," Alternative 2 would not result in unacceptable impacts on or impairment of the natural soundscapes of Grand Teton National Park for several reasons. First, most of the park would be substantially unaffected by aircraft sounds, which would occur only infrequently and at low sound levels. By 2025, aircraft would be audible less than 10 percent of the time over approximately 73 percent of the park, and less than 5 percent of the time over 56 percent of the park. These values are for impacts during the peak season of aircraft operations, and that the number of aircraft using the Jackson Hole Airport is much lower during a substantial portion of the year, notably the spring and fall. Consequently, the impacts during those times would be substantially less than for the peak period. Although a large area of the park would be affected to some degree, the magnitude of those effects at any given point would be small over most of the park. The effects would be slightly greater than those that would occur at present, and there is no indication that the current impacts affect the fulfillment of the park's purpose or the potential for its enjoyment by current or future generations.

VISITOR USE AND EXPERIENCE

Analysis

Under Alternative 2, visitors would continue to have the same range of opportunities to enjoy Grand Teton National Park that would be available under Alternative 1. Many factors would continue to contribute to the quality of visitor use and experience, including the number and type of activities available, the condition of park facilities, interactions with park staff and other visitors, and the conditions of roads and traffic. Other sources of non-natural sounds that would occur under Alternative 1 would continue to affect the quality of the experience for some visitors.

The Jackson Hole Airport would continue to operate much as it does today, serving both scheduled passenger and general aviation. As described in "Natural Soundscape," forecasts provided by The Boyd Group, Inc. (2007a) show a total increase in the number of daily operations between 2010 and 2025 of 3.5 percent. The relatively modest growth is influenced by a shift by scheduled passenger carriers from smaller aircraft with fewer seats to larger aircraft capable of carrying more passengers per flight, thereby accommodating the same number of passengers with fewer flights. Most of the growth in operations at the airport between 2010 and 2025 would result from general aviation.

Table 28 compares the modeled impacts on the natural soundscapes of Alternative 2 in 2025 for two key metrics, percent-time audible and time audible above 60 dBA, compared to Alternative 1. As shown in the table, differences would be greatest at popular visitor use locations (identified in Figure 2) that are nearest the airport, and would be lower at locations farther from the airport. Impacts on visitor experience probably would follow the same pattern.

TABLE 28: 2025 PERCENT-TIME AUDIBLE AND TIME AUDIBLE ABOVE 60 dBA VALUES IN ALTERNATIVE 1 AND ALTERNATIVE 2 FOR VISITOR ACTIVITY SITES ^{a/}

Site	Percent-Time Audible ^{b/}		Time Audible above 60 dBA ^{b/} (total minutes per 15-hour day)	
	Alternative 1	Alternative 2	Alternative 1	Alternative 2
Mountain Wilderness Zone				
Phelps Lake	16.8	16.8	0.0	0.0
Bradley Lake and Taggart Lake ^{c/}	13.8	13.8	0.0	0.0
Mount Wister	10.0	14.2	0.0	0.0
Death Canyon Trail ^{c/}	1.5	3.1	0.0	0.0
South Teton Peak ^{c/}	1.1	1.1	0.0	0.0
Crest Trail	0.5	1.2	0.0	0.0
Valley Zone				
Gros Ventre Campground	36.0	47.5	0.0	0.2
Murie Ranch	34.4	45.5	1.8	1.9
Moose Village ^{c/}	31.8	42.6	9.7	13.5
White Grass Ranch ^{c/}	27.8	37.0	0.0	0.0
Kelly	16.9	23.7	0.0	0.0
South Jenny Lake Junction	9.2	14.4	0.0	0.0
Signal Mountain ^{c/}	7.4	10.4	0.0	0.0
Signal Mountain Lodge	6.6	9.8	0.0	0.0
Jenny Lake Visitor Center	6.5	10.1	0.0	0.0
Jackson Lake Lodge	5.4	7.6	0.0	0.0
Cunningham Cabin	5.1	7.4	0.0	0.0
Emma Matilda Lake ^{c/}	3.5	5.1	0.0	0.0
Colter Bay Village ^{c/}	2.1	3.3	0.0	0.0

a/ All values are for the airport's peak-use season from July through September. This period generally corresponds with the park's maximum visitor use period.

b/ Airport operations were modeled based on a 15-hour day, from 7 A.M. to 10 P.M. This period corresponds with the typical period of visitor activity.

c/ For activity areas that included, or were between, two or more modeling points, only the results from the point with the highest percent-time audible are presented here.

Surveys taken over the past 10 years consistently have indicated an extremely high level of visitor satisfaction with their experience in Grand Teton National Park. Despite the adverse effects of the airport and aircraft operations on the natural soundscape of the park, there is little indication that aircraft sound is substantially affecting the quality of the experience enjoyed by most park visitors. Based on the changes in sound at the popular visitor use sites that are shown in Table 28 and Figure 2, including the continued absence at most sites of aircraft-related sound at levels that would cause speech interference (greater than 60 dBA), the intensity of the indirect, long-term, adverse impact from Alternative 2 would be minor.

Increases in airport-related sound by 2025 would be greatest in the south part of the park. The area from Moose to the south boundary experiences high levels of visitation, but most of it occurs along U.S. Highway 26/89/191, in the Moose developed area, or at the airport itself. In all of these areas, most visitors expect non-natural sounds because of the presence of transportation corridors and

other development. Thus, for many visitors, the increase in airport-associated sounds would take place against the backdrop of substantial amounts of other non-natural sounds in an area where there is an expectation of non-natural sound. It would, therefore, have a negligible or minor effect on their experience.

Depending on the nature or location of their activities, visitors in the Moose area may have differing expectations regarding, and awareness of, non-natural sounds. For example, visitors to the Murie Ranch National Historic Landmark may feel that the increased percent of the time that aircraft are audible at this site (audible 46 percent of the time, compared to 34 percent under Alternative 1, with little change in time at levels that would interfere with speech) would increase their sense of incongruity with their expectations, especially in light of the significance of the site to the preservation of wilderness values. Therefore, Alternative 2 could result in a minor to moderate, indirect, adverse impact at this location. Visitors to other nearby areas, such as the Gros Ventre Campground, Laurance S. Rockefeller Preserve, and Mormon Row, would experience similar effects, although probably less pronounced than at the Murie Ranch.

North of Moose, the impacts on the natural soundscape of the park would decrease. Correspondingly, impacts on visitor experience in most areas of the Valley and Through Zones would be lower, based on smaller differences in factors such as percent-time audible and maximum sound levels between Alternative 1 and Alternative 2. In most of these areas, Alternative 2 would have a negligible or minor, indirect, long-term, adverse impact on visitor use and experience.

Along the Snake River downstream from the Bar BC Ranch, visitors engaged in activities such as float trips and fly fishing may feel an increased interference in their sense of isolation that would result in a minor to moderate, adverse impact on their experience. However, this probably would not alter their patterns of park use.

At Mountain Wilderness Zone locations that are relatively near the airport, such as Phelps Lake and Taggart Lake, the modeling results in Table 28 show that there would be no discernible difference between the no action and action alternatives for the percent-time audible metric. At some of the more distant locations in this zone, such as modeled points along the Death Canyon Trail and Crest Trail, percent-time audible would increase to as much as 3.1 percent. However, compared to an existing 5 to 12 percent of the time audible from aircraft unrelated to the Jackson Hole Airport (see cumulative impacts discussion for Alternative 1), this change would not be discernable to many Mountain Wilderness Zone visitors. As a result, the intensity of the long-term, indirect, adverse impact for Mountain Wilderness Zone visitors would be negligible to minor.

Because of the continuing limitations on the height and color of airport buildings, changes relating to the presence of airport facilities within the scenic view would have a negligible effect on visitor use and experience. There would be little or no change in visitor experience from the presence of aircraft moving across the scene. Aircraft that followed the preferred patterns of an approach from the south and takeoff toward the south would not be flying across park scenic views, and would continue to have no effect on visitor experiences. When aircraft approached from or made takeoffs toward the north, few if any visitors would perceive a difference between the daily average of 99 (in 2015) or 100 (in 2025) aircraft compared to the current 90 aircraft per day (see Tables 7 and 27).

Alternative 2 would continue impacts on visitor use and experience beyond 2033. However, without another extension of the use agreement shortly after 2025, the airport would again have fewer than 20 years remaining on its use agreement. This would result in the discontinuation of scheduled passenger service beginning in 2033. As a result, impacts of Alternative 2 beyond 2033 would be similar to those described for the general aviation period of Alternative 1.

Cumulative Impacts

Cumulative impacts would be the same as those described for Alternative 1.

Conclusions

In most of the park, the impacts of Alternative 2 on visitor use and experience because of aircraft visibility and sound would be negligible to minor, indirect, long-term, and adverse. In some areas where sound from aircraft increased visitors' sense of incongruity with the setting, such as along the Snake River, the intensity of the indirect, long-term, adverse impact could be moderate.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under "Methods for Analyzing Impacts," Alternative 2 would not result in any unacceptable impacts on visitor use and experience of Grand Teton National Park. The effects on visitor use and experience under this alternative would not be unacceptable because the potential impacts are anticipated to be negligible to moderate in intensity and, thus, would not rise to the level where unacceptable impacts could occur.

VISUAL QUALITY AND DARK SKIES

Analysis

Effects on the Visibility of Airport Facilities

Throughout the analysis period until 2033, the effects of Alternative 2 on the visibility of airport facilities and scenic integrity levels would be negligible. During this time, the Jackson Hole Airport Board could make changes within the development subzone, such as replacing existing buildings with new buildings and/or increasing the number of buildings to support changes in scheduled passenger service and general aviation activities. However, all development would continue to be restricted to the development subzone, and the current height restrictions and color scheme would be maintained. Changes in building arrangements would not be apparent except in foreground views (which have no scenic integrity), because the current buildings already appear as largely continuous throughout the entire length of the development subzone from observation points outside the airport.

As described for Alternative 1, additional screening by trees may further reduce the visibility of airport structures. However, the improved screening would not alter the moderate scenic integrity of the landscape that would be seen from observation points along U.S. Highway 26/89/191.

