National Park Service
U.S. Department of the Interior

Grand Teton National Park
Wyoming

Fire Management Plan
Environmental Assessment

October 2004

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Grand Teton National Park, Wyoming

Summary

The National Park Service (NPS) is preparing a revised Fire Management Plan (FMP) for Grand Teton National Park (GTNP) and John D. Rockefeller, Jr. Memorial Parkway, collectively referred to as GTNP. The current 1991 FMP (and 2003 amendment) is primarily a risk-based program that allows for wildland fire use, prescribed burns, and suppression response strategies organized by Fire Management Units (FMUs). The prescribed fire program is permitted throughout the park for fuel treatment and limited resource management objectives. Although the GTNP Fire Management Plan calls for fuel reduction around developed areas by machine, hand, or through prescribed burning, specific implementation information is found in a separate 1991 *Hazard Fuels Management Plan*. The *Hazard Fuels Management Plan* addresses 5 key areas where mechanical treatments will take place but does not address all developed areas, inholdings, and adjacent properties nor does it address collaborative project planning with interagency partners.

In addition to there being a Congressional mandate to update and revise fire management plans, a revised FMP is needed to provide GTNP with the flexibility to manage fire in accordance with 1995 and 2001 Federal Fire Policy Reviews and the related guidelines in NPS Director's Order #18: *Wildland Fire Management*, and NPS *Management Policies 2001*. These policies and directives require an approved FMP in order to use resource benefits as a primary consideration influencing the selection of wildland fire management strategies. A revised FMP would continue to allow GTNP to counter the effects of past fire exclusion and perpetuate fire in fire-dependent ecosystems while protecting life, property and resources from unwanted fire. The new FMP would increase opportunities for wildland fire use, expand opportunities under a multi-year treatment schedule for using prescribed fire to meet resource objectives, and improve fuel reduction (mechanical fuel reduction and prescribed burning) treatments to enhance defensibility around developments, private lands, and other resources at risk.

Furthermore, a need exists to enhance the management of fire on an ecosystem level, further integrating GTNP with adjacent lands and the plans, resources and risks associated with other jurisdictions (private, county, state, regional, and federal). In the future, a revised FMP may serve as the park's portion of a joint fire management plan with the Bridger-Teton National Forest. Where the U.S. Forest Service and National Park Service lands share common boundaries, similar fire management objectives are met through joint operations and shared resources where possible.

Proposed revisions to the FMP include: (1) integrating the previously separate Hazard Fuels Management Plan, (2) modifying the existing FMU boundaries and corresponding management strategies, (3) expanding wildland fire use, (4) adopting an adaptive management decision-making process to select, develop, implement, and monitor planned events and to determine appropriate management strategies for unplanned events, and (5) defining current and desired future conditions (DFCs) for Wildland Urban Interface (WUI) areas and all park vegetation types, within an adaptive framework that provides for modifying these DFCs as new information becomes available.

Three alternatives were identified for this EA: **Alternative A** – a no-action alternative, **Alternative B** – an alternative with multiple strategies and adaptive management (preferred alternative), and **Alternative C** – an alternative with fewer strategies (no prescribed fire) and adaptive management. These alternatives were developed based on program goals and objectives; internal and external scoping; policy guidance from existing park plans; policy guidance from the National Park Service; the 1995 and 2001 Federal Fire Policy; the *National Fire Plan*; the NPS *Wildland Fire Management Strategic Plan 2003-2008*, research, monitoring and experience from GTNP's fire management program.

Alternative A: No Action

The "No Action" alternative is defined as the continuation of the current fire management program. Under the 1991 FMP EA, tools available to fire management staff would include prescribed fire, wildland fire use, and suppression; however, hazard fuels treatment projects require separate NEPA analyses. Under current management conditions, the acreage of prescribed fires would remain similar to the average range, as would the number of expected wildland fire use actions. Hazard fuel treatments would continue, under separate planning documents, at current levels using a 4-year treatment schedule, then transition primarily to a maintenance cycle. Existing FMUs and respective response strategies would not be revised.

Resource objectives would continue to be defined in general vegetative terms and focused on sagebrush/grassland and aspen fuel types (FMP 1991, page 54). Current resource objectives include reducing sagebrush cover and encouraging grasses and aspen regeneration. Vegetation monitoring protocols would continue to follow the *Grand Teton National Park Plan for Fire Effects Monitoring* (1996).

Alternative B: Multiple Strategies (Preferred Alternative)

Alternative B is fundamentally similar to Alternative A in that fire management staff would have multiple tools available (i.e., prescribed fire, mechanical treatments, wildland fire use and suppression) to manage fire and planned actions would, on average, treat a similar number of acres. Mechanical treatment acres are expected to remain between 60-100 acres/year for the next 4-6 years. The prescribed fire trend is predicted to be close to the current annual 10-year average (1,486 acres).

In contrast, hazard fuels treatments would be incorporated into the revised FMP and an adaptive management process would be adopted to formally guide interdisciplinary fire management decisions. FMU boundaries would be modified and strategies would change to allow wildland fire use within all zones. The Suppression Zone would be renamed the Protection Zone. Wildland fire use would be expanded as a result of the ability to use fire throughout the park, adaptive management, and enhanced flexibility to use prescribed and mechanical treatments as tools to reduce risks associated with wildland fire use. An adaptive fire management process would allow fire within the ecosystem based upon broader, more clearly defined resource objectives.

New resource objectives would be formulated to address the primary goal of maintaining fire's active role in ecosystem function. These objectives would be established by vegetation type rather than by FMU. DFCs would be developed for these vegetation types as well as for WUI areas. Vegetation types would include: sagebrush steppe, persistent lodgepole pine, mixed conifer, Douglas-fir, aspen, high elevation mixed conifer, wetland/riparian, and current or former agriculture. Appendix F contains detailed information on vegetation types to be monitored, DFCs, fire return intervals, and management considerations. DFCs would be subject to modification as new information becomes available and would be considered when developing annual prescribed fire and hazardous fuels reduction projects, as well as when making long-range decisions on the management of unplanned events.

Alternative C: Limited Strategies (No Prescribed Fire)

Tools available to fire management staff under Alternative C would include mechanical treatments, wildland fire use and suppression. Prescribed fire would not be used as a management tool, except as a means for debris disposal following mechanical fuel reduction treatments. Mechanical treatments to reduce hazard fuels would increase to compensate for the absence of prescribed fire, wildland fire use would be expanded and new resource objectives would be established based on vegetation type.

Similar to Alternative B, hazard fuels treatments would be incorporated into the revised FMP and an adaptive management process would be adopted to formally guide fire management or more clearly define vegetation objectives. FMU boundaries would be modified and strategies would change by allowing wildland fire use within all zones. The number of wildland fire use fires is expected to increase, ideally allowing between 30-60% natural fire starts to burn. However, wildland fire use is expected to be lower than Alternative B without the ability to use prescribed fire to reduce the risks associated with wildland fire use.

Resource objectives under this alternative would remain the same as those described in Alternative B. These resource objectives would be considered when developing annual mechanical treatment projects as well as when making long-range decisions on the management of unplanned events. With no prescribed fire, the selection of a wildland fire use strategy as a response to a natural fire start would be the only tool available for managing fire on the landscape for resource objectives.

Adaptive Management

The adaptive management process is a multi-year decision-making framework for developing planned events (prescribed fire and mechanical treatment) and determining suppression strategies for unplanned events based on expanded resource objectives. Adaptive management, in compliance with the NEPA process and in accordance with guidelines provided by the Council on Environmental Quality (CEQ 1997, 2003), incorporates the elements “predict, mitigate, implement, monitor, and adapt”. In compliance with Director’s Order #12, adaptive management is used to (1) consider recent fire history, project history, current research, and fire effects monitoring, (2) hold annual public workshops to involve the public, regulators and affected agencies, (3) implement future environmental compliance work such as Biological Assessments and cultural resource surveys, (4) integrate avoidance and mitigation measures to minimize environmental impacts, (5) monitor the effects of fire activities, and (6) re-assess program strategies, decisions and objectives based on learned results from prior actions. Any mechanical and/or prescribed fire project that the fire management committee concludes will have measurable impacts not analyzed in this programmatic EA would require additional NEPA analysis.

Environmental Consequences

The impact of the preferred alternative (Alternative B) on vegetation would be beneficial, moderate, and either short-term or long-term, depending upon the direction of future management plans. Adverese and beneficial, negligible to moderate, and short-term and long-term impacts are anticipated for general wildlife, and USFWS determinations for threatened, and endangered species would not exceed “May affect but not likely to adversely affect.” The impact of the preferred alternative on plant species of special concern would be adverse, negligible to minor, and short-term or long-term, depending upon the species. Impacts to wetlands, water resources, and soils would be adverse and beneficial, minor to moderate, and short-term and long-term. Impacts to wilderness would be adverse, negligible to minor and short-term and long-term. Impacts to air quality/visibility would be adverse, minor to moderate, and short-term. Impacts to archaeological resources would be adverse, negligible to minor, and short-term. There would be negligible impacts to historic structures and beneficial, minor, and long-term impacts to cultural landscapes. The impact of the preferred alternative on firefighter and public safety and park neighbors would be adverse and be beneficial, minor and short-term and long-term.

The impacts on resources analyzed do not vary considerably among the alternatives. Alternatives B and C are generally favored over Alternative A when considering extended long-term effects of limiting or expanding wildland fire use.

Public Comment

This environmental assessment is available on the Grand Teton National Park Internet Web site at http://www.nps.gov/grte/plans/planning.htm and is being distributed for public and agency review and comment for a period of 30 days in accordance with the National Environmental Policy Act. If you wish to comment on the environmental assessment, you may mail comments to the name and address below, or e-mail them to: GRTE_planning@nps.gov. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please send comments by November 3, 2004 to:

Superintendent
Attn: Fire Management Plan EA
Grand Teton National Park
PO Drawer 170
Moose, Wyoming 83012

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CHAPTER 1: PURPOSE AND NEED

1.1 PROJECT AREA DESCRIPTION AND LOCATION

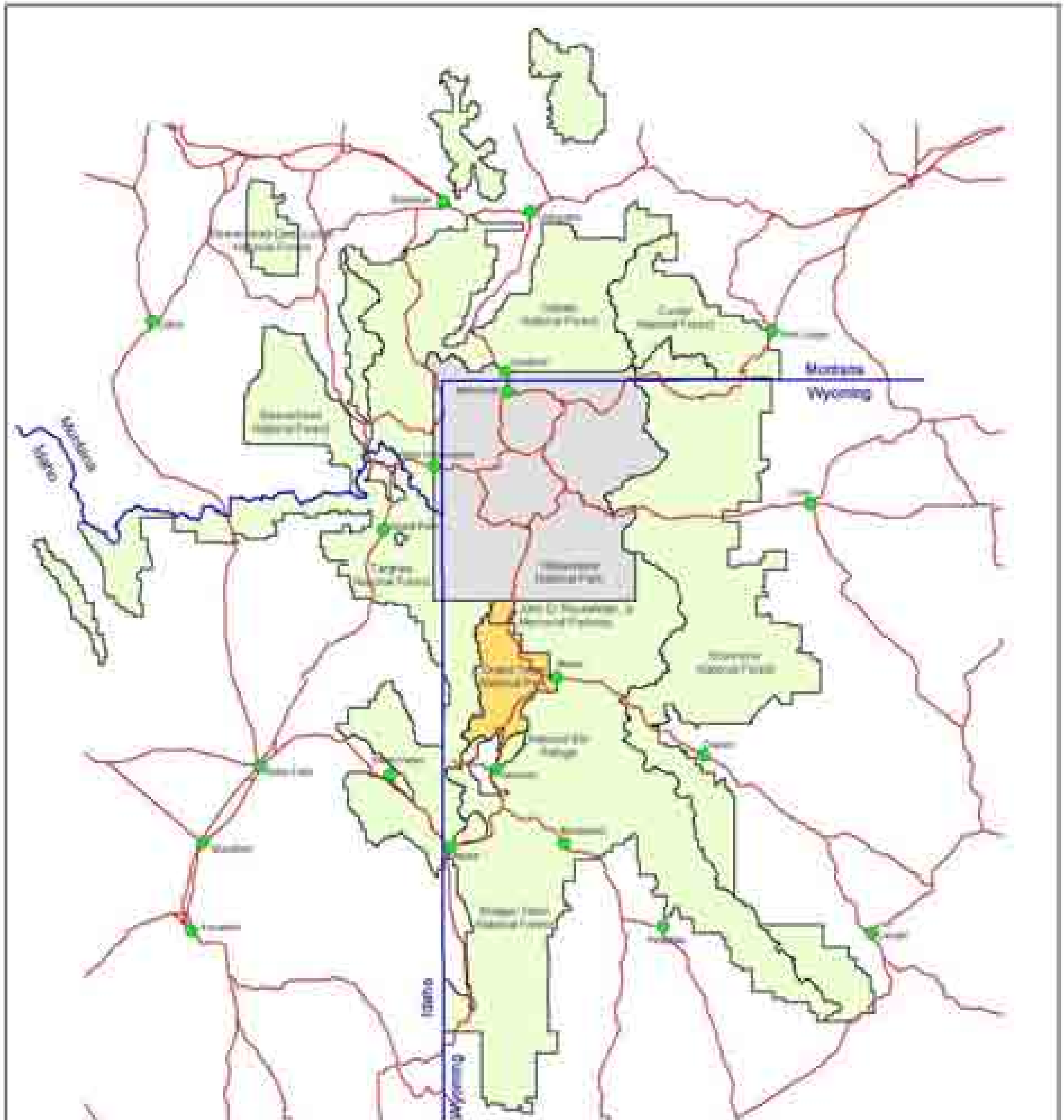
Grand Teton National Park and John D. Rockefeller, Jr. Memorial Parkway are located in the northwest corner of Wyoming, just south of Yellowstone National Park (YNP) (Fig. 1.2). Grand Teton National Park encompasses approximately 300,000 acres of land, with 135,680 acres of the park recommended for inclusion in the National Wilderness Preservation System and an additional 20,320 acres identified as potential wilderness. The John D. Rockefeller, Jr. Memorial Parkway comprises about 23,700 acres of land between the northern boundary of Grand Teton National Park and the southern boundary of YNP. For the purposes of this document, references to "GTNP" or the "park" hereafter refer to both Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway.

The project area, in addition to being located just south of YNP, is also in proximity to numerous other public lands, including several large National Forests and their associated wilderness areas. Together, these lands include 18 million acres called the Greater Yellowstone Area (GYA), which is considered one of the few remaining intact temperate ecosystems on earth (Greater Yellowstone Coalition 2004). The GYA is managed as an ecological unit through cooperative agreements and interagency coordination, which recognize the different mandates of the land management agencies.

1.2 CURRENT FIRE MANAGEMENT PROGRAM OVERVIEW

The fire management program at GTNP is currently based on the 1991 *Wildland Fire Management Plan*, a plan that allows fire as a natural process on the landscape. Under the current FMP, the park is divided into 3 zones that allow varying management strategies, but the over-riding goal of all zones is to protect life, resources, and property. FMUs are depicted in Figure 2.3 and described in detail in Section 2.3. In the Wildland Fire Use Zone, which primarily encompasses the backcountry, management of natural ignitions for resource benefits is given primary consideration. The Conditional Use Zone is primarily comprised of undeveloped portions of the park and management responses consider developments and fine flashy fuels in sage and grassland. The Suppression Zone is delineated to protect developed areas and appropriate management responses are suppression-oriented. All human-caused fire starts, regardless of zone or location, have a suppression-oriented response. The prescribed fire program is permitted throughout the park for fuel treatment and limited resource management objectives.

Although the GTNP Fire Management Plan calls for fuel reduction around developed areas by machine, hand, or through prescribed burning, specific implementation information is found in the Hazard Fuels Management Plan, 1991. Like most fire management plans, the current FMP calls for aggressive suppression of all fires in and around developed areas. Planning for adequate suppression efforts cannot be ignored, therefore management of hazardous fuels to create a defensible space around developments is critical for effective protection of life and property in the wildland/development interface. The Hazard Fuels Management Plan addresses 5 key areas where mechanical treatments will take place but does not address all developed areas, inholdings, and adjacent properties nor does it address collaborative project planning with interagency partners.



Grand Teton National Park,
Teton County, Wyoming

Figure 1.2
Project Vicinity Map

Scale 1:200,000

In July 2003, the 1991 FMP was amended in accordance with direction from National Park Service Directors Order #18 and subsequent Reference Manual # 18: *Wildland Fire Management*. This amendment updated the plan to reflect terminology changes, interagency policy guidance, annual local agreements established with Bridger-Teton National Forest (BTNF), and annual operating plans with BTNF and Teton County. In addition, the 2003 amendments emphasize that all prescribed fires must have an approved FMP prior to implementation, according to guidelines established in Reference Manual #18 (RM-18).

The fire management program as a whole is directed to "understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the park and to allow this evolution of natural processes and species to continue, minimally influenced by human actions" (NPS 2001).

1.3 PURPOSE AND NEED FOR FMP REVISION

The park continues to recognize the role that fire plays in a balanced natural resource management program. Accordingly, the purpose of this federal action, under the authority of Director's Order #18, is to prepare and implement an updated long-range Wildland Fire Management Plan. The Fire Management Plan would provide direction to a program that uses the benefits of fire to achieve desired conditions while protecting park values and those on adjoining lands into the future. Further, this plan is consistent with the Grand Teton National Park Resource Management Plan (1986, 1995), replaces the current Fire Management Plan (1991), updates existing goals and objectives, and redefines strategies and actions to accomplish them under the general guidance provided by the park's General Management Plan (1976). The fire management program, carefully guided by resource management goals, should protect cultural resources and allow natural processes to perpetuate.

A revised FMP is needed to provide GTNP with the flexibility to manage fire in accordance with the NPS *Wildland Fire Management Strategic Plan 2003-2008*, 1995 and 2001 Federal Fire Policy and the related guidelines in NPS Director's Order #18: *Wildland Fire Management*, and NPS *Management Policies 2001*. These policies and directives, in addition to a Congressional mandate, require an approved FMP in order to use resource benefit as a primary consideration influencing the selection of fire management strategies. The decision-making process includes specifically managing wildland fire using best available technology to restore, preserve and maintain ecosystems and the use of resource information gained through inventory and monitoring to evaluate and improve the program.

The need for a new FMP is based not only on policy, but also on scientific study, monitoring and vegetation mapping, which are collectively contributing to a growing understanding of successional trends in the park. Fire history information indicates that fire is one of the primary drivers of vegetation dynamics in this region. Fires ranged in severity and size based on vegetation, location, and environmental conditions. Research indicates that prior to the arrival of Europeans to the area, small fires were frequent and widespread in both forested and non-forested vegetation types, while large crown-fires occurred in forested types at approximately 100-300 year intervals and more frequently in non-forested types. This is the reference condition that the park is striving to preserve or restore in some areas.

Since the initiation of fire suppression in the area, the forest mosaic has been aging more uniformly, and becoming less diverse from a spatial and species composition standpoint. Fire suppression reduces forest vigor and allows increased windfall and damage from insect pests such as mountain pine beetle (*Dendroctonus ponderosae*) and fungal infestations such as root rot (e.g., *Fomes* spp.) and blister rust (*Chronartium ribicola*). For example, excluding fire from the landscape concurrent with heavy mortality and a rapidly declining seed source in the whitebark pine type increases the threat to the continued existence of the species. Whitebark pine functions as a keystone species of the upper subalpine ecosystem by protecting watersheds, promoting post-fire forest regeneration and providing a valuable food source for wildlife (Tomback et al. 2001).

Periodic disturbances such as fire contribute to ecological diversity because moderate levels of disturbance provide opportunities for a larger number of species (Connell 1978). Mixed-severity natural fires, which include a range of fire sizes and intensities, serve to maintain a diversity of vegetation communities, species, age-classes, and wildlife habitats, as well as periodically decreasing fuel loading or providing fuel breaks. Both Brown (1975) and Kilgore (1981) noted that if stability is defined in terms of resistance to change, then fire cycles are actually a stabilizing influence on a broad scale because they result in replacement communities of the same type. Botkin and Sobel (1975) discussed limitations of this notion and proposed instead that fluctuations over time are inevitable and may be considered stable if they are limited in magnitude or geographically bounded.

Fire history records show that 16 fires greater than 100 acres have occurred in the park in the past 30 years. Although the park averages seven natural fire starts per year only two fires on average are managed as wildland fire use, with an average annual burn area of 121 average acres. Only 24 fires averaging 23 acres (totaling 547 acres) have been managed in the past 15 years. Specific fire history information and fire start information can be found in Appendix C. Fires have not been permitted to burn as much as would have occurred naturally in the past and, although not entirely excluded, current and future data indicate that fire reintroduction is warranted in some areas. If the trend of limited fire use continues, vegetation dynamics will slowly change and the natural role of fire in this ecosystem would not be maintained.

An updated FMP will provide GTNP with a means to continue to counter the effects of past fire exclusion and perpetuate fire in a fire-dependent ecosystem while simultaneously protecting life, property and resources from unwanted fire. Furthermore, a need exists to enhance fire management on an ecosystem level, further integrating GTNP with adjacent lands and the plans, resources, and risks associated with other jurisdictions (private, county, state, regional, and federal). In the future, a revised FMP may serve as the park's portion of a joint fire management plan with BTNF. Where the U.S. Forest Service and National Park Service lands share a common boundary, similar fire management objectives are met through joint operations and shared resources where possible.

This environmental assessment was prepared in accordance with the National Environmental Policy Act (1969) and evaluates the potential effects of a revised fire management program on a variety of impact topic areas. It is intended to facilitate sound decision-making based on the current and best understanding of direct and indirect, short-term and long-term, and cumulative impacts of the proposal to determine whether an environmental impact statement is required.

1.4 SCOPE OF PLAN

The programmatic EA for the FMP is a comprehensive environmental analysis of all potential impacts or effects to the park's natural, cultural and social resource as a result of fire management activities planned for the next 10-20 years. This document will serve to fulfill the requirements of NEPA for up to 20 years, provided that: 1) no major policy changes occur, 2) considerable scientific research does not indicate a fire management strategy contrary to the one outlined in the new FMP, or 3) significant changes to the park's resources do not occur. Because the effects of fire on the ecosystem generally range anywhere from 30-300 years out, fire management philosophy and strategy are not likely to significantly change over a period of ten years, especially with the use of the adaptive management process to adjust the program as changes occur. Consequently, the FMP and FMP EA are likely to remain effective for up to or even greater than 20 years. Notwithstanding, the NEPA process is likely to change within the next 20 years and may warrant updating the FMP EA before the FMP requires an update.

This EA focuses on evaluating fire management actions and strategies relevant to proposed FMP revisions. Accordingly, differences among the alternatives include: (1) integrating the previously separate Hazard Fuels Management Plan, (2) modifying the existing FMU boundaries and corresponding management strategies, (3) expanding wildland fire use, (4) adopting an adaptive management decision-making process to select, develop, implement, and monitor planned events and to determine appropriate management strategies for unplanned events, and (5) defining current and desired future conditions (DFCs) for Wildland Urban Interface (WUI) areas and all park vegetation types, within an adaptive framework that provides for modifying these DFCs as new information becomes available.

Detailed elements of the revised FMP, such as implementation plans, a fire monitoring plan, and fire research needs, are part of the actual FMP development and are prepared according to the outline requirements provided in Chapter 4 of RM-18.

1.5 FIRE MANAGEMENT GOALS

Land managers and researchers are often faced with the complex task of perpetuating “natural environments”. When faced with managing or restoring natural systems, land managers need to understand the elements of this system. What is the spatial and temporal context and how do contemporary conditions differ from those of the past? Central to this question is the need for some type of reference or view of the past, when conditions were believed to be more desirable. For the purpose of this EA, reference conditions are described as the ecosystem elements found within a defined area over a specific period of time. Reference conditions tend to describe elements of a landscape prior to Euro-American settlement. The term “reference condition” is used interchangeably with “historic range of variability”. This idea acknowledges that ecosystems are dynamic and complex, while still allowing ecologists the opportunity to describe conditions or states. A historic range of variability will change over time and space, but within a range that keeps the system recognizable.

Many Native Americans burned to promote or protect certain resources. Although some documentation shows that Native Americans intentionally set fires in the GYA, little information exists as to how extensive or intensive the burns were or even the variability of their land use. Therefore, the reference condition used in this EA is the pre-settlement condition of vegetation. These reference conditions vary in how much they differ from present conditions and desired future conditions based on vegetation type and location. For most areas, desired future conditions strive to mimic reference conditions. However, there are developed areas and cultural landscapes where the NPS does not seek to restore reference conditions, primarily because they now represent wildland urban interfaces or cultural landscapes requiring protection. In contrast, most backcountry areas in GTNP were not settled and their current conditions are closer to their reference condition and their desired future condition. The desired future condition or goal in these backcountry areas would be to maintain reference conditions.

Grand Teton National Park Fire Management Program goals are designed to achieve desired future conditions related to the natural role of fire; the protection of resources, life, and property; enhancement of interagency cooperation and community involvement; the use of adaptive management for continuous improvement; and the effective management of personnel and resources. Several objectives are provided to achieve five primary program goals:

1. Implement a fire program that allows the natural process of fire to persist in GTNP.

- Manage natural fire as a dynamic ecosystem process to the maximum extent feasible.
- Support the park by providing fire management tools to restore and perpetuate a mosaic of climax, sub-climax and seral vegetation.

- Mimic natural fire regimes as directed by resource management objectives.
- Maintain a natural mosaic of climax, sub-climax, and seral forest vegetation, thereby reducing the probability of unusually large-scale disturbances such as disease and insect epidemics or large, high severity fires
- Manage fires using the full range of options to protect, restore, or maintain resources and developments within and adjacent to the park.
- Manage fire in the wilderness to perpetuate wilderness values and character by following the minimum requirement and tool concept established in the 1964 Wilderness Act.

2. **Protect life, property and other resources from unwanted fire effects.**

- Ensure that firefighter and public safety is the first priority in every fire management action.
- Manage an efficient wildland fire preparedness organization according to established plans, protocols, and guidelines to prevent, detect, and take effective management action on wildland fires.
- Use pre-treatment and suppression-oriented actions to reduce risk from fire to specially identified resources, private lands, developed areas and infrastructure.
- Simulate the effects of natural fires and/or reduce fuel loading in areas of the park where a fire escape may threaten lives and/or property of employees, visitors and neighbors.

3. **Enhance the interagency fire management program through collaboration and coordination to include public involvement and civic engagement.**

- Maintain an interagency fire program that provides for safe, cost effective, efficient and ecologically sound fire management addressing resource goals and reducing threats to life, property and other resource values across boundaries.
- Foster understanding, appreciation and support among visitors and neighbors for the wildland fire, prescribed fire, fuels, and aviation programs through park interpretation, public information, media, and inviting the media, private landowners, public officials, park visitors, etc., to observe fire management operations.
- Conduct educational outreach programs.
- Conduct a fire prevention program in cooperation with other agencies to reduce risks to human life, physical facilities and cultural resources; decrease modification of park ecosystems by excessive human-caused wildland fires.

4. **Use adaptive management to continually improve the fire management program.**

- Improve fire prescriptions for fire (through fire effects monitoring) that will be safe, capable of restoring and maintaining park ecosystems and meet resource objectives.
- Improve prescriptions for fuels management activities through monitoring.
- Ensure fire management program activities are integrated into land and resource management planning alternatives, goals, and objectives to fully complement one another in support of an ecological approach to resource management.
- Insure the program is responsive to input from interagency partners and the public.

5. **Manage personnel and financial resources effectively.**

- Implement a safe and objectives-oriented fire management program by identifying fire program skill requirements and responsibilities; actively recruiting, retaining, and training staff; and maintaining qualifications and developing employees through assignments.

- Effectively manage fire actions commensurate with values at risk and meet incident objectives while employing fiscal responsibility.
- Reduce unnecessary financial burden to the park by managing fires using the full range of options to protect, enhance, and restore resources and developments within and adjacent to the park.

1.6 SCOPING AND RELEVANT ISSUES

1.6.1 Internal Scoping

The GTNP Planning Office, in cooperation with the Fire Management Office, conducted two internal scoping meetings, one in the north district and one in the south district of the park, in order to gather input from park employees, interdisciplinary team members and other agencies. These meetings were held from 8:30am to 3:30pm on February 5 and 6, 2003. Representatives from five different local, state and federal agencies participated in the internal scoping meetings. During these meetings, attendees outlined the purpose and need; management goals and objectives; issues, concerns, and constraints; preliminary alternatives; and cumulative impacts.

During the months of March and April 2003, several interdisciplinary team meetings were held to address the development of feasible alternatives, address public comment and concern on specific resource topic issues, and work with regulatory agencies such as the USFWS to understand the potential impacts associated with the preliminary alternatives.

1.6.2 Public and Agency Involvement

The purpose of the public scoping process was to identify issues and concerns related to the project and to identify the range of issues and alternatives to be addressed in the EA. In preparation for public scoping, a mailing list of approximately 200 agencies, interested organizations, and individuals was compiled (Chapter 5 contains an abbreviated mailing list). A scoping notice was prepared in April 2003 and mailed to those on the list, with remaining copies distributed to GTNP visitors and other interested parties. On April 14, 2003, GTNP issued a press release announcing the initiation of the scoping period for the project and the date for the public scoping open house. Scoping flyers were posted in various locations in Jackson, Wilson, Moose, Kelly, and Moran. An advertisement was published in the Jackson Hole News and Daily Guide three days prior to the open house and the open house was announced on a local radio station.

The scoping notice included a brief description of the purpose and need, the actions proposed, the alternatives considered to date, the EA completion process, and a solicitation for public participation in a scheduled open house. The notice also contained a one-page response form for readers to complete and return to the National Park Service at GTNP. The response forms were designed so that respondents could provide comments on the project and to ensure that future mailings were sent to anyone indicating an interest in the project.

The public scoping open house was held on April 24, 2003, in Jackson, Wyoming. The open house consisted of an open forum and exhibits pertaining to the FMP. Representatives from the NPS, BTNF, and the Jackson/Teton County Fire Department were present to answer questions and solicit comments on the project. A total of 13 individuals attended the workshop. Interested parties were asked to submit written comments by May 4, 2003.

The Office of the Governor of Wyoming and the Wyoming Game and Fish Department (WGFD) provided formal written responses indicating support for the proposed action. They stated that they have not identified any major wildlife or aquatic issues concerning the proposed action. The Wyoming State Historic Preservation Office (SHPO) also provided written feedback regarding the likelihood of the project to not adversely affect cultural resources. The Shoshone-Bannock Heritage Tribal Office raised five issues that they felt needed to be addressed. Agency correspondence is provided in Appendix B. Responses to how these issues are addressed are below.

1.6.3 Relevant Scoping Issues

Public comments were organized into 4 separate issues. The NPS has addressed these issues in one of two ways: (1) they were analyzed in detail through the development of an alternative or as part of an impact topic; or (2) they were not analyzed in detail and the reader is provided with a rationale for its dismissal.

The first issue addresses suggestions that the Park consider the possibility of selling firewood rather than using burn piles when wood is collected during mechanical fuel reduction treatments. This issue was not analyzed in detail because GTNP has conducted firewood sales to the public under the 1991 Hazard Fuels Management Plan and would continue to do so under a revised FMP. As in the past, firewood sales would be conducted for fuel treatment projects when the public can access the project area from the roadway and no measurable impacts to natural, cultural or social resources would occur. Firewood would be cut by fire personnel into 3-8 foot sections and stacked. The public would be permitted to carry wood to their vehicles by hand or using wheelbarrows. Public use of mechanized equipment would generally not be permitted. In addition, cutting of fallen trees or felling trees would not be allowed.

The second issue is related to the Park's ability to provide a timeline and/or an alternative that would consider when the "natural role of fire" would be restored, thereby minimizing the use of prescribed fires as a fire management tool. Alternatives have been developed in this EA that consider fire management both with and without the use of prescribed fire (Alternative B: Multiple Strategies and Alternative C: Limited Strategies (No Prescribed Fire). Should prescribed fire be maintained as a management tool, its use may eventually decrease, but it would not be eliminated. Prescribed fire would be retained as a means to safely reduce fuel loads in urban interfaces and high visitor use areas and as a means to supplement wildland fire use (by creating fuel breaks) in order to meet desired future conditions for vegetation types that remain untouched by wildland fire. Since the identification of future prescribed fires would be adaptively determined based on recent fire occurrence, history, and fire effects monitoring, it is not practical to generate a timeline for restoring the "natural role of fire" to the landscape.

Although estimates of fire regime and fire return intervals can be made and used in determining locations and timing of prescribed fires, the need for this tool would likely not go away entirely. There are situations, locations and objectives that only lend themselves to prescribed fire activities. The preferred alternative (Alternative B: Multiple Strategies) does not move toward only the use of natural fire as this is not economically feasible throughout the park due to urban interface and high visitor use areas.

General concern about impacts to air quality, water quality, soils, threatened and endangered species, vegetation, and wildlife were grouped as a third issue. The purpose of this EA is to assess impacts to all of these topics. Detailed analyses are contained in Chapter 4 ("Environmental Consequences") of this document.

The fourth issue relates to cultural resource concerns. The first cultural resource concern is related to the protection/destruction of tribal history. The park will work with concerned tribes to identify and protect these resources. The second cultural resource concern relates to the effect of mechanical treatments on cultural properties. This concern is addressed under archaeological resources and historic structures/cultural landscapes sections of the EA. All mechanical treatment or prescribed fire projects will undergo National Historic Preservation Act Section 106 compliance before any activity is initiated in the field. This compliance process ensures consultation with the SHPO, and the Tribes, if applicable. The third cultural resource concern relates to the treaty rights of Native Americans that have treaties with GTNP. The NPS is conducting research in FY05 to clarify the legal history surrounding treaties and other legal documents between American Indian tribes and the United States government as they relate to the area that is now Grand Teton National Park, the National Elk Refuge, and Yellowstone National Park. The information from this research will help us respond to any treaty-related issues. The fourth cultural resource concern relates to inadvertent discovery and the mitigation of such. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during or after fire activities, provisions outlined in NAGPRA (25 USC 3001) of 1990 and associated regulations will be followed. In the interest of facilitating our NAGPRA responsibilities and collaboration with the Tribe, it may in the best interest of the Tribe and park to negotiate a Memorandum of Understanding for inadvertent discoveries.

1.7 IMPACT TOPICS

Impact topics represent the resources or items of concern that might be affected by the range of proposed alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were identified on the basis of federal laws, regulations, and orders; *Management Policies 2001* (NPS); and input from internal and public scoping and public agencies (Table 1.7).

1.7.1 Impact Topics Dismissed from Detailed Study

Some impact topics presented in Table 1.7 were dismissed from further study after discussions with resource specialists, input from federal and state agencies, and after internal and public scoping was completed. The following impact topics were dismissed either because the resources are unlikely to be affected, the topic is combined with another impact topic to streamline analysis, or mitigation could be applied to reduce resource impacts to minor or less.

Wild and Scenic Rivers – No rivers in the affected area are designated by Congress as part of the National Wild and Scenic Rivers System. Portions of the Snake River outside of the affected area were recommended for Congressional designation as a part of the National System on September 13, 1982, but this recommendation has not been formally acted upon.

Floodplains – Floodplains are not further addressed because the fire management activities would not permanently alter floodplain function. Consequently, a Statement of Findings has not been prepared. High intensity fires could cause sedimentation and streambank erosion in floodplains. This issue is addressed under the impact topic Water and Aquatic Resources.

Prime and Unique Farmland – The topic of prime and unique farmland is not addressed as an impact topic because soils in the affected area are not classified as prime and unique farmlands by the Natural Resource Conservation Service (NRCS).

Natural Soundscape/Noise – The topic was dismissed from detailed study because impacts of planned fire events on noise would be minor. Noise is defined as unwanted sound. Hazard fuels reduction, hazard tree removal, prescribed fires, and fire suppression can all involve the use of noise-generating equipment such as chainsaws, trucks, and aircraft. Each of these fire management tools, especially when near operating saws and helicopters, are quite loud (in excess of 100 decibels) and operators are directed to use hearing protection equipment. Direct, indirect, and cumulative impacts from planned fire events would be minor and short-term. Equipment use would be localized and not frequent enough to substantively interfere with human activities in the area, wildlife behavior, or park neighbors. Such infrequent noise would not chronically impair the solitude and tranquility associated with the park. In the event of a

Natural Lightscape – Natural fire ignitions are not artificial, exist in the absence of human-caused light, and are directed to be conserved under NPS *Management Policies 2001*. Human-caused ignitions are not natural and are suppressed. Prescribed fire produces smoke that can temporarily impact natural night skies because of local weather patterns that affect smoke mixing and movement at night. Smoke impacts would be mitigated through adherence to State smoke regulations and impacts are expected to be negligible to minor (WYDEQ 2003).

Natural lightscapes encompass the dark night sky, the experience of darkness, and the ecological importance of natural light cycles The experience of a naturally dark night or a pristine starry night sky are important elements of "scenery" within national park units and are directed to be conserved. The Clean Air Act provides ancillary protection of night skies. Under this law and its 1977 amendments, the Park Superintendent is given an affirmative responsibility to protect visibility and all other Class I area air quality related values (AQRVs) from adverse effects.

Ethnographic Resources – Ethnographic resources are defined by NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order #28, *Cultural Resource Management Guidelines*, 191). While locations of all specific ethnographic resources are not known within GTNP, it is known that American Indian people utilized the Grand Teton area over thousands of years for hunting and gathering subsistence and occupation. GTNP holds many resources important to Native American tribes including, but not limited to, wildlife, plants, and water. These resources do not always have a defined boundary and may occur within the project area. The American Indian tribes traditionally associated with the lands of GTNP were informed by letter of the proposed action on May 16, 2003 (see Appendix B for copies of tribal letters).

All planned fire management activities will either completely avoid areas where ethnographic resources exist or will include mitigation measures to ensure their protection. Impacts to ethnographic resources are expected to be negligible in NEPA terminology or "no historic properties affected" according to National Historic Preservation Act terminology. Although it is not possible to predict the impacts to ethnographic resources for naturally occurring fires, every effort will be made to protect known ethnographic resources in the event of an unplanned fire. The park archaeologist is consulted whenever fires occur in order to determine whether cultural resources are at risk and mitigation measures are employed whenever and wherever possible.

The process GTNP follows for discovery of potential cultural resources is to issue an immediate "stop work" order and have the park archaeologist visit the site to determine whether work may resume or work must remain halted until formal consultation with the SHPO and Tribes is concluded. Formal consultation will determine the appropriate mitigation of such findings. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are inadvertently discovered during project implementation, provisions outlined in the NAGPRA (25 USC 3001) of 1990 will be followed.

The Tribes consulted did not express concern about this procedure; therefore this topic was dismissed from further analysis. Because many of these resources have not been identified, the NPS will continue to consult with the park's associated American Indian tribes, currently the Crow, Northern Arapaho, Northern Cheyenne, Eastern Shoshone, and Shoshone-Bannock tribes. If these tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures will be undertaken in consultation with the tribes as well as the State Historic Preservation Office (SHPO). Since impacts to ethnographic resources are anticipated to be "negligible" or "no historic properties affected", this topic was dismissed from further analysis

Museum Collections – The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), NPS *Management Policies 2001* and Director's Order #28*: Cultural Resource Management*

Guidelines (1998) require the consideration of impacts on museum collections (archaeology, ethnology, history, biology, paleontology, geology, and archives).

Although currently stored or exhibited GTNP museum collection items may occur within the project area, all planned fire management activities will either completely avoid areas where these resources exist or would include appropriate mitigation measures in consultation SHPO. Therefore, impacts to museum collections are expected to be negligible in NEPA terminology or "no historic properties affected" according to National Historic Preservation Act terminology. Although it is not possible to predict the impacts of natural fires on museum collections, every effort will be made to protect known resources in the event of an unplanned fire. The park archaeologist is consulted whenever fires occur in order to determine whether cultural resources are at risk and mitigation measures are employed whenever and wherever possible.

Indian Trust Assets – Impacts to Indian Trust Assets were not studied in detail because there are no Indian Trust Assets within the project area.

Environmental Justice – Environmental justice was not analyzed in detail because none of the alternatives would have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Environmental Justice Guidance (1998).

Socioeconomics – Socioeconomics was dismissed from detailed analysis because the impacts of planned events such as mechanical treatments and prescribed fire would be negligible. Unplanned events range from wildland fire use to large events where some park values, such as life and property, are at risk. Strategies such as wildland fire use and suppression-oriented containment would have adverse short-term and minor effects in the form of lost visitation, which would impact the tourist industry in typical ways such as lodging, food, and travel. However, there would likely be beneficial effects to the same entities, partially offsetting impacts by increases in lodging, food, travel to the area and other services required by firefighter personnel (Franke 2000).

Visitor Experience and Aesthetic Resources – This impact topic was analyzed in detail by evaluating changes in park visitor activities and changes in aesthetic resource values. Given the size of GTNP and the ability to keep restrictions and closures minimal, adverse impacts would not exceed minor. All three alternatives have fairly rigid controls over timing and ignition of planned events. During mechanical fuels reduction, cleared vegetation would be piled and eventually burned to maintain aesthetic values within developed areas. Informational and interpretive messages would inform and educate visitors and the public about objectives of prescribed fire and mechanical projects before the start of any project. Fire use activities would be well signed and, when possible, remain open to the public. Employees and the public would be notified of proposed activities through road signs, trail signs, and postings at visitor centers, entrance stations, and other areas of frequent public use. When possible, fire management activities would be planned during the day and on workdays.

Table 1.7. Impact Topics Retained or Dismissed from Detailed Study.

Impact Topic	Retain or Dismiss	Relevant Regulations or Policies
Natural Resources		
Vegetation	Retain	NPS Organic Act, NPS Management Policies (2001), DO -77, Natural Resource Protection, Executive Order 13112, Invasive Species
Wildlife	Retain	NPS Management Policies (2001), Migratory Bird Treaty Act.
Threatened, Endangered and Special Concern Species	Retain	Endangered Species Act; NPS Management Policies (2001), National Environmental Policy Act, Executive Order 13112, Invasive Species
Water Resources	Retain	Clean Water Act, Executive Order 12088, NPS Management Policies (2001)
Wild & Scenic Rivers	Dismiss	Wild and Scenic Rivers Act
Floodplains	Dismiss	Executive Order 11988, DO 77-2, NPS Directive 93-4, NPS Management Policies (2001)
Wetlands	Retain	Clean Water Act, Executive Order 11990, DO 77-1, NPS Management Policies (2001)
Soils	Retain	NPS Management Policies (2001), Section 4.8, NPS Natural Resource Management Guidelines for Soil Resources Management
Prime & Unique Farmlands	Dismiss	Council on Environmental Quality 1980 memorandum on prime and unique farmlands
Wilderness	Retain	Director’s Order 41; NPS Management Policies (2001); Wilderness Act of 1964.
Air Quality/Visibility	Retain	Organic Act, Clean Air Act, NPS Management Policies (2001)
Natural Soundscape/Noise	Dismiss	Organic Act, NPS Management Policies (2001), Section 4.9
Natural Lightscapes	Dismiss	NPS Management Policies (2001)
Cultural Resources		
Archaeological Resources	Retain	National Park Service Organic Act; National Historic Preservation Act of 1966, as amended; Executive Order 11593 (1971); Archaeological and Historic Preservation Act of 1974, as amended; Archaeological Resources Protection Act of 1979, as amended; the Secretary of the Interior’s *Standards and Guidelines for Archaeology and Historic Preservation*; Programmatic Memorandum of Agreement (MOA) Among the NPS, Advisory Council on Historic Preservation; the National Council of State Historic Preservation Officers (1995); Protection of Archaeological Resources, 43 CFR 7; Protection of Historic Properties, 36 CFR 800; NPS Management Policies (2001); Cultural Resources Management Guidelines, DO-28 (1998)
Cultural Resources		
Ethnographic Resources	Dismiss	The Secretary of the Interior’s *Standards and Guidelines for Archaeology and Historic Preservation*; NPS *Management Policies 2001*; Protection of Historic Properties, 36 CFR 800; Cultural Resources Management Guidelines, DO-28 (1998)

Impact Topic	Retain or Dismiss	Relevant Regulations or Policies
Museum Collections	Dismiss	National Historic Preservation Act of 1966, as amended; National Environmental Policy Act of 1969, as amended; Museum Properties Management Act of 1955; *NPS Management Policies* 2001; Protection of Historic Properties, 36 CFR 800; Cultural Resources Management Guidelines, DO-28 (1998)
Historic Structures and Cultural Landscapes	Retain	National Park Service Organic Act; National Historic Preservation Act of 1966, as amended; Executive Order 11593: *Protection and Enhancement of the Cultural Environment* (1971); Archaeological and Historic Preservation Act of 1974, as amended; the Secretary of the Interior's *Standards for the Treatment of Historic Properties*; Programmatic MOA among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS *Management Policies 2001*; Protection of Historic Properties, 36 CFR 800; the Secretary of the Interior's *Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (1996); Cultural Resources Management Guidelines, DO-28 (1998)
Social Resources		
Environmental Justice	Dismiss	Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.
Indian Trust Resources	Dismiss	Department of the Interior Secretarial Order No. 3206, Secretarial Order No. 3175
Firefighter and Public Safety	Retain	NPS *Management Policies 2001*, Section 4.5; DO-18 (1998), RM-18
Socioeconomic Environment	Dismiss	40 CFR 1500 Regulations for Implementing the National Environmental Policy Act
Visitor Experience, Aesthetic Resources	Dismiss	Organic Act, Enabling Legislation for GTNP, GTNP Master Plan 1976, NPS *Management Policies 2001*
Park Neighbors	Retain	*NPS Management Policies 2001*, Section 2.1.3; NEPA
Program Cost	Retain	DO-18 and RM-18: *Wildland Fire Management*

1.8 RELATIONSHIP OF THE PROPOSED ACTION TO PREVIOUS PLANNING EFFORTS

GTNP Master Plan and John D. Rockefeller, Jr. Memorial Parkway General Management Plan

The Master Plan for GTNP (1976) identifies the restoration of natural fire regimes in the park as a major management initiative. The General Management Plan for the John D. Rockefeller, Jr. Memorial Parkway (1980) identifies several broad, resource management objectives including conserving wildlife and natural habitats; identifying and preserving significant natural and cultural resources; and managing the natural environment to enhance scenic values.

Strategic Plan for Grand Teton National Park and John D. Rockefeller Jr. Memorial Parkway, October 1, 2001-September 30, 2005

Fire Management Plan goals such as managing fire on an ecosystem scale, restoring the natural role of fire to the landscape, using fire as a natural resource management tool, and providing structural protection to historic structures are consistent with the Mission Statement for GTNP that is included in the park's strategic plan. The park's mission statement states "Grand Teton National Park is dedicated to the preservation and protection of the Teton Range and its surrounding landscapes, ecosystems, cultural and historic structures. The singular geologic setting makes the area and its features unique on our planet. Human interaction with the landscape and ecosystem has resulted in an area rich in natural, cultural and historic structures that represents the natural processes of the Rocky Mountains and the cultures of the American West."

GTNP Resource Management Plan

Resource Management Plans for both park units recommend natural-caused fires be allowed to burn within designated areas, except when this would endanger life or property, or would result in unacceptable social, environmental, or economic impacts, or violate air quality regulations. These plans also recommend use of prescribed fires under specific conditions. The current resource management plan will be revised in the next few years to update natural and cultural resource objectives. This plan will be known as the Resource Stewardship Plan.

National Fire Plan

The National Fire Plan's goals and guiding principles are to improve fire prevention and suppression, reduce hazardous fuels, restore fire-adapted ecosystems, and promote community assistance. The National Fire Plan addresses five key points: Firefighting; Rehabilitation and Restoration; Hazardous Fuel Reduction; Community Assistance; and Accountability. The fuels management and reduction focus is critical to the Plan, which states "Fuels management activities will incorporate treatments necessary to change the stand condition class (which reflects the level of damage that would result from a wildland fire on those lands) from a higher risk condition class to lower risk and to maintain those areas in which a desirable condition class has been established." In addition, fuels management activities will focus on Wildland-Urban Interface (WUI) areas that have been identified by community based collaborative efforts with a goal to reduce risk to life and property.

Managing Impacts of Wildfires on Communities and the Environment and Protecting People and Sustaining Resources in Fire Adapted Ecosystems - A Cohesive Strategy

In August 2000, President Clinton issued a memorandum of action to the Secretaries of Agriculture and Interior to assess the impacts of wildland fires on rural communities. The President directed that within 30 days the Secretaries would prepare recommendations for responding to the fires of 2000, reducing the impacts of these fires on rural communities, and ensuring sufficient firefighting resources for the future.

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Comprehensive Strategy

In August 2001 the Secretaries of Agriculture and Interior joined the Western Governors' Association, National Association of State Foresters, National Association of Counties, and the Intertribal Timber Council and endorsed this document. This strategy marked the initial fulfillment of two key Congressional directives whereby the Secretaries of Interior and Agriculture and the Governors jointly develop a long-term national strategy to address the wildland fire and hazardous fuels situation, along with restoration and rehabilitation needs. This strategy is to be developed with "close collaboration among citizens and governments at all levels".

Federal Wildland Fire Management Policy and Program Review – 1995

The events of the 1994 fire season created renewed awareness and concern among the Federal land management agencies and constituents about safety, the impacts of wildland fire, and the integration of fire and resource management. As a result of those concerns and in response to specific recommendations in the report of the South Canyon Fire Interagency Management Review Team (IMRT), the Secretaries of the Interior and Agriculture chartered and completed this review. The Secretaries convened this review to reaffirm and ensure that uniform Federal policies and cohesive and cooperative interagency and intergovernmental fire management programs exist.

The 1995 report provides nine guiding principles fundamental to the success and implementation of the Federal wildland fire management program. It also recommends 13 Federal wildland fire policies in areas of: safety, planning, wildland fire, prescribed fire, preparedness, suppression, prevention, protection priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles.

Federal Wildland Fire Management Policy and Program Review – 2001

The Interagency Federal Wildland Fire Policy Review Working Group, at the direction of the Secretaries of the Interior and Agriculture, reviewed the 1995 Federal Wildland Fire Management Policy & Program Review and its implementation. The working group found that the policy is generally sound and continues to provide a solid foundation for wildland fire management activities and for natural resources management activities of the federal government. The 2001 Federal Wildland Fire Management Policy replaces the 1995 Federal Fire Policy when an implementation guide is completed.

NPS Wildland Fire Strategic Plan – 2004

This multi-year strategy document provides direction for prioritizing regional and park level budget requests and work plans. It emphasizes integration and collaboration with NPS natural and cultural resource management programs.

Town of Jackson/Teton County Comprehensive Plan Chapter 9 (Intergovernmental Coordination)

The Jackson/Teton County Comprehensive Plan emphasizes inter-governmental coordination with GTNP because public and private actions on park lands can influence the effectiveness of the comprehensive plan. This Fire Management Plan has been formulated to be consistent with the Town and County Comprehensive Plan (Third Printing, October 2002).

CHAPTER 2: ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 DEVELOPMENT OF ALTERNATIVES

The park's Interdisciplinary Team (IDT) of fire specialists and natural and cultural resource managers developed preliminary alternatives by 1) identifying a set of reasonable approaches for managing fire and fuels; 2) brainstorming specific approaches that would be effective in managing fire and fuels; 3) evaluating the effectiveness of alternate approaches based on the purpose and need and desired future conditions; 4) evaluating the possible environmental and social effects of various alternatives; and 5) developing necessary mitigation measures for those effects, incorporating these measure into programmatic standards or guidelines to use in specific fire planning efforts.

The team outlined the basic fire management program strategies that fall into the following categories: 1) actions taken when a "fire start" has occurred (unplanned actions) and 2) actions that minimize loss and/or restore and manage resources (planned actions).

Following the ignition of an **unplanned fire**, appropriate management response must be determined and implemented. A continuum of appropriate, interconnected management responses include:

- Aggressive initial attack
- Modified suppression (characterized as some holding actions) plus monitoring
- Confinement to natural boundaries plus monitoring
- Monitoring

Strategies available to implement and manage **planned actions** include:

- Prescribed fire
- Mechanical treatment using either equipment or manual methods
- Monitoring

After discussing all possible actions to manage fires and fuels, the IDT examined the entire range of fire management strategies and alternatives that could feasibly address the purpose and need for a given action and desired future conditions. Nine alternatives were written on wall-mounted poster paper and team members provided feedback on advantages (pros) and disadvantages (cons) for each alternative. The team reviewed the purpose, need, and desired future conditions to determine whether each alternative "Fully Met", "Partially Met" or "Did Not Meet" the project purpose, need, and desired future conditions. Of the 9 alternatives, four "Partially Met", four "Did Not Meet" and one "Fully Met" these conditions. The four "Partially Met" alternatives had elements and strategies that were combined to develop another alternative that "Fully Met" the purpose and need for action and desired future conditions. These three preliminary alternatives (including the "no action" alternative) were publicly scoped and further revised to incorporate public comment and concern. They are presented in this chapter as Alternatives A, B and C.

2.2 ELEMENTS COMMON TO ALTERNATIVES

2.2.1 Fire Management Activities

For all alternatives, any natural ignition that does not meet management criteria at the time of discovery, all human-caused fires, and all prescribed fires exceeding pre-identified prescription parameters would be suppressed. It is the responsibility of park managers to select an appropriate management response that protects life and property and minimizes adverse impacts to cultural and natural resources. A combination of management actions (e.g., suppression, wildland fire use) are part of each alternative selected for analysis. Although not all management actions would be included for every alternative, the activities and site-specific plans associated with each possible management action are described in Table 2.2.1.

2.2.2 Public Education and Engagement

Ongoing education efforts regarding the scope and effect of wildland fire management would be expanded, as directed by DO #18, the National Fire Plan, and the new Director's Order 75A *Civic Engagement and Public Involvement*. Wildland fire management information would include topics such as fire management strategies, resource protection, fire prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management. Information would be factual, educational, and target many varied audiences.

Under the action alternatives (Alternatives B and C), public engagement would be expanded through the adaptive management process, as described in Section 2.4.1. The adaptive management framework would emphasize annual public engagement meetings to communicate recent fire and project history, and identify future planned projects. At the beginning of each fire season, GTNP and its interagency partners would hold a public meeting to discuss the previous fire season activities (both planned and unplanned events), the effects of these actions on the environment, how they relate to desired future conditions, and any changes to the upcoming fire season's planned activities. The public would be welcome to attend and encouraged to participate in the discussions about upcoming planned fire management activities that may affect the resources held in trust for them.

Recognizing that the public and interagency partners play an essential stewardship role, GTNP fire managers will consider annual public feedback at the earliest stages of planning future fire management activities in the park and adjust proposed actions in the upcoming years accordingly. Civic engagement and public involvement would be an essential foundation and framework for continuously improving the fire management program at GTNP.

Table 2.2.1. Description of Fire Management Actions. *Selected management actions differ among the alternatives, but for each management action, potential activities and site-specific plans would remain the same.*

Management Action	Potential Actions	Site-Specific Plan
Suppression (All Alternatives)	Control line construction using hand tools, chainsaws, and, if approved, heavy equipment (for thinning, scraping to mineral soil, removal of selected snags near fireline, and constructing escape routes and safety zones). Engine use to deploy hose along fire perimeter for safety, control lines (wet lines), and mop-up. Ignition operations (aerial or ground) to improve holding effectiveness along constructed firelines or natural barriers by consuming unburned fuels. Helicopters for water drops and air tankers for retardant drops where life, property or other values are threatened. Holding to prevent fire from crossing firelines, patrolling to ensure fire stays inside the designated area and mop up (extinguishing hotspots along fireline). Camps, staging areas, helispots, security checkpoints and other temporary facilities where required.	Incident Action Plan (IAP) Wildland Fire Situation Analysis (WFSA)
Wildland Fire Use (All Alternatives)	Monitoring fire activity aerially or with ground personnel. Management actions such as monitoring, partial suppression, slow or check fire spread in a direction, full suppression action. Aviation operations would be limited, minimizing over-flights, helicopter water drops, and retardant use unless life, property or other values are threatened.	Incident Action Plan (IAP) Wildland Fire Implementation Plan (WFIP)
Prescribed Fire (Alternatives A and B)	Burning vegetation manually or via helicopter within a determined boundary. May include control line construction using hand tools, chainsaws, or mowers (thinning, scraping to mineral soil, removal of selected snags near fireline, and constructing escape routes and safety zones where necessary). Deploying hose along firelines for fire control or as an established control line (wetline). Ignition operations (aerial or ground) that improve control effectiveness along firelines or natural barriers by consuming unburned fuels (black-lining). Holding to prevent fire from crossing firelines, patrolling to ensure fire stays inside the designated project area, and mop-up (extinguishing hotspots along fireline).	Incident Action Plan (IAP) Prescribed Burn Plan
Mechanical Treatment (All Alternatives)	Manual cutting and piling (chainsaws, loppers). Equipment cutting, piling, and removal (chipping). Cutting, piling and burning.	Hazard Fuels Reduction Plan
Burned Area Emergency Rehabilitation (All Alternatives)	Repairing fences, structures, roads, and trails. Installation of erosion control devices; stabilization of slopes and other affected areas. Reclaiming fire camp, temporary helispots, staging areas, and other operational locations. Mitigation according to an approved Burned Area Emergency Rehabilitation (BAER) plan.	Burned Area Rehabilitation (BAER) plan

2.2.3 Interagency Coordination

The park would continue to coordinate with other agencies as required by the Greater Yellowstone Area Interagency Fire Management Planning and Coordination Guide (Greater Yellowstone Coordination Committee 2000) and the Wildland Fire Management Strategic Plan (2004). The park would actively participate in all programs outlined in these guidelines, including the peer review process for fire management plans, the annual meeting of GYA Fire Management Officers, the GYA Situation Report, and the GYA Fire Management Advisory Group. Grand Teton National Park and Bridger Teton National Forest (BTNF) have an interagency agreement that provides for the exchange of resources in support of fire and aviation management activities for prescribed fire, wildland fire use, wildland fire suppression, fuels management, fire prevention, and firefighter training. A joint operating plan is updated annually to define specific operational and funding details. As a member of the Wyoming Interagency Cooperative Fire Management Agreement, GTNP is committed to fire management in cooperation with the U.S. Department of Interior (NPS, Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), U.S. Fish and Wildlife Service (USFWS), the U.S. Department of Agriculture (U.S. Forest Service (USFS)), and the State of Wyoming (Board of Land Commissioners, Office of State Lands and Investments, and Wyoming State Forestry Division). Details for implementing the Wyoming Interagency Cooperative Fire Management Agreement at the local level are outlined in a Wildland Fire Management Annual Operating Plan that involves GTNP, Jackson-Teton County Fire Department, Teton Village Special Fire District, BLM, BTNF, National Elk Refuge (NER), Teton County Commissioners, and Wyoming State Forestry Division

Under all alternatives, fire management activities at GTNP would be consistent with the following management plans in an effort to insure fire management continuity across jurisdictional boundaries

- BTNF Fire Management Plan and Teton Landscape Scale Assessment
- Wyoming Game and Fish Department (WGFD) Strategic Habitat Plan
- Jackson Interagency Habitat Initiative (JIHI).
- YNP Fire Management Plan
- Targhee-Caribou National Forest (CTNF) Fire Management Plan

2.2.4 Fire Monitoring

Program Effectiveness

Monitoring is the process of collecting data and information to determine if goals and objectives are being met. The GTNP Fire Management Program would use monitoring in its adaptive management process for both planned and unplanned actions at the project/incident level for overall program effectiveness.

Fire Effects

The fire effects program includes monitoring prescribed fires, fire use actions, burn severity, and mechanical treatments. Depending on the type of incident, action, or project being monitored, information is derived from aerial reconnaissance, photography, permanent or temporary data plots, on-site fire behavior assessment, weather and fuel assessment (fire danger), burn severity mapping, and fuel loading calculations. Results from monitoring are shared with inter- and intra-agency partners.

Fire effects monitoring is part of the NPS Fire Ecology Program and is required for prescribed burns under NPS DO-18 and RM-18. At the National level, it is guided by the Fire Monitoring Handbook (FMH), which identifies four monitoring levels, (1) reconnaissance (pre-burn), (2) fire behavior (during burn), (3) immediate post-burn, and (4) long-term. Formal fire effects monitoring began at GTNP in 1996. Prior to that, fire monitoring protocols and fuel reduction projects called for the collection and analysis of data for specific objectives, with a primary focus on (1) a 3-year study of aspen mortality and regeneration, and (2) an assessment of fuel reduction on mechanical fuel reduction projects and prescribed fires. Fire effects monitoring currently includes more than 75 permanently established, randomly located vegetation plots. Results from vegetation plots, along with fire behavior and fire weather monitoring, are used to evaluate and refine future prescriptions to achieve desired long-term objectives.

Seasonal and weather-related fuel conditions are monitored to track fire behavior, plan staffing levels, predict fire danger, protect values at risk, and support long-term analysis of wildland fire use actions and initial and extended attack for wildland fire suppression activities. Trained personnel collect these monitoring data in a safe and appropriate manner. Monitors provide on-site fire interpretation, assess fuel models and vegetation types, provide for visitor and firefighter safety, support the protection of structures and cultural sites, and initiate suppression activities as needed to meet the objectives of the wildland fire implementation plan. On some fire use actions monitoring staff establish plots and collect immediate post-burn data, focusing on burn severity so that fire effects can be assessed.

Fire severity mapping is another form of monitoring that assists managers in decision-making and documenting vegetation changes. Mapping is completed post-fire using satellite imagery and ground-truthing to determine the areas burned and their severity.

Specific monitoring projects that guide long-term planning include:

- Ground-truthing and interpretation of satellite burn-severity mapping on landscape-scale fires.
- Review conifer incursions into aspen stands.
- Review impacts of fire exclusion on fuel loading and landscape diversity.
- Analyze fuel reduction projects via plots and photopoints to determine if project objectives are being met. These data are also used for fuels modeling simulations to refine prescriptions.
- Analyze burn severity and fuel reduction programs to assess impact on natural fire processes and determine if increased protection of wildland urban interface zones is warranted.
- Provide support for computer modeling of landscape-scale fires via the FARSITE modeling software.
- Provide support for computer modeling of vegetation change via the Forest Vegetation Modeling software.

The fire effects monitoring program provides a key link between the park's Fire Management Office and resource management staff and interacts with federal and state agencies concerned with natural fire processes in the Jackson Hole area. Fire use monitoring information is shared with regional agencies and frequently supports BTNF wildland fire use operations. For more information refer to the *Grand Teton National Park Fuels and Fire Effects Monitoring Plan* (1996). The 1996 monitoring plan is being evaluated for revisions, and would be attached as an appendix to the revised FMP.

Cultural Resources

Monitoring the effects of fire on cultural resources is performed by cultural and archaeological resource specialists when necessary. Cultural resources are generally excluded from treatment during planned events and efforts are made to protect these resources (via consultation from specialists) in the case of wildland fire use or suppression actions. Surveys are conducted following these events to determine if resources were impacted and/or located and to prepare appropriate documentation. Fire management personnel are briefed early in the season to recognize basic features while working in the field.

2.2.5 Fire and Fuels Reporting

Fire reporting follows guidelines established by NPS policy, DO-18 and the associated RM-18. All park units are required to prepare a written report. As soon as a fire is declared out, the fire report is finalized and submitted to the Assistant FMO for review who then forwards the report to the Chief Park Ranger for signature and approval. The report is then delivered to the fire program assistant who enters information into the national Shared Automated Computer System (SACS) database. The SACS system maintains statistical data on wildland fire occurrence and the use of prescribed fire, and also supports a wide variety of queries and batch reports for data analysis.

Park fire activity is reported daily to the Geographic Area Coordination Center through the local Teton Interagency Dispatch Center (TIDC). Fire information is processed and shared with all fire agencies so that commitments of firefighters and equipment within the region and the nation are coordinated.

The National Fire Plan Operations and Reporting System (NFPORS) database will be used for tracking and reporting fuels management activities and accomplishments.

2.3 ALTERNATIVE A: NO ACTION

The “No Action” alternative is defined as the continuation of current conditions. Under the 1991 FMP, tools available to fire management staff would include prescribed fire, wildland fire use, and suppression; however, hazard fuels treatment projects would require separate NEPA analyses. Under current management conditions prescribed fire acres would remain similar to the average range, as would the number of expected wildland fire use actions. Hazard fuel treatments would continue, under separate planning documents, at current levels using a 4-year treatment schedule, then transition primarily to a maintenance cycle. Existing FMUs and respective response strategies would not be revised.

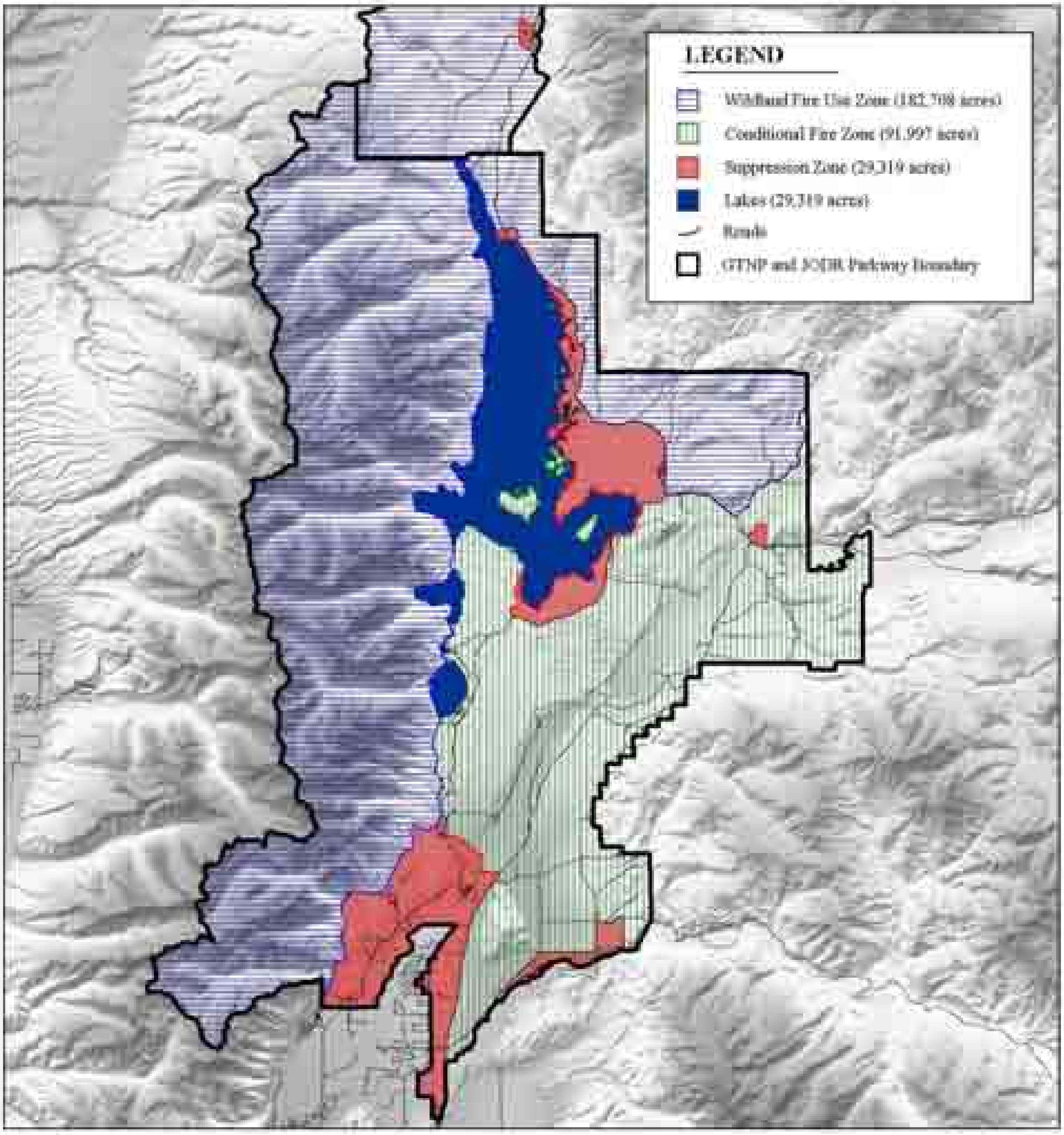
Resource objectives would continue to be defined in general vegetation terms and focused on sagebrush/grassland and aspen fuel types (1991 FMP, page 54). Current resource objectives include reducing sagebrush cover and encouraging grasses and aspen regeneration. Vegetation monitoring protocols would continue to follow the *Grand Teton National Park Plan for Fire Effects Monitoring* (1996).

Fire Management Units

Boundaries for the three existing FMUs would remain unchanged (Fig. 2.3) and a summary of current response strategies for each FMU is provided below.

Zone 1 – Wildland Fire Use Zone (182,708 acres). When possible, natural fires are allowed to fulfill their role in the ecosystem, provided they stay within predetermined boundaries, meet prescription objectives, and pose little risk to people or developments. Fire behavior and weather specialists monitor these fires. Natural fire starts may be managed to insure personnel safety, maintain cost effectiveness, and achieve resource benefits.

Zone 2 – Conditional Fire Management Zone (91,997 acres). Management actions attempt to balance restoration and perpetuation of fire dependent ecosystems and protecting life and



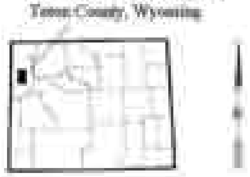


Figure 2.3
1991 Fire Management Unit Boundaries
(Alternative A)

Scale = 1:27,000

property within and beyond park boundaries. Zone 2 is located in areas where the risk of fire escape beyond park boundaries is higher than in Zone 1. Some natural fire starts may be allowed to burn when certain predetermined conditions are met. Prescription parameters are more conservative than in Zone 1 and a given fire is suppressed if prescription parameters are not met. Mechanical treatments are used to protect values at risk.

Zone 3 - Suppression Zone (29,319 acres). Private inholdings, developed areas, and visitor use areas are located within the fire Suppression Zone. All fires within this zone receive a prompt, safe, and cost effective suppression response causing the least possible resource damage. Mechanical treatments are used to protect values at risk.

2.3.1 Planned Events

Decision-making Process

An informal process has been used to develop prescribed fire projects. Resource Management personnel work closely with the Fire Management Office when implementing prescribed fire projects and the Fire Management Committee must approve each proposal (1991 FMP, pg. 54). Hazardous fuels reduction activities would require separate NEPA documentation. A tentative 4-year treatment plan for prescribed and mechanical activities is included in Appendix D.

Prescribed Fire

Prescribed fire would be used throughout all FMUs as a component of the hazard fuels reduction program and as a resource management tool. Prescribed fires, designed to reduce fuel loading in order to achieve structural protection and safety objectives, would be allowed.

In the past 10 years, prescribed fire has ranged from 20 - 4,012 acres/year, with a 10-year annual average of 1,486 acres (Appendix C). The Fire Management Office expects that average prescribed fire treatment acreages for the next 10 years would be similar to those in the past decade.

Mechanical Treatments

Mechanical treatments would be used to reduce hazard fuels to achieve structural protection and safety objectives. These treatments would be limited to the 5 projects identified in the current Hazard Fuels Management Plan (1991). Additional hazard fuels treatment projects would require separate NEPA analyses. Fires would be used to burn debris piles and clearing standards would follow recommended treatments described in the Hazard Fuel Management Plan. Under a tentative 4-year treatment schedule, mechanical treatments would continue to average 60-100 acres/year (Appendix D). In 4-6 years, hazard fuel treatment projects would likely decrease to a maintenance cycle.

Treatment in Wilderness

Mechanical and prescribed fire treatments in wilderness areas are not specifically addressed in the 1991 FMP and are not typically planned. Backcountry cabins are being evaluated to determine the need for fuels reduction treatments and a minimum treatment area if necessary. In order to treat hazard fuels in wilderness areas, a separate NEPA analysis would be necessary.

If mechanical treatments or prescribed fires were to occur in wilderness, the proposed action would have to be reviewed by the Resource Council for NEPA compliance and a minimum requirement analysis would be prepared for the Wilderness Committee. Treatment projects in wilderness are not currently proposed under the four-year treatment schedule.

A prescribed burn took place in potential wilderness in 1999, treating a small portion of 3,000 acres of sage/grass, aspen and mixed conifer. The prescribed burn was used to recreate the natural processes in these communities, create a mosaic of burned and unburned areas, promote aspen regeneration and reduce fuel loading in the area.

2.3.2 Unplanned Events

Decision-making Process

The current "Go/No-Go" decision-making process would be used to determine appropriate management responses to unplanned fire events (Appendix E). Using this process, an appropriate suppression-oriented response is implemented if 1) the cause of the fire is determined to be human, 2) the fire is not located within the Wildland Fire Use or Conditional Use Zone, 3) activities to manage wildland fires are not approved by the Fire Management Committee, or 4) the fire does not meet decision criteria. Decision criteria include distance of the ignition from the fire management unit boundary; fire fuels and weather patterns in the area; the time remaining in the fire season during which the fire may potentially spread and exit the park; and the Energy Release Component (ERC) of the National Fire Danger Rating System (NFDRS) at the time of discovery.

Wildland Fire Use

Naturally occurring wildland fires would be managed with human safety as the primary objective; general resource objectives and property protection would be secondary considerations. Under current management conditions, the number of future wildland fire use fires is expected to remain similar to existing numbers (i.e., approximately 30% of natural fire starts are managed as wildland use fires; Appendix C).

2. 4 ALTERNATIVE B: MULTIPLE STRATEGIES (PREFERRED ALTERNATIVE)

Alternative B is fundamentally similar to Alternative A in that fire management staff would have multiple tools (prescribed fire, mechanical treatments, wildland fire use, and suppression) available to manage fire and planned actions would, on average, treat a similar number of acres. Mechanical treatment acres are expected to remain between 60-100 acres/year for the next 4-6 years and prescribed fire use is predicted to be close to the current 10-year average (1,486 acres).

In contrast, hazard fuels treatments would be incorporated into the revised FMP and an adaptive management process would be adopted to formally guide interdisciplinary fire management decisions. FMU suppression boundaries would be modified and renamed the Protection Zone. Strategies would change to allow wildland fire use within the Protection Zone. Wildland fire use would be expanded as a result of the modified FMU strategy, adaptive management, and the ability to use prescribed and mechanical treatments as tools to reduce risks associated with wildland fire use. An adaptive fire management process would allow fire within the ecosystem based upon broader, more clearly defined resource objectives.

New resource objectives would be formulated to address the primary goal of maintaining fire's active role in ecosystem function. These objectives would be established by vegetation type rather than by FMU. Desired Future Conditions (DFCs) would be developed for these vegetation types as well as for WUI areas. Vegetation types would include: sagebrush steppe, persistent lodgepole pine, mixed conifer, Douglas-fir, aspen, high elevation mixed conifer, wetland/riparian, and current or former agriculture. Appendix F contains detailed information on vegetation monitoring types, DFCs, fire return intervals, and management considerations. DFCs would be subject to modification and considered when developing annual prescribed fire and hazardous fuels reduction projects, as well as when making long-range decisions on the management of unplanned events.

Modified Fire Management Units

The Suppression Zone would be renamed the Protection Zone and current FMU boundaries would be slightly revised (Figure 2.4). In particular, the Protection Zone would be modified to include developed areas near Jenny Lake and omit the narrow area between Lizard Creek campground and AMK Ranch. Overall, the Protection Zone would be decreased in size by 23 acres.

An overlay map would be used as part of a “pre-attack” plan to delineate special resource areas that need protection and/or mitigation. Examples include bald eagle nest locations, critical wildlife habitats, rare plants, historic structures, and known archaeological/cultural resources.

FMU response strategies would remain the same as in Alternative A except that wildland fire use would be allowed within all zones, in adherence to conditions described in a revised “Go/No-Go” decision-making process that is depicted in Figure 2.4.2.

Having the ability to use wildland fire within protection areas (so long as mitigation measures are feasible) is particularly relevant to fire starts that occur along a boundary between the Wildland Fire Use or Conditional Use Zone and a Protection Zone. For example, a fire start occurring along a Protection Zone boundary may be directed uphill, into the Conditional or Wildland Fire Use Zone.

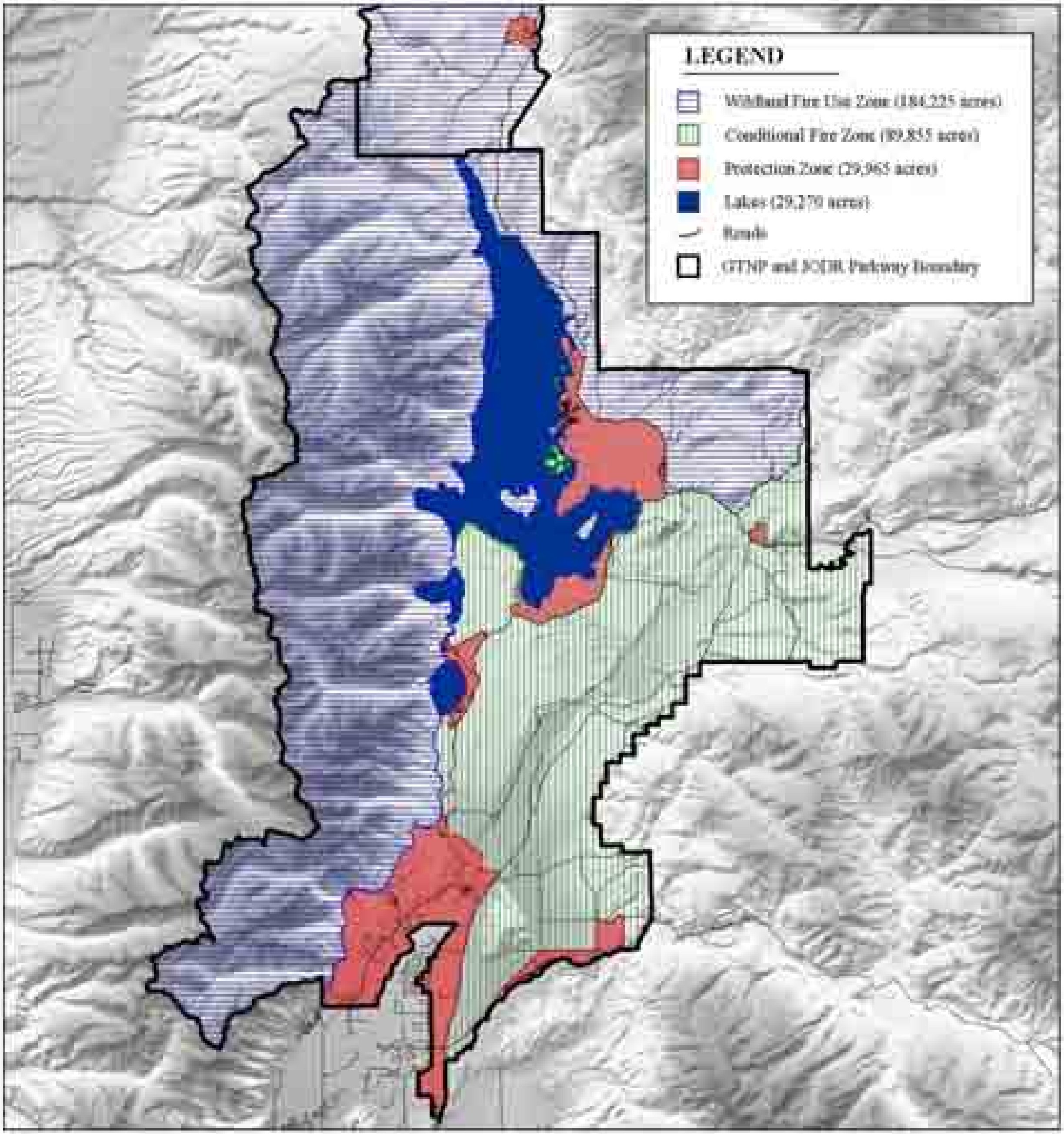
2.4.1 Planned Events

Decision-making Process

Planned events such as prescribed fire and hazard fuels reduction projects would use adaptive management procedures for a multi-year decision-making process, which is summarized below and depicted in Figure 2.4.1. Since planned projects are identified annually but would require as many as 4 years to implement, the process would be reinitiated each year. Although the decision-making is presently designed to occur over a 4-year period, it may be streamlined for efficiency, and is therefore referred to as a multi-year planning process.