Effects on the Scenery and the Visibility of Broad or Distant Vistas

As described for Alternative 1, effects on scenery would be indirect and would result from changes in the visibility of flying aircraft, and their tendency to draw the viewer's attention away from the scenery to the aircraft itself and to the airport in the midground view. By 2025, there would be only a 1.5 percent increase in the more noticeable large air carrier aircraft compared to current conditions (see "Park and Airport Operations" section).

From viewpoints along U.S. Highway 26/89/191 between the Teton Point Turnout and airport road intersection, observant viewers in 2025 may see up to 35 percent more aircraft than under current conditions, but no perceptible change in the number of large aircraft. Even during the busiest airport

operations periods, observers probably would not perceive a substantial increase in the frequency in aircraft passing between them and the Teton Range (currently about one every four minutes when aircraft are arriving from and taking off toward the north), in part because the air traffic control tower would require aircraft to maintain adequate spacing. Most observers would experience a negligible change in the scenic integrity level of the background mountain landscape compared to current conditions. For observers who noted a change in the frequency of the passage of aircraft, the scenic integrity may decrease by up to one level, from very high to high. However, because the change would be extremely short-term, lasting only a few seconds, the intensity of the indirect, adverse effect on the background view would be minor.

(This finding is based only on changes in scenic integrity. An individual's reaction to that change would depend on their personal perceptions. The "Visitor Use and Experience" section examines effects on visitor experience based on changes in airport use, including changes in the presence of aircraft within the scenic view.)

Effects on Light Emissions and the Visibility of Dark Skies

Alternative 2 would have negligible effects on light emissions from the Jackson Hole Airport or the visibility of dark skies within the airport boundary for the same reasons that were described for Alternative 1. Because lighting already is in place on the runway and taxiway, and the entire development subzone has been built out with sufficient lighting, there would be not any need to install additional exterior lighting between now and 2033.

With increased airport use, light emissions from automobile headlights along the airport road and U.S. Highway 26/89/191 between the airport and Jackson would increase, particularly during the winter. Because automobile headlights are focused down onto the road, skyward fugitive emissions from this source would be limited. Particularly along U.S. Highway 26/89/191, the effect of additional headlights from increased airport traffic would be less perceptible when combined with headlights from other travelers. During moonless, cloudless evening, night, and early morning periods, observers close to the road might be able to perceive a one-step change in the visible magnitude of the night sky. This would be an indirect, long-term, adverse effect of minor intensity. At all other times and locations, the adverse effect of headlights associated with Alternative 2 on the visibility of the night sky would be negligible.

Regional changes in the visibility of dark skies as a result Alternative 2 would be negligible.

Cumulative Impacts

Cumulative effects on visual quality for Alternative 2 would be the same as those described for Alternative 1.

The cumulative effects on dark skies that were described for Alternative 1 also would apply to Alternative 2. In addition, cumulative effects would occur because the Jackson Hole Airport is an important contributor to the local economy. Its presence indirectly facilitates the development of the area and increases demand for housing and supporting services. As a result, the continued operation of the airport under Alternative 2 would lead to an increase in outdoor lighting compared to current and Alternative 1 conditions. Because town and county requirement for the control of fugitive emissions would be enforced for all new development, the cumulative increase in light emissions from ongoing growth plus growth facilitated by Alternative 2 would not result in regional changes in the visibility of dark skies.

Conclusions

Alternative 2 would have a negligible effect on the visibility of airport facilities. Increased air traffic associated with this alternative would cause indirect, adverse effects of minor intensity for some viewers at observation points along U.S. Highway 26/89/191 between the Teton Point Turnout and airport road intersection.

Within the Jackson Hole Airport boundary, Alternative 2 would have negligible effects on the visibility of dark skies. Along the airport road and U.S. Highway 26/89/191 between the airport and Jackson, increased light emissions from headlights associated with increases in airport-related traffic would result in an indirect, long-term, adverse effect of minor intensity during moonless, cloudless evening, night, and early morning periods, and a negligible impacts at all other times.

Alternative 2 would have negligible effects on the cumulative changes in visibility of dark skies that would occur in Jackson or areas of Teton County outside the immediate vicinity of the airport.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 2 would not result in any unacceptable impacts on the visual quality and dark skies of Grand Teton National Park. The effects on visual quality or dark skies under this alternative would not be unacceptable because the potential impacts are anticipated to be negligible to minor and, thus, would not rise to the level where unacceptable impacts could occur. Because no unacceptable conditions would result, there would not be impairment of visual quality or dark skies (by definition, impairment is worse than unacceptable impacts) under this alternative.

WATER QUALITY AND HYDROLOGY

Analysis

Surface Water

Compared to the Alternative 1 general aviation period, the effect of continued operation of the Jackson Hole Airport on hydrology would be negligible. The long distances to water bodies, flat topography, absence of direct surface water discharge to any surface water feature, and highly permeable soils would prevent airport runoff from reaching area streams. Because development would be restricted to the already impervious surfaces of the development subzone, runoff volumes would not differ from those that would occur during the Alternative 1 general aviation period.

Compared to Alternative 1’s post-closure condition, Alternative 2 would have a negligible effect on hydrology.

- The airport’s impervious surfaces would remain, but runoff would infiltrate rapidly into the soil and would not cause problems such soil erosion or gullyng.
- Measurable differences compared to Alternative 1 in surface or ground water flows would not occur within or outside the airport boundary.
- There would not be any detectable changes in surface water quality compared to Alternative 1, and all parameters would remain within the applicable water quality standards.

National Pollutant Discharge Elimination System-Permitted Outfalls

Compared to the Alternative 1 general aviation period, changes in water quantity or quality associated with permitted outfalls would be negligible. Similar volumes of treated storm water would be discharged from the ramp area outfall. Treated septic tank discharges would continue to be released at or below the permit limit of 7,514 gallons per day.

Effects on water quality would be negligible compared to the Alternative 1 post-closure period because best management practices would continue to ensure that pollutants were not entering the water system from the permitted outfalls. There would not be measurable differences in pollution levels or the ability to meet water quality standards. Hydrologically, impacts would be negligible because all water used onsite would continue to originate onsite, and there would not be any measurable changes in the water table height or the volumes of ground water within or at the airport boundary.

Fuel Spills and/or Leaks

Under Alternative 2, the airport would continue to employ best management practices to prevent and control fuel spills and leaks. This would ensure that effects on water quality would be negligible compared to both the general aviation and post-closure periods of Alternative 1.

Glycol Deicer Storage, Use, and Disposal

The use of propylene glycol deicer would continue. However, there is no evidence that this product is adversely affecting water quality within or outside the airport. Therefore, effects of its continued use, compared to the general aviation and post-closure periods of Alternative 1 would be negligible.

Aircraft and Rental Car Maintenance Operations

Under Alternative 2, the airport board would continue to ensure that the car rental companies and fixed-base operator used best management practices to prevent the contamination of surface runoff or ground water by oils, greases, and solvents used during maintenance operations. Their continued careful management would ensure that effects on water quality would be negligible compared to both the general aviation and post-closure periods of Alternative 1.

Discharges to the Enterprise Canal

The Enterprise Canal would continue to be unaffected by airport operations and would experience negligible impacts from Alternative 2.

Cumulative Impacts

Area-wide cumulative impacts from Alternative 2 would be the same as those described for Alternative 1.

Conclusions

Alternative 2 would have a negligible impact on hydrology.

Because the use of water quality best management practices would continue to prevent surface and ground water pollution, Alternative 2 would have a negligible effect with regard to National Pollutant Discharge Elimination System-permitted outfalls for storm water and septic tanks; fuel spills

and/or leaks; glycol deicer storage, use, and disposal; aircraft and rental car maintenance operations; and discharges to the Enterprise Canal.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 2 would not result in any unacceptable impacts on water quality and hydrology resources of Grand Teton National Park. The effects on water quality and hydrology resources under this alternative would not be unacceptable because the potential impacts are anticipated to be negligible in intensity and, thus, would not rise to the level where unacceptable impacts could occur. Because no unacceptable conditions would result, there would be no impairment of water quality and hydrology resources (by definition, impairment is worse than unacceptable impacts) under this alternative.

WILDLIFE AND THEIR HABITATS, INCLUDING SPECIAL CONCERN, THREATENED, AND ENDANGERED SPECIES

Analysis

Associated Habitat Effects

Alternative 2 would not result in increased surface disturbance or loss of sagebrush steppe to wildlife species expected to occur within the airport area. Nesting, foraging, and available cover habitat would remain unchanged relative to Alternative 1 until 2033 when, under Alternative 2, the area would continue to be protected from gazing by moose, elk, and bison. There would be no loss of sagebrush steppe, therefore habitat requirements that are currently being met would be retained. The impacts of this alternative would be indirect and negligible compared to Alternative 1.

Collisions between Birds and Aircraft

The projected increase in the number of flight operations anticipated with Alternative 2 would have a potential to proportionately increase future bird/aircraft collisions compared to existing conditions. Because the alternative would not change environmental conditions in such a way to attract more birds or to concentrate their numbers around the airport, a substantial increase in the number or rate of collisions would not be expected. Reported bird/aircraft collision have averaged about two birds per year (of all species). With a forecast increase of about 3.5 percent in total operations in 2025, an average of about three bird/aircraft collisions per year would be expected (an increase of about one additional bird/aircraft collision per year). This effect would be considered a long-term, indirect adverse impact of negligible intensity.

Bird/aircraft collisions with sage-grouse would persist and may eventually increase with Alternative 2, depending on sage-grouse population trends, continued use of the lek site, and possible management measures implemented to reduce or eliminate potential conflicts between aircraft operations and sage-grouse use of airport land. The incremental effect on sage-grouse could be a measurable, indirect, minor, adverse and long-term impact.

Aircraft Sound Effects

The anticipated sound effects on wildlife resource within and near the airport property, including sage-grouse, would be long-term, adverse, indirect, and of negligible to minor intensity for the same reasons that were discussed for Alternative 1. Although more aircraft operations would occur with Alternative 2, the same aircraft fleet mix and sound emission characteristics would be present.

Therefore, the sound contour configurations and areas exposed to aircraft sound emissions would remain very similar to Alternative 1 (see Appendix F figures).

Endangered Species Act Compliance and Effects from Airport Ground Vehicles

Compliance with the Endangered Species Act and effects from airport ground vehicles would be the same as those described for Alternative 1. Therefore, Alternative 2 would have negligible impacts in these areas and would equate to a no effect determination under the Endangered Species Act.

Effects of Airport Ground Vehicles and Traffic

Because the perimeter fence excludes most wildlife from the airport area, effects from ground vehicles would be limited to small and mid-sized mammals and birds. Airport service, security, maintenance, and other ground vehicles are restricted to established roads and work areas to ensure aircraft and worker safety. Speed limits are strictly enforced. Because of the low presence of wildlife within the airport and standard vehicle safety practices, wildlife mortality from ground vehicles within the airport would continue to be uncommon and would have a negligible impact.

Traffic volume along the 10 miles of highway between the airport and Jackson would increase because of increased traffic volume to the airport. The increase in wildlife-vehicle collisions would have an indirect, long-term, adverse effect of negligible to minor intensity on wildlife.

Cumulative Impacts

Alternative 2 would not create any further incremental loss of the existing sage-grouse lek area, but it would preclude the restoration of the portion of the lek area that was lost during construction of the airport tower (NPS 2001b). Moreover, the continuing loss of habitat outside the park that was described for Alternative 1 also would occur with this alternative. The increased mortality of sage-grouse that would occur from aircraft/bird collisions in this alternative could further contribute to area-wide stresses and population declines of this species.

Conclusions

Because the availability of wildlife habitat would not change under this alternative, impacts on wildlife would be negligible.

The frequency of aircraft/bird collisions would increase with increased aircraft operations. This would result in negligible impacts on migratory birds and raptors and indirect, minor, adverse, long-term impacts on sage-grouse.

Continued aircraft sound would continue to have a long-term, adverse, indirect, negligible to minor effect on wildlife.

There would be a negligible change in wildlife mortality because of airport ground vehicles. Increases in collisions with automobiles would have an indirect, long-term, adverse effect of negligible to minor intensity on wildlife.

Alternative 2 could contribute to the area-wide stresses and population declines of sage-grouse.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 2 would

not result in any unacceptable impacts on wildlife and their habitats, including special concern, threatened, or endangered species the in area. The effects on wildlife resources under this alternative would not be unacceptable because the potential impacts are anticipated to be only negligible to minor and, thus, would not rise to the level where unacceptable impacts could occur. Because no unacceptable conditions would result, there would be no impairment of wildlife (by definition, impairment is worse than unacceptable impacts) under this alternative.

PARK AND AIRPORT OPERATIONS

Analysis

Operation of Grand Teton National Park

Until 2053, the National Park Service would continue to commit staff time for coordination with the Jackson Hole Airport Board and oversight of airport activities. The level of involvement would continue at the rate of about one full-time-equivalent NPS position in a normal year. That commitment would periodically increase with special circumstances, much as the increase in staff time that was required to prepare this environmental impact statement. However, those short-term surges would not represent a change from the current situation. Overall, airport coordination and oversight associated with Alternative 2 would have a negligible impact on the NPS' operation of Grand Teton National Park.

This alternative would not change the NPS' management of the area around the airport. It would have a negligible impact on this aspect of park operations.

In future NPS planning for public transit, the airport would be a moderate- to high-priority area. Although enplanements would fluctuate by year (see Table 11), at least 250,000 passengers would need to make their way to and from the airport annually (500,000 person-trips). Most of these travelers currently rent automobiles or take shuttles or taxis (see the "Surface and Air Transportation" section). However, if effective transit services to popular locations within and outside the park became available, more air passengers might choose to use public transit to travel between the airport and their lodging. The large pool of airport employees needed to provide services to travelers also would be candidates for an effective public transit service, particularly if employee parking at the airport were reduced or eliminated (see the "Surface and Air Transportation" section). The intensity of the long-term, indirect impact on park operations would be minor, and effects could be both adverse and beneficial.

Interagency Helibase Operations

Alternative 2 would result in negligible changes on the operation of the interagency helibase. The agencies would continue to obtain water, sewer, and electricity from the airport's systems.

Over time, as the level of air traffic associated with the airport increased, the need for coordination of flight operations between the helibase and airport would increase. At times, this could result in short delays in the ability of helicopters using the helibase to takeoff, land, or otherwise operate in the airport area. The intensity of the long-term, adverse, indirect impact on helibase operations would be minor.

Continued Cooperation

Alternative 2 would have negligible impacts on the effectiveness of the National Park Service and Jackson Hole Airport Board in working together. It would be in the continuing interest of both groups to maintain effective communications and planning throughout the life of the use agreement extensions and beyond.

Airport Facilities within the Development Subzone

Between now and 2053, the Jackson Hole Airport Board could continue to construct or upgrade airport facilities within the development subzone. This could include any or all of the improvements that were recommended in the airport master plan environmental assessment and listed in the “Affected Environment” section, plus additional facilities that could be proposed in the extended use agreement timeframe. All development would have to conform with the following requirements.

- Development would not extend beyond the boundaries of the 28.5-acre development subzone.
- Buildings would have to be within the height specification of the use agreement, which is 6,437 feet above mean sea level.
- The National Park Service would have to be notified at the preliminary or conceptual stage, and provided with detailed plans and specifications at least 150 days before the start of construction.
- Because the airport is on federal land, the Jackson Hole Airport Board would have to coordinate with the National Park Service to ensure that the consultation requirements of Section 106 of the National Historic Preservation Act were met.

As shown in the airport map in Figure 3, there is little unused space in the development subzone. Therefore, the Jackson Hole Airport Board may apply different management to some areas to optimize the use of available space. For example, about a quarter of the development subzone currently is committed to automobile parking. The Jackson Hole Airport Board could implement management actions to limit parking and allow this space to be used for other airport purposes.

Impacts on airport facilities within the development subzone that would result from the Alternative 2 extension of the airport use agreement would be long-term and indirect. The intensity of actions collectively would be moderate to major. Actions singly or collectively could be perceived as beneficial or adverse, depending on personal viewpoints.

Airport Facilities outside the Development Subzone

As described for Alternative 1, improvements outside the development subzone can only include aircraft parking in an area specified by the use agreement, and the installation of navigational and safety aids west of the runway. This stipulation would not be altered by the extension of the use agreement. Maintenance of facilities, such as the recently completed taxiway rehabilitation, and new safety features, such as the recent installation of a new radar facility, would continued to be allowed outside the development subzone and would continue to require action-specific evaluations under the National Environmental Policy Act. Therefore, Alternative 2 would have a negligible impact on the potential for new airport facilities to be constructed outside the development subzone boundary.

If it had what it considered a major need for expansions in facilities that were outside the development subzone, the Jackson Hole Airport Board could propose an amendment to the 1983 use agreement. Any such proposal would require preparation of an action-specific National Environmental Policy Act compliance document, as was described previously. However, such amendments of the

use agreement are beyond the scope of the current action to extend the use agreement, and are identified below, among cumulative impacts.

Airport Use and Operations Patterns

Extension of the use agreement under Alternative 2 would enable the Jackson Hole Airport to maintain its Part 139 classification, and to continue serving as primary, non-hub airport. Future operations for the alternative were presented in Table 27. As shown in that table, in the year 2025, the airport would experience about 36,600 operations per year (100 per day), which is about 9,300 per year (25 per day) more than under Alternative 1. This would include 4,529 annual operations, about 12 or 13 per day, by major air carriers and 4,791 annual operations, about 13 per day, by regional carriers. (None of the air carrier or regional carrier operations would occur under Alternative 1.)

Despite these differences between the action and no action alternative in 2025, airport use and operations patterns associated with scheduled passenger service under Alternative 2 would be little changed from current conditions. A comparison of Table 7 (existing operations in 2004 and 2005) and Table 27 (forecast operations in 2025 for Alternative 2) shows that:

- Air carrier operations would increase by 29 percent, from the current 3,504 per year to 4,529 per year in 2025. This would result from an average increase of about three operations per day.
- Regional carrier operations providing scheduled passenger service would decrease by 58 percent, from the current 11,474 per year to 4,791 per year in 2025. On a daily basis, this would be a decrease from the current average of 31 operations per day to 13 operations per day. This would occur because very soon, and as passenger demand continues to increase, carriers are expected to use larger, more profitable aircraft and decrease the number of flights. Specifically, companies that use regional carrier planes will largely phase out the use of the 30-seat Embraer 120 and 37-seat Dash 8-100/200 models at the Jackson Hole Airport. These will be replaced by aircraft such as the Dash 8 Q400, Bombardier CRJ-700, and Bombardier CRJ-900, which each have seating for 68 to 86 passengers (The Boyd Group, Inc. 2007a).

The change in operations associated with 3 more landings or takeoffs per day by air carriers and 18 fewer operations per day by regional carriers could be readily accommodated within existing use patterns and would have a minor, long-term, indirect impact on use patterns of the Jackson Hole Airport. The perception of whether impacts were adverse or beneficial would depend on personal viewpoints.

Because larger planes could be used, passenger traffic could increase substantially with little change in the number of aircraft operations. This would result in increases in demand for support services, such as airline ticketing, baggage handling, and security; automobile rentals; and food and retail service in the terminal's restaurant and gift shops. Demand for automobile parking also could increase; this was addressed above under the heading "Airport Facilities within the Development Subzone." The intensity of the long-term, indirect impact on airport use patterns from increases in passenger traffic would be minor to moderate. The perception of whether impacts were adverse or beneficial would depend on personal viewpoints.

The greatest increase in operations would occur in the general aviation category, which would average about 75 operations per day in 2025, compared to current levels of just under 50 per day. Until 2033, Alternative 2 increases in general aviation would be the same as in Alternative 1. As a result, compared to Alternative 1, the increase in general aviation would have a negligible impact on airport use and operations patterns. The perception of whether impacts were adverse or beneficial would depend on personal viewpoints.

Estimates of aircraft operations beyond the year 2025 would be highly speculative. However, if the Federal Aviation Administration (2006d, 2006-2017) forecast of an annual growth rate of 3.2 percent per year is applied to the period of 2026 through 2033, the airport in 2033 would have about 47,000 operations, or about 130 operations per day. This value is about 42 percent higher than operations in 2004-2005, and about 30 percent higher than the estimated level of operations in 2025.