Adaptive Management

The Council on Environmental Quality (CEQ) recommended using adaptive management as an ecosystem approach to the NEPA process in the *National Environmental Policy Act: A Study of its Effectiveness after Twenty-five Years* (CEQ 1997). CEQ recognized that the environmental protection afforded by the traditional environmental management model -“predict, mitigate and implement” - depends on the accuracy of the predicted impacts and expected results of any mitigation. CEQ concluded that the traditional environmental impact analysis process is a one-time event where results from intensive research, modeling, and other computations or expert opinions are analyzed, the analysis of potential environmental impacts is prepared, mitigation measures are identified, and a document is released for public review (CEQ 1997, pg.32). Unfortunately, this process does not account for unanticipated changes in environmental conditions, inaccurate predictions, or subsequent information that might affect the original environmental protections. Adding “monitor and adapt” components to the traditional environmental management model creates an adaptive management model that considerably improves upon the former (CEQ 2003, pg. 44). Because GTNP’s Fire Management Program depends heavily on established scientific research, as well as new scientific information, the use of the adaptive management approach is critical to continually adjusting fire management objectives in order to achieve the goal of allowing fire to achieve its natural role in the



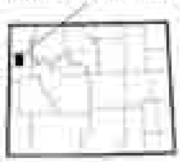
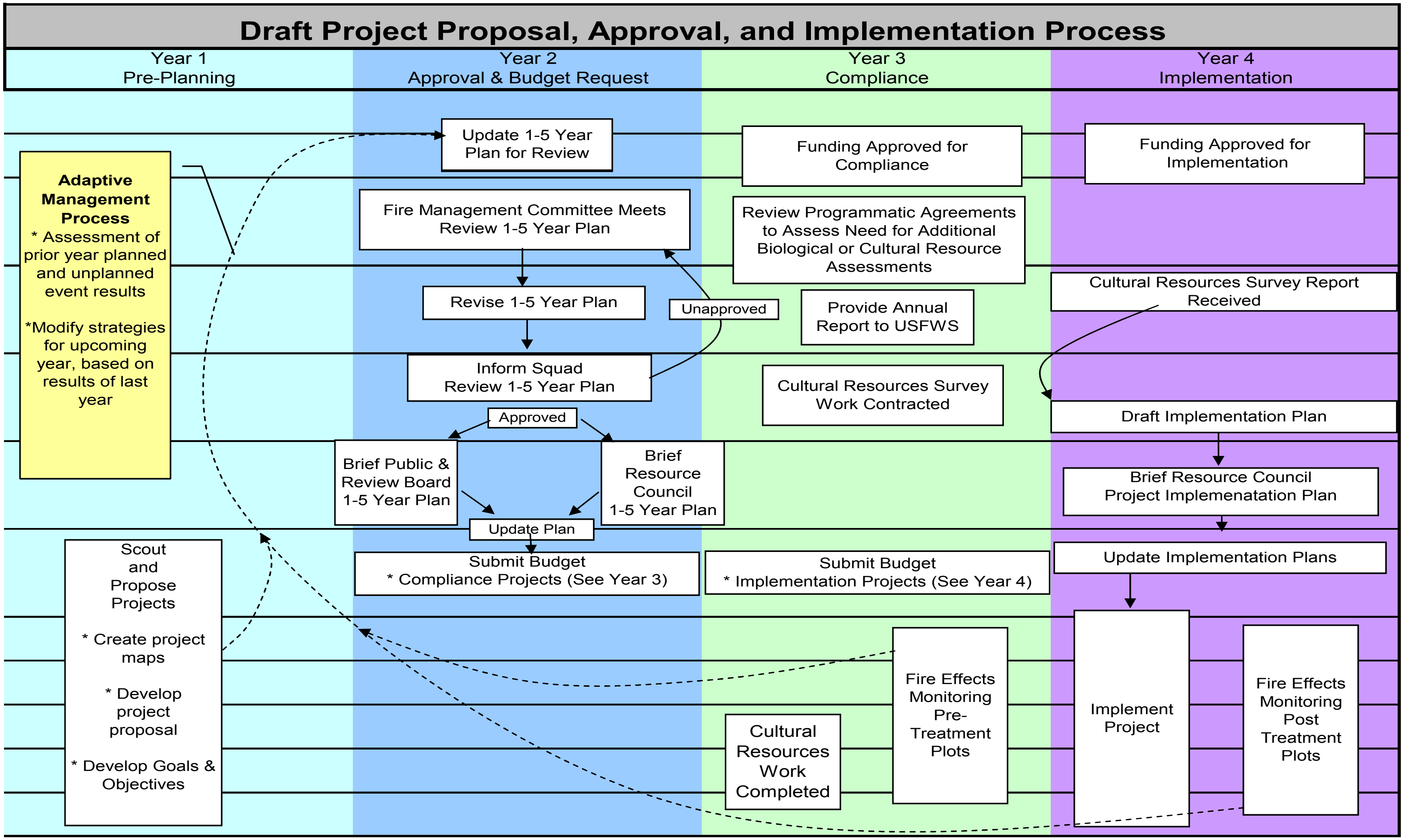


Figure 2.4
2004 Fire Management Unit Boundaries
(Alternatives B and C)

Scale = 1:17,000

Figure 2.4.1. Multi-year decision-making process for planned events in the action alternatives. *Adaptive management would be incorporated into the process of proposing, approving, and implementing planned treatment projects. Planned projects are identified annually but would require as many as 4 years to implement; the decision-making process would be reinitiated each year. See Appendix A (Terminology) for description of Fire Management Committee, Resource Council, and Squad members.*



ecosystem. Throughout this multi-year process, environmental compliance would be accomplished in coordination with other appropriate agencies. Section 110/106 for cultural resource compliance would be conducted through consultation with the SHPO on a project-by-project basis; Section 7 compliance for threatened and endangered species would be achieved with the USFWS by providing annual reports of fire activities and summary briefings upon request (5.1.1). Regulatory compliance for air, water and other natural resources would be conducted with the appropriate federal, state and local agencies as required.

GTNP has a formal process that ensures NEPA review (including Section 7, Section 110/106, and all other federal and state environmental regulations) is conducted on all activities that require NEPA compliance. The process is implemented by the Resource Council, an interdisciplinary team of environmental professionals that meet every month to review and modify projects so they have the least amount of impact to the environment. In addition, the Wilderness Committee would review any activities in wilderness, and a minimum requirement analysis would be completed for any action proposing mechanical equipment use. A few specialists are members of both the Resource Council and Wilderness Committee to ensure that projects receive the proper level of consistent scrutiny. Any mechanical and/or prescribed fire project determined by the Fire Management Committee to have the potential for measurable impacts not analyzed in this programmatic EA would require additional NEPA analysis.

Public scoping and involvement would be conducted in a civic engagement initiative that would establish a review board of all fire management projects each year, before the beginning of the fire season. The basic steps of the Adaptive Management process would include:

Predict. During the first year of the multi-year planning process, treatment projects would be identified throughout the Park based on recent fire history; completed projects, fire effects monitoring; scientific data; threshold evaluations; and the need to protect structures and meet resource objectives. Project proposals would be developed that identify specific goals and overlay maps would be created to identify sensitive cultural and natural resources. Long-term plans would consider unplanned events that occurred the preceding year and their effect on the environment and desired future conditions.

Mitigate. Mitigation would be initiated through the development of compliance projects (i.e., Biological Assessments, archaeological surveys, agency consultations, and permitting) and the incorporation of the results of these compliance projects into implementation plans.

- During the second year of the multi-year decision-making process, the Fire Management Committee would meet to review draft proposals and fire effects monitoring data. If approved, project proposals would be provided to the Resource Council and the public for comment. Project proposals would then be revised to reflect Resource Council and public feedback and budgets would be submitted for environmental compliance work.
- During the third year, funding would be approved and compliance projects would be implemented when the need is identified. In addition, fire effects monitoring of pre-treatment plots would be conducted. Budgets for implementation would be submitted during Year 3 of the multi-year planning process.
- Throughout the multi-year decision-making process planned projects would be evaluated against mitigation measures presented in 2.6. Fire operation sites (e.g., fire camps and dipsites) would be pre-identifiied in the revised FMP and updated annually, along with sensitive resources mapping. Vegetation DFCs would be periodically reviewed to ensure accuracy with goals and objectives.

Implement. During the fourth year, Resource Council would review compliance work findings such as archaeological survey reports and Biological Assessments. Site-specific mitigation measures suggested in these reports would be incorporated into the implementation plans.

During the fourth year, funding would be approved for implementation; implementation plans would be drafted and updated; and projects would be implemented.

Monitor. Monitoring activities would be conducted before and after each planned event. Monitoring may occur on unplanned events depending upon location, size, and duration.

- Fire effects monitoring protocols would follow the *Grand Teton National Park Plan for Fire Effects Monitoring* (NPS, 1996).
- Vegetation objectives would be established by vegetation type rather than by FMU. This would involve determining DFCs for each vegetation type, as well as for WUI areas. Appendix F contains detailed information on vegetation monitoring types, DFCs, fire return intervals, and management considerations. DFCs may be updated and modified as new information become available.
- Measurable indicators or thresholds would be developed, using information in Appendix F to assess vegetation changes. These indicators would help determine the success of each treatment project.

Adapt. Adaptation would be two-fold. First, adaptive management would allow for modifications of resource objectives and thresholds based on vegetation monitoring results throughout the multi-year planning process. Second, the annual identification of treatment projects (Year 1) would reflect recent fire events, fire effects monitoring data, threshold evaluation, and new scientific information. If program goals or project thresholds were not met, appropriate fire management strategies (mechanical, prescribed fire, wildland fire use, or suppression) would be developed to mitigate these instances and move toward desired future conditions and goals during the upcoming year. If and when goals and/or desired future conditions are achieved, some strategies may be used to maintain these conditions or no actions may be warranted to maintain these conditions. All desired future conditions are dependent on unpredictable circumstances such as regional drought, weather patterns and unforeseen human-caused fires. Hence, the need for adaptive management is critical to facilitate continuous improvement of fire management program strategies and to regain and maintain desired future conditions.

Prescribed Fire

As in Alternative A, prescribed fire would be used throughout all fire management units as a component of the hazard fuels reduction program and as a resource management tool. Annual prescribed fires would be planned based on the condition of WUI areas and DFCs for vegetation types. Prescribed fire objectives would include mimicking natural processes where possible, achieving a reduction in fuel loading, and functioning as a fuel break or buffer tool to reduce risks associated with wildland fire use. Depending upon specific project goals, one objective or a combination of objectives may be identified.

The Fire Management Office expects that prescribed fire treatment acres averaged for the next 10 years would remain similar to the current 10-year annual average (1,486 acres).

Mechanical Treatments

Mechanical treatments to reduce fuel loads would be guided by WUI DFCs and planned on an annual basis to achieve structural protection and safety objectives. Fires would be used to burn debris piles and clearing standards would follow recommended treatments described in the *Hazard Fuel Management Plan* (1991). In addition to reducing hazard fuels loading, mechanical treatments could also be used to achieve specific vegetation DFCs if science indicates relevancy and the fire management committee approves the action.

As in Alternative A, mechanical treatments would continue to average 60-100 acres/year. In 4-6 years, hazard fuel treatment projects would then decrease to a level of maintaining previously treated areas, with some new treatment areas likely.

Treatment in Wilderness

Planned treatments in wilderness areas would be rare, but may be allowed, primarily to protect backcountry cabins. Any actions proposed would place emphasis on the use of hand tools as much as possible. Prescribed fire and mechanical treatments would be subject to approval by the Fire Management Committee and reviewed by Resource Council during the multi-year implementation planning process. The proposed mechanical treatment projects would also require a minimum requirement analysis be presented to the Wilderness Committee for review and approval. Treatment projects in wilderness are not currently proposed under the 4-year treatment schedule year (Appendix D).

2.4.2 Unplanned Events

Decision-making Process

The current "Go/No-Go" decision-making process described in Alternative A would be revised using the *Wildland and Prescribed Fire Management Policy, Implementation Procedures Reference Guide* and would incorporate criteria for determining when wildland fire use would be permitted park-wide.

The fire committee would evaluate an appropriate management response using the first graphic depicted in Figure 2.4.2. A line is drawn top to bottom and left to right using 4 criteria: objectives, relative risk, external influences and the ability to defend the selected fire boundary. Relative risk and management boundary defensibility are based on the current and anticipated fire situation. External influences and objectives considered would include other fire activity in the area, smoke impacts, visitor use, desired future conditions, fire history, and location. The intersection of the 2 lines indicates the type of action that would likely be taken to manage the fire. Managers must keep in mind that situations change as the season progresses. Often times the procedure depicted in the first graphic is completed twice, once for the current situation, then again for a projected scenario.

The Fire Committee uses the Wildland Fire Relative Risk Rating (second graphic depicted in Figure 2.4.2) to assess the current fire situation and determine the relative risk of the decision. Fire size, time of season and fire danger indicators are monitored daily for staffing thresholds. The potential complexity is more speculative, therefore fire location and behavior should be examined closely.

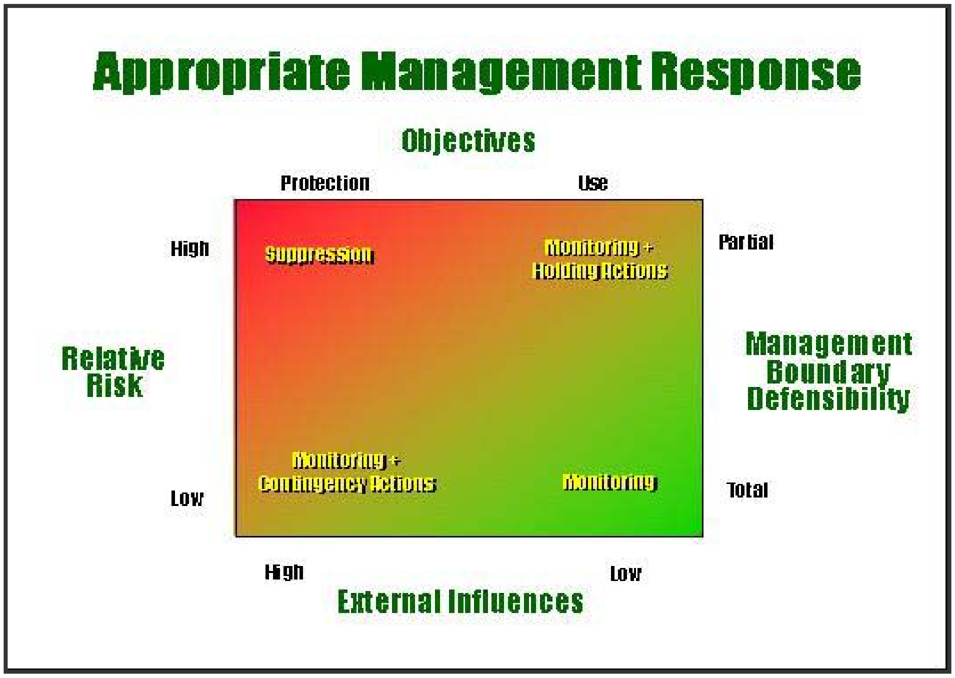
Adaptive Management

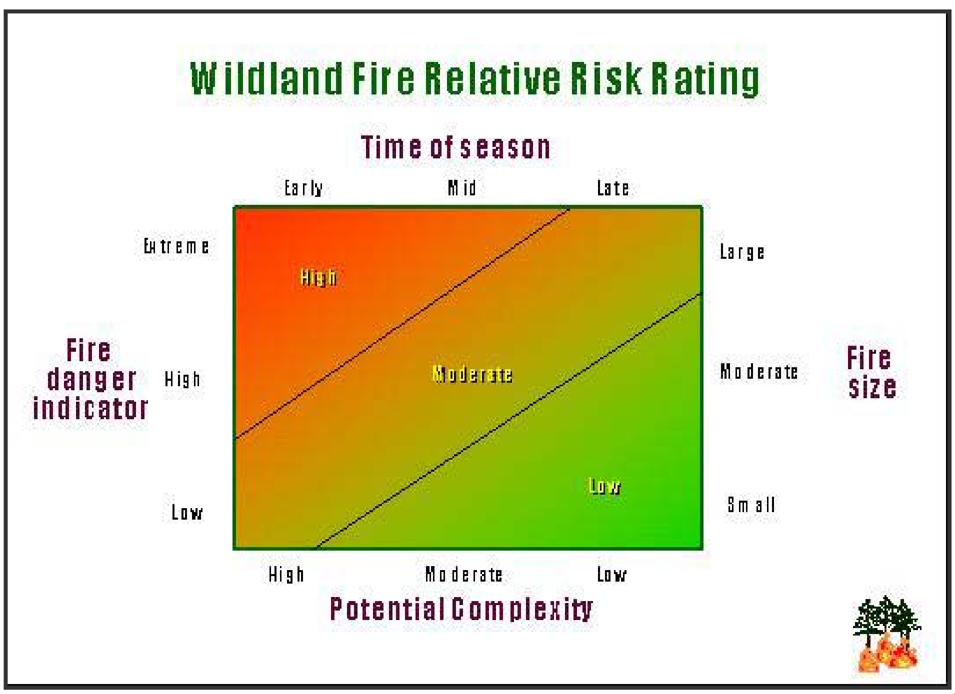
Fire management staff would review recent fire history, scientific information, and fire effects monitoring information during the winter to make decisions where possible on wildland fire use actions for the upcoming fire season.

Wildland Fire Use

Wildland fire use would be managed with firefighter and public safety as the primary objective. Approved wildland fire use actions would consider resource objectives and DFCs for vegetation types and WUI areas. Wildland fire use actions are expected to increase to 30-60% as a result of modified FMUs, adaptive management, vegetation/WUI DFCs and the ability to use prescribed fire as a tool to reduce risks associated with allowing fire on the landscape.

Figure 2.4.2 Alternatives B and C: "Go/No-Go" decision-making process for unplanned events. *The decision-making process for unplanned events is adopted from the "Wildland and Prescribed Fire Management Policy, Implementation Procedures Reference Guide". This document is designed to provide standardized procedures to guide implementation of the policy described in the 1995 Federal Wildland Fire Management Policy and Program Review. The process may be revised to reflect forthcoming 2001 Federal Wildland Fire Management Policy and Program Review.*





2.5 ALTERNATIVE C: LIMITED STRATEGIES (NO PRESCRIBED FIRE)

Tools available to fire management staff would include mechanical treatments, wildland fire use, and suppression. Prescribed fire would not be used as a management tool, except as a means for debris disposal following mechanical fuel reduction treatments. Mechanical treatments to reduce hazard fuels would increase to compensate for the absence of prescribed fire, wildland fire use would be expanded, and new resource objectives would be established based on vegetation type.

Similar to Alternative B, hazard fuels treatments would be incorporated into the revised FMP and an adaptive management process would be adopted to formally guide fire management or more clearly define vegetation objectives. FMU boundaries would be modified and strategies would change by allowing wildland fire use within all zones. The number of wildland fire use fires is expected to increase, ideally allowing between 30-60% natural fire starts to burn. However, wildland fire use is expected to be less than Alternative B without the ability to use prescribed fire to reduce the risks associated with wildland fire use.

Resource objectives under this alternative would remain the same as those described in Alternative B. These resource objectives would be considered when developing annual mechanical treatment projects as well as when making long-range decisions on the management of unplanned events. With no prescribed fire, the selection of a wildland fire use strategy as a response to a natural fire start would be the only tool available for managing fire on the landscape for resource objectives.

2.5.1 Planned Events

Decision-making Process

Planned events would incorporate adaptive management strategies into a multi-year decision-making process described in Alternative B (Fig. 2.4.1).

Mechanical Treatments

Mechanical treatments would be used to reduce hazardous fuel loading. Mechanical treatments to reduce fuel loads would be guided by WUI DFCs and planned on an annual basis to achieve structural protection and safety objectives. Fire would be used to burn debris piles and clearing standards would be slightly revised based on treatment recommendations established in the *Hazard Fuel Management Plan* (1991). Without the use of prescribed fire, mechanical treatments are expected to increase approximately 40% per year (80-140 acres) over the next 4 –6 years to compensate for the treatment of acres that otherwise would be treated by prescribed fire.

Treatment in Wilderness

Mechanical treatments in wilderness areas would be rare, but may be allowed, primarily to protect backcountry cabins. Any actions proposed would place emphasis on the use of hand tools as much as possible. Such projects are subject to approval by the Fire Management Committee and reviewed by Resource Council during the multi-year decision-making process. The proposed mechanical treatment projects would also require a minimum requirement analysis be presented to the Wilderness Committee for review and approval. Mechanical treatment projects in wilderness are not currently proposed under the 4-year treatment schedule year and prescribed fire would not take place.

2.5.2 Unplanned Events

Decision-making Process

The current “Go/No-Go” decision-making process described in the no action alternative would be revised to incorporate criteria for determining when wildland fire use would be permitted throughout the park, as described in Alternative B.

Adaptive Management

As in Alternative B, fire management staff would review recent fire and project history, scientific information, and fire effects monitoring data during the winter to make decisions on where possible wildland fire use activities may occur in the upcoming fire season.

Wildland Fire Use

Naturally occurring wildland fires would be managed with firefighter and public safety as the primary objective. Approved wildland fire use actions would consider DFCs for vegetation types and WUI areas.

The number of natural fire starts managed as wildland fire use is expected to increase and, although difficult to predict, these increases are expected to be lower than Alternative B. Wildland fire use is expected to expand due to modified FMUs (wildland fire use would be permitted throughout the park), adaptive management, and vegetation/WUI DFCs. Without the ability to use prescribed fire, which could keep program costs at a reasonable level and reduce human safety and fire escape risks associated with allowing fire on the landscape, this expansion would be limited.

Modified Fire Management Unit

Revisions to current FMU boundaries and strategies would be the same as in Alternative B (Figure 2.4.1). Boundaries would be slightly modified and wildland fire use would be allowed within the Protection Zone, in adherence to conditions described in the “Go/No-Go” decision-making process (Figure 2.4.2).

2.6 MITIGATION MEASURES FOR THE ACTION ALTERNATIVES

To ensure that action alternatives protect natural, cultural, and social resources, a consistent set of mitigation measures would be applied to the action alternatives. GTNP would adhere to national Minimum Impact Suppression Tactics (MIST). MIST is the concept of selecting the minimum tool needed to safely and effectively suppress wildland fire while minimizing the long-term effects of suppression actions (NWCG 2003). MIST tactics are provided in Appendix H and address mitigation measures specific to construction of fire line (including ground and aerial fuels) mop-up; aviation management (including retardant, foam, and water bucket use); logistics, camp sites, and personal conduct; and restoration and rehabilitation. Fire operation sites (e.g., firecamps and dipsites) and sensitive resource locations would be pre-identified in the revised FMP and updated annually when necessary.

The NPS would prepare appropriate environmental review (i.e., compliance with NEPA, the National Historic Preservation Act, the Endangered Species Act, and other relevant legislation) for future actions not covered in this EA, if necessary. As part of the environmental review, the NPS would avoid, minimize, and mitigate adverse impacts when practicable.

Rehabilitation efforts are an integral component of post-wildland fire suppression activities. All garbage, litter, and equipment should be removed once suppression activities are completed. The continued use of trails and roads, built for the suppression effort, should be discouraged by placing limbs, rocks, and other vegetative cover in a natural arrangement. Waterbars should be constructed on any trails established with a six percent slope or greater.

2.6.1 Vegetation

Mitigating impacts to native vegetation associated with all fire management strategies would consist of actions including, but not limited to, the following.

- For all wildland fires and prescribed fire projects, natural barriers (i.e., rock outcroppings, surface water, open meadows, barren areas, ice, etc.) and/or man-made features (roads, trails, rights-of-way, etc.) would be considered for use as control lines.
- A resource advisor from the park may assist in cases where sensitive resources exist or are suspected to exist.
- Resource specialists would be consulted on proposed locations of camps, staging areas, helispots, or other management actions that may remove or disturb native vegetation of plant species of special concern. These locations would be pre-identified as part of the revised FMP and updated annually.
- Project planning would consider the known effects of fire management activities on vegetation types. WGFD has made several species-specific management

recommendations that would be considered when developing site-specific treatment projects. These recommendations focus on aspen, sagebrush, and willow communities and are provided in Appendix B.

- Following wildland fire and project-related activities, constructed firelines may be reclaimed to prevent erosion and promote vegetative recovery (Appendix H).
- Snags and slash cut to control wildland fire would be cut as close to the ground as possible (Appendix H).
- During project implementation, debris from cut vegetation would be scattered to a depth of no more than 18 inches, piled and burned outside of fire season, or chipped on site. If chipped, the chips would be spread on site at a depth of no more than one inch, hauled for use elsewhere in the park, or transported to a commercial plant for processing. Disposal methods would depend on the amount of material to be disposed of, land use regulations, proximity to existing roads, and need for chipped wood outside or inside the park.
    - Prior to initiating planned events, park staff would identify non-native species present or likely to invade disturbed areas, take measures to prevent such invasion, and assess those measures. If the risk of invasion by exotic species is high at a particular site, planned events would require consultation with resource staff to weigh the cost and benefits of the project and to reduce the possibility of any introductions.
    - Natural disturbance regimes would be used, where appropriate, to restore native vegetation.
    - During rehabilitation of high-severity burned slopes, certified weed-free straw would be used for erosion control.
    - If weeds were to be found present, measures would be implemented to help avoid spreading and increasing the abundance of the weeds. Measures such as frequent equipment cleaning, minimal soil disturbance, avoidance of areas by equipment, and not transporting slash (for treatment or disposal) to areas that don't have exotics would reduce the chance of increasing weed problems.

2.6.2 Wildlife and Fish

Mitigation measures designed to protect animal species and habitats are similar to those listed above for vegetative resources, are derived in part from USFWS recommendations provided in the annual letter discussing emergency consultations for wildland fire suppression activities (USFWS 2003 and 2004-Appendix B) and include the following:

General

- Park personnel would consult with natural resource specialists as part of the revised FMP process to pre-identify locations of camps, staging areas, helispots or other management actions that may impact wildlife. These locations could be updated annually if necessary.
- Park personnel would select time of year for fire management actions that least affects breeding and/or nesting animals.
- Park personnel would avoid conducting planned events (e.g., fuels reductions and prescribed fires) in important wildlife movement corridors.
- When necessary, wildlife surveys would be conducted prior to planned treatments (e.g., prescribed fire, fuel reductions, etc.) to determine if species of concern are present within the project area.

- Pilots would be informed to avoid flying in proximity to raptor nests when possible. Where air operations occur within 0.5 miles of active raptor nests, the use of helicopter water drops would be considered as an alternative to retardant drops or foam to minimize adverse impacts on raptors.
- Park personnel would avoid dewatering waterbodies and wetlands during suppression and control activities to reduce impacts on amphibians and other wildlife linked to aquatic sites and fish.
- Park personnel would avoid dropping fire retardant into or in proximity to watercourses, waterbodies, and wetlands whenever possible to reduce impacts on amphibians and other wildlife linked to aquatic sites, and fish.

2.6.3 Threatened, Endangered, and Special Concern Species

The presence or absence of special-status species in the area would be determined during the project-planning phase of prescribed fire or manual/mechanical treatment projects. Park resource specialists would evaluate existing databases and maps, and, if necessary, request additional surveys or field verification. Consultation with the USFWS is required if a planned project or suppression activity could cause an adverse impact on federally listed species. Specific mitigation measures have been developed as part of a Biological Assessment. As part of the Biological Assessment, the USFWS would review project design criteria proposed in subsequent sections. If approved, the implemented design criteria would avoid adverse impacts to threatened, endangered, and special concern species. Wildland fires use would be managed to avoid long-term, undesirable disturbance to important habitat for special-status wildlife or threats to substantial populations of special-status flora when and where possible.

Wildland fires do not require consultation by the USFWS, as they are considered as a disaster or Act of God as written in section 7 of the Endangered Species Act of 1973 (ESA), as amended (50 CFR 402.05). Consultation by the USFWS is therefore only required if wildland fire suppression activities pose a threat to a listed species or the species' critical habitat (USFWS 2004). In instances where the safety of firefighters is threatened, no constraints are required for the protection of endangered species. GTNP would follow USFWS guidelines on emergency consultations for wildland fire suppression activities (USFWS 2003 and 2004-Appendix B).

All Species

- All fire-fighting and support personnel would be briefed about Federally-protected species and procedures to minimize impacts to these species.
- Temporary roads would be constructed only if necessary for the protection of property or resources, including Federally-protected species.

Bald Eagle

- All fire-related activities occurring within bald eagle habitat will be sensitive to critical life stages and habitat use by this species.
- Fire management personnel (firefighters and support personnel) will be briefed about Federally-protected species and procedures to minimize impacts.
- Annual monitoring of nest territory occupancy and productivity will be performed.
- Seasonal area closures will be maintained encompassing a 1/2 mile radius around active bald eagle nests between February 15 and August 15 or later at the discretion of GTNP.
- Additional area closures may be enacted around bald eagle habitat if monitoring indicates they are warranted.

- Fire management personnel will consult with a park wildlife biologist if a bald eagle nesting area is included in a prescribed burn unit.
- Flight paths will be more than one mile from active bald eagle nests unless a different spatial restriction is warranted. In the event that a one-mile buffer cannot be achieved, areas within 1/2-mile of nests will be avoided, as much as possible, by aircraft (especially helicopters) ferrying supplies or personnel and by all aircraft using lakes for taking on water.
- The park would continue to support the objectives of the Greater Yellowstone Bald Eagle Management Plan.

Canada Lynx

- GTNP will continue following the recommendations of the Lynx Conservation Assessment and Strategy.
- Project-related impacts to potential lynx habitat will be analyzed annually by park personnel as part of the compliance review between GTNP and the USFWS.
- GTNP will continue to support research on lynx ecology.
- Historic, recent, and current information on lynx occurrence within GTNP and the GYA will be reviewed and the possible impacts of both planned and unplanned events on lynx will be assessed.
- No new roads or large openings would be created and, to the extent possible, permanent and temporary travel ways and machine-built firelines will be minimized and reclaimed so that barriers to lynx movement and increased access to potential lynx habitat by competitors can be avoided and connectivity within and between LAUs will be maintained.
- Construction of firebreaks on ridges or saddles within lynx habitat will be avoided whenever possible.
- Where feasible, fire management actions will be conducted in a manner that maintains adequate lynx denning habitat, such as retaining large dead and down woody debris.
- Prolonged disturbances around denning habitat will be avoided from May-August.
- Fire management personnel will consult with the park's Resource Council and Fire Resource Advisor when planning mechanical fuel reduction and prescribed burns, in order to minimize potential impacts to lynx.

Grizzly Bear

- No human foods or other bear attractants would be available during project activities at any of the project sites.
- Project crews would not carry firearms.
- Park employees will be educated about packing out all food and other bear attractants. Project crews will carry bear pepper spray when conducting project activities and will have gone through the park's standard bear safety training program.
- Certain areas may be closed to public entry to promote separation of bears and humans at critical times and/or locations.
- All grizzly bear/human confrontations will be reported.
- Fire management personnel will consult with the park's Resource Council and Fire Resource Advisor when planning mechanical fuel reduction and prescribed burns, in order to minimize potential impacts to grizzly bears.
- Low-level flights will be minimized and avoid open alpine meadows where possible.

- GTNP will continue participating in ongoing grizzly bear research to assess bear abundance, distribution, and habitat selection. Research findings will assist park managers in protecting important habitats and planning activities that minimize impacts to bears.

Gray Wolf

- Certain areas may be closed to public entry to promote separation of wolves and humans at critical times and/or locations.
- Park personnel would participate in ongoing wolf research to assess abundance, distribution, and habitat selection, including the location of dens. Research findings would assist park managers in protecting important habitats and planning recreational activities that minimize impacts to wolves.
- Fire management personnel would consult with a park resource specialist when planning mechanical fuel reduction and prescribed burns to avoid or minimize impacts to gray wolves.

Trumpeter Swan

- Park personnel would avoid filling water buckets in waterbodies that represent trumpeter swan nesting habitat during the nesting season.
- Park personnel would avoid dropping fire retardant on swan nesting habitat during the nesting season.
- Park personnel would avoid conducting mechanical treatments and prescribed fires near swan nesting habitat during the nesting season.

Migratory Birds

- Planned projects would avoid breeding period (May 1-July 31), if possible, in order to minimize impacts to migratory birds protected under the Migratory Bird Treaty Act.
- Planned projects occurring within the breeding period (May 1-July 31) would prevent the loss of nests by conducting nest searches and surveys prior to initiating management actions.
- Post-treatment activities within treatment areas would be permitted only if they are compatible with habitat restoration.

Sage-grouse

- Project-related activities would be no closer than 5 km of an active lek during the lekking period (March 1-May 15) and nesting and brood-rearing period (April 1-July 31).
- Projects would avoid late brood-rearing period (July 15-September 30) in areas known to be used by sage-grouse.
- Projects would occur between October 1 and March 31 but only outside of known wintering areas.
- Projects would strive to maintain sagebrush stands that provide sage-grouse with nesting, brood-rearing, and winter habitat.
- Unburned patches of sagebrush remaining within burned area would not be altered by future management practices within a 20-30 year interval after a fire.

2.6.4 Water Resources

Mitigation of effects on water resources largely depends on burn severity and time of year. Increased sedimentation from high-severity wildland fires may directly affect hydrology, water quality, and aquatic resources. Wildland fires that impact riparian areas are considered natural events and little mitigation is required for the fire itself, although MIST (Appendix H) would be used during management and suppression actions:

- Fire personnel would not use retardant and foam near streams and lakes and
- Extra care would be taken when using portable water pumps to avoid leakage of oil and gasoline.
- Wherever possible, fireline locations would be restricted from erosive soils and/or steep slopes that lead directly into water resources.
- Careful implementation of prescribed fire could be used to reduce the risk of stream sedimentation resulting from fire management actions.
- Alternatives B and C would, in consultation with park resource specialists, consider mitigation suggestions provided by WGFD when developing site-specific prescribed burn projects (Appendix B).
- Dip sites would be identified in pre-attack plans to limit the spread of the New Zealand mud snail.

2.6.5 Wetlands

Mitigation of effects on wetlands would be similar to mitigation of effects on water resources. Wildland fires that impact riparian areas are considered natural events and little mitigation is required for the fire itself, although MIST (Appendix H) would be used during management and suppression actions. GTNP may use the following mitigation measures to protect wetlands prior to project implementation:

- Proposed project boundaries would achieve total avoidance or protect forest cover in known wetland habitat.
- Retardant and foam would not be used in or near wetlands.
- Operating and filling gas-operated machinery in wetlands would be avoided and when not possible, would be conducted with extra care, including spill containment systems.
- Wetlines, natural barriers, and burnouts would be used to control fire in wetlands, and fireline locations would be restricted from erosive soils and/or steep slopes that lead directly into water resources, whenever possible.
- Alternatives B and C would, in consultation with park resource specialists, consider mitigation suggestions provided by WGFD (Appendix B) when developing site-specific prescribed treatment projects.

2.6.6 Soil

Wildland fires are considered natural events and little mitigation is required for the fire itself, although MIST (Appendix H) would be used during management and suppression actions.

- GTNP would use MIST guidelines during all fire management activities (Appendix H).
- Natural barriers and wetlines, where feasible, would be used to minimize soil disturbance during all types of fire management containment actions.
- Suppression and holding actions may call for specific rehabilitation efforts, such as installation of erosion-control devices on steep slopes, or covering bare soil to prevent soil movement and promote rapid re-vegetation of a site (see MIST guidelines, Appendix H).

- Mitigation measures would be specifically identified following on-site evaluation by a resource advisor or, if necessary, a Burned Area Emergency Rehabilitation team (BAER).

2.6.7 Wilderness

The impacts of fire management activities on wilderness would be mitigated through the use of MIST (Appendix H), minimal use of mechanized equipment in wilderness areas, and preparation of a minimum requirement analysis as part of the revised FMP (with annual updates to the FMP as necessary). An explanation of the minimum requirement concept is provided in Section 4.7 of this document.

2.6.8 Air Quality/Visibility

Park staff would monitor air quality adjacent to project areas and in nearby developed areas by monitoring and documenting smoke dispersal, column mixing height, and documenting smoke complaints by visitors and residents. Accumulations of smoke from planned and unplanned events may trigger a change in management strategy.

The Wyoming Department of Environmental Quality (WDEQ) under authority of the Clean Air Act regulates air quality impacts resulting from wildland and prescribed fire activities. The Smoke Management Regulations promulgated by WDEQ outline mitigation measures required of the park in implementing fire management activities that have the potential to affect air quality.

Mitigation measures are proposed for both unplanned and planned fire events. While measures target the same air quality elements regardless of treatment, the regulation recognizes the limits of implementing some measures during unplanned events. Measures considered under the management of wildland fires include coordination with the WDEQ and coordination with other wildland fire management entities within the area/airshed. In the context of prescribed fires, projects would consider alternatives to burning, utilize emission reduction techniques, conduct burns under favorable smoke dispersal conditions, and require prior public notification of the intent to burn.

2.6.9 Cultural Resources

Mitigation measures approved by the SHPO would be included in all treatment plans, wildland fire implementation plans, incident management plans for suppression actions, and hazardous fuels reduction plans. Resource specialists would conduct post-fire cultural resource surveys to insure knowledge of cultural resource site locations and to document fire effects. Mitigation measures would be implemented as conditions warrant.

- GTNP would use protection measures in identified cultural resource areas, such as constructing firelines around sites, treating sites with approved retardant, and removing fuels around and within sites.
- GTNP would locate, identify, and isolate cultural resource sites that are vulnerable to fire effects or human activities.
- GTNP would consult with cultural resource specialists on proposed locations of camps, staging areas, helispots, or other management actions that may disturb cultural resources.
- Tribal officials would be contacted in advance of planned fire management projects to determine if traditional use areas are included in the project area.
- Wildland fires that pose a potential threat to identified cultural resources would require a qualified cultural resource specialist to provide specific on-site mitigation strategies

during operations or, at a minimum, provide information that could be used for planning response actions.

- Fire crews would be educated about reporting procedures and the need to protect cultural resources.
- GTNP would minimize ground disturbance wherever possible.
- All mechanical treatment or prescribed fire projects would undergo National Historic Preservation Act Section 106 compliance before any activity is initiated in the field. This compliance process ensures consultation with the SHPO, and the Tribes, if applicable.

2.6.10 Firefighter and Public Safety

Firefighter Safety

Firefighting is inherently dangerous and requires all personnel involved to exercise caution and good judgment. Mitigation of risk is the overriding consideration during all operations. If any action cannot be carried out safely, another action must be used. At no time would the protection of resources be placed before the safety of fire management personnel and the public. All operations would be carried out in accordance with established safety practices established by Reference Manuals 18, 58, and 60, the Fireline Handbook (NWCG 410-1), the Interagency Standards for Fire and Fire Aviation Operations (Red Book), OSHA; NPS policy, job hazard analysis standards, and park safety plans. Below is a list of actions integral to safe firefighting practices:

- Lookouts, communications, escape routes, and safety zones (LCES) would be employed on all fire incidents.
- GTNP would comply with the 10 Standard firefighter Orders.
- Fire personnel shall be equipped with personal protective equipment appropriate to their incident assignments.
- Firefighters would only be allowed on an active wildland or prescribed fire after receiving proper equipment and training as specified in RM-18. This includes an annual 8-hour wildland firefighter safety class.
- Fire personnel would follow established Job Hazard Analyses (JHA) which are written descriptions of hazards and corresponding mitigations for fire and daily operations.
- A qualified aviation manager will manage air operations and assure that they are performed in accordance with Federal Aviation Administration rules and regulations, the USDI departmental manual, and NPS Aviation Management Policy as outlined in Reference Manual-60. The Teton Interagency Aviation Management Plan will be adhered to for all activities.

Public Safety

The park's fire management program attempts to mitigate long-term threats to public safety, including park employees, by reducing hazardous fuels around developments and along roadways where visitors could become trapped by fire. Event-specific mitigation measures would be implemented to limit the public's direct exposure to fire and smoke. Such measures include temporary trail closures and cautionary signing, strict road visibility standards, temporary closures and/or evacuation of facilities and developments, and notification of residents as to current and potential impacts.

2.6.11 Park Neighbors

The park would work with neighbors to identify response measures needed to protect life, property, and associated values during planned and unplanned events. The park would also use timely informational messages to inform park neighbors of fire status and actions being taken (Section 2.2.2). Fire management activities that could affect adjacent, federally administered public lands would be responsive to interagency agreements and coordinated with management plans of neighboring agencies (Section 2.2.3).

2.6.12 Program Costs

The park would maximize efficient use of fixed funds for operations and projects through the following measures:

- Fire management resources would be shared with the BTNF
- Personnel would be flown into a fire but would hike out, with logistical support provided through ground resources.
- Flight time would be minimized using lookouts or high points to approximate fires
- An appropriate management response to each fire would allow fire managers to respond according to the fire danger, location, and activity, which leads to program costs commensurate with values at risk.

2.7 COMPARISON OF THE ALTERNATIVES

The three alternatives differ in regard to their description (Sections 2.3-2.5), project objectives (Section 1.5), and resource impacts (Chapter 4). A series of comparison tables (Tables 2.7a-2.7d) are provided to compare project and resource tradeoffs between alternatives.

Table 2.7a. Alternatives Comparison Summary.

	Management Direction	Planned Events				Unplanned Events		
		Decision-Making Process	Prescribed Fire	Mechanical Treatment	Treatment in Wilderness	Decision-Making Process	Wildland Fire Use	Fire Management Units
Alternative A: No Action	1. General and informal, with resource treatments focused on sagebrush/ grassland and aspen regeneration in mixed conifer communities. 2. Resource objectives do not drive fire management program.	1. Informal process for identifying treatment projects. 2. Treatment projects: fire management plan covers prescribed fire only (hazard fuels projects are separate NEPA and process). 3. Proposals approved by an informal Fire Management Committee.	1. Primarily used as a component of the hazard fuels reduction program. 2. Used to achieve resource objectives (primary focus in sagebrush and aspen stands). 3. Used to create fuel breaks to decrease risks associated with wildland fire use.	1. Primarily used as part of hazard fuels reduction program and indirectly tied to fire management plan. 2. Vegetation DFCs would not be considered. 3. Mechanical treatments would not be used to achieve vegetation DFCs. 4. Clearing Standards follow recommended treatments in *Hazard Fuel Management Plan* (1991). 5. Burn piles and other methods would be used to dispose of debris.	1. Prescribed Fire allowed, but would require a minimum tool analysis for Wilderness Committee Review. 2. Mechanical treatments would require a separate NEPA analysis (and minimum tool analysis for Wilderness Committee review). 3. No projects are currently planned.	1. Current "Go/No-Go" process. 2. No formal use of adaptive management to determine long-range management priorities for unplanned events.	1. Safety and resource objectives would be the primary consideration. 2. Wildland fire use is expected to remain at current levels. 3. Vegetation DFCs would not be considered.	1. Existing boundaries would not change. 2. Response strategies would not change.
Alternative B: Multiple Strategies (Preferred Alternative)	1. Expanded to include DFCs (specific to WUI areas and 8 vegetation types), as well as potential cultural and natural resource restoration goals identified at interagency meetings or by cultural and natural resource specialists. 2. Resource objectives would be expanded to a landscape scale through adaptive management.	1. Formal process, guided by adaptive management and public involvement, for identifying treatment projects. 2. Treatment projects: prescribed fire and hazard fuels reduction projects (mechanical treatments could potentially be planned for resource benefits). 3. Proposals reiteratively approved by Fire Management Committee. Annual reviews by the public and Resource Council.	*1. SAME AS ALTERNATIVE A* 2. Prescribed fire would be used to achieve ecosystem and resource management objectives *3. SAME AS ALTERNATIVE A*	1. Primarily used as a component of the hazard fuels reduction program 2. Vegetation DFCs considered in coordination with hazard fuel reduction needs. 3. Mechanical treatments could be used to achieve vegetation DFCs. 4. Clearing Standards revised based on "lessons learned" and DFCs. 5. Burn piles and other methods would be used to dispose of debris.	*1. SAME AS ALTERNATIVE A.* 2. Mechanical treatments would be allowed, but would require a minimum tool analysis for Wilderness Committee review. 3. Treatment projects may be planned to protect backcountry cabins and achieve specific resource objectives.	1. Revised "Go/No-Go" process because fire use would be considered throughout the park. 2. Use of adaptive management to determine long-range management priorities for unplanned events.	1. SAME AS ALTERNATIVE A. 2. Wildland fire use, considered throughout the park, would increase. 3. Vegetation DFCs would be considered.	1. Boundaries would be slightly revised to reflect public safety and protection of developments. 2. Response strategies would be modified to include wildland fire use throughout the park
Alternative C: Limited Strategies (No Prescribed Fire)	*1. SAME AS ALTERNATIVE B* 2. Resource objectives would be part of the adaptive management process, but without the use of prescribed fire, the primary application of treatments projects would be to achieve safety and structural protection goals.	*1. SAME AS ALTERNATIVE B.* 2. Treatment projects: Mechanical only (primarily for hazardous fuel reduction, resource objectives would be a secondary application). *3. SAME AS ALTERNATIVE B.*	1. No prescribed fire. 2. Only pile burning for hazard fuel reduction and not used for large scale landscape treatments. 3. Not used for fuel breaks.	1. Only tool available to reduce hazard fuels. *2. SAME AS ALTERNATIVE B.* *3. SAME AS ALTERNATIVE B.* *4. SAME AS ALTERNATIVE B.* 5. Burn piles and other methods would be used to dispose of debris.	1. Prescribed fire would not be allowed. *2. SAME AS ALTERNATIVE B.* 3. SAME AS ALTERNATIVE B.	*1. SAME AS ALTERNATIVE B.* *2. SAME AS ALTERNATIVE B.*	*1. SAME AS ALTERNATIVES A & B.* 2. Wildland fire use considered throughout the park, but increase would be limited without prescribed fire. *3. SAME AS ALTERNATIVE B.*	*SAME AS ALTERNATIVE B.*

Table 2.7b. Comparison of Alternatives by Treatment Trends.

	Total Prescribed Fire	Hazard Fuel Reduction	Wildland Fire Use
Alternative A: No Action	Similar to current range (20-4,012 ac/year) and 10-year annual average (1,486 ac/yr). See prescribed fire history from 1993-2003 in Appendix D. Note: Prescribed fire acreages overestimate acres burned because there are burned and unburned patches within the total acreage.	Mechanical Treatments: About 60-100 ac/year for the next 4-6 years. Hazard fuels reduction projects would eventually decrease to a level of maintaining previously treated areas, with few new treatment areas Prescribed Fire: Approximately 100-200 acres/ year for the next 4-6 years	Approximately 30% of natural fire starts would continue to be managed as wildland fire use
Alternative B: Multiple Strategies (Preferred Alternative)	Similar to Alternative A. Annual fluctuations are possible due to shifts in management direction or priorities identified through adaptive management.	Same as Alternative A	Fire use would have the greatest potential to increase when compared to other alternatives. 30-60% of natural fire starts would be managed as wildland fire use.
Alternative C: Limited Strategies (No Prescribed Fire)	No prescribed fire. Pile burning materials generated by mechanical treatment is anticipated.	Mechanical treatments would increase by approximately 40% (due to the lack of prescribed fire as a management tool.)	Fire use more than Alternative A, but less than Alternative B (without prescribed fire to reduce risk). This prediction assumes risk and cost kept at a reasonable level.

Table 2.7c. Comparison of Alternatives & Methods Used to Ensure Goals are Met.

Goal	Alternative A: No Action	Alternative B: Multiple Strategies (Preferred Alternative)	Alternative C: Limited Strategies (No Prescribed Fire)
1.Implement a fire program that allows the natural process of fire to persist in GTNP	▪ Resource Objectives: limited in focus to certain vegetation types ▪ Full range of management tools available (mechanical treatments, prescribed fire and wildland fire use) Wildland fire use would be limited ▪ This combination of management strategies would not best maintain the natural role of fire on the landscape because wildland fire use would be limited ▪ The combination of prescribed fire and limited wildland fire use under this alternative would not best balance minimum human influence with the perpetuation of wilderness character and values.	▪ Resource Objectives: development of desired future conditions (DFCs) for all vegetation types based on fire history and fire regime condition class (Appendix F) ▪ Same as Alternative A, except wildland fire use would be expanded. ▪ This combination of management strategies is favored to maintain the natural role of fire on the landscape because wildland fire use would be expanded ▪ Prescribed fire and increased wildland fire use would perpetuate wilderness character and values, but human influence would not be minimized	▪ Resource Objectives: Same as Alternatives A and B ▪ All tools would not be available to manage fire (no prescribed fire) Wildland fire use would increase ▪ Same as Alternative B, except wildland fire use increases may be limited without prescribed fire ▪ This alternative relies heavily on natural processes to perpetuate wilderness character and values and human influence would be minimal without the use of prescribed fire.
2.Protect life, property, and other resources from unwanted fire effects	▪ Firefighter and public safety is the highest priority for all alternatives ▪ Current “Go-No/Go” decision-making process used when deciding between fire use and suppression response (Appendix E) ▪ Hazard fuel reduction program: prescribed fire and mechanical treatments, separate NEPA analysis required ▪ No desired future condition for developed areas (WUI DFCs) ▪ Prescribed fire available to pre-treat and simulate the effects of natural fire	▪ Firefighter and public safety is the highest priority for all alternatives ▪ “Go-No/Go” decision-making process determines an appropriate management response, largely based on risk (Figure 2.4.2) ▪ Hazard fuel reduction program: prescribed fire and mechanical treatments, separate NEPA analysis not required ▪ Same as Alternative A	▪ Firefighter and public safety is the highest priority for all alternatives ▪ Same as Alternative B ▪ Hazard fuel reduction program: mechanical treatments only, separate NEPA analysis not required ▪ Prescribed fire not available to pre-treat and simulate the effects of natural fire
3.Enhance the interagency fire management program through collaboration and coordination to include public involvement and civic engagement	▪ Components of the current fire management program are in place to address cost-effective fire management (multiple tools), public education and interagency cooperation (e.g. shared resources with BTNF).	▪ Same as Alternative A, but adaptive management would enhance civic engagement and public participation.	▪ Same as Alternative B, but without prescribed fire there may be less opportunity to observe fire management operations.
4.Use adaptive management to continually improve the fire management program	▪ Alternative A does not provide for a formal adaptive management process	▪ Alternative B provides for a formal adoptive management process outlined in a multi-year decision-making process Monitoring is a key component in this process (Figure 2.4.1)	▪ Same as Alternative B
5. Manage personnel and financial resources effectively	▪ All full range of fire management tools and strategies are available under Alternative A, although hazard fuel reduction projects would require additional NEPA analysis.	▪ Alternative B allows the greatest flexibility to use all tools and strategies for appropriate response. The hazard fuel reduction program would be integrated into the fire management program, which would require less NEPA compliance than Alternative A.	▪ In the absence of prescribed fire, Alternative C would provide for less tools to cost effectively manage the fire program.

Table 2.7d. Comparison of Impacts by Alternatives.

Impact Topic	Alternative A: No Action	Alternative B: Multiple Strategies, Adaptive Management	Alternative C: Multiple Strategies (No Prescribed Fire)
Vegetation	Adverse, moderate, and either short- or long-term, depending on the direction of future fire management plans	Beneficial, moderate, and either short- or long-term, depending on the direction of future fire management plans.	Beneficial and adverse, minor, and short- or long-term, depending on the direction of future management plans
Wildlife	Adverse and beneficial, negligible to moderate, and short-term and long-term	Same as Alternatives A and C	Same as Alternatives A and B
Threatened, Endangered, and Special Concern Species	May Affect But Not Likely To Adversely Affect Bald Eagles, Canada Lynx, Grizzly Bears, and Gray Wolves Trumpeter Swans – No effect (short-term and long-term) Migratory Birds –Adverse, negligible, and short-term; adverse, minor, and long-term Sage-Grouse - Adverse minor, and short-term and long-term. Harlequin Duck- No effect (short-term and long-term) Wolverine- No effect (short-term and long-term)	Same as Alternatives A and C, except: Migratory Birds – Adverse, negligible, and short-term and long-term Sage-Grouse – Adverse, minor, and short-term; beneficial and adverse, minor, and long-term	Same as Alternatives A and B except: Migratory Birds –Adverse Negligible Short-term and Long-term Sage-Grouse – Adverse, negligible, and short-term; beneficial and adverse, minor, and long-term
Plant Species of Special Concern	Adverse, minor to moderate, and of short-term or long-term duration (depending on the species involved)	Adverse, negligible to minor, and short or long term (depending on the species)	Same as Alternative A
Water Resources	Adverse and beneficial, minor to moderate, and both short- and long-term	Same as Alternative A	Same as Alternatives A and B except that under Alternative C planned treatments would have negligible impacts to water resources because they would be limited to mechanical treatments
Wetlands	Adverse and beneficial, minor to moderate, and short- and long-term	Same as Alternative A	Same as Alternatives A and B except that under Alternative C planned treatments would have negligible impacts to wetlands because they would be limited to mechanical treatments

Table 2.7d. Comparison of Impacts by Alternatives.

Impact Topic	Alternative A: No Action	Alternative B: Multiple Strategies (Preferred Alternative)	Alternative C: No Prescribed Fire
Soils	The impacts of prescribed fire and wildland fire use on soils under Alternative A (No Action) are considered adverse and beneficial, negligible to minor, and short to long-term.	Same as Alternative A	Same as the Alternatives A and B, although prescribed fire and associated activities would not occur.
Wilderness	Adverse, negligible to minor, and short-and long-term	Same as Alternative A	Same as Alternatives A and B, except there would be less fireline construction in the absence of prescribed fire
Air Quality	Adverse, minor to moderate, and short-term.	Same as Alternatives B and C	Same as Alternatives A and B
Archaeological Resources	Adverse, negligible to minor, and short-term.	Same as Alternatives B and C	Same as Alternatives A and B
Historic Structures and Cultural Landscapes	The impact of planned events on historic structures is considered negligible and the impact on cultural landscapes is considered beneficial, minor, and long-term.	Same as Alternatives B and C	Same as Alternatives A and B
Firefighter and Public Safety	Beneficial and adverse, minor to moderate, and short-term and long-term	Beneficial, minor to moderate, and short-term and long-term	Same as Alternative A
Park Neighbors	Negligible	Adverse, minor, and short-term; beneficial, minor, and long-term	Adverse, moderate, and short-term; beneficial, minor, and long-term
Program Cost	Negligible	Beneficial, minor, and long-term	Adverse, minor, and long-term

2.8 ENVIRONMENTALLY PREFERRED ALTERNATIVE

Alternative B is the environmentally preferred alternative as well as the NPS preferred alternative. The “environmentally preferred alternative” is the alternative that promotes national environmental policy as expressed in NEPA’s Section 101 to:

1. *Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.*

   Alternative B best promotes this goal. The ability to manage fire with all available tools (mechanical, prescribed, wildland fire use, and adaptive management) provides the flexibility necessary to select appropriate management responses that efficiently maintain fire’s active role on the landscape. Although Alternative A also provides the ability to manage fire with multiple tools, Alternative B would best perpetuate natural process because wildland fire use would be expanded and adaptive management would facilitate use of best available science through formal interdisciplinary decision-making. Alternative C provides for adaptive management and would expand wildland fire use, but life and property values may be at increased risk if wildland fire use were to expand without the use of prescribed fire.

2. *Assure, for all generations, safe, healthful, productive, and aesthetically and culturally pleasing surroundings.*

   Although all three alternatives would manage fire with the objective of preserving visual and cultural resources as well as safe and productive surroundings, Alternative B best achieves this goal because all fire management strategies would be available. Both action alternatives can adapt management activities to reflect recent fire and project history, scientific research, and fire effects monitoring data. This adaptive management strategy formally incorporates the protection of cultural and natural resource goals into the development of treatment projects.

   Alternative B’s combination of adaptive management and multiple tools enables fire management personnel to most effectively maintain hazard fuel reduction, thereby minimizing risk to property, life, and cultural resources more than Alternatives A or C. Alternative C would be the least effective at assuring safe, healthful, productive, and aesthetically and culturally pleasing surroundings because it would be difficult to effectively reduce hazard fuel loads through the use of mechanical treatment and wildland fire use alone.

4. *Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.*

   While all alternatives would strive to provide a range of beneficial uses without degradation, Alternative C may be less economically and strategically efficient at protecting values such as safety, life, and property.

5. *Preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.*

   As explained in the previous responses, the adaptive management tool provides for the most effective protection of historic, cultural, and natural resources. None of the alternatives inhibit diversity and individual choice.

6. *Achieve a balance between population and resource use that would permit high standards of living and wide sharing of life’s amenities.*

Alternatives B and C are preferred because adaptive management would expand public education and engagement and focus on effectively protecting sensitive cultural and natural resources. The effect of fire on the visual landscape would not noticeably vary among the alternatives.

7. *Enhance the quality of renewable resources and approach the maximum attainable recycling of resources.*

   The ability to enhance the quality of renewable resources and approach the maximum attainable recycling of resources would not vary substantially among the alternatives. Alternative B is preferred because it maximizes the flexibility to maintain fire's active role in ecosystem function with the safest and most cost-efficient means.

2.9 ALTERNATIVES CONSIDERED BUT NOT FURTHER ADDRESSED

The internal scoping workshop attendees developed preliminary alternatives by 1) identifying a set of reasonable approaches for managing fire and fuels; 2) brainstorming specific approaches that would be effective in managing fire and fuels; 3) evaluating the effectiveness of alternative approaches based on the purpose and need and desired future conditions developed; 4) evaluating the possible environmental and social effects of various alternatives; and 5) developing necessary mitigation measures for those effects, which can be described as programmatic standards or guidelines to use in specific fire planning efforts. Six alternatives were considered but dismissed.

Suppression Only

This alternative was dismissed because it failed to meet several key conditions. The alternative could lead to a large buildup of fuels because no preventative measures would be allowed. Risks to firefighter and public safety increase over time. Further, this alternative would not adequately protect life and property, achieve the goal of fire as a natural process, and address ecosystem management.

Suppression, Prescribed Fire, Mechanical Treatment (No Wildland Fire Use)

Eliminating wildland fire use as a management tool is not consistent with the general management plan to allow fire to function as a natural process. Lack of wildland fire use would create a large strain on firefighting resources, would not restore natural fire regimes, and would not meet resource and safety objectives. This alternative would have minimal human influence.

Suppression and Mechanical Treatment

Managing fire entirely by suppression and mechanical treatments may be perceived as safer, but it could also lead to a buildup of fuels. This alternative does not allow fire use in fire dependent areas, and does not address ecosystem management or achieve the goal of allowing fire to function as a natural process.

Suppression and Prescribed Fire

This is a subset of the dismissed Suppression, Prescribed Fire, Mechanical Treatment (No Wildland Fire Use) alternative and was dismissed for the same reasons.

No Suppression – Do Nothing (Free Roaming Fires)

The free-roaming fire scenario was eliminated because it does not meet policy or the purpose and need for an updated FMP. Park policy (DO-18) and the purpose and need for a revised FMP state that the program should perpetuate fire on the landscape while simultaneously protecting life, property, and resources from unwanted fire. A "no suppression" alternative could not effectively protect these values. Similarly, a free roaming fire scenario would not meet the purpose and need to further integrate GTNP with adjacent lands and the plans, resources, and risks associated with other jurisdictions.

Suppression and Wildland Fire Use

This is similar to the two action alternatives (Alternatives B and C) but lacks both prescribed fire and mechanical treatments. Policy requires NPS to protect structures and this would be impossible to achieve without the use of mechanical and prescribed fire treatment as a fire management tool.

CHAPTER 3: AFFECTED ENVIRONMENT

FIRE HISTORY

Ecological Role of Fire in GTNP

Fire is one of the primary drivers of vegetation dynamics in the Rocky Mountain region. Direct ecological effects include clearing of forest or shrub canopy, plant mortality, exposure of bare mineral soil, changes in nutrient distribution and availability, regulation of biomass accumulation and effects on major ecosystem processes (Wright and Heinselman 1973, Mutch 1970). The indirect effects of fire include changes in plant species distributions and vegetation structure, which in turn affect insects, parasites, fungi, hydrology, and wildlife habitat availability and distribution.

The ecological effects of fire are a function of fire behavior (i.e., the degree and pattern of disturbance) and the composition and vegetation type (adaptations of the affected area). Both factors are interdependent and highly variable.

The terms *fire intensity* and *burn severity* are used to explain the range of impacts that a fire can create. Fire intensity is the amount and rate of energy (heat/unit area) released by fire. Three major categories of fire intensity are commonly described and each varies in its ecological impacts. *Ground fires* burn slowly through accumulations of duff and organic material; *surface fire* can burn rapidly consuming litter and above-ground portions of forbs, graminoids, shrubs and tree seedlings if present; *crown fires* burn through the crowns of trees and the understory is not always affected. These three types of fire can occur in any combination simultaneously or a fire can begin as one type and transform into another depending on a variety of factors.

Burn severity is a qualitative scale that includes chemical and physical changes in the substrate and changes in vegetation composition, structure, and function. Burn severity classes have been described in terms of “low,” “moderate,” and “severe” (Ryan and Noste 1985, White et al. 1996). Low severity burns are characterized by very little vegetation mortality or change in composition; usually less than half of the substrate (litter and duff) fuels have been consumed, and trees are lightly scorched. Moderate burns show consumption and mortality of more than 50% of trees and shrubs, and more than half the litter and duff is removed; some understory grasses and forbs resprout, and some pioneer species become established by seed. Severe burns result in mortality and removal of most vegetation; large woody fuels are heavily consumed; bare soil is exposed over much of the area; and revegetation is slower, occurring almost entirely by seed dispersal from unburned areas.

Mixed-severity fires are common in the heterogeneous landscape of GTNP. Large fires that burn over many different vegetation types over many days tend to have a complex arrangement of severity, including unburned patches. In GTNP, the burn severity of the Moran, Hechtman, Glade, and Wilcox fires of 2000 was mapped. These large fires were caused by lightning and managed using a suppression-oriented containment strategy similar to wildland fire use. Of the 9,455 acres contained within burn perimeters, 16% did not burn, 21% was low severity, 43.6% was moderately burned, and 19% was severely burned. This severity ratio has been found to be typical of wildland fires in intermountain mixed conifer forests.

Many of the plants in GTNP evolved in the presence of fire and exhibit adaptations to fire. These adaptations include vegetative characteristics such as fire-resistant bark of Douglas-fir, spreading rhizomes of fireweed, the ability of aspen to regenerate from root suckers, the serotinous cones of lodgepole pine, and the heat-induced germination of buckbrush (*Ceanothus velutinus*) seeds. The role of fire is evident in the landscape of GTNP – vegetation patches of different ages, composition, and structure reflect a history of disturbances of varying size and severity. Fire, blowdowns, avalanches, and insect-induced mortality are all disturbances that perpetuate the dynamic landscape mosaic present in GTNP.

Vegetation composition changes following fire. Initial occupation of a burned site is often by pioneer or early successional species arriving by seed or resprouting from surviving roots. Early successional species are generally characterized by requiring sunlight penetration to the ground, rapid initial growth, and early maturation. In time, these species may be replaced by more shade tolerant species with slower initial growth rates. Fire fuel loading also changes over time with fuels typically increasing as the duration of time since the last fire increases. Patchy fires or combinations of fires over the landscape cause temporal and spatial variability in vegetation seral stages, which in turn create a complex distribution of burnable fuels and change potential fire behavior. The patterns of succession and fuel loading differ between vegetation types, as does the time it takes for a burned area to once again have sufficient fuels to support a fire.

The *historical or natural fire regime* is defined as the frequency and severity typical of fires occurring within a vegetation type prior to the land-use changes of the mid-19th century and prior to the advent of modern fire control methods. Historical fire frequency and acreages vary among vegetation types and geographically within GTNP due primarily to differences in fuel loading, soils, topography, and ignition frequency. The historical and ecological role of fire in the northern Rocky Mountain region, the GYA, and GTNP specifically has been the subject of numerous studies (Heinselman 1970b; Despain 1972, 1983; Habeck and Mutch 1973; Loope and Gruell 1973; Houston 1973; Gruell and Loope 1974; Howe 1975; Arno 1980; Crane 1982; Romme 1982; Knight and Wallace 1989; Romme and Despain 1989; and others). This body of ecological research indicates that naturally occurring wildland fire has played a major role in the formation of vegetation patterns throughout the region for thousands of years. Collectively this research indicates that, prior to the arrival of Europeans to the area, small fires were frequent and widespread in both forested and non-forested vegetation types, while large crown fires occurred in forested types at approximately 100-300 year intervals (Turner et al. 1997, Romme and Despain 1989, Houston 1973, Loope and Gruell 1973) and more frequently in non-forested types. Vegetation characteristics and fire frequencies for each of the eight fire-vegetation types in GTNP are described in Section 3.1.1.

Grand Teton National Park Fire History

Evidence for patterns of fire type, behavior, and history come from fire history research and from fire records kept since 1910. The most extensive fire history study in GTNP was conducted in the early 1970's (Loope and Gruell 1973). Loope and Gruell's research (1973, 1974) in GTNP indicates that, prior to 1900, numerous small lightning-caused fires occurred in the mountains and canyons of GTNP but large fires were rare, presumably because of the rugged topography and numerous natural fire breaks. Dendrochronology of fire-scarred trees indicate that most areas in Jackson Hole burned sometime in the years between 1850 and 1885. Large fires occurred in various parts of what is now GTNP around 1765, in the early 1840's, around 1856, and in the interval 1878-1883. Many forest stands in the valley experienced stand-replacing fire around 1856 or around 1879. Data from cross-sections of fire-scarred trees correlated with weather records since 1916 suggest that conditions conducive to extreme fire conditions (e.g., hot, dry, windy conditions in drought years) have occurred at infrequent intervals (one to three times per century). These are the conditions in which large acreage stand-replacing fires are likely to occur.

Following the establishment of GTNP in 1929 and until 1972, fire was essentially excluded from park environs. All fires, both man-made and naturally ignited, were suppressed if possible. In 1963 the Leopold Committee was convened to review wildlife management issues in National Parks, including but not limited to the GYA. The resulting Leopold Report (Leopold et al, 1963)

Table 3.0. Fire Management Strategies by Vegetation Type for fires occurring between 1970 and 2003, Grand Teton National Park, Wyoming.

	Vegetation Types								
Fires	Sagebrush	Persistent Lodgepole	Mixed Conifer	Douglas-fir	High Elev. Mixed Conifer	Aspen	Agric. Land	Wetland/ Riparian	Not Classified
Natural Ignition									
Wildland Fire Use									
Number	0	7	13	3	11	2	1	2	12
Total Acres		2013.0	3785.0	25.1	15.2	0.2	0.1	0.4	451.0
Acres/Fire		287.0	291.0	8.4	1.4	0.1	0.1	0.2	37.5
Contained Fires									
Number	0	1	3	0	2	0	0	0	1
Total Acres		2350.0	6530.0		661.0				0.5
Acres/Fire		2350.0	2177.0		331.0				0.5
Suppression Fires									
Number	25	37	15	13	8	7	2	13	17
Total Acres	4993	2481	3.7	7.35	4.6	2.9	0.6	4.6	96.8
Acres/Fire	199	67	0.25	0.56	0.57	0.42	0.3	0.35	5.7
Natural Outs	1	4	4	1	1	0	2	0	5
Total Ignitions	26	49	35	17	22	9	5	15	35
Total Acres	4993	6844	10318.7	32.45	680.8	3.1	0.7	5	548.3
Human Ignitions									
Prescribed Fires	17	15	7	2	0	3	2	2	6
Total Acres	8776	329	108	1446		1720	500	1335	728
Acres/Fire	516	22	15.4	723		573	250	445	145.6
Suppression Fires	28	70	29	17	3	6	4	5	24
Total Acres	346	25.7	98.8	18.6	0.3	0.6	7.7	0.5	2.4
Acres/Fire	12	0.36	3.4	1.09	0.1	0.1	1.9	0.1	0.1
Contained Fires	0	1 (2611)	0	0	0	0	0	0	0
Total Ignitions	45	86	36	19	3	9	6	7	30
Total Acres	9122	2965.7	206.8	1464.6	0.3	1720.6	507.7	1335.5	730.4
Total Acres	56700	52000	36300	11700	22200	7000	11200	11250	N/A
Total Burned (ac)	14115	9809.7	10525.5	1497.05	681.1	1723.7	508.4	1340.5	1278.7
% Burned	24.9%	18.9%	29.0%	12.8%	3.1%	24.6%	4.5%	11.9%	N/A

NOTE 1: Confine/Contain fires are categorized as suppression actions but are managed with strategies similar to wildland fire use actions.

NOTE 2: Fire perimeters often include unburned acres and a range of burn severity. The total burned acres reflect a range of fire effects within that vegetation type.

recommended modification of the NPS policy of total fire suppression. Ecological studies in the 1960's and 1970's indicated that fire exclusion might have slow-paced effects on natural vegetation dynamics and diversity. Taylor (1973) evaluated the impacts of a long history of fire suppression in YNP and stated that "elimination of forest fires will limit ecological diversity within the Park by reducing or eliminating certain plants and animals that are present only in the successional communities present before closure of the forest canopy." He went on to add "all evidence indicates that with control of forest fires, the younger seral stages …will be reduced and in many cases eliminated, thus making for greater uniformity…." The recognition of the importance of fire in maintaining natural vegetation dynamics, wildlife habitat, and landscape diversity resulted in the modification of NPS fire management policy in 1968 and the establishment of prescriptions under which certain naturally caused fires might be allowed to burn within specified parameters.

Fire Frequency and Behavior in GTNP

The history of fire starts in GTNP from 1930 to present is well documented. The record from 1970 to present is much more complete with aerial detection of fires during this time contributing to the recognition of smaller fires and higher elevation fires (Table 3.0). Data on fires allowed to burn, many of which remained small and naturally extinguished without suppression efforts, can be used to assess the role of small acreage and non-stand-replacing fires in GTNP. While these data supplement the forest fire history that has been reconstructed from fire-scarred trees, they also provide valuable information on the frequency and potential acreage of naturally occurring shrubland and grassland fires.

The number of natural fire starts expected in the park in any one year is difficult to predict as it is dependent on summer weather patterns and fuel moisture. The park fire history from 1970-2003 indicates an average of six natural fire starts per year in the park. As many as 21 lightning-caused fires have begun in a single year (1994) and up to 17 human-caused fires have occurred in a single season (1981). Most fires occur from June 15 to September 30. Although wildland fire use has been permitted since 1970 and is considered desirable for the maintenance of ecological processes, only about 30% of natural ignitions have been managed as either wildland fire use or "prescribed natural fire". The largest natural fires allowed to burn in GTNP were the 3,672-acre Waterfalls Canyon Fire (WCF) in 1974 and the 2,000-acre Mystic fire in 1981. The WCF burned in the mixed conifer fire vegetation type, comprised of spruce, subalpine fir and lodgepole pine; the Mystic Fire burned in persistent lodgepole pine vegetation.

The majority of acreage burned in GTNP since the park was established has burned during hot, dry, windy conditions, and under a suppression-oriented fire management strategy. The role of weather conditions in determining fire starts, behavior, and burned acreage is substantive. The importance of long-term climate variations have also been shown in a 17,000-year fire-climate reconstructive history from Cygnet Lake area in YNP's plateau region which indicates a strong connection between changes in climate and variations in fire frequency on millennial time scales (Millspaugh et al. 2000).

3.1 VEGETATION

The low-lying valley of Jackson Hole consists of a glacial outwash plain that supports mainly sagebrush-dominated communities. Pockets of historical agricultural lands consisting mostly of non-native pasture grasses are also present on the valley floor. The Snake River bisects the valley and riparian communities associated with the river and its tributaries support blue spruce, narrowleaf cottonwood, silver buffaloberry, and various willow species. Hydrology associated with Jackson Lake sustains a large and diverse willow community (Willow Flats) and smaller ones along its perimeter. Aspen communities are located in moist upland areas at lower elevations in the park and are often intermixed with sagebrush steppe and Douglas-fir woodlands. Lower and mid-elevation forests are dominated by lodgepole pine, Douglas-fir, subalpine fir, and Engelmann spruce. Mountain shrub communities (chokecherry, serviceberry, Scouler's willow, etc.) are also common on the foothill slopes of the Teton Range. Where vegetated, the higher elevations of the Tetons consist of timberline forests (subalpine fir, Engelmann spruce, and white-bark pine) and graminoid -, forb-, and shrub-dominated alpine communities.

The integrity of the park's plant communities remains largely intact. However, some communities have been affected by human activities including homesteading, agricultural use, introduction of exotic species, resource utilization and extraction, (i.e., gravel pits, grazing, and browsing) land development, and fire exclusion. Fire was historically a major disturbance event that sustained natural diversity in plant communities and wildlife habitat in the park. However, natural fire regimes have been altered and, in some vegetative communities, the decrease in fire frequency, particularly low severity fires, has reduced age-class, structural, and landscape diversity leaving older, contiguous forests and grasslands, which are more prone to stand-replacing fire events.

3.1.1 Covertypes

The most recent land covertype classification for GTNP was completed in 1985 in an effort to map and assess grizzly bear habitat (Mattson and Despain 1985). Broad-scale vegetation patterns were categorized based on the dominant life form (i.e., tree, shrub, graminoid), dominant species (i.e., aspen, sagebrush, lodgepole pine, etc.) and in some cases seral stage, hydric regime, and elevation. Although a new vegetation classification system is currently being developed, the 36 covertype classes described in the Grizzly Bear Habitat Component Mapping Handbook for the Yellowstone Ecosystem (Mattson and Despain 1985) represent the most up-to-date vegetation classification system in the park. Most of these covertypes were condensed into 8 fire management vegetation types for the Fire Management Plan based on similarities in fire ecology, fuel loading, and resource objectives. A ninth "vegetation type" - Wildland Urban Interface (WUI) - was also included to accommodate separate management strategies for those areas near structures and developments. Some of the original 36 covertypes were purposefully left out of the fire management vegetation types because they are not fire-associated covertypes (i.e., avalanche chutes and alpine communities). Distribution of each category is depicted in Figure 3.1.1 and descriptions and estimated fire return intervals are included below and summarized in Appendix F.

Sagebrush Steppe (~ 56,700 acres)

The sagebrush steppe vegetation type occurs mainly on the valley floor but is also found in smaller pockets on foothill slopes. It includes at least 4 different sagebrush-dominated communities distributed according to soil characteristics including: mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) on deep, fine textured soils; low sagebrush (*Artemisia arbuscula*) on valley bottoms with seasonally dry, rocky soils; mixed mountain big sagebrush/ low sagebrush; and mixed mountain big sagebrush/bitterbrush (*Purshia tridentata*) (Sabinske and Knight 1978). Silver sagebrush (*Artemisia cana*) is occasionally found in wet meadows in the northeast part of the park and big sagebrush (*Artemisia tridentata spp. spiciformis*) is found on slopes above 7,200 feet in the Teton Range.

Forbs and grasses are present in the understory and they dominate early seral stages. Shrubs including rabbitbrush (*Chrysothamnos spp*.), snowberry (*Symphoricarpos spp*.), chokecherry (*Amelanchier alnifolia*), and serviceberry (*Prunus virginiana*) are found in some sagebrush communities. Changes to species composition, fuel characteristics, and fire frequency have occurred since human settlement of the area, primarily as a result of agricultural activities and the introduction of non-native pasture grasses. Exotic species have also invaded some sagebrush communities near roadsides, trails, and other disturbed areas.

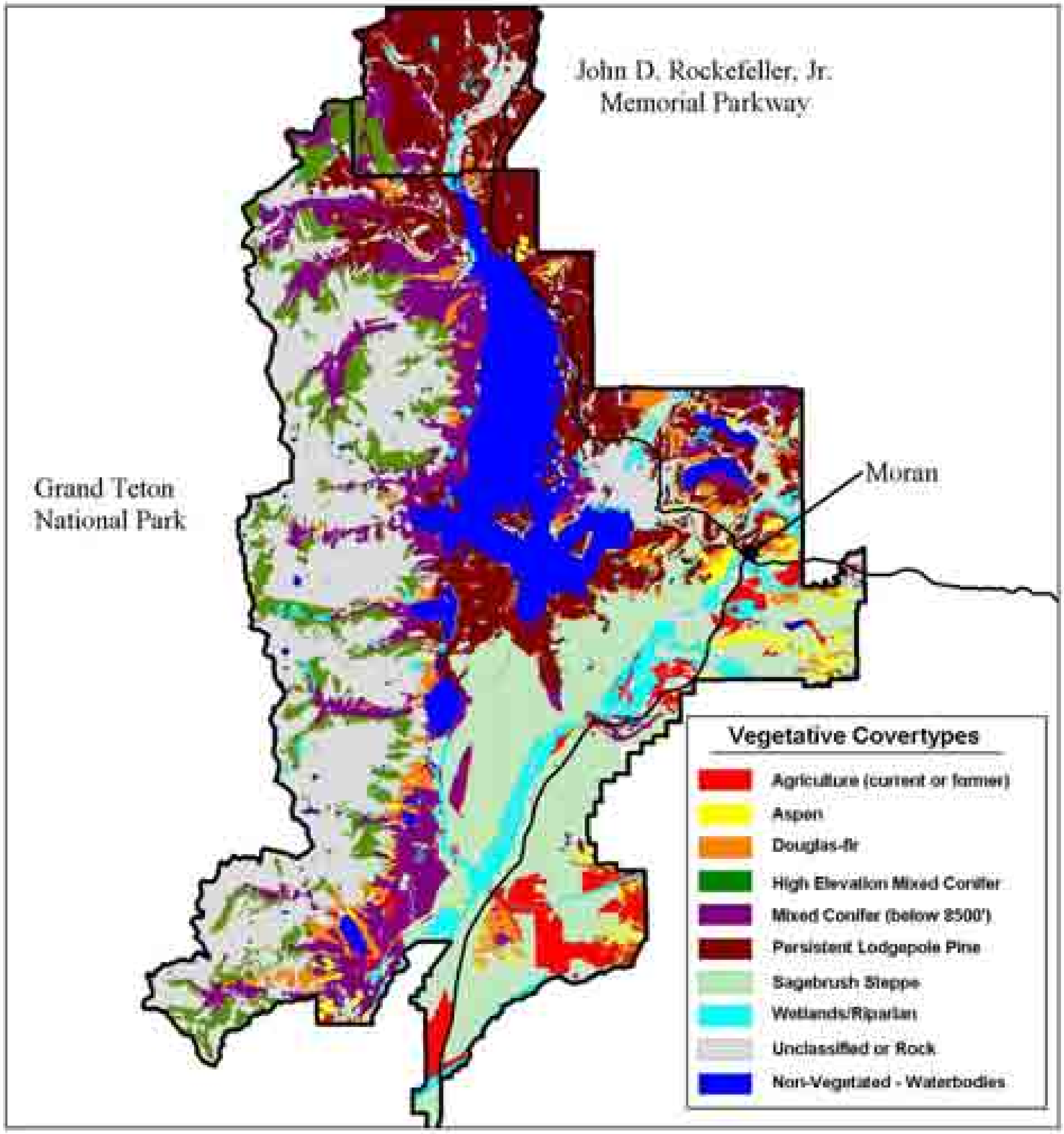


Figure 3.1.1
Fire Management Vegetation Types in GTNP

Approximate Scale 1 : 27,500

The estimated historic fire return interval for mountain big sagebrush steppe, which is the dominant sagebrush covertype in the park, ranges from 20-60 years. Mountain big sagebrush is generally killed by fire and must regenerate through seed. Approximately 25% of this vegetation type has been burned due to wildland fire or prescribed fire treatments over the past 33 years. This has resulted in a mosaic of sagebrush communities at different seral stages across the landscape that is somewhat coarser, but similar to historic conditions. `

Persistent Lodgepole Pine (~ 52,000 acres)

Although lodgepole pine (*Pinus contorta*) often represents a seral species in mixed conifer forests, persistent lodgepole pine forests are found on cold sites with nutrient and moisture-poor volcanic soils in YNP and in the northern portion of GTNP at elevations up to 8,000 feet (Despain 1982). These stands have relatively sparse and species-poor understory vegetation due to harsh growing conditions (Bradley et al. 1992). Common shrubs are huckleberry (*Vaccinium membranaceum*) and grouse whortleberry (*Vaccinium scoparium*). Forbs include heart-leaf arnica (*Arnica cordifolia*) and timber milkvetch (*Astragalus miser*); grasses and sedges include elk sedge (*Carex geyeri*) and pinegrass (*Calamagrostis rubescens*). Stands of persistent lodgepole pine have been categorized into 4 seral stages, from LP0 (0-40 years old) to LP3 (300+ years old).

Historically, two fire types occurred in persistent lodgepole pine forests. The most frequent were patchy, creeping surface fires with occasional torching that thinned the stand and opened up gaps for lodgepole pine regeneration. Stand-replacing fires occurred during drought periods with high winds. The estimated historic fire return interval for these forests varies from 22 years for a low severity regime (Arno 1976, in Montana) to 300+ years for a stand replacing regime (Romme 1982, in YNP). In GTNP, approximately 19% of this vegetation type has burned over the past 33 years by wildland fire use (20%), prescribed fires (4%), and suppression and confine/contain fires (76%).