Comments during scoping indicated concern that extending the use agreement would enable the Jackson Hole Airport to grow from a small, local airport used primarily by area residents into a regional or national airport with heavy commercial use. The operations data in Table 12 demonstrate that the period when it was a small, locally used airport is past. Specifically, in each of the seven years of 1999 through 2005, local general aviation represented 10 to 12 percent of airport operations. Major future changes in the airport's character resulting from a use agreement extension are unlikely for the following reasons.

- The numbers of aircraft operations are projected to increase by 11 percent between 2005 and 2025, and the mix of operations would be similar. In both 2010 and 2025, large air carrier planes would represent 12 or 13 percent of the operations, and the piston and turboprop classes of aircraft each would represent 14 or 15 percent of operations. Small differences would occur only among regional carriers, which would decrease from 16 percent of operations to 13 percent, and among business jets, which would increase from 41 percent to 45 percent of operations between 2010 and 2025 (The Boyd Group, Inc. 2007a).
- According to provisions of the use agreement that would not be changed, improvements could not be constructed outside the 28.5-acre development subzone, the runway could not be extended, the airport could not expand outside its 533-acre boundary, and improvements could not include any commercial overnight lodging, industrial operations, or other facilities unrelated to direct airport operations.

As a result, the long-term, indirect impact of extending the use agreement on the character of the airport would be minor. The perception of whether impacts were adverse or beneficial would depend on personal viewpoints.

Airport Capacity

Until 2033, Alternative 2 would have a negligible impact on airport capacity. This would occur because Alternative 2 would not result in any changes in the airport boundary, the boundary of the development subzone, or the types of uses or buildings that were authorized at the airport.

Under this alternative, airport aircraft operations and enplanements would increase. However, as described in the "Affected Environment," the Jackson Hole Airport through 2033 and beyond could accommodate anticipated growth. During peak use periods around holidays, some general aviation users who could not obtain reservations for ramp parking would continue to be inconvenienced, but the numbers would be similar to those under Alternative 1, resulting in a negligible impact. Some management changes of lands within the development subzone might be required to accommodate growth, but because all of those changes could be made within the provisions of the existing use agreement, the impact would be negligible.

Alternative 2 would continue operation of the airport beyond 2033. However, without another extension of the use agreement shortly after 2025, the airport would again have fewer than 20 years remaining on its use agreement. This would result in the discontinuation of scheduled passenger service beginning in 2033. As a result, impacts of Alternative 2 beyond 2033 would be similar to those described for the general aviation period of Alternative 1.

Payments to the U.S. Department of the Interior

Payments from the Jackson Hole Airport Board to the Department of the Interior would increase under Alternative 2. However, the long-term, beneficial, indirect impact on the budgets of the park and department would be negligible. Between now and 2033, operations at the airport are expected to increase by about 42 percent. The increase in payments would be less than \$60,000 per year. This increase could not be perceived compared to the normal range of variability in the \$10 million annual budget of Grand Teton National Park.

Cumulative Impacts

The implementation of Alternative 2 would maintain the potential for amendments to the use agreement that would allow for the future modifications of airport facilities. Any such proposals, regardless of whether they were within or outside the development subzone, would require an amendment to the use agreement and would be subject to the National Environmental Policy Act process to inform and involve the public and to disclose impacts. An amendment to the use agreement also would have to be approved by the U.S. Department of the Interior.

Conclusions

For the National Park Service, effects would be negligible on the operation of Grand Teton National Park, on ensuring cooperation between the National Park Service and Jackson Hole Airport Board, and on the amount of payments to the U.S. Department of the Interior. Minor effects would result to interagency helibase operations, the planning and management for public transit, and the character of the airport.

For the Jackson Hole Airport, effects would be negligible on the construction of facilities outside the development subzone, general aviation use of the airport, and the capacity of the airport. Airport use and operations patterns would experience minor to moderate, long-term, indirect impacts from increases in passenger traffic. Impacts on airport facilities within the development subzone would be moderate to major, long-term, and indirect.

PUBLIC HEALTH AND SAFETY

Analysis

Safety Associated with Airport Flight Operations

Alternative 2 would enable the Jackson Hole Airport to demonstrate a satisfactory property interest in the site and to maintain its eligibility for Federal Aviation Administration funding for an additional 20 years. It could continue to apply for and receive available federal funds, based on need, for key operational and safety features such as upgraded navigational aids, safety equipment, and refurbishing of the runway and taxiway. Funds from other sources could then continue to be available to maintain the current high levels of training that will help ensure adequate response to emergency situations. Operation of the tower would be assured under Alternative 2. It is expected that ongoing technological advances in all of these areas would lead to incremental improvements in safety over time. The resulting indirect, long-term, beneficial effect of these improvements on public health and safety would be minor.

Changes in the aircraft mix under Alternative 2 probably would have a negligible effect on the number of aircraft accidents recorded for the Jackson Hole Airport. While improved technology in aircraft may make flying safer, the resulting decrease in accidents at the Jackson Hole Airport and other airports would not be related to implementing Alternative 2.

Community Well-Being

The effects of Alternative 2 on community well-being, including medical evacuations for health- or life-critical conditions, would have negligible effects on public health and safety for the same reasons described for Alternative 1. Emergency medical tickets on scheduled passenger service flights would continue to be available from the Jackson Hole Airport, but these would continue to largely be a convenience rather than a medical necessity that would effect public health.

Emergency Response

Emergency response services, such as search and rescue and wildland fire fighting, would continue to be conducted from the interagency helibase within the airport boundary. Increased scheduled passenger service and general aviation air traffic associated with Alternative 2 could increase the potential for conflicts with emergency response flights. However, the tower should be able to manage all of these activities such that adverse effects on public health and safety would not develop and the impacts would be negligible.

Public Health and Safety on Highways

This analysis used the same assumptions that were used for Alternative 1. As described for that alternative, effects on public health and safety on highways were caused by changes in traffic volumes, as people who wanted to access the area by air drove different distances in automobiles to get from or to their destination airport. Because Alternative 2 would not change the destination airport to and from which people were driving, it would have a negligible effect on highway safety.

Public Health and Safety Relating to Hazardous Materials at the Airport

Under Alternative 2, greater volumes of fuels, lubricants, and solvents would be used at the airport. However, the Jackson Hole Airport Board and fixed-base operator would maintain their record in the safe handling of hazardous materials. Effects of Alternative 2 would be negligible, because of the continued absence of accidents that threaten public health and safety.

Cumulative Impacts

Safety Associated with Flight Operations. Unlike Alternative 1, the action alternative would not result in the displacement of flight operations to other airports. The cumulative effect of this alternative on flight operations, including their safety, at other airports would be negligible.

Community Well-Being. People who wanted medical evacuations using chartered fixed-wing aircraft or emergency medical tickets on scheduled passenger service flights could continue to obtain these services from the Jackson Hole Airport and would not need to travel to other airports to secure flights. Cumulative effects of Alternative 2 on other airports and communities would be negligible.

Emergency Response Services would continue to be provided from the interagency helibase. The cumulative effect of Alternative 2 on the ability of agencies to provide emergency response throughout the region would be negligible.

Public Health and Safety on Highways. Alternative 2 would not result in the need for visitors to the area to fly into more distant airports and drive to Jackson. However, the continuing access to the area by air, and the increases in air traffic that would result over time with the implementation of either action alternative, would have cumulative effects with other factors that are encouraging population growth in the area. Collectively, these would contribute to regional increases in automobile traffic and increases in the numbers of traffic-related injuries and fatalities.

Hazardous Materials. Alternative 2 would not result in the increased use of hazardous materials, such as fuels, lubricants, and solvents, at other airports. The cumulative effect on safety relating to these materials would be negligible.

Conclusions

Indirect, long-term, beneficial effects of minor intensity would result from the ability to pay for upgraded navigational aids, safety equipment and training, and refurbishing of infrastructure such as the runway and taxiway. Alternative 2 would have negligible effects on public health and safety associated with medical evacuations, emergency response, health and safety on highways, and hazardous materials.

Consistent with Section 1.4.7.1 of *Management Policies 2006* (NPS 2006a) and the unacceptable impacts analysis method described earlier under “Methods for Analyzing Impacts,” Alternative 2 would not result in any unacceptable impacts on public health and safety in Grand Teton National Park. The effects on public health and safety under this alternative would not be unacceptable because the potential impacts are anticipated to be negligible or minor in intensity and, thus, would not rise to the level where unacceptable impacts could occur.

SOCIOECONOMICS

IMPACTS OF ALTERNATIVE 2

Analysis

A key consideration in understanding the assessment of this alternative is that it represents a continuation of existing conditions. Nothing would be removed and nothing would be developed because of this alternative. Existing facilities, economic processes, and linkages between the airport and the surrounding communities and governments would remain essentially unchanged. The description of impact intensity is based on comparing the incremental difference between conditions with Alternative 2 to existing conditions.

If the effects were considered in the context of the incremental difference between the Alternative 2 conditions and Alternative 1 conditions (end of scheduled passenger service by 2015 and airport closure in 2033), the impact intensities would generally be moderate and major, depending on the specific economic metric.

Effects on the Economy of Jackson and the Region

Under Alternative 2, the Jackson Hole Airport would function essentially in its current fashion, would remain a key component of the local and regional economy, and would continue to provide

convenient access for visitors to the Jackson area. The overall socioeconomic benefits under this alternative would be indirect, long-term, and minor compared to the economic benefits being generated by current airport operational conditions. The tourist-driven economy would continue to increase at a reasonably consistent rate, which would be tied, in part, to increases in enplanements and operations at the Jackson Hole Airport. Trends in enplanements and operations at the Jackson Hole Airport were shown in Tables 11 and 12, respectively, in the “Park and Airport Operations” section. Projections in operations for 2015 and 2025 were provided in Table 27 in the Alternative 1 analysis.

Local and regional economic features, such as employment, earnings, business volume, and government revenues, would continue to grow at reasonably consistent rates under this alternative. During the 1997 through 2004 period, direct travel spending and associated travel-generated earnings in the Jackson area increased at an annual rate of about 5 percent (Dean Runyan Associates 2005). During the period from 1990 to 2000, the local and regional economy grew at an annual rate that exceeded population growth. With the implementation of Alternative 2, it is likely that these trends would continue, and that the Jackson area and Teton County would experience continued economic growth because of the presence of non-local visitors.

Although the economy as a whole would incur benefits, some potential adverse impacts could result from continued economic growth and expansion. For example:

- Affordable housing would continue to be an issue that could become more acute.
- It could become more difficult for community and public agencies to provide quality, efficient, and convenient services.

Because of growth that is stimulated by the presence of the airport, the town of Jackson and Teton County may have to institute new planning capacity guidelines for the community and individual resorts, and possibly implement some forms of growth control.

- Jackson has almost reached its residential development capacity, with only about 100 residentially zoned lots available for new development. Current development within the town consists primarily of in-fill and redevelopment.
- The supply of land for private development is limited in Teton County, Wyoming, because 97 percent of the land is publicly owned. The *Jackson/Teton County Comprehensive Plan* (2002) noted that “at recent and current trends, approximately 55 percent of the total residential development potential in unincorporated Teton County will have been developed by the year 2020.”

Teton County, Idaho would probably continue to experience growth and development caused by overflow from Teton County, Wyoming. For example, in April 2006, there were more than 30 development applications pending that included proposals for the development of more than 2,500 residential lots in Teton County, Idaho. Cheaper land and less expensive housing in Teton County, Idaho would continue to be the primary driving forces encouraging development.

Effects on Recreation outside Grand Teton National Park

Alternative 2 would result in negligible changes in the choices of vacation destinations made by non-local visitors. Most summer visitors would continue to arrive in the area by highways, and most winter visitors would continue to fly into the Jackson Hole Airport using scheduled passenger service to access the area’s recreation resources and facilities.

The implementation of Alternative 2 would have negligible effects on the economic viability of recreation-related projects in the area because this alternative would represent a continuation of cur-

rent conditions. For example, the Grand Targhee Resort master plan includes a proposal to more than triple its current skier capacity. The Jackson Hole Mountain Resort and Snow King Resort also have master plans that include expansion of current skier capacity and supportive facilities. Within the limitations posed by outside factors (such as the national economy and the current decline in the housing market), these and other recreation providers could continue their long-term planning with the assurance that visitors could continue to enter the area on scheduled passenger service via the Jackson Hole Airport. These resorts would continue to have a strong, positive effect, particularly on the area's winter economy.

Sustainability and growth in employment, personal incomes, and business volume would be expected locally and regionally as a result of operational stability at the Jackson Hole Airport. Long-term, indirect, minor economic benefits would be incurred by summer and winter recreational destinations and activities in the Jackson region.

General Effects on Airport Use and Demand for Airport Services

Airport use and associated local and non-local demand for services would continue, increasing over time as the number of airport operations increased. The Federal Aviation Administration (2006d) predicted annual increases for all categories of air transportation over the planning period. As population and business growth continues within the region, demand for use of the airport also will increase. The effect of implementing Alternative 2 would be long-term, indirect, beneficial, and of minor intensity.

Effects on General Aviation Use of the Airport

Projections of general aviation use of the airport are identical for Alternative 1 and Alternative 2. Therefore, this alternative would have a negligible impact on general aviation use.

Effects on Scheduled Passenger Service Use of the Airport

The Federal Aviation Administration (2006d) predicted that total domestic passenger enplanements on the national level would increase at an average annual rate of 3.2 percent between 2006 and 2017. Actual enplanements at the Jackson Hole Airport during the 10-year period 1999 through 2008 increased from 173,358 to 311,795, an 80 percent increase for the period. It is reasonable, therefore, to expect that enplanements at the Jackson Hole Airport would continue to increase between now and 2025. Factors that could limit growth in enplanements are changes in the airline industry, especially in regard to the number of flights that are economically viable for the airlines, changes in the United States and foreign economies, and the availability of lodging and other hospitality services in the Jackson Hole area.

Continued increases in demand for air service to Jackson would likely prompt carriers to use two approaches to accommodate passengers (The Boyd Group, Inc. 2007a):

- Increase the number of operations by the large air carrier class of planes (for example, Airbus A319 and 320, and Boeing 737 and 757).
- Phase out or diminish the use of commuter aircraft such as the 30-seat Embraer 120 and 37-seat Dash 8-100/200 models in favor of somewhat larger regional aircraft such as the Dash 8 Q400, Bombardier CRJ-700, and Bombardier CRJ-900, which each have seating for 68 to 86 passengers

The increases in enplanements would have long-term, indirect, beneficial impacts of minor intensity that are consistent with current planning.

Effects on Availability and Use of Airport Services by Area Residents

Alternative 2 would have a negligible effect on the existing ability of area residents to conveniently access major cities nationwide through the airport.

Effects on the Airport's Operations Revenues

Alternative 2 would have a negligible impact on the ability of the airport to generate revenues that were sufficient to finance scheduled passenger service and general aviation while maintaining rates that were “fair and reasonable” in conformance with Section 9(b) of the use agreement. There would not be any changes in the ability of the Jackson Hole Airport Board to collect fees directly associated with flight operations, such as landing and ramp fees, or to indirectly generate revenue from such sources as the lease of terminal space and automobile rental operations. Growth in operations revenues would continue in a pattern that was generally consistent with the past increases that were illustrated in Figure 8.

Effects on Federal Aviation Administration Funding

If the Alternative 2 use agreement amendment was signed prior to 2013, the Jackson Hole Airport Board could demonstrate a “satisfactory property interest” of at least 40 years in the land under the airport. This would exceed the statutory requirement of at least 20 years that is included in Title 14, Part 152 of the *Code of Federal Regulations*, Sections 152.103 and 152.3. This would maintain the Jackson Hole Airport Board's current ability to compete with other airports nationwide for Federal Aviation Administration grant funding for capital improvements and would result in a negligible impact.

Effects on Quality of Life Factors in Jackson and the Region

Perceptions of “quality of life” are highly subjective. Therefore, this section summarizes some of the long-term changes associated with Alternative 2 that could alter opinions about the overall quality of life in Jackson and the surrounding area without identifying intensities or classifying them as adverse or beneficial.

Airport-related aircraft sound would continue within Grand Teton National Park and at surrounding locations. Effects were analyzed in the “Natural Soundscape” and “Visitor Use and Experience” sections. Effects on the general quality of life in Jackson and nearby areas would be somewhat controlled by the day-night average sound level thresholds that are included in the use agreement for Grand Teton National Park and by the noise regulations for development on private land close to the airport that are included in the *Jackson/Teton County Comprehensive Plan* (2002).

The visual scene would continue to include the airport and the eye-catching movement of aircraft across the high-value natural landscape of the Teton Range. The potential for noticing aircraft would increase with the future increase in aircraft operations that would occur in association with Alternative 2.

Area traffic would continue to increase year-round. Summer increases primarily would be related to population increases in:

- Full-time and part-time residents who would be drawn to the Jackson and Teton County, Wyoming area by the attractive setting and the easy access to other cities through the airport; and

- Workers who moved to Lincoln County, Wyoming or Teton County, Idaho to provide services to the former group.

Winter traffic increases would result from continued expansion of recreation facilities, particularly ski resorts, which would increase winter visitation to the area and increase the requirements for winter employment, much of which would be drawn from neighboring counties.

Ongoing increases in population throughout the three-county area would result in the continuation of recent patterns of land use change that have involved the conversion of private agricultural lands to residential and commercial developments.

Demand for housing, including second homes, would continue to increase, which would maintain the current trend in rapidly increasing home prices.

Ongoing increases in the housing valuations, numbers of housing units, and sales tax receipts would continue to increase government revenue and the ability to provide community and public services. Demand for such services, including the need to address larger numbers of crimes, also would continue to grow.

Cumulative Impacts

Alternative 2 would maintain the airport and its economic benefits within Teton County, Wyoming. Neighboring counties would continue to serve as bedroom communities for workers who would commute by highway to jobs in the Jackson area.

Alternative 2 would not result in substantial changes in the planning of private parties or government agencies at the local, state, or federal levels. For example:

- The owners of developments such as Teton Village and managers of the area's ski resorts would continue to implement planned expansions based on market conditions but without consideration of whether residents, business representatives, and visitors could readily access the area.
- Jackson and Teton County would continue to implement the comprehensive plan and to prepare periodic updates. However, the updates may require new land use practices and plans ensure sustainable, quality growth.
- The ability to provide affordable housing and efficient, quality public services would continue to be local and regional issues.
- Transportation planning by the states of Wyoming and Idaho would not include any substantial changes in highway travel patterns. Traffic would continue to increase in a manner consistent with recent trends. Transit planning by the National Park Service, Southern Teton Area Rapid Transit, and other entities would continue to consider the Jackson Hole Airport as a potential site for a transit stop.
- The National Park Service, U.S. Forest Service, and other land managers would continue to use current visitation trends for future planning.

Implementation of Alternative 2 would not result in the need to change any of the land use plans, controls, and policies for the Jackson area.

Conversion of private land from agricultural use to residential and commercial uses to support the growing population would continue under Alternative 2.

Conclusions

Continuing all of the current operations at the Jackson Hole Airport at least through 2033 would have long-term, indirect impacts of negligible or minor intensity on the town of Jackson and surrounding counties. Socioeconomic components that would contribute to this condition would include the following:

- For recreation that occurs in the region outside Grand Teton National Park, this alternative would have negligible impacts in the choices of vacation destinations made by non-local visitors and in the economic viability of recreation-related projects such as ski resort expansions. Sustainability and growth, particularly in winter recreation would result in long-term, indirect, minor economic benefits.
- On and off the airport site, continued increases in airport use for scheduled passenger service would have minor, long-term, indirect, beneficial impacts. Effects associated with general aviation would be negligible.
- The continued local availability of scheduled passenger service would have a negligible effect on the ability of area residents to conveniently access major cities nationwide through the airport.
- Impacts on the ability of the airport to generate revenues to finance operations would be negligible.
- Impacts on the ability of the airport to compete for Federal Aviation Administration grant funding for capital improvements would be negligible.
- The effects on quality of life would depend on personal perceptions.