Mixed Conifer below 8,500 ft (includes Seral Lodgepole Pine) (~ 36,300 acres)

Mixed conifer forests below 8,500 feet consist of several combinations of co-dominant trees including lodgepole pine, limber pine (*P. contorta*), Douglas-fir (*Pseudotsuga menziesii*), Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*). Aspen (*Populus tremuloides*) may also be present but is generally not reproducing successfully. In the absence of disturbance, mixed conifer forests generally have a successional pathway beginning with lodgepole pine or aspen and moving toward subalpine fir that will regenerate in the shade on organic material. Berry-producing shrubs are common in the understory and include huckleberry, grouse whortleberry, and currant (*Ribes spp*.). Forbs include meadowrue (*Thalictrum sp.*), arnica, sweet cicily (*Osmorhiza sp.*), and yarrow (*Achillea millifolium*). The most common graminoids are elk sedge and pinegrass.

All species found in the mixed conifer covertype have evolved in the presence of fire disturbance but their adaptations differ and, therefore, plants occupy different roles in succession. Historic fire return intervals for these forests vary from 22-300 years (and up to 400+ years for old growth spruce). This wide variation is attributable to different burn severities, site characteristics, and pre-fire plant composition (species and successional stage). Due to heavy fuel accumulations and dense foliage, these forests are especially susceptible to stand replacing fire events during drought. Early seral stands are dominated first by grasses, then by shrubs and/or regenerating lodgepole pine. These stands are unlikely to carry fire (Bradley et al. 1992). Lodgepole dominates the mid-successional canopy for up to 200 years, after which replacement by subalpine fir usually occurs. Multi-layered stands of late successional subalpine fir and spruce persist in the absence of fire.

Small fires in this forest type serve to create fuel breaks, reduce fuels, recycle nutrients, and open the canopy, allowing sunlight to reach the forest floor. Much of the mixed conifer forest in

GTNP exists in late seral stages dominated by subalpine fir. Approximately 22% of this vegetation type has burned over the past 33 years and most of the burned acreage has resulted from large, relatively severe events.

Douglas-fir (~ 11,700 acres)

Douglas-fir forests in GTNP fall into two general groups, known as “cool, dry Douglas-fir forests” and “moist Douglas-fir forests” (Bradley et al. 1992). Mature Douglas-fir trees are moderately fire resistant because of their thick, corky bark (Crane 1982).

Moist Douglas-fir forests are common on sedimentary slopes on Blacktail Butte, the Teton foothills south of Jenny Lake, and the east side of Timbered Island. The understory shrub community usually consists of spirea (*Spirea betulafolia*), snowberry (*Symphoricarpos sp.*), and low-growing evergreen species such as Oregon grape (*Mahonia repens*) and mountain clover (*Paxistima myrsinites*), as well as a variety of shade tolerant forbs such as heart-leaf arnica, yarrow (*Achillea millifolium*), and fairy bells (*Disporum trachycarpum*). Pinegrass is the most common grass and elk sedge and Ross’s sedge (*Carex rossii*) are also present in most places (Bradley 1992; Steele et al. 1983).

Historically, moist Douglas-fir forests experienced frequent fires of various sizes and severity levels, which produced a highly patchy distribution of seral species, tree ages, understory vegetation, and fuel loading. This led to inconsistent fire behavior and severity across burned areas. Larger, more fire resistant trees survived while thin-barked young trees were killed, promoting an open park-like stand structure. Loope and Gruell (1973) determined that the fire frequency in moist Douglas-fir on Blacktail Butte during pre-settlement times was 25-100 years. Aspen and/or lodgepole pine are generally the pioneering species on these sites following major disturbances such as stand replacing fires and avalanche activity.

Approximately 7% of Douglas-fir forests in GTNP have burned over the last 33 years as a result of small, low severity prescribed fire treatments and wildland fire use. As a result, Douglas-fir trees have spread into formerly treeless slopes, aspen stands, and are a component of mixed conifer stands. In some Douglas-fir stands, the overstory is beginning to succumb to insect infestations, resulting in increased fuel loading which increases the likelihood of stand-replacing fire.

Cool dry Douglas-fir stands in the park are not common. They occur on steep sedimentary ridges near Uhl Hill in association with limber pine, rocky mountain juniper (*Juniperus scopulorum*), and native bunchgrasses. Dry Douglas-fir forests experienced low to moderate severity fires at less than 30-year intervals prior to European settlement, which effectively maintained a seral grassland understory by restricting trees to rocky micro-sites with sparse herbaceous fuels (Uchytil and Crane 1991). These forests have experienced few fires in the last 100 years. Shrubs and dense conifer regeneration are now apparent in areas that were formerly grass-dominated. The fuel loading in these stands is increasing, which could result in higher fire severity and greater potential for stand-replacing fire events.

Aspen (~7,000 acres)

Quaking aspen is the only upland deciduous tree species present in the park. Quaking aspen stands occur in moist and nutrient rich sites at elevations up to about 8,500 feet. The largest stands are on the east side of the park, near Shadow Mountain, Spread Creek, Cow Lake, and Wolff Ridge. There are many small stands north of the Oxbow Bend and along the base of the Tetons south of Jenny Lake. Most of the park’s aspen is seral to Douglas-fir, lodgepole pine, or subalpine fir. Understory communities feature a variety of shrubs, including snowberry, chokecherry, serviceberry, and buffaloberry (*Sherperdia canadensis*). The herbaceous plants are diverse and lush, due to favorable growing conditions. The majority of mixed aspen/conifer stands in GTNP were classified as conifer-dominated by the 1985 mapping effort and, therefore, have not been included in the overall acreage of aspen communities known in the park.

Aspen regeneration in the region occurs primarily vegetatively. Individual aspen trees are called ramets and are genetically identical to others that sprouted from the same root system. Together, the root system and its ramets are referred to as a genet or clone. Aspens resprout vigorously following fire and other disturbances. Moderate severity fires often result in the most dense sprouting; severe fires can kill roots in the upper layers of soil which delays or sometimes prevents sprouting. Low severity surface fires may leave live trees that locally suppress sprouting (Howard 1996; Tirmenstein 1988). Aspen sprouts are highly palatable to browsing ungulates and extensive browsing can delay or prevent regeneration. Aspen ramets are short-lived relative to other Rocky Mountain forest species; in GTNP most aspen will succumb to age, wind, and disease by the time they are 130 years. Many of the aspen stands in the park are old and deteriorating, some of which are converting to conifer stands and others are reverting to sagebrush-dominated shrublands. Conifer-encroached, seral aspen stands are more likely to burn than persistent aspen stands due to fuel loading and distribution. Aspen regeneration in much of the park currently appears low. This is likely the result of the complex interactions of climate, wildlife populations, and disturbance regimes (Romme et al. 1995, Hessl and Graumlich 2002).

Areas dominated by aspen historically have had a mixed severity fire return interval of 20-60 years (Campbell and Bartos 2001). In GTNP, approximately 37% of this vegetation type has been burned over the past 33 years, mainly through low to moderate severity prescribed fire during spring and fall.

High Elevation (above 8,500 ft) Mixed Conifer (~ 22,200 acres)

Forested areas in GTNP above 8,500 feet are dominated by spruce-fir and whitebark pine (*Pinus albicaulis*) covertypes. Most of this vegetation is found in areas managed as wilderness. Trees may grow in continuous stands or in isolated groups among alpine vegetation and rocks. Near treeline, they are often stunted due to wind and snow damage (“krummholz”). Most high elevation mixed conifer forests are in late successional stages dominated by subalpine fir. Early seral whitebark pine stands are rare and mature stands are threatened by successional conversion, insects, and disease. Subalpine fir dominated forests are found on steep north- and east-facing slopes. Engelmann spruce often co-dominates on moist sites. Whitebark pine grows in pure stands on very dry and severely windy sites but tends to be mixed with subalpine fir and Engelmann spruce on protected sites. Whitebark pine is considered a keystone species for wildlife habitat due to mast crops of high protein pine nuts. This species is also extremely vulnerable to infection by white pine blister rust (an introduced pathogen) and pine beetles. The understory vegetation is sparse and few shrubs besides grouse whortleberry are present. Forbs include arnica, lousewort (*Pedicularis sp.*), and wintergreen (*Pyrola* and *Orthilia sp*). Graminoid cover is low but mosses are common.

Disturbance factors in high elevation forests include fire, insect outbreaks, avalanches, rockslides, and windstorms. While fire ignition occur due to lightning activity, severe fires rarely happen. Most fires are small and isolated as a result of discontinuous tree canopy and sparse, moist fuels. The estimated historic fire return interval in these forests varies from 50-400 years. (Bradley et al. 1992). Low severity fires provide micro-sites for seedling establishment, help to create mosaics of stand ages, and favor whitebark pine over less fire resistant species. Stand replacing fires lead to herbaceous and shrub-dominated stages where the return to forest can be extremely slow (Bradley 1992). Moderate severity fires are rare in this vegetative community. Approximately 3% of this vegetation type has been burned over the past 33 years.

Wetland/Riparian (~11,250 acres)

This category includes cottonwood-blue spruce river corridors, willow bottomlands, wet meadows, lakeshores, and streamside vegetation. Wetland and riparian vegetation is adapted to frequent inundation/flooding and is generally considered fire resistant. Most plants that do burn are able to re-sprout after fire due to extensive root systems protected by moist organic soils. Riparian areas function as natural firebreaks some of the time and historically burned only during landscape-scale fire events – particularly late in the season when graminoids were dry (Bradley et al. 1992). Jackson Lake Dam and flood control levees along the Snake River have affected the historic hydrologic function (and potentially fire resistance) of riparian cottonwood communities. These communities are generally over-mature, have accumulated fuels, and are being encroached upon by blue spruce, making them more vulnerable to fire particularly because they may not be able to reestablish post-burn due to both altered moisture regimes and ungulate browsing. Fire return intervals for moist spruce communities in other parts of Wyoming are reported to be 300-400 years (Crane 1982, Romme and Knight 1981).

The effects of fire on wetland/riparian communities occur both as a result of on-site fires and upstream fires, which affect hydrology and can cause changes in erosion and sediment transport. Actual fire return intervals are highly variable and poorly understood for wetland communities. Approximately 5% of this vegetation type has burned over the past 33 years and it is unknown how this compares to the historic pattern. A portion of the Willow Flats area near Jackson Lake Lodge was prescribed burned in 2002 and cottonwood corridors along irrigation ditches burned in the 2003 Blacktail Fire. Lakeshore and stream areas have also burned in several large landscape-scale fires.

Current or Former Agriculture (~11,200 acres)

This vegetation type includes areas that were formerly sagebrush steppe but were converted to pastures, hayfields, and/or vegetable cropland by homesteaders in the early 1900's. All of these areas are currently fallow but some pastures are still irrigated and used for livestock grazing. Non-native agronomic grasses such as timothy (*Phleum pratense*), smooth brome (*Bromus inermis*), and Kentucky bluegrass (*Poa pratensis*) have prevailed because they are well adapted to site conditions. Bison and elk graze extensively in these pasture grass communities during spring and fall. Native sagebrush may be re-establishing on some of these sites. In general, sagebrush can establish in bluegrass-dominated sites but brome sites are probably too competitive. Native forbs are also rare in brome-dominated meadows and exotic species are problematic at some sites, especially musk thistle (*Carduus nutans*).

This introduced vegetation is favored by disturbance and is highly flammable when cured. Fire spreads easily and can either serve to reduce or promote smooth brome and Kentucky bluegrass growth depending on the timing of burns. Approximately 13% of this vegetation type has been burned over the past 33 years, including the use of prescribed fire to improve forage productivity. Because these communities were not present historically and are generally considered undesirable from an ecological perspective, the desired future conditions involve restoring pre-settlement vegetation in areas where agricultural vegetation is not considered part of the “cultural landscape”. Fire may be a useful tool in the restoration process.

Wildland-Urban Interface (~ 19,800 acres)

Vegetated areas in the vicinity of structures and human communities are mapped as part of the wildland-urban interface, which includes all vegetation types except high elevation mixed conifer forest. Many developed areas have been treated mechanically to reduce fuels and increase defensible space. In forested areas, an open “park-like” setting is maintained by thinning trees (increasing the distance between stems) and mowing and/or burning shrubs. The time span between treatments in the WUI is generally 10-15 years.

3.1.2 Exotic Plants

Exotic (non-native) plants are those that were introduced from other locations worldwide. Exotic plants threaten to alter ecology and displace native plants from many communities. Exotic plant control is an important resource management program within GTNP. Most non-native plants occur primarily along roadsides and trails and in other disturbed areas, including construction sites, gravel pits, and some recently burned areas, where they take advantage of resource (water, nutrient, light) pulses made available by the recent removal of other vegetation. The seeds of exotic plants are distributed by wind, wildlife, as well as human activity. States and counties maintain “noxious weed” lists consisting of plants that have a considerable detrimental affect on agricultural producers, livestock, and sometimes wildlife. GTNP cooperates with Teton County, Wyoming to control high-priority non-native plants and exotic species. Noxious weed control is viewed as a high priority, long-term management issue within the park.

GTNP personnel inventory, monitor, collect test plot data, and control weeds each summer. The most effective method of weed control is to prevent establishment by maintaining optimum biodiversity and cover within native plant communities (GTNP 2000). Where exotic species have established, eradication and revegetation with native species is the ultimate goal, although managers never expect to completely eliminate weeds from the park (Haynes 2002, pers. comm.). Methods used to control or reduce the spread of invasive species in the park include herbicide application, biological controls (insect introductions), and mechanical treatments (pulling and removing). A total of 1,054 acres of weed infestations in the park were chemically, mechanically, and biologically treated in 2003, requiring over 2,000 person hours. In addition, weed inventories were conducted on over 500 miles of roads, utility corridors, and rights-of-way (Janssen 2003).

Exotic plants sometimes establish quickly in areas where fire has removed competing vegetation, making fire a potential contributor to their spread. Although this has not been well documented in GTNP, weeds do have the potential to become established in severely burned sites, especially where seed sources are present. Musk thistle, Canada thistle (*Cirsium arvense*), and knapweed (*Centaurea sp.*) are of primary concern, due to their preference for dry, exposed soil in open areas with minimal shading. Predicting the response of exotic species to fire is extremely difficult. This is due to both a lack of research on the fire ecology of introduced species as well as the fact that vegetative responses to individual fires depend on a host of factors involving characteristics of the fire (including season and severity), existing vegetation, weed presence, seed bank characteristics, grazing influences, and post-fire weather (USDA Forest Service 2000). In general, however, severe fires that expose large areas of mineral soil are most apt to be invaded by exotic plants especially if they are already near the burn area. Lower severity burns are more resistant to proliferation of exotics because many native species resprout and quickly re-occupy the site (USDA Forest Service 2000).

A 20-year study of the 1974 Waterfalls Canyon fire in GTNP showed increases in *C. arvense* and *Taraxacum sp.* in the first 8 years post-fire. *C. arvense* decreased to nearly undisturbed levels by 16 years post-fire, while *Taraxacum sp.* cover continued to increase (Doyle 1994). This trend was more pronounced in the high severity areas than in the moderate severity areas.

3.2 WILDLIFE

GTNP provides habitat for a variety of wildlife species, including 61 mammals, four reptiles, six amphibians, 19 fish, and 299 birds (NPS 2000). Six native ungulate species are common including elk, moose, mule deer, bison, pronghorn antelope, and bighorn sheep.

Elk - Elk (*Cervus elaphus*) are the most numerous ungulate in GTNP. These elk belong to what is referred to as the Jackson Hole Elk Herd which numbers about 13,000 animals with a stable or slightly declining population trend and is largely regulated by hunting. Although some elk reside in lower elevations throughout GTNP, the majority of park elk summer at higher elevations. Summer ranges for Jackson Hole elk are extensive (more than 1,000 sq mi) with virtually unlimited supplies of forage (Boyce 1989). Mid-elevation forested areas and portions of the Snake River riparian zone represent spring calving areas. A substantial portion of the Jackson Hole elk herd migrates through the project area during spring and fall movements between summer range (in GTNP, on BTNF lands, and even in YNP) and winter range (on the National Elk Refuge near Jackson). Large numbers of elk move through the Mormon Row Hayfields, Antelope Flats, Blacktail Butte, and Moose-Wilson Road areas of GTNP each spring and fall. During migrations, it is not uncommon to observe several hundred elk at one time bedding down, foraging, and/or moving. The migration from winter range to summer range is generally complete by the end of May and elk are largely absent from the eastern portion of the project area until the fall migration begins in October and November. The availability, abundance, and quality of winter range would normally constrain elk population size in Jackson Hole. Heavy snow accumulation in the mountains and foothills reduces food availability and forces elk to migrate to lower elevations during the winter. Supplemental feeding of large numbers of elk occurs on the NER and Wyoming Game and Fish Department (WGFD) feedgrounds during the winter and this activity allows more elk to winter in Jackson Hole than what native winter range would likely have supported.

Moose - Shiras moose (*Alces alces shirasi*) are widely distributed throughout Jackson Hole and can be found within the park at anytime of the year. Estimates from the 1960's suggest that 200-300 individuals inhabited the valley throughout the year with as many as 500 additional individuals migrating to riverbottoms and valley floor during the winter (Houston 1968, USFWS 1990). More recent WGFD population estimates suggest that the moose population in Jackson Hole may have numbered in excess of 3,500 animals in 1992 (D. Brimeyer pers. comm.). However, recent research has shown that the moose population in Jackson Hole has again declined, down to around 1,700 individuals in 2003 (D. Brimeyer, WGFD, pers. comm.). The reason for the population decline is unknown, but may be related to poor nutrition or predation.

The entire Snake River drainage and low elevation portions of the Gros Ventre River drainage represent either "winter-yearlong" or "crucial moose winter range" (WGFD unpubl. data). Moose densities along the Snake River north of the Gros Ventre River confluence average about 6 moose per mile (Fralick 1989) but vary both seasonally and annually. Increases may occur during the autumn as the rutting season progresses, during winter when moose move to lower elevations, and during harsh winters. In contrast, moose densities at lower elevations may decrease when winters are mild or where there are high levels of human activity (Minta and Campbell 1991). As with many ungulates, severe winters appear to be a key factor causing population declines. Although willow and spruce forest vegetation types are preferred during winter; moose will select and use other habitat types based on snow depth (Matchett 1985). As winter progresses and snow accumulations become greater, moose use of older, denser stands of trees with a high conifer component and relatively shallow snow depths increases (Saether et al. 1989).

The Snake River drainage and the lower elevations of the surrounding mountains are also considered critically important reproductive and maintenance habitat to the Jackson Hole moose population (WGFD unpubl. data). Moose thrive in seral stages of shrub and tree communities (Coady 1982) and environmental disturbances that disrupt existing vegetative patterns and promote the formation of ecotones are generally beneficial to moose (Tefler 1978). Shrub communities interspersed with forest cover and riparian willow stands provide winter range to moose in Wyoming (Houston 1968). Both lowland and upland climax shrub habitats are heavily used during summer and fall (Van Ballenberghe and Miquelle 1990). Aquatic vegetation is used extensively where available, particularly in early summer.

Mule Deer - Jackson Hole provides year-round habitat for mule deer (*Odocoileus hemionus hemionus*) and this species is abundant in GTNP during non-winter months. Most of the park and its vicinity are classified as spring-summer-fall mule deer habitat. Primary mule deer summer range is on mountain slopes surrounding the southern portion of the valley, but mule deer can also be found summering within the Snake River floodplain. Mule deer use of lower elevations (e.g., along the Snake River and on the slopes of buttes and foothills) increases dramatically during the spring and fall months as mule deer migrate to and from winter range. Use of specific migration routes by mule deer in Jackson Hole is not common and migrating deer apparently use whatever routes are available to them in order to get where they want to go (Campbell 1990). General mule deer movement routes are present within the park (e.g., along the Snake and Gros Ventre River) and are used by mule deer in route to and from crucial winter range located to the south on East and West Gros Ventre Buttes.

Mule deer winter range is limited in Jackson Hole and these ranges are generally confined to east- and south-facing slopes and bottomlands at low elevations in the southern portion of Jackson Hole. Some deer are known to irregularly winter along the Snake River depending upon the severity of the winter and/or the availability of artificial foods intentionally or unintentionally provided by humans. The number of deer wintering along the Snake River is unknown but appears to be increasing in response to intentional feeding efforts and recent mild winters.

Bison - A small population of bison (*Bison bison*) resides in Jackson Hole and uses portions of the project area. Bison use of GTNP usually occurs from spring through fall and animals typically winter on the NER where they exploit supplemental feed provided to the elk. This population originated from 20 animals (12 cows, 3 bulls, and 5 calves) transplanted from YNP to the Jackson Hole Wildlife Park near Moran in 1948. Prior to that time, bison had been extirpated from the valley as early as 1840 except for 3 animals that wandered in from YNP in 1945. The Jackson Hole bison population, once escaped from the Wildlife Park, began expanding, first slowly and then much faster when wintering animals gained access to supplemental feed meant for NER elk beginning in 1975. Population numbers were consistently less than 50 animals until 1982 and then increased. The 2003-2004 winter population was 730-750 animals. Because of the availability of supplemental feed on the NER and few sources of mortality, the bison herd will likely continue to increase unless controlled by humans.

Bison residing in GTNP primarily use the sagebrush-grassland communities, especially in the Mormon Row, Kelly Hayfields, Antelope Flats, and Uhl Hill/Wolff Ridge areas, and the irrigated pastureland and adjacent areas in and around Buffalo Valley. Bison actively select recently burned sagebrush-grassland areas for several years post-burn (Vinton et al. 1993) in response to increased abundance of preferred grass species (Pfeiffer and Hartnett 1995). This has been documented in GTNP following wildland and prescribed fires in the southern portion of Antelope Flats.

Pronghorn Antelope - Pronghorn antelope (*Antilocapra americana americana*) are seasonal residents of the project area. Approximately 150-250 pronghorn antelope summer in GTNP and the Gros Ventre River drainage and generally migrate out of Jackson Hole to winter range in the Green River Basin, approximately 100 miles away (Sawyer and Lindzey 2000). Historic records indicate that pronghorn summering in Jackson Hole have migrated as far south as Rock Springs, Wyoming. Pronghorns have been described as opportunistic migrants because herds may not migrate to specific wintering areas each year (Minta and Campbell 1991). In fact, not all pronghorn leave Jackson Hole every winter as evidenced by individuals (16-88) wintering on the NER and East Gros Ventre Butte during the winters of 1976/77, 1986/87, and 1992/93 through 1997/98 (Segerstrom 1997; Sawyer and Lindzey 2000). Pronghorns that do migrate into and out of Jackson Hole generally follow a route along the Gros Ventre River and arrive in GTNP in May and depart by late November (Segerstrom 1997; Sawyer and Lindzey 2000). Pronghorns that summer in GTNP do not necessarily return year after year, although these particular animals do exhibit high fidelity to winter ranges (Sawyer and Lindzey 2000).

The highest concentrations of pronghorns summering in Jackson Hole occur within GTNP in the low-lying sagebrush communities on the east and west side of the Snake River floodplain (Segerstrom 1997), including Baseline Flats, the Potholes, south Antelope Flats, the Kelly hayfields (Sawyer and Lindzey 2000), and in the Elk Ranch area. Some of these antelope also spend portions of the summer on the NER (Sawyer and Lindzey 2000). Key fawning areas for pronghorns in the park include the Kelly hayfields and Antelope Flats area, the Potholes, Lupine Meadows, and Elk Ranch (K. Berger 2002, pers. comm.). Fawning occurs between mid-May to mid-July and represents the time of year when this species is most sensitive to human disturbance (J. Berger 2002, pers. comm.). Breeding territories, defended by bucks, are also concentrated in GTNP. Reproductive rates for Jackson Hole and upper Gros Ventre River drainage pronghorns tends to be lower than the rest of the Sublette pronghorn herd to which they belong. This may be because of stress related to a lengthy migration or because there is a higher percentage of barren females that migrate to GTNP (Sawyer and Lindzey 2000). It could also be that pronghorn fawns are more susceptible to predation by coyotes in GTNP (Berger 2003).

Pronghorns select forage with a high water content and will move from relatively dry ranges to more mesic sites in search of succulent vegetation (Minta and Campbell 1991). Forbs are an important part of the pronghorn's diet. When forbs are scarce, pronghorn select the most succulent browse available. Considering only food habits, ranges dominated by forbs, browse (e.g., sagebrush, rabbitbrush), and grasses appear to provide the highest carrying capacity for pronghorns.

Bighorn Sheep - Rocky Mountain bighorn sheep populations continue to decline from loss of habitat and disease. Many Rocky Mountain bighorn sheep herds are small, isolated, and sedentary. This situation has resulted from historic reductions in sheep populations and has been perpetuated by habitat loss and disease. Man-caused habitat loss has resulted from agricultural, industrial, and recreational developments, and from the succession of open grasslands to dense shrublands and forests, a result of fire suppression (Thorne et al. 1985). Additional range may have been lost from loss of traditions for movement patterns as herds declined. Habitat loss and confinement to small areas of habitat increase the susceptibility of bighorn herds to seasonal deficiencies in forage quantity and quality, to harassment by human activities, and probably to predation and transmission of disease, especially lungworms.

Bighorns occupy patchily distributed grassland habitats. Three primary components of bighorn habitat (i.e., visibility, escape terrain, and abundant and continuous forage) are not in favorable proximity everywhere and, consequently, bighorn sheep habitat usually has a patchy distribution (Wishart 1975). Decades of fire suppression have decreased the size and increased the insularity of these habitat patches.

Common Mammals - Mammalian predators inhabiting the park include coyotes, bobcats, mountain lions, grizzly bears, black bears, wolverines, badgers, long-tailed weasels, short-tailed weasels, mink, river otters, red foxes, badgers, pine marten, skunks, and bats. Small mammals are abundant within the project area and include Uinta ground squirrels, mice, voles, shrews, chipmunks, tree squirrels, marmots, porcupines, beavers, muskrats, northern pocket gophers, and snowshoe hares.

Upland Game Birds - Sage grouse, ruffed grouse, and blue grouse are present on GTNP lands. Sage grouse are dealt with in section 3.4.2 Species of Concern. Blue grouse prefer coniferous forests, aspen stands, and adjacent sagebrush-grassland for habitat and these covertypes are abundant in GTNP. Ruffed grouse are most common in mixed aspen-conifer forests.

Waterfowl and Shorebirds - Waterfowl and shorebird species present in GTNP are diverse and, in most cases, have habitat linked to aquatic features. Several species of waterfowl (e.g., Canada geese, mallards, green-winged teal, gadwalls, American widgeons, common and Barrow's goldeneyes, and common mergansers) are year-round residents but most waterfowl and shorebird species are seasonal migrants.

Common Birds - Avifauna inhabiting GTNP are diverse; both seasonal and year-round habitat for a variety of birds is available. Year-round residents such as ravens, magpies, Clark's nutcrackers, mountain chickadees, northern shrikes, and horned larks are expected to occur within the project area. Seasonal residents likely include sandhill cranes, gulls, terns, rough-legged hawks, and great horned owls among many other species.

Reptiles and Amphibians - Several species of amphibians and reptiles are present in GTNP (Baxter and Stone 1980) including tiger salamander (*Ambystoma tigrinum*), northern leopard frog (*Rana pipiens*), western spotted frog (*Rana pretiosa*), boreal toads (*Bufo boreas*), western chorus frog (*Pseudacris triseriata*), wandering garter snake (*Thamnophis elegans*), valley garter snake (*Thamnophis sirtalis*), rubber boa (*Charina bottae*), northern sagebrush lizard (*Sceloporus graciosus*), and perhaps bullsnakes (*Pitophis melanoleucas*). The majority of these species commonly inhabit wet areas within the Snake River riparian zone and elsewhere on the valley floor and foothill regions (Koch and Peterson 1995), with the exception of rubber boas that are typically found in mesic forested areas with heavy ground cover (Baxter and Stone 1980). Populations of most of these species, with the exception of boreal toads, northern leopard frogs, and sagebrush lizards, appear healthy and are relatively common in Jackson Hole.

Western boreal toads are known to occur both within the GYA and GTNP. The southern Rocky Mountain population of western boreal toads has been a Candidate Species for listing under the ESA since 1995. The listing is considered warranted but precluded by USFWS due to higher priority species and activities. The northern Rocky Mountain population within the GYA, including Jackson Hole and GTNP, can be locally abundant, but appears to be less widespread than it was in the 1950's (Koch and Peterson 1995). Boreal toads inhabit mesic areas in the foothills, montane and subalpine life zones, willow marshes, and aspen or spruce-fir stands (Baxter and Stone 1980).

Northern leopard frogs were historically present in GTNP but observations confirming their continued existence are lacking (Koch and Peterson 1995). Although 3 museum specimens were collected at Jenny, String, and Leigh Lakes (Carpenter 1953), no verified sightings of this species have been made in GTNP in nearly 40 years (Koch and Peterson 1995). It is assumed that this species is extirpated from GTNP.

The northern sagebrush lizard is the only lizard species known to occur in the GYA and, specifically, in GTNP. Although not often found above 6,000 feet in the northern Rocky Mountains (Baxter and Stone 1985), it has been documented as high as 8,300 ft in YNP and GTNP in geothermally influenced areas and as high as 7,000 ft in non-geothermal areas (Koch and Peterson 1995). Occurrence of sagebrush lizards in GTNP was not confirmed until 1992 when an individual was observed near Pilgrim Creek (Koch and Peterson 1995). Three other observations are reported in GTNP (2 near Bar BC Ranch and one near Colter Bay) but all three are unverified (GTNP 2002). This species likely occurs only in small, localized areas such as along the east-facing exposed gravel terrace slopes above the Snake River east of the RKO Road

Fishes - Seven species of salmonids are present or possibly present within the project area (Kiefling, 1978). Only 2 of these species, the Snake River fine-spotted cutthroat trout (*Oncorhynchus clarki*) and mountain whitefish (*Prosopium williamsoni*) are native to the area. The 5 remaining salmonids (brook trout, brown trout, rainbow trout, lake trout, and grayling) are non-native species that have been introduced into Jackson Hole. In addition, 3 species of native suckers (Utah, bluehead, and mountain), 2 species of sculpins (Piute and mottled), and 5 species of cyprinnid minnows (Bonneville redside shiner, speckled and longnose dace, and leatherside and Utah chub) are also present.

The Snake River fine-spotted cutthroat trout is an indigenous subspecies inhabiting only the upper reaches of the Snake River drainage in Wyoming and extreme eastern Idaho, Jackson Lake, and Palisades Reservoir. It is a self-sustaining (no stocking) and economically important fish in the Jackson Hole area with estimates suggesting that fishing generates between $6.8-10 million annually. WGFD manages the Snake River and its spawning tributaries as a wild native fishery and has been keenly interested in the Snake River cutthroat trout for many years. Concerns about the long-term viability of this native species have arisen due to dramatic changes to its habitat and it was identified as a Candidate Species for listing under the Endangered Species Act although it was later removed from the list.

3.3 THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

3.3.1 Threatened and Endangered Species

GTNP contains four vertebrate species and no plant species listed under the Endangered Species Act (ESA) as threatened, endangered, experimental, or candidate species.

Table 3.3.1. Federally listed threatened, endangered, and experimental wildlife species occurring or potentially occurring in GTNP. *Data source: US Fish and Wildlife Service (USFWS 2003).*

Wildlife Species	Federal Status	Habitat Affinity
Bald Eagle *Haliaeetus leucocephalus*	Threatened	Riparian Areas
Canada lynx *Lynx canadensis*	Threatened	Montane Forests, Forest Mosaics
Grizzly bear *Ursus arctos horribilis*	Threatened	Montane Forests
Gray wolf *Canis lupus*	Experimental/Non-essential; Threatened in Natl. Parks	Various Throughout Greater Yellowstone Area

Bald Eagle (*Haliaeetus leucocephalus)*

Eagles feed primarily on fish, waterfowl, and carrion. Bald eagles nesting in GTNP belong to the Snake Population Unit of the GYA (GYEBEWG 1996). Most nesting territories in GTNP and Yellowstone National Park (YNP) are located along major rivers or lakes within 3 miles of their inlets or outlets, or along thermally influenced streams or lakes (Alt 1980). Nests and roosts commonly occur in mature and old growth trees in multi-layered stands of Douglas fir, cottonwood, or spruce. Proximity to food, presence of suitable perches, and security from human activities are important habitat components for both nest and roost sites. Nest building or repair activities in the Jackson Hole region begins in early February and eggs are laid in late March or early April, followed by a 35-day incubation period (Swensen et al. 1986; Harmata and Oakleaf 1992; Stangl 1994).

A total of 11 active bald eagle nesting territories were recorded in GTNP during 2003. Known territories are primarily located along the banks of the Snake River (*n*=8) and the shorelines of Jackson Lake (*n*=3). Bald eagles that nest along the Snake River may remain on their nest territories throughout the year, occasionally leaving for short periods during the non-breeding season to exploit abundant or ephemeral food sources elsewhere. In addition to spring, summer, fall, and winter use by resident breeding and non-breeding bald eagles, an unknown number of migrant bald eagles from northern latitudes spend much or all of the winter in this same area.

The number of occupied nesting territories in GTNP stayed relatively constant between 1990 (*n*=6) and 1999 (*n*=5) but more than doubled in 2001 and 2002 (*n*=12), and 2003 (*n*=11). The annual number of eaglets fledged for all nesting territories averaged 5.9 and varied between 3 and 9 during this same period with 2002 showing a total of 8. The total number of young per territory and the total number of young per nest has remained relatively constant between 1990 and 2002.

Bald eagle management in the park involves annual nest location surveys, monitoring of annual nest territory occupancy and productivity, and seasonal area closures around active bald eagle nests. Seasonal area closures usually occur February 15-August 15 and involve a 0.5-mile buffer zone around active bald eagle nests to provide protection from human disturbance.

Canada Lynx (*Lynx canadensis*)

The Canada lynx was first proposed for listing as a threatened species under the ESA in July of 1998 and was formally listed in April 2000. The USFWS determined the lynx population in the United 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. The final rule to list lynx in the lower 48 states emphasized the need for management and protection of lynx habitat on public lands (primarily public lands administered by the USFS and BLM) in order to ensure the continued survival of the species in the “contiguous US distinct population segment”.

In response to the uncertain status of lynx in the coterminous United States and to ESA listing, an interagency lynx coordination effort between the USFWS, USFS, and BLM, and NPS was initiated in March 1998. In January 2000, a “Canada Lynx Conservation Assessment and Strategy” (LCAS) was completed and approved (Ruediger et al. 2000).

GTNP has identified lynx management areas, called Lynx Analysis Units (LAUs), within the park as prescribed by the LCAS (Ruediger et al. 2000). A final mapping of LAUs in GTNP, based primarily on vegetative characteristics, was completed in spring 2004 and shows 5 areas totaling about 150,000 acres providing approximately 96,000 acres of potential lynx habitat.

Lynx are solitary carnivores generally occurring at low densities in boreal forests. Distribution and abundance of this species is closely tied to that of the snowshoe hares (*Lepus americanus*), their primary prey. In Wyoming, lynx occur primarily in spruce-fir and lodgepole pine forests with slopes of 8-12 degrees and at elevations from 7995-9636 ft (Ruediger et al. 2000). Densely regenerating coniferous forests and regenerating burned areas in mixed species forests provide excellent habitat for snowshoe hares and, therefore, are also important habitat for lynx. Dispersal corridors, principally continuous conifer forests, several miles in width, are critical for lynx travel and dispersal (Tanimoto 1998). Lynx travel corridors may be found in any conifer-covered landscape.

In Wyoming, the Canada lynx has been protected as a non-game species with no open season since 1973. It is considered rare in the state by the Ruediger et al. (2000) and is classified as a Category 2-Species of Special Concern by the Wyoming Game and Fish Department, indicating that habitat is limited and populations are restricted or declining (NPS 1998). Ruediger et al. (2000) reported the historical presence of lynx in western Wyoming from YNP through the Wind River and Wyoming Mountain Ranges. Fertig and Beauvais (1999) report lynx sightings in Teton and Lincoln counties of Wyoming from the mid-1980’s and 1990’s.

Information on lynx abundance and distribution within GTNP is mostly lacking. Park records include 12 anecdotal lynx observations (GTNP 2002), but the veracity of these reports is unknown and none have been confirmed. Three years of surveying within and around GTNP have failed to detect lynx presence. Low habitat quality (e.g., low densities of snowshoe hares) make it likely that Canada lynx, if present, will also occur at very low densities, perhaps only as transients (S. Cain 2002, pers. comm.). Recent research in YNP documented a female lynx and her male kitten in the east-central portion of YNP and a male in the Absaroka Mountains between Gardiner and Livingston, Montana; found probable lynx tracks near Le Hardy Rapids and Cub Creek; and found a possible lynx tracks near Mary Mountain (Murphy et al. 2003). These researchers cautioned that demonstrating lynx presence does not prove that resident individuals are present in YNP and that detected animals could be entirely transient to YNP or may be only partially resident in YNP.

Grizzly Bear (*Ursus arctos horribilis*)

Grizzly bears once ranged over most of western North America, from the Arctic Ocean to central Mexico. Although still abundant throughout much of Canada and Alaska, the range of grizzly bears in the lower 48 states is confined to 6 separate areas in Wyoming, Montana, Idaho, and Washington covering less than 1% of its historic range in the lower 48 states (USFWS 1993). Grizzly bears currently inhabit much of the GYA, including portions of YNP, GTNP, and Bridger-Teton, Shoshone, Targhee, Gallatin, and Custer National Forests.

Between 1800 and 1975, this grizzly population was reduced from an estimated 100,000 animals to less than 1,000 as a result of habitat destruction and intensive persecution from livestock interests (USFWS 1982). By 1974, some scientists estimated that fewer than 200 grizzlies remained in the GYA (Craighead et al. 1974). In 1975, grizzly bears were listed as threatened under the ESA in the lower 48 states. In 1982, a recovery plan for grizzly bear populations in the contiguous United States was completed and implemented (USFWS 1982). The guidelines were developed in 1983 to guide grizzly bear recovery. The IGBC is comprised of representatives from the NPS, USFWS, USFS, BLM, and the state wildlife agencies of Idaho, Montana, and Wyoming. Recovery zones and population goals were established in the Grizzly Bear Recovery Plan (USFWS 1982) and revised Grizzly Bear Recovery Plan (USFWS 1993). These plans established 6 grizzly bear recovery zones in the contiguous United States, one of which encompasses a portion of the GYA including portions of GTNP. The revised Grizzly Bear Recovery Plan established measurable population parameters as indicators of population status for the GYA (USFWS 1993). The USFWS will consider removing the Yellowstone ecosystem population of grizzly bears from threatened species status when these demographic recovery goals are met.

After being listed as a threatened species in 1975, grizzly bear population estimates in the GYA continued to decline through the early 1980’s. Starting in the mid-1980s, annual minimum population estimates have increased (Haroldson et al. 1998, Haroldson and Frey 2001), largely due to lower numbers of human-caused grizzly bear mortality, especially of adult female grizzly bears. In 2003, 50 unduplicated females with young were estimated in the GYA (Haroldson 2004). Absolute minimum population estimates for grizzly bears in the GYA based on counts of adult females with cubs-of-the year, have increased from a low of 99 in 1979 (Haroldson et al.1998) to a high of 354 in 2000 (Haroldson and Frey 2001). Eberhardt et al. (1994) evaluated population trends based on reproductive and survival rates and estimated a rate of increase of 4.6 percent annually since the mid to late 1980's.

Grizzly bear occurrence in GTNP has increased during the past 20 years, most likely in response to increases in bear densities throughout the GYA (Pyare et al. 2004). Grizzly bears are now relatively common in the southern GYA including the Gros Ventre Mountains southeast of GTNP and are regularly observed in the Teton Mountain Range north of Paintbrush Canyon and in the Badger Creek drainage (GTNP 2001). Grizzlies have been infrequently observed on the valley floor south of the Triangle X Ranch and south of GTNP in the vicinity of Teton Village and along the Snake River south of Jackson.

Management of grizzly bears and grizzly bear habitat in GTNP follow the Interagency Grizzly Bear Guidelines (1985) and the park's Human-Bear Management Plan (GTNP 1989). The documents were developed to provide effective direction for the conservation of grizzly bears and their habitat to federal agencies responsible for managing land within the recovery zone. Management of grizzly bears in both the GYA and, more specifically, in GTNP has been highly successful in promoting grizzly bear recovery and reducing bear-human conflicts (e.g., property damages, incidents of bears obtaining human food, bear-inflicted human injuries) and human-caused bear mortalities in the park.

Gray Wolf (*Canis lupus irremotus*)

The subspecies of the northern Rocky Mountain wolf was initially listed as an endangered species in 1973 (38 FR 14678). Due to taxonomic concerns, the entire species (*Canis lupus*) was listed as endangered in the contiguous United States outside of Minnesota, where it was listed as threatened in 1978 (43 FR 9607). Although gray wolves are native to the GYA (Young and Goldman 1944) human persecution resulted in their extirpation by the 1930's (Phillips and Smith 1996).

Wolf distribution varies depending upon prey abundance and includes a variety of habitats (e.g., grasslands, sagebrush steppes, coniferous and mixed forests, riparian, and alpine areas). Wolves tend to be flexible in their habitat needs and are considered habitat generalists. The most important habitat components for wolves are an adequate ungulate prey base and tolerance by humans (Jimenez 2001, pers. comm.). Small mammals also provide an important source of food during the non-winter months.

At the end of 2003, at least 301 wolves in 27 packs occupied the Greater Yellowstone Area park. The Teton Pack is the only wolf pack currently using GTNP consistently, although observations of other wolves with unknown pack affiliations occur regularly throughout the park. The traditional home range of the Teton Pack includes a small portion of Grand Teton National Park with the remainder of its territory within the Gros Ventre River drainage. This pack first denned in Grand Teton National Park in 1999. In spring 2004, the Teton pack consisted of about 18 wolves (9 adults and yearlings and 9 pups). The Gros Ventre Pack resided in the vicinity of GTNP between 1999-2001 but the pack no longer exists.

Wolf activity is concentrated in areas with dense populations of big game and, in the winter, wolves frequent elk feed grounds on the NER and in the Gros Ventre River drainage. There is no consistent wolf activity in southern portion of GTNP but confirmed wolf sightings have occurred in the vicinity of Signal Mountain Lodge and Elk Ranch (Cain 2002, pers. comm.) and the proximity of the southern portion of the park to the NER makes it highly likely that wolves use this area. Gray wolves are considered present throughout the project area but only in limited numbers.

Wolf management in the park consists of monitoring wolf population dynamics and gathering ecological data relevant to the wolf's return to the GYA. To determine territory sizes and locate dens, collared wolves are monitored using both ground-based and aerial telemetry. By observing dens, birthing dates are estimated and the number of pups counted. In addition, wolf deaths are investigated, and wolf-prey relationships are documented by observing wolf predation directly and by recording characteristics of wolf prey at kill sites. Collaborative research is ongoing and represents pioneering work on wolf ecology. All management and monitoring activities are closely coordinated with the USFWS.

3.3.2 Species of Special Concern

The NPS uses the species classification systems generated by the WGFD and the Wyoming Natural Diversity Database (WYNDD) in order to help identify key species to monitor. The WGFD classifies certain non-game animal species as “species of special concern” and categorized these species into a range of priority groups according to their need for special management. This classification system evaluates species’ distribution, population status and trend, habitat stability, and tolerance of human disturbance (WGFD 1996). Plants and animals are considered species of special concern by the WYNDD if they are “vulnerable to extirpation at the global or state level due to inherent rarity, substantial loss of habitat, or sensitivity to human-caused mortality or habitat disturbances” (Fertig and Beauvais 1999). In addition, many plants listed as “sensitive” by federal land management agencies are considered species of special concern by WYNDD (2002).

Trumpeter Swans (*Cygnus buccinator*)

Trumpeter swans are classified as a Priority 2 species of special concern by WGFD and also are a species of interest to the USFWS because of a long-term decline in the year-round resident population. Over-winter survival has decreased because of suspected competition for marginal winter range with a migratory Canadian trumpeter swan flock and low reproductive recruitment. A recent petition for listing trumpeter swans as threatened and identifying the Tri-State population (residing in the GYA) as a distinct sub-population was filed with the USFWS, but denied in February 2003.

The GYA is home to the Tri-State subpopulation of trumpeter swans (part of the Rocky Mountain Flock) and is the largest breeding area for swans in the lower 48 states. In spite of harsh winter conditions, swans that breed in this region also winter here. Swan survival in the GYA has been attributed to the presence of warm spring-fed creeks and streams in the mountain valleys which enable them to find open water on or adjacent to breeding areas during the winter (Lockman et al. 1987). Swan survival is also attributed to avoidance of migration routes through popular waterfowl hunt areas.

Late summer estimates for the Tri-State subpopulation for 2000 totaled 415 swans and consisted of 318 adults/subadults and 97 cygnets (Patla 2001, pers. comm.). Of the 415 swans observed in 2000, 29% were in Wyoming (n=122), 34% in Idaho (n=142), and 36% in Montana (n=151). During the past 32 years the Tri-State subpopulation has ranged between a low of 364 in 1995 and a high of 589 in 1990 (Caithamer 2001). In 2000, Wyoming (outside of YNP) had 16 nesting pairs that produced 34% (33) of the cygnets observed. Of the total cygnets fledged in 2000, Wyoming produced 26. More recent reproductive data collected in Wyoming (outside of YNP) showed 28 sites occupied by swan pairs, 17 actual nesting territories, 29 cygnets hatched, and 21 cygnets fledged in 2001. Of 12 known nesting territories within GTNP between 1988 and 2002, 8 were occupied during 2002; 3 had unsuccessful nesting attempts, 2 had no nesting attempts, and 3 fledged a total of 3 cygnets.

The entire reach of the Snake River within GTNP represents winter swan habitat. Swan numbers vary annually with most swans found between the Jackson Lake Dam and Moran. The greatest numbers of trumpeter swans pass through GTNP in late October through mid-November and concentrate along shallow areas in Jackson Lake (north end and also south end above the dam). The Snake River Oxbow also receives considerable swan use. After the lake freezes, swans move down the Snake River into areas in southern Jackson Hole and eastern Idaho. Braided channel areas between Moose and Moran are also used but variable surface icing strongly influences swan numbers and distribution. Collisions with wires and bridges are a major cause of mortality and conflicts with recreationists may preclude use of some habitat by swans in winter (S. Patla 2002, pers. comm.)

Neotropical Migratory Birds

Neotropical migratory birds include raptors, passerines, and shorebirds that breed in North America, but migrate to Mexico, Central and South America for the winter. In Wyoming, 162 bird species are considered Neotropical migrants (Cerovski et al. 2001) with peak migration periods occurring in May and September through early October. Nesting is typically initiated from mid-May to mid-June.

Neotropical migratory birds are of particular interest to wildlife managers because they have been experiencing severe population declines throughout their North American range. Habitat fragmentation and loss of winter range are at least 2 factors believed responsible for these declines. Although studies were not conducted to inventory Neotropical migrant species presence and possible nesting within the project area, Wallen (1994, pers. comm.) found that riparian and wetland habitats in GTNP generally contain the highest density of neotropical migrants. The mixture of wetland, riparian, and upland habitats found within the project area makes it certain that a variety of neotropical migrant species are present and breed here between May and mid-July. Sagebrush-grassland plant communities also provide important breeding habitat and these communities are also abundant in the project area.

Neotropical migrant species expected to be present within the project areas include (but are not limited to) savannah sparrow, Brewer's sparrow, chipping sparrow, vesper sparrow, lark sparrow, sage sparrow, green-tailed towhee, Say's phoebe, western and eastern kingbirds, mountain bluebird, western meadowlark, American robin, sage thrasher, yellow-headed and red-winged blackbird, Brewer's blackbird, brown-headed cowbird, common nighthawk, mourning dove, barn and bank swallow, killdeer, marsh and rock wren, osprey, northern harrier, American kestrel, red-tailed hawk, Swainson's hawk, merlin, and prairie falcon.

Western Sage-Grouse (*Centrocercus urophasianus*)

Sage-grouse populations across their entire North American range have been in decline for nearly 20 years and these declines have resulted in certain species, subspecies, and distinct population segments have been petitioned for listing under the ESA. However, as of mid-2004, the species was still under review for listing by the USFWS.

Western sage-grouse are considered a species of special concern by WGFD and by GTNP. The USFWS has been petitioned to list sage-grouse populations in Washington State ("western") but not in Wyoming, southwestern Colorado and southeastern Utah (Gunnison's), California and Nevada (Mono Basin), and "eastern" sage-grouse but none have been listed to date. Western sage-grouse are now considered as a species of concern by WGFD and the department has recently published a final statewide conservation plan for Wyoming sage-grouse (WGFD 2003).

Western sage-grouse are year-round residents of Wyoming and numbers of breeding sage-grouse are estimated in excess 20,000 (Braun 1998). However, western sage-grouse populations throughout the West, including Wyoming, have experienced an average 33% decline since 1985 (Braun 1998). The exact cause of their decline has not been conclusively identified but permanent loss, degradation and fragmentation of key habitat, as well as low nest productivity are likely factors. Since most land management agencies are interested in preventing the listing of western sage-grouse, research and conservation efforts are underway throughout their range. State and local working groups have initiated conservation planning efforts that focus on providing guidelines for sustaining and/or perpetuating sage-grouse populations through consistent and up to date management strategies. In Wyoming, the Wyoming Greater Sage-Grouse Conservation Plan (WGFD 2003) outlines these guidelines. In addition, the Northwest National Fire Plan Consultation Process has developed criteria for the Forest Service and Bureau of Land Management to evaluate the potential impacts that proposed fire activities may have on sage-grouse populations and their habitat.

Sage-grouse populations in Jackson Hole are considered to be remnant and at risk of local extinction. Bird hunting is not permitted in GTNP and WGFD has closed other areas of Jackson Hole to sage grouse hunting indefinitely. Local sage-grouse populations, as measured by male and female attendance on leks, have declined by 85% since 1990 (M. Holloran 2002, pers. comm.) compared to an approximately 30% decline elsewhere in Wyoming. The reasons for these declines are unknown; therefore, it is important to carefully evaluate Park activities that may affect sage-grouse behavior and/or their important habitats.

Sage-grouse are present in the eastern and southern portions of the park. Eight historical sage-grouse leks are known within GTNP, but sage-grouse used only 3 in 2003 (Antelope Flats, Jackson Hole Airport, and east of Timbered Island).

Recent studies have identified the north end of the Elk Refuge, the sagebrush flats around Kelly, an area south of Blacktail Butte, and Wolffe Ridge (M. Holloran 2002, pers. comm.) as important winter range. Loss of sagebrush habitats, especially on the north end of the refuge, may adversely affect wintering sage-grouse during difficult winters. A wildland fire burned about 2,500 acres of sage-grouse habitat located south of Blacktail Butte in 2003.

Sage-grouse are dependent upon large expanses of sagebrush habitats containing diverse and substantial understory of native grasses and forbs needed for food and cover throughout much of the year. Habitat requirements for sage-grouse change somewhat during the lekking, nesting, brood-rearing, and wintering periods (Table 3.4.2). Sage-grouse have a high fidelity to seasonal ranges and return to historical lek and nest sites year after year (Fischer et al. 1993).

Table 3.3.2. Characteristics of sagebrush in productive sage-grouse habitat. *Source: Connelly et al. 2000.*

	Breeding		Brood-rearing		Winter	
	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)
Sagebrush	40-80	15-25	40-80	10-25	25-35	10-30
Grass-Forb	>18	>25	Variable	>15	N/A	N/A
Areal Coverage	>80		>40		>80	

Breeding habitat critical for the survival of sage-grouse populations is characterized by sagebrush dominated rangelands with a healthy herbaceous understory. Lek attendance, nesting and early brood-rearing all occur within breeding habitats; however, vegetation characteristics differ between each of these areas. Breeding activity begins in mid-March when grouse gather on leks. Located in open areas (e.g., meadows), low sagebrush zones, ridgetops, and old lakebeds surrounded by denser sagebrush cover (Connelly et al. 1981).

Females disperse to nesting areas characterized by relatively dense, tall, mature sagebrush stands (Table 3.4.2, Connelly et al. 2000, Holloran 2004). Nests are typically shallow depressions lined with grass, twigs, and feathers located under the tallest shrub in the given sagebrush stand (Keister and Willis 1986). Most nests occur within 5-6 km (2-4 miles) of the lek, but some nests may be more than 20 km (12 miles) away (Autenrieth 1981, Wakkinen et al.1992). Sage-grouse nests in GTNP average 4.5 km (range from 2.3-10.0 km) from active leks

(Holloran 2004) and are located throughout Antelope Flats, Ditch Creek, Baseline Flats, the Potholes, and north of the Jackson Hole Airport.

Early brood-rearing typically occurs in dense, mature sagebrush stands (Table 3.3.1; Holloran 2004) close to nest sites (Gates 1983). Hens and their broods also use relatively open sagebrush stands that have good grass and forb cover as summer progresses (Lyon 2000) and depend on forbs and insects for food during the brood-rearing period. Sage-grouse usually move to more mesic sites as sagebrush habitats desiccate (Gates1983, Connelly et al. 1988). Known brood-rearing locations in GTNP include Antelope Flats, Baseline Flats, north of the Jackson Hole Airport, and southwest of Lost Creek Ranch. Sage-grouse use a variety of habitats in the fall including both sagebrush and meadows, and areas within recent prescribed burns.

Some researchers describe winter habitat as probably the most limiting seasonal habitat (Beck 1977, Eng and Schladweiler 1972, Patterson 1952) and thus perhaps the most critical (Remington and Braun 1985). Sage-grouse select dense, tall stands of mature sagebrush during the winter where they find both food and cover (Table 3.4.2) but also 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 include relatively flat south to west facing slopes such as south of Blacktail Butte and on Wolff Ridge, exposed sagebrush near Lost Creek Ranch, the Potholes, and areas near the town of Kelly and the Teton Science School (Holloran 2001).

Fire may be beneficial or detrimental to sage-grouse, depending on the particular setting and location relative to seasonal changes Call and Maser (1985). Sage-grouse use sagebrush of different age classes and stand structure for different life history events at different seasons. Fire effects on these different sagebrush habitats vary.

Harlequin Ducks (*Histrionicus histrionicus*)

Harlequin ducks are currently listed by the USFS as a sensitive species and by WGFD as a Category 3 species of special concern. Although previously listed by the USFWS as a Category 2 Candidate species for listing under the Endangered Species Act, this classification has since been removed. Harlequin ducks are known to be present in GTNP.

The distribution of harlequin ducks in Wyoming is confined to the northwestern corner of the state and includes GTNP. Harlequins are seasonal residents, summering in the area and wintering in marine waters along the Pacific coast. This species prefers cold, shallow, rapid mountain streams away from concentrated human activities. Nesting habitat includes very low gradient stream sections with dense shrubs lining the banks, braided channels, swift currents, and water rich in aquatic insects. Harlequin ducks nest on the ground or in tree cavities and their nests consist of a mass of down concealed in a rock crevice or cavity along a stream. They are diving ducks that eat crustaceans, mollusks, insects, and fish. They winter in marine waters along the Pacific coast.

Harlequin duck presence on a given stream is an indicator of high water quality. Nesting success is influenced by water quality and stream degradation due to sedimentation, channelization, logging, incompatible recreation, and incompatible livestock grazing adversely affects nesting success (Cassirer et al. 1996, Nicholoff 2003).

Wolverines (*Gulo gulo*)

Wolverines are medium-sized carnivores that are holarctic in their distribution around the northern hemisphere. In North America, the range extends south from the arctic tundra and forested portions of Alaska and Canada into the Rocky Mountain region. Present distribution of the wolverine in the western United States appears to constitute several peninsular extensions of Canadian populations (Hash 1987; Banci 1994). Extirpation of the wolverine throughout the eastern and mid-western portions of its range probably coincided with the westward advancement of civilization (Banci 1994). The USFWS was petitioned to list wolverines under ESA in 2000 but determined on October 21, 2003 that the petition does not provide substantial information indicating that listing may be warranted. The WGFD classify wolverines as a Category 3 species of special concern and U.S.Forest Service and the BLM classify the wolverine as a sensitive species.

The wolverine is a habitat generalist that is generally associated with remote, inaccessible terrain. Important source habitats (core habitat) include alpine tundra and all subalpine and montane forest types (Wisdom et al. 2000). Vegetative characteristics appear less important than physiographic structure of the habitat (Wolverine Foundation, 2002a). Montane coniferous forests, suitable for winter foraging and summer kit rearing, may only be useful if connected with subalpine cirque habitats required for natal denning, security areas, and summer foraging. In addition, these habitats must be available during the proper season. Subalpine cirque areas, important for natal denning, may be unavailable due to the presence of winter recreationists. Conversely, high road densities, timber sales, or housing developments on the fringes of subalpine habitats may reduce potential for winter foraging and kit rearing, and increase the probability of human-caused wolverine mortality. Wolverines migrate seasonally between higher and lower elevations in search of food. In winter, a large part of their diet includes big game carrion (Banci 1994), but they also feed on a variety of small mammals and birds (Hash 1987).

Witmer et al. (1998) identified 3 issues that are important to wolverines conservation: 1) maintenance of large, remote areas of habitat, 2) maintenance of adequate prey populations, and 3) minimizing incidental trapping and predator control mortalities. Winter is a critical period for wolverine and they rely on large home ranges that are likely to intersect winter recreational activities. Winter recreation, such as skiing and snowmobiling, have the potential to affect wolverine foraging, denning or movements.

GTNP provides habitat that helps support the GYA wolverine population and a small number of wolverines are present within the park. An ongoing wolverine study being conducted by the Wildlife Conservation Society has captured and marked five individual wolverines as of winter 2001-02 (*Wolverine Foundation, 2002b*).

3.3.3 Plant Species of Special Concern

Based on plant data from the Wyoming Natural Diversity Database (WYNDD), there are 63 plant species of special concern occurring in GTNP. Each of these species has been assigned a global rank from 1-5 referring to the range-wide probability of extinction for a species as designated by the Nature Conservancy and its network of natural heritage programs. In addition, each also has a state rank from 1-5 referring to the probability of extinction from Wyoming as designated by WYNDD. The following descriptions provide a breakdown of the global and state ranking system scales:

1. Critically imperiled because of extreme rarity or because some factor makes it highly vulnerable to extinction.
2. Imperiled because of rarity or because of factors making it vulnerable to extinction.
3. Rare or local throughout its range or found locally in a restricted range.
4. Apparently secure, although it may be quite rare in parts of its range, especially at the periphery.
5. Demonstrably secure, although it may be rare in parts of its range, especially at the periphery.

There are no G1 species in GTNP but five G2 and G3 species are present. None of the G2 or G3 species grow in habitats where fire is part of the natural disturbance regime and, therefore, these 5 species are not included as part of the affected environment. G4 and G5 species that are also ranked S1 by the WYNDD and occur in habitats where fire is part of the natural disturbance regime are discussed individually in Appendix J.

3.4 WATER RESOURCES

Approximately 10% of GTNP is covered by surface water. Much of this coverage is in seven lakes along the eastern front of the Teton Range (Jackson, Jenny, Leigh, String, Two Ocean, Emma Matilda, and Phelps Lakes) and the Snake River. The Wyoming Department of Environmental Quality has designated these waters as Class 1 – Outstanding Resource Water. No further degradation of these waters is allowed, and restrictions for avoiding all point source discharges have been applied. There are approximately 100 alpine lakes above 9,000 feet, most of which are fed by mountain drainages and eventually drain into the main waterbodies listed above and ultimately into the Snake River.

3.4.1 Surface Waters

Jackson Lake

Glacial moraines are prevalent throughout the park and one such formation created Jackson Lake, the largest waterbody in GTNP. Although naturally formed, the construction of a dam in 1916 by the Bureau of Reclamation substantially enlarged the lake. Jackson Lake is fed primarily by the Snake River, but numerous other small creeks drain into the lake from surrounding mountains and wilderness areas (i.e., Arizona, Pilgrim, Owl, Moose, Third, Moran, Berry, and North Moran Creeks). As with all waters within NPS boundaries, Jackson Lake is classified as Class 1 waters with special designation as Class 2A. This classification is given to Class 1 waters that provides exceptional coldwater fisheries habitat and are of high enough quality for drinking water standards. Such high water-quality standards are typical of snowmelt-fed, high elevation waterbodies with low water temperature, nutrient loading, and turbidity and high dissolved oxygen averages.

Leigh, String, and Jenny Lake

The Leigh/String/Jenny Lake complex is a series of lakes also formed by glacial activity and fed primarily by mountain tributary creeks. They drain from north to south from Leigh Lake to String Lake to Jenny Lake. Cottonwood Creek flows out of Jenny Lake and eventually drains into the Snake River. These lakes total about 2,298 ac (3.6 sq mi) of surface water and are all classified as Class 1/2AB water.

Two Ocean and Emma Matilda Lakes

Two Ocean and Emma Matilda Lakes are located in the hills east of Jackson Lake. The formation of these lakes is unknown and is not attributed to glacial activity. Two Ocean Lake is approximately 589 acres (0.9 sq mi) and Emma Matilda Lake is about 890 acres (1.4 sq mi). Both lakes contain pristine water quality.

Phelps Lake

Phelps Lake is located near the southern park boundary within the Greys-Hoback Watershed. Much like the other lakes along the base of the Teton Range, this lake was formed by glacial activity. Phelps Lake encompasses approximately 456 acres (0.7 sq. mi).

Snake River

The Snake River originates on the western slope of the Continental Divide in the northwestern portion of the Teton Wilderness Area and flows for approximately 450 miles through the upper Snake River Basin into south-central Idaho. From its headwaters, the river flows westward through a portion of YNP, south through the parkway and into Jackson Lake.

3.4.2 Regional Watershed Characteristics

Upper Snake River Watershed

The Upper Snake River watershed encompasses 275,840 ac (431 sq mi) of GTNP. For most of its length, the river follows the pattern of a classic braided stream, flowing and meandering through its floodplain. However, in the area adjacent to Moose, flow is contained within a single channel. The river returns to a braided form about 1 mile south of Moose where its western boundary is contained by a flood control levee maintained by the US Army Corps of Engineers and Teton County.

Principle tributaries to the Snake River below Jackson Lake include Buffalo Fork River, Spread Creek, Pacific Creek, Cottonwood Creek, and Ditch Creek. No tributaries enter the Snake River within GTNP boundaries below the Upper Snake Watershed.

Gros Ventre and Greys-Hoback Watersheds

The Gros Ventre River flows through the southeastern portion of GTNP, joining the Snake River south of the park boundary. The Gros Ventre River headwaters originate in the Wind and Gros Ventre River Ranges, with a drainage area of 683 sq mi (USGS 2004). Average daily discharge rate measured at the Zenith, Wyoming gauging station (near southern GTNP) is approximately 317 cubic feet/second (USGS 2003). This watershed accounts for 7,040 ac (11 sq mi) of GTNP.

The Greys-Hoback watershed encompasses 26,240 acres (41 sq mi) of the southwestern corner of GTNP. The principal watercourses found within this section of the park include Lake and Granite Creeks, which flow south out of the park until their confluence with Fish Creek.

3.5 WETLANDS

National Wetlands Inventory (NWI) mapping was completed in 1990 by the USFWS and is available for the entire park. NWI mapping is the primary wetland tool used by the NPS to provide general locations of and information about wetlands and open water habitats using a wetland classification system developed by Cowardin et al. (1979). Four wetland types are expected to be present within the park and include palustrine emergent, palustrine scrub-shrub, palustrine forested,and open water.

Palustrine Emergent Wetlands: These wetlands are characterized by erect, rooted, herbaceous hydrophytic plants, excluding mosses and lichens. Vegetation is present for most of the growing season in most years and is usually dominated by perennial plants. Plant species that dominate emergent wetlands in the affected area include sedges (*Carex* spp.), rushes (J*uncus* spp.), spikerush (*Eleocharis* spp.), and various hydrophytic grasses. Palustrine emergent wetlands exist in a variety of geomorphic settings and water regimes, both of which strongly influence plant species composition. Emergent wetlands may revert to open water habitats during wetter climatic periods.

Palustrine Scrub-Shrub Wetlands: These wetlands are dominated by woody vegetation less than 20 feet tall. Plant species may include true shrubs, young trees and trees and shrubs that are stunted due to environmental conditions. Scrub-shrub wetlands may represent a seral stage leading to a forested wetland or they may be stable, self-perpetuating plant communities. Palustrine scrub-shrub wetlands in the park are usually dominated by willows (*Salix* spp.), but may also be dominated by alders (*Alnus* spp.), birches (*Betula* spp.) or other shrubs. Scrub-shrub wetlands exist in a variety of water regimes and geomorphic settings.

Palustrine Forested Wetlands: Trees taller than 20 feet dominate forested wetlands and are relatively uncommon in arid to sub-humid regions. Forested wetlands in GTNP, and the GYA are usually restricted to river valleys where water is abundant or higher elevations where moist conditions are found (Tiner 1999). Forested wetlands in GTNP are dominated by narrowleaf cottonwoods (*Populus angustifolia*), quaking aspen, subalpine fir, alders, willows, and lodgepole pine.

Open Water: Shallow water (palustrine), lakes and ponds (lacustrine) and stream channels (riverine) within which water is present on an annual, but not necessarily permanent basis, are considered to be open water habitats. Macrophytic plants are usually present and include a variety of rooted and floating species.

NWI mapping reveals wetland areas scattered throughout GTNP. Wetlands in GTNP are diverse, largely pristine, and have high functional values. Park wetlands are predominately palustrine emergent and scrub/shrub wetland. The most extensive palustrine wetlands are located:

- Along the Snake River floodplain below Jackson Lake Dam;
- Along the Buffalo Fork River;
- In the Willow Flats area north of the Jackson Lake dam;
- Along the Gros Ventre River; and;
- At the Snake River inlet of Jackson Lake.

Wetlands are important components of the Snake River aquatic and riparian zones and help create diverse wildlife habitat for prominent species of birds, such as the bald eagle, trumpeter swan, great blue heron, and osprey (NPS 1997). Willow Flats supports diverse bird and mammal populations and the area between Willow Flats and Colter Bay Village on Jackson Lake has many ponds (e.g., Swan Lake and Heron and Cygnet ponds) are bordered by emergent wetlands.

3.6 SOILS

A variety of soils exist in GTNP. Combinations of rubble lands and rock outcrops, sometimes intermixed with soil, dominate the project area. These rubble land and rock outcrop units are associated with steeper areas along the western portion of the Teton Mountain Range. Erosion hazard and surface runoff is generally high.

GTNP soil survey mapping indicates that Taglake-Sebud Association and Tineman-Bearmouth gravelly loams dominate the flat meadows of the valley floor. These soils developed from the porous quartzite sand and gravel deposited by glacial meltwater. Surface runoff and erosion hazard is variable. Small basins (kettles) are left in the moraine deposits from glacial outwash material. These glacial outwash soils are generally very deep and well drained and have little water retention capability. As a result, these soils are nutrient poor and support a fragile sagebrush/grassland community.

Floodplain soils include Tineman-Bearmouth gravelly loam, Tineman gravelly loam, Teton Wilsonville fine sandy loam, and Tetonville Riverwash Complex. Characteristics associated with these floodplain soils include a seasonally high water table, slow surface runoff and slight erosion hazard.

3.7 WILDERNESS

GTNP contains recommended and potential wilderness areas, both of which are considered designated wilderness for the purpose of this analysis (Figure 3.7). GTNP has recommended that Congress include about 122,604 acres of the park's backcountry in the National Wilderness Preservation System pursuant to Public Law 88-577 (Wilderness Recommendation GTNP 1984). This 122,604 acres is approximately 43% of GTNP and encompasses the Teton Range, several of the lakes at the base of the range, and Two Ocean Lake in the northeastern portion of the park. Another 7% of GTNP is potential wilderness. Potential wilderness is comprised of two parcels that total 20,850 acres, most of which is located in the Potholes, southeast of Jackson Lake. A smaller parcel is located adjacent to recommended wilderness, near Phelps Lake, southwest of Moose.

To date, Congress has not enacted legislation to include the recommended wilderness in the National Wilderness Preservation System. However, NPS policy dictates that potential and recommended wilderness areas are treated as wilderness (so as not to preclude eventual designation). When considering the management of wilderness in GTNP, park staff consider three types of values (Table 3.7).

Table 3.7. Wilderness Values.

Type of Value	Definition
Biophysical Aspects	The natural condition of the land, its wildlife, and ecological processes (such as native wildlife and natural fire regimes)
Experiential Aspects	The personal benefits and meanings people derive from their experiences in wilderness (such as personal challenge and self-discovery)
Symbolic Aspects	The meanings that individuals and society derive from the existence of wildernesses (such as humility and restraint)

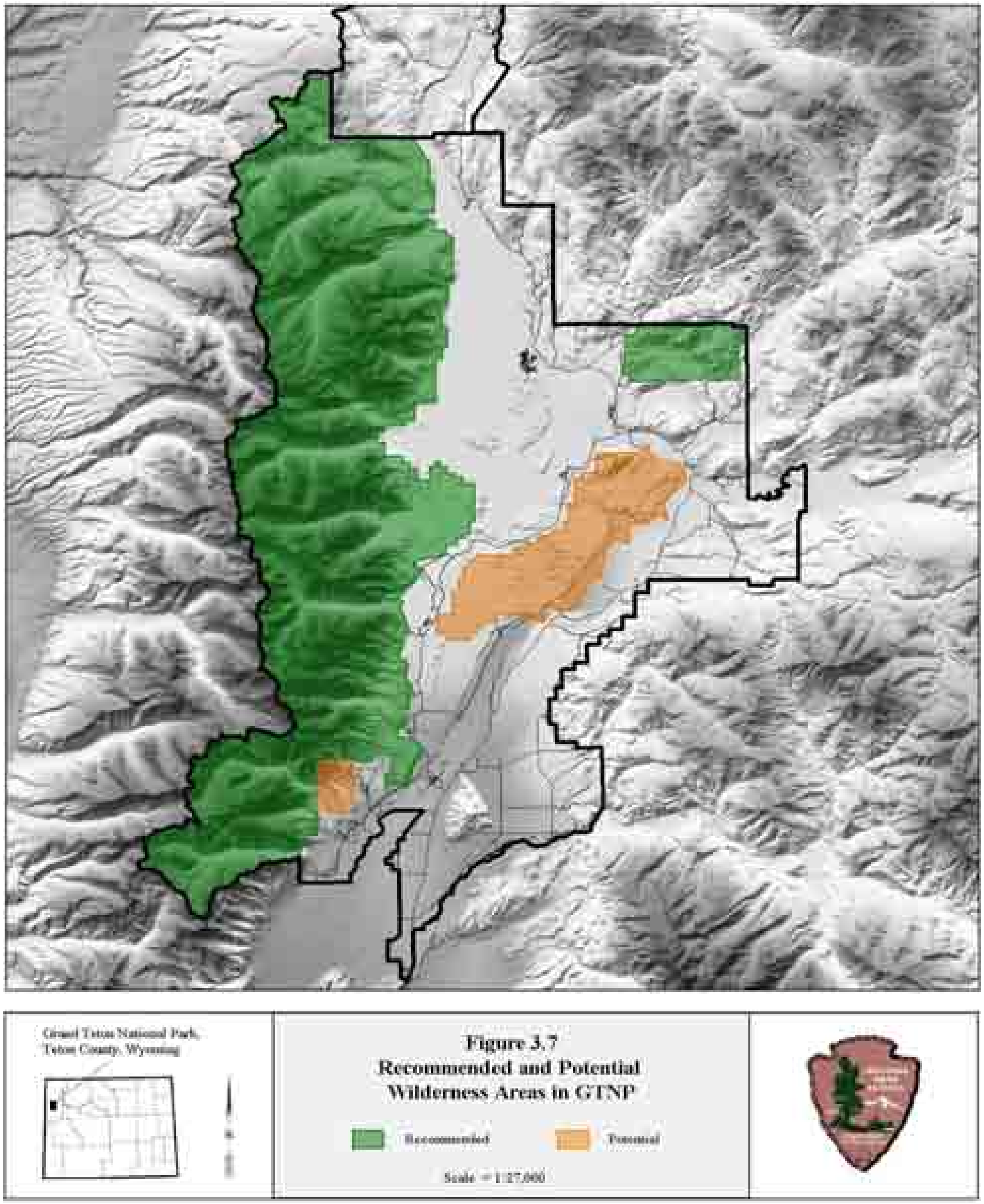


Figure 3.7
Recommended and Potential Wilderness Areas in GTNP

3.8 AIR QUALITY/VISIBILITY

3.8.1 Regulatory Overview

Air pollution sources within national parks must comply with all federal, state, and local regulations. The Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from air pollution. To date, the EPA has set standards for 6 criteria pollutants: carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, (SO_2), ozone (O_3), lead (Pb), and particulate matter less than 2.5 ($PM_{2.5}$) and less than 10 ($PM_{10)}$ microns in diameter.

The NPS has developed guidance for air quality and smoke management related to wildland and prescribed fires (NPS 1999a). This is supplemented by guidance and policies from the EPA (i.e., Interim Air Quality Policy on Wildland and Prescribed Fires, Federal Wildland Fire Management Policy, and PM10 Natural Events Policy). In 1998, the EPA developed an interim policy for addressing impacts of managed wildland fires and prescribed fires on public health and welfare. Ambient air quality below the national ambient air quality standards for $PM_{2.5}$ and PM10 is used as the principal indicator of adverse impacts to public health. Poor visibility is used as the principal indicator of adverse impacts to public welfare. This policy complements the Natural Events Policy, which addresses public health impacts from wildland fires.

The EPA has also developed regional haze regulations to improve visibility or visual air quality in national parks and wilderness areas across the country (EPA 1999). In developing these rules, the EPA recognized that fires of all kinds, including prescribed fire and wildland fires, contribute to regional haze and that there is a complex relationship between what is considered a natural source of fire versus a human-caused source of fire. Given that in many instances the purpose of prescribed fires is to restore the natural fire regime to forest ecosystems, the EPA is working with states and federal land managers to support development of enhanced smoke management plans to minimize the effects of fire emissions on pubic health and welfare.

Wyoming Department of Environmental Quality (WDEQ) is the governing authority for regulating air pollution from stationary sources in the state. Wyoming recently completed the codification of new smoke management regulations that recognize both the importance of protecting air quality and the role of fire. A comprehensive Smoke Management Plan (SMP), which meets the requirements of the Regional Haze Rule and the Clean Air Act, includes burn activity reporting, smoke reductions techniques, and alternatives to burning. Generally, the agency planning a prescribed fire must notify WDEQ, provide burning location, acreage, vegetation type, fuel conditions, schedule, location of sensitive receptors, and other information.

3.8.2 Air Quality and Visibility Conditions

Air quality in northwestern Wyoming is considered good as a result of little industrial activity and low populations in the region. Industrial activity in Wyoming mainly occurs in eastern and southwestern counties. Major sources of gaseous pollutants and deposition in the GYA are electrical utility power plants, industrial fossil-fuel combustion, and oil and gas processing in southwestern Wyoming and southeastern Idaho. Annual emissions levels of gaseous SO2, NOx and VOC in Wyoming are moderate relative to other states (Peterson et. al. 1998).

GTNP is classified as a Class I air quality area and John D. Rockefeller, Jr. Memorial Parkway is classified as a Class II air quality area. Under NPS policy, both park units are managed as Class I areas and both are in attainment with federal and state ambient air quality standards. Large and small particulate monitoring in Jackson and Cody, Wyoming are well below NAAQS for both the yearly mean and the 24-hour average concentration, which is a level that may not be exceeded on more than one day per year, after compensating for days when monitoring did not occur (Table 3.8.2a).

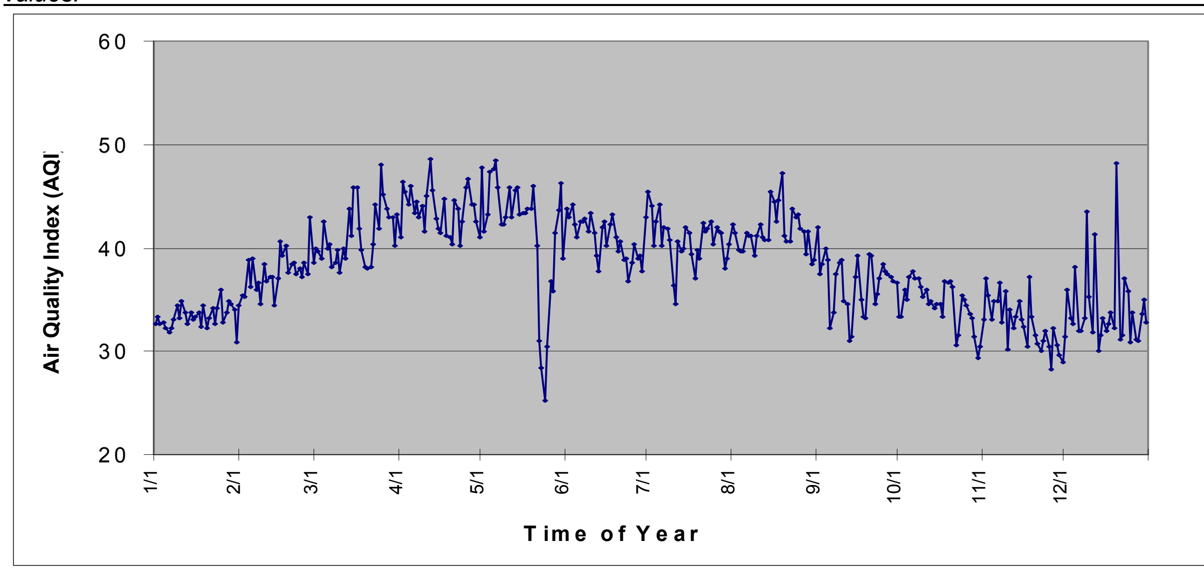
Table 3.8.2a. Relevant ambient air quality standards compared to current background concentrations representative of Grand Teton National Park. *The most representative monitoring station for particulate matter for GTNP is located in Jackson (Darla Potter, WDEQ, pers. comm.). The monitoring station in Cody was selected as a representative measure of regional conditions. Background concentrations are considerably lower than federal air quality standards.*

Pollutant	Time Period	Federal	Jackson, Teton Co., WY 2000	2001	2002	2003	Cody, Park Co., WY 2000	2001	2002	2003
Respirable PM_{10} (current)	24-hour Average ($\mu g/m^3$)	150	66	44	43	67	73	66	47	64
	Annual Mean ($\mu g/m^3$)	50	28	21	17	21	20	17	15	19
Fine $PM_{2.5}$ (proposed)	24-hour Average ($\mu g/m^3$)	65	--	30	18	24	--	--	--	--
	Annual Mean ($\mu g/m^3$)	15	--	9	7	7	--	--	--	--

Source: EPA Air Data http://www.epa.gov/air/data/geosel.html

Air Quality Index (AQI) values (see Section 4.8) averaged over the past 10 years for Teton County, Wyoming indicate that values tend to be highest in early spring. Winter levels tend to fluctuate, with values on some days equaling the seasonally high spring values (Table 3.8.1). High AQI values in the spring are likely associated with the burning of agricultural fields and irrigation ditches. High AQI values in the winter are likely associated with woodburning stoves and low pressure conditions. This is evidenced by the fact that the main pollutant generally shifts from ozone to PM in the spring and winter.

Figure 3.8.2b. Seasonal air quality trends from 1993-2003 in Teton County, Wyoming. *An AQI value of 100 is equivalent to the NAAQS for either ozone or particulate matter, depending on the primary pollutant for the day (see Section 4.7.1). Winter levels tend to fluctuate, with values on some days equaling the seasonally high spring values.*



While visibility is not currently a major problem in the GYA, it is an important air quality concern. Primary sources for particulates are fire, unpaved roads, seasonal increases in CO, particulates associated with woodburning stoves in Jackson (15 mi south of GTNP), and high snowmobile use (Peterson et. al. 1998). The Jackson Hole region has exceeded the standard for total-suspended particulate matter in only a handful of instances. All occurrences were in the mid-1990s and during the winter season, when wood-burning and street sanding are most common.

3.9 ARCHAEOLOGICAL RESOURCES

Although less than 10% of the lands within GTNP have been surveyed, previous archaeological surveys within the park and on adjacent lands suggest a seasonal settlement pattern for the Jackson Hole area. The park's prehistoric sites represent a wide range of plant, animal, and stone procurement locations, seasonal camps and plant processing features that represent more than 10,000 years of human use in Jackson Hole.

To date, 190 prehistoric sites are known to exist within the project area, 146 of which have not been evaluated for eligibility to the National Register of Historic Places (NRHP). Thirty-eight of these have been classified as eligible for listing in the NRHP and are included in the Jackson Lake Archaeological District. Two additional sites near Jenny Lake are also eligible for listing in the NRHP and four prehistoric sites have been determined ineligible for listing in the NRHP (NPS 1990).

Because of the lack of archaeological surveys within the park and parkway project area, additional archaeological surveys will be required and fieldwork will be needed to determine whether sites are eligible for listing in the National Register of Historic Places.