SURFACE AND AIR TRANSPORTATION

Analysis

Community Access by Air Travel

With an extension of the use agreement for two 10-year terms, access to Jackson, Grand Teton National Park, and the area's ski resorts using scheduled passenger service through the Jackson Hole Airport would be assured through the year 2033. (Continued operation of the airport for scheduled passenger service beyond 2033 and for general aviation beyond 2053 would require the future negotiation of additional extensions.) Summer visitors, winter visitors, and residents all could continue to fly into and out of the area. As a result, Alternative 2 would have a negligible effect on community access by air travel.

Levels of Scheduled Passenger Air Service and General Aviation

Jackson Hole Airport. Forecasts for system-wide air travel by the Federal Aviation Administration (2006d) for the 10-year period from 2008 through 2017 predict that:

- Domestic commercial aviation capacity will increase at an annual rate of 3.8 percent;
- Enplanements will increase at an annual rate of 3.2 percent; and
- General aviation hours flown will increase at an annual rate of 3.2 percent.

The Jackson Hole Airport currently has sufficient capacity to handle these predicted operations increases, although more intensive management and some use restrictions may be necessary. Examples that would affect transportation include limitations on parking of automobiles and/or aircraft and the removal of automobile rental operations from the airport (and park).

The increases in air traffic volumes that would occur over the period of the use agreement extension would be readily apparent at the Jackson Hole Airport. However, they would not be “caused” by Alternative 2 (although they could not occur at this facility unless the action alternative was implemented), and they would not differ from the similar increases in air traffic volumes that were occurring throughout the nation’s air traffic system. Therefore, the effects on the alternative on levels of scheduled passenger air service and general aviation would be negligible.

Options for more intensively managing the airport to support the increased operations within the existing boundary could include reducing or eliminating overnight or extended parking for general aviation aircraft. As a result, some aircraft owners and operators, particularly those of locally based aircraft, may have to use alternate locations, such as other public airports or private airstrips. While this would occur at the Jackson Hole Airport only if Alternative 2 was implemented, it would be a cumulative effect and not one “caused” by the action alternative.

Alternate Airports. The Jackson Hole Airport would continue to provide scheduled passenger service at least until 2033 and general aviation service at least until 2053. As a result, there would not be any need for alternate airports to accommodate air traffic that was diverted from the Jackson Hole Airport. Therefore, it would have negligible impacts on other airports in the region.

Highway Use and Traffic

Effects on U.S. Highway 26/89/191. Initially, the increases in air traffic that are predicted by the Federal Aviation Administration (2006d) would result in approximately proportional increases in airport-related automobile traffic on U.S. Highway 26/89/191 between the airport and Jackson. However, some of airport management changes that could be implemented to accommodate increased future levels of aircraft operations and/or increased passenger enplanements would act cumulatively with other factors to indirectly limit airport-related traffic on this road. For example:

- Employees may be encouraged to car-pool by eliminating parking for single-occupancy vehicles. Under more intense management, all employee parking could be eliminated and employees would be transported from transit stops outside the park by contracted van or bus service, or they would ride an expanded public transit system.
- Passenger parking could be eliminated, and passengers could get to the airport by using a shuttle or taxi service, could ride an expanded public transit system, or could be dropped off by another driver.
- Automobile rental operations could be required to move to space outside the airport (and park). The companies probably would provide shuttle services between the airport and their rental lots.

All of these measures are common at airports in major urban areas nationwide, where parking and automobile rentals can be several miles from the terminal.

Collectively, these measures would decrease the use of personal vehicles and increase the use and occupancy of multi-passenger shuttles and buses. As a result, airport-related automobile traffic volumes on U.S. Highway 26/89/191 north of Jackson probably would not change much from current levels, and the long-term impact of Alternative 2 would be negligible.

Other Area Roads. Alternative 2 would not displace traffic or change any traffic patterns. Its effects on other area roads would be negligible.

Public or Commercial Transit

Alternative 2 does not include characteristics that would induce people to change their use of public or commercial transit systems. The impact of this alternative on such systems would be negligible.

Transportation Planning

Highway Planning. Current highway planning for the area anticipates the ongoing operation of the Jackson Hole Airport, with its well-established traffic pattern. Existing plans include accommodation of gradual increases in traffic levels and gradual changes in preferred routes. Alternative 2 would have negligible effects on existing and future planning for highways in the area.

Transit Planning. The park is currently evaluating the feasibility of transit services within the park, including a transit stop at the airport.

Cumulative Impacts

Alternative 2 would allow the Jackson Hole Airport Board to propose, and the U.S. Department of the Interior to consider, future proposals for airport facility development and/or upgrades. Each proposal would be subject to an independent evaluation, and proposals for actions outside the development subzone would have to include National Environmental Policy Act compliance.

The continuing access to the area by air, and the increases in air traffic that would result over time with Alternative 2, would have incremental effects with other factors that are encouraging population growth in the area. Collectively, these would contribute to regional increases in automobile traffic and decreases in the ability of the current roadways to meet capacity demand.

Public or commercial transit, including planning, is an evolving area where substantial changes may occur regardless of whether the use agreement for the Jackson Hole Airport is extended. Increased population and visitation that resulted from Alternative 2 may increase demand for transit, which would have a long-term, beneficial effect on area transportation.

Other cumulative effects were identified in the “Analysis” section. These could only occur because the airport would remain open and fully operational, but would not be “caused” by Alternative 2.

Conclusions

Alternative 2 would have negligible effects on:

- Community access by air travel;
- Levels of scheduled passenger air service and general aviation;
- Air traffic levels at other airports;
- Highway use and traffic on U.S. Highway 26/89/191 and other area roads;
- Use of public or commercial transit systems; and
- Highway planning.

UNACCEPTABLE IMPACTS AND IMPAIRMENT ANALYSIS

As previously described, unacceptable impacts are those that fall short of impairment, but are still not acceptable within a particular park's environment. As defined in Section 8.2 of *Management Policies 2006* (NPS 2006a), unacceptable impacts are those that would:

- Be inconsistent with a park's purposes or values, or
- Impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- Create an unsafe or unhealthful environment for visitors or employees, or
- Diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- Unreasonably interfere with
 - Park programs or activities, or
 - An appropriate use, or
 - The atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, or
 - NPS concessioner or contractor operations or services.

Chapter 1 describes the park's enabling legislation, its purpose and significance, and its fundamental resources and values. It also describes the NPS mission and mission goals, as well as special mandates, laws, policies, and administrative commitments that apply to management of the park. Taking all of these into consideration, neither of the alternatives evaluated in this document would result in unacceptable impacts (and thus would not result in impairment of park resources and values).

- Neither alternative is inconsistent with the park's purposes and values.
- Neither alternative would impede the attainment of the park's desired future conditions for natural and cultural resources.
- The analysis indicated that the alternatives would not adversely affect the health and safety of park visitors or employees. The moderate adverse impacts that were noted for Alternative 1 would apply only to people aboard general aviation aircraft who continued to use the airport after it lost its Part 139 certification.
- Under both alternatives, visitors would continue to have opportunities to enjoy, learn about, or be inspired by park resources and values.
- Implementation of Alternative 1 would result in beneficial impacts on the park's natural soundscape because sounds from aircraft using the airport would decrease somewhat compared to current conditions and would end after 2033. Under Alternative 2, although impacts on the natural soundscapes of the park would be characterized as major, indirect, adverse, and long-term, those impacts would not be unacceptable for the reasons described in the natural soundscape and visitor experience analyses.
- Neither alternative would unreasonably interfere with any NPS concessioner or contractor operations or services.

As described in Chapters 1 and 4, the NPS threshold for considering whether there could be impairment of "the scenery and the natural and historic objects and the wild life therein" for Grand Teton National Park is based on whether "major" (that is, significant) effect would occur. The impact analysis identifies less than major impacts for all natural and cultural resource topics, with the exception of natural soundscapes. For the reasons described in the impact analysis for that topic, neither Alternative 1 nor Alternative 2 would result in impairment of park resources.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

Consideration of long-term impacts and the effects of foreclosing future options are addressed in this section. The term “sustainability” refer to Sections 102(2)(C)(ii), (iv), and (v) of the National Environmental Policy Act (NEPA), not to the more recent context that includes green building standards. The intent of this analysis is to identify sustainable development that meets the needs of the present without compromising the ability of future generations to meet their needs.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are those environmental consequences of an action that cannot be avoided, either by changing the nature of the action or through mitigation if the action is taken. Therefore, they would remain throughout the duration of the action.

The continued intrusion of aircraft sound on the natural soundscape and the quality of the visitor experience for some users of Grand Teton National Park would be an unavoidable adverse impact of either alternative. With the implementation of Alternative 1, the unavoidable adverse impacts on the natural soundscape and the visitor experience would decline and eventually disappear when the airport ceased operation after 2033. With Alternative 2, the unavoidable adverse impacts would continue for the term of the use agreement. These unavoidable impacts would increase or decrease in direct proportion to the number and type of airport aircraft operations that would cross the park.

Alternative 1 would result in an unavoidable, major, long-term, adverse impact on the socioeconomic conditions of Jackson and Teton County with the loss of scheduled passenger air service. With Alternative 2, the airport and its scheduled passenger airline services would be major contributors to the continued economic welfare of Jackson and surrounding areas.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

This determination identifies whether the proposed action would trade the immediate use of the land or resources for any long-term management possibilities, adversely affecting the productivity of park resources. This determination also discloses whether the proposed action or its alternative would be a sustainable action that could continue over the long term without environmental problems (NPS 2001a).

Neither alternative would result in substantial loss of natural resources or ecosystems in the park. The alternatives would involve an administrative action that would not result in alteration or permanent loss of park resources. In the short term, Alternative 2 would continue use the land within the airport boundary for airport operation and maintenance under current conditions, resulting in no change of natural resources within the property and outside the development subzone. In the long term, the airport property could be considered for potential facility development or expansion. Such a proposal would require review and authorization through the NPS environmental and regulatory compliance process. Jackson Hole Airport Board actions that would disturb or alter lands outside the development subzone would require review and approval by the National Park Service. With Alternative 1, there would be an increase in sagebrush steppe productivity as about 128 acres of currently developed area would be returned to biological productivity.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

This determination determines whether the proposed action or its alternative would result in effects or impacts that could not be reversed over the long term or would be permanent. An effect on a resource would be irreversible if the resource could not be reclaimed, restored, or otherwise returned to conditions that existed before the disturbance. An irretrievable commitment of resources involves the effects on resources that, once gone, cannot be replaced or recovered (NPS 2001a).