3.10 HISTORIC STRUCTURES & CULTURAL LANDSCAPES

3.10.1 Historic Structures

The park landscape includes 34 properties listed in the National Register of Historic Places (two are private inholdings), two properties eligible for listing, and one National Historic Landmark. A second nomination is currently being prepared for the Murie Ranch to become a National Historic Landmark. Nearly all properties owned by the park have been evaluated for eligibility to the National Register.

Eligible or listed historic structures within the park number 322 and include ranches, homesteads, patrol cabins, residences, vacation homes, ranger stations, a church, Civilian Conservation Corp camp buildings, administration buildings, and concession facilities. The properties are associated with the historic contexts of settlement, conservation, park administration and development, dude ranches, and tourism.

Historic structures are located throughout GTNP, with many structures concentrated along Teton Park Road between Moose and Jackson Lake Lodge, and on East Antelope Flats. Properties on East Antelope Flats include the Mormon Row Historic District, Aspen Ridge Ranch Residence and Barn, Hunter Hereford Ranch Historic District, and the McCollister Residential Complex.

Hazardous fuels reduction projects have and/or would target the majority of National Historic Landmarks and properties listed or eligible for listing in the National Register of Historic Places (Appendix I).`

3.10.2 Cultural Landscapes

In FY1999, the NPS Intermountain Regional Office conducted a Level 0 Cultural Landscape Inventory (CLI) for GTNP. A Level 0 Assessment is a general overview of the whole park involving preliminary identification of landscapes, component landscapes within the park, and identification of immediate threats to cultural landscape resources that helps determine CLI priorities. The SHPO was not consulted on the Level 0 Assessment. The only National Register listed cultural landscape in GTNP is Mormon Row.

According to the National Park Service's *Cultural Resource Management Guideline* (DO-28), a cultural landscape is:

"…a reflection of human adaptation and use of natural resources [often] expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions."

The NPS defined four overlapping types of cultural landscapes (Cowley 2002, pers. comm.).

Historic Designed Landscape – A landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person(s), trend, or event in landscape architecture; or illustrate an important development in the theory and practice of landscape architecture. Aesthetic values play a significant role in designed landscapes. Examples include parks, campuses, and estates.

***Historic Vernacular* Landscape** – A landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family or a community, the landscape reflects the physical, biological, and cultural character of those everyday lives. Function plays a substantial role in vernacular landscapes. They can be a single property such as a farm or a collection of properties such as a district of historic farms along a river valley. Examples include rural villages, industrial complexes, and agricultural landscapes.

Historic Site – A landscape noteworthy for its association with a historic event, activity, or person. Examples include battlefields and president's house properties.

Ethnographic Landscape – A landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, religious sacred sites, and massive geological structures. Small plant communities, animals, and subsistence and ceremonial grounds are often components.

3.11 FIREFIGHTER AND PUBLIC SAFETY

The health and safety of the public, employees, and fire personnel would be affected to varying degrees under all alternatives. Safety is the first priority in all fire management activities. Many human related safety issues in GTNP focus on wildland fire intensity and behavior, access and egress (topographic and special) near fires and around values to be protected, smoke exposure, injury from falling rocks and trees, or losing balance and falling. Although injuries to firefighters have been reported, there is no history in the park of death or injury to visitors or residents directly caused by wildland fire, although the potential exists.

Most high visitor use and wildland urban interface areas in the park are located within the Protection Zone, which covers about 29,000 acres of land in and near major developments. Areas that are not within this zone include remote trailheads, campsites, and some individual developments. Some of these areas have had some pre-fire treatments completed and are identified in pre-plans as features to be protected thus typically indicating a suppression-oriented response. Fuel loadings range from heavy dead and down in timber stands to sage/grass to light grasses. Fire behavior ranges from high intensity large fires to lower intensity fast moving fires. Greater hazards exist where pre-treatment has not taken place or where access and egress is difficult.

Treatment of fuels to reduce risk to firefighters, employees, and the public has occurred around many large developments through mechanical treatment or prescribed fire and is in a maintenance cycle. These areas are continually being assessed to determine if re-treatment or expansion of treatment is needed. Other smaller developments and NPS lands near private properties are currently being treated or assessed. Some campgrounds within the area where heavy fuels exist are being treated to reduce the threat of a fire burning into and out of the area. Minimal to no work has been completed around remote trail heads and parking areas unless there is a cabin associated with it or a hazard tree issue.

Firefighters are exposed to the highest health risk from smoke (carbon monoxide, hydrocarbons, and particulates) on or near the fireline. Standard firefighting practices are employed to minimize firefighter exposure to include planning the location of firelines to minimize exposure, rotating firefighters out of smoky segments of the fireline at frequent intervals, and providing rest and sleep areas away from substantial smoke and long duration events. Mitigation measures to the public include keeping them away from the fireline, posting signs warning them of smoke in the area, assisting them in avoiding smoke, burning under conditions with the best smoke dispersion, or putting in holding actions to put out or suppress the fire. Most byproducts of wildland fire combustion of health concern are concentrated at the fireline and decrease to negligible levels in short distances.

3.12 PARK NEIGHBORS

The majority of land that borders GTNP publicly owned and administered by federal land management agencies. The western boundary is shared with Caribou-Targhee National Forest (CTNF), the northern boundary is shared with YNP, and the eastern and southern boundaries are shared with BTNF. Communities in and near the park are depicted in Figure 3.12 and include Moran, Moose, Kelly, Jackson, Wilson, and Teton Village. The location and distribution GTNP inholdings are depicted in Figure 3.12. Several properties will be purchased by or donated to the park in the future. Most private inholdings are small tracts, but a few larger tracts are owned by the State of Wyoming.

In an effort to ensure management continuity across jurisdictional boundaries, fire management activities at GTNP are coordinated with the Fire Management Plans of CTNF, BTNF, and YNP as required by the GYA Interagency Fire Management Planning and Coordination Guide (Greater Yellowstone Coordination Committee 2000). In addition, activities are also coordinated with the Teton County Comprehensive Plan, the WGFD Strategic Habitat Plan, and the Jackson Interagency Habitat Initiative. These plans are described in Section 1.6 and interagency coordination is discussed in Section 2.2.3.

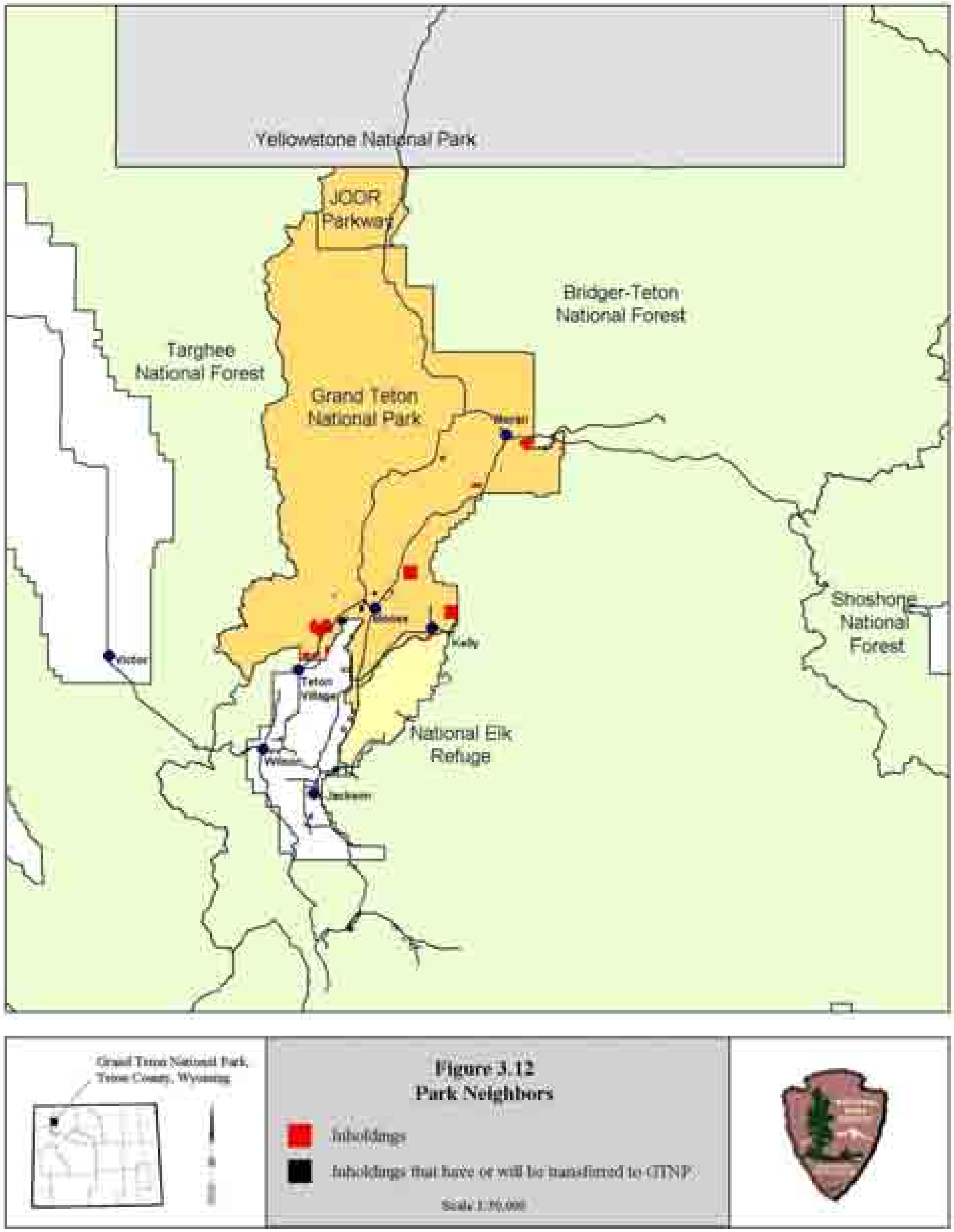


Figure 3.12
Park Neighbors

3.13 PROGRAM COST

Fire management funding for the NPS is derived from 2 sources, one fixed and the other a shared national fund for emergency wildland fires.

Fixed funds at the NPS level are managed for program operations and planned projects (authorized project funds). Park fire operations and projects include preparedness activities, permanent staffing, training, monitoring, fire GIS, fuels management, fire prevention and education, aviation and equipment purchases. These funds are currently based on the FIREPRO analysis and budget process, which is an analysis of workload and complexity, based of the third worst year in the previous ten. This process allows program managers some flexibility to determine annual program needs. The FIREPRO budget process will soon be replaced by the Fire Program Analysis (FPA) system that is an interagency planning process designed to increase economic efficiency through promoting more accurate allocations of shared resources and personnel. Although the interagency planning process is new, GTNP and BTNF have had shared positions and equipment for a number of years, which has led to an efficient and economic organization. These shared resources include aviation, suppression, fire use, fire effects, GIS, education/prevention, dispatch, fuels management, and overhead positions.

National emergency funds are managed for wildland fire operations. Within the NPS portion of the USDI firefighting account, budgets could be insufficient to cover expenditures for suppression and rehabilitation during severe fire years. In these situations, the NPS would first request that USDI transfer wildland fire management funds from other bureaus or, if these funds were unavailable, use the emergency authority under Section 102 of the general provisions of the Interior Appropriations Act to transfer funds from other programs. The NPS would then seek to restore funds to affected programs through a supplemental appropriation.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This section contains the scientific and analytical foundation for comparison of the effects (the word "effect" is used interchangeably with "impact") of the alternatives, where the alternatives are designed to define issues and provide a clear basis of choice. Described are the possible impacts of each alternative on the natural, cultural, and social environments, in accordance with the resource topics identified in the Purpose and Need section. Under each resource topic, the methodology used for impact analysis and the conclusions of the impact analysis are explained.

Methodology for Assessing Impact

For each alternative, the analysis discloses direct, indirect, and cumulative environmental effects for the various resource topics by describing the **context**, **duration**, and **intensity** of the effects. Unless otherwise stated, impacts are assumed to be direct.

The analyses include a description of whether effects are beneficial or adverse (context) and short- or long-term (duration). However, the effects of managing fire as a process on the landscape may not become apparent for decades. Consequently, many analyses in this chapter refer to "extended long-term" impacts in addition to the defined long-term impacts of managing fire under a particular alternative. Extended long-term impacts refer to effects that may not be detectable during the life of this plan (approximately 20 years), but could occur depending upon the direction of future fire management plans. Definitions of intensity (negligible, minor, moderate, or major) vary by impact topic and are therefore provided separately for each impact topic analyzed in this EA.

The NPS Intermountain Region has established guidance in the form of sample methodologies and impact threshold definitions used throughout the Intermountain Region. This guidance serves to provide general definitions for a range of impacts as they relate to various resource topics. Each individual park unit is encouraged to use this guidance, but to tailor them so that they are applicable to the specific characteristics of the unit's resources and environment. In most cases, the impact threshold definitions used in this analysis were derived from this guidance and modified slightly by park professionals with field expertise in each of the resource topic fields. Best professional judgment is applied based on personal knowledge of the resource and experience in the field.

Impacts to Cultural Resources and Compliance with §110 and §106 of the National Historic Preservation Act

This document is not a combined EA/AEF (assessment of effect) document because much of the cultural resources within both park units have not been surveyed and Section 110 has not been completed for all ethnographic resources, archaeological resources, and cultural landscapes within the scope of this EA. Generally, a combined EA/AEF document is prepared when the action includes a specific or finite location that is feasible to conduct surveys and collect information necessary to comply with Sections 110 and 106 of the National Historic Preservation Act (NHPA). When a programmatic document such as this FMP EA is prepared for a very large geographical area (GTNP and John D. Rockefeller, Jr. Memorial Parkway), it is unrealistic to collect all the necessary data to comply with Section 110 and Section 106 of NHPA. Therefore, all specific planned projects will be required to comply with the requirements of §106 of the National Historic Preservation Act (NHPA) before they are implemented as identified in Figure 2.4.1, which outlines the multi-year decision-making process for planned projects under the Fire Management Plan.

In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources would be identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected, National Register eligible or listed cultural resources; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect would also be made for affected National Register listed or eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g. diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there may be an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

None of the Fire Management Plan alternatives would intentionally allow an "adverse effect" to a cultural resource from planned actions or activities. The NPS contends that all impacts resulting from planned fire actions and activities can be mitigated such that there would not be an adverse effect to any cultural resource. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that cannot be recovered. Therefore, although actions determined to have an adverse effect under §106 may be mitigated, the effect remains adverse. In the unlikely event that the NPS proposed an activity that would potentially adversely affect a cultural resource, that action would require separate NEPA analysis and would not be covered under the Fire Management Plan's compliance. In the event of a wildland fire, measures will be taken to avert damages to archaeological resources, historic structures and cultural resources.

Cumulative Impacts Scenario

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts 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" (40 CFR 1508.7).

The geographical boundary for a cumulative impact analysis changes depending on the resource topic. The park was the area of analysis for most natural resources, archaeological resources, and program cost. The area of cumulative effects analysis for water resources was watersheds contained within the park; the area of analysis for wildlife and threatened, endangered, and sensitive species varied by species. The park and its vicinity were considered when evaluating the cumulative impacts of wilderness, firefighter and public safety, and park neighbors because there is a relationship between these impact topics and actions outside the park. To assess the impacts of air quality, cumulative effects were analyzed at the regional level.

Cumulative impacts were determined by combining the impacts of each alternative on other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects in GTNP and the surrounding area.

Relevant ongoing actions at specific locations within GTNP include the rehabilitation and adaptive use of several historic districts, facility expansions and upgrades, North Park Road reconstruction, construction of a new visitor center at Moose, acquisition of the JY Ranch, and several hazard fuel reduction projects. At the park level, a transportation plan will be prepared to address administrative actions over the next 5-10 years, including those that could be applied to the Moose-Wilson Road to pilot study different management actions. These studies will provide data to help the upcoming General Management Plan (GMP) address more permanent solutions for the Moose-Wilson corridor.

Ongoing interagency projects include the Elk and Bison Management Plan, the Jackson Interagency Habitat Initiative and the YNP-GTNP Winter Use Plan. The USFWS and NPS are developing a comprehensive plan for managing bison and elk inhabiting the National Elk Refuge (NER) and GTNP. Issues to be addressed in the EIS include bison and elk use levels on the NER and GTNP, population control, habitat management, disease management, and winter-feeding. WGFD, NER, BTNF, and NPS are currently collaborating on the Jackson Interagency Habitat Initiative (JIHI) which may lead to the development of burn plans around or in the park that are habitat specific. The NPS, on September 7, 2004, published a proposed rule in the Federal Register for temporary winter use management in Yellowstone and Grand Teton Parks and the John D. Rockefeller, Jr., Memorial Parkway.

Projects in the vicinity of GTNP that were considered when assessing cumulative effects include planned expansion of Teton Village, a BLM plan for Snake River Resource Management, a new YNP hazard fuel reduction plan, and several activities on BTNF lands. BTNF has several fuels reduction projects planned and has prepared an EA for amending their current FMP to allow wildland fire use outside of wilderness areas. In addition, BTNF is also expanding recreation facilities in the Snake River Canyon and evaluating the impacts of heli-skiing and backcountry guide permits.

Impairment of Park Resources or Values

NPS *Management Policies 2001* requires analysis of potential effects to determine whether or not actions would impair park resources. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. 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, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be more likely to constitute impairment if it affects a resource or value whose conservation is:

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

4.1 VEGETATION

Fire history analysis chronicles periodic, naturally occurring fires in GTNP prior to European settlement (see Fire History Section). In addition, many native trees, shrubs, and graminoids occurring in the park exhibit classic evolutionary adaptations to periodic fire events. For these reasons, it was assumed that most vegetation communities that occur in the park have evolved in the presence of fire and that perpetuating a natural fire regime would have no effect or a beneficial effect on native vegetation. Long-term fire exclusion could change the landscape scale diversity of vegetative communities, resulting in the elimination of natural fuel breaks, more heavy fuel loading, and an increase in the possibility that fires outside the range of natural variability for the region could occur. The loss of individual plants due to fire was not considered in assessing the environmental impacts of the alternatives, except for special status species that are discussed in 4.3. The loss of individual plants as a result of fuels reduction projects for the protection of life and property was also not considered in depth in this analysis, primarily because thinning and mowing is concentrated in developed areas where the vegetation has already been substantially disturbed.

Methodology

Factors Used to Assess Environmental Consequences

Maintenance of Natural Fire Disturbance Regimes – Alternatives that most closely maintain and restore the natural fire regime, including fire return interval, fire severity, and landscape pattern are favored over alternatives that alter or constrain those factors.

Exotic Species – Alternatives that stabilize or reduce the exotic plants are favored over those that promote the spread of exotic plants.

Adverse Impacts: Fire disturbance regimes move further away from historic conditions and/or DFCs, requiring extensive treatments to restore them. Altered fire regimes increase the potential for fires outside the range of natural variability (due to fuel load and continuity changes) that can cause undesirable effects to vegetative communities and developed areas. The potential for spreading exotic plants is increased

Beneficial Impacts: Fire disturbance regimes, patch sizes, distributions, and successional pathways more closely resemble pre-settlement conditions and/or DFCs in vegetative communities within GTNP. Fires of historic fire frequency, size and severity occur throughout all vegetation types. The potential for spreading exotic plants remains stable or is decreased.

Impact Threshold Definitions: Vegetation	
Negligible	The effects would be similar or identical to the historic disturbance regime for the vegetation type, with an ecologically functional successional response.
Minor	The effects would be similar to the historic disturbance regime for vegetation types with an ecologically functional successional response. The duration would be commensurate with historic intervals and successional pathways. Mitigation to offset adverse effects could be required and would be effective.
Moderate	The effects may be similar to the historic disturbance regime for the vegetation type. The successional response could take decades. Required mitigation to offset adverse effects could be extensive but would likely be successful.
Major	The effects would not necessarily be similar to the historic disturbance regime for the vegetation type. Successional responses may be different than historic responses and may cause a long-term change in vegetation type. Mitigation or restoration measures to offset the adverse effects would be required and extensive; success of the mitigation measures would not be guaranteed.
Duration	*Short-term*: Beneficial or adverse impact lasts 1-20 years *Long-term*: Beneficial or adverse impact lasts 20-100 years.

Regulations and Policies

Desired Condition: Vegetation	Source
The NPS is directed by the Organic Act to conserve the scenery and the natural objects unimpaired for future generations. The NPS *Management Policies 2001* define the general principles for managing biological resources as maintaining all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity and ecological integrity of plant communities. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, and fires, will be allowed to recover unless manipulation is necessary to mitigate for excessive disturbance caused by past human effects, or to protect park developments or the safety of people using those developments. Landscape and vegetation conditions altered by human activity may be manipulated where the park management plan provides for restoring human-altered landscapes and includes restoring natural processes and conditions to areas disturbed by human activities such as fire suppression	NPS Organic Act; NPS *Management Policies 2001*
Non-native species (also referred to as non-native, exotic, or alien) are not a natural component of the ecosystem. Management of populations of exotic plant and animal species, up to and including eradication, will be undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.	DO–77*: Natural Resource Protection,* Executive Order 13112*: Invasive Species*

4.1.1 Impacts Common to All Alternatives

Wildland fire use would occur under all three alternatives and would involve allowing some natural fire starts to burn across the landscape in a closely monitored fashion. Because partial or full suppression may be required with wildland fire use at some point during the treatment, impacts could include the removal of vegetation for control lines, the development of short-term camps for crews working in the area, and use of natural openings for helicopter landing areas that could compact soils and temporarily trample or remove vegetation. Suppression of unwanted wildland fires would also occur under all three alternatives and would have similar effects. Minimum impact suppression techniques (MIST, Appendix H) would be used during all suppression efforts to mitigate these adverse, minor, and short-term impacts.

Mechanical treatments for the purpose of reducing hazard fuels in proximity to structures and developed areas would occur under all three alternatives and would affect the park's vegetation in the same way under all alternatives. Mechanical treatments would involve manual or mechanized cutting and piling of woody vegetation and removal or burning of the slash (see Appendix G). Most hazard fuel reduction projects would occur in or near WUI areas and would involve maintenance of already completed projects, including removing regenerating trees and shrubs. In grassland-dominated WUI areas, where regeneration occurs annually, frequent mowing may be used to reduce fuels. Shrub fuels may also be treated and maintained by mowing. These actions would maintain WUI areas in a perpetually unnatural disturbance regime. Resulting impacts to vegetation are considered adverse, minor, and long-term but effects would be concentrated in a small portion of the park (6%) that is already impacted by development.

4.1.2 Impacts of Alternative A (No Action) on Vegetation

Analysis

Under the no action alternative, the resource objectives for vegetation would remain focused primarily on aspen and sagebrush community types. An informal process to identify treatments in these vegetative communities would entail periodic project proposals and approval by a Fire Management Committee. Decisions regarding wildland fire use would be made based on the current "Go/No-Go" decision-making process; wildland fire use is expected to remain at existing levels. No wildland fire use fires would be allowed in the Suppression Zone. Future mechanical treatments for hazard fuels reduction would be planned, managed, and analyzed separately from the FMP under the existing and future Hazard Fuel Reduction Plan.

Sagebrush Steppe - No planned treatments for resource purposes would occur in sagebrush steppe in the near future because recent fire events have resulted in a mix of sagebrush seral stages that is proportionately similar to historic conditions. Resource-related concerns about burning in sage-grouse habitat further limit treatment options. Although wildland fire starts may occur in sagebrush, they would be aggressively suppressed anywhere within the Suppression Zone and would also likely be suppressed in the Conditional Use Zone due to current resource objectives for protecting sage-grouse habitat. As a result, desired reductions of fuel continuity and patch sizes of old-aged sagebrush stands would not likely be met. However, wildland fires in sagebrush within the Fire Use Zone may be allowed to burn, particularly if holding actions are taken on that portion of the fire, while allowing it to spread to other targeted vegetative communities. Sagebrush communities would be prescribed burned or mechanically treated for fuels reduction purposes in WUI areas.

Persistent Lodgepole Pine - No planned treatments for resource purposes would occur in persistent lodgepole pine since this community type is not considered in the current long-range management objectives under Alternative A. Some wildland fires in lodgepole could be allowed to burn in the Conditional and Fire Use Zones, but in the absence of resource objectives or DFCs, support for the program may be limited. In the absence of periodic low-severity fires in persistent lodgepole pine to thin the stands and reduce ground fuels, the potential for insect outbreaks and severe fires will increase over time. In addition, encroachment of lodgepole pine in meadow openings may continue to occur, resulting in the loss of important plant communities and wildlife habitat. Lodgepole pine communities would be mechanically treated for fuels reduction purposes in WUI areas.

Douglas-fir - No planned treatments (prescribed burns, mechanical treatment) for resource purposes would occur in Douglas-fir forests since this community type is not considered in the current long-range management objectives under Alternative A. Wildland fires could be allowed to burn in the Conditional and Wildland Fire Use Zones if approved, but in the absence of resource objectives or DFCs, support for the program may be limited. Fire is needed to perpetuate most Douglas-fir stands and, in the absence of periodic mixed severity fires, fuel loading and continuity would increase, as would the potential for fires outside the range of natural variability. Such a pattern would be accompanied by a loss of vegetation structure and diversity. Douglas-fir communities would be prescribed burned or mechanically treated for fuels reduction purposes in the WUI areas.

Aspen - Aspen communities are currently targeted for long-range management for resource purposes and prescribed burns for resource purposes in aspen and mixed aspen-conifer stands outside of the Suppression Zone would occur under Alternative A. Mechanical treatments could also be used both inside and outside of the Suppression Zone for resource purposes but clear-cutting or thinning aspen stands has not typically been implemented in the park for resource purposes. Wildland fire use in aspen communities would be a potential management tool outside of the Suppression Zone and could be effective at producing moderate-severity burns that stimulate aspen regeneration and reduce conifer encroachment. Aspen communities would be mechanically treated for fuels reduction purposes in the WUI areas.

<u>Low-Elevation Mixed Conifer</u> - No planned treatments for resource purposes would occur in mixed conifer forests since this community type is not considered in the current long-range management objectives under Alternative A. Wildland fires could be allowed to burn outside of the Suppression Zone, but in the absence of resource objectives or DFCs, support for the program may be limited. Wildland fires in some mixed conifer stands, especially multi-layered stands of late successional subalpine fir, could be difficult to control and may result in large, high severity burns that diminish landscape diversity and threaten old growth spruce forests. In addition, the absence of relatively frequent low to moderate severity fires would likely lead to more over-mature stands and heavy fuel loading. Mixed conifer communities would be mechanically treated for fuels reduction purposes in the WUI areas.

<u>High Elevation Mixed Conifer</u> - No planned treatments for resource purposes would occur in high elevation mixed conifer forests under Alternative A since this community type is not considered in the current long-range management objectives for planned treatments. Wildland fire use actions would be conducted, when possible, in communities managed as wilderness far from human settlements and structures. Fire suppression actions can be very damaging to these fragile environments, which further supports the fire use strategy. However, isolated natural fire starts in unpredictable locations may not be sufficient to promote establishment and regeneration of whitebark pine, an important species for much wildlife.

<u>Wetland/Riparian</u> - No planned treatments for resource purposes would occur in wetland/riparian communities under Alternative A since this community type is not considered in the current long-range management objectives for planned treatments. Wildland fires could be allowed to burn outside of the Suppression Zone, but in the absence of resource objectives or DFCs, support for the program may be limited. Suppression of fires upstream from wetland/riparian areas may lead to a decrease in landscape diversity that periodic fire disturbances promote. Although continued fire suppression may help maintain cottonwood forests in the short-term because mature trees are easily killed by fire, over time the combined effects of flood control and fire suppression would lead to the continued loss of cottonwood-dominated riparian forests. Wetland/riparian communities would be mechanically treated for fuels reduction purposes in the WUI areas.

<u>Current or Former Agriculture</u> - No planned treatments would occur in current or former agricultural areas under the no action alternative since this community type is not considered in the current long-range management objectives for planned treatments. Wildland fires typically would not be allowed to burn due to the proximity of developed areas and the absence of resource objectives or DFCs to support it. As such, smooth brome and Kentucky bluegrass dominated communities would be perpetuated and the future expansion of smooth brome through vegetative reproduction may also occur, given appropriate conditions. Agricultural communities would be mechanically treated for fuels reduction purposes in the WUI areas.

<u>Wildland-Urban Interface</u> - Most WUI areas are located in the existing Suppression Zone, which covers about 29,000 acres of land in and near the major developments in the park. Vegetation within WUI areas consists primarily of disturbed grasslands, shrublands, and forested communities. All fires within this Suppression Zone would be suppressed. Therefore, mechanical treatments would be the only tool available to meet resource objectives and reduce fuels in and near WUI areas. This would be effective for fuel reduction purposes but would not be sufficient to restore historic fire return intervals to areas within the Suppression Zone, including WUI areas.

Cumulative Impacts

Recent, current, and planned projects that would impact fire management vegetation types in and around GTNP include adaptive use and new facility construction projects, hazard fuels reduction projects, North Park Road reconstruction, a new Transportation Plan, the Interagency Elk and Bison Management Plan, the BLM Snake River Resource Management Plan (RMP), the Jackson Interagency Habitat Initiative (JIHI), and a recent amendment to the BTNF Forest Plan.

Adaptive use projects in GTNP include the Murie Ranch, the McCollister residences, White Grass Ranch, Teton Science School, and Lucas-Fabian homestead. All of the projects are expected to result in adverse, negligible to minor, and long-term impacts to vegetation and the cumulative impact of these actions are also expected to be minor since all activities are occurring in previously disturbed areas within the designated WUI (6% of the park).

New construction projects in GTNP will result in disturbance to vegetation, some of which may occur in previously undisturbed areas. The total acreage of disturbance from the combination of these projects is unknown at this time but is expected to be less than 20 acres of common upland vegetation. This represents a very small percentage of the total park acreage and, therefore, is considered an adverse, minor, and long-term impact.

Planned hazard fuels reduction projects within GTNP include the Lost Creek prescribed fire, the Triangle X Mechanical Treatment Project, and 7 small fuels reductions projects. These WUI areas are expected to remain in a perpetually unnatural vegetative state due to ongoing fuels reduction projects resulting in adverse, minor, and long-term impacts.

The combination of the North Park Road reconstruction project and a new Transportation Plan for GTNP (likely involving the development of pathways) would disturb a small amount of native vegetation along road corridors. The bulk of this disturbance would be in common vegetation types including sagebrush steppe and low-elevation mixed conifer as well as in developed WUI areas. These impacts would involve a very small percentage of the total acreage of affected vegetation types in GTNP and therefore are considered adverse, minor, and long-term.

Natural fire disturbance regimes associated with vegetation within and around GTNP may be beneficially impacted by the Elk and Bison Management Plan, Jackson Interagency Habitat Initiative (JIHI), and an amendment to the BTNF Forest Plan. The effects of the Elk and Bison Management Plan to vegetation inside and outside of the park would likely be beneficial if herd and habitat management promotes a natural level of landscape diversity and disturbance regimes. Likewise, impacts of JIHI on native vegetation in and around the park are considered beneficial to the extent that the initiative proposes to manage vegetation communities for long-term sustainability and resiliency, emphasizing healthy early- and mid-successional habitats and the processes that create and maintain them on the landscape. The BTNF Fire Management Plan amendment would likely benefit natural fire regimes because wildland fire use would be expanded outside of wilderness areas and prescribed fire would be increased to focus on areas where wildland fire use would not be appropriate because of risk or technical difficulty.

Overall, the incremental impacts of these related actions, in conjunction with the impacts of Alternative A, would result in adverse, minor to moderate, short- and long-term cumulative impacts as well as beneficial minor cumulative impacts.

Conclusion

Impacts to vegetation resulting from Alternative A (No Action) are considered moderate, adverse, and either short- or long-term, depending on the direction of future fire management plans.

Alternative A constrains the parks ability to closely maintain and restore natural fire regimes to most vegetative communities because of narrowly defined and outdated resource objectives that cannot be periodically updated using adaptive management. In particular, planned treatments for resource purposes would be restricted primarily to sagebrush and aspen communities. Wildland fire use would be restricted to areas outside of the Suppression Zone and may be minimally supported due to a lack of clear resource objectives. Many potentially beneficial wildland fire starts would likely be suppressed. Continued fire suppression would perpetuate a high percentage of climax communities and over-mature forests and would inhibit natural disturbance patterns related to fire.

Due to historic and continued fire suppression in most vegetative communities, the risk of continuous, heavy fuel loadings that could support fires outside the range of natural variability would increase. This could result in large tracts of burned areas with exposed mineral soil being invaded by exotic plants or promoting the spread of those already established, particularly on the valley floor where weed populations are concentrated.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.1.3 Impacts of Alternative B (Multiple Tools) on Vegetation

Analysis

Alternative B would provide maximum flexibility for management of fire in all vegetative communities. Resource objectives would be expanded to include restoring natural fire return intervals and meeting specific DFCs for each community type. Adaptive management would be used to identify planned treatment projects (mechanical and prescribed fire) on a 4-year cycle. Decisions regarding wildland fire use would be made based on a revised "Go/No-Go" decision-making process. Wildland fire use is expected to increase in response to DFCs for most vegetative communities. Natural fire starts may or may not be suppressed if they occur in the Protection Zone, depending on risks to human health and safety. Prescribed fire and/or mechanical treatments would be available for fuels reduction around developments or for wildland fire fuel breaks.

<u>Sagebrush Steppe</u> - Although many acres of sagebrush steppe covertype have been burned and successional stages are similar to historic proportions, fuel continuity and patch size of older aged stands are not currently at desired levels. Prescribed treatments would not likely be planned in the near future due to concerns related to sage-grouse habitat. For the same reason, wildland fire in sagebrush would likely be suppressed until resource objectives and DFCs for sagebrush are reevaluated under the adaptive management process. In addition, if a wildland fire is moving toward an area or a vegetative community type targeted for wildland fire use, some sagebrush would likely be allowed to burn. Sagebrush in WUI areas would be treated mechanically and with prescribed fire for fuels reduction purposes.

<u>Persistent Lodgepole Pine</u> - These stands rely on relatively frequent low to moderate severity fires with occasional stand replacement events to maintain health, vigor, and diversity. This would be accomplished through the use of both prescribed fires and wildland fire use. Initially, meadow encroachment areas could be treated using prescribed or wildland fire use activities. A diversity of potential management actions would ultimately result in a mix of seral stages similar to pre-settlement. Large tracts of forest with continuous heavy fuel loading may be treated to approach historic patchy conditions. Persistent lodgepole pine in WUI areas would be treated mechanically for fuels reduction purposes.

<u>Douglas-fir</u> - Douglas-fir forests require fires of various sizes and severities to maintain landscape and structural diversity. Prescribed fire, wildland fire use, and mechanical treatments would all be used in Douglas-fir forests depending on the type and severity of treatment necessary to accomplish resource objectives. The combination of management options would ultimately promote an open structure and a mixture of seral stages similar to historic conditions

as well as break up large tracts of forest where fuel loading is more continuous and heavy. Douglas-fir in WUI areas would be treated mechanically for fuels reduction purposes.

Aspen - Aspen stands in the park are dependent on periodic disturbance for regeneration. The maintenance of aspen communities and healthy aspen stands in GTNP would be accomplished primarily through the use of prescribed and wildland fire. Mechanical treatments may also be used to stimulate regeneration of aspens stands on a small scale. A diversity of potential management actions would ultimately promote a mix of seral stages, perpetuate aspen stands, and provide natural firebreaks. Aspen in WUI areas would be treated mechanically and with prescribed fire for fuels reduction purposes.

Low-Elevation Mixed Conifer - These stands rely on relatively frequent low to moderate severity fires with occasional stand replacement events to maintain all seral stages and species in a historic distribution across the landscape. This would be accomplished through the use of prescribed fires for low- to moderate-severity burns and wildland fire for moderate-severity and stand replacing events in areas with high fuel loads. In addition, mechanical treatment would be available for reducing fuel loads prior to initiating a prescribed fire in order to reduce risks associated with high severity fires. A diversity of potential management actions would ultimately provide a mix of seral stages similar to pre-settlement as well as remove dead trees and break up large tracts of forest where fuel loading is more continuous and heavy. Mixed conifer in WUI areas would be treated mechanically for fuels reduction purposes.

High Elevation Mixed Conifer - Prescribed fire could be used to promote regeneration of whitebark pine and prevent conversion of existing stands to spruce or subalpine fir with prior approval through the adaptive management process. However, wildland fire use actions would be the primary treatment action due to the isolation and short fire season in this vegetation type. Wildland fire use would likely produce both low-severity and occasional stand replacing events that promote early seral forests, remove accumulated fuels, reduce fuel loading, and ultimately result in a mix of seral stages similar to pre-settlement. Due to the remote locations of these stands, their patchy nature, and distance from developed areas, mechanical treatments would not likely be used for fuels reduction purposes.

Wetland/Riparian - Prescribed fire and/or mechanical treatments would provide a means to prevent encroachment by conifers and meet other resource objectives in site-specific areas within or upstream of wetland and riparian communities. Wildland fire use would also be available as a tool for burning wetland and riparian communities especially those areas adjacent to forests targeted for wildland fire. This would likely result in landscape scale fires that burn through multiple community types and create patches of burned and unburned habitat. Wetland/riparian communities in WUI areas would be treated mechanically or through prescribed fire for fuels reduction purposes.

Current or Former Agriculture - This alternative would provide maximum flexibility for management of fire in current or former agriculture communities. Prescribed fire would allow opportunities to meet fuels and resource objectives. Wildland fire use may also be a tool for meeting resource objectives when appropriate, although most of these communities are either in or near WUI areas and, therefore, are not conducive to fire use. Although pre-settlement conditions may not be restored in this community type, the combination of planned treatments, wildland fire use, and fire suppression would provide opportunities to meet DFCs and potentially increase native plant diversity. Agricultural communities in WUI areas would be treated mechanically (mowing) for fuels reduction purposes.

Wildland-Urban Interface - This alternative would provide maximum flexibility for management of fire in WUI areas. Mechanical treatments would be the main tool used to reduce hazard fuels in and prevent the threat of fire. Prescribed fire would also be available to treat vegetation if deemed safe and appropriated by managers. Wildland fire use could also be allowed near WUI areas to reduce hazardous fuels, promote diversity, and ultimately decrease the future risk of large-scale wildland fire spreading into WUI areas.

Cumulative Impacts

Projects affecting vegetation in an around GTNP under Alternative B would be the same as Alternative A. Overall, the incremental impacts of these related actions, in conjunction with the impacts of Alternative B, would result in beneficial, minor to moderate and adverse minor short- and long-term cumulative impacts.

Conclusion

Impacts to vegetation resulting from this alternative are considered beneficial, moderate, and short- or long-term, depending on the direction of future fire management plans.

Alternative B provides maximum flexibility for managers to closely maintain and restore natural fire regimes to all vegetative communities. This is due to a wide variety of treatment options and an adaptive management process for integrating newly developed resource objectives for vegetative communities and fuels management needs. Prescribed fire, mechanical treatments, and wildland fire use would all be used to simulate more natural fire return intervals and enhance natural vegetation dynamics, landscape diversity, and wildlife habitat in the park. This would also reduce the risk of continuous, heavy fuel loadings that could support fires outside the range of natural variability. In addition, this alternative promotes natural landscape diversity, which can help prevent the rapid spread of exotic species.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.1.4 Impacts of Alternative C (No Prescribed Fire) on Vegetation

Analysis

Resource objectives would be expanded to include restoring natural fire return intervals and meeting specific DFCs for each vegetative community type. Adaptive management would be used to identify planned treatment projects (mechanical only) on a 4-year cycle. Decisions regarding wildland fire use would be made based on a revised "Go/No-Go" decision-making process. Natural fire starts would not necessarily be suppressed if they occur in the Protection Zone. Wildland fire use is expected to increase in response to DFCs for most vegetative communities and as a result of not having a prescribed burn option. However, fire use increases may be limited by the lack of prescribed fire to reduce potentially hazardous risks. Mechanical treatments would also be used for fuels reduction around developments, for wildland fire fuel breaks, and perhaps to help meet resource objectives. Impacts to specific vegetative community types are described below.

<u>Sagebrush Steppe</u> - Alternative C allows for wildland fire use but does not allow prescribed burns. Wildland fires would likely be suppressed in the near future due to current constraints related to sage-grouse habitat and until resource objectives and DFCs for sagebrush are reevaluated under the adaptive management process. In addition, prescribed fire is generally considered a better treatment option in sagebrush communities because wildland fire spreads rapidly, is unpredictable, often difficult to control in sagebrush communities, and can pose risks to structures and human health and safety. Without the ability to reduce fuel loads in site-specific areas using prescribed fire, fuels would likely accumulate over time making sagebrush communities more prone to large, rapidly spreading fires. Sagebrush in WUIs would be treated mechanically for fuels reduction purposes.

Persistent Lodgepole Pine - Treatment of persistent lodgepole pine stands would be restricted to wildland fire use and mechanical treatments. Due to the existing high fuel loads in some of these stands and the frequency of fires, wildland fire use may not be an effective technique for reestablishing the pattern of low- and moderate-intensity burns that are necessary to break up fuel continuity. Additionally, targeting areas where lodgepole pine is encroaching on meadows and sagebrush would be difficult without the ability to use prescribed fire as a management tool. Persistent lodgepole pine in WUIs would be treated mechanically for fuels reduction purposes.

Douglas-fir - Treatment of Douglas-fir stands would be restricted to wildland fire use and mechanical treatments. Wildland fires would likely be effective for promoting landscape-scale stand diversity in moist Douglas-fir forests but would be difficult to manage in Douglas-fir stands near developed areas. Relying primarily on wildland fire use may not be sufficient to maintain the open structure of dry Douglas-fir forests. In addition, preventing encroachment of Douglas-fir stands into aspens forests would be difficult without the ability to use prescribed fire since targeting specific locations where encroachment is occurring would be nearly impossible. Douglas-fir in the WUIs would be treated mechanically for fuels reduction purposes.

Aspen - Treatment of aspen stands would be restricted primarily to wildland fire use and mechanical treatments to stimulate aspen regeneration. Relying primarily on wildland fire use may not be sufficient to ensure revitalization of aspen stands, particularly in and near WUI areas. The use of aspen stands as fuel breaks may be restricted since prescribed fire would not be available to maintain aspen vigor for fire protection purposes. However, mechanical treatments could potentially be employed for this purpose.

Low Elevation Mixed Conifer - Treatment of mixed conifer forests would be restricted primarily to wildland fire use and mechanical treatments. However, due to the existing high fuel loads in many of these stands, it may be difficult to restore or simulate frequent low- and moderate-severity burns that are necessary to break up fuel continuity and promote landscape diversity using these treatments alone. In addition, this would put old growth conifer stands at greater risk. Continued accumulation of fuels in mixed conifer will increase the likelihood of large, stand replacing fires. Mixed conifer in the WUIs would be treated mechanically for fuels reduction purposes.

High Elevation Mixed Conifer - Treatment of high elevation mixed conifer forests would be restricted primarily to wildland fire use; mechanical treatments for resource purposes would be very limited due to isolation of these communities and their location in areas managed as wilderness. Although effective at maintaining the range of historic variability in these forests, wildland fire use may not be sufficient to prevent the loss of whitebark pine stands. Relying solely on isolated natural fire starts in unpredictable locations may diminish managers ability to promote regeneration of whitebark pine and maintain the historic landscape scale diversity at high elevations including both whitebark pine and spruce-fir components. These forests are not present in the WUIs and, therefore, would not likely be treated for fuels reduction purposes.

Wetland/Riparian - Treatment of wetland/riparian communities would be restricted primarily to wildland fire use. Wildland fire can be an effective tool for promoting large, landscape scale events that burn portions of some wetland/riparian communities, particularly those near forested areas. However, the lack of prescribed fire as a management tool would compromise managers' ability to treat site-specific wetland/riparian habitats that could benefit from fire. Wetland/riparian communities in the WUIs would be treated mechanically

Current or Former Agriculture - Treatment of current and former agricultural communities would be restricted primarily to wildland fire use. Wildland fire use can be an effective tool for promoting large, landscape scale events that burn portions of some agricultural communities but are not likely due to the proximity of developments. In addition, grasses in these communities are highly flammable when dry and can facilitate the rapid spread of wildland fire into areas that may not be targeted for fire. The lack of prescribed fire as a management tool would compromise managers' ability to treat site-specific areas to promote or reduce pasture grass health and vigor. Prescribed fires are generally better treatment tools to meet resource objectives in these communities. Agricultural communities in WUIs would be treated mechanically (mowing) for fuels reduction purposes.

Wildland-Urban Interface - Alternative C would provide some flexibility for management of fire in WUI areas. Mechanical treatments would be the primary tool used to reduce fire potential. Under very precise and probably rare conditions, wildland fire use would be allowed near WUI areas to reduce hazardous fuels, promote diversity, and ultimately decrease the future risk of high severity, difficult to control fires spreading into WUIs. Management of such fires under conditions that would provide large-scale protection would be both risky and costly. Prescribed fires, which is generally a more containable form of treatment than wildland fire use, would not be available to treat vegetation in or near WUI areas.

Cumulative Impacts

Projects affecting vegetation in an around GTNP under Alternative C would be the same as Alternatives A and B. Overall, the incremental impacts of these related actions, in conjunction with the impacts of Alternative C, would result in beneficial and adverse, minor, and short- and long term cumulative impacts.

Conclusion

Impacts to vegetation resulting from this alternative are considered beneficial and adverse (depending on the community type), minor, and of short- or long-term duration (depending upon the direction of future fire management plans).

Alternative C provides some flexibility for managers to maintain and restore natural fire regimes in certain vegetative communities. Wildland fire use would be the primary tool available to do this. However, without the use of prescribed fire, some target vegetative communities or regions that require either more frequent fires or a specific severity of fire may not be treated, especially since wildland fire starts are unpredictable and subsequent fire behavior may be difficult to control. It will be difficult to have wildland fire use occurring near developed areas because of risks to structures and human health and safety, especially without prescribed fire options to help reduce this risk.

Clear resource objectives for vegetative communities and the ability to periodically update objectives using adaptive management would be established, but all objectives may not be met in the absence of prescribed fire treatments. In addition, the lack of prescribed fire as a tool allows for continued fuel accumulation in certain vegetative communities and increases the risk of fires outside of the natural range of variability. This could result in the removal of large tracts of grass, shrub, and forest cover making certain areas more vulnerable to weed invasion, especially on the valley floor where weed populations are concentrated.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.2 WILDLIFE AND FISH

Methodology

This section analyzes impacts of the proposed management alternatives on wildlife and fish species. The activities associated with the three proposed alternatives were compared to known distribution records and habitat of wildlife and fish species in order to assess potential impacts.

The following sources of information were used to assess project impacts to wildlife and fish:

- Scientific literature on species' life histories, distributions, habitat selection, and responses to human activities was reviewed.
- Site-specific information on wildlife distribution and use patterns within GTNP and its vicinity were reviewed, including complete and on-going studies (when available), and the professional judgment of park and state resource specialists familiar with the status and management concerns related to individual species.
- The results of past studies of fire impacts to regional ecosystems were also used where similar impacts would be anticipated.

When assessing the environmental consequences of the alternatives on wildlife and fish, the assumption was made that native wildlife and fish populations inhabiting the park have evolved in the presence of fire under historic fire regime conditions. Therefore, and in accordance with NPS policy, the loss of individual animals was not considered in assessing the environmental impacts of the alternatives.

It is reasonable to assume that most wildlife and fish species inhabiting the northern Rocky Mountains have coexisted and adapted to periodic fire disturbances in their habitats (Lyon et al. 2000).

Elk prefer grazing in burned areas versus unburned sites (Canon et al. 1987, Leege 1968, Lowe et al. 1978, Rowland 1983). Although most preferred elk forage species exhibit an increase in nutrients following fire (DeByle et al. 1989, Leege 1968), forage quantity appears to be more important than increases in forage quality (Bartos and Mueggler 1979, Canon 1985, Canon et al. 1987, Davis 1977, Gruell and Loope 1974, Jourdonnais and Bedunah 1990, Leege 1979,). Elk use within burns increased immediately after fires and peaked at year 7 when grasses were most abundant (Lowe et al. 1978). Fire encourages early spring green-up of grasslands by reducing litter, slow or prevent conifer dominance in important foraging areas, increase palatability of foods, reduce the height of browse species, and stimulate regeneration through sprouting or heat scarification of seed (Jourdonnais and Bedunah 1990, Leege 1979). In Glacier National Park fires increased carrying capacity on winter range by creating a mosaic of thermal and hiding cover and forage areas (Martinka 1976).

Fire generally enhances moose habitat by creating and maintaining seral communities, and is considered beneficial to moose populations (Davis and Franzmann 1979, MacCracken and Viereck 1990, LeResche et al. 1974). The beneficial effects of fire on habitat were estimated to last less than 50 years, with moose density peaking 20 to 25 years following fire (LeResche et al. 1974).

The effects of fire on mule deer habitat are varied, but in general, fires that create mosaics of forage and cover are beneficial to mule deer. Deer seem to prefer foraging in burned areas compared to unburned areas, although seasonal preferences have been documented (Biswell 1989, Davis 1977, Johnson 1989, Keay and Peek 1980, Klinger et al. 1989, and Willms et al. 1980), possibly reflecting increases in plant nutrients following fire (Hobbs and Spowart 1984, Severson 1987). Fire can stimulate browse, create openings in dense, inaccessible plant communities, and reduce slash, as well as increase nutrient content and palatability of forage

(Dasmann and Dasmann 1963, Gruell 1986, Nelson 1976). Fires in sagebrush communities can result in considerable increases of herbaceous plants by reducing decadent sagebrush that out-competes more nutritious and palatable species (Smith 1985). However, in areas where sagebrush is the only cover, its complete removal can be detrimental to mule deer populations.

Fire exclusion for over 50 years has adversely affected bighorn sheep habitats throughout North America by altering plant succession. Fire is an important factor in maintaining bighorn sheep habitat (Chapman and Feldhamer 1982, Woodard and Van Nest 1990) and periodic burning keeps seral grasslands from becoming dominated by coniferous trees and improve the production, availability, and palatability of important bighorn sheep forage species (Woodard and Van Nest 1990). Burning can also increase the security value of habitat and bighorn sheep use burned areas more distant to escape terrain than on adjacent unburned sites (Woodard and Van Nest 1990). Fire can negatively affect bighorn sheep habitat when range condition is poor and forage species cannot recover, when non-sprouting species that provide important forage for bighorn sheep are eliminated, or when too much area is burned and forage is inadequate until the next growing season. Another potentially negative effect is when other species, especially elk, are attracted to prescribed burns intended to benefit bighorn sheep (Peek et al. 1985).

Relatively little is known about the effect of fire on pronghorn antelope but some researchers believe that fire suppression has adversely affected pronghorn habitat (Ockenfels et al. 1994). Presumably, antelope will move to unburned areas when fire has eliminated foraging opportunities in other portions of their habitat. Most sites will produce an abundance of forbs following fire, but species composition may be different than what existed prior to the fire (Smith and Davison 1996). Pronghorns are favorably influenced by the increase in herbaceous species and reduction of shrubs after fire (Higgins et al. 1989).

Fire is important in creating and maintaining bison habitat and several studies have shown that bison prefer to forage on recently burned areas (Boyce and Merrill 1991, Easterly and Jenkins 1991, Forde et al. 1984, Shaw and Carter 1990, Vinton et al. 1993). In particular, bison select recently burned sagebrush-grassland areas for several years post-burn (Vinton et al. 1993) in response to increased abundance of preferred grass species (Pfeiffer and Hartnett 1995). Fire regenerates grasslands and enhances production, availability, and palatability of many bison forage species (Campbell and Minkes 1983, Chapman and Feldhamer 1982, Risser 1990). During pre-settlement times bison habitats were to a large extent created and maintained by lightning-caused fires or fires set by Native Americans (Higgins et al. 1989, Little 1974, Madson 1990, McCormack 1992).

Factors Used To Assess Environmental Consequences

Three impact measures are examined for wildlife and fish. These include habitat loss, mortality, habitat fragmentation, and human-caused disturbance:

<u>Habitat Loss</u> - Implementation and perpetuation of all or part of the alternative that would result in the direct loss of habitat.

<u>Habitat Fragmentation</u> - Implementation and perpetuation of all or part of the alternative that would result in the fragmentation of habitat. Habitat fragmentation is defined as "Human alteration of natural landscape patterns, resulting in reduction of total area, increased isolation of patches, and reduced connectivity between patches of natural vegetation" (Ruediger et a. 2000)."

<u>Human-caused Disturbance</u> - Implementation and perpetuation of all or part of the alternative that would result in the displacement of individuals.

***Adverse impacts* - I**mpacts 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* - I**mpacts would include increased conservation of individual animals and populations and their habitats on a local and regional scale.

Impact	Threshold Definitions: Wildlife and Fish
Negligible	A small amount of habitat may be affected via direct or indirect impacts associated with a given alternative. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures are not warranted.
Minor	Effects to habitat would be more numerous and detectable. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures may be needed and would be successful in reducing adverse effects.
Moderate	Effects to 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.
Major	Effects to habitat would be obvious and would have substantive consequences on a regional population level. Extensive mitigation measures would be needed to reduce any adverse effects and their success would not be guaranteed.
Duration	*Short-term*: impact would have a duration less than or equal to 3 years following implementation *Long-term* - impact would have a duration greater than 3 years following implementation.

Regulations and Policy

Current laws and policies require that the following conditions be achieved for wildlife and fish in the park:

Desired Condition: Wildlife and Fish	Source
Populations of native plant and animal species function in as natural condition as possible except where special management considerations are warranted. (Areas with special management considerations would be determined through management zoning decisions in the GMP.)	NPS *Management Policies 2001*
The Service will strive to restore extirpated native plant and animal species to parks when specific criteria are met.	NPS *Management Policies 2001*
Management of populations of exotic plant and animal species, up to and including eradication, will be undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.	NPS *Management Policies 2001*; Executive Order 13112, Invasive Species

4.2.1 Impacts Common to All Alternatives

Wildland Fire Use - Wildland fire use is a component of all alternatives. Fire is a natural process integral to maintenance of healthy Rocky Mountains ecosystems. When assessing the environmental consequences of alternatives on flora and fauna of GTNP, it was assumed that wildlife and fish species have evolved, coexisted, and adapted to periodic fire disturbances in their habitats (Lyon et al. 2000).

Wildland fire has the potential of affecting wildlife and fish and their respective habitats. Direct and indirect impacts occurring to park wildlife and fish from future wildland fires are unknown, but can be generally predicted based on current research and best available science. Moderately severe fires within the fuel/vegetation types found in GTNP will generate the most complex habitat components over time when compared to low and high severity fires. Fire occurring within its bounds as a natural process has the potential to improve or degrade habitats for durations equivalent to successional response of vegetation communities to burn severities. Critical wildlife habitats can be protected by when different age class mosaics are present on the landscape and vegetative homogeneity is reduced. High severity fires will likely create prey concentration areas, moderate severity patches will create coarse woody debris, and unburned patches mixed with low severity patches will provide cover. Fire suppression over long periods of time will cause trends toward homogenous stands of vegetation with reduced diversity, reduced resistance to insects and disease, and increased susceptibility to high severity fire and habitat loss for certain periods of time. Fire plays an important role in the management and health of many species of plants and animals. Fire helps maintain open habitats, encourages sexual and vegetative reproduction, and affects competing or associated plant species.

Although fire may injure or kill plants, long-term effects on species may be beneficial. Direct impacts of wildland fire on sedentary species of wildlife, such as mortality and reduction in reproductive success, are likely in localized areas but are not expected to affect species on a population level. More mobile species that are expected to avoid wildland fire in most cases. Short-term measurable adverse effects to terrestrial wildlife habitat are expected to result from allowing wildland fires to burn but the extent of these impacts cannot be predicted prior to the fires. Once quantified, however, park personnel would analyze wildland fire impacts on wildlife habitat to determine compliance with GTNP management policies and objectives. Restoring the role of wildland fire in the park is a goal and is expected to have long-term benefits to wildlife in general.

<u>Hazardous Fuel Reductions</u> – The reduction of hazardous fuels within the Wildland-Urban Interface is a component of all alternatives and would be achieved via mechanical treatments within and in the vicinity of WUI areas. Mechanical treatments would involve manual or mechanized cutting and piling of woody vegetation and removal or burning of the slash. Most hazard fuel reduction projects would occur within WUI areas and would primarily involve maintenance of already completed projects, including removing regenerating trees and shrubs. Impacts associated with these treatments are typically small in scope, scale, and intensity.

Fuel reduction treatment activities may cause the short-term and long-term destruction of small mammal habitat and, depending upon timing, the nests of some ground- and tree-nesting birds. Increases in noise and the level of human activity temporarily displace species sensitive to human disturbance. The primary long-term effects of the fuel reduction treatment activities include wildlife avoidance and loss of habitat within 500 feet of existing structures. Treatment areas have less dead and down materials for smaller mammals to use for cover and food storage, and fewer trees in the canopy may change understory vegetative characteristics. Less visual buffer between humans and wildlife result from treatment activities and animals less tolerant of human presence may avoid these areas.

<u>Prescribed Fire</u> – In some cases, prescribed fire may be used as another tool to achieve resource objects, reduce hazard fuel loads, and allow for wildland fire use, but it is proposed only with Alternatives A and B.

4.2.2 Impacts of Alternative A (No Action) on Wildlife and Fish

Analysis

<u>Unplanned Events</u> –Wildland fire use associated with Alternative A is expected to remain near current levels (approximately 30% of candidate fires are managed as fire use). Each natural start would be reviewed using the existing “Go/No-Go” process, within which potential benefits to wildlife and fish resources play a relatively minor role.

Wildland fire and associated fire suppression activities have the potential of affecting wildlife and fish and their respective habitats. Direct impacts (i.e., mortality and reduction in reproductive success) of wildland fire on sedentary species of wildlife are likely in localized areas but are not expected to affect species on a population level. More mobile species are expected to avoid wildland fire in most cases. Short-term measurable adverse effects to terrestrial wildlife habitat are expected to result from allowing wildland fires to burn but the extent of these impacts cannot be predicted prior to the fires. Once quantified, however, wildland fire impacts on wildlife habitat would be analyzed by park personnel to determine compliance with GTNP management policies and objectives. Short-term adverse impacts may also occur to aquatic species, such as amphibians, if large, high-severity fire occurs on a watershed basis or if the timing overlaps with certain critical life stages and within high use areas. However, restoring the role of wildland fire in the park is a goal and is expected to have long-term benefits to wildlife. Beneficial impacts include creating more successional vegetative mosaics and improving habitat conditions while simultaneously decreasing the likelihood of uncharacteristically severe fires occurring in the future. If wildland fire suppression activities are likely to have direct adverse effects on wildlife, these actions would be evaluated by park personnel before being implemented in the event that life, safety, and property is not at risk.

Wildland fire in GTNP has a small potential of adversely affecting fish species through direct impacts associated with chemical pollution from fire retardant use and indirect impacts associated with erosion-caused sedimentation from severe burns. Spring-fed tributaries of the Snake River, especially those that represent cutthroat trout spawning habitat, would be most susceptible to these impacts but are also the most removed from these threats as a result of their proximity to the Snake River and their location within its riparian zone.

<u>Planned Events</u> – Planned events associated with Alternative A consist of limited prescribed burns and mechanical treatments and are primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities. Resource-related concerns about burning in sage-grouse habitat would likely limit treatment options in this vegetation type.

Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments may cause a small reduction in wildlife habitat, reduce habitat quality, and create short-term disturbances effects that may displace more mobile animals in proximity to WUI areas. However, these actions are not expected to adversely affect wildlife at a population level because WUIs and their immediate vicinity already have reduced habitat effectiveness. WUI areas represent a small part of habitat available to park wildlife and the vast majority of wildlife habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an estimated annual average of 1,400 acres over a 10-year period for achieving resource objectives and as part of the hazard fuel reduction program; a small portion (0-300 acres annually) may be part of the hazard fuel reduction program. The focus of prescribed fires associated with Alternative A would be sagebrush-grassland and mixed aspen-conifer communities but concerns about burning in sage-grouse habitat would likely limit treatment options in sagebrush in the near-term. Prescribed fire can be used to maintain and restore more diverse vegetative communities in landscapes where natural fire regimes have been disrupted. Prescribed burns may, in the short-term and long-term, alter plant communities and displace individuals from certain portions of habitat, but the long-term effects could create vegetative diversity that favors native wildlife species.

Cumulative Impacts

Activities occurring within GTNP and on public lands within the GYA that may adversely affect wildlife and fish are analyzed both individually and cumulatively via the NEPA compliance process. Management activities and issues likely to affect wildlife and fish occurring within the

GYA include: livestock grazing; private land development; firewood cutting; road use/management; timber harvest; recreation activities, including hunting; vegetation management; wildland fire (and suppression) and prescribed fires; and water management (e.g., dams, diversions, and irrigation activities). These activities cumulatively contribute to reductions in secure habitat availability, diminished habitat effectiveness, and increased mortality risks to wildlife and fish in GTNP and the GYA. Simultaneously, these same activities may be beneficial to some species of wildlife.

Alternative A is not expected, in the long-term, to reduce habitat abundance, security and effectiveness, reduce reproductive success, or increase mortality. Alternative A could result in short-term displacements of wildlife within planned treatment areas, possibly increasing mortality risks and affecting individual reproductive success and these impacts would contribute, in a minor way, to cumulative impacts. However, these impacts are expected to be localized and occur at an individual level and not a population level.

The cumulative impact of Alternative A to wildlife and fish species is expected to be both adverse and beneficial, negligible, and of short-term and long-term duration.

Conclusion

Impacts to wildlife and fish species resulting from management actions associated with Alternative A are expected to be both adverse and beneficial, negligible to moderate, and short-term and long-term. Hazardous fuel reductions (mechanical and prescribed fire) within and near WUI areas would have minimal adverse impacts on park wildlife and fish resources. Similarly, prescribed fires and wildland fire use are expected to have adverse and beneficial, negligible to moderate, and short-term and long-term impacts on fish and wildlife populations. Allowing minimal wildland fire use in GTNP would benefit wildlife and fish negligibly, in the long-term, by creating more successional vegetative mosaics and improving foraging and nesting habitat.

Alternative A would constrain the ability of GTNP to restore and maintain natural fire regimes within the park. Existing, narrowly defined, and narrowly implemented resource objectives prevent fire managers from utilizing planned and unplanned events to their fullest. Wildland fire use would be restricted to areas outside of the Suppression Zone and decisions to allow potentially beneficial wildland fires to burn outside of these areas may be difficult to make because other resource objectives are not clearly defined. Limited wildland fire use would, by default, preclude many of the landscape-level benefits associated with natural wildland fire regimes.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.2.3 Impacts of Alternative B (Multiple Strategies) on Wildlife and Fish

Analysis

Unplanned Events –Wildland fire use would have the greatest potential for increase under Alternative B (30-60% of candidate fires would be managed as fire use). Each natural start would be reviewed using the revised "Go/No-Go" process, within which potential impacts and potential benefits to wildlife and fish species and their habitats are actively considered by park personnel and included in the adaptive management strategy decision-making process.

Adverse and beneficial impacts to wildlife and fish populations in GTNP resulting from unplanned events, suppression activities associated with wildland fires, and wildland fire use are expected to be similar to those disclosed in Alternative A except that the scope and scale would be somewhat larger. Short-term and long-term measurable adverse effects to terrestrial wildlife habitat are expected to result from allowing wildland fires to burn but actual impacts cannot be predicted prior to the fires. Once quantified, however, these impacts would be analyzed as part of an annual compliance review and assessment associated with the Fire Management Plan's adaptive management process.

Planned Events – Planned events associated with Alternative B include a combination of prescribed burns and mechanical treatments. DFCs for vegetation and WUI areas would be established to, in part, direct planned events.

Adverse impacts to wildlife and fish populations in GTNP resulting from planned events are expected to be similar in scope and scale as Alternative A. Prescribed burns may impact some wildlife, in the short-term and long-term, by altering plant communities and displacing individuals from certain portions of habitat.

Mechanical treatments and prescribed fire would be planned and implemented in a manner sensitive to critical life stages of fish and wildlife and protective of important habitat components.

Cumulative Impacts

Cumulative impacts to wildlife and fish associated with Alternative B are expected to be generally similar to those disclosed for Alternatives A with the following exceptions.

Natural ignitions managed as wildland fire use would be greater than Alternative A, while treatment acres for hazardous fuel reduction and annual average treatment acres for prescribed burns would be the same. Restoring fire to the GTNP landscape is, in the long-term, considered beneficial. Hazardous fuel reductions around WUIs and prescribed fires could result in short-term displacements of individual animals and short-term and long-term reductions in habitat quality within treatment areas and may minimally contribute to cumulative impacts but are not expected to cause a loss of high quality habitat. Allowing substantially more natural fire starts to be managed as fire use would help restore wildland fire and its positive influence on wildlife habitat into GTNP.

The cumulative impact of Alternative B to wildlife and fish species is expected to be adverse and negligible in the short-term, and beneficial and minor to moderate in the long-term. To insure this, impacts associated with Alternative B would be analyzed in the context of other impacts occurring within Jackson Hole as part of an annual review of actions associated with the Fire Management Plan's adaptive management process.

Conclusion

Impacts to wildlife and fish species resulting from management actions associated with Alternative B are expected to be beneficial and adverse, negligible to moderate, and short-term and long-term. Hazardous fuel reductions (mechanical and prescribed fire) within and near WUI areas would help protect these features while having negligible long-term adverse impacts on park wildlife and fish resources. Prescribed fires and wildland fire use are expected to have short-term and long-term, negligible to moderate, adverse and beneficial impacts on fish and wildlife populations.

Alternative B provides flexibility for managers to restore and maintain natural fire regimes into GTNP by employing a wide variety of treatment options and clear resource objectives. Prescribed fire, mechanical treatments, and wildland fire use would all be used to simulate more natural fire return intervals and enhance inter-community and landscape diversity within GTNP. Implementing Alternative B would also reduce the risk of unnaturally large, high-severity fires occurring within the park and provide managers with the ability to periodically update implementation of the Fire Management Plan by using adaptive management strategies.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.2.4 Impacts of Alternative C (No Prescribed Fire) on Wildlife and Fish

Analysis

The background information for and measures used to assess impacts to wildlife and fish were the same as presented in Alternative A.

Unplanned Events –Wildland fire use associated with Alternative C is expected to exceed current levels (Alternative A) but would likely be less than Alternative B because prescribed fire cannot be used to decrease risks associated with allowing wildland fire use in certain areas. Each natural start would be reviewed using the revised "Go/No-Go" process, within which potential impacts and potential benefits to all wildlife and fish species and their habitats are actively considered by park personnel and included in the adaptive management strategy decision-making process.

Adverse and beneficial impacts to wildlife and fish populations in GTNP resulting from unplanned events, suppression activities associated with wildland fires, and wildland fire use are expected to be similar to those disclosed in Alternatives A and B. Short-term measurable adverse effects to terrestrial wildlife habitat are expected to result from allowing wildland fires to burn but actual impacts cannot be predicted prior to the fires. Once quantified, however, these impacts would be analyzed as part of an annual compliance review and assessment associated with the Fire Management Plan's adaptive management process.

Planned Events – Planned events associated with Alternative C include mechanical treatments only and are primarily associated with hazard fuels reduction efforts. No prescribed fires would be employed. Resource objectives associated with planned events are secondary to other park objectives.

Mechanical treatments would increase 40% from current levels (Alternative A) and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Hazardous fuel reduction efforts proposed within WUI areas would affect about 140 acres of land per year. Pile burning of slash associated with mechanical treatments is anticipated. Mechanical treatments would be planned and implemented in a manner sensitive to critical life stages of fish and wildlife and protective of important habitat components. Adverse impacts to wildlife and fish populations in GTNP are expected to be similar to those disclosed for planned events associated with Alternative A with the exception of those associated with prescribed burns.

Cumulative Impacts

Cumulative impacts to wildlife and fish associated with Alternative C are expected to be similar to those disclosed for Alternatives A with the following exceptions.

Natural ignitions managed as wildland fire use would be greater than Alternative A but probably less than B and this use may contribute to short-term and long-term cumulative impacts to fish and wildlife. Allowing more natural fire starts to be managed as fire use would help restore wildland fire into GTNP. The number of acres treated for hazardous fuel reduction would increase by about 40% because prescribed fire use would not be available. Hazardous fuel reductions around WUIs could result in short-term displacements of individual animals and short-term reductions in habitat quality within treatment areas and may minimally contribute to cumulative impacts but are not expected to cause a loss of high quality habitat.

The cumulative impact of Alternative C to wildlife and fish species is expected to be adverse and negligible in the short-term, and beneficial and minor in the long-term. To insure this, impacts associated with Alternative C would be analyzed in the context of other impacts occurring within Jackson Hole as part of an annual review of actions associated with the Fire Management Plan's adaptive management process.

Conclusion

Impacts to wildlife and fish species resulting from management actions associated with Alternative C are expected to be beneficial and adverse, negligible to moderate, and short-term and long-term. Hazardous fuel reductions (mechanical treatments) within and near WUI areas would help protect these features while having negligible, long-term adverse impacts on park wildlife and fish resources. Similarly, wildland fire use is expected to have beneficial and adverse, negligible to moderate, and short-term and long-term impacts on fish and wildlife populations.

Alternative C provides managers with some flexibility to restore and maintain natural fire regimes to GTNP, but wildland fire use would be the primary tool available to do this. Not having prescribed fire as an available tool may, in some cases, make wildland fire use less acceptable due to increased risks. The lack of prescribed fire being used as a fire management tool may increase the risk of large, high severity wildland fires occurring within the park more than Alternative B, but less than Alternative A. Well-defined resource objectives and the ability to periodically update objectives using adaptive management strategies would occur, but without prescribed fires, some target vegetative communities that require more frequent fires or a specific fire severity would likely not be treated.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.3 THREATENED ENDANGERED AND SPECIAL CONCERN SPECIES

Methods

Threatened, Endangered, and Special Concern Species

This section analyzes impacts of the proposed management alternatives upon federally listed threatened, endangered, and on identified sensitive species. GTNP maintains a list of sensitive species, using information from the Wyoming Natural Diversity Database and other references. GTNP also maintains a list of sensitive species of flora and fauna. The activities associated with the three proposed alternatives were compared to known distribution records and habitat types threatened, endangered, and sensitive species in order to assess potential impacts. The status and distribution for several identified species is not well known, and predictions about impacts were largely based on available research describing a given species' biology, ecology, and recent monitoring data from the region.

The following sources of information were used to assess project impacts to threatened, endangered, and sensitive species:

- National Fire Plan Project Design and Consultation Process provides a suite of effects determinations, including project criteria and conservation recommendations, designed to reduce the effect of National Fire Plan related activities on species listed under the

Endangered Species Act and other species of concern (http://www.blm.gov/fcp/). Although this process applies only to the National Fire Plan related to activities on National Forests and BLM lands in the western US and the NPS is not a signatory party to this process, it does provide excellent guidance on the potential impacts and likely USFWS "effect determinations" associated with fire-related management actions.

- Scientific literature on species' life histories, distributions, habitat selection, and responses to human activities was reviewed.
- Site-specific information on wildlife distribution and use patterns within GTNP and its vicinity were reviewed, including complete and on-going studies (when available), and the professional judgment of park and state resource specialists familiar with the status and management concerns related to individual species.
- The results of past studies of fire impacts to regional ecosystems were used where similar impacts would be anticipated.

Factors Used to Assess Environmental Consequences

Two impact measures are examined for listed species:

- Potential For "Take" - The potential for a "take" to occur (bald eagles. Canada lynx, grizzly bears, and gray wolves) 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.
- Population Level Impacts – Each alternative was evaluated to determine whether or not a loss of habitat, reduction in reproductive success, human-caused disturbances, habitat fragmentation, or indirect mortality would occur or was likely to occur.

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.

Impact Threshold Definitions: Threatened and Endangered Species	
No Effect	A federally listed species would not be affected.
Minor	Same as "May Affect But Not Likely To Adversely Affect" determination used by the US Fish and Wildlife Service. Implementing the alternative could possibly affect but is not likely to adversely affect a listed species or its critical habitat. Mitigation measures may be needed in order to attain the not likely to adversely affect determination
Moderate	Same as "May Affect But Not Likely To Adversely Affect" determination used by the US Fish and Wildlife Service. The alternative could affect an individual(s) of a listed species and/or its critical habitat but would not threaten the survival of the species. Mitigation measures would likely be required to reduce impacts.
Major	Same as "May Affect and Likely To Adversely Affect" determination used by the US Fish and Wildlife Service. The alternative would affect an individual(s) of a listed species and/or its critical habitat; the impact could threaten the survival of the species. Mitigation measures would likely be required to reduce impacts.

Sensitive Species

Factors Used to Assess Environmental Consequences

Five impact measures are examined for sensitive species.

Habitat Loss or Gain - Implementation and perpetuation of all or part of an alternative would result in the loss or gain of habitat.

Mortality - Implementation and perpetuation of all or part of the alternative would result in the death(s) of individuals.

Loss or Improvement of Viable Populations - Implementation and perpetuation of all or part of an alternative would be likely to result in the loss or improvement of a viable population.

Human-caused Disturbance - Implementation and perpetuation of all or part of an alternative would result in the displacement of individuals.

Habitat Fragmentation - Implementation and perpetuation of all or part of an alternative would result in the fragmentation of habitat. Habitat fragmentation is defined as human alteration of natural landscape patterns, resulting in reduction of total area, increased isolation of patches, and reduced connectivity between patches of natural vegetation (Ruediger et a. 2000).

Adverse Impacts – Impacts would 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.

Impact Threshold Definitions: Sensitive Species	
Negligible	A small number of individual plants or animals and/or a small amount of their respective habitat may be adversely affected via direct or indirect impacts associated with a given alternative. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures are not warranted.
Minor	Effects to individual plants or animals and/or their respective habitats would be more numerous and detectable. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures may be needed and would be successful in reducing adverse effects.
Moderate	Effects to individual plants or 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.
Major	Effects to individual plants or animals and their habitat would be obvious and would have substantive consequences on a regional population level. Extensive mitigation measures would be needed to reduce any adverse effects and their success would not be guaranteed.
Duration	*Animal Species of Special Concern* *Short-term*: Impact has a duration less than or equal to 3 years following implementation. *Long-term*: Impact has a duration greater than 3 years following implementation. *Plant Species of Special Concern* *Short-term:* Impact lasts 1-5 years and can be easily reversed *Long-term:* Impact lasts 6 or more years and cannot be easily reversed

Regulations and Policy

Current laws and policies require that the following conditions be achieved for species of special concern in the park:

Desired Condition: Threatened, Endangered, and Special Concern Species	Source
Federal- and state-listed threatened and endangered species and their habitats are sustained.	Endangered Species Act; NPS *Management Policies 2001*, NEPA
Populations of native plant and animal species function in as natural condition as possible except where special management considerations are warranted. (Areas with special management considerations will be determined through management zoning decisions in the GMP.)	NPS *Management Policies 2001*
The Service will strive to restore extirpated native plant and animal species to parks when specific criteria are met.	NPS *Management Policies 2001*

4.3.1 Impacts Common To All Alternatives

Animals

Unplanned Events – Wildland fire use is a component of all alternatives. Fire is a natural process integral to maintenance of healthy Rocky Mountains ecosystems. Wildlife, fish and plant species inhabiting the northern Rocky Mountains have evolved lived with fire in their habitats and have adapted to maximize their ability to use burned areas and minimize the negative impacts of fire. Wildland fires typically create a mosaic pattern of burned and unburned vegetation and alter the successional stages of the landscape. Changes in habitat structure and vegetative compositions as a result of fire are unlikely to considerably alter habitat values or jeopardize the ability of a population to survive so long as these habitat modifications occur within the historic range of variability. The overall long-term effects of wildland fire on habitat is that it increases habitat diversity, improves habitat quality, maintains the resilience and vigor of ecosystems, and is beneficial to native wildlife and fish species.

Planned Events – The reduction of hazardous fuels within the WUIs is a component of all alternatives and would be achieved via mechanical treatments within and in the vicinity of WUI areas. Mechanical treatments would involve manual or mechanized cutting and piling of woody vegetation and removal or burning of the slash. Most hazard fuel reduction projects would occur within WUI areas and would primarily involve maintenance of already completed projects, including removing regenerating trees and shrubs. Impacts associated with these treatments are typically small in scope, scale, and intensity.

In some cases, prescribed fire may be used as another tool for hazardous fuel reductions but its use is proposed only with Alternatives A and B.

Plants

Unplanned Events – Wildland fire use would generate both adverse and beneficial impacts, the outcome depending on the adaptability of each species to fire. In all cases, fire would likely destroy above ground parts, but the ability to re-establish varies. Taxa including *Xerophyllum tenax* and *Luzula glabrata* var. *hitchcockii* are known to proliferate after fire, while others such as *Paeonia brownii* usually do not. Loss of canopy and altered site conditions would affect plants in a manner similar to that generated though mechanical treatment.

Planned Events – Wildland fire use would have varying effects. Mechanical treatment could potentially destroy above ground plant structures through crushing by heavy equipment and may kill entire plants or plant populations through ground disturbance and soil removal. Some of these would return if underground parts that are capable of vegetative reproduction remain intact. Opening a considerable portion of the overstory through mechanical treatment would alter light, moisture, and temperature regimes, thereby creating site conditions unsuitable to those species requiring cool, shady habitats. Such species would remain excluded until canopy closure was re-established, which is undesirable in sites identified for mechanical treatment.

4.3.2 Impacts of Alternative A (No Action) on Threatened, Endangered, and Special Concern Species

Bald Eagle

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Section 3 of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

Bald eagles inhabiting GTNP and the GYA have evolved in the presence of fire under historic fire regime conditions. While some displacement and possibly loss of individual birds may occur in areas subjected to fire (whether planned or unplanned), long-term benefits to bald eagle populations are expected as a result of restoration of fire-maintained habitat.

Unplanned Events – Wildland fire use associated with Alternative A is expected to remain near current levels (i.e., allowing about 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing “Go/No-Go” process. No measurable adverse effects to bald eagles or their habitat are expected to result from unplanned events associated with Alternative A.

Planned Events – No direct or indirect negative effects to bald eagles or their habitat are expected to result from planned events associated with Alternative A. Prescribed burns and mechanical fuel reductions have and would continue to be planned and implemented in a manner sensitive to critical life stages and protective of important habitat components. If planned events are likely to adversely affect bald eagles, these actions would incorporate additional NEPA compliance and consultation with the USFWS.

Cumulative Impacts

Residential development on private lands and recreational use of the Snake River outside of GTNP has increased dramatically in the recent past and this trend is expected to continue into the foreseeable future. However, in the face of past residential and recreational increases, the number of bald eagles nesting and producing young within the Snake Population Unit, including GTNP, has increased. The residential development and recreational use thresholds at which productivity of the Snake Population Unit eagle would decline is unknown but is not expected to occur as a result of this project or other projects proposed at this time.

Recreational activities such as floating, fishing, hiking, horseback riding, snow-shoeing, and skiing within bald eagle nesting and foraging areas could adversely impact nest occupancy and productivity if these activities occur in proximity to active nests. However, the park has been successful at minimizing human intrusion into the 0.5-mile radius spatial buffer around active bald eagle nests during the nesting season, thus minimizing disturbance to nesting eagles. GTNP also closes the Snake River riparian zone to human use during the winter and this action also helps minimize human-caused disturbances to nesting, foraging, and roosting bald eagles. There is no evidence that suggests current recreational use levels within GTNP or elsewhere in Jackson Hole has adversely affected bald eagle nesting.

The impacts of past planned and unplanned fire management events on bald eagle nesting and reproducing in GTNP and in Jackson Hole appear to have been neutral and this trend is expected to continue if the proposed action is implemented. The number of occupied bald eagle nesting territories and nest productivity is expected to fluctuate annually but remain at or above levels recorded in the 1990's. Negative impacts to bald eagles resulting from Alternative A are expected to be minimal and are not expected to contribute to cumulative impacts to bald eagles in any measurable way.

The cumulative impact of Alternative A to bald eagles is expected to be adverse and negligible in both the short-term and long-term.

Conclusion

The impacts of past planned and unplanned fire management events on bald eagle nesting and reproductive success in GTNP and in Jackson Hole appear to have been neutral and this trend is expected to continue if Alternative A is implemented. The number of occupied bald eagle nesting territories and nest productivity is expected to fluctuate annually but remain at or above levels recorded in the 1990's. Adverse impacts (in NEPA terms) to bald eagles resulting from Alternative A are expected to be negligible and are not expected to contribute to cumulative impacts to bald eagles in any measurable way.