The decision to renew the airport use agreement would not result in the direct irretrievable or irreversible commitment of resources. However, an indirect effect of renewing the use agreement would be the continued use of the airport by scheduled passenger service aircraft and the irreversible commitment of aviation fuels, gasoline, and other non-renewable fossil fuels. Neither alternative would be expected to result in the irreversible or irretrievable commitment of park resources.

Chapter 5

Consultation and Coordination

HISTORY OF PUBLIC INVOLVEMENT

Internal Scoping

Formal internal scoping meetings were held on October 11, 12, and 13, 2005 with the park Interdisciplinary Team (October 11 to 13, 2005) and with members of the Jackson Hole Airport Board staff (October 12, 2005). Field activities were conducted October 11, 2005 along the Snake River in the park to familiarize team members with the effects that aircraft approaching the airport can have on visitor experience.

The meeting on October 12, 2005 included representatives of the Jackson Hole Airport Board, National Park Service, and the environmental impact statement contractor, Parsons. The goals were to present issues; describe purpose and need concepts; discuss preliminary alternatives; review potential modifications to the use agreement to be addressed by the environmental impact statement; identify preliminary resource concerns; discuss resource topics to be retained, dismissed, and evaluated in detail; and identify issues relating to with extending the airport use agreement. Other scoping involved identification of resource issues by NPS resource and operations personnel.

The meeting on October 13, 2005 was held at Grand Teton National Park and included park staff and the environmental impact statement contractor. The planning meeting involved reviewing and explaining the airport use agreement, identifying primary impact topics, discussing primary resource issues associated with impact topics, reviewing project background, identifying purpose and need, reviewing preliminary alternative action, planning the public scoping notification process, and defining a process for addressing noise abatement plan provisions in the environmental impact statement.

On April 24-25, 2006 a third Interdisciplinary Team meeting was conducted at Grand Teton National Park. This meeting involved park staff, the Intermountain Regional office, and the environmental impact statement contractor, Parsons. Topics addressed included the environmental impact statement status, soundscape impact analysis; cumulative impacts assessment approach; use agreement analysis approach; impact threshold definitions; and review of draft environmental impact statement sections. Since that time, there have been on-going Interdisciplinary Team meetings both internally with the park and in coordination with the Jackson Hole Airport.

Public Scoping

Based on the internal scoping meetings, the National Park Service prepared a newsletter to inform the public of the intent to prepare a National Environmental Policy Act compliance document on the Jackson Hole Airport use agreement extension. The newsletter:

- Described the purpose and need for the use agreement extension;
- Presented a map showing the affected area;

- Outlined three preliminary alternatives, including no action, extend the existing agreement, and update and extend the agreement;
- Identified the impact topics that most likely would be considered in the environmental impact evaluation;
- Provided an overview of the National Environmental Policy Act compliance process; and
- Invited the public to comment on any of the elements presented in the newsletter, or to provide additional information that might be useful to evaluating the use agreement extension.

A press release was issued to inform all federal, state, and local officials and interested organizations that a newsletter soliciting public feedback on the project was published. The newsletter was mailed to all of the individuals and organizations that previously had indicated an interest in the management of Grand Teton National Park. Additional copies were provided at the Craig Thomas Discovery and Visitor Center at Moose and the Teton County public library. It also was posted on the Internet with links from the Grand Teton National Park web site and from the NPS' Planning, Environment, and Public Comment (PEPC) website at <<http://parkplanning.nps.gov>>.

A notice of intent to prepare an environmental assessment for the Jackson Hole Airport use agreement extension was published in the *Federal Register* on December 28, 2005. The notice included much of the same information as the newsletter and provided an Internet address to access the newsletter. Similar information was provided in a public notice provided to the press on November 17, 2005.

The period for providing scoping comments ended on January 9, 2006. As a result of scoping, the National Park Service received 24 responses from other agencies and the public by letter, e-mail, or the Internet. Agencies that provided comments included the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and Wyoming Fish and Game Department. Comments were received from three organizations and 18 unaffiliated individuals.

Collectively, the responses from agencies and the public included approximately 250 individual comments. These were combined with the comments made by NPS staff and representatives from the Jackson Hole Airport Board, and then were sorted based on similar concerns. The comments resulted in the lists of issues that are provided at the ends of the “Methods” sections for each of the impact topics in Chapter 4 and that were systematically analyzed in the impact analysis. Comments that were not included among the issues were addressed in Chapter 1 under the heading “Alternatives or Actions Eliminated from Further Study” with a justification for why they were dismissed.

After looking at preliminary data, the National Park Service determined that its planning process would be better served, and the quality of its decision would be enhanced, by preparation of an environmental impact statement rather than an environmental assessment. The notice of intent to prepare an environmental impact statement was published in the *Federal Register* on August 9, 2007.

Agency Consultation and Coordination

During scoping, the National Park Service sent letters requesting consultation with the U.S. Fish and Wildlife Service and Wyoming Game and Fish Department regarding endangered or threatened species within or near the Jackson Hole Airport site. A letter to the Wyoming state historic preservation officer requested consultation regarding cultural resources. The December 19, 2005 response from the U.S. Fish and Wildlife Service and January 6, 2006 response from the Wyoming Game and Fish Department are provided in Appendix D of this environmental impact statement. A written response was not received from the Wyoming state historic preservation officer. All of these agencies will receive copies of the environmental impact statement with a written request for their comments.

In November 2005, the National Park Service sent copies of the scoping brochure to the local tribes, including the Crow, Northern Arapaho, Northern Cheyenne, Eastern Shoshone, and Shoshone - Bannock Tribes. When the environmental impact statement is released to the public, the National Park Service will send letters to the tribes, formally asking for their input.

Table 29 identifies the agencies, organizations, and experts consulted in the process of preparing this environmental impact statement. Complete information on each of these contacts is provided in the “Bibliography” section.

TABLE 29: AGENCIES, ORGANIZATIONS, AND EXPERTS CONSULTED

Name	Agency or Organization
Tim Sieber	The Boyd Group, Inc.
Roman Piñon	Federal Aviation Administration
Sandra Simmons	Federal Aviation Administration
Tom Cole	Idaho Transportation Department
Doug Johnstone	Jackson Hole Airport
Raymond Bishop	Jackson Hole Airport
Brian Grubb	Jackson, Town of
Shan Burson	National Park Service, Grand Teton National Park
Jennifer Carpenter	National Park Service, Grand Teton National Park
Susan Wolff	National Park Service, Grand Teton National Park
Thomas Wood	Parsons
Virgil Boss	St. Johns Medical Center
Sam Crowe	U.S. Department of Agriculture, Wildlife Services
Mike Jimenez	U.S. Fish and Wildlife Service
Brian T. Kelley	U.S. Fish and Wildlife Service
Matthew Holloran	University of Wyoming
Stacey R. Adams-Gierisch	Wyoming Department of Transportation
Tory Thomas	Wyoming Department of Transportation
Bill Wichers	Wyoming Game and Fish Department

LIST OF PREPARERS

The people identified in Table 30 were primarily responsible for preparing this environmental impact statement. The table includes their expertise, experience, and roles in preparing this document.

TABLE 30: PREPARERS

National Park Service, Grand Teton National Park	
Mary Gibson Scott	Superintendent. B.A. in design, M.A. in architecture and urban planning, and 33 years of experience, including 29 years in national parks. Provided project oversight and review.
Sherman (Shan) L. Burson III	Specialist in acoustics, NPS soundscapes, and ecology. B.A. in ecology; M.S. in ecology, evolution and behavioral biology; and coursework and research toward a Ph.D. in biological sciences-ecology. Has 9 years of soundscape work in the NPS, and 16 years of ecological experience. Member of the interdisciplinary team, reviewed and consulted on soundscape sections.
Jennifer Carpenter	Environmental planning and compliance specialist. B.A. in ecology and evolutionary biology, M.S. in environmental resources and applied ecology, and 11 years of experience. Project manager after April 2007.
Peter Lindstrom	Cartographic technician. B.S. in geology and 5 years of experience. Provided map preparation and analyses to produce acreages from model outputs.
Kathy Mellander	Geographical information system specialist with M.S. in environmental science/hydrology and 20 years of experience. Provided map preparation.
Gary Pollock	Management assistant. BS in zoology with more than 25 years of experience. Provided project management and oversight, and served as airport liaison.
Suzu Schulman	Environmental planning and compliance specialist. B.S. in systems engineering, M.S. in environmental management, and 20 years of experience. Project manager until April 2007.
Parsons	
Donald Beisel	Socioeconomist. B.S. and M.A. degrees in geography and 39 years of experience. Managed economic impacts modeling using the IMPLAN model and interpreted model results. Primary author of the “Socioeconomics” section.
Areg Gharabegian	Noise specialist. B.S. and M.S. degrees in mechanical engineering and 31 years of experience. Managed sound modeling using Integrated Noise Model 6.2a and interpreted model results. Primary author of the “Natural Soundscape” section.
Bruce Snyder	Environmental scientist. B.S. in biology, M.S. in wildlife biology, and 40 years of experience. Project manager for Parsons, oversaw document preparation, and primary author of numerous document sections and subsections.
Janet Snyder	Environmental scientist. B.S. in zoology and 35 years of experience. Primary writer and editor of the environmental impact statement.
Emery Tuttle	Noise specialist. Board-certified member of the Institute of Noise Control Engineering with 31 years of experience. Conducted sound modeling using Integrated Noise Model 6.2a.
Biota Research and Consulting, Inc.	
Thomas Campbell	Wildlife biologist. B.S. and M.S. degrees in wildlife biology with 29 years of professional experience. Managed wildlife biology, threatened and endangered species, and vegetation resource characterization and evaluation.
Jessica Mitchell	National Environmental Policy Act compliance specialist. B.S. degree in geography and environmental systems with 9 years of experience. Conducted wildlife, endangered and threatened species, and vegetation analyses.