Impacts to bald eagles resulting from management actions associated with Alternative A are expected to be negligible in both the short-term and long-term. A determination was made that Alternative A **may affect but is not likely to adversely affect bald eagles**. Implementing project design criteria and mitigation measures would insure that adverse impacts to bald eagles would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Canada Lynx

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Section 3 of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

Canada lynx inhabiting GTNP and the GYA have evolved in the presence of fire under historic fire regime conditions. In the past century, however, fire suppression has changed lynx habitat and it is likely these habitat changes were not positive to lynx. Fire exclusion has altered vegetative mosaics and species composition, and may have reduced the quality and quantity of habitat for snowshoe hares and adversely affected lynx (Ruediger et al. 2000). Fire exclusion in areas with infrequent fire returns has probably had minor impacts. However, areas where the fire regime was historically frequent or mixed have become more homogeneous, composed of more shade-tolerant species with more canopy layers, and more susceptible to severe fires, insects, and diseases. Restoring fire as an ecological process can greatly benefit lynx habitat and periodic vegetation disturbances associated with fire maintain the successional forest mosaics that the snowshoe hare prey base requires, even at moderately long intervals (Rowe and Scotter 1973). Although short-term impacts of fire in localized areas may be detrimental to lynx, the long-term benefits are positive.

Unplanned Events – Wildland fire use associated with the proposed action is expected to stay at current levels (approximately 30% of candidate fires are managed as fire use). Each natural start would be reviewed using the existing "Go/No-Go" process. Short-term negligible adverse effects to lynx habitat are expected to result from allowing wildland fires to burn. The extent of impact resulting from future wildland fire cannot be predicted but would be analyzed as part of the annual compliance review associated with the programmatic Biological Assessment developed between GTNP and the USFWS. Allowing minimal wildland fire use in GTNP would benefit lynx negligibly, in the long-term, by creating more successional vegetative mosaics and improving habitat for their primary prey.

Planned Events – Planned events associated with Alternative A consist of prescribed burns and mechanical treatments primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affect Canada lynx through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years and possibly slightly fewer acres per year during the last 4 years. Hazardous fuel reduction efforts are proposed to occur within WUI areas and some of these actions are expected to convert some suitable lynx habitat into an unsuitable condition. However, the majority of potential lynx habitat in GTNP occurs outside of developed areas. Most WUI areas are located adjacent to major roadways and/or in areas of high human use and are assumed to have a relatively low probability of lynx presence when compared to other areas of potential habitat within the park. Depending upon the environmental setting, mechanical treatments may reduce habitat quality and generate short-term noise effects that may displace individual lynx if present. If lynx displacement occurs, it is expected to be temporary and would not affect adults or kittens during critical life stages.

Prescribed fire would be used to treat an estimated annual average of 1,400 acres to achieve resource objectives (targeting sage-grass and mixed conifer-aspen) and as part of the hazard fuel reduction program. Short-term and long-term effects of prescribed fire may cause a small reduction in habitat, reduce habitat quality, and may displace individual lynx. The extended long-term effects (>20 years) are expected to be increased vegetative diversity that favors snowshoe hare, red squirrels, and other alternate prey species, and the creation denning habitat.

Cumulative Impacts

Cumulative impacts to lynx and lynx habitat within the GYA are related to current and future land use practices occurring primarily on lands administered by the federal agencies (i.e., Bridger-Teton, Shoshone, Caribou-Targhee, and Gallatin National Forests; YNP and GTNP) and the States of Wyoming, Montana and Idaho. Actions occurring on private lands may also contribute to cumulative impacts, but to a far lesser degree.

Management actions occurring in the GYA that may affect lynx include timber management, wildland fire use and management, prescribed fires, hazard fuel reduction programs, grazing (both inside and outside the park), and furbearer trapping. All of these activities, with the exception of trapping, have the potential of affecting lynx habitat by changing forest successional stages, and consequently, influencing snowshoe hares and lynx distribution and may contribute cumulatively to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for lynx. However, federal land management agencies in the GYA have identified LAU's on lands they respectively administer and each agency considers protection of potential lynx habitat in relation to various management actions taken by these agencies and others.

Recent hazardous fuel reduction projects within GTNP may have contributed to lynx cumulative impacts in a minor way and planned events associated with the proposed action may continue this trend. Hazardous fuel reductions around WUIs and prescribed burns could result in short-term displacements of lynx and reduce habitat quality within treatment areas and may minimally contribute to cumulative impacts to lynx. Allowing more natural fire starts to burn would help restore wildland fire and its positive influence on lynx habitat into GTNP. Alternative A is not expected to increase, in the long-term, human presence within or improved access to lynx habitat that would further reduce habitat security and effectiveness. Therefore, the contribution of Alternative A to lynx cumulative impacts is expected to be minimal.

The cumulative impact of Alternative A to Canada lynx is expected to be adverse and negligible in both the short-term and long-term.

Conclusion

Estimations of suitable lynx habitat converted by management actions into an unsuitable habitat condition within GTNP are within management guidelines of the LCAS (as specified by Ruediger et al. 2000). Planned events occurring within lynx LAUs as part of Alternative A may, in both the in the short-term and long-term, reduce the quality of suitable lynx habitat through mechanical treatments and may convert a small additional acreage into an unsuitable condition as a result of prescribed burns. For example, prescribed burning in mixed aspen-conifer could reduce conifer densities and set succession back to an earlier stage, thereby converting potential lynx habitat into an unsuitable condition. However, the small acreage proposed for prescribed burns insures that this conversion would be within LCAS guidelines within GTNP. The contribution of Alternative A to lynx cumulative impacts is expected to be minimal.

For these reasons, impacts to lynx and lynx habitat associated with Alternative A are expected to be negligible and adverse in the short-term, and minor and both adverse and beneficial in the long-term. A determination was made that Alternative A **may affect but is not likely to adversely affect Canada lynx**. Implementing project design criteria and mitigation measures will insure that adverse impacts to lynx would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Grizzly Bear

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

The overall long-term impact of fire on grizzly bear habitat is that it increases habitat diversity, maintains the resilience and vigor of ecosystems, and is beneficial to grizzly bears (USFWS 2003). Fire can create and maintain seral shrub communities used by grizzly bears by rejuvenating shrubs, releasing nutrients, and discouraging conifer dominance (Zager 1980). In addition, burns may create openings that enhance forb and grass production. These are important food sources, comprising up to 80% of the grizzly bear diet from May through July in Glacier National Park (Kendall and Keane 2001). Fires also promote and maintain many important berry-producing shrubs and forbs, as well as provide a medium for insects and in some cases carrion.

Unplanned Events – Wildland fire use associated with Alternative A is expected to remain at current levels (i.e., allowing 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing “Go/No-Go” process. Direct impacts to grizzly bears (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to grizzly bear habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Allowing minimal wildland fire use in GTNP would benefit grizzly bears negligibly, in the long-term, by creating more successional vegetative mosaics and improving foraging habitat.

Planned Events – Planned events associated with Alternative A consist of prescribed burns and mechanical treatments primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affecting grizzly bears through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments may cause small reductions in grizzly bear habitat, reduce habitat quality, and generate short-term noise effects that may displace individual bears near WUI areas. However, these actions are not expected to adversely affect grizzly bears because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence.

Prescribed fire would be used to treat an annual average of 1,400 acres per to achieve resource objectives and as part of the hazard fuel reduction program. Prescribed burns may adversely impact grizzly bears in the short-term by altering plant communities and displacing grizzly bears from certain portions of habitat.

Cumulative Impacts

Actions occurring on public lands within the recovery zone that may adversely affect grizzly bears or their habitat, such as oil and gas exploration and development, logging, and mining, are limited by the ESA (USFWS 1982) and are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing, which may impact grizzly bears through management actions
- Private land development
- Firewood cutting
- Road use/management
- Timber harvest (past)
- Recreation activities, especially big game hunting, that leads to human-bear conflicts
- Vegetation management
- Wildland fire and prescribed fires

- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression)
- Potential reduction in elk and bison populations

These activities and issues cumulatively contribute to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above listed activities as well as other unidentified actions occurring within the grizzly bear recovery zone does not appear to be adversely affecting population recovery as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996, Schwartz et al. 2002, Pyare et al. 2004).

Alternative A is not expected to increase, in the long-term, human presence within or improved access to grizzly bear habitat that would further reduce habitat security and effectiveness. Alternative A could result in short-term displacements of grizzly bears within planned treatment areas and would contribute, in a minor way, to cumulative impacts to grizzly bear. A short-term increase in human presence during treatment activities could increase the risk of conflicts between humans and bears, but simultaneous implementation of project design criteria and mitigation measures would help insure these increases would not contribute to cumulative mortality risks. The contribution of Alternative A to grizzly bear cumulative impacts is expected to be minimal.

The cumulative impact of Alternative A to grizzly bears is expected to be adverse and beneficial, but negligible in both the short-term and long-term. Implementation of project design criteria and mitigation measures would help insure that cumulative impacts associated with the proposed action would be negligible.

Conclusion

Adverse effects to grizzly bears and their habitat resulting from planned and unplanned events associated with Alternative A are expected to be negligible. Direct mortality of grizzly bears is not likely because bears are highly mobile and individuals would be expected to leave planned event project areas and wildland fire areas. Grizzly bears may avoid treatment areas during project implementation, but this would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts are expected to be small in scale and short-term in duration and, therefore, negligible because they would be within the historic range of fire impacts on grizzly bear habitat. The contribution of Alternative A to grizzly bear cumulative impacts is expected to be negligible. Implementation of project design criteria and mitigation measures would help insure that cumulative impacts associated with the proposed action would be negligible.

For these reasons, impacts to grizzly bear and their habitat associated with Alternative A are expected to be negligible, and adverse and beneficial in the short-term and minor, and adverse and beneficial in the long-term. A determination was made that Alternative A **may affect but is not likely to adversely affect grizzly bears**. Implementing project design criteria and mitigation measures would insure that adverse impacts to grizzly bears would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Gray Wolf

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

Fire is a natural process integral to maintenance of healthy ecosystems in the Rocky Mountains and wolves have evolved to maximize their ability to use burned areas and minimize the negative impacts of fire. Wildland fires typically create a mosaic pattern of burned and unburned vegetation on the landscape. Changes in the structure of wolf habitat as a result of fire are unlikely to substantially alter habitat values so long as their primary prey species are, in the long-term, equally adaptable to fire-related changes.

Unplanned Events – Wildland fire use associated with Alternative A is expected to remain at current levels (i.e., allowing 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing “Go/No-Go” process. Direct impacts to wolves (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term, negligible, adverse and beneficial effects to wolf habitat (i.e., prey base) are expected to result from allowing minimal wildland fire use.

Planned Events – Planned events associated with Alternative A consist of prescribed burns and mechanical treatments primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affecting wolves through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years, primarily associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause, in the short-term, a small reduction in wolf habitat, reduce habitat quality, and create disturbances that may displace individual wolves in proximity to WUI areas. However, these actions are expected to affect wolves on a localized and individual level. The vast majority of wolf habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. Prescribed fire may adversely impact wolves in the short-term by altering plant communities used by their primary prey and displacing individuals from certain portions of habitat. The long-term effects can create vegetative diversity that favors prey and their respective forage.

Direct mortality of wolves as a result of planned events is not anticipated because wolves are highly mobile and would likely leave project areas when burns are present. Wolves may avoid treatment areas during project implementation, but this avoidance would not result in a long-term loss of important habitat or a reduction in overall population viability. Adverse project impacts are expected to be small in scale and short-term in duration and, therefore, negligible. Changes in habitat structure related to Alternative A are unlikely to alter habitat values because wolves are habitat generalists and prey species are abundant in and around GTNP.

Cumulative Impacts

Activities occurring within wolf habitat that may adversely affect wolves in the GYA are limited and, for public land management actions, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above listed activities as well as other unidentified actions occurring within the wolf habitat does not appear to have adversely affected population recovery as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. Alternative A is not expected to increase, in the long-term, human presence within or improved access to wolf habitat that would cumulatively reduce habitat security. Hazardous fuel reductions around WUIs and prescribed fires associated with the proposed action could result in short-term displacements of wolves within planned treatment areas and this increase would contribute, in a minor way, to cumulative impacts to this species. However, hazardous fuel treatments and prescribed fires are not expected to create long-term improved access and increased human activity within wolf habitat that would reduce habitat security and effectiveness cause a loss of high quality habitat. Allowing more natural fire starts to be managed as fire use would help restore wildland fire and its positive influence on the habitats of wolf prey species.

Alternative A is expected to result in negligible adverse cumulative impacts to wolves and would not influence wolf recovery either adversely or beneficially. The contribution of the proposed action to cumulative wolf impacts is expected to be negligible.

Conclusion

Adverse effects to wolves and/or their habitat resulting from Alternative A planned and unplanned events are expected to be short-term and negligible. Direct mortality of wolves is not likely because wolves are highly mobile and individuals would be expected to leave planned event project areas and wildland fire areas. Wolves may avoid treatment areas during project implementation, but this would not result in a long-term loss of important habitat or a reduction in overall population viability. Any adverse project impacts are expected to be small in scale and short-term in duration and, therefore, negligible because they would be within the historic range of fire impacts on wolf habitat. Alternative A is not expected to result in measurable adverse effects to wolves or influence recovery of this species and the contribution of Alternative A to cumulative wolf impacts is expected to be minimal.

For these reasons, adverse impacts to gray wolves and their habitat associated with Alternative A are expected to be negligible in the short-term and long-term. A determination was made that Alternative A **may affect but is not likely to adversely affect gray wolves**. Implementing project design criteria and mitigation measures would insure that adverse impacts to wolves would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Trumpeter Swans

Analysis

Certain activities associated with fire suppression, prescribed burns, and mechanical treatments could potentially have adverse impacts to trumpeter swans. Wildland fires and prescribed burns occurring near nesting areas may burn vegetation in the immediate vicinity of nests and be of sufficient intensity to cause adults to abandon a nest. Non-molting adult trumpeter swans can probably easily escape fire, but molting adults, cygnets, and eggs are probably most susceptible to fire (Tesky 1993). Hakala et al. (1971) reported that heavy smoke and burning trees in proximity to swan nesting habitat resulting in adults with fledged cygnets simply moving to an opposite side of a lake but not flushing from the lake. Fire suppression activities such as dipping water, dropping retardant, and fireline construction occurring near nests may disturb incubating adults and cause adults to abandon their young. Mechanical treatments in proximity to nesting areas may also adversely impact nesting birds.

Fire occurring in emergent wetlands often removes excessive accumulations of fast-growing hydrophytes, permitting better waterfowl access and growth of more desirable trumpeter swan foods such as pondweed and duckweed (Schlichtemeier 1967, Vogl 1967). In contrast, large-scale autumn burning may have adverse effect upon marshes by reducing retention of drifting snow, a vital aspect of marsh survival (Ward 1968).

The measures used to determine the level of impact to trumpeter swans include impacts to habitat and human disturbances of nesting birds.

Unplanned Events – Wildland fire use associated with Alternative A is expected to remain at current levels (i.e., allowing 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing “Go/No-Go” process. Direct impacts to trumpeter swans (i.e., mortality) resulting from wildland fires are unlikely. Short-term or long-term adverse effects to swan habitat resulting from unplanned events are difficult to predict but are not expected so long as fires occur within the historic range of fire impacts on swan habitat.

Planned Events – Planned events associated with Alternative A consist of limited prescribed burns and mechanical treatments and are primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affecting trumpeter swans through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years, primarily associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments are not expected to cause a reduction in swan habitat, reduce swan habitat quality, or create disturbances that would displace individual birds in proximity to WUI areas. The vast majority of swan habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. Prescribed burns are not expected to adversely effect swans in the short-term or the long-term so long as mitigation measures are implemented.

Cumulative Impacts

Cumulative effects to trumpeter swans in Jackson Hole include mortality resulting from collisions with existing overhead utility lines, bridges, and fences, and human-caused disturbances to nesting trumpeter swans that lower reproductive fitness and success and wintering swans that may force swans into suboptimal habitat. Recent efforts by the Jackson Hole Wildlife Foundation, other organizations, and residents to either visually mark or bury overhead utility lines located near swan habitat and remove fences that span watercourses used by swans have eliminated some collision threats. The Wyoming Wetland Society is helping to re-establish historic migration patterns for trumpeter swans through a captive breeding program and works closely with landowners to provide wintering and nesting habitat for trumpeter swans. Successes of these and other efforts are helping reduce cumulative adverse effects to swans.

Alternative A is not expected to contribute to cumulative impacts affecting swans in the GYA.

Conclusion

No direct or indirect effects to trumpeter swans or their habitat are expected to result from Alternative A as long as mitigation measures are implemented. Mechanical treatments and prescribed fires for resource objectives or for hazardous fuel reductions are not expected to impact trumpeter swan nesting or winter habitat so long as mitigation measures are implemented.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Migratory Birds

Analysis

Migratory birds inhabiting GTNP and the GYA have evolved in the presence of fire under historic fire regime conditions. Wildland fires typically create a mosaic pattern of burned and unburned vegetation and historically altered the successional stages on a landscape scale. For these reasons, the short-term effects of fire are positive for species that exploit early seral habitats and negative for species relying on more mature forest types. While some habitat loss or displacement of individual birds would occur in areas subjected to fire (whether planned or unplanned), long-term benefits to migratory birds, such as increased in habitat diversity, improved habitat quality, and enhanced ecosystem vigor, would be derived by restoring fire-maintained habitats.

Species such as the hairy woodpecker, mountain bluebird, chipping sparrow, pine siskin, American robin, dark-eyed junco, yellow-rumped warbler, western tanager, Cassin's finch, northern flicker, red-breasted nuthatch are common in early successional forests and will benefit from fires (Hutto 1995). Some species (black-backed woodpecker, three-toed woodpecker, olive-sided flycatcher, Townsend's solitaire) are post-fire specialists (Hutto 1995). In contrast, brown creepers, kinglets, hermit thrushes, and certain warblers are more commonly associated with denser, more mature forests (Hutto and Young 1999).

Direct and indirect effects to migratory birds could result from activities that alter existing vegetative communities. Depending on timing of disturbances, nesting migratory birds could be disturbed and productivity of individual pairs reduced. Current activities occurring within GTNP are not expected to be of sufficient magnitude to adversely affect migratory birds on a population level although some activities may negatively affect individuals and/or nesting pairs.

The measures used to determine the level of impact to migratory birds associated with the Fire Management Plan include alteration of nesting and foraging habitat and disruption of reproductive activities.

<u>Unplanned Events</u> –Both wildland fire and fire suppression activities have the potential to affect migratory birds and their habitat. However, direct adverse impacts occurring to birds from wildland fire are unpredictable and, therefore, unknown. Wildland fire use associated with Alternative A is expected to remain near current levels (i.e., allowing about 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing "Go/No-Go" process. Direct impacts to migratory birds, such as mortality and reduction in reproductive success, resulting from wildland fires are likely in localized areas. Short-term measurable

adverse effects to migratory bird habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Allowing minimal wildland fire use in GTNP would benefit migratory birds negligibly, in the long-term, by creating more successional vegetative mosaics and improving foraging and nesting habitat.

Planned Events – Planned events associated with Alternative A consist of limited prescribed burns and mechanical treatments and are primarily associated with hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affecting migratory birds through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years, primarily associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause, in the short-term, a small reduction in migratory bird habitat, reduce habitat quality, and create disturbances that may displace individual birds in proximity to WUI areas. However, these actions are expected to affect birds on a localized and individual level. The vast majority of habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat 1,400 acres per year for the next 10 years, most of which would be linked to achieving resource objectives but a small portion may be part of the hazard fuel reduction program. Prescribed burns may adversely impact migratory birds in the short-term by altering plant communities and displacing individuals from certain portions of habitat. The long-term effects can create vegetative diversity that favors some migratory bird species.

Planned projects would avoid breeding period (May 1-July 31) as much as possible in order to minimize impacts to migratory birds protected under the Migratory Bird Treaty Act.

Cumulative Impacts

Actions occurring within GTNP and the GYA that may adversely affect migratory birds or their habitat, include private land development, logging, livestock grazing, vegetation management, and elevated elk populations. All these activities and issues cumulatively reduce availability of secure habitat, diminish habitat quality and effectiveness, influence reproductive success, and increase mortality risks to migratory birds. However, it is presently unknown if habitat loss and increased mortality impacts occurring in GTNP and the GYA affect migratory birds at a population level.

Alternative A is not expected, in the long-term, to reduce habitat abundance, security and effectiveness; reduce reproductive success; or increase mortality. Alternative A could result in short-term displacements of migratory birds within planned treatment areas, possibly adversely affecting reproductive success if displacements occur during the breeding season and these impacts would contribute, in a minor way, to cumulative impacts. Alternative A is not expected to result in long-term adverse effects to migratory birds.

Alternative A is expected to result in negligible, adverse cumulative impacts to migratory birds.

Conclusion

Impacts to migratory birds associated with Alternative A are expected to be negligible and adverse in the short-term. Alternative A constrains the ability of GTNP to restore and maintain natural fire regimes within the park. This is due, in part, to narrowly defined and implemented resource objectives that would benefit from incorporation in an adaptive fire management strategy. Planned events associated with achieving resource objectives are restricted to sagebrush and mixed aspen/conifer communities in Alternative A. Wildland fire use would be restricted to areas outside of the defined suppression zone and decisions to allow potentially beneficial wildland fires to burn outside of these areas may be difficult to make because other resource objectives are not clearly defined. Continued fire suppression would, by default, preclude many of the landscape-level benefits associated with natural wildland fire regimes and increase risks of unnaturally large, high-severity fires. The long-term impacts of Alternative A are expected to be minor and adverse.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Greater Sage-Grouse

Analysis

Agency consultation with the USFWS regarding the impacts of management actions on sage-grouse is not required because this species is not presently listed nor a candidate for listing. However, several petitions have been made to the USFWS asking for listing and the recent documented population decline in GTNP makes it imperative that potential impacts of management actions on sage-grouse be evaluated.

Fire may be either beneficial or detrimental to sage-grouse, depending on the particular setting and location relative to seasonal changes (Call and Maser 1985). Sage-grouse use sagebrush of different age classes and stand structure for different life history events at different seasons. Fire effects on these different sagebrush habitats vary and are treated separately.

Fire-related mortality of sage-grouse has not been documented in the literature and Blackburn et al. (1975) reported that fire generally has no direct effect on wildlife. However, Call and Maser (1985) caution that fires in late spring and early summer, before young are capable of escaping, could kill sage-grouse.

Fire can adversely affect potential sage-grouse winter and nesting habitat (Robertson 1991, Fischer 1994). Connelly and Braun (1997) reported that fire may negatively impact sage-grouse populations by eliminating or fragmenting relatively large blocks of wintering or nesting habitat.

Data from the study suggest that greater sage-grouse continue to use leks in altered areas because some hens nest successfully under non-sagebrush plants. The authors caution that persistence of leks in burned areas should not be interpreted as evidence that fire has little effect on greater sage-grouse populations. Greater sage-grouse use of non-sagebrush shrubs for nest sites may allow populations to persist at low levels in a burned area until the area recovers. However, this behavior may slow, but not prevent, the birds' ultimate disappearance from the burned area.

Long-term response of nesting sage-grouse to fire appears to be dependent on both the scale of sagebrush removal and intensity of fidelity to nesting areas Fischer (1994). Klebenow (1969) states that shrubs provide the cover necessary for nesting greater sage-grouse and complete removal of shrubs within burns will result in greater sage-grouse abandonment from the area. Greater sage-grouse that show nesting-area fidelity may subsequently return to the same area and attempt a nest even after the habitat has been manipulated. Fischer (1994) found sage-grouse nesting within burned areas, but only in unburned patches, and concluded that removal of sagebrush by fire reduces nesting cover for grouse.

Connelly et al. found no difference in the use of burned and unburned areas by a migratory population of greater sage-grouse suggesting fire does not improve and may cause an overall decline in brood-rearing habitat, perhaps contributing to the decline in the population following fire (McWilliams 2002). Decreased food abundance following fire in the treatment area may have indirectly affected survival by increasing chick movement.

Fire may negatively impact sage-grouse populations by eliminating or fragmenting relatively large blocks of wintering habitat (Connelly and Braun 1997) and high severity fires can destroy important wintering areas for sage-grouse (Call and Maser 1985). Gates and Eng (1984) indicate that stand-replacing fires in sagebrush will render sage-grouse winter habitat unusable. Known sage-grouse wintering areas should receive priority attention in the control of wildland fires (Autenreith et al. 1982) and loss of critical winter habitat has resulted in sage-grouse population declines (Berry and Eng 1985).

According to guidelines established by the Northwest National Fire Plan Project Design and Consultation Process, prescribed burning of mountain big sage should not remove more than 20% of breeding and winter habitat on landscape/watershed scale over 20 years and management actions that cumulatively result in less than 20% breeding and winter habitat removal should be reviewed on a local level to determine possible effects to local sage-grouse populations.

Potential effects to sage-grouse were measured by loss of habitat and potential disruption of breeding, nesting, brood-rearing, wintering activities, and direct mortality.

<u>Unplanned Events</u> –Wildland fire use associated with Alternative A is expected to remain near current levels (i.e., allowing about 30% of natural starts to be managed as fire use) and each natural start would be reviewed using the existing “Go/No-Go” process (Appendix D). Both wildland fire and fire suppression activities have the potential to affect sage-grouse and their habitat both positively and negatively. Adverse impacts to sage-grouse (i.e., direct mortality and reduction in reproductive success) resulting from wildland fires are possible in localized areas. Short-term measurable adverse effects to sage-grouse habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted until after a fire occurs. Restoring the role of wildland fire in GTNP would benefit sage-grouse in the long-term by creating more successional vegetative mosaics while simultaneously decreasing the likelihood of large, high-severity fires occurring in the future. GTNP resource personnel would be consulted before being implemented if suppression activities are likely to have direct adverse effects on sage-grouse.

<u>Planned Events</u> – Planned events associated with Alternative A consist of prescribed burns and mechanical treatments primarily linked to hazard fuels reduction efforts. Resource objectives associated with planned events are secondary to other park objectives and would be primarily limited to creating age-class diversity and vegetative mosaics in sagebrush-grassland communities and encouraging aspen regeneration within mixed aspen-conifer communities.

Alternative A has the potential of directly and indirectly affecting sage-grouse through modification of suitable habitat into a less suitable or unsuitable condition, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause a small reduction in sage-grouse habitat, reduce habitat quality, and generate short-term noise effects that may displace individual grouse in proximity to WUI areas. However, these actions are not expected to adversely affect sage-grouse because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence. The vast majority of sage-grouse habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an annual average of 1,400 acres for the purposes of achieving resource objectives and as part of the hazard fuel reduction program. Prescribed fire, if done properly, can be used to maintain and restore more diverse vegetative communities in landscapes where natural fire regimes have been disrupted. Prescribed burns may adversely impact sage-grouse in the short-term and long-term by altering plant communities and displacing individuals from certain portions of habitat. Changes in habitat structure would include a reduction in the density of mature sagebrush and would change the vertical structure of the stand and result in a reduced sagebrush canopy cover and increased forb cover. Grouse require tall, mature sagebrush stands for food and cover, especially during in the winter and nesting period, so inappropriate changes in stand structure may have direct, long-term effects on sage-grouse habitats.

Adverse impacts to sage-grouse and their habitat resulting from planned events associated with Alternative A would be minimized by keeping project activities greater than greater than 5km from active leks during the lekking, nesting and brood-rearing periods when sage-grouse are present. Direct mortality of sage-grouse is possible but not anticipated because the timing of such events would insure that flightless juvenile birds would not be present within treatment areas. Prescribed fires in sagebrush would be designed to create mosaic burns that maintain certain proportions of mature sagebrush within burn areas, thereby minimizing adverse effects on sage-grouse habitat. Any project impacts are expected to be small in scale and short-term and long-term in duration and, therefore, negligible to minor.

Cumulative Impacts

Historic conversions of sagebrush communities to agricultural land in Jackson Hole and, to a lesser degree, more recent conversions to non-sagebrush dominated plant communities associated with residential development have undoubtedly had adverse impacts on sage-grouse. Wildland fire and prescribed fire activities in sagebrush habitat have also contributed to cumulative effects on sage-grouse in the valley and would continue to do so in the future. However, the extent of this impact is unknown.

Large-scale loss of remaining sagebrush communities in Jackson Hole that represent sage-grouse habitat is not expected although small- to medium-sized, localized conversions are possible as a result of development, wildland fire, and prescribed burns. Airport expansion could adversely affect sage-grouse breeding on the Airport lek, and nesting and brood-rearing activities in adjacent habitat. Livestock grazing in areas east of US Highway 89 has the potential to adversely affect nesting by individual sage-grouse. Additional losses of sagebrush habitats may adversely affect wintering sage-grouse during difficult winters.

The majority of sage-grouse habitat in Jackson Hole is located within the boundaries of GTNP and at the northern end of the NER. It is difficult to accurately quantify the amount of suitable grouse habitat available as well as the acreage and characteristics of habitat lost to past fires and other management actions in the park. Estimates suggest that more than 20% of potential sage-grouse habitat has been burned by both prescribed and wildland fires within the past 10-20 years. In addition, wildland fire and prescribed fires have occurred in the recent past in 2 important grouse wintering areas (south of Blacktail Butte and Wolff Ridge).

In total, cumulative impacts to sage-grouse resulting from Alternative A to sage-grouse are expected to be adverse, minor, and short-term and long-term. Planned events associated with Alternative A, in particular prescribed burns in sagebrush-dominated communities, may contribute to cumulative effects on sage-grouse in GTNP. To insure this, impacts associated with Alternative A would be analyzed annually by GTNP resource personnel in the context of other impacts occurring within Jackson Hole.

Conclusion

Planned events occurring within sagebrush communities would increase the amount of sagebrush altered in the park beyond levels recommended in regional sage-grouse management guidelines and could also affect potential sage-grouse wintering and breeding habitat. However, mosaic burns that retain patches of mature sagebrush within treatment areas would reduce the amount of wintering and breeding habitats lost. Although habitat loss has the potential to be detrimental to sage-grouse, the expected small sizes of future treatments within sagebrush communities, their timing, the likelihood that wintering and breeding areas would be maintained within treatment areas, and project scrutiny performed by Park resource personnel insure that impacts will be small. For these reasons, adverse impacts to sage-grouse and their habitat associated with Alternative A are expected to be minor in both the short-term and long-term.

Hazardous fuel reductions (mechanical and prescribed fire) within and near WUI areas would help protect these features with minimal adverse impacts on sage-grouse. Prescribed fires and wildland fire use are expected to have short-term and long-term, minor, adverse impacts on sage-grouse. Alternative A constrains the ability of GTNP to restore and maintain natural fire regimes within the park due, in part, to narrowly defined and implemented resource objectives. However, minimal wildland fire use would probably not decrease the likelihood of large high-severity fires occurring in the future. Wildland fire use would be restricted to areas outside of the suppression zone and decisions to allow potentially beneficial wildland fires to burn outside of these areas may be difficult to make because other resource objectives are not clearly defined. Continued fire suppression would, by default, preclude many of the landscape-level benefits associated with natural wildland fire regimes and increase risks of unnaturally large, high-severity fires. In total, the short-term and long-term impacts of Alternative A are expected to be minor and adverse.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Harlequin Duck

Analysis

The measures used to determine the level of impact to harlequin ducks include impacts to habitat and human disturbances. No direct or indirect effects to harlequin ducks or their habitat are expected to result from Alternative A. It is highly doubtful that wildland fire would alter harlequin duck habitat within GTNP. Mechanical treatments and prescribed fires for resource objectives or for hazardous fuel reductions are not expected to impact harlequin ducks or their habitat.

Harlequin duck presence on a given stream is an indicator of high water quality. Nesting success is influenced by water quality and stream degradation due to sedimentation, channelization, logging, incompatible recreation, and incompatible livestock grazing adversely affects nesting success.

Cumulative Impacts

Cumulative effects on harlequin ducks in the GYA involve loss of habitat, degradation of habitat due to sedimentation, channelization, logging, and human-caused disturbances resulting from recreational use that can adversely affect reproductive success. Large, high-severity fires that result in soil erosion and sedimentation of mountain streams used by harlequins can be expected to adversely affect habitat quality.

Alternative A is not expected to adversely affect harlequin ducks nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to harlequin ducks are associated with Alternative A nor does GTNP propose setting any specific prescriptions or mitigation measures related to fire management activities for harlequin ducks.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Wolverine

Analysis

The measures used to determine the level of impact to wolverines include impacts to habitat, direct mortality, and human disturbances. No direct or indirect effects to wolverines or their habitat are expected to result from Alternative A. It is highly doubtful that wildland fire would alter wolverine habitat within GTNP. Mechanical treatments and prescribed fires for resource objectives or for hazardous fuel reductions are not expected to impact wolverines or their habitat.

Cumulative Impacts

Cumulative effects to wolverines in Jackson Hole include mostly human-caused disturbances resulting from backcountry recreational use, especially during the winter. Activities such as snowmobiling, heli-skiing, and cross-country skiing have the potential to influence wolverine distribution, and habitat use during this critical period.

Alternative A is not expected to adversely affect wolverines nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to wolverines are associated with Alternative A nor does GTNP propose setting any wolverine-specific prescriptions or mitigation measures related to fire management activities.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Plant Species of Special Concern

Analysis

Wildland fire use would be restricted to areas outside of the Suppression Zone and may be minimally supported due to a lack of clear resource objectives under Alternative A. Many potentially beneficial wildland fire starts would likely be suppressed. Continued fire suppression would perpetuate a high percentage of climax communities and over-mature forests and would inhibit natural disturbance patterns related to fire. These effects would impose little short-term impact on taxa of concern, but may, in the long run, inhibit establishment or proliferation of species that prosper after fire (i.e., *Luzula glabrata and Xerophyllum tenax*). Additionally, heavy fuel loading could ultimately result in unusually hot fires, which would kill both above and underground plant parts, and may temporarily sterilize the upper surface of the soil. Re-establishment of any species of concern after severe fire could take decades and may not occur at all within the foreseeable future.

Planned treatments for resource purposes under Alternative A would be restricted primarily to sagebrush and aspen communities. Since these are common vegetation types that evolved under frequent fire conditions, they generally do not support plants vulnerable to population-level loses due to fire. The only S1 species of special concern occurring in these habitats are *Carex sartwellii* (in aspen), and *Orobanche corymbosa var. corymbosa and O. ludoviciana var. arenosa* (both in sagebrush) (Appendix J). As a rhizomatous perennial, *C. sartwellii* would probably survive a low to moderate severity fire, but may not be able to persist within the altered environment. Both species of *Orobanche* also have underground root structures and would probably survive prescribed treatments. These plants are non-photosynthetic and depend on sagebrush as a host; therefore, the temporary loss of sagebrush could reduce *Orobanche* spp. populations and distributions. However, regrowth of sagebrush with increased vigor could result in improved habitat conditions and larger, healthier populations of *Orobanche*. The latter scenario has been documented for *O. corymbosa* habitat in other areas.

Cumulative Impacts

There are no known adverse or beneficial impacts to any of the S1 plant species of concern considered in this analysis from recent, current, or planned projects in or near GTNP; therefore no additional incremental impacts would occur.

Conclusion

A few individual plant species of special concern and perhaps site-specific populations could be lost as a result of Alternative A. However, these impacts are difficult to predict due to the unpredictability of fire (especially wildland fire use). Therefore impacts are considered adverse, ranging from minor to moderate, and of short-term or long-term duration (depending on the species involved).

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values

4.3.3 Impacts of Alternative B on Threatened, Endangered, and Special Concern Species

Bald Eagle

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA. Greater detail on the impacts of fire on bald eagles, in general, and the impacts of Alternative B (preferred alternative), as well as detailed project criteria and mitigation measures can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to bald eagles were the same as presented in Alternative A.

Unplanned Events – Both wildland fire and fire suppression activities have the potential of affecting bald eagles and their habitat. However, adverse impacts occurring to bald eagles from wildland fire are unpredictable and, therefore, unknown until after the fire has occurred. Wildland fire is considered to be an "Act of God" by the USFWS (50 CFR 402.05) and federal agencies are not required to consult with the USFWS regarding impacts that might occur to bald eagles from wildland fires. Agency consultation with the USFWS is required if suppression activities would cause an adverse effects on bald eagles and this consultation, if needed, would be in the context of the emergency consultation process. If suppression activities comply with the project design criteria listed in the BA, it is unlikely that bald eagles would be adversely affected and consultation may not be necessary.

Wildland fire use associated with the proposed action is expected to increase above current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised "Go/No-Go" process. No measurable adverse effects to bald eagles or their habitat are expected to result from unplanned events associated with the proposed action. Restoring the role of wildland fire in GTNP would benefit bald eagles in the long-term by creating more successional vegetative mosaics and improving habitat.

<u>Planned Events</u> – Planned events associated with the proposed action include a combination of prescribed burns and mechanical treatments these actions have the potential of directly and indirectly affecting bald eagles through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species.

Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence. Primary bald eagle habitat in GTNP occurs outside of developed areas although eagles can and do use WUI areas located in the vicinity of foraging habitat. As in the past, mechanical treatments would not occur within 1/2 mile from an active nest during the nesting season (February 1-August 15) and would protect all active and inactive nests and known or suspected perch trees.

Prescribed fire would be used to treat an estimated annual average of 1,400 acres over a 10-year period for achieving resource objectives and as part of the hazard fuel reduction program and is not expected to adversely affect bald eagles. Prescribed fires would not occur within 1/2 mile from an active nest during the nesting season (February 1-August 15) and would protect all active and inactive nests and known or suspected perch trees.

No direct or indirect negative effects to bald eagles or their habitat are expected to result from planned events associated with Alternative B. Prescribed burns and mechanical fuel reductions have and would continue to be planned and implemented in a manner sensitive to critical life stages and protective of important habitat components. Implementing and/or adhering to the design criteria listed above would insure that impacts to bald eagles are minimized. If planned events are likely to adversely affect bald eagles, these actions would incorporate additional NEPA compliance and consultation with the USFWS.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative B are expected to be generally similar to those identified in Alternative A. Alternative B could result in short-term displacements of bald eagles within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The contribution of Alternative B to bald eagle cumulative impacts is expected to be minimal and, in total, cumulative impacts are expected to be adverse, negligible, and short-term

Conclusion

A determination was made that implementing Alternative B **may affect but is not likely to adversely affect** bald eagles. Although bald eagles may be occasionally flushed from perches in proximity to fire control activities associated with unplanned events, these events are expected to be infrequent and impacts are expected to be negligible and short-term and would not jeopardize reproductive success. Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence. Management actions are not expected to jeopardize reproductive success of or increase the mortality risk to bald eagles. Mechanical treatments occurring within 1/2-mile of an active bald eagle nest would avoid the nesting season (February 1-August 15). No loss of nest, perch, or roost trees or primary aquatic foraging sites is anticipated as a result of proposed management actions. Activities associated with:(1) fire control and suppression, such as fireline construction, burnout, patrol, mop-up, and monitoring fire effects, (2) hazard fuels removal with chainsaws that may include cutting, piling and burning, and (3) prescribed fire operations including project preparation, line location, firing operations, holding, patrol and mop-up, and fire effects monitoring are expected to have negligible, short-term effects on bald eagles if mitigation measures are followed. Negative impacts to bald eagles resulting from Alternative B are expected to be minimal and are not expected to contribute to cumulative impacts to bald eagles in any measurable way. Implementing project design criteria and mitigation measures would insure that adverse impacts to bald eagles would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Canada Lynx

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA. Greater detail on the impacts of fire on lynx, in general, and the impacts of Alternative B (preferred alternative), as well as detailed project criteria and mitigation measures can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to Canada lynx were the same as presented in Alternative A.

<u>Unplanned Events</u> – Wildland fire use associated with the proposed action is expected to increase above current levels and allow up to 30-60% of natural starts to be managed as fire use. Each natural start would be reviewed using a revised "Go/No-Go" process. Short-term adverse effects to lynx habitat are expected to result from allowing more wildland fires to burn. The extent of impact resulting from future wildland fire cannot be predicted but would be analyzed as part of the annual compliance review associated with the programmatic Biological Assessment developed between GTNP and the USFWS. Restoring the role of wildland fire in GTNP would benefit lynx in the long-term by creating more successional vegetative mosaics and improving habitat for their primary prey.

<u>Planned Events</u> – Alternative B has the potential of directly and indirectly affecting lynx through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years and possibly slightly fewer acres per year during the last 4 years. Hazardous fuel reduction efforts are proposed to occur within WUI areas and some of these actions are expected to convert some suitable lynx habitat into an unsuitable condition. However, the majority of potential lynx habitat in GTNP occurs outside of developed areas. Most WUI areas are located adjacent to major roadways and/or in areas of high human use and are

assumed to have a relatively low probability of lynx presence when compared to other areas of potential habitat within the park. Depending upon the environmental setting, mechanical treatments may reduce habitat quality and generate short-term noise effects that may displace individual lynx if present. If lynx displacement occurs, it is expected to be temporary and would not affect adults or kittens during critical life stages.

Prescribed fire would be used to treat an estimated annual average of about 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. Short-term and long-term effects of prescribed fire may cause a small reduction in habitat, reduce habitat quality, and may displace individual lynx. The extended long-term effects (>20 years) are expected to be increased vegetative diversity that favors snowshoe hare, red squirrels, and other alternate prey species and creation of denning habitat. Planned events occurring within lynx LAUs as part of Alternative B may convert a small additional acreage into an unsuitable condition in the short-term and long-term. For example, prescribed burning in mixed aspen-conifer could reduce conifer densities and set succession back to an earlier stage, thereby converting potential lynx habitat into an unsuitable condition. However, the small acreage proposed for prescribed burns insures that this conversion within GTNP would be within LCAS guidelines.

Cumulative Impacts

Cumulative impacts to Canada lynx associated with Alternative B are expected to be generally similar to those identified in Alternative A. Alternative B could result in short-term displacements of lynx within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative B to lynx is expected to be adverse in the short-term and long-term, beneficial in the extended long-term, negligible in intensity for both impact durations.

Conclusion

A determination was made that implementing Alternative B **may affect but is not likely to adversely affect** Canada lynx. Alternative B is not expected to have individual or population level impacts nor would it jeopardize the recovery of the species within the GYA. Direct mortality of lynx is not likely because lynx are highly mobile and individuals are expected to leave wildland fire and planned event project areas. Adverse effects to lynx and their potential habitat resulting from planned and unplanned events are expected to be negligible and of a short-term and long-term duration. Lynx may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability. Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on lynx habitat. The proposed action adheres to programmatic and project-planning standards recommended in the Lynx Conservation Assessment and Strategy. Implementing the proposed action would not result in unsuitable lynx habitat exceeding 30% of a given LAU and would not convert more than 15% of suitable habitat into an unsuitable condition. The contribution of Alternative B to lynx cumulative impacts is expected to be negligible. Implementing project design criteria and mitigation measures would insure that adverse impacts to lynx would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Grizzly Bear

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA. Greater detail on the impacts of fire on grizzly bears, in general, and the impacts of Alternative B (preferred alternative), as well as detailed project criteria and mitigation measures can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to grizzly bears were the same as presented in Alternative A.

<u>Unplanned Events</u> – Wildland fire use associated with Alternative B is expected to increase above current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to grizzly bears (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to grizzly bear habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Restoring the role of wildland fire in GTNP would benefit grizzly bears in the long-term by creating more successional vegetative mosaics.

<u>Planned Events</u> – Alternative B has the potential of directly and indirectly affecting grizzly bears through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Prescribed fire would be used to treat an annual average of 1,400 acres for achieving resource objectives and as part of the hazard fuel reduction program. Prescribed burns may adversely impact grizzly bears in the short-term by altering plant communities and displacing grizzly bears from certain portions of habitat.

Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments may cause small reductions in grizzly bear habitat, reduce habitat quality, and generate short-term noise effects that may displace individual bears near WUI areas. However, these actions are not expected to adversely affect grizzly bears because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence.

Cumulative Impacts

Cumulative impacts to grizzly bears associated with Alternative B are expected to be generally similar to those identified in Alternative A. Alternative B could result in short-term displacements of grizzly bears within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative B to grizzly bears is expected to be adverse, short-term, and negligible.

Conclusion

A determination was made that implementing Alternative B **may affect but is not likely to adversely affect** grizzly bears for the following reasons. Adverse effects to grizzly bears and their habitat resulting from planned and unplanned events associated with the proposed action are expected to be negligible and of a short-term duration. Grizzly bears may avoid treatment areas during project implementation, but management actions would not result in a long-term loss of important habitat or a reduction in overall population viability. Any adverse project impacts are associated with prescribed burns or wildland fire use are expected to be small in scale and short-term in duration and, therefore, negligible because they would be within the historic range of fire impacts on grizzly bear habitat. Changes in habitat structure related to the project are unlikely to alter habitat values in the long-term because grizzly bears are habitat generalists and suitable, high quality habitat is abundant in GTNP and its vicinity. The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of this species within the GYA. Direct mortality of grizzly bears is not likely because bears are highly mobile and individuals are expected to leave planned event project areas and wildland fire areas. Implementation of project design criteria and mitigation measures would help insure that cumulative impacts associated with the proposed action would be small.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Gray Wolf

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or Chapter Three of this EA. Greater detail on the impacts of fire on wolves, in general, and the impacts of Alternative B (preferred alternative), as well as detailed project criteria and mitigation measures can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to gray wolves were the same as presented in Alternative A.

Unplanned Events – Wildland fire use associated with Alternative B is expected to increase over current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to wolves (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to wolf habitat (i.e., prey base) are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted.

Planned Events – Alternative B has the potential of directly and indirectly affecting wolves through modification of habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. However, these actions are not expected to adversely affect wolves because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence. The vast majority of wolf habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. Prescribed fire can be effective in maintaining and restoring wolf habitat and is not expected to pose a direct threat to individual wolves. Prescribed burns may adversely impact wolves in the short-term by altering plant communities used by their primary prey and displacing individuals from certain portions of habitat but these impacts are considerable negligible. The long-term effects can create vegetative diversity that favors prey and their respective forage.

Direct mortality of wolves as a result of planned events is not anticipated because wolves are highly mobile and would likely leave project areas when burns are present. Wolves may avoid treatment areas during project implementation, but this avoidance would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts are expected to be small in scale and short-term in duration and, therefore, negligible. Changes in habitat structure related to the project are unlikely to considerably alter habitat values because wolves are habitat generalists and suitable, high quality habitat is abundant in GTNP.

Cumulative Impacts

Cumulative impacts to gray wolves associated with Alternative B are expected to be similar to those identified in Alternative A. Alternative B could result in short-term displacements of wolves within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative B to wolves is expected to be adverse, short-term, and negligible.

Conclusion

A determination was made that implementing Alternative B **may affect but is not likely to adversely affect** gray wolves. The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of the species within the GYA. Direct mortality of gray wolves is not likely because wolves are highly mobile and individuals are expected to leave wildland fire and planned event project areas. Adverse effects to gray wolves and their habitat resulting from planned and unplanned events are expected to be negligible and of a short-term duration. Gray wolves may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability. Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on wolf habitat (i.e., ungulate habitat). Alternative B is not expected to result in measurable adverse effects to wolves or influence recovery of this species and the contribution of Alternative B to cumulative wolf impacts is expected to be minimal. Implementing project design criteria and mitigation measures would insure that adverse impacts to wolves would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Trumpeter Swans

Analysis

The background information for and measures used to assess impacts to trumpeter swans were the same as presented in Alternative A.

Unplanned Events – Wildland fire use associated with Alternative B is expected to increase above current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to trumpeter swans (i.e., mortality) resulting from wildland fires are unlikely. Short-term or long-term adverse effects to swan habitat resulting from unplanned events are difficult to predict but are expected to be negligible so long as fires occur within the historic range of fire impacts on swan habitat.

Planned Events – Alternative B has the potential of directly and indirectly affecting swans through modification of habitat, disturbance and displacement. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and probably fewer acres thereafter. Prescribed fire would be used to treat an annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. These actions are not expected to adversely affect swans.

Cumulative Impacts

Cumulative impacts to trumpeter swans associated with Alternative B are expected to be similar to those identified in Alternative A. Alternative B is not expected to adversely affect swans nor is it expected to contribute to cumulative impacts.

Conclusion

No direct or indirect effects to trumpeter swans or their habitat resulting from planned events and suppression activities are expected to result from Alternative B so long as project mitigation measures are implemented.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Migratory Birds

Analysis

The background information for and measures used to assess impacts to migratory birds were the same as presented in Alternative A.

Direct and indirect effects to migratory birds could result from activities that alter existing vegetative communities. Depending on timing of disturbances, nesting migratory birds could be disturbed and productivity of individual pairs reduced. Current activities occurring within GTNP are not believed to be of sufficient magnitude to adversely affect migratory birds on a population level although some activities may negatively affect individuals and/or nesting pairs.

<u>Unplanned Events</u> – Both wildland fire and fire suppression activities have the potential of affecting migratory birds and their habitat. However, direct adverse impacts occurring to birds from wildland fire are unpredictable and, therefore, unknown. Wildland fire use associated with Alternative B is expected to increase above current levels (Alternative A) but be used less than Alternative C. Direct impacts to migratory birds (i.e., mortality and reduction in reproductive success) resulting from wildland fires are likely in localized areas. Short-term measurable adverse effects to migratory bird habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted.

<u>Planned Events</u> – Planned events associated with Alternative B are a combination of prescribed burns and mechanical treatments. DFCs would be established to, in part, direct planned events.

Alternative B has the potential of directly and indirectly affecting migratory birds through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause, in the short-term, a small reduction in migratory bird habitat, reduce habitat quality, and create disturbances that may displace individual birds in proximity to WUI areas. However, these actions are expected to adversely affect birds on a localized and on an individual level. The vast majority of habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. If done properly, prescribed fires can be used to maintain and restore bird habitat. Prescribed burns may adversely impact migratory birds in the short-term and long-term by altering plant communities and displacing individuals from certain portions of habitat. The long-term effects can create vegetative diversity that favors migratory bird species.

Cumulative Impacts

Cumulative impacts of Alternative B to migratory birds are expected to be adverse and negligible in the short-term, and both adverse and beneficial and negligible in the long-term. These cumulative impacts to migratory birds associated with Alternative B are expected to be generally similar to those identified in Alternative A with the following exceptions. Increasing wildland fire use would change more acreage of the park into earlier seral stages that would benefit some species and be adverse to others. Short-term displacements of migratory birds within planned treatment areas could adversely affect reproductive success if displacements occur during the breeding season.

Conclusion

Short-term impacts to migratory birds associated with Alternative B are expected to be negligible and adverse, while long-term impacts are expected to be adverse and beneficial, and negligible. Implementing project design criteria and mitigation measures would insure that adverse impacts to migratory birds would remain negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Greater Sage-Grouse

Analysis

The background information for and measures used to assess impacts to migratory birds were the same as presented in Alternative A.

<u>Design Criteria for Planned Events or Wildland Fire Suppression Actions</u> – Implementing the following project design criteria in planned fire events or in wildland fire suppression activities would minimize adverse impacts to sage-grouse and are expected to produce a "Not Likely to Adversely Affect" determination from the USFWS. These criteria were derived, in part, from the Northwest National Fire Plan Project Design and Consultation Process website (http://www.blm.gov/fcp/) and are consistent with the Wyoming Greater Sage-Grouse Conservation Plan (WY-GSG-CP; Wyoming Greater Sage-Grouse Conservation Plan 2003) and the management guidelines by the Western States Sage and Columbian Sharp-tailed Grouse Technical Committee, under the direction of the Western Association of Fish and Wildlife Agencies.

- Prescribed burning of mountain big sage would not remove more than 20% of breeding and winter habitat on landscape/watershed scale over 20 year interval.
- Projects that cumulatively result in less than 20% breeding and winter habitat removal should be reviewed on a local level to determine possible effects to local sage-grouse populations (Adaptive Management).
- Local environmental conditions (e.g., soil moisture, drought status, potential for invasive species, etc.) and their relationship to growth characteristics of mountain big sage in Jackson Hole would be considered when determining the duration and degree of impact from project activities.
- Project activities do not come with 5km of an active lek during the lekking period (March 1-May 15) and nesting and brood-rearing period (April 1-July 31).

- Projects avoid late brood-rearing period (July 15-September 30) in areas known to be used by sage-grouse.
- Projects may occur between October 1-March 31 but only outside of known wintering areas.
- Projects would strive to maintain sagebrush stands that provide sage-grouse with nesting, brood-rearing, and winter habitat.
- Prescribed fires should be ≤50ha in size and should not burn more than 20% of areas used by wintering sage-grouse within a 20 to 30-year interval.
- Unburned patches of sagebrush remaining within burned area would not be altered by future management practices within a 20 to 30-year interval after a fire.

The rationale for incorporating these design criteria in fire-related management activities are several. Concern about the security of sage-grouse populations and their habitats provided the impetus for the development of sage-grouse management guidelines (Connelly et al. 2000) and have been adopted by numerous agencies, working groups, as well as the Northwest National Fire Plan Consultation Process. The Greater Sage-Grouse Species Team recognizes that habitat treatments using prescribed burning and mechanical methods can have long-term beneficial effects for sage-grouse and their habitat. Simultaneously, these actions have the potential of adversely affecting sage-grouse and their habitat if not properly planned. Adhering to criteria based on disturbance of critical life stages and behaviors during specific seasons would help insure that management actions would minimize adverse impacts to sage-grouse.

These design criteria are, however, so restrictive that full implementation and adherence would impede the ability of fire management personnel to meet objectives in WUI areas and to create fuel beaks to prevent large expanses of sage being burned during an unplanned fire. Until all GTNP sage-grouse habitats are mapped to better define and refine no-burn areas in a spatial and temporal use context, proposed projects would consider these design criteria and mitigation measures, but may deviate from them on a project-specific basis with approval from the park's Fire Resource Council and input from the park's Fire Resource Advisor.

<u>Unplanned Events</u> –Both wildland fire and fire suppression activities have the potential of affecting sage-grouse and their habitat. However, direct adverse impacts occurring to sage-grouse from wildland fire are unpredictable and, therefore, unknown. Wildland fire use associated with Alternative B is expected to exceed current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use). Each natural start would be reviewed using the revised "Go/No-Go" process within which potential impacts and potential benefits to wildlife and fish species and their habitats are actively considered by park personnel and included in the adaptive management strategy decision-making process.

Direct impacts to sage-grouse (i.e., mortality and reduction in reproductive success) resulting from wildland fires are likely in localized areas. Short-term measurable adverse effects to sage-grouse habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Once quantified, however, these impacts would be analyzed as part of the annual compliance review associated with the programmatic consultation agreement developed by GTNP. Restoring the role of wildland fire in GTNP would benefit sage-grouse in the long-term by creating more successional vegetative mosaics and improving habitat while simultaneously decreasing the likelihood of uncharacteristically severe fires occurring in the future. If suppression activities are likely to have direct adverse effects on sage-grouse, these actions would evaluated by park personnel before being implemented.

<u>Planned Events</u> – Planned events associated with Alternative B are a combination of prescribed burns and mechanical treatments. DFCs would be established to, in part, direct planned events.

Alternative B has the potential of directly and indirectly affecting sage-grouse through modification of suitable habitat, disturbance and displacement during critical life stages, and changing the risk of mortality.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause a small reduction in sage-grouse habitat, reduce habitat quality, and generate short-term noise effects that may displace individual grouse from WUI treatment areas. However, these actions are not expected to adversely affect sage-grouse because WUI sites and their immediate vicinity already have reduced habitat effectiveness. The vast majority of sage-grouse habitat in GTNP occurs outside of developed areas.

Prescribed fire would be used to treat an annual average of 1,400 acres to achieve resource objectives and as part of the hazard fuel reduction program. Prescribed fire can be effective in maintaining and restoring more diverse vegetative communities in landscapes where natural fire regimes have been disrupted. Prescribed burns may adversely impact sage-grouse in the short-term and long-term by altering plant communities and displacing individuals from certain portions of habitat. Changes in habitat structure would include a reduction in the density of mature sagebrush and would change the vertical structure of the stand and result in a reduced sagebrush canopy cover and an increase in forb cover. Grouse require tall, mature sagebrush stands for food and cover, especially during in the winter and nesting period, so changes in stand structure may have direct, long-term effects on sage-grouse habitats.

Mechanical treatments and prescribed burns would be planned and implemented in a manner sensitive to critical life stages of and protective of important habitat components for sage-grouse. Implementing and/or adhering to the “Design Criteria” listed above would insure that adverse impacts to sage-grouse are minimized. The adaptive fire management strategy associated with this alternative would result in an annual review of planned and unplanned events in the context of short-term and long-term habitat protection and achievement of DFCs and would assist planning future fire management activities.

Cumulative Impacts

Cumulative impacts to sage-grouse associated with Alternative B (Multiple Strategies) are expected to be similar to those determined for Alternative A, with the exception that wildland fire use would be expanded under Alternative B. Allowing substantially more natural fire starts to be managed as fire use would help maintain and restore wildland fire and its positive influence on sage-grouse habitat into GTNP. However, wildland fires also have the potential to adversely affect sage-grouse habitat in both the short-term and long-term if large, stand-replacing fires occur. The proposed wildland fire use expansion, along with adaptive management strategies associated with Alternative B, would assist in minimizing adverse impacts to sage-grouse and their habitat by reducing the likelihood of large, high severity fires burning large expanses of important sage-grouse habitat.

Prescribed fires associated with Alternative B occurring within sagebrush-dominated communities may also contribute to cumulative effects on sage-grouse in GTNP. It is difficult to accurately quantify the amount of suitable grouse habitat available as well as the acreage and characteristics of habitat lost to past fires in the Park. Estimates suggest that more than 20% of potential sage-grouse habitat has been burned by both prescribed and wildland fires within the past 10-20 years. In addition, wildland fire and prescribed fires have occurred in the recent past in two important grouse wintering areas (south of Blacktail Butte and Wolff Ridge).

The impacts of these related actions, in conjunction with the impacts of Alternative B would result in overall adverse, minor, and short-term and long-term cumulative impacts to sage-grouse. To insure this, impacts associated with Alternative B would be analyzed in the context of other impacts occurring within Jackson Hole as part of the annual compliance review associated with the programmatic consultation agreement developed between GTNP and the USFWS.

Conclusion

Planned and unplanned events occurring within sagebrush communities would affect potential sage-grouse wintering and breeding habitat and would increase the amount of sagebrush altered in the park beyond levels recommended in regional sage-grouse management guidelines. However, mosaic burns that retain patches of mature sagebrush within treatment areas would reduce the amount of wintering and breeding habitats lost. Although habitat loss has the potential to be detrimental to sage-grouse, the expected small sizes of future planned treatments within sagebrush communities, their timing, the likelihood that wintering and breeding areas would be maintained within the project site, and the project scrutiny performed by park resource personnel insure that adverse impacts associated with Alternative B would be minor in the short-term.

The long-term impacts of Alternative B are expected to be minor and both adverse and beneficial. Alternative B provides flexibility for managers to restore and maintain natural fire regimes by employing a wide variety of treatment options and clear resource objectives. Prescribed fire, mechanical treatments, and wildland fire use would all be used to simulate more natural fire return intervals, enhance inter-community and landscape diversity, and reduce the potential for fires outside the historic range of variability to occur within GTNP sagebrush communities.

Alternative B would provide managers with the ability to periodically update implementation of the Fire Management Plan and project design criteria by using adaptive management strategies. The currently proposed design criteria would insure that management actions would minimize adverse impacts to sage-grouse and keep impacts at a minor level in the short-term. However, it may be necessary to deviate from the design criteria in order to protect larger expanses of sage-grouse habitat, which would maintain adverse impacts at a minor level in the long-term. Deviations from design criteria could be made on a project-specific basis, with approval from the park's Fire Resource Council and with input from the park's Fire Resource Advisor.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Harlequin Duck

Analysis

The background information for and measures used to assess impacts to harlequin ducks were the same as presented in Alternative A.

No direct or indirect effects to harlequin ducks or their habitat are expected to result from Alternative B. It is highly doubtful that wildland fire would alter harlequin duck habitat within GTNP. Mechanical treatments for resource objectives or for hazardous fuel reductions are not expected to impact harlequin ducks or their habitat.

Cumulative Impacts

Cumulative impacts to harlequin ducks associated with Alternative B are expected to be similar to those identified in Alternative A. Alternative B is not expected to adverse affect harlequin ducks nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to harlequin ducks are associated with Alternative B nor does GTNP propose setting any specific prescriptions or mitigation measures related to fire management activities for harlequin ducks.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Wolverine

Analysis

The background information for and measures used to assess impacts to trumpeter swans were the same as presented in Alternative A.

No direct or indirect effects to wolverines or their habitat are expected to result from Alternative B. It is highly doubtful that wildland fire would alter wolverine habitat within GTNP. Mechanical treatments and prescribed fires for resource objectives or for hazardous fuel reductions are not expected to impact wolverines or their habitat.

Cumulative Impacts

Cumulative impacts to wolverines associated with Alternative B are expected to be similar to those identified in Alternative A. Alternative B is not expected to adverse affect wolverines nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to wolverines are associated with Alternative B nor does GTNP propose setting any wolverine-specific prescriptions or mitigation measures related to fire management activities.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Plant Species of Special Concern

Analysis

Under Alternative B, a more aggressive treatment approach (prescribed fire and wildland fire use) in most vegetative community types would allow for a more natural fire regime that is expected to benefit most plant species of special concern by perpetuating landscape diversity. However, burning of forested areas, either by prescribed fire or wildland fire use could initially result in loss of individuals of those species identified in Appendix J as requiring moist, shady habitats (*Dryopteris expansa, Listera convallarioides, Luzula glabrata var. hitchcockii, and Viola orbiculata*). However, there is a potential for any individuals or populations affected to reemerge once canopy coverage returns. On the other hand, species that respond favorably to fire (*Luzula hitchcockii* and *Xerophyllum tenax*) would have the greatest chance of proliferating under this alternative.

In those cases where wetland vegetation was allowed to burn, there would be a temporary loss of those species that reside in such habitat (*Carex diandra, Juncus filiformis, Senecio hydrophiloides, and Torreyochloa pallida var. fernaldii*). These would probably regenerate quickly and, possibly, in greater abundance than under pre-fire conditions, due to reduced competition and enhanced nutrient cycling.

Cumulative Impacts

There are no known adverse or beneficial impacts to any of the S1 plant species of concern considered in this analysis from recent, current, or planned projects in or near GTNP; therefore no additional incremental impacts would occur.

Conclusion

A few individual plant species of special concern and perhaps site-specific populations could be temporarily lost during the restoration of historic fire return intervals under Alternative B. However, if fires occur within the range of natural variability, affected species/populations are expected to return and perhaps even benefit. Therefore adverse impacts are considered negligible to minor and short or long term (depending on the species).

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.3.4 Impacts of Alternative C on Threatened, Endangered, and Special Concern Species

Bald Eagle

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter 3 of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to bald eagles were the same as presented in Alternative A.

Unplanned Events – Wildland fire use associated with Alternative C is expected to increase above current levels (Alternative A) but be less than Alternative B. Each natural start would be reviewed using a revised "Go/No-Go" process. No measurable adverse effects to bald eagles or their habitat are expected to result from unplanned events associated with the proposed action. Restoring the role of wildland fire in GTNP would benefit bald eagles in the long-term by creating more successional vegetative mosaics and improving habitat.

Planned Events – Planned events associated with Alternative C involve mechanical treatments only. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence. Primary bald eagle habitat in GTNP occurs outside of developed areas although eagles can and do use WUI areas located in the vicinity of foraging habitat.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative C are expected to be similar to those identified in Alternative A. Alternative C could result in short-term displacements of bald eagles within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative C to bald eagles is expected to be adverse, short-term, and negligible.

Conclusion

A determination was made that implementing Alternative C **may affect but is not likely to adversely affect** bald eagles. Although bald eagles may be occasionally flushed from perches in proximity to fire control activities associated with unplanned events, these events are expected to be infrequent and impacts are expected to be negligible and short-term and would not jeopardize reproductive success. Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence. Management actions are not expected to jeopardize reproductive success of or increase the mortality risk to bald eagles. Mechanical treatments occurring within 1/2-mile of an active bald eagle nest would avoid the nesting season (February 1-August 15). No loss of nest, perch, or roost trees or primary aquatic foraging sites is anticipated as a result of proposed management actions. Activities associated with: 1) fire control and suppression, such as fireline construction, burnout, patrol, mop-up, and monitoring fire effects and 2) hazard fuels removal with chainsaws that may include cutting, piling and burning are expected to have negligible, short-term effects on bald eagles if mitigation measures are followed. Negative impacts to bald eagles resulting from Alternative C are expected to be minimal and are not expected to contribute to cumulative impacts to bald eagles in any measurable way. Implementing project design criteria and mitigation measures would insure that adverse impacts to bald eagles would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Canada Lynx

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to lynx were the same as presented in Alternative A.

<u>Unplanned Events</u> – Wildland fire use associated with Alternative C is expected to increase above current levels (Alternative A) but be less than Alternative B. Each natural start would be reviewed using a revised "Go/No-Go" process. Short-term measurable adverse effects to lynx habitat are expected to result from allowing more wildland fires to burn. The extent of impact resulting from future wildland fire cannot be predicted but would be analyzed as part of the annual compliance review associated with the programmatic consultation agreement developed between GTNP and the USFWS. Restoring the role of wildland fire in GTNP would benefit lynx in the long-term by creating more successional vegetative mosaics.

<u>Planned Events</u> – Planned events associated with Alternative C involve mechanical treatments only. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years and possibly slightly fewer acres per year during the last 4 years. Hazardous fuel reduction efforts are proposed to occur within WUI areas and some of these actions are expected to

convert some suitable lynx habitat into an unsuitable condition. However, the majority of potential lynx habitat in GTNP occurs outside of developed areas. Most WUI areas are located adjacent to major roadways and/or in areas of high human use and are assumed to have a relatively low probability of lynx presence when compared to other areas of potential habitat within the park. Depending upon the environmental setting, mechanical treatments may reduce habitat quality and generate short-term noise effects that may displace individual lynx if present. If lynx displacement occurs, it is expected to be temporary and would not affect adults or kittens during critical life stages.

Cumulative Impacts

Cumulative impacts to lynx associated with Alternative C are expected to be similar to those identified in both Alternatives A and B. Alternative C could result in short-term displacements of lynx within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative C to lynx is expected to be adverse in the short-term and long-term, beneficial in the extended long-term, negligible in intensity for both impact durations.

Conclusion

A determination was made that implementing Alternative C **may affect but is not likely to adversely affect** Canada lynx. Alternative C is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of the species within the GYA. Direct mortality of lynx is not likely because lynx are highly mobile and individuals are expected to leave wildland fire and planned event project areas. Adverse effects to lynx and their habitat resulting from planned and unplanned events are expected to be negligible and of a short-term and long-term duration. Lynx may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability. Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on lynx habitat. The proposed action adheres to programmatic and project-planning standards recommended in the Lynx Conservation Assessment and Strategy. Implementing the proposed action would not result in unsuitable lynx habitat exceeding 30% of a given LAU and would not convert more than 15% of suitable habitat into an unsuitable condition. The contribution of Alternative C to lynx cumulative impacts is expected to be minimal. Implementing project design criteria and mitigation measures would insure that adverse impacts to lynx would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Grizzly Bear

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to lynx were the same as presented in Alternative A.

Unplanned Events – Wildland fire use associated with Alternative C is expected to increase above current levels (Alternative A) but be less than Alternative B. Each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to grizzly bears (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to grizzly bear habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Restoring the role of wildland fire in GTNP would benefit grizzly bears in the long-term by creating more successional vegetative mosaics and improving habitat for their while simultaneously decreasing the likelihood of uncharacteristically severe fires occurring in the future.

Planned Events – Planned events associated with Alternative C involve mechanical treatments only. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. Mechanical treatments may cause small reductions in grizzly bear habitat, reduce habitat quality, and generate short-term noise effects that may displace individual bears near WUI areas. However, these actions are not expected to adversely affect grizzly bears because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence.

Cumulative Impacts

Cumulative impacts to grizzly bears associated with Alternative C are expected to be generally similar to those identified in Alternatives A and B. Alternative C could result in short-term displacements of grizzly bears within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative C to grizzly bears is expected to be adverse, short-term, and negligible.

Conclusion

A determination was made that implementing Alternative C **may affect but is not likely to adversely affect** grizzly bears for the following reasons. Adverse effects to grizzly bears and their habitat resulting from planned and unplanned events associated with Alternative C are expected to be negligible and of a short-term duration. Grizzly bears may avoid treatment areas during project implementation, but would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts associated with wildland fire use are expected to be small in scale and short-term in duration and, therefore, negligible because they would be within the historic range of fire impacts on grizzly bear habitat. Changes in habitat structure related to the project are unlikely to considerably alter habitat values because grizzly bears are habitat generalists and suitable, high quality habitat is abundant in GTNP and its vicinity. The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of this species within the GYA. Direct mortality of grizzly bears is not likely because bears are highly mobile and individuals are expected to leave planned event project areas and wildland fire areas. Implementation of project design criteria and mitigation measures would help insure that cumulative impacts associated with the proposed action would be small.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Gray Wolf

Introduction

The Endangered Species Act requires an examination of impacts on all federally threatened or endangered species. The affected environment description for this species is presented in Chapter Three of this EA and greater detail on the impacts of fire, in general, can be found in the Biological Assessment associated with this analysis document.

Analysis

The background information for and measures used to assess impacts to gray wolves were the same as presented in Alternative A.

Unplanned Events – Wildland fire use associated with Alternative C is expected to increase above current levels (Alternative A) but be less than Alternative B. Each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to wolves (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to wolf habitat (i.e., prey base) are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted.

Planned Events – Planned events associated with Alternative C involve mechanical treatments only. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. However, these actions are not expected to adversely affect wolves because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence. The vast majority of wolf habitat in GTNP occurs outside of developed areas.

Direct mortality of wolves as a result of planned events is not anticipated because wolves are highly mobile and would likely leave project areas when burns are present. Wolves may avoid treatment areas during project implementation, but this avoidance would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts are expected to be small in scale and short-term in duration and, therefore, negligible. Changes in habitat structure related to the project are unlikely to considerably alter habitat values because wolves are habitat generalists and suitable, high quality habitat is abundant in GTNP.

Cumulative Impacts

Cumulative impacts to gray wolves associated with Alternative C are expected to be similar to those identified in Alternatives A and B. Alternative C could result in short-term displacements of wolves within planned treatment areas and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative C to wolves is expected to be adverse, short-term, and negligible.

Conclusion

A determination was made that implementing Alternative C **may affect but is not likely to adversely affect** gray wolves. The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of the species within the GYA. Direct mortality of gray wolves is not likely because wolves are highly mobile and individuals are expected to leave wildland fire and planned event project areas. Adverse effects to gray wolves and their habitat resulting from planned and unplanned events are expected to be negligible and of a short-term duration. Gray wolves may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability. Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on wolf habitat (i.e., ungulate habitat). Alternative C is not expected to result in measurable adverse effects to wolves or influence recovery of this species and the contribution of Alternative C to cumulative wolf impacts is expected to be minimal. Implementing project design criteria and mitigation measures would insure that adverse impacts to wolves would be negligible.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Trumpeter Swans

Analysis

The background information for and measures used to assess impacts to trumpeter swans were the same as presented in Alternative A.

Unplanned Events –Wildland fire use associated with Alternative C is expected to increase above current levels (Alternative A) but be less than Alternative B. Each natural start would be reviewed using a revised "Go/No-Go" process. Direct impacts to trumpeter swans (i.e., mortality) resulting from wildland fires are unlikely. Short-term or long-term adverse effects to swan habitat resulting from unplanned events are difficult to predict but are not expected so long as fires occur within the historic range of fire impacts on swan habitat.

Planned Events – Planned events associated with Alternative C involve mechanical treatments only. Mechanical treatments would be used to treat 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year during the last 4 years. These actions are not expected to adversely affect swans.

Cumulative Impacts

Cumulative impacts to trumpeter swans associated with Alternative C are expected to be similar to those identified in Alternative A. Alternative C is not expected to adversely affect swans nor is it expected to contribute to cumulative impacts.

Conclusion

No direct or indirect effects to trumpeter swans or their habitat are expected to result from Alternative C so long as project mitigation measures are implemented. Mechanical treatments are not expected to impact trumpeter swan nesting or winter habitat so long as mitigation measures are implemented.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Migratory Birds

Analysis

The background information for and measures used to assess impacts to migratory birds were the same as presented in Alternative A.

Direct and indirect effects to migratory birds could result from activities that alter existing vegetative communities. Depending on timing of disturbances, nesting migratory birds could be disturbed and productivity of individual pairs reduced. Current activities occurring within GTNP are not believed to be of sufficient magnitude to adversely affect migratory birds on a population level although some activities may negatively affect individuals and/or nesting pairs.

Unplanned Events – Both wildland fire and fire suppression activities have the potential of affecting migratory birds and their habitat. However, direct adverse impacts occurring to birds from wildland fire are unpredictable and, therefore, unknown. Wildland fire use associated with

Alternative C is expected to increase above current levels (Alternative A) but be used less than Alternative C. Direct impacts to migratory birds (i.e., mortality and reduction in reproductive success) resulting from wildland fires are likely in localized areas. Short-term measurable adverse effects to migratory bird habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted.

Planned Events – Planned events associated with Alternative C involve mechanical treatments only. DFCs would be established to, in part, direct planned events. Alternative C has the potential of directly and indirectly affecting migratory birds through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species.

Mechanical treatments would treat 60-100 acres per year during the next 4-6 years and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Mechanical treatments may cause, in the short-term and long-term, a small reduction in migratory bird habitat, reduce habitat quality, and create disturbances that may displace individual birds in proximity to WUI areas. However, these actions are expected to affect birds on a localized and on an individual level. The vast majority of habitat in GTNP occurs outside of developed areas.

Cumulative Impacts

Cumulative impacts to migratory birds associated with Alternative C are expected to be similar to those identified in Alternatives A and B. Alternative C is not expected, in the long-term, to reduce habitat abundance, security and effectiveness, reduce reproductive success, or increase mortality. Alternative C could result in short-term displacements of migratory birds within planned treatment areas, possibly adversely affecting reproductive success if displacements occur during the breeding season and these impacts would contribute, in a minor way, to cumulative impacts. The cumulative impact of Alternative C to migratory birds is expected to be adverse and negligible in both the short-term and long-term.

Conclusion

Adverse impacts to migratory birds associated with Alternative B are expected to be negligible in both the short-term and the long-term. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Greater Sage-Grouse

Analysis

The background information for and measures used to assess impacts to migratory birds were the same as presented in Alternative A.

Design Criteria for Planned Events or Wildland Fire Suppression Actions – Implementing the project design criteria for planned fire events or in wildland fire suppression activities (previously described under Alternative B) would minimize adverse impacts to sage-grouse and their habitat.

Unplanned Events –Both wildland fire and fire suppression activities have the potential of affecting sage-grouse and their habitat. However, direct adverse impacts occurring to sage-grouse from future wildland fires are unpredictable and, therefore, unknown. Wildland fire use associated with Alternative C is expected to exceed current levels (Alternative A) but would likely be less than Alternative B. Each natural start would be reviewed using the revised "Go/No-Go" process, within which potential impacts and potential benefits to all wildlife and fish species and their habitats are actively considered by park personnel and included in the adaptive management strategy decision-making process.

Direct impacts to sage-grouse (i.e., mortality and reduction in reproductive success) resulting from wildland fires are likely in localized areas. Short-term measurable adverse effects to sage-grouse habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Once quantified, however, these impacts would be analyzed as part of the annual compliance review associated with the programmatic consultation agreement developed by GTNP. Restoring the role of wildland fire in GTNP would benefit sage-grouse in the long-term by creating more successional vegetative mosaics while simultaneously decreasing the likelihood of uncharacteristically severe fires occurring in the future. Suppression activities that are likely to have direct adverse effects on sage-grouse would be evaluated by park personnel before being implemented.

<u>Planned Events</u> – Planned events associated with Alternative C include mechanical treatments only and are primarily associated with hazard fuels reduction efforts. No prescribed fires would be employed. Alternative C has the potential of directly and indirectly affecting sage-grouse through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Mechanical treatments would increase 40% above current levels (Alternative A) and would primarily be associated with hazard fuel reduction in the vicinity of WUI areas. Hazardous fuel reduction efforts are proposed to occur within WUI areas and would affect about 140 acres of land per year. Pile burning of slash associated with mechanical treatments is anticipated.

Mechanical treatments may cause, in the short-term, a small reduction in sage-grouse habitat, reduce habitat quality, and generate disturbances that may displace individual birds in proximity to WUI areas. However, these actions are expected to affect sage-grouse on a localized and on an individual level. The vast majority of sage-grouse habitat in GTNP occurs outside of developed areas.

Adverse impacts to sage-grouse and their habitat resulting from planned events associated with Alternative C would be minimized by keeping project activities greater than 5 km from active leks during the lekking, nesting and brood-rearing periods when grouse are present. Direct mortality of sage-grouse is possible but not anticipated because the timing of such events would insure that flightless juvenile birds would not be present within treatment areas. Project impacts are expected to be small in scale and short-term in duration and, therefore, negligible, and projects will be reviewed by the park's Fire Resource Council and Fire Resource Advisor prior to approval to insure that impacts to sage-grouse will remain negligible.

Cumulative Impacts

Cumulative impacts to sage-grouse associated with Alternative C are expected to be similar to those disclosed for Alternatives A and B. The impacts of related actions, in conjunction with the impacts of Alternative C would result in overall adverse, minor, and short-term and long-term cumulative impacts to sage-grouse. Alternative C is not expected, in the long-term, to reduce habitat abundance, security and effectiveness, reduce reproductive success, or increase mortality. Alternative C could result in short-term displacements of sage-grouse within planned treatment areas, possibly adversely affecting reproductive success if displacements occur during the breeding season and these impacts would contribute, in a minor way, to cumulative impacts. Impacts associated with Alternative B would be analyzed in the context of other impacts occurring within Jackson Hole as part of the annual compliance review associated with the programmatic consultation agreement developed between GTNP and the USFWS.

Conclusion

Planned and unplanned events occurring within sagebrush communities would affect potential sage-grouse wintering and breeding habitat and would increase the amount of sagebrush altered in the Park beyond levels recommended in regional sage-grouse management guidelines. However, wildland fires that result in mosaic burns and retain patches of mature sagebrush would reduce the amount of wintering and breeding habitats lost. Although habitat loss has the potential to be detrimental to sage-grouse, the expected small sizes of future planned treatments in sagebrush communities within WUI areas, their timing, the likelihood that wintering and breeding areas would not be affected, and the project scrutiny performed by Park resource personnel insure that adverse impacts associated with Alternative C would be negligible in the short-term.

The long-term impacts of Alternative C are expected to be minor and both adverse and beneficial. Alternative C provides flexibility for managers to restore and maintain natural fire regimes by employing a wide variety of treatment options and clear resource objectives. Wildland fire use would be used to restore more natural fire return intervals, enhance inter-community and landscape diversity, and reduce the potential for fires outside the historic range of variability to occur within GTNP sagebrush communities. However, the absence of prescribed fire as a fire management tool may inhibit the park's ability to use wildland fire. Mechanical treatments will be used to protect WUI areas.

Alternative C would provide managers with the ability to periodically update implementation of the Fire Management Plan and project design criteria by using adaptive management strategies. The currently proposed design criteria would insure that management actions would minimize adverse impacts to sage-grouse and keep impacts at a minor level in the short-term. However, it may be necessary to deviate from the design criteria in order to protect larger expanses of sage-grouse habitat, which would maintain adverse impacts at a minor level in the long-term. Deviations from design criteria could be made on a project-specific basis, with approval from the park's Fire Resource Council and with input from the park's Fire Resource Advisor.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Harlequin Duck

Analysis

The background information for and measures used to assess impacts to harlequin ducks were the same as presented in Alternative A.

No direct or indirect effects to harlequin ducks or their habitat are expected to result from Alternative C. It is highly doubtful that wildland fire would alter harlequin duck habitat within GTNP. Mechanical treatments for resource objectives or for hazardous fuel reductions are not expected to impact harlequin ducks or their habitat.

Cumulative Impacts

Cumulative impacts to harlequin ducks associated with Alternative C are expected to be similar to those identified in Alternative A. Alternative C is not expected to adversely affect harlequin ducks nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to harlequin ducks are associated with Alternative C nor does GTNP propose setting any specific prescriptions or mitigation measures related to fire management activities for harlequin ducks.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Wolverine

Analysis

The background information for and measures used to assess impacts to wolverines were the same as presented in Alternative A.

No direct or indirect effects to wolverines or their habitat are expected to result from Alternative C. It is highly doubtful that wildland fire would alter wolverine habitat within GTNP. Mechanical treatments for resource objectives or for hazardous fuel reductions are not expected to impact wolverines or their habitat.

Cumulative Impacts

Cumulative impacts to wolverines associated with Alternative C are expected to be similar to those identified in Alternative A. Alternative C is not expected to adverse affect wolverines nor is it expected to contribute to cumulative impacts.