LIST OF RECIPIENTS

Elected Officials

U.S. Senator John Barrasso
U.S. Senator Mike Enzi
Congresswoman Cynthia Lummis

Federal Agencies

Advisory Council on Historic Preservation
Greater Yellowstone Ecosystem Interagency
Visitor Center
U.S. Army Corps of Engineers
U.S. Department of Agriculture, Bridger-
Teton National Forest and Grand Targhee
National Forest
U.S. Department of the Interior, Bureau of
Land Management, State Office
U.S. Department of the Interior, Fish and
Wildlife Service, Cheyenne Office
U.S. Department of the Interior, National
Park Service, Intermountain Region Office
U.S. Department of the Interior, National
Park Service, Yellowstone National Park
U.S. Department of the Interior, Office of En-
vironmental Policy and Compliance
U.S. Department of the Interior, U.S. Fish and
Wildlife Service, National Elk Refuge
U.S. Department of Transportation, Federal
Aviation Administration
U.S. Environmental Protection Agency, Re-
gion 8 Office

Affiliated Indian Tribes

Crow Tribal Council
Eastern Shoshone Business Council
Northern Arapahoe Business Council
Northern Cheyenne Business Council
Shoshone-Bannock Tribes

State and Local Agencies

Jackson Hole Airport
Mayor Mark Barron, Town of Jackson
Teton County Board of Commissioners
Teton County Library
Teton County Planning Office
Town of Jackson Administrator
Wyoming Department of Environmental
Quality
Wyoming Department of State Parks and Cul-
tural Resources - State Historic Preserva-
tion Office
Wyoming Department of Transportation
Wyoming Game and Fish Department
Wyoming Office of Federal Land Policy

Other Agencies and Organizations

American Alpine Club/Climbers Ranch
Defenders of the Rockies
Exum Mountain Guides
Grand Teton National Park Foundation
Grand Teton Natural History Association
Greater Yellowstone Coalition
Jackson Hole Conservation Alliance
Jackson Hole Historical Society
Jackson Hole Land Trust
Jackson Hole Mountain Guides
Jackson Hole Mountain Resort
National Parks Conservation Association
National Wildlife Foundation
Northern Rockies Conservation Cooperative
Teton Group of the Sierra Club
Teton Science Schools
The Nature Conservancy
The Wilderness Society
Trout Unlimited
Wild Earth
Wildlife Conservation Society
Wyoming Wildlife Federation
Yellowstone Association

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Chapter 6

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GLOSSARY

Air carrier. For the purposes of this environmental impact statement, and based on classifications provided by The Boyd Group, Inc. (2007a), an air carrier is an aircraft with 100 to 188 passenger seats that transports passengers on routes according to regularly published schedules.

Audible. A sound that can be heard by a person with normal hearing.

Day-night average sound level. The day-night average sound level was defined by the U.S. Environmental Protection Agency (1974) and has been adopted by several federal agencies as the standard for measuring sound. An important factor in evaluating a sound environment is the occurrence of sound events during nighttime. People are normally more sensitive to intrusive sound events at night, and the background sound levels are normally lower at night because of decreased human activity. Therefore a 10-decibel “penalty” is added to sound levels that occur during night hours, between 10:00 P.M. and 7:00 A.M. the following morning. This 10-decibel penalty means that one nighttime sound event is equivalent to 10 daytime events of the same level. The 24-hour average sound level, including this 10-decibel penalty, is known as the day-night average sound level (DNL).

The Federal Aviation Administration’s formal definition is in Title 14, *Code of Federal Regulations*, Part 150, Section 150.7. It states, “Day-night average sound level means the 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 A.M., and between 10 P.M., and midnight, local time.”

Day-night average sound level provides a combined “measure” of factors that can be used to evaluate existing and predicted future conditions on a single-number basis. Other measures, such as maximum sound level or sound exposure level, give valuable supplemental information in analyzing airport sound. Nevertheless, day-night average sound level remains the best single measure for assessing the effects of airport sound on communities, and allows a standardized and effective means for measuring transportation sound (source: Federal Aviation Administration 2006).

Decibels. Sound levels are plotted in units of A-weighted decibels (abbreviated dB, or sometimes dBA), a logarithmic measure of the magnitude of a sound as the average person hears it. The “A-weighting” accounts for the fact that humans do not hear low frequencies and high frequencies as well as they hear middle frequencies, and it corrects for the relative efficiency of the human ear at the different frequencies. A logarithmic measure is used to cover efficiently the wide range of sound magnitudes encountered daily (source: Federal Aviation Administration 2006).

DNL. See Day-night average sound level.

Enplanement. Each enplanement is one individual at an airport getting on an aircraft for a scheduled commercial flight. A round trip from, for example, Denver to Grand Teton National Park involves one enplanement at Denver International Airport and one enplanement at the Jackson Hole Airport.

Equivalent sound level. A method to describe both the number of sound-producing events and the sound exposure level of each. It is the time-average of the total sound energy over a specified period, and is symbolized as L_{eq} . It accounts for all of the sound energy during a sample period, and

provides a single-number descriptor in terms of sound energy per second (source: Federal Aviation Administration 2006).

General aviation. The category of civil aviation that encompasses all aircraft flights other than scheduled airline activity. It includes both private and commercial flights. Examples include, but are not limited to, privately owned aircraft, business jets, news gathering, police, pipeline patrols, emergency medical flights, crop-dusting, rotorcraft, gliding, and sport ballooning (source: [http://en.wikipedia.org/wiki/ General_aviation](http://en.wikipedia.org/wiki/General_aviation)).

Instrument flight rules (IFR). A set of regulations set down by the U.S. Civil Aeronautics Board (in Civil Air Regulations) to govern the operational control of aircraft on instrument flight. IFR is popularly used to describe the weather and/or flight conditions to which these rules apply (source: amsglossary.allenpress.com/glossary/browse). These include weather situations at an airport during which a pilot must use instruments to assist takeoff and landing. IFR conditions for fixed-wing aircraft means the minimum cloud ceiling is greater than 500 feet and less than 1,000 feet and/or visibility is greater than 1 mile and less than 3 miles (source: www.weather.com/glossary/i.html). Compare to visual flight rules (VFR).

Instrumented airport. An airport that has electronic navigation equipment installed that enables pilots to make a landing approach using instruments. However, not all instrumented airports have instrument approaches that have been approved by the Federal Aviation Administration.

Ldn. See Day-night average sound level.

Lek. A location where males of a species (in Grand Teton National Park, the greater sage-grouse) gather for competitive [mating](#) display. The term also applies to the gathering. The lek is used / occurs daily before and during the breeding season by the same group of males, each defending a small territory. They spar with their neighbors or put on extravagant visual or aural displays, such as mating dances, plumage displays, and/or vocal challenges (Wikipedia 2009).

Lmax. This sound level is defined by the U.S. Environmental Protection Agency (1974) as the maximum A-weighted sound level for a given time interval or event. In relation to aircraft sound, it is the peak sound level reached by a single aircraft event (San Francisco International Airport 2006). It provides no information on the duration (length) of the maximum sound level.

Natural Ambient Sound. The natural ambient sound level (natural quiet) of a park is composed of the sound conditions which exist in the absence of any human-produced sound.

Noise. Unwanted sound that disturbs our routine activities or peace and quiet, and perhaps causes a feeling of annoyance (source: Federal Aviation Administration 2006).

Operation. A takeoff or a landing. Every flight requires two operations, a takeoff and a landing (source: Chicago, City of, Department of Aviation 2006).

Percent-Time Audible. The percent of the total daytime period (7 A.M. to 10 P.M.) that the sound from aircraft that use the Jackson Hole Airport is audible.

Regional carrier. For the purposes of this environmental impact statement, and based on classifications provided by The Boyd Group, Inc. (2007a), a regional carrier is an aircraft with 30 to 86 passenger seats that transports passengers on routes according to regularly published schedules.

Sound exposure level. The sound exposure level (SEL) is the total sound energy of a single sound event that takes into account both its intensity and duration. Sound exposure level is the sound level that would be experienced if all of the sound energy of a sound event occurred in one second. This normalization to a duration of one second allows the direct comparison of sounds of different durations (source: Federal Aviation Administration 2006).

State I, Stage II, and Stage III aircraft. In 1977, the Federal Aviation Administration designated four stages of aircraft, based on sound level. For example, the Boeing 707 is a Stage I aircraft, the noisiest stage; the Boeing 727 and DC-9 are somewhat quieter Stage II planes; and the Boeing 767 is a relatively muted Stage III aircraft (source: <http://www.perc.org/perc.php?subsection=5&id=413>). Stage III aircraft, in general, are 10 decibels quieter than Stage II aircraft, which represents a halving of perceived sound. All aircraft greater than 75,000 pounds that were manufactured after January 1, 2000 had to meet Stage III standards (source: http://www.massport.com/logan/airpo_noise_gloss.html). With support from Congressional legislation, the Jackson Hole Airport banned the use of Stage II aircraft on June 28, 2004.

Time Above 60 Decibels. The time above a specified level (TA) metric describes the total number of minutes that instantaneous sound levels from an aircraft are above a given threshold. In this case, the threshold is 60 dBA, the sound level of a normal conversation, that would be abbreviated as TA60.

Time Above Natural Ambient. The time above a specified level (TA) metric describes the total number of minutes that instantaneous sound levels from an aircraft are above a given threshold. In this case, the threshold is the natural ambient sound that would be abbreviated as TALnat.

Visual flight rules (VFR). A set of flight operating rules that assumes that the visibility is good enough to fly the airplane with visual reference to the horizon and to approach an airport by visual reference only (source: www.k-online.com/~esquared/alaska/aviation.htm). VFR criteria include a ceiling greater than 3,000 feet and visibility greater than 5 miles (source: www.weather.com/glossary/i.html). (Marginal visual flight rules or MVFR criteria include a ceiling between 1,000 and 3,000 feet and/or 3 to 5 miles visibility.) Compare to instrument flight rules (IFR).

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