Conclusion

No short-term or long-term adverse impacts to wolverines are associated with Alternative C nor does GTNP propose setting any wolverine-specific prescriptions or mitigation measures related to fire management activities.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of GTNP; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Plant Species of Special Concern

Analysis

Excluding prescribed fire from the treatment options would lengthen fire return intervals, increase fuel loads, and inhibit nutrient cycling in some areas. These effects would impose little short-term impact on taxa of concern, but may, in the long run, inhibit establishment or proliferation of species that prosper after fire (i.e., *Luzula glabrata and Xerophyllum tenax*). Heavy fuel loading could ultimately result in high intensity fires that could kill both above and underground plant parts and may temporarily sterilize the upper surface of the soil. Re-establishment of any species of concern after severe fire could take decades and may not occur at all within the foreseeable future.

Cumulative Impacts

There are no known adverse or beneficial impacts to any of the S1 plant species of concern resulting from recent, current, or planned projects in or near GTNP; therefore no additional incremental impacts would occur.

Conclusion

A few individual plant species of special concern and perhaps site-specific populations could be lost as a result of Alternative C. However, these impacts are difficult to predict due to the unpredictability of fire (especially wildland fire use). Therefore adverse impacts are considered minor to moderate and short term or long term (depending on the species involved).

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation; (2) key to natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's Master Plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

4.4 WATER RESOURCES

Methodology

Fire can have a wide range effects on watershed resources due to landscape and fire behavior characteristics (e.g., vegetation, slope, stream size, burn severity), season of burning, and pre-fire and post-fire environmental conditions such as rainfall (Clark 2001). Loss of vegetation reduces the amount of water that is absorbed by soil and plants and, without vegetation, the amount of rain and snowmelt flowing over the surface of the land increases (surface runoff). Surface runoff affects water quality and stream dynamics by increasing stream temperatures, sedimentation, turbidity, and nutrient cycling (Buckhouse and Gifford 1976, Feller and Kimmis 1984, Helvey et al. 1985, Nissley et al. 1980, Richter and Ralston 1982, Striffler and Mogren 1971, Tiedemann et al. 1979, and Wright et al. 1976).

Factors Used to Assess Environmental Consequences

Water resources are **more likely** to be impacted when:

- Changes in runoff, stream flow, and sediment delivery are either large or of sustained duration, requiring channel modification to a new equilibrium. Alluvial channels or those having considerably depositional features are channel types most susceptible to changes in flow and sediment delivery.
- Large or sustained increases or decreases in peak flows.
- Large or substantial increases in nutrients.
- Aquatic resources are altered at the reach-scale or greater over long periods of time.

Water resources are **less likely** to be impacted when:

- Flow regimes, including peak flow regimes, are relatively unaltered.
- Accelerated watershed (or channel) erosion is not large compared to the transport capacity of the stream, and is of short duration.
- Floodplain and riparian vegetation resources are in good condition.
- Aquatic resources are sustained in healthy condition.

Adverse Impacts - Fire management activities that degrade or contribute to the degradation of the chemical and physical properties of water quality or hydrology; sediment loading outside the natural range of variability when compared to historic or geologic rates.

Beneficial Impacts – Fire management activities that improve or contribute to the improvement of the chemical and physical properties of water quality or hydrology; sediment loading within the natural range of variability when compared to historic or geologic rates.

Impact Threshold Definitions: Water Resources	
Negligible	Water quality or hydrology would not be affected, or changes would be either non-

	detectable or if detected, would have effects that would be considered slight, local, and short-term.
Minor	Changes in water quality or hydrology would be measurable, although the changes would be small, likely short-term, and the effects would be localized. No mitigation measure associated with water quality or hydrology would be necessary.
Moderate	Changes in water quality or hydrology would be measurable and long-term but would be relatively local. Mitigation measures associated with water quality or hydrology would be necessary and the measures would likely succeed.
Major	Changes in water quality or hydrology would be readily measurable, have substantial consequences, and be noticeable on a regional scale. Mitigation measures would be necessary and their success would not be guaranteed.
Duration	*Short-term* - Following treatment recovery will take less than one year *Long-term* - Following treatment recovery will take longer than one year

Regulations and Policy

Current laws and policies require that the following conditions be achieved for water resources in GTNP:

Desired Condition: Water Resources	Source
The service will manage watersheds as complete hydrologic systems, and will minimize disturbance to the natural upland processes that deliver water, sediment, and woody debris to streams. These processes include runoff, erosion, and disturbance to vegetation and soil caused by fire, insects, meteorological events, and mass movements.	NPS *Management Policies 2001*
The service will manage streams to protect stream processes that create habitat features such as floodplains, riparian systems, woody debris accumulations, terraces, gravel bars, riffles and pools. Stream processes include flooding, stream migration, and associated erosion and deposition.	NPS *Management Policies 2001*
The NPS will perpetuate surface waters and groundwater as integral components of park aquatic and terrestrial ecosystems.	Clean Water Act; Executive order 11514; NPS *Management Policies 2001*
The NPS will determine the quality of park surface and groundwater resources and avoid, whenever possible, the pollution of park waters by human activities occurring within and outside of the park.	Clean Water Act; Executive Order 12088; NPS *Management Policies 2001*

4.4.1 Impacts Common to All Alternatives

Adverse short-term and long-term effects and beneficial long-term effects can result when fires occur within watersheds and in proximity to watercourse and waterbodies. Increased sediment delivery can adversely affect water resources by temporarily decreasing biotic diversity and productivity (Minshall and Robinson 1993). Fire beneficially affects water resources through the transportation of spawning gravel, influx of sediments and nutrients, and increases in summer water temperature. This shift in nutrient cycling may bring about pulses of aquatic productivity for up to 6 years after a large fire (Minshall et al. 1989). For controlled management fires, increased sediment delivery to water resources would be localized and within the range of the normal variability that contributed, over geologic time, to defining water resource characteristics (NPS 2003a).

For all alternatives the impact of wildland fire use and/or prescribed fire would be both adverse and beneficial, minor to moderate, and both short- and long-term. A variety of mitigation measures are used to minimize human disturbance to water resources during fire events (Section 2.6.4). In addition, human activities such as fireline construction, retardant drops, and water-handling would take place as part of fire control and suppression. These activities would have adverse minor to moderate short-term impacts on water resources. Wherever possible, fireline locations would be restricted from erosive soils and/or steep slopes that lead directly into water resources. All alternatives would adhere to *Interagency Standards for Fire and Aviation Operations* (National Interagency Fire Center 2004) for use of suppression chemicals. This document, along with the *Minimum Impact Suppression Tactics* (Appendix H) provides detailed mitigation measures for water resources during suppression-oriented responses.

4.4.2 Impacts of Alternative A on Water Resources

Analysis

Planned events using prescribed fire are expected to have beneficial and adverse, negligible to minor and long-term impacts.

Impacts of wildland fire use associated with Alternative A to water resources would be adverse and/or beneficial, long-term, and locally negligible to moderate in intensity. The impacts of low and moderate severity fires and some high severity fires are expected to fall with the historic range of fire regimes. But, in general, impact intensities are expected to increase as fire size and severity increases when fires are in proximity to watercourses. The effects of low and moderate intensity fires are expected to be negligible, localized, and of short-term duration while the effects of higher severity fires would be minor to moderate, of short-term duration, and localized. Higher intensity fires are expected to cause more sedimentation and ashflow events following heavy rains because more vegetation has been removed and will take longer to re-establish and stabilize bare soils. Soils that are severely burned do not allow water to infiltrate into the soil, which in turn increases run-off or suspended sediments and ash. Wildland fire within riparian zone would remove vegetation that equates to sediment buffer along the edge of water, increasing chances for water quality degradation. Removal of streamside vegetation could also cause increases in water temperatures resulting from losses of shade and a reduction in cover habitat for fish.

Long-term impacts of Alternative A on water resources are difficult to predict, especially when considering potential impacts that extend beyond the life of this and future fire management plans. If current and future fire management plans or other management policies fail to maintain or restore natural ecosystem processes (e.g., wildland fire), the potential for conditions outside the normal range of variability would increase.

Wildland fire use would perpetuate the historic fire regime, but only a small number of fire starts and acres are managed for wildland fire use under Alternative A. Prescribed fire could be used to achieve a narrow range of resource objectives should areas of the park warrant restoration, but the timing and severity of prescribed fire may not mimic natural processes. In this respect, Alternative A is not favored because current fire management strategies could contribute to an eventual movement of ecosystem processes toward a condition that is outside the normal range of variability. It is when high severity fires burn large portions of a given watershed that impacts could exceed the natural range of variability and cause adverse effects. An event that exceeds the natural range of variability could cause sediment loading that is substantially higher than historic/geologic rates and the transport capacity of the affected channel(s), initiating channel adjustments that may require a substantial duration of time for recovery to pre-existing conditions (NPS 2003a).

Cumulative Impacts

Cumulative impacts associated with this alternative include past, present and reasonably foreseeable future events in watersheds contained within GTNP.

One planned project would improve water quality through stabilizing approximately 150 feet of the Snake River bank near the boat launch area at Moose. Several rehabilitation and adaptive use projects may benefit water resources in the long-term through upgrades to the current utilities. These projects included the Murie Ranch, White Grass Ranch, Lucas/Fabian property, and East Antelope Flats. Given the size of these projects, adverse negligible to minor and short-term impacts would result during the implementation of these projects and beneficial, minor and long-term impacts would occur within a localized area. Relevant construction and facility upgrade projects are anticipated to have adverse moderate short-term impacts to water resources at the local scale.

Road construction projects in and around GTNP may affect water quality by increasing the amount of impervious surface. Relative to existing disturbance within GTNP watershed, these projects are estimated to result in an incrementally small increase in acres of impervious surface. Adverse, minor and short-term impacts to water resources would occur during construction activity, but projects such as the North Park Road reconstruction expect beneficial, moderate and long-term impacts from the use of oversized culverts that permit natural streambed development.

The BLM *Snake River Resource Management Plan* may affect water resources in the Snake River Watershed though decisions related to gravel mining, recreation, and fire management activities. Impacts range from adverse, minor to moderate, and short to long-term. A recent amendment to the current BTNF Fire Management Plan would expand wildland fire use outside of wilderness areas. This program would likely have short-term, moderate, adverse impacts on local water resources. However, increased fire on the landscape would reduce the distant long-term risk of negative watershed impacts. The Elk and Bison Management plan is anticipated to have impacts on water resources that are beneficial and adverse and would range from minor to moderate and short to long-term.

The impacts of these various actions, in conjunction with the impacts of Alternative A, would result in overall cumulative adverse, minor to moderate, long-term impacts to park water resources.

Conclusion

The impacts of Alternative A resulting from wildland fire use and/or prescribed fire would be adverse and beneficial, minor to moderate, and both short- and long-term. Fire control and suppression activities such as fireline construction, retardant drops, and water-handling would have adverse minor to moderate short-term impacts on water resources. Cumulative impacts to park water resources are considered adverse and beneficial, minor to moderate and of a long-term duration. Alternative A is not favored, however, because it will not move the fire management program toward long-term perpetuation of the historic fire regime and the risks of large, high severity fires occurring are greater than other alternatives.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's water resources or values.

4.4.3 Impacts of Alternative B on Water Resources

Analysis

The background information for and measures used to assess impacts to water resources, as well as the short-term impacts resulting from planned and unplanned events are the same as presented in Alternative A.

If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential increases for high severity fires that burn large portions of a given watershed to occur and have impacts that exceed the natural range of variability, causing adverse effects. Alternative B is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded. Prescribed fire could be used to achieve a broader range of resource objectives than in Alternative A, should areas of the park warrant restoration, but the timing and severity of prescribed fire may not mimic natural processes. Expanded wildland fire use would perpetuate the historic fire regime by allowing more fire on the landscape. Fire management strategies under Alternative B would not contribute to an eventual movement of ecosystem processes toward a condition that is outside the normal range of variability.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those actions identified for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in overall adverse and beneficial, minor to moderate, and long-term cumulative impacts.

Conclusion

The impacts of prescribed fire and wildland fire use would be the same as Alternative A and are considered adverse and beneficial, minor to moderate, and both short- and long-term. In addition, like Alternative A, human activities such as fireline construction, retardant drops, and water-handling would take place and impacts on water resources are considered adverse, minor to moderate in intensity, and short-term. Cumulative impacts to park water resources are considered adverse and beneficial, minor to moderate and long-term. Alternative B will move the GTNP fire management program toward long-term perpetuation of the historic fire regime better than any other alternative.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's water resources or values.

4.4.4 Impacts of Alternative C on Water Resources

Analysis

The background information for and measures used to assess impacts to water resources, as well as the short-term impacts resulting from planned and unplanned events are the same as presented in Alternative A.

If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential for a sediment delivery outside the normal range of variability, when compared to historic or geologic rates, would increase. Alternative C is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded under this alternative. Although Alternative C is quite similar to Alternative B, it will not use prescribed fire as a fire management tool and, as a result, perhaps reduce the amount of wildland fire use that occurs due to increased risks. Nor would prescribed fire be available as a tool to achieve resource objectives.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those actions identified for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in overall adverse and beneficial, minor to moderate, and long-term impacts.

Conclusion

The impacts of human activities associated with fire management (e.g., equipment use, fireline construction and suppression chemicals) are the same as Alternatives A and B and are considered adverse, minor to moderate, and short-term. Under Alternative C, planned treatments would have negligible impacts to water resources because they would be limited to mechanical treatments. The impacts of wildland fire use on water resources under Alternative C would be the same as Alternatives A and B: adverse and beneficial, minor to moderate, and short- and long-term. Cumulative impacts are estimated to result in adverse and beneficial, minor to moderate, and long-term effects. Alternative C, when compared to the No Action Alternative (Alternative A), would be favored because it has greater potential to move the fire management program toward long-term perpetuation of the historic fire regime.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's water resources or values.

4.5 WETLANDS

Methodology

Factors Used to Assess Environmental Consequences

Alternatives Improve Resource Condition: Alternatives are evaluated to assess the extent to which they maintain or improve resource conditions.

Actions Conform to Executive Order 11990: Alternatives are evaluated in relation to conformity with the Executive Order on wetlands protection.

Adverse Impacts - Adverse impacts exhibit a loss of wetland habitat or a reduction of wetland functions and values.

Beneficial Impacts - Beneficial impacts restore wetland habitat or improve wetland functions and values.

Impact Threshold Definitions: Wetlands	
Negligible	Wetlands area or function would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, local, and would likely be short-term.
Minor	Wetlands function would not be affected, but effects to a few individual plant or wildlife species would be measurable. Changes would be small, localized and short-term. No mitigation measures would be necessary.
Moderate	Wetlands function would be affected. Changes would be measurable and long-term, but localized, with all species remaining indefinitely viable within the park. Mitigation measures would be necessary and likely successful.
Major	Wetlands function would be affected permanently. Changes would be readily measurable, long-term, and have consequences on a regional scale. Wetland species dynamics would be upset and species would be at risk of expiration from the park. Mitigation measures would be necessary and their success would not be guaranteed.
Duration	*Short-term* - Recovers in less than 3 years. *Long-term* - Takes more than 3 years to recover.

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Wetlands	Source
NPS will (1) provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands.	Executive Order 11990: *Protection of Wetlands*, Rivers and Harbors Act; Clean Water Act; NPS *Management Policies 2001*
NPS will implement a “no net loss of wetlands” policy. In addition, NPS will strive to achieve a goal of net gain of wetlands across the national park system through restoration of previously degraded or destroyed wetlands.	NPS *Management Policies 2001;* DO #77-1: *Wetland Protection*
Actions proposed by the NPS that have the potential to have adverse impacts on wetlands will be addressed in an EA or an EIS. If the preferred alternative in an EA or EIS will result in adverse impacts on wetlands, a "Statement of Findings" will be prepared and approved.	NPS *Management Policies 2001;* DO #77-1*: Wetland Protection*

Actions that result in adverse impacts on wetlands generally require the preparation of a Statement of Findings, in accordance with Director’s Order #77-1 and its implementation procedures. These procedures allow for the exception of several types of actions considered to have minimal impacts on wetlands. In particular, actions designed specifically for the purpose of restoring degraded natural wetland, stream, riparian, or other aquatic habitats or ecological processes are exempt. For purposes of this exemption, "restoration" refers to reestablishing environments in which natural ecological processes can, to the extent practicable, function at the site as they did prior to disturbance. Temporary wetland disturbances directly associated with and necessary for implementing the restoration are allowed under this exemption, provided Best Management Practices are adhered to. Actions causing a cumulative total of up to 0.25 acres of new long-term adverse impacts on natural wetlands may be allowed under this exception if they are directly associated with and necessary for the restoration (RM 77-1). Compliance with Director's Order #77-1 is not required prior to implementing emergency actions to protect life and property (RM 77-1).

4.5.1 Impacts Common to all Alternatives

Wetlands are closely associated with watershed dynamics (Section 4.4) in much of GTNP, as wetland vegetation tends to be concentrated in damper areas along streams and lakes. Changes in vegetative cover on slopes and nearby wetland areas can adversely and beneficially affect wetland hydrology. Overall, the occurrence of fire at a natural frequency is necessary to prevent loss of wetland habitat. High flows and sediment loading caused by fire returns the successional process to a state in which new plants colonize areas of sediment deposition. Likewise, in the absence of fire, evergreens replace deciduous wetland vegetation, which reduces nutrient transfer from land to water (Franke 2000).

For all alternatives the impact of wildland fire use and/or prescribed fire on wetlands would be adverse and beneficial, minor to moderate, and both short-term and long-term. Fire management activities such as heavy equipment use, fireline construction and the use of fire retardants have the potential to disturb wetland communities, degrade water quality, and increase sedimentation. Impacts are considered adverse, minor to moderate in intensity, and short-term in duration.

A variety of mitigation measures are used to minimize human disturbance to wetlands during fire events (Section 2.6.5). Machinery in wetlands would be avoided whenever possible. For alternatives that allow prescribed burning, controlling fire intensity and timing and leaving unburned strips of vegetation would be considered to decrease sedimentation and stabilize slopes. Wherever possible, fireline locations would be restricted from erosive soils and/or steep slopes that lead directly into wetlands. Retardant and foam would not be used in or near wetlands. All alternatives would follow *Interagency Standards for Fire and Aviation Operations* (National Interagency Fire Center 2004) that provides mitigation measures for the use of suppression chemicals. This document, along with the *Minimum Impact Suppression Tactics* (Appendix H) provides detailed mitigation measures that can be implemented during suppression-oriented responses.

4.5.2 Impacts of Alternative A on Wetlands

Analysis

Wetland impacts associated with planned events, and control and suppression activities are identical for all alternatives, so long as mitigation measures are adhered to. These impacts and their respective measures of type, intensity, duration were presented in the previous section (4.5.1-Impacts Common to all Alternatives).

Like most resource topics, impacts on wetlands would vary primarily when considering distant long-term indirect impacts (i.e., impacts that extend beyond the life of this and future plans). If current and future fire management plans fail to maintain/restore natural ecosystem processes the potential for conditions outside the normal range of variability would increase. It would be difficult under Alternative A to promote maintenance of the historic fire regime with limited prescribed fire and wildland fire use. Prescribed fire could be used to achieve a narrow range of resource objectives should areas of the park warrant restoration, but the timing and severity of prescribed fire may not mimic natural processes. Prescribed burns have been conducted in willow flats under current management conditions (Section 3.2.1, Appendix F). Wildland fire use would contribute to perpetuation of the historic fire regime, but only a small number of fire starts and acres are managed for wildland fire use under current conditions. Given the low levels of wildland fire use in this scenario, wetland resource conditions could decline without the occurrence of fire at historic intervals and intensities.

In this respect, Alternative A is not favored because current fire management strategies could contribute to an eventual movement of ecosystem processes toward a condition where the historic fire regime is not maintained. While it is safe to assume that riparian areas functioned as natural firebreaks some of the time and probably only burned during landscape scale fire events, fire outside of the historic fire regime could alter wetland hydrology.

Cumulative Impacts

Recent, current, and planned projects within watersheds that would impact wetlands include North Park Road reconstruction, a new Transportation Plan for GTNP, an interagency Elk and Bison Management Plan, the BLM Snake River RMP, the JIHI, and a recent amendment to the BTNF fire management plan.

North Park Road reconstruction and a new Transportation Plan for GTNP would unavoidably disturb a currently unknown but believed minimal amount of wetlands. Compensation mitigation for the impacted acres will be accomplished at a ratio of at least 3 acres restored per 1 acre impacted. Road-related wetland impacts would likely be adverse, moderate, and long-term.

The overall trend in wetland resource conditions within and around GTNP may be adversely impacted by the Snake River RMP and beneficially impacted by the Elk and Bison Management Plan, JIHI, and an amendment to the BTNF Fire Management Plan. The Snake River RMP EA determined that prescribed fire along the Snake River corridor would be inappropriate today given the population, recreation use, and property values in the planning area. Most wildland fires on public lands could burn 5 acres or less before being suppressed. The risk of wildland fire may increase under the proposed plan due to increased human activities such as campfires. The exclusion of fire in combination with the absence of flooding outside levees would inhibit cottonwood regeneration, setting the stage for conversion of cottonwood-dominated communities into shrub-grass or conifer communities, and contributing to the homogenization and/or loss of wetland communities. Increased public access, gravel extraction, and OHV use could cause degradation of wetland habitat. To the extent that the Elk and Bison Management Plan EIS addresses issues such as bison and elk use levels, population control, and habitat management, effects to wetlands would likely be beneficial. Similarly, impacts of JIHI on wetlands are considered beneficial to the extent that the initiative proposes to manage vegetation communities for long-term sustainability and resiliency, emphasizing healthy early and mid-successional habitats and the processes that create and maintain them on the landscape. The BTNF Fire Management Plan amendment would likely benefit wetland resource conditions because wildland fire use would be expanded outside of wilderness areas and prescribed fire would be increased in areas where wildland fire use would not be appropriate because of risk or technical difficulty.

Adverse, minor to moderate, and long-term impacts would occur at locations of road and pathway projects in proximity to wetlands. Beneficial and adverse, minor to moderate and long-term impacts to wetlands would occur in riparian areas in and around GTNP as addressed in various management plans. Relative to existing wetland resource conditions within and around GTNP, these projects are expected to result in a minor increase to permanent new disturbance and a minor beneficial increase in wetland resource conditions. Overall, the incremental impacts of these related actions, in conjunction with the impacts of Alternative A, would result in beneficial and adverse, minor to moderate, and long-term cumulative impacts on park wetlands.

Conclusion

The impacts of human activities associated with fire management (e.g., equipment use, fireline construction and suppression chemicals) are considered adverse, minor to moderate, and short-term. Overall, the impact of prescribed fire and wildland fire use on wetlands under Alternative A is considered adverse and beneficial, minor to moderate, and short- and long-term. Cumulative impacts are also estimated to result in adverse and beneficial, minor to moderate, and short- and long-term effects. Alternative A is not favored among the alternatives, Alternative A is not favored to best move the fire management program toward long-term perpetuation of the historic fire regime.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's wetland resources or values.

4.5.3 Impacts of Alternative B on Wetlands

Analysis

The background information for and measures used to assess impacts to wetlands, as well as the short-term impacts resulting from planned and unplanned events are the same as presented in Alternative A. No discernible differences in wetland impacts associated with planned events, and control and suppression activities, regardless of alternative, exist so long as mitigation measures are adhered to.

If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential for conditions outside the normal range of variability would increase. Alternative B is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded under this alternative. Prescribed fire could be used to achieve a broader range of resource objectives than in Alternative A, should areas of the park warrant restoration, but the timing and severity of prescribed fire may not mimic natural processes. Expanded wildland fire use would contribute to perpetuation of the historic fire regime by allowing more fire on the landscape.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those actions identified for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in overall adverse and beneficial, minor to moderate, and long-term cumulative impacts.

Conclusion

The impacts of Alternative B would be the same as impacts predicted for Alternative A. Human activities associated with fire management (e.g., equipment use, fireline construction and suppression chemicals) are considered adverse, minor to moderate, and short-term. The impacts of prescribed fire and wildland fire use on wetlands under Alternative B would be adverse and beneficial, minor to moderate, and short- and long-term. Cumulative impacts are expected to result in adverse and beneficial, minor to moderate and long-term effects. Alternative B, when compared to the Alternative A, would be favored because it has greater potential to move the fire management program toward long-term perpetuation of the historic fire regime.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's wetland resources or values.

4.5.4 Impacts of Alternative C on Wetlands

Analysis

The background information for and measures used to assess impacts to wetlands, as well as the short-term impacts resulting from planned and unplanned events are the same as presented in Alternative A. No discernible differences in wetland impacts associated with planned events, and control and suppression activities, regardless of alternative, exist so long as mitigation measures are adhered to.

Impacts to wetlands would vary among the alternatives primarily when considering distant long-term indirect impacts. If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential for conditions outside the normal range of variability would increase. Alternative C is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded under this alternative. Although Alternative C is quite similar to Alternative B, prescribed fire will not be used as a fire management tool and, as a result, wildland fire use may be less due to increased risks. Prescribed fire would not be available as a tool to achieve resource objectives.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those actions identified for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in overall adverse and beneficial, minor to moderate, and long-term cumulative impacts.

Conclusion

The impacts of human activities associated with fire management (e.g., equipment use, fireline construction and suppression chemicals) are the same as Alternatives A and B and are considered adverse, minor to moderate, and short-term. Under Alternative C, planned treatments would have negligible impacts to wetlands because they would be limited to mechanical treatments. The impacts of wildland fire use on wetlands under Alternative C would be the same as Alternatives A and B: adverse and beneficial, minor to moderate, and short- and long-term. Cumulative impacts are estimated to result in adverse and beneficial, minor to moderate, and long-term effects. Alternative C, when compared to the No Action Alternative (Alternative A), would be favored because it has greater potential to move the fire management program toward long-term perpetuation of the historic fire regime.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's wetland resources or values.

4.6 SOILS

Methodology

Factors Used to Assess Environmental Consequences

Maintenance of Soil Stability: Alternatives that most closely maintain soil stability over the long-term, within a range of variability defined by the historic fire regime, are favored over alternatives that constrain soil stability.

Adverse Impacts – Human-caused actions that contribute to soil loss or disturbance; actions that alter inherent soil productivity, erosion rates, and nutrient cycling.

Beneficial Impacts – Actions that avoid human-caused soil loss or disturbance, or maintain inherent soil productivity, erosion rates, and nutrient cycling.

Impact Threshold Definitions: Soils	
Negligible	Impacts to soil characteristics would not be measurable or of any perceptible consequence. Any effects would be slight and no long-term effects to soil would occur.
Minor	Changes to soils characteristics would be detectable but small, localized and of little consequence. Any mitigation needed to offset adverse effects would be relatively simple to implement and effective.
Moderate	Changes to soils characteristics would be readily apparent, likely long-term, and evident over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	Impacts to soils characteristics would be readily apparent and long-term. Changes would be evident over a large area within the GYA. Mitigation to offset adverse effects would be needed, extensive, and success not guaranteed.
Duration	*Short-term* – durations of less than 3 years. *Long-term* – durations in excess of 3 years.

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
NPS will actively seek to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, and contamination of soil. Soil stability and fertility, in the long-term, are not decreased as a result of fire management programs and practices.	NPS *Management Policies 2001*

4.6.1 Impacts Common to all Alternatives

A range of fire effects can occur in burned areas because soil and vegetation are not evenly distributed around a given site and a mosaic of soil heating occurs during fires depending upon fuels. In forested areas, high subsurface soil temperatures usually occur beneath burning fuels. In comparison, rangelands support considerably lighter fuel loadings and frequently result in fires of shorter duration with less subsurface heating (Clark 2001).

Low to moderate severity fires burn soils in a manner that prevents subsequent erosion and promotes the release of nutrients contained in burned vegetation to enter the soil, contributing to new growth at varying rates. High intensity fires can temporarily sterilize soils, reduce soil productivity, and may cause considerable erosion (Franke 2000).

For all alternatives prescribed fire and/or wildland fire use would have adverse and beneficial impacts, negligible to minor in intensity and short to long-term. Mechanical treatments could cause soil loss and disturbance through activities such as hazard tree removal, equipment use, and pile burning. Reasonable care to minimize ground disturbance during these projects would result in negligible impacts. The impact of burn piles on soil is considered negligible because effects to soil productivity are localized, of very short duration, and would affect very small areas in relation to the treatment areas. Only soils within the center of burn piles would be impacted and soils in burn piles generally show evidence of vegetative regeneration within a year or two, with full regeneration after 10-12 years. As a whole, the hazard fuel reduction program would potentially exclude fire from no more than 6% of the park. For all alternatives these impacts would be adverse, minor and long-term.

Suppression activities include scraping of mineral soil, water and retardant drops where necessary, and temporary facilities that may disturb the ground. After such activities, erosion control devices would be installed, slopes would be stabilized, and operational locations would be reclaimed. Impacts related to suppression responses would be adverse and of short-term to long-term duration for all alternatives with impact intensities ranging from negligible to minor, depending on the scale of the fire event.

4.6.2 Impacts of Alternative A on Soils

Analysis

Soil impacts associated with planned events, and control and suppression activities are identical for all alternatives, so long as mitigation measures are adhered to. These impacts and their respective measures of type, intensity, duration were presented in the previous section (4.6.1-Impacts Common to all Alternatives).

Although Alternative A enables fire to occur within the park, wildland fire use would be limited and use would be less than other alternatives. In this respect, Alternative A is not favored over other alternatives because current fire management strategies do not maintain/restore the natural role of fire as well as other alternatives and could contribute to eventual changes to soil character that are outside the normal range of variability.

Cumulative Impacts

Recent, current, and planned projects within GTNP that would adversely impact soils are related to ground disturbance and include rehabilitation and adaptive use of the Murie Ranch, construction of a new visitor center at Moose, upgrading visitor facilities at Jenny Lake Lodge, a new Transportation Plan for GTNP, McCollister residential housing complex, Spring Gulch Road employee housing, adaptive use of the Lucas/Fabian property, East Antelope Flats adaptive use, Teton Helibase relocation and North Park Road reconstruction. The Elk and Bison Management Plan is anticipated to have beneficial impacts on soils in the park.

Adverse, minor, and long-term cumulative impacts would occur at the locations of utility upgrades, and adverse, minor, short-term cumulative impacts to soils would occur at the locations of construction projects. Relative to existing disturbance within the park, these projects are estimated to result in a minor increase to permanent new disturbance. Overall, the incremental impacts of these related actions, in conjunction with the impacts of Alternative A, would result in a beneficial and adverse, minor and long-term cumulative impact to soils in the park.

Conclusion

The impacts of prescribed fire and wildland fire use on soils under Alternative A (No Action) are considered be adverse and beneficial, negligible to minor and short to long-term. The impact of mechanical treatment activities (e.g., hazard tree removal, pile burning, and equipment use) would be negligible. As a whole, the hazard fuel reduction program would have an adverse, minor and long-term impact on soils. Suppression activities (e.g., control lines and temporary facilities) would have adverse, short to long-term impacts that range from negligible to moderate, depending on the scale of the fire event. Cumulative impacts would result in overall adverse and beneficial, minor and long-term impacts to park soils. When compared among the alternatives, Alternative A is not favored to best move the fire management program in a direction that would minimize the potential for eventual changes in soil characteristics that are outside the range of normal variability (when compared to the historic fire regime and geologic processes).

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's soil resources or values.

4.6.3 Impacts of Alternative B on Soils

Analysis

Soil impacts associated with planned events, and control and suppression activities are identical for all alternatives, so long as mitigation measures are adhered to. These impacts and their respective measures of type, intensity and duration were presented in the previous section (4.6.1-Impacts Common to all Alternatives).

Impacts to park soils would vary among alternatives when considering distant long-term indirect impacts. If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential for changes in soil characteristics that are outside the normal range of variability would increase. Alternative B is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded under this alternative to the maximum extent practicable and using the widest array of fire management tools to allow more fire on the landscape. Prescribed fire could be used to achieve a broader range of resource objectives than in Alternative A, but the timing and severity of prescribed fire may not mimic natural processes.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in overall beneficial and adverse, minor and long-term cumulative impact to soils in the park.

Conclusion

The impacts of prescribed fire and wildland fire use on soils under Alternative B would be similar to Alternative A and are also considered be adverse and beneficial, negligible to minor and short to long-term. The impact of mechanical treatment activities, the hazard fuel reduction program as a whole and suppression activities would be the same as Alternative A. Cumulative impacts are also estimated to be the same as Alternative A. Alternative B is favored over Alternative A in terms of best promoting the natural role of fire and minimizing the potential for eventual changes in soil characteristics that are outside the range of normal variability.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park' soil resources or values.

4.6.4 Impacts of Alternative C on Soils

Analysis

Soil impacts associated with planned events, and control and suppression activities are identical for all alternatives, so long as mitigation measures are adhered to. These impacts and their respective measures of type, intensity, duration were presented in the previous section (4.6.1-Impacts Common to all Alternatives).

Impacts to park soils would vary among the alternatives primarily when considering distant long-term indirect impacts. If current and future fire management plans fail to maintain/restore natural ecosystem processes, the potential for changes in soil characteristics that are outside the normal range of variability would increase. Alternative C is favored over Alternative A to promote maintenance of the historic fire regime primarily because wildland fire use would be expanded under this alternative, allowing more fire on the landscape. Although Alternative C is quite similar to Alternative B, prescribed fire will not be used as a fire management tool and, as a result, wildland fire use may be less due to increased risks. Prescribed fire would not be available as a tool to achieve resource objectives.

Cumulative Impacts

Impacts of past, current and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in overall beneficial and adverse, minor and long-term cumulative impact to soils in the park.

Conclusion

The impacts of wildland fire use on soils under Alternative C (No Prescribed Fire) would have the same context, intensity and duration as the impacts of prescribed fire and wildland fire use under Alternatives A (No Action) and Alternative B (Multiple Strategies): adverse and beneficial, negligible to minor and short to long-term. The impact of mechanical treatment activities, the hazard fuel reduction program as a whole and suppression activities would be the same as Alternatives A and B, although prescribed fire and associated activities would not occur. Cumulative impacts are also estimated to be the same as Alternatives A and B. When compared to Alternative A, Alternative C would be favored in terms of best promoting the natural role of fire and minimizing the potential for eventual changes in soil characteristics that are outside the range of normal variability.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's soil resources or values.

4.7 WILDERNESS

Methodology

Factors Used to Assess Environmental Consequences

Wilderness Character – Alternatives are favored based on the extent to which the actions add or detract from wilderness character. Values associated with wilderness character include biophysical, experiential, and symbolic conditions (Table 3.7).

Natural Fire Regime – Alternatives are favored based on the extent to which fire regimes resemble historic conditions and the extent that they allow natural fires to perpetuate within the wilderness to the extent practicable and feasible regarding risk to adjacent and/or connected resources.

Minimum Requirement – Alternatives are favored if the actions are the minimum requirement to meet stewardship goals or efficiently administer the recommended and potential wilderness areas. The wilderness impact analysis in this EA will evaluate which of the proposed alternatives best fulfills the minimum requirement concept. Minimum tool would always be applied.

Adverse Impacts - Fire management activities detract from wilderness character. Fire regimes move further away from pre-settlement conditions in wilderness area.

Beneficial Impacts - Fire management activities add to wilderness character. Fire regimes more closely resemble historic conditions in wilderness areas.

Impact Threshold Definitions: Wilderness	
Negligible	No change or a change in the wilderness character could occur, but it would be so small that it would not be of any measurable or perceptible consequence.
Minor	A change in the wilderness character and associated values would occur, but it would be small and, if measurable, would be highly localized.
Moderate	A change in the wilderness character and associated values would occur. It would be measurable, but localized.
Major	A noticeable change in the wilderness character and associated values would occur, or the action has potential to be precedent setting. Change in wilderness character and associated values would be measurable, and would have a substantial or possibly permanent consequence.
Duration	*Short-term* – lasts or recovers in less than 1 year *Long-term* - lasts or recovers in more than 1 year

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Wilderness areas are managed for (1) use and enjoyment in ways that leave them unimpaired as wilderness, (2) protection and preservation of their wilderness values, and (3) acquisition of information to facilitate preservation and public use of wilderness. Section 4(c) of the Wilderness Act generally prohibits motorized equipment (including vehicles and boats and other forms of mechanical transport), aircraft landings, installations, roads, and commercial enterprise. These prohibited activities may be allowed if they are necessary to meet minimum requirements for the administration of the area, including emergency measures to protect human health and safety.	Wilderness Act of 1964
The minimum requirement concept guides all NPS management actions in wilderness. This concept is a two-step process, which uses an appropriate level of NEPA documentation: ▪ To determine if a proposed management action is appropriate or necessary for the administration of the areas as wilderness, and does not pose a significant impact to the wilderness resource and character. ▪ To select, for appropriate or necessary projects in wilderness, the management method (tool) that causes the least amount of impact to the physical resources and character of wilderness.	DO# 41*: Wilderness Preservation and Management*
Fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness. The parks' fire management and wilderness plans together will identify the natural and historic roles of fire in the wilderness and will provide a prescription for response to natural and human caused wildland fires. Actions taken to suppress wildland fire will use the minimum requirement concept and will be conducted in such a way as to protect natural and cultural features and to minimize the lasting impacts of the suppression actions and the fires themselves. Under ideal conditions, natural fire should be considered as a fundamental component of the wilderness environment"	DO# 41*: Wilderness Preservation and Management;* NPS *Management Policies 2001*
The National Park Service will manage wilderness areas for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness.	NPS *Management Policies 2001*

While this analysis addresses the effects of fire management decisions on wilderness, site-specific planned fire management activities in wilderness areas are subject to the minimum tool analysis. The minimum tool analysis makes use of the least intrusive tool, equipment, device, force, regulation, or practice that will achieve the wilderness management objective. Minimum tools analyses will be completed annually for aircraft use and expected suppression activities.

4.7.1 Impacts Common to all Alternatives

Direct impacts to wilderness associated with potential fire management activities would occur under all alternatives. These activities would have adverse minor short and long-term impacts on wilderness character.

Mechanical treatments activities would generally not be planned in wilderness, but if permitted, would have short-term impacts on wilderness character. Activities involve thinning and/or pile burning vegetation, as well as the noise and activity from firefighting staff and equipment during operations. Mechanical treatments in wilderness, if proposed, would focus on the protection of backcountry cabins (Alternative A would require separate NEPA analyses for mechanical treatments) and would re-occur at a maintenance schedule every 10-15 years.

Alternatives that include the use of prescribed fire as a management tool would have more long-term impacts on wilderness character. Prescribed fire activities that contribute to long-term impacts include burning vegetation, control-line construction, and ignition operations to consume unburned fuels along the fireline.

Wildland fire use would occur at varying levels under all alternatives. Most management activities would take the form of short-term impacts necessary for monitoring natural fire events by aircraft and from the ground. There would be an occasional need to initiate suppression actions to keep fires from directly affecting developments, boundaries, or other sensitive areas, or to meet requirements for preventing excesses of air quality standards.

Suppression responses are considered long-term. Activities include control-line construction, ignition operations, extinguishing hot spots along firelines, water or retardant drops, and the construction of temporary facilities (i.e., helispots, camps, and staging areas). The impact of suppression actions on wilderness character would be mitigated using Minimum Impact Suppression Tactics (MIST) (Section 2.6; Appendix H).

4.7.2 Impacts of Alternative A on Wilderness

Analysis

Hazard fuel reduction around structures in the backcountry would emphasize the use of hand tools and focus on mechanical treatments to reduce fuel loads immediately surrounding backcountry cabins. Hazard fuel reduction projects would constrain the natural fire regime only as required to protect structures and people, but could detract from the personal meaning derived from wilderness experience and existence. If reduction treatments were planned at a maintenance level, there would be a small but measurable long-term change in habitat. Overall, impact of hazard fuel reduction on wilderness character under Alternative A is considered adverse, negligible to minor and long-term.

Prescribed fire could be used under Alternative A to achieve specific resource objectives and wildland fire use is expected to remain at current levels (approximately 30% of all ignitions are managed as wildland fire use). Impacts are considered beneficial to the extent that prescribed fire would be specifically aimed at areas that warrant restoration of the historic fire regime and wildland fire use would allow natural fire on the wilderness landscape. However, prescribed fire can be regarded as intrusive and may not necessarily mimic natural ecosystem processes. The impacts of prescribed fire and wildland fire use would be beneficial and adverse, minor and long-term. Because wildland fire use is not expected to expand under Alternative A, wilderness character would have the potential to be indirectly compromised over the long-term if this fire management plan and future management plans failed to maintain the natural role of fire on the wilderness landscape. Alternative A could contribute to an eventual movement of fire frequency and behavior outside the historic range of variability. Consequently, Alternative A is not favored among the alternatives to best balance minimizing human influence with maintaining the natural role of fire on the landscape.

Cumulative Impacts

Cumulative effects would stem from actions on the 143,454 acres of Recommended and Potential wilderness in GTNP (Figure 3.7). Activities include past, present, and future events within and immediately surrounding wilderness areas.

In keeping with its mission and strategic plan, the park has sought to manage recommended and proposed wilderness areas in such a way as to provide for their enjoyment while maintaining the qualities that make these areas unique. Such actions include managing the number of visitors who receive backcountry access and restricting use of trails to non-motorized means. Trail counts indicates that human use of some more accessible backcountry trails more than doubled from 1995-1998 (visitation over this same time period remained relatively constant). Air traffic in park wilderness areas occurs for fire management, resource management (e.g., telemetry), search and rescue, and maintenance activities. Air use summaries indicate that total flight hours in the park were 179.3 hrs in 2001, 289.6 hrs in 2002, and 315.7 hrs in 2003. Fire-related air traffic in wilderness accounted for 4.1% of these flight hours in 2001, 16.3% in 2002 and 2.5% in 2003. The total percent of flight hours in wilderness ranged from 46.8-51.6% between 2001 and 2003 (Teton Interagency Fire 2001-2003). Resulting cumulative impacts are considered adverse, minor to moderate and short-term and long-term.

At nearby Jackson Hole Mountain Resort, approximately 23 miles of hiking and cycling trails have been approved for construction on BTNF lands. Trails must be sited and designed so as to avoid encroachment into GTNP. However, to the extent that this project brings more people into the backcountry, opportunities exist for social trailing into recommended wilderness areas, as well as evidence of more human presence (noise, litter). These trails would result in adverse, negligible to minor and long-term impacts on wilderness.

NPS is preparing a Transportation Plan and associated environmental impact statement (EIS) for GTNP. Since this plan would consider trailhead relocation and a variety of road management techniques, backcountry use may be facilitated or discouraged depending on the alternatives. Resulting impacts on wilderness would be negligible and/or beneficial, minor, and long-term.

The incremental impacts of these related actions, in conjunction with the impacts of Alternative A, would result in an overall beneficial and adverse, minor to moderate and long-term cumulative impact to park wilderness areas.

Conclusion

Alternative A would employ fire management activities that would directly impact wilderness character in an adverse, minor, and short-and long-term manner. The impact of hazard fuel reduction projects on wilderness character is considered adverse, negligible to minor and long-term. Prescribed fire and wildland fire use would have beneficial and adverse, minor and long-term impacts. Because wildland fire use is not expected to expand under Alternative A, it is not favored among the alternatives to best balance minimizing human influence with maintaining the natural role of fire on the landscape. Overall cumulative impacts would be beneficial and adverse, minor to moderate and long-term.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's wilderness resources or values.

4.7.3 Impacts of Alternative B on Wilderness

Analysis

The impacts of hazard fuel reduction projects for Alternative B would be the same as Alternative A and are considered adverse, negligible to minor and long-term. The impacts of prescribed fire and wildland fire use would also be the same as Alternative A (beneficial and adverse, minor and long-term). However, because wildland fire use would have the greatest potential to increase under Alternative B, it is favored over Alternative A to best balance minimizing human influence with maintaining the natural role of fire on the landscape.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of ongoing related actions occurring in and around wilderness, in conjunction with the impacts of Alternative B, would result in overall beneficial and adverse, minor to moderate and long-term cumulative impacts.

Conclusion

The impacts of fire management activities, hazard fuel reduction projects, prescribed fire and wildland fire use would be the same as Alternative A. When compared among the alternatives. Alternative B is favored over Alternative A to best balance minimizing human influence with maintaining the natural role of fire on the landscape. This is because expanding wildland fire use would not contribute to an eventual increased potential for fire behavior and frequency to occur outside of the historic range of variability. The overall cumulative impact of Alternative B would be the same as Alternative A: beneficial and adverse, minor to moderate and long-term.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's wilderness resources or values.

4.7.4 Impacts of Alternative C on Wilderness

Analysis

The impacts of hazard fuel reduction projects for Alternative C would be the same as Alternative A, except that only mechanical cutting and burn piles would be permitted. Impacts are considered adverse, negligible to minor and long-term. Although wildland fire use levels vary among the alternatives, the impacts of wildland fire use on wilderness areas under Alternative C are of the same context, duration and intensity as the impacts of wildland use under the other alternatives (beneficial and adverse, minor and long-term).

Alternative C would promote natural processes in wilderness better than other analyzed alternatives. Areas would appear substantially natural and be affected primarily by natural forces. Alternative C is favored to best balance minimizing human influence with maintaining the natural role of fire on the landscape.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impacts of ongoing related actions occurring in and around wilderness, in conjunction with the impacts of Alternative C, would result in overall adverse, minor to moderate, and long-term cumulative impacts to wilderness character.

Conclusion

Alternative C would employ fire management activities that would directly impact wilderness character in an adverse, minor, and long-term manner. Fire management activities in Alternative C would differ from the other alternatives because there would be less fireline construction without the use of prescribed fire. Hazard fuel reduction projects are considered adverse, negligible to minor, and long-term. The impacts of wildland fire use on wilderness areas would have the same context duration and intensity as the impacts of prescribed fire and wildland fire use under the other alternatives (adverse, minor to moderate, and long-term). Alternative C is favored to best balance minimizing human influence with maintaining the natural role of fire on the landscape. Cumulative impacts on wilderness areas under Alternative C would be adverse, minor to moderate, and long-term.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's wilderness resources or values.

4.8 AIR QUALITY/VISIBILITY

Methodology

In order to predict the impacts of fire on local and regional air quality, Air Quality Index (AQI) data for 1988-2003 was compared with corresponding fire history data for GTNP, BTNF, and YNP (Table 4.8). Air quality data collected from Teton County (Jackson) is representative of local impacts, while air quality data from Park County (Cody) is representative of regional impacts.

Table 4.8. Air Quality Index (AQI) values and corresponding levels of health concern.

Air Quality Index (AQI) values	**Levels of Health Concern**	
When the AQI is in the range:	***…air quality conditions are:***	**Definition**
0-50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk.
51-100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects, but the general public is not likely to be affected when the AQI is in this range.
151-200	Unhealthy	Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.
201-300	Very Unhealthy	"Very Unhealthy" AQI values trigger a health alert, meaning everyone may experience more serious health effects.
301-500	Hazardous	AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

Source: **http://www.epa.gov/airnow/aqibroch/aqi.html**

The AQI is an index for reporting daily air quality. Values are calculated for each day for each monitoring site, using the highest concentration of each pollutant recorded that day. The highest pollutant-specific index value at a site is that site's AQI value for the day, and the pollutant associated with that Air Quality Index value is the *main pollutant*. The station in Teton County has monitored ozone and PM_{10} since 1987. $PM_{2.5}$ has been monitored in Teton County since 2000. The station in Park County only monitors PM_{10}. Since the biggest health threat from smoke comes from particles, these stations are good indicators of the health effects of smoke.

The AQI can be thought of as a yardstick that runs from 0-500. The higher the AQI value, the greater the level of air pollution and the greater the level of health concern. An AQI value of 100 is equivalent to the NAAQS. The following table equates AQI values to general health risks.

Factors Used to Assess Environmental Consequences

Conformity to Existing Law: Extent to which the alternatives conform to existing law regulating air quality and related values.

Extent to Which Alternatives Minimize Air Quality Effects while Achieving Park Goals: Alternatives are evaluated to assess their ability to balance competing objectives (clean air and ecosystem health).

Adverse Impacts - Changes to air quality with increases in the Air Quality Index (AQI) and decreases in visibility.

Beneficial Impacts – Changes to air quality with decreases in the Air Quality Index (AQI) and increases in visibility.

Impact Threshold Definitions: Air Quality/Visibility	
Negligible	A change in AQI value could occur, but it would be so small and short-term that it would not be of any measurable or perceptible consequence.
Minor	A change in the AQI value would be measurable, although changes would be small, barely noticeable in a localized area, and short-term. The AQI would not exceed 100 in the long term. No air quality mitigation measures would be necessary.
Moderate	A change in the AQI value would be measurable, noticeable over a larger area, and would not exceed an AQI of 150 over the long term. AQI values may occasionally spike up to 200 in the short term. Air quality mitigation measures would be necessary and the measures would likely be successful.
Major	A change in the AQI value would be measurable, highly noticeable over a regional area, and would exceed an AQI of 200 over the long term. Air quality mitigation measures would be necessary and success of the measures could not be guaranteed
Duration	*Short-term* – Impacts are not measurable beyond a week *Long-term* – Impacts are measurable beyond a week

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Air Quality/Visibility	Source
Air quality meets national ambient air quality standards (NAAQS) for specified pollutants.	Clean Air Act; NPS *Management Policies 2001*
Park activities do not contribute to deterioration in air quality.	Clean Air Act; NPS *Management Policies 2001,* National Environmental Policy Act

4.8.1 Impacts Common to All Alternatives

<u>Large-scale Fire Events</u> - The 1988 and 2000 fire seasons were examined to determine the impacts of large-scale fire events on air quality.

The 1988 fire season was the largest in recent history; approximately 1.4 million acres burned in the GYA from June until November. Approximately 2,700 acres burned in GTNP, 270,000 acres in BTNF, and 790,000 acres in YNP; the primary vegetation type affected by these fires was forest. The Teton County monitoring station recorded elevated index levels in the moderate and unhealthful range from August 26 to September 3. Several days were characterized by a shift in the main pollutant from ozone to particulate matter (PM_{10}). In addition, this event was the only time on record that the AQI was in the unhealthy range. On August 26, PM_{10} reached an AQI of

149 and on September 3, PM_{10} reached an AQI of 113. The monitoring station in Park County recorded a dramatic increase from 24 to 100 between September 5th and 7 (Appendix K) for supporting graphical data. The impact of the 1988 fire season on air quality is considered moderate because the main pollutant was elevated to unhealthful levels at the local scale for approximately a week. Consequently, the impact of a large-scale fire event on air quality is expected to be adverse, moderate, and short-term.

During the 2000 fire season a total of approximately 53,800 acres of GTNP, BTNF, and YNP land burned between June and November. Approximately 9,600 acres burned in GTNP, 37,000 acres in BTNF and 7,200 acres in YNP. All fires in 2000 were confinement or suppression fires and the predominant fuel type was forest. The AQI values recorded in Teton County showed a noticeable elevation from “good” to “moderate” for 3 consecutive days (July 30th to August 1st). This change in air quality could have been related to fire activity (4,500 acres) on BTNF land. Approximately 38,000 acres began burning on GTNP, YNP and BTNF lands between August 10-15. This period of fire activity coincided with noticeable changes in local and regional AQI monitoring records on August 16 and marked one of the few days in the year where PM_{10} was the main pollutant at the Teton County monitoring station. The AQI index value for that day was 46, which is in the “good” range. On the same day, the Park County monitoring station, which only monitors PM_{10}, showed a noticeable one-day index increase from 19 (“good” range) to 54 (“moderate” range); see Appendix K for supporting graphical data. The impact of the 2000 fire season on air quality is considered moderate because measurable changes in AQI values occurred at the regional level, but both regional and local AQI changes were of short duration and below 150.

<u>Prescribed Burns</u> - Fire history from GTNP during May 1999 provides a good example for examining isolated prescribed fire effects. During this month, 2,390 acres of sagebrush and 1,350 acres of forest/aspen were burned in GTNP and fire activity on surrounding federal lands was minimal. BTNF and YNP did not record any large fires in 1999. Approximately 1,050 acres of sage burned on May 6 and corresponded with a noticeable increase in the Teton County AQI from “good” to “moderate” (45 to 64 to 61 May 4th through May 6th). Similarly, 1,340 acres of sagebrush burned between May 20-21 and the AQI showed an increase from “good” to “moderate” (44 before the fire to a peak of 54). There was no noticeable AQI increase recorded in Teton County during the Cow Lake prescribed fire, which was approximately 1,350 acres of forest/Aspen on September 21st. The Park County monitor did not record AQI levels beyond the “good” range in 1999. These data suggest that timing prescribed fires when fire activity on adjacent federal lands is minimal has the potential to keep air quality values closer to the “good” range. The impact of the 1999 fire season, which was limited to prescribed burns in GTNP, is considered minor because changes in the AQI were measurable at a local scale for a short duration and did not exceed the “moderate” level of health concern (AQI <100). Based on this example, and the recognition that vegetation types and regional fire activity can also influence smoke effects, the impact of prescribed fire in GTNP is expected to have an adverse short-term impact on air quality that could range from minor to moderate.

Prescribed fire events in GTNP is spring and fall of 1999 were not characterized by a shift in the main pollutant from ozone to PM_{10}, as was the case for larger-scale fires recorded by Teton County monitor.

4.8.2 Impacts of Alternative A on Air Quality/Visibility

Analysis

Alternative A would maintain use of prescribed fire at levels similar to the current 10-year average of 1,486 acres. The comparison of 1999 planned events to corresponding AQI values in Teton County suggests that prescribed fire would have adverse minor to moderate and short-term impacts on air quality, depending on prescribed fire acreages, vegetation type and fire activity on adjacent federal land. Prescribed fire events are not expected to cause an increase in AQI values from the “moderate” to “unhealthy” range since fire events in the magnitude of 50,000 acres in the 2000 fire season did not cause such a shift. The impact of planned events is considered localized, temporary, and below NAAQS based on available air quality and fire history data.

Since wildland fire use is expected to remain similar to current activity levels under this alternative, adverse impacts would be short-term and are not expected to range beyond “moderate”. Fire use records since 1972 indicate that only 2 large wildland fire use events occurred, one in 1974 that totaled approximately 3,672 acres and another in 1981 that totaled approximately 2,017 acres.

Cumulative Impacts

Relevant past, present and reasonably foreseeable future actions are primarily related to fire occurring simultaneously on adjacent lands. The cumulative impact of large-scale fire events could elevate impacts from the “moderate” range to the “unhealthful“ range, and from noticeable at the local scale to noticeable at both the local and regional scale. The incremental impact of high levels of fire activity on adjacent lands, when added to the impacts of Alternative A, would still not exceed adverse moderate short-term levels.

Growth and development in and beyond the GYA have the potential to increase background concentration levels for air quality. Local population growth is associated with increased levels of woodstove burning and vehicle emissions and these increases may be noticeable during the winter during certain weather patterns. Reasonably foreseeable actions associated with GTNP and YNP’s Winter Use Plan is a decrease in the level of snowmobile use in the GYA. Overall cumulative impacts are considered adverse, moderate and short-term and long-term.

Conclusion

Prescribed fire under Alternative A would have an adverse minor to moderate and short-term impact on air quality and would follow recently updated WDEQ smoke management regulations, which require consideration of regional fire activity when implementing prescribed fire plans. Wildland fire use impacts under Alternative A would be adverse, minor to moderate and short-term. Cumulative impacts may increase the intensity of moderate impacts and duration may extend into the long-term if background concentration levels were to increase. Overall, cumulative impacts are considered adverse, moderate and short-term and long-term.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park’s general management plan or other relevant National Park Service planning documents, there would be no impairment of the park’s wilderness resources or values.

4.8.3 Impacts of Alternative B on Air Quality/Visibility

Analysis

The direct impacts of planned events on air quality under Alternative B would be the same as Alternative A; adverse, minor to moderate and short-term. Impact intensity could range from minor to moderate depending on prescribed fire acreages, vegetation type and fire activity on adjacent federal land. Although wildland fire use would expand under Alternative B, the impact would not exceed impacts associated with large-scale fire events. Consequently, the adverse impact of wildland fire use under Alternative B is not expected to exceed moderate and short-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in overall adverse, minor to moderate, and long-term cumulative impacts to air quality.

Conclusion

Prescribed fire, wildland fire use, and cumulative impacts would be the same as Alternative A. Because the number of candidate fires managed as wildland fire use would increase under Alternative B, associated impacts may occur more frequently than under Alternative A.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of GTNP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's wilderness resources or values.

4.8.4 Impacts of Alternative C on Air Quality/Visibility

Analysis

Since prescribed fire would not be allowed under this alternative, there would be no adverse effect on air quality. The adverse impact of wildland fire use on air quality under Alternative C, like the other alternatives, is not expected to exceed moderate, and short-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in overall adverse, minor to moderate, and long-term cumulative impacts to air quality.

Conclusion

Wildland fire use, and cumulative impacts would be the same as the other alternatives. Alternative C would not have the flexibility to put fire on the landscape when risks to air quality are low. Because the number of candidate fires managed as wildland fire use would increase under Alternative C, associated wildland fire use impacts may occur more frequently than they would under Alternative A.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's wilderness resources or values.

4.9 ARCHAEOLOGICAL RESOURCES

Methodology

Archaeological resources have the potential to help answer important research questions about human history. In order for an archaeological resource to be eligible for the National Register of Historic Places, it must meet one or more of the following criteria of significance: A) associated with events that have made a significant contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the archaeological resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association (National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation*).

Factors Used to Assess Environmental Consequences

Pre-Planning and Mitigation - Alternatives that maximize archaeological resource managers ability to anticipate, inventory, and mitigate impacts to cultural resources will be favored.

Fire Intensity - Those alternatives that contribute to continued fuel accumulation increase the risk to archaeological resources from high intensity fire.

Impact Threshold Definitions: Archaeological Resources	
Negligible	Impact at the lowest levels of detection – barely measurable, with no perceptible consequences. For purposes of Section 106, the determination of effect would be **no historic properties affected**
Minor	***Adverse impact*** - Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for §106 would be no adverse effect. ***Beneficial impact*** - Maintenance and preservation of a site(s). The determination of effect for §106 would be **no historic properties affected**.
Moderate	***Adverse impact*** - Disturbance of a site(s) results in loss of integrity. §106 effect determination would be adverse effect. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate. ***Beneficial impact*** - Stabilization of a site(s). The determination of effect for §106 would be **no historic properties affected**
Major	***Adverse impact*** - Disturbance of a site(s) results in loss of integrity. The determination of effect for §106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b). ***Beneficial impact*** - Active intervention to preserve a site(s). The determination of effect for §106 would be **no historic properties affected**.
Duration	Short-term - Recovers in less than 3 years; Long-term - Takes more than 3 years to recover.

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Archaeological Resources	Source
Archaeological sites are identified and inventoried, and their significance determined and documented. Archaeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. In those cases where disturbance or deterioration is unavoidable, the site is professionally documented and salvaged.	National Historic Preservation Act; Executive Order 11593; Archaeological and Historic Preservation Act; Archaeological Resources Protection Act; the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation*; Programmatic Memorandum of Agreement among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS *Management Policies 2001*, National Environmental Policy Act

4.9.1 Impacts Common to all Alternatives

Planned events (mechanical treatments and/or prescribed fire) result in surface disturbances, which can physically damage material or augment the looting of archaeological resources (Hanes 2001). Physical damage to archaeological resources could result from equipment use, fireline construction, and burning vegetation. The effects of heating associated with prescribed fire are usually not severe. However, if fire burns with high heat per unit area then damage to buried artifacts is more likely (Hanes 2001). Avoidance techniques and other typical mitigation measures employed (via consultation with the SHPO) generally mitigate the effect of planned events on archaeological resources.

None of the analyzed alternatives would intentionally diminish characteristics of archeological resources that qualify the resources for inclusion in the National Register. Planned events could have impacts that range from beneficial and adverse, negligible to minor and long-term, but the §106 determination of effect would be "no adverse effect." In the unlikely event that the NPS proposed an activity that would potentially adversely affect an archaeological resource, that action would require separate NEPA analysis and would not be covered under the Fire Management Plan's compliance.

Alternatives that rely more heavily on planned fire management actions (e.g., prescribed fire) allow advance identification and avoidance of archaeological resources. Conversely alternatives that entail more unplanned or emergency fire events, with little opportunity for advanced planning and clearance for archaeological resources, have more potential to impact archaeological resources.

There are opportunities for high intensity fire events to occur under all alternatives. Since archaeological resources are located in a highly flammable environment, the adverse impacts of unplanned fire effects cannot be completely avoided under any alternative. Alternatives that proactively reduce heavy fuel accumulations through low intensity prescribed fire or through mechanical removal reduce the risk of damage to archaeological resources from high intensity fire. In contrast, alternatives that promote continued accumulation of fuels increase the risk to archaeological resources from high intensity fire (Hanes 2001).

In the event of a wildland fire, measures will be taken to avert damages to archaeological resources. Unplanned events that involve wildland fire use and suppression-oriented activities will be conducted in coordination with the park archaeologist. Should any archaeological site be discovered, it would be formally documented in consultation with the SHPO. If numerous archaeological resources were threatened by an unplanned event, the park archaeologist would be present to help mitigate the impacts of suppression and rehabilitation efforts.

4.9.2 Impacts of Alternative A on Archaeological Resources

Analysis

The combination of management activities under this alternative would optimize mitigation efforts through the use of prescribed fire. Wildland fire use would be minimal because the number of managed natural fire starts would continue to remain low (approximately 30% of candidate fires are managed as fire use). Fuels could accumulate, thereby increasing the risk of high intensity fire damage to archaeological resources.

Cumulative Impacts

Cumulative effects would stem from past, present, and future actions to archaeological resources within GTNP. Relevant projects would increase human activity and disturbance at finite locations within the park, thereby increasing the potential for looting of archaeological resources. Resulting impacts are considered adverse, minor and long-term.

The impacts of these related actions, in conjunction with the impacts of Alternative A, would result in an adverse, minor and long-term cumulative impact to GTNP archaeological resources.

Conclusion

The impacts of planned events on archaeological resources under Alternative A would be adverse, negligible to minor and short-term. Project areas would be surveyed and evaluated prior to disturbance, if necessary. Any identified archaeological resources would be protected in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. Cumulative impacts would be adverse, minor and long-term cumulative impact to archaeological resources in the park. Alternative A is favored to maximize pre-planning and mitigation through the use of planned events. Alternative A is not favored to reduce the risk of intense fires. Although intense fires are within the historic range of variability and would occur under all alternatives, limited wildland fire use under Alternative A could contribute to an eventual unnatural level of fuels build up in certain areas of the park.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's archaeological resources or values.

4.9.3 Impacts of Alternative B on Archaeological Resources

Analysis

The combination of management activities occurring as part of Alternative B would optimize mitigation efforts through the use of prescribed fire. Fuels would accumulate under this alternative, but expanded wildland fire use would decrease the eventual potential for fuels to build up to unnaturally high levels in certain areas of the park. Consequently, Alternative B would indirectly decrease the risk of high intensity fire damage to archaeological resources in the extended long-term (beyond the life of this fire management plan).

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in an overall adverse, minor and long-term cumulative impact to archaeological resources in the park.

Conclusion

The impacts of planned events on archaeological resources under Alternative B would be the same as Alternative A and are considered adverse, negligible to minor, and short-term. Project areas would be surveyed and evaluated prior to disturbance. Any identified archaeological resources would be protected, as necessary, in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. Cumulative impacts would be adverse, minor and long-term cumulative impact to archaeological resources in the park. Alternative B is favored to maximize pre-planning and mitigation through the use of planned events. Alternative B is favored over Alternative A to reduce the risk of intense fires. Although intense fires are within the historic range of variability and would occur under all alternatives, expanded wildland fire use under Alternative B could contribute to an eventual decrease in unnatural level of fuels build up in certain areas of the park.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park;

or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's archaeological resources or values.

4.9.4 Impacts of Alternative C on Archaeological Resources

Analysis

Alternative C would provide the least opportunity to protect archaeological resources. In the absence of prescribed fire, the ability to pre-plan mitigation measures would diminish. Wildland fire use would increase under this alternative, but may be limited without the use of prescribed fire to reduce risk. Fuels would accumulate under this alternative, but expanded wildland fire use would decrease the eventual potential for fuels to build up to unnaturally high levels in certain areas of the park. Consequently, Alternative C would indirectly decrease the risk of high intensity fire damage to archaeological resources in the extended long-term (beyond the life of this fire management plan).

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in an overall adverse, minor and long-term cumulative impact to archaeological resources.

Conclusion

The impacts of planned events on archaeological resources under Alternative C would be negligible to minor due to limited ground disturbance associated with mechanical treatments. Project areas would be surveyed and evaluated prior to treatment. Any identified archaeological resources would be protected in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. Cumulative impacts to archaeological resources in the park would be adverse, minor and long-term. Alternative C does not maximize the ability to pre-plan and mitigate because prescribed fire projects would not be allowed. Alternative C is favored over Alternative A to reduce the risk of intense fires. Although intense fires are within the historic range of variability and would occur under all alternatives, expanded wildland fire use under Alternative C could contribute to an eventual decrease in unnatural level of fuels build up in certain areas of the park.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's archaeological resources or values.

4.10 HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Methodology

In order for a structure, building, site, or landscape to be listed in the National Register of Historic Places, it must meet one or more of the following criteria of significance: A) associated with events that have made a substantial contribution to the broad patterns of our history; B) associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the structure, building, site, or landscape must possess integrity of location, design, setting, materials, workmanship, feeling, and association (National Register Bulletin #16, *How to Apply the National Register Criteria for Evaluation).* A landscape must also have integrity of those patterns and features, land uses and activities, patterns of special organization, response to the natural environment, cultural traditions, circulation networks, boundary demarcations, vegetation related to land use, clusters, small scale elements, and buildings, structures, and objects necessary to convey its significance (National Register Bulletin #30, Guidelines for Evaluating and Documenting Rural Historic Landscapes) (NPS 1999).

Factors Used to Assess Environmental Consequences

Maximize Site Preservation - Alternatives that maximize the ability to preserve features of historic structures or the patterns and features of the cultural landscape will be favored.

Allow Pre- Planning and Mitigation -Alternatives that maximize the ability of cultural resource managers to anticipate, inventory, and mitigate impacts to historic structures and cultural landscapes will be favored.

Fire Intensity - Those alternatives that contribute to continued fuel accumulation increase the risk to historic structures and cultural landscapes from high intensity fire.

Impact Threshold Definitions: Historic Structures and Cultural Landscapes	
Negligible	Impact(s) is at the lowest levels of detection –barely perceptible and not measurable. For purposes of §106 of the National Historic Preservation Act, the determination of effect would be **no historic properties affected.**
Minor	***Adverse***: Alteration of a feature(s) of historic structures or alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the resource. The determination of effect for §106 would be no adverse effect. ***Beneficial***: Stabilization/preservation of features of historic structures in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and preservation of landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS 1996). The determination of effect for §106 would be **no historic properties affected**
Moderate	*Adverse:* Alteration of a feature(s) of the historic structures or alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the resource. The determination of effect for §106 would be **no historic properties affected.** *Beneficial:* Stabilization/preservation of features of historic structures in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and preservation of landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS 1996). The determination of effect for §106 would be **no historic properties affected.**
Major	***Adverse***: Alteration of a feature(s) of the historic structures or alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the resource. The determination of effect for §106 would be **no historic properties affected**. ***Beneficial***: Stabilization/preservation of features of historic structures in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and preservation of landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS 1996). The determination of effect for §106 would be **no historic properties affected.**
Duration	*Short-term* - Recovers in less than 3 years *Long-term* - Takes more than 3 years to recover.

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Historic Structures and Cultural Landscapes	Source
Historic properties are inventoried and their significance and integrity are evaluated under National Register criteria. The qualities that contribute to the eligibility for listing or listing of historic properties on the National Register of Historic Properties are protected in accordance with the Secretary of the Interior's Standards (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).	National Historic Preservation Act of 1966, as amended; Executive Order 11593 (1971); Archaeological and Historic Preservation Act of 1974, as amended; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS *Management Policies 2001.*

4.10.1 Impacts Common to all Alternatives

Mechanical fuel reduction and/or prescribed fire are used to indirectly and directly protect and preserve historic structures and cultural landscapes. Historic wooden buildings and structures, as well as vegetation in a cultural landscape, are susceptible to fire damage but can be indirectly protected by mechanically reducing surrounding fuels. Prescribed fire and mowing can be used to reestablish the environmental context of important cultural landscapes, including, but not limited to, historic vernacular and ethnographic landscapes. For example, fire can restore grassland from recent shrub invasion and can be used to promote the growth of certain plants used for food, medicine, or craft manufacture such as woven baskets (Hanes 2001).

Planned events are proposed in all alternatives and do not physically alter the features of historic structures. Treatment areas would be surveyed and evaluated for cultural landscapes before project implementation. The impact of planned events on historic structures is considered negligible for all alternatives. Since planned events would physically stabilize or preserve cultural landscapes, impacts are considered beneficial and minor. The duration of impact to both historic structures and cultural landscapes is considered long-term, particularly because hazard fuel reduction would occur on a maintenance schedule (10-15 years).

None of the analyzed alternatives would intentionally allow effects that would diminish characteristics that qualify historic structures and cultural landscapes for inclusion in the National Register. Planned events could have impacts that range from beneficial and adverse, negligible to minor, and long-term, but the §106 determination of effect would be “no adverse effect.” In the unlikely event that the NPS proposed an activity that would potentially have adverse effect on a historic structure or cultural landscape, that action would require separate NEPA analysis and would not be covered under the Fop’s compliance.

Pre-planning and mitigation measures will minimize potential adverse impacts by allowing consultation and oversight by cultural resource specialists. Alternatives that rely more heavily on planned fire management actions allow advance identification, avoidance, or preservation of historic structures and cultural landscapes. Planned fire management actions also allow the park the time to do additional consultation with SHPO regarding the proposed project. Conversely, alternatives that entail more unplanned events, with little opportunity for advanced planning and consultation with the SHPO, have more potential to adversely impact historic structures and cultural landscapes.

Opportunities exist for high intensity fire events to occur under all alternatives. Historic structures and cultural landscapes would be proactively protected during both planned and unplanned events, but it is impossible to eliminate all potential risks for fire to adversely impact these resources.

Alternatives that proactively reduce heavy fuel accumulations through prescribed fire or through mechanical removal indirectly reduce the risk of damage to historic structures and directly reduce the risk to cultural landscapes from high intensity fire. In contrast, alternatives that promote continued accumulation of fuels increase the risk to these cultural resources from high intensity fire.

4.10.2 Impacts of Alternative A on Historic Structures and Cultural Landscapes

Analysis

The combination of management activities would optimize mitigation and site preservation efforts through the use of prescribed fire and mechanical treatments. Wildland fire use would be minimal because the number of managed natural fire starts would continue to remain low (approximately 30% of candidate fires would be managed as wildland fire use). Fuels would have an increased potential to accumulate under Alternative A, thereby increasing the risk of high intensity fire damage to historic structures and cultural landscapes in the extended long-term (beyond the life of this plan).

Cumulative Impacts

Historic Structures - Cumulative effects would stem from past, present, and future actions to historic structures within GTNP. Relevant actions include several stabilization, rehabilitation, and adaptive use projects within the park. Resulting impacts from working on historic structures are considered beneficial, minor to moderate in intensity, and long-term in duration.

The impacts of these related actions on historic structures, in conjunction with the impacts of Alternative A, would result in an overall beneficial, minor to moderate, and long-term cumulative impact.

Cultural Landscapes - Cumulative effects would stem from past, present, and future actions to cultural landscapes within the park. Relevant actions include several stabilization, rehabilitation, and adaptive use projects within the park that could or do have cultural landscapes, as well as mechanical fuels reduction and prescribed fire treatments in several historic districts, including McCollister Residential Complex, Bar BC Dude Ranch, White Grass Ranch, Lucas/Fabian, Jackson Lake Ranger Station, and the Brinkerhoff Lodge. These projects have and would avoid adverse impacts to cultural landscapes. When the impacts of Alternative A are added to cumulative effects, the overall impacts on cultural landscapes are considered beneficial, minor and long-term.

Conclusion

Prior to treatments, project areas would be evaluated and surveyed if necessary. Historic structures and identified cultural landscapes would be protected in accordance with Section 106 of the National Historic Preservation Act and Advisory Council Regulations 36 CFR Part 800. The impact of planned events on historic structures is considered negligible and the impact on cultural landscapes is considered beneficial, minor, and long-term. The overall cumulative impact of Alternative A on historic structures would be beneficial and adverse, minor to moderate, and long-term. The impact of planned events to cultural landscapes under Alternative A is considered beneficial, minor and long-term. Corresponding cumulative impacts would also be beneficial, minor, and long-term. Alternative A is favored to maximize pre-planning and mitigation through the use of planned events. Due to limited wildland fire use under this alternative, there is an increased potential for fuels to buildup to unnatural levels in certain areas of the park in the extended long-term (beyond the life of this fire management plan).

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's historic structures and cultural landscapes.

4.10.3 Impacts of Alternative B on Historic Structures and Cultural Landscapes

Analysis

The combination of management activities available under Alternative B would optimize mitigation efforts through the use of prescribed fire and mechanical treatments. Fuels would accumulate, but expanded wildland fire use would decrease the potential for fuels to build up to unnaturally high levels in certain areas of the park. Consequently, Alternative B would indirectly decrease the risk of high intensity fire damaging historic structures and cultural landscapes in the extended long-term (beyond the life of this fire management plan).

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in an overall adverse and beneficial, minor to moderate, and long-term impact to historic structures and an overall beneficial, minor, and long-term impact to cultural landscapes.

Conclusion

The impacts of planned events on historic structures and cultural landscapes under Alternative B would be the same as Alternative A. Prior to treatments, project areas would be evaluated and surveyed if necessary. Historic structures and identified cultural landscapes would be protected in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. Cumulative impacts for both historic structures and cultural landscapes would be the same as Alternative A. Alternative B is favored to maximize pre-planning and mitigation through the use of planned events. Alternative B is favored over Alternative A to reduce the risk of large, high-severity fires. Although intense fires are within the historic range of variability and would occur under all alternatives, expanded wildland fire use under Alternative B could contribute to an eventual decrease in unnatural levels of fuels buildup in certain areas of the park.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's historic structures and cultural landscapes.

4.10.4 Impacts of Alternative C on Historic Structures and Cultural Landscapes

Analysis

Due to absence of prescribed fire, Alternative C would not maximize the preservation of historic structures and cultural landscapes or the ability to pre-plan, mitigate and preserve sites. The expansion of wildland fire use under Alternative C could decrease the long-term potential for large fuel buildups in certain areas of the park in the extended long-term (beyond the life of this fire management plan). Alternative C, like Alternative B, would therefore indirectly decrease risk of high intensity fire to historic structures and cultural landscapes.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative C, would result in an overall adverse and beneficial, minor to moderate, and long-term impact to historic structures and an overall beneficial, minor, and long-term impact to cultural landscapes.

Conclusion

The impacts of planned events on historic structures and cultural landscapes under Alternative C would be the same as Alternatives A and B (negligible for historic structures and beneficial, minor and long-term for cultural landscapes). Prior to treatments, project areas would be evaluated and surveyed if necessary. Any historic structure or identified cultural landscape would be protected in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. Cumulative impacts to historic structures and cultural landscapes would be the same as the other alternatives. The absence of prescribed fire under Alternative C would not maximize the ability to pre-plan, mitigate and protect sites. Alternative C is favored over Alternative A to reduce the risk of intense fires. Although intense fires are within the historic range of variability and would occur under all alternatives, expanded wildland fire use under Alternative C could contribute to an eventual decrease in unnatural levels of fuels build up in certain areas of the park in the extended long-term (beyond the life of this fire management plan) but not as much as Alternative B.

Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation and proclamation of Grand Teton National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's historic structures and cultural landscapes.

4.11 FIREFIGHTER AND PUBLIC SAFETY

Methodology

From a human safety perspective, fire management activities are dangerous and pose inherent risks to firefighters and the public. This analysis evaluates risk *reduction* by comparing the relative short- and long-term potential of each alternative.

Factors Used to Assess Environmental Consequences

Appropriate Management Response: Favored alternatives maximize tools available to manage fire and facilitate safe response.

Fire Management Units: Favored alternatives have up-to-date management boundaries that ensure timely and effective response to fires.

Hazard Fuel Reduction and Firebreaks: Favored alternatives maximize the ability to manage fire by creating and maintaining defensible space around developed areas and by promoting firebreaks on the landscape.

Adverse Impacts –Action would have the potential to increase risk posed to firefighters and the public.

Beneficial Impacts – Action would have the potential to reduce risk posed to firefighters and the public.

Impact Threshold Definitions: Firefighter and Public Safety	
Negligible	An action that could cause a change in level of risk to human safety, but the change would be so small that it would not be of any measurable or perceptible effect.
Minor	An action that could cause a change in risk level, but the change would be small and have a localized effect.
Moderate	An action that would cause a change in risk level. The change would be measurable, and may be perceptible beyond the park boundary.
Major	An action that would cause a severe change to human safety related values. The change would have a substantial and possible permanent effect, and may be perceptible at the regional level.
Duration	*Short-term:* Beneficial or adverse impacts for the life of this fire management plan. *Long-term:* Beneficial or adverse impacts for 20-100 years.

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Firefighter and Public Safety	Source
Park fire management programs will be designed to ensure that firefighter and public safety are not compromised. Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program that is responsive to safety considerations for park visitors, employees, and developed facilities.	DO-18 and RM-18: *Wildland Fire Management*
While recognizing that there are limitations on its capability to totally eliminate all hazards, all parks will seek to provide a safe and healthful environment for visitors and employees. When practicable, and consistent with congressionally designated purposes and mandates, the NPS will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education. In doing so, the NPS preferred actions will be those that have the least impact on park resources and values.	NPS *Management Policies 2001*

4.11.1 Impacts Common to all Alternatives

Wildland fire may compromise public and firefighter safety, especially during severely hot, dry years. Due to the abundance of flammable landscapes, plentiful natural and human ignition sources, and hot, dry summers, no alternative eliminates risk to firefighters, visitors, or communities. Wildland fires represent a direct and indirect threat to the public, employees, and firefighters under all alternatives. Alternatives that maximize control over timing, placement, and conditions under which fires burn are more successful at minimizing impacts, especially in the long-term. Individual wildland fire use and prescribed fire projects would be managed similarly (same conditions and constraints) under all alternatives, although increased fire use is desirable under Alternatives B and C. Each project would be implemented and mitigated according to guidelines established by Wyoming Department of Environmental Quality.

4.11.2 Impacts of Alternative A on Firefighter and Public Safety

Analysis

Alternative A (No Action) provides for a full range of tools to manage fire, which would help ensure appropriate management response and maximize the timing, placement, and conditions under which fire burns. A flexible response to fire (where safety is the most important goal) is not expected to increase smoke exposure or fire-caused injuries to the public, employees, or firefighters under Alternative A. Accordingly, the ability to use all tools is considered to have a beneficial, moderate, and short term impact on human safety. The No Action Alternative does not maximize the ability to control the timing and location of hazard fuel reduction projects because the hazard fuel program is not currently integrated with the fire management program. In addition, FMU boundaries would not be modified to reduce risk associated with previously undelineated developed areas. The consequences of having a separate hazard fuel reduction program and FMUs that are not updated under Alternative A would be adverse, minor, and short-term.

Natural firebreaks would not be maximized because wildland fire use is not expected to increase under Alternative A. Minimal fire use on the landscape under this management plan could lead to an increase in firefighter and public safety risks in the long-term if this plan and future management plans fail to maintain/restore the natural role of fire on the landscape. Such a scenario could eventually lead to fire events outside the range of historic variability, where homogeneous vegetation and age classes and fuel buildups, thereby providing less fire slowing/stopping opportunities. Resulting impacts would be adverse, minor to moderate, and long-term.

Cumulative Impacts

Relevant past, present, and reasonably foreseeable projects that could contribute to cumulative impacts on firefighter and public safety include continued development in the park and on lands adjacent to the park. Such actions would have an adverse, minor to moderate, and short- and long-term impact because expanded WUI areas would increase risks to firefighters and the public. The incremental impact of continued development, when added to the impacts of Alternative A, would result in overall adverse, minor, and short-term impacts as well as adverse, moderate, and long-term impacts on firefighter and public safety.

Conclusion

There would be beneficial moderate and adverse minor short-term impacts to firefighter and public safety associated with Alternative A (No Action). Long-term impacts would be adverse and minor to moderate. Cumulative impacts would be adverse, minor, and short-term as well as adverse, moderate, and long-term.

4.11.3 Impacts of Alternative B on Firefighter and Public Safety

Analysis

Alternative B (Multiple Strategies) is similar to Alternative A (No-Action) because it provides for a full range of tools to manage fire. Resulting impacts would be the same as Alternative A and are therefore also considered beneficial, moderate, and short term. In contrast to Alternative A, Alternative B would maximize the ability to control the timing and location of hazard fuel reduction projects because the hazard fuel program would be integrated with the fire management program. FMU boundaries would be modified to reduce risk associated with previously undelineated developed areas. Further, the revised “Go/No-Go” decision-making process for unplanned events would select an appropriate management response that considers a broader range of safety issues than the current “Go/No-Go” decision-making process for unplanned events (Appendix E). The consequences of having an integrated hazard fuel reduction program, modified FMUs, and an updated Go/No-Go” decision-making process for unplanned events would be beneficial, minor to moderate, and short-term.

An increase in wildland fire use would lead to a reduction in risk to firefighter and public safety, both during and beyond the life of this FMP. Human safety risks would decrease as natural firebreaks increase, uncharacteristically high fuels buildups decrease, and control efforts become more effective. Impacts would be beneficial, minor to moderate, and short- and long-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B would result in an overall beneficial, minor, and short- and long-term cumulative impacts to firefighter and public safety.

Conclusion

Short-term impacts to firefighter and public safety under Alternative B (Multiple Strategies) would be beneficial and minor to moderate. Long-term impacts would be beneficial and minor to moderate. Cumulative impacts would be beneficial, minor, and short- and long-term.

4.11.4 Impacts of Alternative C on Firefighter and Public Safety

Analysis

In contrast to Alternatives A and B, Alternative C (Limited Strategies) would not provide for a full range of tools to manage fire because prescribed fire would not be available. Without prescribed fire the timing, placement, and conditions under which fire burns would not be maximized and hazard fuel treatments may be less effective or efficient in reducing fuel loads around developed areas. Resulting impacts are considered adverse, moderate, and short-term. In contrast, this alternative, like Alternative B, would have an integrated hazard fuel reduction program, modified FMUs, and an updated Go/No-Go" decision-making process for unplanned events. Resulting impacts would be beneficial, minor to moderate, and short-term.

The expansion of wildland fire use without the use of prescribed fire to mitigate risk could have an adverse, moderate, and short-term impact. Wildland fire use increases may be limited in an effort to keep human safety risks at an acceptable level. In the long-term, control efforts could become more effective if wildand fire use were to increase, creating more firebreaks on the landscape. Resulting impacts would be beneficial and adverse, minor, and long-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The incremental impact of continued development, when added to the impacts of Alternative A, would result in overall adverse, minor to moderate, and short- and long-term cumulative impacts on firefighter and public safety.

Conclusion

The short-term impacts of Alternative C (Limited Strategies) on firefighter and public safety would be are considered adverse and beneficial and minor to moderate. Long-term impacts would be beneficial and adverse, and minor. Cumulative impacts would be the same as the other alternatives: adverse, moderate, and long-term.

4.12 PARK NEIGHBORS

Methodology

Factors Used to Assess Environmental Consequences

<u>Public Participation and Informed Decision-making</u> - Alternatives that maximize the ability of park neighbors (the public and cooperative agencies) to embrace or participate in the fire management process will be favored.

<u>Interagency Cooperation</u> - Alternatives that promote or maximize the ability of the park to cooperate and participate with other agencies.

Adverse Impact - Neighbor relations would be weakened.

Beneficial Impacts - Neighbor relations would be strengthened.

Impact Threshold Definitions: Park Neighbors	
Negligible	Changes in park neighbor(s) participation would be below the level of detection. Changes would affect a small proportion of park neighbor(s).
Minor	Changes in park neighbor(s) participation would be detectable, although the changes would be slight and likely short-term. Changes would affect a small proportion of park neighbor(s).
Moderate	Changes in park neighbor(s) participation would be readily apparent and mostly long-term. Changes would affect a moderate proportion of park neighbor(s).
Major	Changes in park neighbor(s) participation would be readily apparent and have substantial long-term consequences. Changes would affect a large proportion of park neighbor(s).
Duration	*Short-term* - Effects extend only through the period of one project or event *Long-term* - Effects extend beyond the project or event and generally last for the duration of the proposed Fire Management Plan

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Park Neighbors	Source
Public participation in planning and decision-making will ensure that the NPS fully understands and considers the public's interests in the parks, which are part of their national heritage, cultural traditions, and community surroundings. NPS will actively seek out and consult with existing and potential visitors, neighbors, people with traditional cultural ties to park lands, scientists and scholars, concessionaires, cooperating associations, gateway communities, other partners, and government agencies. NPS will work cooperatively with others to improve the condition of parks; to enhance public service; and to integrate parks into sustainable ecological, cultural, and socioeconomic systems.	NPS *Management Policies 2001*, National Environmental Policy Act
In the spirit of partnership, NPS will also seek opportunities for cooperative management agreements with state or local agencies allowing for more effective and efficient park management, as authorized by §802 of the National Parks Omnibus Management Act of 1998.	NPS *Management Policies 2001*
The new civic engagement initiative is the NPSs challenge to itself, to find new ways to revitalize its mission of preserving and interpreting our nation's natural and cultural heritage. Forming meaningful partnerships with the very people most invested in the park ensures the long-term relevance of NPS resources and programs.	Director's Order # 75A: *Civic and Public Engagement*

4.12.1 Impacts Common to All Alternatives

Under all alternatives, GTNP would work with neighbors to identify response measures needed to protect life, property, and associated values during planned and unplanned events. The park would also use informational messages to inform park neighbors of fire status and actions being taken in a timely manner. GTNP has obligations and commitments to cooperating agencies during the planning and protection of similar lands, and through jointly funded programs. Fire management activities that could affect federally administered adjacent lands are further addressed in the form of interagency agreements.

The primary concern related to park neighbors is the threat of fire to life and property and the ability to cooperatively address mitigating the risk of these resources. The health impacts related to smoke exposure are addressed in Section 4.8 (Air Quality).

4.12.2 Impacts of Alternative A on Park Neighbors

Analysis

Mechanical treatments and prescribed fires would continue to be used to protect inholdings by creating fire-breaks and reducing hazard fuel loads near private properties within the boundaries of the park. Low levels of wildland fire use would continue to reduce fire threats to inholdings, local communities, and adjacent federal lands over the short and long term. However, over the extended long term (beyond the duration of the proposed Fire Management Plan), threats to neighbors' life and property could be increased because historic fire-return intervals would not likely be restored, contributing to an eventual increase in the potential for fire events to occur outside of the range of historic variability. Under current management conditions, adaptive management would not be available as a tool. Consequently, the ability to expand public education and engagement would be restricted, resulting in negligible beneficial changes to public participation would be negligible.

Cumulative Impacts

Recent, present, and planned projects that would affect park neighbors include:
1) Rehabilitation, adaptive use, and employee housing projects within GTNP;
2) Transportation Plan for GTNP; 3) Winter Use Plan for Yellowstone and Grand Teton National Parks; 4) Agency and interagency fire management planning documents; and 5) Current federal fire policy emphasizes planning, safety, preparedness, protection, interagency cooperation, and wildland/urban interface.

Interagency and agency planning documents would benefit park neighbors and help them understand and scope and scale of proposed and upcoming projects. The Transportation Plan would likely have minor beneficial impacts on collaboration with park neighbors. Depending on the alternative implemented, transportation improvement measures could have beneficial, negligible to moderate impacts and/or adverse minor impacts. Rehabilitation, adaptive use, and employee housing projects within GTNP could have adverse and beneficial impacts on park neighbors.

The incremental impacts of these related actions, in conjunction with the impacts of Alternative A, would result in an overall beneficial and adverse, minor and long-term cumulative impact to relations with park neighbors.

Conclusion

Under Alternative A, fire management activities have the potential to impact park neighbors in a negligible way (both beneficial and adverse and short-term and long-term impacts). Alternative A, when compared to the other alternatives, would not strengthen neighbor relations or protect threats to life and property in the extended long-term as well as Alternatives B and C.

4.12.3 Impacts of Alternative B on Park Neighbors

Analysis

Mechanical treatments and prescribed fires would continue to protect inholdings by creating fire-breaks and reducing hazard fuel loads near private properties within the boundaries of the park. Increased levels of wildland fire use could increase fire threats to inholdings, local communities, and adjacent federal lands over the short and long term. However, over the extended long term, expanded wildland fire use (in addition to other planned treatments) could reduce the risk of fire occurring outside of the historic fire regime thus decreasing the overall threat of large-scale fires that might adversely affect park neighbors. Adaptive management strategies associated with Alternative B would be available to expand public engagement through public meetings in order to communicate recent fire history and identify/discuss proposed projects entailing planned events.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in an overall an overall beneficial and adverse, minor, and long-term cumulative impact to park neighbors.

Conclusion

Fire management activities have the potential to impact park neighbors in an adverse, minor, and short-term way. In addition, a beneficial, minor to moderate, and long-term impact is anticipated. Alternative B is favored over Alternative A to strengthen neighbor relations and better protect threats to life and property in the extended long-term. This is because Alternative B would use adaptive management to expand public engagement and because expanded wildland fire use would contribute to eventual restoration/maintenance of the natural role of fire on the landscape.

4.12.4 Impacts of Alternative C on Park Neighbors

Analysis

Mechanical treatments and suppression/control actions would be the fire management tools used to protect inholdings and park neighbors under Alternative C. Prescribed fire projects would not be used, which may exclude participation in interagency projects. Increased levels of wildland fire use without prescribed fire to mitigate risk would directly increase fire threats to inholdings, local communities, and adjacent federal lands over the short and long term. However, beneficial impacts that extend beyond the life of this plan are anticipated, as expanded wildland fire use could contribute to an eventual reduced risk of fire outside of the historic fire regime. Adaptive management strategies associated with Alternative C would be available to expand public engagement through public meetings in order to communicate recent fire history and identify/discuss proposed mechanical treatment projects.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impacts of these related actions, in conjunction with the impacts of Alternative B, would result in an overall beneficial and adverse, minor to moderate, and short-term and long-term cumulative impact to park neighbors.

Conclusion

Fire management activities have the potential to impact park neighbors in an adverse, moderate, and short-term way. In addition, a beneficial, minor, and long-term impact is anticipated from the combination of being able to use of adaptive management to expand public engagement, but being restricted from participating in interagency initiatives that involve the use of prescribed fire. .Alternative C, when compared to the other alternatives, would be the least effective at protecting threats to life and property during the life of the Fire Management Plan as well as over the extended long term. Although fire use would expand under this alternative, prescribed fire would not be available to mitigate wildland fire use risks, and the ability to participate in interagency projects would be restricted.

4.13 PROGRAM COST

Methodology

Factors Used to Assess Environmental Consequences

Relative Cost of Alternatives - Less expensive alternatives are favored over more expensive ones.

Achieve Management Objectives – Those alternatives that best meet management goals identified in Section 1.4 will be favored. Relevant goals are subitems of the fifth goal, "Manage Personnel and Financial Resources Effectively", and include:

- Effectively manage fire actions commensurate with values at risk and meet incident objectives while employing fiscal responsibility.
- Reduce unnecessary financial burden to the park by managing fires using the full range of wildland and prescribed fire options to protect, enhance and restore resources and developments within and adjacent to the park.

Adverse Impact - The program is not economically effective at responding to incidents and maximizing the efficiency of using fixed agency programming.

Beneficial Impacts - The program is economically effective at responding to incidents and maximizing the use of fixed agency programming.

Impact Threshold Definitions: Program Cost	
Negligible	Changes in park program costs would be small with little effect on the fixed budget, authorized project funds, or national emergency funds.
Minor	Changes in park program costs would affect the fixed budget, authorized projects funds, or national emergency funds but could be absorbed.
Moderate	Changes in park program costs would affect the fixed budget, authorized projects funds, or national emergency funds but may not be easily absorbed and could result in project delays.
Major	Changes in park program costs would affect the fixed budget, authorized projects funds, or national emergency funds at the regional or national level and projects would be delayed or cancelled.
Duration	*Short-term* – Effects extend only through one fiscal year *Long-term* - Effects extend beyond one fiscal year

Regulations and Policy

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition: Program Cost	Source
NPS is directed to ensure that costs of large fire will be commensurate with values protected and to ensure financial integrity, accountability and efficiencies within the wildland fire management program.	NPS *Wildland Fire Management Strategic Plan 2003-2008*
FIREPRO funds must not be diverted for non-fire program support.	RM 18: *Wildland Fire Management (*Chapter 18*)*

4.13.1 Impacts Common to All Alternatives

Availability of emergency response, and fire and project planning personnel are assumed for all alternatives. While the assumption for core personnel remains constant across the alternatives, variations exist between alternatives due to the range of tools available to achieve fire management objectives. Costs used in this section are based on average costs primarily using park employees for labor.

Table 4.13.1 contains estimates that can vary widely because each incident or project cost can differ by vegetation, location, resource availability, contract labor and risk. Research has shown that alternatives that maintain more park acres over time, and those that use fire more deliberately and less randomly, eventually result in a reduction in the rate of fires requiring aggressive suppression and a consequent increase in overall economic return (Omi et al. 1999).

Table 4.13.1. Average Treatment Cost per Acre

Tool	Cost Per Acre	Notes
Mechanical Fuels Treatment	\$100/ac \$500-700/ac	Low costs include mowing grass or sage with minimum resources or time involved. Higher costs would include heavy fuels and timber types involving more labor and time as well as follow up burning.
Wildland Fire Suppression - Small	\$2,500/acre	Minimum resources, fires are small but costs are high due to size. Costs are variable and may include equipment, helicopter flight time, and personnel time values at risk.
Wildland Fire Suppression - Moderate	\$100-400/ac	Using a local organization keeps costs down. These costs would increase dramatically if burning in heavy fuels where mop up and burning time are long or near developments. Costs are less than small fires because of acreage burned.
Wildland Fire Suppression Large	\$600-800/ac	Costs for fires are very high but can be moderated because of acres burned. Many resources from outside the area are mobilized at high costs. Values at risk, fire behavior, fire size, and local resource skill/availability would affect this mobilization. Type I teams are brought in for very complex incidents and cost as much as \$1,000,000/day. Type II teams cost approximately \$500,000 per day handling large incidents that are usually slightly less complicated than Type I.
Prescribed Fire	\$60/ac \$300/ac	Low costs would involve low complexity, remote, quick burning fuels. Higher costs would involve higher risks, higher complexity fires.
Wildland Fire Use-small	\$500-\$2,000/ac	Small fires with some aerial recon or personnel time.
Wildland Fire Use – moderate-large	\$100-300/ac	Larger fires that use a range in resources (aerial recon, ground personnel, and small team mobilization).

4.13.2 Impacts of Alternative A on Program Cost

Analysis

Under Alternative A, the cost of planned projects is expected to be proportional to current budget allocations because all options would be available to fire managers and prevention through both prescribed fire and hazard fuel management can reduce future cost. There have been two fires in GTNP that burned into previously treated areas where dramatic decreases in fire behavior were observed. The previously treated areas aided fire personnel in suppressing these fires. Although this alternative provides for a range of wildland and prescribed fire options, only a small percentage of ignitions would be managed as wildland fire use. Low levels of wildland fire use on the landscape would keep suppression costs at current levels. Resulting impacts of planned events on program costs under Alternative A are considered negligible because fire program costs would not noticeably increase if current fire management operations continue.

Cumulative Impacts

Relevant actions that could potentially affect park fire management program costs include local use of fire resources for non-fire activities and political pressure to suppress fires. Such activities are not currently anticipated, but if they occur, the resulting impact would likely be adverse, minor, and short-term and long-term. The impact of these related actions, in conjunction with the impacts of Alternative A, would result in an overall adverse, minor, and long-term cumulative impact to program cost.

Conclusion

The impact of fire operations under Alternative A on program cost is considered negligible. Cumulative impacts, if any, would result in an adverse, minor, and long-term impact on fire program cost.

4.13.3 Impacts of Alternative B on Program Cost

Analysis

The impacts of planned projects on program costs under Alternative B would be the similar to those in Alternative A. The cost of planned projects is expected to be proportional to current budget allocation because multiple strategies would be available to manage fire. Alternative B would differ slightly from Alternative A when considering planned events because separate NEPA analysis would not be required for hazard fuel reduction projects. In addition, increased wildland fire use would provide for a broader range of wildland and prescribed fire options and lead to lower suppression costs. Resulting impacts of planned events on program costs under Alternative B are considered beneficial, minor, and long-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternative A. The impact of these related actions, in conjunction with the impacts of Alternative B, would result in an overall negligible cumulative impact to program cost.

Conclusion

The impact of fire operations under Alternative B on program cost is considered beneficial, minor, and long-term. Cumulative impacts, if any, would result in an overall negligible impact on fire program cost.

4.13.4 Impacts of Alternative C on Program Cost

Analysis

Planned project costs would be higher than those associated with other alternatives because prescribed fire could not be used to treat hazard fuels and minimize the need for more expensive suppression-oriented protective measures in the future. Increasing wildland fire use without prescribed fire could lead to an increase in program cost because labor-intensive mechanical treatments would increase. Although this alternative provides a narrower range of wildand and prescribed fire options than other alternatives, increased wildand fire use would partially offset program cost increases because they would lower suppression costs. The impact of fire operations under Alternative C would be adverse, minor, and long-term.

Cumulative Impacts

Impacts of past, present, and reasonably foreseeable future actions would be the same as those for Alternatives A and B. The impact of these related actions, in conjunction with the impacts of Alternative C, would result in an overall adverse, minor to moderate, and long-term cumulative impact to program cost.

Conclusion

The impact of fire operations under Alternative C on program cost is considered adverse, minor, and long-term. Cumulative impacts, if any, would result in an overall adverse, minor to moderate, and long-term impact on fire program cost.

CHAPTER 5: CONSULTATION AND COORDINATION

5.1 AGENCY CONSULTATION

5.1.1 United States Fish and Wildlife Service (USFWS)

The programmatic Biological Assessment (BA) that accompanies this programmatic EA outlines design criteria and mitigation measures for threatened and endangered species within the park that would ensure a high likelihood of a "not likely to affect" determination for all planned fire management activities. Special emergency consultation procedures are in effect and will be followed to determine effects to species for unplanned fire activities such as suppression and wildland fire use. Any fire activity or action that is out of the scope of the FMP and the EA would require separate NEPA analysis and consultation with the USFWS; however, all activities within the scope of the programmatic EA and BA would not require consultation on an action-by-action basis. Rather, GTNP would provide an annual report of fire activities to the USFWS and briefings at their request, in order to keep the USFWS informed on all fire management activities within the park. This annual report and review process will give the USFWS an opportunity to monitor fire activity within the park, ensure compliance with the programmatic documents, and provide valuable feedback to the park on wildlife issues and latest regional findings. In summary, a BA would not be written and submitted to the USFWS for future planned activities within the scope of the new FMP unless the activity could not follow the design criteria for some reason. Consultation with the USFWS would be conducted on an annual basis using a fire activity report. The report format will be worked out between GTNP and the USFWS on a regular basis, as the need for information changes.

USFWS issues annual memorandums that address emergency consultations for suppression activities. GTNP would be obligated to initiate consultation if fire suppression activities would appear to adversely affect a listed species. Emergency consultation for wildland fire is characterized by a five-step process: initial contact, consultation completion, biological opinion, and conservation recommendation. The memorandum detailing this process is included in Appendix B: Agency Correspondence.

5.1.2 Wyoming State Historic Preservation Office (SHPO)

The park initiated consultation with the State Historic Preservation Office (SHPO) by sending a scoping statement to the Office of the Governor. This office distributed the scoping document to all affected agencies for their review. SHPO responded to the scoping statement by letter on April 14, 2003. This letter reviewed compliance procedures and stated that there were no objections to the project, provided regulations and procedures are followed (Appendix B).

Grand Teton National Park does not have a good database or inventory for their cultural resources, other than historic structures. Archaeological resources, ethnographic resources, museum collections, and cultural landscapes are located throughout the park and their locations are not all known. Current practice is to survey these resources and submit a report for review/concurrence by the Wyoming State Historic Preservation Office to before any planned action may take place. Hence, separate compliance with Sections 110 and 106 are conducted for each project area. Emergency procedures are in place for wildland fire use and suppression events and assessment of effects would be conducted after unplanned events to determine these effects. The results of any post-burn inventory would be forwarded to the Wyoming SHPO.

In summary, NHPA compliance would be conducted in consultation with the Wyoming SHPO on a project-by-project basis for all actions within the scope of the FMP for cultural resources, as described in figure 2.4.1 Multi-year decision-making process for planned events. In the future, the park wishes to develop a programmatic agreement with the SHPO that would support moving away from 100% surveys toward identifying high probability areas and developing better sampling strategy techniques to predict where cultural resources have a higher probability of occurring. This agreement would be similar to the agreement that the BTNF currently has with the SHPO.

5.1.3 Wyoming Game and Fish Department (WGFD)

The park initiated consultation with WGFD by sending a scoping statement to the Office of the Governor. WGFD responded to the scoping statement by letter on April 25, 2003. The letter stated that WGFD supports Alternative B. In addition, WGFD made several recommendations that have been incorporated into mitigation measures and interagency coordination procedures (see Sections 2.2.3 and 2.7, and Appendix B).

5.1.4 Wyoming Department of Environmental Quality (WDEQ)

WDEQ is developing a new smoke management regulation based on a permit-by rule system. Compliance with the following considerations would constitute permission from the state to conduct the project. Prescribed burns expected to generate two tons of particulate matter (PM_{10})/day would be classified as a SMP-II and registration would be required. Notification would also be required two weeks prior to a burn. Burn information would have to be communicated to the general public so that precautions against smoke exposure could be taken. In addition, GTNP would be required to document consideration of alternatives to burning, use at least one emission reduction technique for a given prescribed fire, and conduct visual monitoring under a smoke management program guidance document that is still being developed. The permissibility of burning is based on smoke dispersion, which is classified by weather-related ventilation categories. The program guidance document will identify those conditions under which a variance may be requested and granted by the state or mitigation measures may be requested of the burner to comply with statewide emissions thresholds.

5.2 PREPARERS AND CONTRIBUTORS

5.2.1 Core Interdisciplinary Team Members and Consultants

Name	Title	Team Role
Mary Gibson Scott	Superintendent	Management oversight
Lisa Elenz	Fire Management Officer	Team leader for FMP
Suzy Schulman	Environmental Planner	Team leader for EA
Chip Collins	Assistant Fire Management Officer	Fire management advisor
Mack McFarland	Fuels Management Specialist	Fire and fuels management advisor
Diane Abendroth	Lead Fire Effects Monitor	Fire effects and fire ecology advisor.
Lori Iverson	Fire Education Specialist	Fire education advisor
Dirk Shupe	GIS Fire Specialist	GIS data transfer
Linda Kerr	Fire Ecologist	Regional fire ecologist advisor
Andy Fisher	Chief Ranger	Law enforcement and fire management advisor
Sue Consolo-Murphy	Chief, Science & Resource Management	Natural resource advisor
Jacquelin St. Clair	Park Archaeologist	Cultural resource advisor
Pam Holtman	Park Historian	Cultural resource advisor
Steve Haynes	Vegetation Management Specialist	Natural resource advisor
Kelly McCloskey	Vegetation Management Specialist	Natural resource advisor
Sue Wolff	Wildlife Biologist	Natural resource advisor
Margaret Wilson	Planning Program Assistant	NEPA policy advisor
Thomas M. Campbell III	Fisheries and Wildlife Biologist, President, Biota Research and Consulting, Inc.	Senior project manager, biological impact analyses
Jessica Mitchell	GIS Analyst and NEPA Specialist, Biota Research and Consulting, Inc.	Project manager, impact analyses, NEPA compliance
Cynthia Riegel	Terrestrial Ecologist, Biota Research and Consulting, Inc.	Vegetation impact analysis
Sarah Sams	Hydrologist, geomorphologist, Biota Research and Consulting, Inc.	Water resources impact analysis

5.2.2 Agencies, Tribes, Organizations, and Individuals Contacted

Federal Agencies

U.S. Army Corps of Engineers, Omaha District
U.S. Department of the Interior, Fish and Wildlife Service, Wyoming Office
U.S. Department of the Interior, National Elk Refuge, Jackson Office
U.S. Department of the Interior, Bridger-Teton National Forest, Jackson Office
U.S. Department of the Interior, Caribou-Targhee National Forest, Driggs Office
U.S. Department of the Interior, National Park Service, Denver Service Center
U.S. Department of the Interior, Yellowstone National Park
U.S. Department of the Interior, Bureau Land Management

State and County Agencies

State of Wyoming Fire Dept
Jackson/Teton County Fire Department
Wyoming SHPO
Teton County Planning Office
Wyoming Fish and Game Department
Jackson Town Council
WY Dept. of Transportation
Wyoming Department of Environmental Quality

Tribes

Northern Arapaho Business Council
Eastern Shoshone Business Council
Crow Tribal Council
Northern Cheyenne Tribal Council
Shoshone-Bannock Tribes

Special Interest Groups

Wilderness Watch
Greater Yellowstone Coalition
Rocky Mountain Elk Foundation
The Nature Conservancy
Jackson Hole Conservation Alliance
Jackson Hole Land Trust
Friends of Pathways

* A list of all individuals and additional organizations that received the project scoping statement and/or the environmental assessment is kept in the GTNP Planning Office in GTNP.

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APPENDIX A: TERMINOLOGY

Adaptive Management - Human understanding of nature is imperfect and human interactions with nature can reduce the resilience of ecosystems. Moreover, consequences of management of human activities in an ecosystem extend in time and space beyond that ecosystem. Therefore: *Adaptive management treats management policies and actions as experiments in order to improve management by learning from the ecosystems being affected. Adaptive management links credible science, values, and experience of stakeholders and managers for management decision making.*

Appropriate Management Response - Specific actions taken in response to a wildland fire to implement protection and fire-use objectives.

Biological Diversity - The richness, abundance, and variability of plant and animal species and communities, and the ecological processes that link them with one another and with soil, air, and water.

Control Line – Removal of burnable vegetation through the use of tools or machinery to check or stop fire spread.

Desired Future Conditions – Description of natural, cultural, and social conditions and opportunities that are desirable now and in the future, considering current conditions and limitations - both management limitations (law, directions, policies), and physical and biological limitations.

Fire Management Committee – Members include Deputy Superintendent, Chief Ranger, Chief of Science and Resource Management, North or South District Ranger, North or South District Interpreter, Fire Management Officer.

Fire Management Plan (FMP) - A strategic plan that defines a program to manage wildland and prescribed fires and documents the fire management program in the approved land-use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch, prescribed fire plans, and prevention plans.

Fire Management Unit (FMU) - Any land management area definable by objectives, topographic features, access, values to be protected, political boundaries, fuel types, or major fire regimes, etc., that set it apart from management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans or FMPs. These units may have dominant management objectives and pre-selected strategies to accomplish these objectives.

Habitat Fragmentation – the subdivision of once continuous habitats and ecosystems into patches of various sizes and shapes. Fragmentation decreases habitat effectiveness for many forest-dwelling species. Species requiring large tracts of undisturbed forest for food, cover and reproduction may be less successful in areas where this habitat type remains as patches only. On the other hand, other species of plants and animals may benefit from the large clearings and more forest edge.

Hazard Fuels - Excessive live and/or dead fuel accumulations (either natural or created) having the potential for causing or carrying intense wildland fire (NPS RM-18, 2001).

Holding Actions - Planned actions required to achieve wildland and prescribed fire management objectives. Specific holding actions are developed to preclude fire from exceeding the MMA (or allowable area). Holding actions may include the implementation of control lines.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Manual Treatment - The use of hand-operated power tools and hand tools to cut, clear, or prune herbaceous and woody plants. Hand tools such as the handsaw, axe, shovel, rake, machete, and hand clippers as well as hand operated power tools such as chain saws, brush cutters, and mowers are used in manual treatments. Manual treatments may be considered stand-alone or be followed by burning.

Mechanical Fuels Reduction (or treatment) **-** Manipulation or removal of fuels to reduce the fire behavior and risk of loss to life/property that may include cutting, thinning, mowing, chipping, lopping, limbing or like applications. These treatments may be multi-season stand-alone, or multi-treatment.

Minimum Impact Suppression Tactics (MIST) - The application of strategies and tactics that effectively meet suppression, fire use, and resource objectives with the least environmental, cultural, and social impacts.

Minimum Tool Requirement - Minimum requirement is a documented process the NPS will use for the determination of the appropriateness of any proposed actions affecting wilderness. Minimum tool means the use or activity, determined to be necessary to accomplish an essential task, which makes use of the least intrusive tool, equipment, device, force, regulation, or practice that will achieve the wilderness management objective.

Mitigation - Actions taken to eliminate hazards or reduce their risk(s).

Mitigation Measures - Those on the ground activities that would serve to manage risk in all fire management actions and decrease potential impacts; check, direct, or delay the spread of fire; and minimize threats to life, property, or resources.

Natural Fire/Natural Ignition - Any fire started by a natural ignition source (i.e. lightning) as opposed to accidental or intentional ignitions or fires set by humans.
Planned Events – Mechanical treatments and/or prescribed fire projects to achieve resource or hazardous fuels reduction objectives.
Unplanned Events – Fire starts (natural or human-caused) and associated suppression and wildland fire use actions.

Pre-attack Plan – A comprehensive compilation of essential fire management information available to fire personnel, which would include command, operations, logistics, and planning functions.

Preparedness - Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met before ignition. This term replaces management ignited prescribed fire.

Prescription - Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Pre-Treatment of Fuels – The use of mechanical or prescribed fire treatments to reduce the buildup of fuels so natural fire can safely be managed in an area.

Resources – Things, items or concepts that hold specific value and qualities that people may draw from or enjoy, such as natural, cultural, social and socioeconomic resources. Natural and cultural resources are described by kind and type, e.g., soil, water, air, vegetation, wildlife, artifacts, historic structures, etc., whereas social resources may be described as solitude, dark skies, visitor experience, etc. Socioeconomic resources describe more the means available for use in conducting activities, such as people, equipment, materials, and money.

Resource Council – Interdisciplinary team in GTNP that meets monthly to review proposed actions in order to ensure compliance with environmental planning. Members include Archaeologist, Business Resources Specialist, Environmental Planner, Historian, Landscape Architect, Maintenance Specialist, Management Assistant, Park Interpreter, Park Ranger, Vegetation Management Specialist, Wildlife Biologist.

Risk - Chance of hazard or bad consequences; exposure to chance of injury or loss. Risk level is expressed in terms of hazard, probability and severity.

Severity - The expected consequence of an event in terms of degree of injury, property damage, or program impairment that could occur.

Squad – Members include Superintendent, Deputy Superintendent, Management Assistant, Chief of Public Relations and Partnerships, Chief of Administration, Chief of Business Resources, Chief of Ranger Activities, Chief of Interpretation, Chief of Maintenance and Professional Services, Chief of Science and Resource Management.

Values – Park and Parkway “resources” and beliefs pertaining to natural, cultural and social resources and their meaning to the ecosystem and the visitor’s experience. Values also refer to anything of value such as developments, inholdings, sensitive habitats, endangered species, wilderness, watersheds, nearby urban structures, management strategies, aesthetics, and adjacent land.

Wildfire - An unwanted wildland fire that management treats with suppression oriented tactics. All arson or accidental human caused fires are unwanted wildland fires. The determination to treat lighting-caused fires as unwanted wildland fires, and to suppress them, is made according to the start location in the fire management units and the associated decision matrix that evaluates time of season, fuel moisture, drought conditions, the national fire situation, and other seasonal indices and human life and safety factors. The Wildland and Prescribed Fire Management Policy Implementation Procedures and Reference Guide outlines the flowcharts that are utilized to determine the appropriate management response for a wildland fire.

Wildland Fire - Any non-structure fire, other than prescribed fire, which occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire Implementation Plan (WFIP) - A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits would have two or three stages of the WFIP completed, whereas some fires that receive a suppression response may only have a portion of Stage I completed).

Wildland Fire Situation Analysis (WFSA) - A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression - An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration but minimize the loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Wildland Fire Use - The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined areas outlined in FMPs. Operational management is described in the WFIP.

Wildland Fuels - Combustible materials that can be consumed by fire which includes naturally occurring live and dead vegetation.

Wildland-Urban Interface (WUI) - That line, area, or zone where structures and other human development meet or intermingles with undeveloped wildland or vegetative fuels.

APPENDIX B: AGENCY CORRESPONDENCES

DAVE FREUDENTHAL
GOVERNOR

THE STATE OF WYOMING

STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

May 1, 2003

National Park Service
Grand Teton National Park
P.O. Box 170
Moose, Wyoming 83012
Attn: Planning Office

**Re: Grand Teton Fire Management Plan – Scoping Statement
State Identifier Number: 2003-060**

Gentlemen and Ladies:

This office has reviewed the referenced Scoping Statement on behalf of the State of Wyoming. This Office also distributed the referenced document to all affected state agencies for their review, in accordance with State Clearinghouse procedures. Attached are comments from the Wyoming Game and Fish Department and the State Historic Preservation Office.

At this time this office will offer no state position however, we ask that you give the attached comments your due consideration.

Please continue to provide this office with either (3) three hard copies or electronic copy (submit to OFLP@state.wy.us) of continued information for review and distribution to interested agencies. Thank you for the opportunity to comment.

Sincerely,

Tracy J. Williams

Tracy J. Williams
Policy Analyst

TJW
Enclosures: (1)

Wyoming Game and Fish Department
State Historic Preservation Office

**WYOMING
GAME AND FISH DEPARTMENT**

Dave Freudenthal, Governor | Brent Manning, Director

"Conserving Wildlife - Serving People"

April 25, 2003

WER 10588
National Park Service
Grand Teton National Park
Fire Management Plan
State Identifier Number: 2003-060

Office of Federal Land Policy
Herschler Building, 1W
122 W. 25th Street
Cheyenne, WY 82002

Dear Sir/Madam/Staff:

The staff of the Wyoming Game and Fish Department has reviewed the Fire Management Plan for Grand Teton National Park. We offer the following comments.

<u>Terrestrial Considerations:</u>

The Wyoming Game and Fish Department supports Alternative A-Suppression, Wildland Fire Use, Prescribed Fire, Mechanical Treatment. This alternative provides the most flexibility to apply management actions (prescribed burning and mechanical treatments) within vegetation community types that are successionally outside or near the outer limits of their historic range of natural variability. This will in turn help assure planning support to provide the greatest diversity and ecological health of wildlife habitats.

Fire planning and management efforts that are well coordinated with surrounding public and private lands will best address the goal of achieving enhanced/desired watershed functions on a landscape scale. Coordination of this plan with the following existing plans will help in addressing this goal:

- Bridger-Teton National Forest Fire Management Plan
- Wyoming Game and Fish Department's Strategic Habitat Plan
- Bridger-Teton National Forest's Teton Landscape Scale Assessment
- Jackson Interagency Habitat Initiative

Such plans have identified and prioritized specific land parcels as well as vegetative communities for management actions. Coordination will help insure management continuity across jurisdictional boundaries.

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
Fax (307) 777-4610 Web Site: http://gf.state.wy.us

Three general community types within and adjacent to Grand Teton National Park which are of particular interest to the Wyoming Game and Fish Department are 1) aspen, 2) sagebrush, and 3) willow. We recommend reviewing the following sources when developing management plans for these communities.

Campbell, R.B.; D.L.Bartos 2001. Aspen Ecosystems: Objectives for Sustaining Biodiversity. Prioritized Key to Risk Factors for Landscapes With Aspen. In Sustaining Aspen in Western Landscapes: Symposium Proceedings. Rocky Mtn. Research Station. RMRS-P-18. p. 303-304.

Wyoming Interagency Vegetation Committee. 2002. Wyoming Guidelines for Managing Sagebrush Communities with Emphasis on Fire Management. Wyoming Game and Fish Department and Wyoming BLM. Cheyenne. WY. 53p.

Connelly, J.W.; M.A. Schroeder, A.R. Sands; C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28(4):967-985. (Our Department is currently developing a supplemental document on practical application of the above guidelines within Wyoming; it should be available in June 2003.)

Winward, A.H. 2000. Monitoring the Vegetation Resources in Riparian Areas. Rocky Mtn. Research Station. RMRS-GTR-47.

General Recommendations

Aspen - We encourage utilizing Campbell and Bartos (2001) to identify and prioritize aspen communities in need of treatment, and to utilize burn prescriptions that remove most of the competing conifer component and to stimulate regeneration. Past prescriptions within the Cow Lake and Wolff Ridge areas do not appear to have been hot enough to remove the competing conifer component.

Older aspen communities provide excellent nesting and foraging habitat for cavity nesters so we encourage maintaining a diversity of age-classes across the landscape. We suggest conducting surveys for nesting raptors in proposed treatment areas.

Sagebrush - Sage grouse, a sagebrush obligate, has experienced significant declines within and adjacent to Grand Teton National Park as well as the entire West in recent decades, and is currently petitioned as a federally endangered species. Therefore, management actions directed at sagebrush communities should adequately analyze effects and prioritize management benefits for this species. Identification of seasonal ranges and historic sagebrush disturbances prior to additional treatments are important components of the analysis. The effects of fire treatment on other sagebrush obligate species such as Brewer's sparrow and sage thrasher should also be considered when planning treatments and determining the ratio of different age-classes and sagebrush densities to maintain across the landscape.

Willows - Recent investigations by the Wildlife Conservation Society indicate moose may be experiencing a winter nutritional deficit. This population has declined significantly since 1990. We are developing plans to further investigate the nutritional hypothesis with the Wildlife Conservation Society.

Several historic willow treatments have been conducted on adjacent U.S. Forest Service lands, and Grand Teton National Park has conducted more recent burns. For the future, we recommend development of a landscape scale treatment plan/schedule across jurisdictional lines to best address winter moose habitat concerns and as well as the needs of other willow community species. We have contracted Alma Winward, a retired Forest Service riparian ecologist, to assist with an evaluation of willow community condition class during the 2003 summer. We encourage the Park to work with ornithologists such as Martin Cody and Diane Dubinsky who have conducted past studies within the Park to plan projects and monitor effects of willow treatments on bird communities.

Aquatic Considerations:

The Wyoming Game and Fish Department supports Alternative A - Suppression, Wildland Fire Use, and Prescribed Fire from the aquatic standpoint. Since the National Park Service is developing the Environmental Assessment, we encourage them to develop Best Management Practices to control erosion and sedimentation into streams as part of the Prescribed Fire Plan.

Examples of management practices that may be considered are:

- A buffer strip at least 150 feet wide on each side of streams and watercourses should be left unburned except as noted in the next bullet statement. The purpose of this buffer strip is to minimize loss of fish habitat associated with stream bank vegetation, to reduce the possibility of increased soil erosion and to maintain woody vegetation for beaver dam construction and repairs. Under most circumstances, riparian vegetation should not be burned.

- To facilitate removal of decadent willows and to stimulate growth of new willows, a complete burn to the stream bank may be acceptable. However, to minimize potential sedimentation and to maintain stream bank stability, we recommend that burns on opposing banks be avoided in any one year.

- Burning activities should be conducted prior to June 1, if possible. Because riparian zones generally retain snow or moisture longer than more exposed areas, burning at this time minimizes the potential for fires to spread into riparian areas.

- A contingency mitigation plan should be developed to provide for reestablishing vegetation in riparian areas and other sensitive areas associated with burns that escape containment and impact these areas. This plan should include a provision to complete mitigation within the season of disturbance.

Sincerely,

Bill Wichers

BILL WICHERS
DEPUTY DIRECTOR

BW:TC:as

Wyoming

Wyoming Department of State Parks and Cultural Resources
State Historic Preservation Office

Richard L. Currit, SHPO
2301 Central Avenue
Barrett Building, 3rd Floor
Cheyenne, WY 82002
Phone (307) 777-7697
FAX (307) 777-6421

Apr 14, 2003

Office of Federal Land Policy
Herschler Building, 1 West
Cheyenne, WY 82002-0600

Re: Grand Teton National Park Fire Management Plan (OFLP 2003-060) (SHPO File # 0403SES018)

Dear Sir or Madam :

Sara Sheen of our staff has received information concerning the aforementioned . Thank you for allowing us the opportunity to comment.

Management of cultural resources on National Park Service (NPS) projects is conducted in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulations 36 CFR Part 800. These regulations call for survey, evaluation and protection of significant historic and archeological sites prior to any disturbance. Our records indicate that cultural surveys have been completed for all the project areas listed in the scoping document. Provided the NPS follows the procedures established in the regulations, we have no objections to the project.

Please refer to SHPO project control number 0403SES018 on any future correspondence dealing with this project. If you have any questions contact Sara Sheen at 307-777-7498 or me at 307-777-6311.

Sincerely,

Judy K Wolf

Judy K. Wolf
Review and Compliance Program Manager

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

JUN 16 2004

In Reply Refer to:
ES-61411/WY8130

Memorandum

To: Field Managers, Bureau of Land Management
Forest Supervisors, U.S. Forest Service
Superintendents, National Park Service
Refuge Managers, National Wildlife Refuges
Tribal Affairs, Wind River Reservation

From: Brian T. Kelly, Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Emergency Consultations for Wildfire Suppression Activities

As the fire season approaches, the U.S. Fish and Wildlife Service (Service) would like to review with you the procedure for emergency consultations, which includes wildfire suppression activities. Of paramount importance is the safety of the firefighters. No constraints for protection of endangered species or their habitat will be considered if they place firefighters in danger. FIREFIGHTER SAFETY COMES FIRST ON EVERY FIRE, EVERY TIME.

There is no need to consult on the wildfire itself. Wildland fire has many beneficial effects in a naturally functioning ecosystem, but on occasion fire can destroy endangered species and their habitats and/or alter critical habitat. Wildland fire is considered a disaster or an act of God as regards section 7 of the Endangered Species Act of 1973 (Act), as amended (50 CFR §402.05). Initiation of consultation is only required if there may be an effect to a listed species resulting from *wildfire suppression activities*. Chapter 8 of the Section 7 Consultation Handbook (FWS/NMFS, 1998) describes the emergency consultation process for wildfire suppression activities. The Action Agency (i.e., the lead federal agency) has a duty to meet their section 7(a)(2) and 7(d) obligations under the Act (16 U.S.C. 1531 *et seq.*) even in emergency situations. Emergency consultation for wildland fire can be characterized by a 4-step process.

1. Initial contact by the Action Agency: Initial contact by the Action Agency can be by phone or fax (please see numbers listed below). This contact should be followed by a written request from the Action Agency for emergency consultation if fire-suppression activities may affect a listed species or critical habitat. The Service can be contacted at any time, for assistance in identifying areas with Federally protected species. **Do not delay response to a wildfire to contact the Service.** Typically, initial contact with the Service occurs simultaneously with, or at the earliest

possible convenience after, the Action Agency responds to a fire. During the initial contact with the Service, the Action Agency describes the emergency incident and response (proposed and taken actions) and the Service provides recommendations to minimize effects to listed species and their habitats. In addition to site-specific recommendations, the Service advises use of Minimum Impact Suppression Tactics in areas with Federally protected species or habitat. Refer to Appendix U of the Interagency Standards for Fire and Aviation Operations 2003 (or updates). The designated Resource Advisor serves as the field contact for coordination with the Service. The Service recommends that additional, on-the-ground monitors be in place when fires suppression activities occur in areas with Federally protected species. In situations where an adverse effect to listed species or their designated critical habitat may occur, the Service determines whether the incident may result in jeopardy or adverse modification.

2. Completing Consultation: During the fire containment phase, the Action Agency continues the consultation process. A Biological Assessment, including justification for expedited consultation, a description of the fire and fire-suppression activities, and resultant effects to listed species and their habitats is required. Note that the "federal action" consists of the agency actions (i.e., fire-suppression activities) that occurred, whereas the description of fire effects considers the environmental baseline for listed species.

3. Biological Opinion: Emergency consultations are "after the fact" consultations and are modified from the standard Biological Opinion format. Their focus is on the assessment of effects, identification of restoration opportunities, and re-evaluation of the environmental baseline. Therefore, reasonable and prudent measures or terms and conditions are generally not applicable. An emergency consultation (1) estimates the amount of 'take' that occurred due to the emergency fire-suppression, (2) documents the Service's recommendations to minimize effects, (3) evaluates the success of the Action Agency carrying out these recommendations, and (4) determines the ultimate effect of 'take.' If there is incidental 'take' of a listed species, it is only for fire suppression actions; federally-listed species or critical habitats lost due to the wildfire itself are not counted as 'take' attributable to the consulting agency.

4. Conservation Recommendations: Emergency consultations may contain conservation recommendations to help protect listed species and their habitats in future emergency situations or to initiate beneficial actions to conserve the species. For example, a conservation recommendation may advise restoration of areas that previously provided habitat for listed species prior to being affected by suppression activities. Rehabilitation efforts in areas near or occupied by Federally protected species should be coordinated with the Service. Proactive suppression response tactics that reduce the need for rehabilitation are preferred whenever feasible.

The most effective way to minimize impacts on endangered species is to informally consult with the Service during the development of the consulting agency's "Fire Management Plan." Endangered species concerns can be identified before wildfires start, and pre-attack suppression strategies can be designed to address endangered species needs. This will provide important information to the initial attack Incident Commander and facilitate the development of the Wildland Fire Situation Analysis (WFSA), if necessary. The WFSA is an effective means of identifying all resource considerations, including endangered species and their critical habitats. The WFSA identifies appropriate suppression actions. Appropriate suppression actions can include the entire range of activities normally implemented – application of retardant, backfires, air attack, line construction, etc. We have enclosed a list of recommended conservation measures to minimize fire-suppression effects to endangered species and their habitats.

If you have any questions or comments regarding your responsibilities under the Act or emergency consultation procedures, please contact our office at the letterhead address, phone (307) 772-2374 or fax (307) 772-2358. You are welcome to speak with me, the Deputy Field Supervisor, Jodi Bush or any of the National Fire Plan Biologists including Brad Rogers, Trish Sweanor, Ann Belleman, Brock Applegate or Jessica Homyack.

After Hours Emergency Contact: Brian T. Kelly (307) 631-8186 or Jodi Bush (307) 631-5920.

Attachment (1)

cc: BLM, Wildlife Biologists and Fire Response Staff, WY
BLM, State Office, Cheyenne, WY (J. Carroll, D. Roberts, V. Herren)
FS, Wildlife Biologists and Fire Response Staff, WY
FS, Region 2, Regional Office, Golden, CO (P. McDonald)
FWS, R6, Lakewood, CO (A. Cornman, B. Fahey)
FWS, Wildlife Biologists and Fire Response Staff, WY
FWS/BIA, Lander, WY (P. Hnilicka)
NPS, Natural Resource Staff and Fire Response Staff, WY
NPS, Intermountain Region, Denver, CO (C. Ogden)
NPS, Montana/Wyoming State Coordinator, Cheyenne, WY (J. Keck)

Attachment 1: Emergency Consultations for Wildfire Suppression Activities

Conservation Measures to Minimize Fire-Suppression Effects to Federally Protected Species

The Service recommends the following conservation measures be implemented during fire suppression operations unless firefighter safety, public safety, or the protection of property, improvements, or natural resources, render them infeasible. The Service is providing these measures to reduce potential adverse effects to Federally protected species and their habitats from wildland fire suppression activities. Section 7 (a)(1) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.)* directs Federal agencies to further the purpose of the Act by carrying out conservation measures for the benefit of endangered and threatened species. Resource Advisors should coordinate with the Service to document necessary modifications or supplementation of these conservation measures during fire suppression operations.

1. **Coordination**
   a. Brief all firefighting and support personnel about Federally-protected species and procedures to minimize impacts.
   b. Apply operation guidelines from the Interagency Standards for Fire and Fire Aviation Operations 2003 (or updates).
   c. Ensure that equipment is free of weed seeds, parasites, disease and containments.

2 **Fire Fighting Construction, Activity Areas, and Camps**
   a. Use historic line, existing skid trails, roads and trails as fuel breaks.
   b. Use natural barriers as fuels breaks. In riparian areas, use openings in vegetation, such as sandy overflow channels, as fuel breaks.
   c. Use existing helispots and/or existing openings for helispot locations when possible.
   d. Construct temporary roads only if they are necessary for the protection of property or resources, including Federally protected species. Do not construct permanent roads.
   e. Build hand line instead of machine-built (e.g., bulldozer) line when possible, especially in riparian areas and wet meadows.
   f. Retain areas of fire tolerant tree species to the extent practicable.
   g. Locate camps, staging areas, aircraft landing areas and fueling areas outside of Federally protected species habitat and riparian areas - preferably in areas that are already disturbed.
   h. Establish good sanitation for handling food and trash. In areas within the range of grizzly bears, store attractants (food, trash, toiletries etc.) in bear-proof containers or hang them 100 yards downwind of camps. Do not burn trash. Incomplete combustion leaves odors.

3. **Aquatic Environments**
   a. Inform pilots to avoid flight paths over waterways and to drop retardants or foams no closer than 300 horizontal feet from the edge of any waterway.
   b. Fire retardants and foams should not be used within 300 feet of waterways. Retardants may cause nitrate poisoning and may be lethal to aquatic organisms. Foams cause mortality to fish via the surfactant affecting the ability of gills to absorb oxygen.
   c. Buckets that have contained fire retardant or foam should not be dipped into open waters. Set up a dip tank that is isolated from natural water bodies for this purpose.
   d. Natural water bodies should not receive or be refilled with water from tanks, or other lakes or water sources that may support non-native aquatic species, parasites or diseases.
   e. Limit stream crossing sites and locate them on hardened ground or over logs or rocks.

f. Screen pump intakes with 3/32 inch plate screen to reduce fish entrainment.
g. Construct water chances or containments to minimize streambed alteration and so that they do not inhibit fish passage.
h Use erosion control methods, such as sediment traps to limit the influx of ash and sediment into aquatic systems.
i. Store fuel and refuel equipment away from natural water systems.
j. Use containment systems for portable pumps to avoid fuel spills.
k Be aware of management plans or develop and distribute management plans for handling spills of retardant, foams, fuels or other chemicals in waterways.
l. If fuel, other oil-based contaminants or foam come in contact with surface waters inform your administrative unit's HazMat coordinator immediately to contain the spill, and contact the National Response Center at 1-800-424-8802 or 1-202-267-2675 to report it.

4. **Raptors**
   a. Inform pilots to avoid raptor nests when possible. (Flight paths should be more than one mile from active bald eagle nests unless a different spatial restriction is warranted.
   b. Where air operations occur with 0.5 miles of raptor nests, consider use of helicopter water drops as an alternative to retardant drops or foam, to minimize effects to raptors.

5. **Summarize Efforts and Effects**
   a. Document the locations of hand and machine built firelines.
   b. Record the locations of areas impacted by fire and fire suppression activities, such as construction of safety zones, spike camps, sanitation facilities, and landing strips.
   c. Identify the extent of any waterway inadvertently contaminated with foams or retardants.
   d. Identify the chemical composition of retardants and foams used during fire suppression.
   e. Record the locations of new or re-opened/re-constructed roads or trails.
   f. Identify the locations of all water chances and waterbodies used as water sources or inadvertently receiving unused water from other sources.
   g. Identify areas where invasive weeds may have been introduced and/or are likely to spread.
   h. Identify general rehabilitation needs.

6. **Rehabilitation**
   a. After suppression activities are completed, remove all garbage, litter, and equipment.
   b. Discourage use of trails, created during the suppression effort, by covering with them with brush, limbs, rocks, and rotten logs in a natural arrangement.
   c. Replace dug-out soil and duff and obliterate berms created during the suppression effort.
   d. If trails were established on slopes greater than six percent, construct waterbars.
   e. Re-seed, re-vegetate, directionally fell trees, etc., to minimize sediment delivery to waterways. Use nearby seed and transplant nearby native vegetation when possible.
   f. Restore water chances and sites used for water dipping to pre-fire conditions. Ensure that no foam or retardant residues enter water ways during restoration.
   g. In areas where pre-fire conditions consisted of degraded resources, habitat or environmental conditions, restore or stabilize these sites to the extent possible.
   h. Burned area emergency rehabilitation (BAER) activities and long-term restoration activities should be monitored with the results provided to the Service.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/W.25/WY7240

June 5, 2003

Memorandum

To: Stephen P. Martin, Superintendent, Grand Teton National Park, Wyoming

From: Jodi L. Bush, Acting Field Supervisor, ES, Cheyenne, WY (ES-61411)

Subject: Scoping Comments for the Fuels Reduction Projects Environmental Assessment

Thank you for your letter of May 16, 2003, received in this office May 21, regarding your request for our comments regarding the proposed Fuel Reduction Projects including Oxbow Housing (7 acres), JL Dam (6 acres), Fabian Ranch (20 acres), Bar BC (30 acres), Blacktail North (6 acres), McCollister (10 acres), and Moran (10 acres). The purpose of these seven fuel reduction projects is to provide protection of structures from fire in the wildland-urban interface.

In accordance with section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended (50 CFR §402.13), my staff has determined that the following threatened or endangered species, or species proposed for listing under the Act, may be present in the project area.

LISTED AND PROPOSED SPECIES

Species	**Status**	**Expected Occurrence**
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened	Nesting. Winter resident. Migrant.
Canada lynx (*Lynx canadensis*)	Threatened	Resident of forested areas.
Grizzly Bear (*Ursus arctos horribilis*)	Threatened	Montane forests
Gray Wolf (*Canis lupus*)	Threatened	Greater Yellowstone Ecosystem
Mountain plover (*Charadrius montanus*)	Proposed	Grasslands statewide

Bald eagle: While habitat loss still remains a threat to the bald eagle's full recovery, most experts agree that its recovery to date is encouraging. Adult eagles establish life-long pair bonds and build huge nests in the tops of large trees near rivers, lakes, marshes, or other wetland areas. Bald eagle may use the same nest in consecutive years. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were fledged.

In order to reduce potential adverse effects to the bald eagle, a disturbance-free buffer zone of 1-mile should be maintained around eagle nests and winter roost sites. Activity within 1 mile of an eagle nest or roost may disturb the eagles and result in take. If a disturbance-free buffer zone of 1-mile is not practicable, then the activity should be conducted outside of February 15 - August 15 to protect nesting birds and November 1 through April 15 to protect roosting birds.

Canada lynx: The U.S. Fish and Wildlife Service (Service) published a Final Rule in the Federal Register on March 24, 2000 (65 FR 16052) listing the Canada lynx in the contiguous United States as threatened. Historically, lynx were observed in every mountain range in the state. Concentrations of observations occur in western Wyoming in the Wyoming and Salt River ranges and continuing north through the Tetons and Absaroka ranges in and around Yellowstone National Park. Numerous records have also come from the west slope of the Wind River Range, with fewer observations in the Bighorn and Uinta mountains (Reeve et al. 1986). In Wyoming, the lynx lives in subalpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare. The snowshoe hare, the predominant prey of lynx, require structured and regenerating forests that provide an abundance of cover and food at ground level in the summer and snow level in winter. It is likely that forest structure and composition during the winter period is the limiting factor. Dense, low-hanging conifer branches are essential for thermal cover. To most benefit lynx, such habitats should retain an overstory for concealment and forested connectivity between feeding, security, and denning habitats.

The Service has identified significant threats to the lynx including (1) loss and/or modification of habitat; (2) past commercial harvest (trapping), which is partially responsible for the extremely small lynx population; (3) inadequate regulatory mechanisms to protect lynx and their habitat; and (4) other factors such as increased human access into suitable habitat and human-induced changes in habitat allowing other species (e.g., bobcats and coyotes) to move into lynx habitat and compete with them. Examples of human alteration of forests include loss of and conversion of forested habitats through urbanization, ski area and other developments; fragmentation that leads to isolation of forested habitats by highways or other major construction; and certain timber harvesting practices and fire suppression measures.

Grizzly bear: The grizzly bear has a wide range of habitat tolerance. Contiguous, relatively undisturbed mountainous habitat having a high level of topographic and vegetative diversity characterizes most areas where the species remains. Habitat loss and direct and indirect human-caused mortality is related to the decline in numbers. We strongly encourage the enforcement of food storage and garbage disposal stipulations. In addition, contractor should be aware of, and provide to their employees and subcontractors, information on the protected status of the grizzly bear and on appropriate personal safety measures and behavior in grizzly bear habitat. Project activities may occur during the denning season (November to March) to avoid disturbance to grizzly bears. We recommend that your actions comply with the Interagency Grizzly Bear Guidelines (1986).

Gray wolf: All wolves within Wyoming are now considered part of the nonessential experimental population. Although such wolves remain listed and protected under the Act, additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population on November 22, 1994 (59 FR 60252). Requirements for interagency consultation under section 7 of the Act differ based on the land ownership and/or management responsibility where the animals occur. On any unit of National Park System or National Wildlife Refuge System lands, wolves that are part of the experimental population are considered a threatened species and the full provisions of section 7 apply. Thus, the Service and any other action agency is prohibited from authorizing, funding or carrying out an action within a National Park or National Wildlife Refuge that is likely to jeopardize the continued existence of the gray wolf. Formal section 7 consultation is required if a Federal action within these areas "may affect" the gray wolf.

Wolves are dependent on movements of big game populations and may occur in large ungulate migration, wintering, or parturition areas. During project activities wolves may change their use of the project areas based upon changes to big game population numbers and changes in movement of herds. Project planning should consider impacts to big game populations, including wintering grounds and migration corridors.

Consultation: Section 7(c) of the Act requires that a biological assessment be prepared for any Federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead Federal agency is responsible for review of proposed activities to determine whether listed species will be affected. We would appreciate the opportunity to review any such determination document. If it is determined that the proposed activities may affect a listed species, you should contact this office to discuss consultation requirements. If it is determined that any Federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so we can work together to determine how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold. If it is concluded that the project "is not likely to adversely affect" listed species, we should be asked to review the assessment and concur with the determination of not likely to adversely affect.

For those actions where a biological assessment is necessary, it should be completed within 180 days of receipt of a species list, but can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with this office prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance of section 102 of NEPA, and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. a description of the project;
2. a description of the specific area potentially affected by the action;
3. the current status, habitat use, and behavior of threatened and endangered species in the project area;
4. discussion of the methods used to determine the information in item 3;
5. direct and indirect impacts of the project to threatened and endangered species, including impacts of interrelated and interdependent actions;
6. an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from Federal, State, or private projects in the area;
7. measures that will reduce or eliminate adverse impacts to threatened and endangered species;
8. the expected status of threatened and endangered species in the future (short and long term) during and after project completion;
9. determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;
10. determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;
11. Alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives;
12. citation of literature and personal contacts used in the assessment.

A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare biological assessments. However, the ultimate responsibility for section 7 compliance remains with the Federal agency, and written notice should be provided to the Service upon such a designation. We recommend that Federal agencies provide their non-Federal representatives with proper guidance and oversight during preparation of biological assessments and evaluation of potential impacts to listed species.

Section 7(d) of the Act requires that the Federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources which would preclude the formulation of reasonable and prudent alternatives until consultation on listed species is completed.

Regarding species proposed for listing or listed as an experimental, non-essential population, Federal agencies (other than the Fish and Wildlife Service and National Park Service) must determine whether any of their proposed activities are likely to jeopardize the continued existence of the species. If jeopardy is likely, that agency must confer with the Service.
We will work with the lead Federal agency in the section 7 consultation process. The analysis of project impacts must assess direct impacts of the project, as well as those impacts that are interrelated to or interdependent with the proposed action. Impacts to listed species on non-Federal lands must be evaluated along with such impacts on Federal lands. Any measures that are ultimately required to avoid or reduce impacts to listed species will apply to Federal as well as non-Federal lands.

Species of Special Interest: The U.S. Fish and Wildlife Service (Service) has received several petitions to list the greater sage-grouse (*Centrocercus urophasianus*) under the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 *et seq*. The causes for the greater sage-grouse rangewide decline are not completely understood, and may be influenced by local conditions. However, habitat loss and degradation, as well as loss of population connectivity are important factors (Braun 1998, Wisdom et al. 2002). Greater sage-grouse are dependent on sagebrush year-round. Therefore, any activities that result in loss or degradation of sagebrush habitats that are important to this species should be closely evaluated for their impacts to sage grouse. If important breeding habitat (leks, nesting or brood rearing habitat) is present in the project area, the Service recommends no project-related disturbance between March 1 and June 30. Minimization of disturbance during lek activity, nesting, and brood rearing is critical to sage grouse survival.

We recommend you contact the Wyoming Game and Fish Department to identify important greater sage-grouse habitats within the project area, and appropriate mitigative measures to minimize potential impacts from the proposed project. The Service recommends surveys and mapping of important greater sage-grouse habitats where local information is not available. The results of these surveys should be used in project planning, to minimize potential impacts to this species. No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats.

Migratory Birds: Since my staff has not visited the permit area, and without information on habitats present, we are unable to provide you with a comprehensive migratory bird species list. Attached to this letter is a list of Migratory Birds of High Federal Interest for Wyoming. If suitable habitat for any of these birds occurs on the permit area, or within a 0.5 mile perimeter, surveys should be conducted to determine if these species are present.

The Migratory Bird Treaty Act, 16 U.S.C. 703, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations and does not require intent to be proven. Section 703 of the Act states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird..." The Bald and Golden Eagle Protection Act, 16 U.S.C. 668, prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests (for example, if you are going to mine or process material in the vicinity of a nest), should be coordinated with our office before any actions are taken. Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of the above statutes. Removal of nests or nest trees is prohibited, but may be allowed once young have fledged and/or a permit has been issued. In either case, timing is a significant consideration and should be allowed for in your project planning. We also recommend the project area be surveyed for raptor nests and roost areas.

Wetlands/Riparian Areas: The Service recommends measures be taken to avoid any wetland losses in accordance with Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) as well as the goal of "no net loss of wetlands." If wetlands may be destroyed or degraded by the proposed action, those (wetlands) in the project area should be inventoried and fully described in terms of functions and values. Acreage of wetlands, by type, should be disclosed and specific actions outlined to minimize impacts and compensate for all unavoidable wetland impacts.

Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Riparian areas are the single most productive wildlife habitat type in North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover. In view of their importance and relative scarcity, impacts to riparian areas should be avoided. Any potential, unavoidable encroachment into these areas should be minimized and quantitatively assessed in terms of functions and values, areas and vegetation type lost, potential effects on wildlife, and streams (bank stability and water quality). Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the project.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful.
These comments are made pursuant to the National Environmental Policy Act, the Endangered Species Act, and the Fish and Wildlife Coordination Act. Please keep this office informed of any developments or decisions regarding this project. If you have any questions or concerns regarding your responsibilities under the Acts, please contact Darryl York of my staff at the letterhead address or phone (307) 772-2374, extension 24.

Literature cited:

Braun, C.E. 1998. Sage grouse declines in western North America: What are the problems? Proceedings of the Western Association of Fish and Wildlife Agencies 78:139-156

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Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Nancy, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. *Canada Lynx Conservation Assessment and Strategy.* 2USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 14

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cc: WGFD, Lander, Non-Game Coordinator (B.Oakleaf)
WGFD, Cheyenne, Statewide Habitat Protection Coordinator (T.Collins)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

Memorandum May 20, 2003

To: Field Managers, Bureau of Land Management, Wyoming
Forest Supervisors, U.S. Forest Service, Wyoming
Superintendents, National Park Service, Wyoming
Tribal Affairs, Wind River Reservation, Wind River, Wyoming

From: John E. Bush, Acting Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Emergency Consultations for Wildfire Suppression Activities

As the fire season approaches the U.S. Fish and Wildlife Service (Service) would like to review with you the procedure for emergency consultations, which includes wildfire suppression activities. Of paramount importance is the safety of the firefighters. No constraints for protection of endangered species or their habitat will be considered if they place firefighters in danger. FIREFIGHTER SAFETY COMES FIRST ON EVERY FIRE, EVERY TIME.

In the forest and plains systems of Wyoming, wildlife can be a frequent occurrence. Fire has many beneficial uses in a naturally functioning ecosystem, but on occasion fire can destroy listed species and/or alter critical habitat. Both the fire itself and fire suppression activities may affect listed species and their habitats. There is no need, however, to consult on the wildfire itself as fire is considered a disaster or an act of God in the sense of 50 CFR 402.05. Initiation of consultation is only required if there appears to be an adverse effect to a listed species resulting from suppression activities. In the case of wildfire suppression activities Chapter 8 of the Section 7 Consultation Handbook (CFR 402.2) describes the emergency consultation process. Even in an emergency, the Action Agency (i.e., the federal agency responding to an emergency situation) has a duty to meet their section 7(a)(2) and 7(d) obligations under the Endangered Species Act of 1973 (Act), as amended (50 CFR §402). Emergency consultation, in this case for wildland fire, is characterized by a 5-step process.

1. <u>Initial contact</u> - Initial contact by the Action Agency is often conducted by phone or fax (for after hours and weekends please see telephone number below). The initial contact is followed by written documentation indicating that the Action Agency is requesting emergency consultation because the fire-suppression activities may affect a listed species or critical habit. **You do not need delay response to a wildfire for this contact. It can**

be simultaneous or at your earliest possible opportunity. Typically, initial contact occurs after the Action Agency has responded to a fire with initial attack. During the initial contact, the Action Agency describes the emergency incident and response (proposed and taken actions) and the Service will provide recommendations to minimize effects to listed species and their habitats. These recommendations should <u>only</u> be considered when safety or the mission is not comprised. In situations where an adverse affect to listed species or their designated critical habitat may occur, the Service will also determine whether the incident may result in jeopardy or adverse modification.

2. <u>Completing Consultation</u> - As early as fire containment, the Action Agency must continue the consultation process. A Biological Assessment, including a justification for expedited consultation, description of the fire and fire-suppression activities (including any interrelated or interdependent activities), and resultant effects to listed species and their habitats, is required. Note that the "federal action" consists of the actual agency actions (i.e., fire-suppression activities) that occurred, whereas the description of fire effects should be described in the environmental baseline for listed species.

3. <u>Biological Opinion</u> - Emergency consultations are "after the fact" consultations and are modified from the standard biological opinion format. An "after the fact" biological opinion's focus is on the assessment of effects, identification of restoration opportunities, and re-evaluation of the environmental baseline. Because emergency consultations are "after the fact," reasonable and prudent measures or terms and conditions are generally not applicable. An emergency consultation (1) estimates the amount of take that occurred with the emergency response (i.e., fire-suppression), (2) documents the recommendations given by the Service to minimize effects, (3) evaluates the success of the action Agency carrying out these recommendations, and (4) determines the ultimate effect of this take. If there is incidental take of a listed species it is only for actions responding to a wildfire; those listed species or critical habitats lost from the fire itself are not counted as take attributable to the consulting agency.

5. <u>Conservation Recommendations</u> - Emergency consultations may contain conservation recommendations to help protect listed species and their habitats in future emergency situations or to initiate beneficial actions to conserve the species. For example, a conservation recommendation may request that areas that previously provided habitat for listed species be restored. These areas may include helispots, water chances, fire camps, etc.

The most effective way to minimize impacts on listed species is to informally consult with the Service during the development of the consulting agency's "Fire Management Plan." Listed species concerns can be identified before a wildfire starts, and specific pre-attack suppression strategies can be anticipated that best address listed species needs. This will provide the initial attack Incident Commander important information and facilitate the development of the Wildland Fire Situation Analysis (WFSA), if necessary. The WFSA is an accepted and effective means of identifying all resource considerations, including listed species and their critical habitats. The WFSA identifies the appropriate suppression actions to be taken. Appropriate suppression actions can include the entire range of activities normally implemented - fire retardant, backfires, helicopters, line construction. If those actions may affect the listed species, utilize the procedures of emergency consultation. However, NEVER delay the measures needed to protect the lives of fire crews waiting for that consultation. In the case of wildfire suppression and fire crew safety, the expert opinions are on the fire line. The Service understands the initial attack phase of wildfire suppression is of critical importance so a delay in the emergency consultation with the Service is understandable. In order to provide proactive recommendations for the protection of natural resources Attachment A is a list of recommended measures to minimize fire-suppression effects on listed species and their habitats.

If you have any questions or comments regarding your responsibilities under the Act or emergency consultation procedures please feel free to contact this office and speak with me or any of our National Fire Plan Biologists including Brad Rogers, Trish Sweanor or Darryl York.

After Hours Emergency Contact: Jodi Bush (307) 631-5920

cc: BLM, Resource Staff
BLM, State Office, Endangered Species Staff, Cheyenne (J.Carroll)
FWS, RCTT Member, Lakewood ES Office (A.Cornman)
NPS, Grand-Teton, Wildlife Staff
NPS, Yellowstone, Wildlife Staff
NPS, Threatened and Endangered Species Coordinator, Denver (C.Ogden)
USFS, Forest Biologists, Wyoming
USFS, RCTT Member, Denver (P.McDonald)
USFS, Endangered Species Program Manager, Golden CO (N.Warren)

ATTACHMENT A

RECOMMENDED MEASURES TO MINIMIZE FIRE-SUPPRESSION EFFECTS

The Service provides the following recommendations to reduce the potential effects of fire suppression activities to listed species and their habitats. Section 7 (a)(1) of the Endangered Species Act of 1973, as amended (Act), 50 C.F.R. § 402 directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. However, safety is the prime directive in emergency situations. Only those measures that do not create a safety hazard should be employed. Likewise, "mission" or the purpose of the response to an emergency (e.g., fire suppression) may not be compromised. The following commonly employed measures may not be practical in all situations and are designed to conserve listed species in Wyoming. Additional site-specific measures to minimize effects to listed species and their habitats may also be required.

1. Fireline Construction
   - Hand line construction is preferred over machine-built (e.g., bulldozer, etc .) line in riparian and wet meadow habitats.
   - To reduce the need to clear additional habitat, use historic line, existing skid trails, roads and trails and natural features as fuel breaks whenever possible.
   - Fire-tolerant tree species should be retained to the maximum extent practicable to promote forest health and to provide fish and wildlife habitat.
   - Minimum Impact Suppression Techniques (MIST), as described by the FS Northern Region in 1993, are strongly recommended.

2. Water Quality, Pumps, and Stream Crossings
   - Refuel all equipment away from waterbodies to protect aquatic habitats.
   - Develop and distribute a written management plan for handling spills of retardant, fuel, or other chemicals.
   - Water chances should be constructed such that they do not inhibit fish passage and should minimize streambed alteration.
   - At stream crossing sites without a bridge or ford, limit crossings to hardened locations or over logs or rocks.
   - Minimize road and trail construction and limit the number of stream crossings.
   - Pump intakes should be screened with 3/32" plate screen (or equivalent) to minimize fish entrainment.

3. Air Operations
   - All aircraft should use flight paths that avoid bald eagle nests.
   - Aircraft should fly greater than one mile from known bald eagle nests during the nesting season (February 15 - August 15), unless topographic features or other extenuating circumstances suggest an alternate (larger or smaller) spatial

restriction is warranted.

- Retardant should be dropped no closer than 300 feet (horizontal) from all waterways in order to protect aquatic resources.
- Where air operations occur within 0.5 miles of raptor nests, consider the use of helicopter water drops as an alternative to retardant drops or foam releases as a means to minimize effects to raptors during the nesting season.
- Use existing helispots and/or existing openings for helispot construction to minimize the amount of vegetation clearing required.

4. <u>Fire Camps</u>
   - Fire campsites (including spike camps) should be outside of riparian reserves whenever possible and should employ proper sanitation measures for food and trash.
   - Food and other attractants (such as toiletries) should be stored in bear proof containers or hung 100 yards downwind from camps. Suspend these items at least 10 feet off the ground and at least 4 feet from the trunk of the tree.
   - Trash should be hung or removed from camp daily. Do not burn trash as incomplete combustion leaves residual odors.

5. <u>Resource Advisors</u>
   - In addition to recommending measures to minimize effects to sensitive resources, resource advisors should record the locations of:
     - hand and machine built fireline.
     - highly impacted areas due to both fire and fire-suppression activities such as the construction of safety zones , spike camps, sanitation facilities, and landings.
     - new or re-opened/re-constructed roads or trails.
     - water chances and waterbodies used as a water sources.

   This information will be valuable for rehabilitation efforts and is a necessary component of the "after-the-fact" consultation in accordance with section 7(a)(2) of the of the Act.

6. <u>Rehabilitation and Restoration Activities</u>
   - Consider seeding, re-vegetation, directional falling of trees, etc., to minimize sediment delivery to streams and lakes.
   - Roads, trails, firelines, and all stream crossings should be rehabilitated to pre-fire conditions with adequate drainage structures to prevent resource damage.
   - Water chances and sites used for water dipping should also be restored to their pre-fire condition.
   - In cases where the pre-fire condition was degrading resources, habitat, or environmental conditions, restore or stabilize these sites to the extent practicable.

The SHOSHONE-BANNOCK TRIBES

P. O. BOX 306
FORT HALL, IDAHO 83203
PHONE (208) 478-3707
FAX# (208) 237-0797

CULTURAL RESOURCES
HERITAGE TRIBAL OFFICE (HETO)

June 19, 2003

Planning Office
National Park Service
Grand Teton National Park
P. O. Box 170
Moose, WY 83012

Dear Ms. St. Clair:

The Shoshone-Bannock Heritage Tribal Office (HeTO) appreciates the opportunity to provide technical comments to the scoping notice for the Fire Management Plan Environmental Assessment for the Grand Teton National Park.

The following are issues that we feel need to be addressed:

1. The protection of cultural resources. The Grand Teton Park is within the aboriginal use area of the Shoshone and Bannock people, and the tribes are concerned about the protection/destruction of our tribal history.
2. The uses of mechanical treatment and how it affects cultural properties.
3. Displacement of wildlife and habitat.
4. Treaty rights of Native American tribes with treaty that include the Grand Teton National Park area.
5. Inadvertent discovery and mitigation of such.

The purpose of this letter is to provide technical input and not intended as formal government-to-government consultation. Should there be any questions or concerns, feel free to contact me at (208) 478-3707 or e-mail at lbuckskin@shoshonebannocktribes.com.

Sincerely,

LaRae Buckskin

LaRae Buckskin
Interim Cultural Resources Coord.

llb

cc: File/NPS-Grand Teton

APPENDIX C: FIRE HISTORY

Table 1 of 2. Historic non-fire use fires in Grand Teton National Park, Wyoming, 1910-1969.

Year	Suppressed Fires		
	Lightning	Human Caused	Total
1910*	3	8	11
1911	No Records Available		
1912	No Records Available		0
1913	No Records Available		0
1914	0	2	2
1915	No Records Available		0
1916	0	6	6
1917	2	0	2
1918	1	0	1
1919	1	11	12
1920	2	4	6
1921	0	13	13
1922	0	7	7
1923	3	9	12
1924	2	6	8
1925	0	0	0
1926	3	13	16
1927	0	2	2
1928	0	5	5
1929	7	0	7
1930	1	2	3
1931	4	8	12
1932	2	1	3
1933	5	2	7
1934	11	6	17
1935	11	13	24
1936	4	1	5
1937	8	19	27
1938	2	2	4
1939	2	19	21
Totals	**74**	**159**	**233**

Year	Suppressed Fires		
	Lightning	Human Caused	Total
1940	8	9	17
1941	1	1	2
1942	2	7	9
1943	3	2	5
1944	0	3	3
1945	2	1	3
1946	1	6	7
1947	3	6	9
1948	7	16	23
1949	7	6	13
1950	2	0	2
1951	1	3	4
1952	3	10	13
1953	3	4	7
1954	3	9	12
1955	3	6	9
1956	5	4	9
1957	3	4	7
1958	4	5	9
1959	1	9	10
1960	7	5	12
1961	0	2	2
1962	6	9	15
1963	1	3	4
1964	5	12	17
1965	4	8	12
1966	6	4	10
1967	2	3	5
1968	3	10	13
1969	5	3	8
Totals	**101**	**170**	**271**

Grand Totals	**175**	**329**	**504**

Note: At least 2,154 acres burned within the boundaries of Grand Teton National Park in 1910. No comparably sized fires or combinations of fires occurred in GTNP until after 1985.

Table 2 of 2. Historic non-fire use and fire use fires in Grand Teton National Park, Wyoming, 1970-2003.

YEAR	NON FIRE USE MANAGEMENT										YEAR	FIRE USE MANAGEMENT					
	Lightning				Human Caused												
	Suppression		Natural Out		Suppression		Natural Out		Total			Wildland Fire Use		Prescribed Fire		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres		Number	Acres	Number	Acres	Number	Acres
1970	1	0.1	0	0.0	7	0.7	0	0.0	8	0.8	1970	0	0.0	0	0.0	0	0.0
1971	4	0.3	1	0.1	6	0.6	0	0.0	10	0.9	1971	0	0.0	0	0.0	0	0.0
1972	3	0.3	0	0.0	4	0.4	0	0.0	7	0.7	1972	1	0.1	0	0.0	1	0.1
1973	4	0.3	0	0.0	5	0.5	0	0.0	9	0.8	1973	1	5.0	0	0.0	1	5.0
1974	2	4.0	0	0.0	9	1.8	0	0.0	11	5.8	1974	3	3677.1	0	0.0	3	3677.1
1975	3	0.3	0	0.0	4	0.4	0	0.0	7	0.7	1975	1	0.1	0	0.0	1	0.1
1976	4	1.3	0	0.0	5	7.4	0	0.0	9	8.7	1976	3	0.3	0	0.0	3	0.3
1977	1	1.0	0	0.0	3	1.2	0	0.0	4	2.2	1977	5	21.3	0	0.0	5	21.3
1978	0	0.0	0	0.0	6	0.6	0	0.0	6	0.6	1978	1	23.0	0	0.0	1	23.0
1979	1	0.1	0	0.0	5	2.4	0	0.0	6	2.5	1979	1	0.1	0	0.0	1	0.1
1980	1	0.1	0	0.0	4	2.3	0	0.0	5	2.4	1980	0	0.0	0	0.0	0	0.0
1981	9	1.8	0	0.0	17	96.5	0	0.0	26	98.3	1981	7	2017.3	0	0.0	7	2017.3
1982	5	1.4	0	0.0	2	1.1	0	0.0	7	2.5	1982	4	0.4	0	0.0	4	0.4
1983	0	0.0	0	0.0	2	0.2	0	0.0	2	0.2	1983	1	0.1	0	0.0	1	0.1
1984	0	0.0	0	0.0	3	0.3	0	0.0	3	0.3	1984	0	0.0	0	0.0	0	0.0
1985	2	1028.5	0	0.0	5	1.9	0	0.0	7	1030.4	1985	0	0.0	0	0.0	0	0.0
1986	7	0.8	1	0.1	5	0.5	0	0.0	13	1.4	1986	0	0.0	0	0.0	0	0.0
1987	1	2350.0	0	0.0	0	0.0	0	0.0	1	2350.0	1987	0	0.0	0	0.0	0	0.0
1988	7	7.9	1	0.1	12	2767.0	0	0.0	20	2774.9	1988	0	0.0	0	0.0	0	0.0
1989	8	1.8	1	0.1	4	0.4	0	0.0	13	2.3	1989	0	0.0	0	0.0	0	0.0
1990	12	3.3	2	0.2	3	0.3	0	0.0	17	3.8	1990	0	0.0	0	0.0	0	0.0
1991	3	0.3	1	0.1	15	16.5	0	0.0	19	16.9	1991	5	0.5	0	0.0	5	0.5
1992	6	3.4	1	0.1	4	0.4	0	0.0	11	3.9	1992	2	0.4	0	0.0	2	0.4
1993	0	0.0	1	0.0	4	0.4	0	0.0	5	0.4	1993	1	0.1	3	45.0	4	45.1
1994	19	2386.9	1	0.1	8	0.8	0	0.0	28	2387.8	1994	1	0.1	3	79.0	4	79.1
1995	0	0.0	2	0.2	5	1.6	0	0.0	7	1.8	1995	2	0.3	6	72.2	8	72.5
1996	2	3.1	0	0.0	4	0.4	0	0.0	6	3.5	1996	2	2.1	5	1110.1	7	1112.2
1997	1	0.1	0	0.0	0	0.0	1	0.1	2	0.2	1997	0	0.0	4	2857.0	4	2857.0
1998	0	0.0	1	0.1	2	340.5	0	0.0	3	340.6	1998	3	101.7	6	2606.0	9	2707.7
1999	4	44.3	0	0.0	9	10.7	1	0.1	15	55.2	1999	2	347.3	5	3765.0	7	4112.3
2000	13	9658.7	2	0.2	9	0.8	0	0.0	24	9659.7	2000	0	0.0	1	20.0	1	20.0
2001	7	8.2	0	0.0	9	1.1	1	0.1	17	9.4	2001	2	10.1	6	220.0	8	230.1
2002	10	5.0	0	0.0	8	2.7	0	0.0	18	7.7	2002	1	0.3	13	4012.0	14	4012.3
2003	13	2653.3	0	0.0	4	1.0	0	0.0	17	2654.3	2003	3	84.2	5	69.0	8	153.2
Totals	**153.0**	**18166**	**15.0**	**1.4**	**192.0**	**3263.4**	**3.0**	**0.3**	**363.0**	**21431.6**		**52.0**	**6291.9**	**57.0**	**14855.3**	**109.0**	**21147.2**

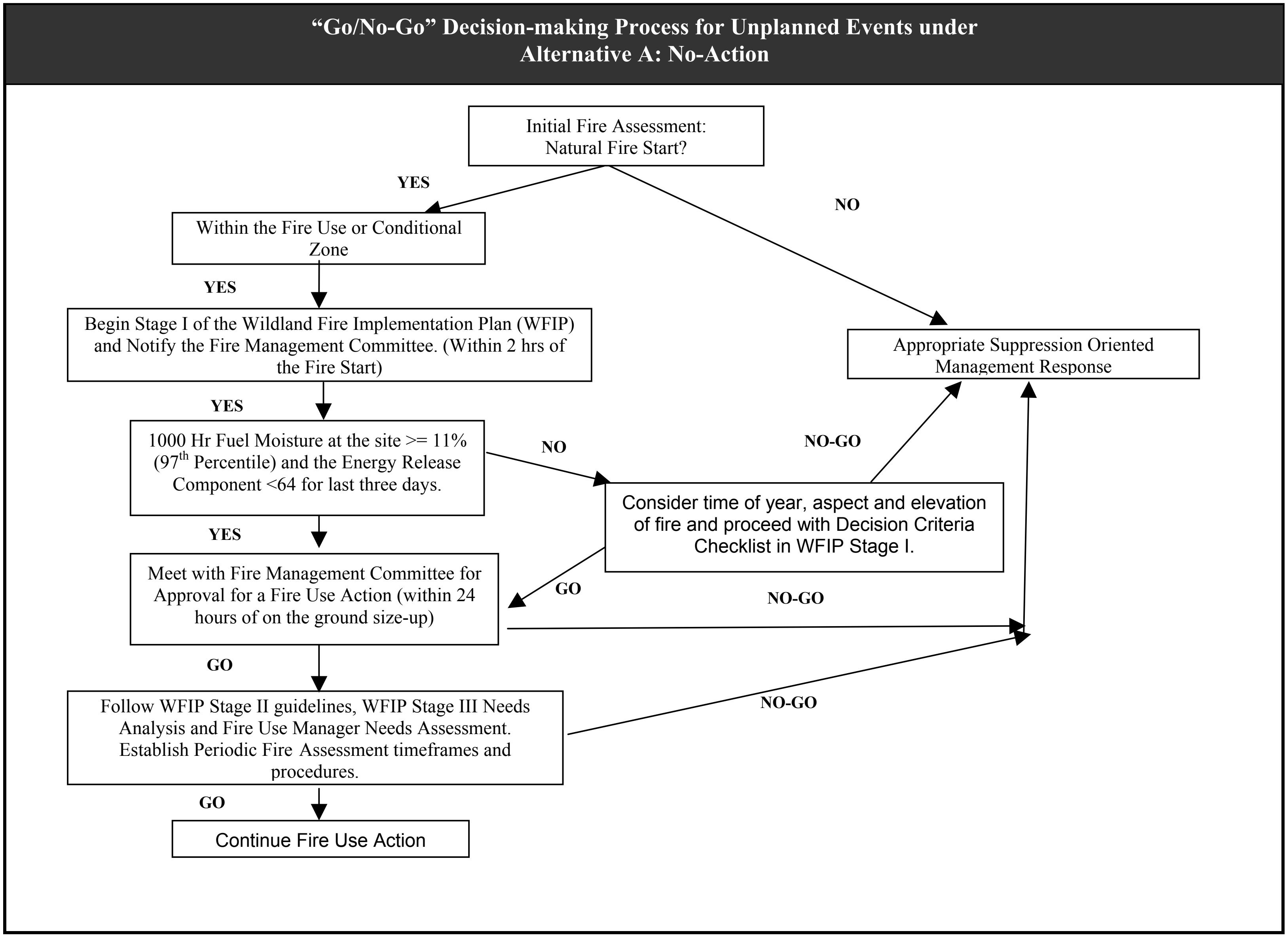
APPENDIX D: TREATMENT SCHEDULE

Fiscal Year	Project Name	Purpose	Treatment Type	Activity Type	Acres
FY04	Bar B-C	Structure Prot / Historic Landscape	Mechanical	Mechanical	25
FY04	Bar B-C	Structure Prot / Historic Landscape	Mechanical	Monitor	25
FY04	Blacktail North/B-E	Structure Protection	Mechanical	Mechanical	12
FY04	CB Gas Station	Structure Protection	Mechanical	Mechanical	32
FY04	CB Log Cabins	Structure Protection	Mechanical	Planning	20
FY04	Death Canyon Rd	Structure Prot / Habitat	Mechanical	Planning	45
FY04	Ditch Creek	Structure Protection	Mechanical	Planning	20
FY04	Elbo Ranch (E & W)	Habitat	Prescribed Burning	Monitor	500
FY04	Elbo Ranch (E & W)	Habitat	Prescribed Burning	Monitor	500
FY04	Fabian Ranch	Structure Prot / Historic Landscape	Mechanical	Monitor	20
FY04	Fabian Ranch	Structure Prot / Historic Landscape	Mechanical	Mechanical	20
FY04	Housing 2000	Structure Protection	Pile Burning	Fire	25
FY04	Jackson Lake Dam	Structure Protection	Mechanical	Mechanical	6
FY04	Jenny Lake CG	Structure Protection	Mechanical	Planning	20
FY04	Jenny Lake CG	Structure Protection	Mechanical	Monitor	20
FY04	Lizard Creek CG	Structure Protection	Mechanical	Planning	15
FY04	Lost Creek Ranch	Structure Protection	Prescribed Burning	Fire	13
FY04	Lost Creek Ranch	Structure Protection	Prescribed Burning	Monitor	60
FY04	McCollister	Structure Protection	Mechanical	Mechanical	10
FY04	Moose Wilson Rd	Structure Prot / Habitat	Mechanical	Planning	30
FY04	Moran	Structure Protection	Mechanical	Mechanical	10
FY04	Murie	Structure Protection	Pile Burning	Fire	40
FY04	NPS Housing	Structure Protection	Prescribed Burning	Fire	16
FY04	Oxbow Housing	Structure Protection	Mechanical	Mechanical	7
FY04	Pacific Creek	Structure Protection	Pile Burning	Fire	12
FY04	Signal Mt West	Structure Protection	Prescribed Burning	Fire	300
FY04	Timbered Island	Habitat	Prescribed Burning	Monitor	280
FY04	Whitegrass Ranch	Structure Prot / Historic Landscape	Pile Burning	Fire	15
FY05	AMK	Structure Protection	Pile Burning	Fire	40
FY05	Bar B-C	Structure Prot / Historic Landscape	Pile Burning	Fire	25
FY05	Bar B-C	Structure Prot / Historic Landscape	Prescribed Burning	Fire	25
FY05	Blacktail North/B-E	Structure Protection	Pile Burning	Fire	12
FY05	CB Gas Station	Structure Protection	Pile Burning	Fire	32
FY05	CB Gas Station	Structure Protection	Mechanical	Monitor	32
FY05	CB Log Cabins	Structure Protection	Mechanical	Mechanical	20
FY05	Death Canyon Rd	Structure Prot / Habitat	Mechanical	Mechanical	15
FY05	Ditch Creek	Structure Protection	Mechanical	Mechanical	20
FY05	Ditch Creek	Structure Protection	Mechanical	Monitor	20
FY05	Elbo Ranch (E & W)	Habitat	Prescribed Burning	Monitor	500
FY05	Hunter Ranch	Habitat	Prescribed Burning	Fire	200
FY05	Jackson Lake Dam	Structure Protection	Pile Burning	Fire	6
FY05	Jenny Lake CG	Structure Protection	Mechanical	Mechanical	20
FY05	Lizard Creek CG	Structure Protection	Mechanical	Mechanical	15
FY05	Lost Creek Ranch	Structure Protection	Prescribed Burning	Fire	60
FY05	Moose Wilson Rd	Structure Prot / Habitat	Mechanical	Mechanical	15
FY05	Moran	Structure Protection	Pile Burning	Fire	10
FY05	NPS Housing	Structure Protection	Prescribed Burning	Monitor	16
FY05	Oxbow Housing	Structure Protection	Pile Burning	Fire	7
FY05	Signal Mt development	Structure Protection	Mechanical	Planning	40
FY05	Signal Mt West	Structure Protection	Prescribed Burning	Monitor	300
FY05	Timbered Island	Habitat	Prescribed Burning	Monitor	280

Fiscal Year	Project Name	Purpose	Treatment Type	Activity Type	Acres
FY06	Bar B-C	Structure Prot / Historic Landscape	Mechanical & Prescribed	Monitor	50
FY06	Death Canyon Rd	Structure Prot / Habitat	Mechanical	Mechanical	15
FY06	Fabian Ranch	Structure Prot / Historic Landscape	Pile Burning	Fire	20
FY06	Hunter Ranch	Habitat	Prescribed Burning	Monitor	200
FY06	Lizard Creek CG	Structure Protection	Pile Burning	Fire	15
FY06	Lost Creek Ranch	Structure Protection	Prescribed Burning	Monitor	60
FY06	McCollister	Structure Protection	Pile Burning	Fire	10
FY06	Moose Wilson Rd	Structure Prot / Habitat	Mechanical	Mechanical	15
FY06	NPS Housing	Structure Protection	Prescribed Burning	Fire	16
FY06	Shane Cabin	Structure Protection	Mechanical	Planning	7
FY06	Signal Mt development	Structure Protection	Mechanical	Mechanical	40
FY07	CB Log Cabins	Structure Protection	Pile Burning	Fire	20
FY07	Death Canyon Rd	Structure Prot / Habitat	Mechanical	Mechanical	15
FY07	Ditch Creek	Structure Protection	Pile Burning	Fire	20
FY07	Hunter Ranch	Habitat	Prescribed Burning	Monitor	200
FY07	Jenny Lake CG	Structure Protection	Pile Burning	Fire	20
FY07	Lost Creek Ranch	Structure Protection	Prescribed Burning	Monitor	60
FY07	Moose Wilson Rd	Structure Prot / Habitat	Pile Burning	Fire	30
FY07	NPS Housing	Structure Protection	Prescribed Burning	Monitor	16
FY07	Pacific Creek	Structure Protection	Mechanical	Monitor	12
FY07	Shane Cabin	Structure Protection	Mechanical	Mechanical	7
FY07	Signal Mt development	Structure Protection	Pile Burning	Fire	40
FY07	Signal Mt West	Structure Protection	Prescribed Burning	Monitor	300

APPENDIX E: DECISION-MAKING PROCESS FOR UNPLANNED EVENTS

Source: GTNP Wildland Fire Management Plan Amendment July 12. 2003



APPENDIX F: FIRE REGIMES AND WUI & VEGETATION DFCS

For fire management purposes, GTNP's vegetation has been divided into 9 vegetation types. These types are general groupings, chosen because they have similar ecology, fuel loading, and fire regimes. Fire managers have described desired future conditions for these vegetation types. In general, the landscape should have historic structure (species composition, fuels) and function (disturbance regimes, wildlife habitat). Specific vegetation objectives and monitoring protocols have been developed for these types, some of which focus on specific plant associations within the categories. The following table summarizes the fire management vegetation types, ecological characteristics, reference conditions, current conditions and desired conditions.

Current conditions are described in terms of fire regime condition class (FRCC). FRCC is a key variable for assessing wildland fire risk to people, communities, and ecosystems in the United States. Conditions classes are generally equivalent to low, moderate, and high departure from 5 defined natural (historical) fire regimes.

- <u>Fire Regime I</u> – 0-35 year frequency and low severity (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced).
- <u>Fire Regime II</u> – 0-35 year frequency and high severity (stand replacement - greater than 75% of the dominant overstory vegetation replaced)
- <u>Fire Regime III</u> – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced)
- <u>Fire Regime IV</u> – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced)
- <u>Fire Regime V</u> – 200+ year frequency and high severity (stand replacement).

Condition classes are numbered from 1-3 and represent increasing levels of risk for uncharacteristic wildland fire behavior and effects (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002). Characteristic conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g., weeds, insects, and diseases), "high graded" forest composition and structure (e.g., large trees removed in a frequent surface fire regime), or repeated annual grazing that maintains grassy fuels across relatively large areas at levels that will not carry a surface fire. Determination of amounts of departure is based on comparison of a composite measure of fire regime attributes (vegetation characteristics, fuel composition, fire frequency, severity, and pattern) to the central tendency of the natural (historical) fire regime. The amount of departure is then classified to determine the fire regime condition class. A simplified description of the fire regime condition classes and associated potential risks follows.

Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered Uncharacteristic conditions range from low to moderate Risk of loss of key ecosystem components are moderate
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high

Source: http://www.frcc.gov

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Fire Management Vegetation Type	Reference Conditions: Fire Regime	Current Conditions, Condition Class	Desired Future Conditions	Management Considerations
Sagebrush Steppe **~ 56,700 acres** ▪ Mountain big sagebrush ▪ Mixed mountain big sage and bitterbrush ▪ Low sage ▪ Others	**Historic Fire Return Interval:** Mountain Big Sagebrush – 20-60 years Low Sage – 100+ years Patchy pattern of age classes over the landscape due to fire disturbance **Fire Regime:** II/IV	**Condition Class:** 1-2 Species composition change has occurred and weeds threaten some types. There has been change in fire frequency, fuel characteristics, and species composition since settlement. Approximately 16% has been converted by agricultural use. Approximately 25% has burned in the last 33 years through wildfire and prescribed burn treatments.	Proportions of sagebrush seral stages would consider Wyoming Interagency Vegetation Committee guidelines. The committee's guidelines do not supercede NPS directives.	Wildlife habitat Possible Sage-grouse listing Conversion to agriculture Ungulate browsing Exotic vegetation Loss of patchy distribution of fuels Prescribed fire opportunities Wildfire risks Cultural artifacts and landscapes Expansion into meadow ecotones due to lack of disturbance
Persistent Lodgepole Pine **~ 52,000 acres** ▪ Young Stands:0-40 years (LP0) ▪ Immature Stands: 40-150 years (LP1) ▪ Mature Stands: 150-300 years (LP2) ▪ Over-mature Stands: 300+ years (LP3)	**Historic Fire Return Interval:** 22- 300+ years Adapted to both understory burns and stand replacing crown fires. Lodgepole pine remains the dominant tree species throughout seral stages. Fires create mosiacs of various seral stages and fuel accumulations. An open understory was maintained by fire and cold, nutrient-poor growing conditions. **Fire Regime:** III/V	**Condition Class:** 1-2 Fire suppression has led to changes in low severity fire regimes, resulting increased fuel continuity and loading. Stand replacing crown fires have continued to occur, and 19% of this type has burned in the past 33 years. Moderate and low severity understory fires have not occurred as they did historically due to suppression. Fuel loading has increased as a result, and these fuels are more continuous across the landscape.	All seral stages (LP0-LP3) should be represented in the landscape. Patchy areas of tree seedlings and poles should be present within stands.	Wildlife habitat Difficulty of conducting prescribed burns Mechanical options
Mixed Conifer below 8,500 ft **~ 36,300 acres** Several forest covertypes combined, all with successional trajectory toward Subalpine Fir ▪ Lodgepole pine ▪ Limber pine ▪ Douglas-fir ▪ Englemann Spruce ▪ Subalpine Fir ▪ Aspen	**Historic Fire Return Interval:** 22- 300 years (up to 400+ years for old growth spruce). Adapted to both understory burns and stand replacing crown fires. Lodgepole pine and Douglas-fir follow seral aspen forests after stand replacing events. Limber pine is found in more sparsely forested dry locations. Englemann spruce grows in moist, well shaded areas. In the absence of disturbance, shade tolerant subalpine fir will dominate over time. Heavy fuel accumulations and dense foliage make these forests susceptible to stand replacing fire when unusually dry and windy weather permits. **Fire Regime:** III/V	**Condition Class**: 1-2 Fire suppression has led to changes in low severity fire regimes, resulting increased fuel continuity and loading. 29% of this vegetation has burned in the past 33 years. Fire severity has been mixed. Subalpine fir-dominated late seral stages predominate over mid and early seral stands. Limber pine may be under-represented in current vegetation maps.	All seral stages and species should be represented in the landscape. Historic patchy distributions should persist. Subalpine fir succession should be interrupted by fire to encourage regeneration by early seral species such as lodgepole pine and aspen according to historic patterns. Old growth spruce forests should be protected from unnaturally severe fires when possible by managing adjacent fuels.	Advanced fuels buildup and succession Wildlife habitat Lynx habitat Hydrology impacts Old Growth spruce Risks during drought Danger of spot fires during prescribed fire Difficulty of conducting prescribed burns Mechanical options Blister rust in limber pine
Douglas-fir **~ 11,700 acres** ▪ Cool Dry Douglas-fir ▪ Moist Douglas-fir	**Historic Fire Return Interval:** 25-100 years Douglas-fir forest is nutrient-demanding and persists on shaded, calcareous soils. It is dependent on understory fire to maintain its open, park-like understory. Thick bark protects older overstory trees from scorch. Stand replacing fires are rapidly recolonized by Douglas-fir seedlings or aspen (which are subsequently replaced by Douglas-fir). **Fire Regime:** I/III	**Condition Class:** 1-2. Fuels accumulations and forest insect outbreaks currently threaten this type. 13% has been burned in the past 33 years. Half of this has been prescribed fire, which was very low severity. Fire suppression has allowed seedlings and pole trees to increase in the Douglas-fir understory. Fuels accumulation is heavy and continuous in some areas which were formerly open and patchy. Subalpine fir trees are encroaching, and competition for water and nutrients has weakened trees and facilitated insect outbreaks.	Historic patterns of patchy disturbances should thin understory regeneration and keep forest floors open. Patches of crown fire should create openings for aspen and Douglas fir regeneration to initiate.	Fuel buildup increases risk for large stand replacing fires Prescribed fire difficult in spring and fall. Open forest structure is being lost Conversion of aspen stands Wildlife habitat

Fire Management Vegetation Type	Reference Conditions: Fire Regime	Current Conditions, Condition Class	Desired Future Conditions	Management Considerations
Wetland/Riparian **~ 11250 acres** Includes Cottonwood-Blue Spruce river corridors, willow bottomlands, wet meadows, and streamside vegetation.	**Historic Fire Return Intervals**: Not well understood. Riparian areas may have functioned as natural firebreaks some of the time. Probably burned during landscape scale fire events. Most riparian vegetation is flood adapted and fire tolerant. **Fire Regime:** IV/V	**Condition Class:** 1-2 Approximately 12% of this vegetation has been burned in the past 33 years. Prescribed burns in willow have been conducted in Buffalo Valley and Jackson Lake Lodge areas. Lack of disturbance due to flood control has altered the fuels and vegetation of many acres of cottonwood along river corridors. Blue spruce has increased. Fuel loading and continuity in these areas may threaten wildland urban interface communities along the Snake River in particular.	Fire may be an important tool or process in maintaining these communities.	Wildlife habitat Flood adaptations and flood control Exotic vegetation Wildlife utilization
Current or former Agricultural **~ 11,200 acres** Formerly sagebrush, homesteaded in the 1900's and used for pasture, vegetable crops, and hayfields. Currently fallow or used as pasture for permitted horses and cattle. Smooth brome and Kentucky bluegrass are primary species.	Introduced vegetation is highly adapted to disturbance such as fire. Capable of carrying fire very well when cured, very frequently (annually) depending on grazing and productivity. **Fire Regime:** II	**Condition Class:** 2 5% of this type has been burned in the past 33 years. Prescribed fire has been used with the objective of improved forage productivity. Native shrubs such as sagebrush are beginning to re-establish in some areas. Noxious weeds such as musk thistle are common in brome-dominated areas.	Where possible, former agricultural lands should be restored to pre-settlement vegetation. Exotic vegetation threats and current grazing permits may require some areas to be maintained as irrigated grassland Agricultural vegetation may be the desired future condition in some cultural landscapes.	Exotic vegetation Grazing Wildlife utilization Cultural landscapes
Wildland Urban Interface **~ 19,800 acres** Vegetated areas located in the vicinity of structures and communities. Includes all vegetation types listed above, with the exception of high elevation mixed conifer.	Reference conditions for specific vegetation types are described in this table. However, these areas have been removed from these conditions by development. **Fire Regime:** N/A	**Condition Class:** 2 Historic fire regimes have been purposely altered due to WUI priorities. Many of the developed areas have been treated mechanically (thinned) or with prescribed fire to reduce fuels and increase defensible space. Treatments last from 10-15 years before re-treatment is necessary.	In forested areas, an open "park-like" setting is maintained. Shrub vegetation is mowed and burned to promote a native seral herbaceous community. These characteristics allow firefighter access and decrease fire behavior compared to untreated stands even under extreme burning conditions. Cultural landscape and scenic values are maximized where possible.	High value developments Life safety issues Wildlife Habitat Cultural landscapes Exotic vegetation Fuel buildup Need for maintenance Visual buffers Smoke
Aspen **7000 acres mapped** (Many more acres of mixed aspen-conifer forest exist) ▪ Climax aspen forests ▪ Aspen forests seral to conifers	**Historic Fire Return Interval**: 20-60 years Aspen depends on disturbances such as fire to persist when succession trends toward conifers and moisture demanding shrubs such as sagebrush. Aspen sprouts vigorously following fire. Many stands are even aged. Trees live to be about 120 years old. Aspen forests are found in moist areas. Understory vegetation is lush. Fire often does not carry through this type as a result. **Fire Regime:** II	**Condition Class**: 1 –3 Lack of fire and increased levels of ungulate browsing (depending on stand location) threaten aspen stands. Aspen stands are old (80-120+ years) and many are deteriorating and converting to conifer stands or sagebrush. 25% of aspen stands have burned in the past 33 years, mainly through prescribed fire during spring or fall. Burn severity was low and low-moderate. Aspen sprouts are highly palatable to ungulates. Excessive browsing stunts and kills regeneration. Burned aspen stands are very vulnerable to heavy browsing	Stands should have few trees older than 100 years. Ungulate browsing should not prevent at least 200 suckers/acre to reach tree stature following stand replacement by fire or manual overstory removal. Conversion of aspen to conifer and sagebrush types should be balanced by equal disturbances that favor aspen dominance.	Wildlife habitat Over-browsing risks Exotic vegetation Aspen function as a fire break Difficulty of prescribed burning under cool prescriptions Mechanical treatment options Incomplete distribution mapping of aspen stands
High Elevation (above 8,500 ft) **Mixed Conifer** **~ 22,200 acres** ▪ Englemann spruce ▪ Subalpine Fir ▪ Whitebark pine Includes stunted Krumholtz forest types	**Historic Fire return intervals:** often very long, over 400 years in some cases. Forests are moist and patchy due to shade, snowpack, and poor soils. Fires are usually relatively small in size, with varying severity. Whitebark pine can function as a pioneer species following fire disturbance due to its ability to spread by bird-planted seeds. Spruce and subalpine fir are shade tolerant and eventually dominate until disturbance again removes them. **Fire Regime:** V	**Condition Class**: 1-3 Many stands are within the range of historic variability. Whitebark pine stands are significantly threatened. 3% of this type has burned in the last 33 years. High elevation mixed conifer forests are mature, and most stands have reached a late successional stage dominated by subalpine fir. Whitebark pine stands are threatened by insect and disease outbreaks, particularly mountain pine beetle and white pine blister rust. Spruce and fir dominate many stands which were formerly whitebark and early seral whitebark stands are rare.	Conversion of whitebark pine types to spruce and fir should be balanced by initiation of new whitebark stands. Whitebark seed sources should be managed to promote disease resistance.	Wilderness Whitebark pine blister rust Opportunities for wildland fire use Remote and challenging terrain Grizzly habitat

APPENDIX G: Hazard Fuels Reduction Clearing Standards

Grand Teton National Park, John D. Rockefeller Memorial Parkway
Fire Management Office

Wildland-Urban Interface Clearing Standards
For NPS Structures and Structures Protected by NPS Resources

Mack McFarland, Fuels Management Specialist, Grand Teton National Park January 3, 2003.

Introduction:

Within GTNP there five major developed areas (Moose, Beaver Creek, Signal Mountain, Colter Bay, and Flagg Ranch) and many outlying privately owned, leased, or federally owned structures within the wildland urban interface (WUI). The Review and Update of the 1995 Federal Wildland Fire Management Policy (2001) and GTNP's Fire Management Plan (1991) require identification of WUI areas and prioritization of treatment of fuels around these areas to reduce potential losses due to uncontrollable wildland fire.

Issues and Concerns:

Housing within GTNP offer personal experiences within the landscape and a large part of the enjoyment of residing within a national park includes living in a wilderness setting. In realizing this aesthetic quality, the recognition that wildland fire is a part of the wilderness environment must be clear. While large fires are generally rare, the risks to firefighters and residents are high when these events occur near the urban interface (Arno and Wakimoto 1988). In developing these standards, every effort has been made to take into account the value of privacy screening and landscaping fundamentals while maximizing fuel reduction effectiveness based on moderate to high wildland fire behavior. While suppression efforts during extreme fire behavior seen in GTNP are relatively ineffective, pre-bum clearing standards outlined below have been successful in protecting WUI structures during high to extreme fire behavior events in GTNP (Row Fire 1994, Alder Fire 1999) and other similar fuel types (Martinson and Ami in press).

Clearing Standards, within 30 feet of structures:

The following standards have been developed from implementation of treatments designed by utilizing fuel loading information, crowning potential, and rate of spread models (Morgan 1991). A general prescription was designed and implemented in GTNP starting in 1989. Since then this prescription has been modified to reduce costs and improve visual effects of the treatment areas. This modified prescription combined with case study information from similar fuel types and the "FIREWISE" program have lead to the following clearing standards for WUI structures in different fuel types within GTNP and the JDR.

Aspen, meadows and sagebrush

- Water or mow grass to maintain a height of 6 inches or less.
- Remove dead or overhanging branches.
- Thin sagebrush to at least 15 feet between individual plants.
- Maintain or increase aspen pole size tree density.
- In areas of dense sagebrush, removal of sagebrush within 30 feet of the structure should be combined with thinning sagebrush for an additional 40- 70 feet outside the cleared area. Thinning should create clumps of sagebrush separated by open areas with clump size no larger than 15 feet in diameter and openings no less than 15 feet.

Lodgepole Pine-Mixed Conifer

- Remove dead or overhanging branches.
- Remove needle and/or leaf accumulation from gutters and around the structure.
- Remove tall, dry grasses, or maintain ground fuels to be less than 6 inches in height.
- Remove "ladder fuels" so that no limbs reach within 6 feet of the ground.
- Remove dead and down logs and branches.
- Thin trees or groups of trees to a spacing of 10-12 feet stems.
- Prune landscaping vegetation regularly, removing excess growth, dead leaves and branches.
- Where vegetation is needed to provide a visual screen between buildings, pruning is probably unacceptable visually. In these cases, live trees could be left standing as long as the crowns were at least 10 feet apart and all downed and dead woody fuel or other ladder fuels were removed. Preferentially remove Sub-alpine Fir and select for maintaining/expanding healthy aspen stands were they occur.

APPENDIX H: Minimum Impact Suppression Tactics (MIST)

NWCG GUIDANCE ON MINIMUM IMPACT SUPPRESSION TACTICS

In Response to the 10-YEAR IMPLEMENTATION PLAN FOR REDUCING WILDLAND FIRE RISKS TO COMMUNITIES AND THE ENVIRONMENT

TASK: Prepare awareness and training information on the use of minimum impact suppression activities and deliver through standard firefighting training program.

POLICY

The change from **fire control** to **fire management** has added a new perspective to the role of fire manager and the firefighter. Traditional thinking that "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire Management now means managing fire "with time" as opposed to "against time." The objective of putting the fire dead out by a certain time has been replaced by the need to make unique decisions with each fire start to consider the land, resource and incident objectives, and to decide the appropriate management response and tactics which result in minimum costs and minimum resource damage.

This change in thinking and way of doing business involves not just firefighters. It involves all levels of management. Fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's potential or existing behavior while producing the least possible impact on the resource being protected. The term used to describe these tactics is "Minimum Impact Suppression Tactics", commonly called MIST. Simply put: MIST is a 'do least damage' philosophy.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set - how to suppress a wildfire while minimizing the long-term effects of the suppression action. MIST is the concept of using the minimum tool to safely and effectively accomplish the task. MIST should be considered for application on all fires in all types of land management.

While MIST emphasizes suppressing wildland fire with the least impact to the land, actual fire conditions and good judgment will dictate the actions taken. Consider what is necessary to halt fire spread and containment within the fireline or designated perimeter boundary, while safely managing the incident.

Use of MIST will not compromise firefighter safety or the effectiveness of suppression efforts. Safety zones and escape routes will be a factor in determining fireline location

Accomplishments of minimum impact fire management techniques originate with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. They are ensured by monitoring results on the ground. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

GUIDELINES

The intent of this guide is to serve as a checklist for all fire management personnel. Be creative and seek new ways to implement MIST

INCIDENT MANAGEMENT CONSIDERATIONS

- Fire managers and firefighters select tactics that have minimal impact to values at risk. These values are identified in approved Land or Resource Management Plans. Standards and guidelines are then tied to implementation practices which result from approved Fire Management Plans.
- Firefighter and public safety cannot be compromised.

- Evaluate suppression tactics during planning and strategy sessions to ensure they meet agency administrator objectives and MIST. Include agency Resource Advisor and/or designated representative.
- Communicate MIST where applicable during briefings and implement during all phases of operations.
- Evaluate the feasibility of Wildland Fire Use in conjunction with MIST when appropriate for achieving resource benefits.

RESPONSIBILITIES

Agency Administrator or Designee
- Ensure agency personnel are provided with appropriate MIST training and informational/educational materials at all levels.
- Communicate land and fire management objectives to Incident Commander.
- Periodically monitor incident to ensure resource objectives are met.
- Participate in incident debriefing and assist in evaluation of performance related to MIST.

Incident Commander
- Communicate land and fire management objectives to general staff.
- Evaluate suppression tactics during planning and strategy sessions to see that they meet the Agency Administrator's objectives and MIST guidelines.
- Monitor operations to ensure MIST is implemented during line construction as well as other resource disturbing activities.
- Include agency Resource Advisor and/or local representative during planning, strategy, and debriefing sessions.

Resource Advisor
- Ensure interpretation and implementation of WFSA/WFIP and other oral or written line officer direction is adequately carried out.
- Participate in planning/strategy sessions and attend daily briefings to communicate resource concerns and management expectations.
- Review Incident Action Plans (IAP) and provide specific direction and guidelines as needed.
- Monitor on the ground applications of MIST.
- Provide assistance in updating WFSA/WFIP when necessary.
- Participate in debriefing and assist in evaluation of performance related to MIST.

Planning Section
- Use Resource Advisor to help assess that management tactics are commensurate with land/resource and incident objectives.
- Ensure that instructions and specifications for MIST are communicated clearly in the IAP.
- Anticipate fire behavior and ensure all instructions can be implemented safely.

Logistics Section
- Ensure actions performed around Incident Command Post (ICP), staging areas, camps, helibases, and helispots result in minimum impact on the environment.

Operations Section
- Evaluate MIST objectives to incorporate into daily operations and IAP.
- Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes during planning/strategy sessions.

- Communicate MIST to Division Supervisors and Air Ops/Support during each operational period briefing. Explain expectations for instructions listed in Incident Action Plan.
- Participate in incident debriefing and assist in evaluation of performance related to MIST.

Division/Group Supervisor and Strike Team/Task Force Leader

- Communicate MIST objectives and tactics to single resource bosses.
- Recommend specific tasks on divisions to implement MIST.
- Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes to Operations Section Chief.

Single Resource Bosses

- Communicate MIST objectives to crew members.
- Monitor work to ensure that crews are adhering to MIST guidelines and specific incident objectives.
- Provide feedback to supervisor on implementation of MIST.

IMPLEMENTATION

- Keep this question in mind: What creates the greater impact, the fire suppression effort or the fire?
- Safety
- Apply principles of LCES to all planned actions.
- Constantly review and apply the 18 Watch Out Situations and 10 Standard Fire Orders.
- Be particularly cautious with:
- Burning snags allowed to burn.
- Burning or partially burned live and dead trees.
- Unburned fuel between you and the fire.

Escape Routes and Safety Zones

- In any situation, the best escape routes and safety zones are those that already exist. Identifying natural openings, existing roads and trails and taking advantage of safe black will always be a preferred tactic compatible with MIST. If safety zones must be created, follow guidelines similar to those for helispot construction.
- Constructed escape routes and safety zones in heavier fuels will have a greater impact, be more time consuming, labor intensive and ultimately less safe.
- General Considerations
- Consider the potential for introduction of noxious weeds and mitigate by removing weed seed from vehicles, personal gear, cargo nets, etc.
- Consider impacts to riparian areas when siting water handling operations.
- Use longer draft hoses to place pumps out of sensitive riparian areas.
- Plan travel routes for filling bladder bags to avoid sensitive riparian areas.
- Ensure adequate spill containment at fuel transfer sites and pump locations. Stage spill containment kits at the incident.
- Fire Lining Phase
- Select tactics, tools, and equipment that least impact the environment.
- Give serious consideration to use of water or foam as a firelining tactic.
- Use alternative mechanized equipment such as excavators and rubber tired skidders rather than bulldozers when constructing mechanical line.
- Allow fire to burn to natural barriers and existing roads and trails.

- Monitor and patrol firelines to ensure continued effectiveness.
- Ground Fuels
- Use cold-trail, wet line or combination when appropriate. If constructed fireline is necessary, use minimum width and depth to stop fire spread.
- Consider the use of fireline explosives (FLE) for line construction and snag falling to create more natural appearing firelines and stumps.
- Burn out and use low impact tools like swatters and gunny sacks.
- Minimize bucking to establish fireline: preferably move or roll downed material out of the intended constructed fireline area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial fuels–brush, trees, and snags

- Adjacent to fireline: limb only enough to prevent additional fire spread.
- Inside fireline: remove or limb only those fuels which would have potential to spread fire outside the fireline.
- Cut brush or small trees necessary for fireline construction flush to the ground.
- Trees, burned trees, and snags:
- Minimize cutting of trees, burned trees, and snags.
- Do not cut live trees unless it is determined they will cause fire spread across the fireline or seriously endanger workers. Cut stumps flush with the ground.
- Scrape around tree bases near fireline if hot and likely to cause fire spread.
- Identify hazard trees with flagging, glowsticks, or a lookout.
- When using indirect attack:
- Do not fall snags on the intended unburned side of the constructed fireline unless they are an obvious safety hazard to crews.
- Fall only those snags on the intended burn-out side of the line that would reach the fireline should they burn and fall over.
- Mopup Phase
- Consider using “hot-spot” detection devices along perimeter (aerial or hand-held).
- Use extensive cold-trailing to detect hot areas.
- Cold-trail charred logs near fireline: do minimal scraping or tool scarring. Restrict spading to hot areas near fireline.
- Minimize bucking of logs to check for hot spots or extinguish fire: preferably roll the logs and extinguish the fire.
- When ground is cool return logs to original position after checking.
- Refrain from piling: burned/partially burned fuels that were moved should be arranged in natural positions as much as possible.
- Consider allowing larger logs near the fireline to burn out instead of bucking into manageable lengths. Use a lever, etc. to move large logs.
- Use gravity socks in stream sources and/or combination of water blivets and fold-a-tanks to minimize impacts to streams.
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work.
- Avoid use of non-native materials for sediment traps in streams.
- Aerial fuels (brush, small trees, and limbs): remove or limb only those fuels which if ignited have

potential to spread fire outside the fireline.

- Burning trees and snags:
- *Be particularly cautious when working near snags (*ensure adequate safety measures are communicated).
- The first consideration is to allow a burning tree/snag to burn itself out or down.
- Identify hazard trees with flagging, glow-sticks or a lookout.
- If there is a serious threat of spreading firebrands, extinguish with water or dirt.
- Consider felling by blasting, if available.

Aviation Management

- Minimize the impacts of air operations by incorporating MIST in conjunction with the standard aviation risk assessment process.
- Possible aviation related impacts include:
- Damage to soils and vegetation resulting from heavy vehicle traffic, noxious weed transport, and/or extensive modification of landing sites.
- Impacts to soil, fish and wildlife habitat, and water quality from hazardous material spills.
- Chemical contamination from use of retardant and foam agents.
- Biological contamination to water sources, e.g., whirling disease.
- Safety and noise issues associated with operations in proximity to populated areas, livestock interests, urban interface, and incident camps and staging areas.

<u>Helispot Planning</u>

- When planning for helispots determine the primary function of each helispot, e.g., crew transport or logistical support.
- Consider using long-line remote hook in lieu of constructing a helispot.
- Consult Resource Advisors in the selection and construction of helispots during incident planning.
- Estimate the amount and type of use a helispot will receive and adapt features as needed.
- Balance aircraft size and efficiency against the impacts of helispot construction.
- Use natural openings as much as possible. If tree felling is necessary, avoid high visitor use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

<u>Retardant, Foam, and Water Bucket Use</u>

- Assess risks to sensitive watersheds from chemical retardants and foam. Communicate specific drop zones to air attack and pilots, including areas to be avoided.
- Fire managers should weigh use of retardant with the probability of success by unsupported ground force. Retardant may be considered for sensitive areas when benefits will exceed the overall impact. This decision must take into account values at risk and consequences of expanded fire response and impact on the land.
- Consider biological and/or chemical contamination impacts when transporting water.
- Limited water sources expended during aerial suppression efforts should be replaced. Consult Resource Advisors prior to extended water use beyond initial attack.

<u>Logistics, Camp Sites, and Personal Conduct</u>

- Consider impacts on present and future visitors.
- Provide portable toilets at areas where crews are staged.

- Good campsites are found, not made. If existing campsites are not available, select campsites not likely to be observed by visitors
- Select impact-resistant sites such as rocky or sandy soil, or openings within heavy timber. Avoid camping in meadows and along streams or shores.
- When there is a small group try to disperse use. In the case of larger camps: concentrate, mitigate, and rehabilitate.
- Lay out camp components carefully from the start. Define cooking, sleeping, latrine, and water supplies.
- Prepare bedding and campfire sites with minimal disturbance to vegetation and ground.
- Personal Sanitation:
  - Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap.
  - Do not introduce soap, shampoo or other chemicals into waterways.
  - Dispose of wastewater at least 200 feet from water sources.
  - Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.
  - If more than 1 crew is camped at a site strongly consider portable toilets and remove waste.
  - Store food so that it is not accessible to wildlife, away from camp and in animal resistant containers.
  - Do not let garbage and food scraps accumulate in camp.
- Monitor travel routes for damage and mitigate by:
  - Dispersing on alternate routes or
  - Concentrating travel on one route and rehabilitate at end of use.
  - If a campfire is built, leave no trace of it and avoid using rock rings. Use dead and down wood for the fire and scatter any unused firewood. Do not burn plastics or metal.

<u>Restoration and Rehabilitation</u>

Firelines:

- After fire spread has stopped and lines are secured, fill in deep and wide firelines and cup trenches and obliterate any berms.
- Use waterbars to prevent erosion, or use woody material to act as sediment dams.
- Ensure stumps are cut flush with ground.
- Camouflage cut stumps by flush-cutting, chopping, covering, or using FLE to create more natural appearing stumps.
- Any trees or large size brush cut during fireline construction should be scattered to appear natural.
- Discourage the use of newly created firelines and trails by blocking with brush, limbs, poles, and logs in a naturally appearing arrangement.
- Camps:
  - Restore campsite to natural conditions.
  - Scatter fireplace rocks and charcoal from fire, cover fire ring with soil, and blend area with natural cover.
  - Pack out all garbage.
- General:
  - Remove all signs of human activity.
  - Restore helicopter landing sites.
  - Fill in and cover latrine sites.
  - Walk through adjacent undisturbed areas and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible.

APPENDIX I: Hazard Fuel Reduction Treatments for Historic Structures and Cultural Landscapes

Table 1 of 3

Contributing Resources	Non Contributing Resources	Mechanical Treatment Implemented	Mechanical Treatment Planned for Implementation	Mechanical Treatment Anticipated Discussed	Follow Up Treatment Expected (10-15 yr cycle)	Mowing for structural protection Completed Annually	Mowing for structural protection Anticipated	Possible use of fire for cultural landscape maintenance and structural protection
AMK Ranch Historic District	14	9	2	37	2	1	7	2
Andy Chambers Ranch Historic District	3	0	0	3	1	0	0	0
Bar BC Dude Ranch Historic District	0	0	0	0	0	0	0	0
The Brinkerhoff	0	0	0	0	0	0	0	0
Cascade Canyon Barn (Patrol Cabin)	0	0	0	0	0	0	0	0
Cunningham Cabin Historic District	0	0	0	0	0	0	0	0
Death Canyon Barn (Patrol Cabin)	0	0	0	0	0	0	0	0
Double Diamond Dude Ranch Dining Hall (Climbers' Ranch)	0	0	0	0	0	0	0	0
The Highlands Historic District	0	0	0	0	0	0	0	0
Hunter Hereford Ranch Historic District	14	9	2	37	2	1	7	2
Jackson Lake Lodge National Historic Landmark	3	0	0	3	1	0	0	0
Jackson Lake Ranger Station	0	0	0	0	0	0	0	0
Jenny Lake Boat Concession Facilities	0	0	0	0	0	0	0	0

Table 2 of 3

Contributing Resources	Non Contributing Resources	Mechanical Treatment Implemented	Mechanical Treatment Planned for Implementation	Mechanical Treatment Anticipated Discussed	Follow Up Treatment Expected (10-15 yr cycle)	Mowing for structural protection Completed Annually	Mowing for structural protection Anticipated	Possible use of fire for cultural landscape maintenance and structural protection
Jenny Lake CCC Camp #NP-4 (Exum Headquarters)	0	0	0	0	0	0	0	0
Jenny Lake Ranger Station Historic District	0	0	0	0	0	0	0	0
Kimmel Kabins Historic District (Lupine Meadows Seasonal Housing)	0	0	0	0	0	0	0	0
Leigh Lake Ranger Patrol Cabin	0	0	0	0	0	0	0	0
Geraldine Lucas Homestead/Fabian Place Historic District	11	1	6	9	1	44	20	15
Manges Cabin (Trails Crew Storage Shed)	0	0	0	0	0	10	4	4
McCollister Residential Complex	0	0	0	0	0	0	0	0
Menor's Ferry Historic District	0	0	0	0	0	0	0	0
Moose Entrance Kiosk	0	0	0	0	0	0	0	0
Mormon Row Historic District	0	0	0	0	0	0	0	0
Murie Ranch Historic District	0	0	0	0	0	0	0	0
Old Administrative Area Historic District (Beaver Creek)	0	0	0	0	0	0	0	0
Ramshorn Dude Ranch Lodge (Teton Science School Admin. Bldg)	0	0	0	0	0	0	0	0

Table 3 of 3

Contributing Resources	Non Contributing Resources	Mechanical Treatment Implemented	Mechanical Treatment Planned for Implementation	Mechanical Treatment Anticipated Discussed	Follow Up Treatment Expected (10-15 yr cycle)	Mowing for structural protection Completed Annually	Mowing for structural protection Anticipated	Possible use of fire for cultural landscape maintenance and structural protection
Dick & Ethel Reimer Residence (Reimer/Hultman Residence or Holy Ost)	*11*	*1*	*6*	*9*	*1*	*44*	*20*	*15*
Snake River Land Co. Residence & Office (Buffalo Dorm)	*0*	*0*	*0*	*0*	*0*	*10*	*4*	*4*
String Lake Comfort Station	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Triangle X Barn	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Upper Granite Canyon Patrol Cabin	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
White Grass Dude Ranch Historic District	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
White Grass Ranger Station Historic District	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Wolff Ranch	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Chapel of the Transfiguration	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
4 Lazy F Dude Ranch Historic District	*11*	*1*	*6*	*9*	*1*	*44*	*20*	*15*

APPENDIX J: PLANT SPECIES OF SPECIAL CONCERN IN GTNP POTENTIALLY IMPACTED BY FIRE

Lesser-panicled sedge (*Carex diandra*)

A perennial graminoid that inhabits stream banks, swampy areas, wet meadows and lakesides. The species is common across Canada and, although it occurs coast to coast in the US, it is only occasional to rare. It occurs in scattered locations in northwestern Wyoming, 2 of which are in GTNP. Habitat is often characterized by thick mats of grasses and sedges which provide an abundance of fine fuels, especially late in the growing season. This species is capable of developing new shoots from reproductive structures lying below the surface in wet soil and therefore, it is unlikely that the populations in GTNP would be permanently impacted by fire.

Sartwell's sedge (*Carex sartwellii*)

An important wetland species in the Midwestern US and Canada but becomes uncommon and rare outside of that range. It occurs in wetlands and thickets at scattered locations across Wyoming, with one occurrence in GTNP identified as an "aspen grove near Moran". This population may be vulnerable to fire, due to opening of the canopy and subsequent drying of the soil.

Jeffery's shootingstar (*Dodecatheon jeffery* ssp. *jeffreyi*)

A common wetland species in the Pacific Northwest and is apparently at the edge of its range in western Wyoming. Two populations are known to occur in the state, both in GTNP. The species usually grows in association with abundant graminoids on sites that dry out late in the summer. These graminoids provide fine fuels that would easily carry a fire. However, the species drops its seed early in the season and the underground portion is probably well protected from surface fires.

Spreading woodfern (*Dryopteris expansa*)

A perennial, semi-evergreen fern that occurs in a broken distribution across Europe, northeastern North America, and western North America from British Columbia to California, east to Wyoming and Colorado. It is at the edge of its eastern range in northwestern Wyoming, where it occurs in moist, shady conifer forests. A single population is known in GTNP (Cascade Canyon). Fire could adversely impact this population by opening of the canopy and associated alteration of the light and moisture regimes.

Giant helleborine (*Epipactis gigantea*)

A perennial member of the orchid family that occurs infrequently throughout the western United States and British Columbia. Habitat consists of wet, seepy areas, especially thermal springs. The species is known to occur at 2 Wyoming sites, one in GTNP and one Sheridan County. Because the site in GTNP is characterized by large amounts of herbaceous plant material, it is possible that fire could alter local conditions. However, moist conditions would not be conducive to carrying fire during most seasons.

Thread rush (*Juncus filiformis*)

This is a slender perennial graminoid that occurs in coarse-textured soils along stream banks, lakeshores, rivers, and seepy areas. The species is circumboreal in North America extending from Alaska to Greenland, south to Pennsylvania, Colorado, and Utah. In Wyoming, it is known to occur in the Sierra Madre Range, Yellowstone Park, and GTNP. It often grows in association with other graminoids on sites that become dry in late summer and may become vulnerable to fire at certain times of the year.

Milk kelloggia (*Kelloggia galioides*)

A branched, perennial herb in the maddar family (Rubiaceae), it occurs from Washington to California, east to Wyoming, Utah, and Arizona, with one population occurring in GTNP and another just outside the park. Habitat is open and forested slopes at mid-elevations (7500-8200 feet) that may be altered under the proposed fire management plan. Potential response of this species to fire is unknown.

Broadleaved twayblade (*Listera convallarioides*)

A small, delicate, perennial member of the orchid family (Orchidaceae) occurring from Alaska to Newfoundland, south to California, Arizona, Utah, and Colorado. In Wyoming, it is known to occur in the Teton, Laramie, Medicine Bow, and Bighorn mountain ranges. Habitat features include streambanks and moist, shady coniferous and aspen forests. Overstory reduction has resulted in extirpation of the species from some locations outside of GTNP and it appears likely that a stand replacing fire would have a similar impact. It is not known what effect a ground fire would have.

Smooth woodrush (*Luzula glabrata* var. *hitchcockii*)

A perennial graminoid in the rush family (Juncaceae) that is common in the understory of coniferous forests in the Pacific Northwest. The species is at the edge of its range in western Wyoming and occurs in Teton and Park counties. Populations in Wyoming tend to be small and restricted to shady forests in the upper montane zone. Fire has been shown to consume above-ground portions of the plant, but it quickly re-sprouts and propagates vigorously. Thus, fire may benefit populations of this species.

Flat-top broomrape (*Orobanche corymbosa* var. *corymbosa*)

A fleshy, herbaceous root-parasite usually associated with big sagebrush (*Artemisia tridentata*). It occurs from British Columbia to California, east to Nevada and western Wyoming, including Teton and northern Sublette counties. Two extant populations are known to GTNP. Response to fire is not known but the species occurs in grasslands that are dependant on fire for regeneration in British Columbia. Restoring natural fire regimes in GTNP may increase long-term sagebrush vigor and enhance habitat for flat-top broomrape.

Louisiana broomrape (*Orobanche ludovicianaa* var. *arenosa*)

A species similar to *O. corymbosa* in morphology and ecology. It is widespread across North America, but is known only to GTNP in Wyoming. Although it is reportedly parasitic on a variety of host plants, it is restricted to sagebrush steppe communities in GTNP. Response to fire is not known but is likely similar to *O. corymbosa*.

Brown's peony (*Paeonia brownii*)

A stout, perennial herb, widely distributed across western North America from British Columbia to California, east to Montana and Wyoming. Three extant populations are known to occur in the state. The species generally occupies fairly dry sites and is usually associated with mountain shrub communities. These sites burn readily and, reportedly, *P. brownii* does not tolerate fire well.

Fleshy porterella (*Porterella carnosula*)

A small annual occurring from Oregon and California, east to Arizona, Utah and Wyoming. Several populations occur in GTNP along the margins of ponds and lakeshores. Typically, the plants emerge following the lowering of lake levels and drying out of water's edge. Associates often include grasses and sedges which dry to produce highly flammable fuels. Because of the plants proximity to open water, it is unlikely that the species would be impacted by fire although some plants may be lost at the periphery of the population.

Sweet-marsh butterweed (*Senecio hydrophiloides*)

A tall, perennial composite that is common in wet meadows and lakeshores across Washington and Oregon, east to Montana and Wyoming, and south to California, Nevada, and Utah. Its occurrence in Wyoming was recently confirmed with the only known extant population near Colter Bay. At this site, it grows in association with a diversity of forbs and graminoids that dry out late in the season, producing fine fuels. The underground portion of the plant is protected by moist to saturated soil and a surface fire would probably have little long term impact on the population.

Crimped stitchwort (*Stellaria crispa*)

A weak-stemmed perennial herb in the carnation family (*Caryophyllaceae*) that inhabits wet areas in shady forests. It ranges from Alaska and the Pacific Northwest, south to California and east to Montana and Wyoming. It is apparently at the edge of its range in western Wyoming where it is known from 2 locations in GTNP and a single site in YNP. This plant requires shade, and may be adversely affected by a canopy-removing fire that would alter light, temperature, and moisture conditions.

Fernald alkalai grass (*Torreyochloa pallida* var. *fernaldii*)

A short graminoid that grows in wetlands across northeastern U. S. and southeastern Canada, the taxon is disjunct in western Wyoming with the next nearest population being in Minnesota. It was probably accidentally introduced by either waterfowl or vehicular traffic in GTNP and occurs in wetlands near Moose. A fire would probably remove the above-ground portion of the plant, but it would most likely re-sprout from its deep rhizomes.

Western round-leaved violet (*Viola orbiculata*)

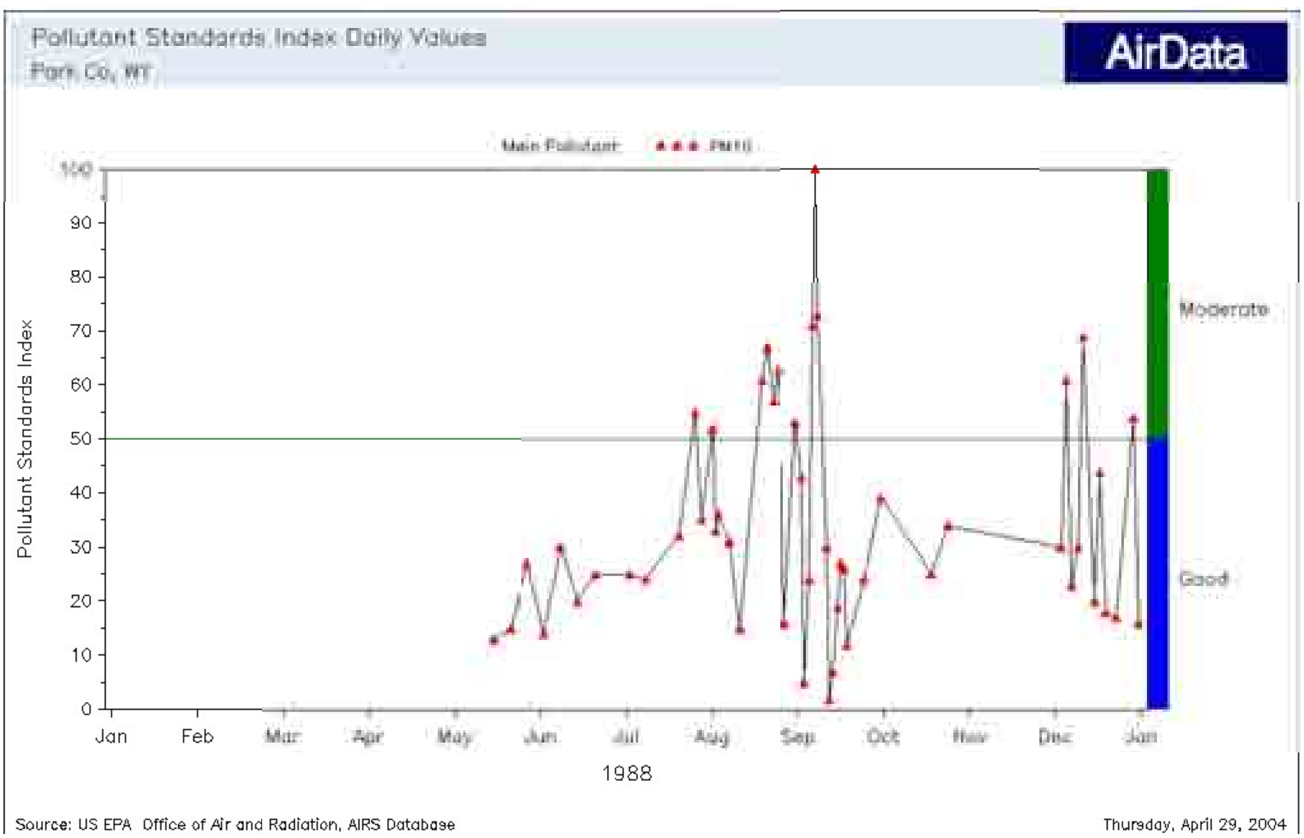
A species that occurs from British Columbia, south to Oregon and east to Montana and Wyoming. In GTNP, the species is known at sites in Webb, Cascade, and Waterfalls Canyons and to the JODR Memorial Parkway where it occurs in moist, shady forests. Fire would probably result in physically destroying the plants, opening the canopy, and modifying light and temperature conditions. However, the population in Waterfalls Canyon was discovered within an area that burned in the early 1970’s, so removal may be only temporary until the site returns to pre-fire conditions.

Beargrass (*Xerophyllum tenax*)

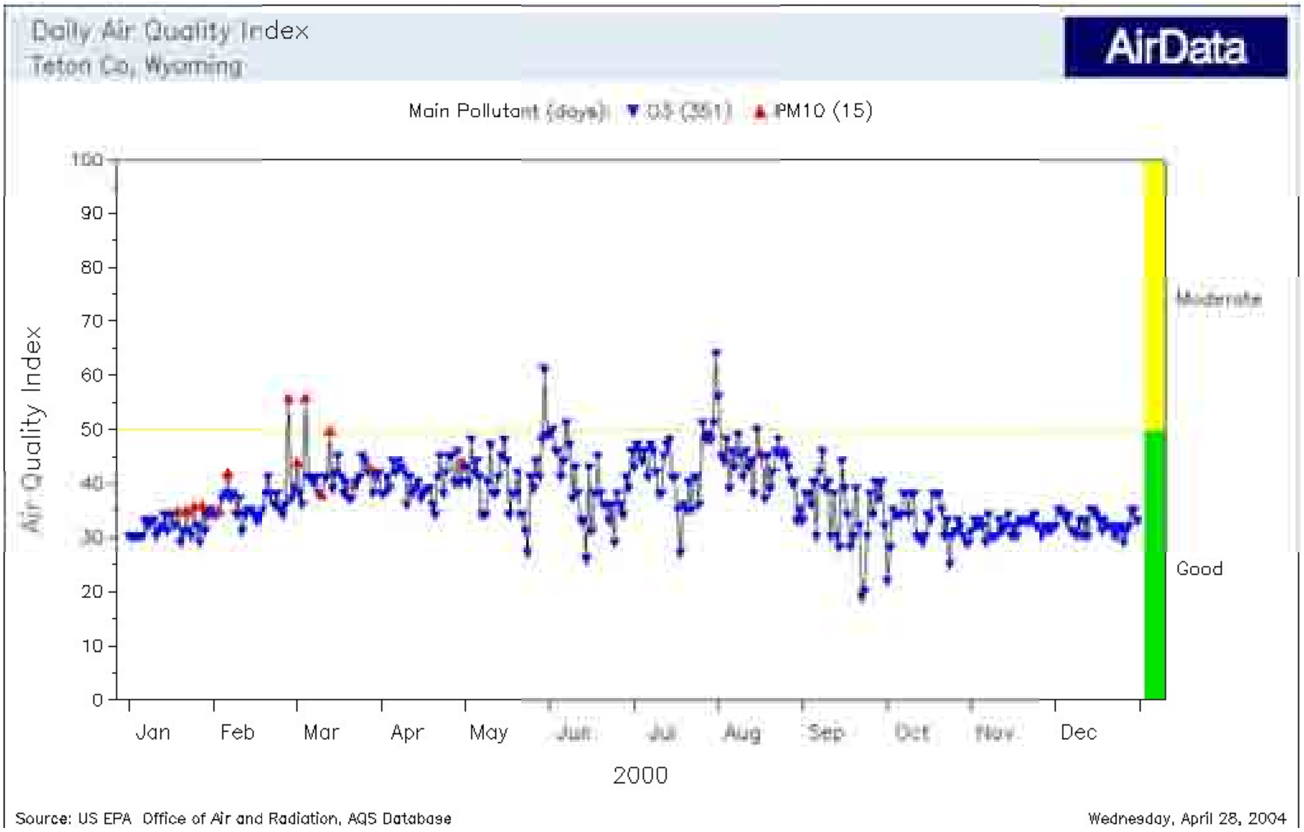
This species is a tall, densely matted perennial herb that is common in open woods and clearings of the Pacific Northwest and northern Rocky Mountains. The two known Wyoming populations are disjunct and may have originally established from propagules brought in by birds or motor vehicles. The species is well adapted to fire; on sites where it naturally occurs, canopy-removing fires will often result in extensive proliferation.

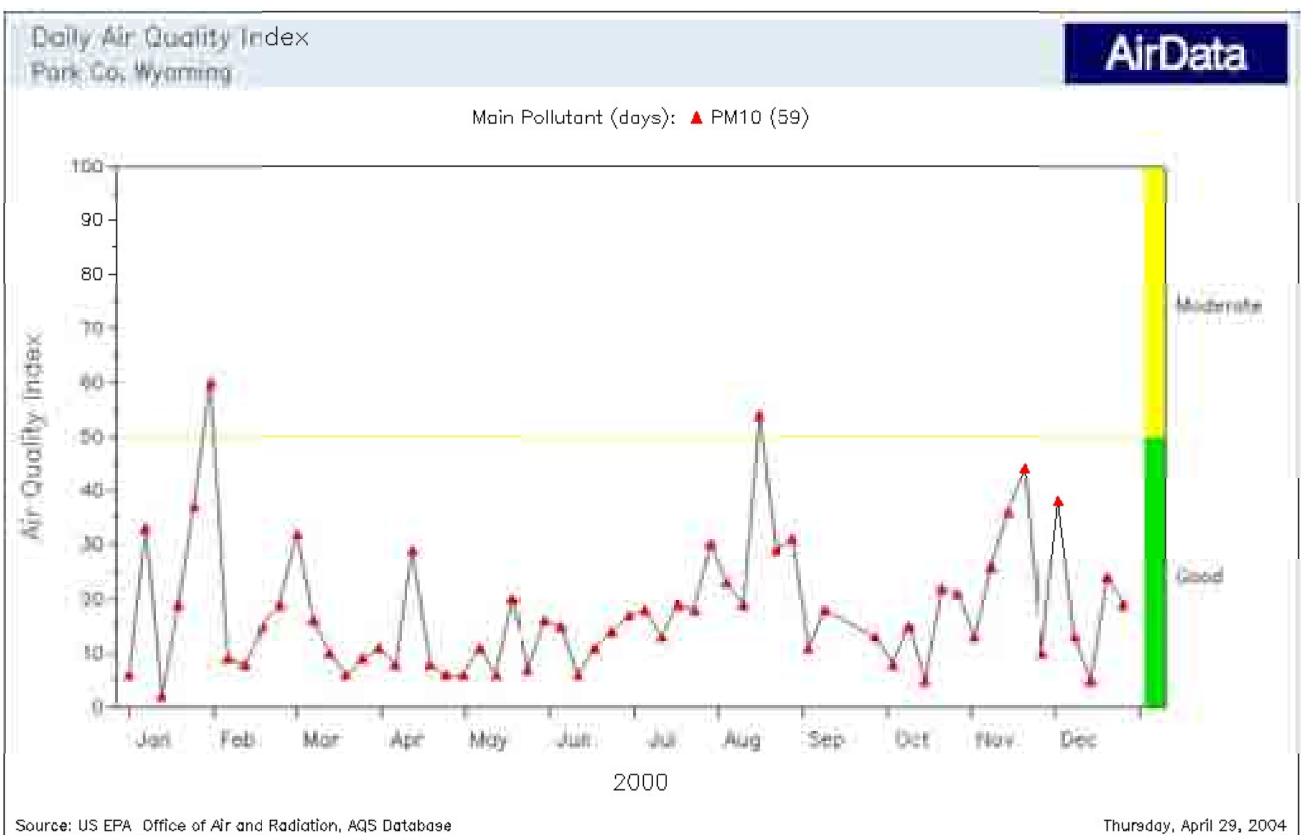
APPENDIX K: AIR QUALITY ANALYSIS: SUPPORTING DATA

Large Scale Fire Events: 1988 Fire Season

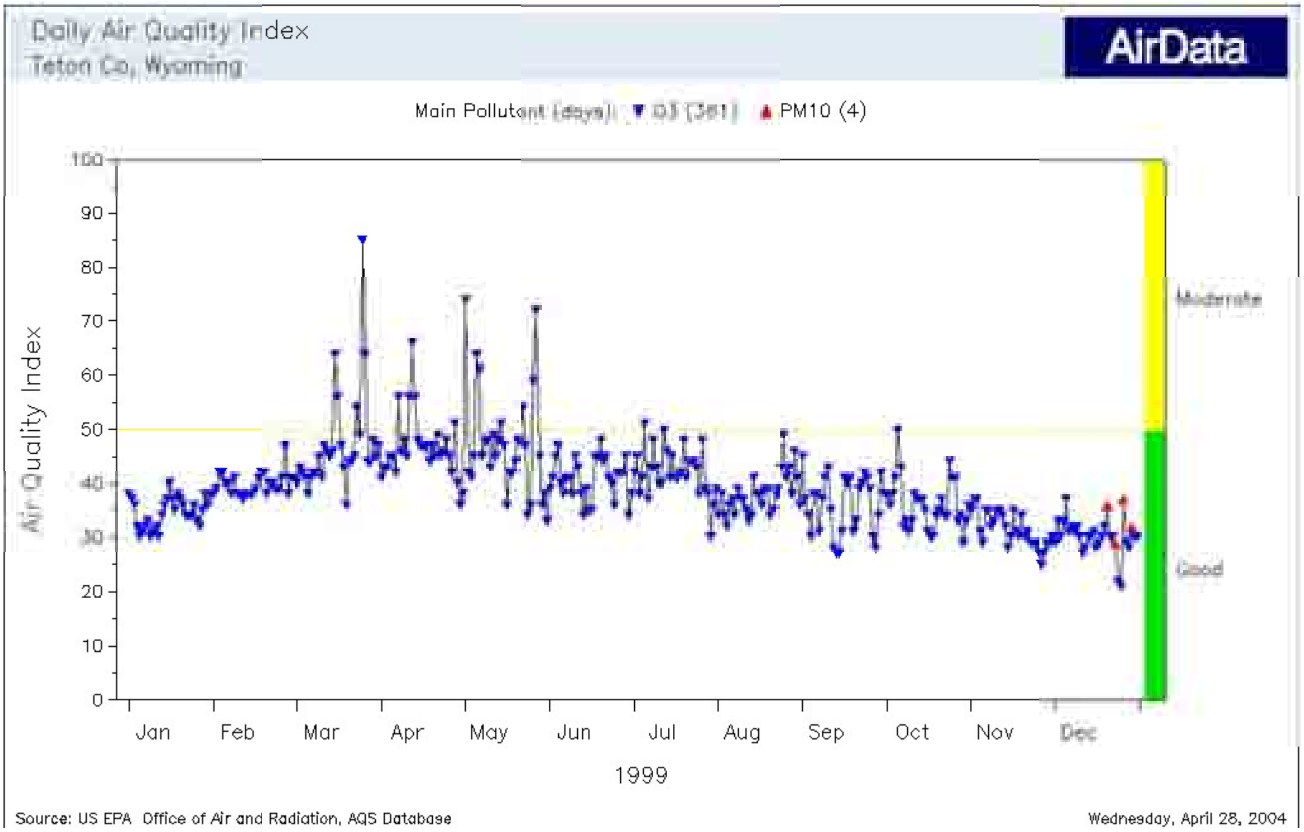


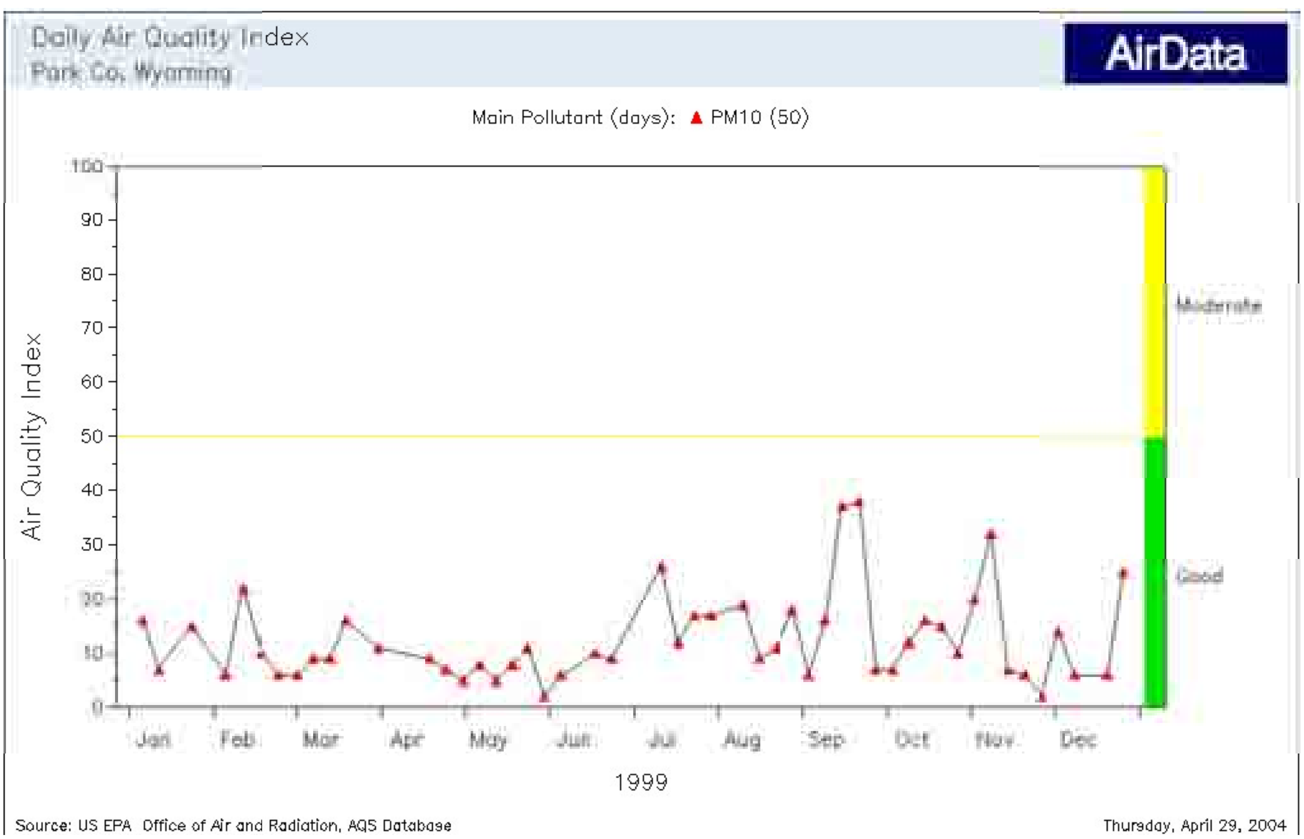
Large Scale Fire Events: 2000 Fire Season





Prescribed Burns in GTNP: 1999 Fire Season





PROGRAMMATIC

BIOLOGICAL ASSESSMENT

FOR THE

GRAND TETON NATIONAL PARK

FIRE MANAGEMENT PLAN

PREPARED BY THE NATIONAL PARK SERVICE

17 September 2004

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INTRODUCTION

This programmatic Biological Assessment (BA) presents and analyzes the effects of the preferred alternative (Alternative B) of the Grand Teton National Park (GTNP) Fire Management Plan Programmatic Environmental Assessment (GTNP 2004) on wildlife species listed or proposed for listing as threatened or endangered. For purposes of this document, references to “GTNP” or the “park” hereafter include both Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway.

Biological Assessments are prepared by the National Park Service (NPS) in compliance with the requirements of Section 102 of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332) and Section 7 of the Endangered Species Act (ESA). In accordance with Section 7(c) of the ESA, the NPS received from the United States Fish and Wildlife Service (FWS) a list of the threatened and endangered species that may be present in the GTNP Fire Management Plan (FMP) project area (Table 1).

Threatened, endangered, and proposed species are managed under the authority of the Federal Endangered Species Act (PL 93-205, as amended) and the NPS Organic Act (16 USC 1). The Endangered Species Act requires federal agencies to ensure all actions which they “authorize, fund, or carry out” are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species. NPS Management Policies (NPS 2001) requires the NPS to fully meet its obligations under the Endangered Species Act and the NPS Organic Act to “both proactively conserve listed species and prevent detrimental effects on these species.”

The programmatic BA accompanies the programmatic EA and includes design criteria and mitigation measures for threatened and endangered species within the park that, when implemented, would have a high likelihood of producing a “not likely to adversely affect” determination for all planned fire management activities. Special emergency consultation procedures are in effect and would be followed to determine effects to species for unplanned fire activities such as suppression and wildland fire use. Any fire activity or action that is out of the scope of the FMP and the EA would require separate NEPA analysis and consultation with the USFWS; however, all activities within the scope of the programmatic EA and BA would not require consultation on an action-by-action basis. Instead, GTNP would provide an annual report of fire activities to the USFWS and briefings at their request, in order to keep the USFWS fully apprised of all fire management activities within the park. This annual report and review process would give the USFWS an opportunity to monitor fire activity within the park, ensure compliance with the programmatic documents, and provide valuable feedback to the park on threatened and endangered species issues and latest regional findings. In summary, a BA would not be written and submitted to the USFWS for future planned activities within the scope of the new FMP unless the activity was unable to follow the design criteria. Consultation with the USFWS would be conducted on an annual basis using a fire activity report. The report format would be worked out between GTNP and the USFWS on a regular basis, as the need for information changes.

LISTED SPECIES IN GRAND TETON NATIONAL PARK

Species listed as threatened, endangered, or experimental/nonessential in Grand Teton National Park as of June 5, 2003 are provided in Table 1 (USFWS 2003).

Table 1. Federally listed threatened and endangered wildlife species occurring or potentially occurring in GTNP. *Data source: US Fish and Wildlife Service (USFWS 2003)*.

Wildlife Species	Federal Status	Habitat Affinity
Bald Eagle *Haliaeetus leucocephalus*	Threatened	Riparian Areas
Canada lynx *Lynx canadensis*	Threatened	Montane Forests, Forest Mosaics
Grizzly bear *Ursus arctos horribilis*	Threatened	Montane Forests
Gray wolf *Canis lupus*	Threatened in Natl. Parks	Various Throughout Greater Yellowstone Area

PROJECT DESCRIPTION

This BA has been prepared in conjunction with GTNP's Fire Management Plan Programmatic Environmental Assessment (FMPEA) and addresses fire management activities to be conducted during the 20-year period from 2005 to 2025.

The FMPEA analyzes a variety of fire management actions disclosed in the GTNP Fire Management Plan (FMP). These actions are linked to managing wildland fires, suppressing unwanted wildland fires, restoring the natural role of fire to the ecosystem, reducing fuel loads, and maximizing the long-term resource benefits of wildland fire; using prescribed fire to restore the role of fire to the ecosystem, reduce fuel loads, and dispose of debris piles; and mechanical fuel reduction to improve defensibility around Wildland Urban Interfaces (WUIs), human improvements, and other values at risk.

DESCRIPTION OF PROJECT AREA

GTNP is located in the northwest corner of Wyoming, just south of Yellowstone National Park (YNP) (Fig. 1). GTNP encompasses approximately 300,000 acres of land, with 135,680 acres of the park recommended for inclusion in the National Wilderness Preservation System and an additional 20,320 acres identified as potential wilderness. The John D. Rockefeller, Jr. Memorial Parkway comprises approximately 23,700 acres of land between the northern boundary of GTNP and the southern boundary of YNP.

The project area, in addition to being located just south of YNP, is also in proximity to numerous other public lands, including several large national forests and their associated wilderness areas. Together, these lands include 18 million acres called the Greater Yellowstone Area (GYA), which is considered one of the few remaining intact temperate ecosystems on earth (Greater Yellowstone Coalition 2004). The GYA is managed as an ecological unit through cooperative agreements and interagency coordination, which recognize the different mandates of the land management agencies.

DESCRIPTION OF PROPOSED ACTION

The proposed action (Alternative B: Multiple Strategies in the FMP EA) provides fire management staff with multiple tools (e.g., prescribed fire, mechanical treatments, wildland fire use, and suppression) available to manage fire. Mechanical treatments would continue to average 60-100 acres/year for the next 4-6 year. . Hazard fuel treatment projects would then decrease to a level of maintaining previously treated areas with some new treatment areas likely. Prescribed fire would be used to achieve resource objectives and as part of the hazard fuel reduction program. The Fire Management Office expects that prescribed fire treatment acres averaged for the next 10 years would remain similar to the current 10-year annual average (1,486 acres). For purposes of this analysis, the past 20 years of planned fire activity was examined and used to predict the extent that planned activities would be used during the next 20 years because the latter is expected to be similar in magnitude.

Hazard fuels treatments would be incorporated into the revised FMP and an adaptive management process would be adopted to formally guide fire management in GTNP. Fire Management Unit (FMU) suppression boundaries would be modified from existing FMUs and strategies would change to allow wildland fire use within any FMU within the park. Wildland fire use would be expanded as a result of the modified FMU strategy, adaptive management, and the enhanced flexibility to use prescribed and mechanical treatments as tools to reduce risks associated with allowing fire on the landscape. An adaptive fire management process would allow fire within the ecosystem based upon broader, more clearly defined resource objectives.

New resource objectives would be formulated to address the primary goal of maintaining fire's active role in ecosystem function. Resource objectives would be established by vegetation type rather than by FMU. Desired Future Conditions (DFCs) would be developed for vegetation types as well as for Wildland Urban Interface (WUI) areas and would strive to manage or return vegetation back to reference conditions (pre-settlement). Vegetation types would include: sagebrush steppe, persistent lodgepole pine, mixed conifer, Douglas-fir, aspen, high elevation mixed conifer, wetland/riparian, and current or former agriculture. DFCs would be subject to modification as new information is gathered and considered when developing annual prescribed fire and hazardous fuels reduction projects, as well as when making long-range decisions on the management of unplanned events.

EFFECTS ANALYSIS TO LISTED SPECIES

Bald Eagle

Status

The bald eagle was listed as an endangered species in Wyoming in March 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001) and again listed as endangered in 1978 under the ESA of 1973 (43 FR 6233). No critical habitat was designated. The Pacific States Bald Eagle Recovery Team was formed as a result of the 1978 listing and a recovery plan was completed in 1986 (USFWS 1986). GTNP lies within the Greater Yellowstone

Recovery Area (Zone 18 in the Recovery Plan). In part as a result of recovery plan implementation, populations of bald eagles began to increase by the mid-1980s. Consequently, the status of the bald eagle was down-listed from endangered to threatened on July 12, 1995. Recovery goals were subsequently met and, on July 6, 1999, the USFWS announced a proposal to remove (delist) the bald eagle from the endangered species list. No final action on the proposal to delist the eagle has occurred to date and the current status of this bird is on hold because of unresolved issues related to current and future protection and permitting. If delisting does occur, select bald eagle populations would be monitored for at least 5 years (P. Deibert 2002, pers. comm.) and individual eagles and nests would continue to be afforded protection under the Migratory Bird Treaty Act (MBTA) 16 U.S. Code 703 of 1918, and the Bald Eagle Protection Act 16 U.S. Code 668 of 1940.

Background

Eagles feed primarily on fish, waterfowl, and carrion. Bald eagles nesting in GTNP belong to the Snake Population Unit of the GYA (Greater Yellowstone Bald Eagle Working Group 1996). Most nesting territories in GTNP and YNP are located along major rivers or lakes within 3 miles of their inlets or outlets, or along thermally influenced streams or lakes (Alt 1980). Nests and roosts commonly occur in mature and old growth trees in multi-layered stands of Douglas fir, cottonwood, or spruce. Proximity to food, presence of suitable perches, and security from human activities are important habitat components for both nest and roost sites. Nest building or repair activities in the Jackson Hole region begins in early February and eggs are laid in late March or early April, followed by a 35-day incubation period (Swensen et al. 1986; Harmata and Oakleaf 1992; Stangl 1994).

Stalmaster (1987) reviewed a variety of published and unpublished studies (e.g., Master's theses and Ph.D dissertations) and reported that, in general, human disturbances to nesting bald eagles can adversely affect bald eagles by reducing nest occupancy, activity, parental care, success, and productivity. In contrast, Mathisen (1968) did not find a relationship between human disturbance and bald eagle nesting. Fraser et al. (1985) and Thelander (1973) suggest nesting bald eagles are somewhat adaptable to human disturbances. A tolerance to human disturbance by some individuals or nesting pairs of bald eagles within the Snake Population Unit has been reported (GYEBEWG 1996, BRCI 1997). Bald eagles in the Snake Population Unit are most sensitive to human-caused disturbance during the early portion of the nesting season (Harmata and Oakleaf 1992).

Since 1983, the Greater Yellowstone Bald Eagle Working Group has guided management of bald eagles in the GYA and published a bald eagle management plan for the GYA (GYEBEWT 1983). This group historically convened once or twice annually to foster interagency communication and direction, and identify, implement, and track necessary research, plans, and projects related to bald eagle ecology. During the 1980's the group contracted a major research project on the ecology of bald eagles in the GYA (Harmata and Oakleaf 1992), a study that was designed to provide information on the most pressing bald eagle conservation needs. During the last few years the group has been relatively inactive, largely because of the eagle's improved status and consequently, the decreasing need for intensive management.

The intended purpose of the Greater Yellowstone Bald Eagle Working Group was to identify specific threats to the GYA bald eagle population, provide management recommendations and direction, and implement the applicable recovery plans at a local level. This plan was updated in 1995 (GYEBEWG 1996) and included recommendations for bald eagles using 3 zones based on lineal distances from active and inactive bald eagle nests. Zone 1, referred to as the Occupied Nesting Zone, extends out from the nest 0.25 miles (0-1,320 ft); Zone 2, the Primary

Use Area, encompasses the area within 0.5 miles (2,640 ft) of the nest; and Zone 3, the Home Range has a radius of 2.5 miles (13,200 ft) from the nest.

Prior to being listed as an endangered species in 1967, 30-35 occupied bald eagle nesting territories were known in the GYA (GYEBEWT 1983). Between 1970 and 1995, the bald eagle population in the GYA increased dramatically (Stangl 1994), reaching over 100 known occupied nests by 1995 (GYEBEWG 1996). In 1998, 118 breeding territories were known, of which 105 were occupied. Population growth has been attributed to a significant reduction in the level of environmental contaminants (e.g., DDT) and the protection of nesting habitat (Stangl 1994).

Occurrence Within the Project Area

Bald eagle habitat in GTNP has been defined by park biologists as areas within 1/4 mile of the Snake River, Gros Ventre River, Buffalo Fork River, Cottonwood Creek, Jackson Lake, or other waterbodies (Appendix 1-Fig. 2). A total of 11 active bald eagle nesting territories were recorded in GTNP during 2003. Known territories are primarily located along the banks of the Snake River (n=8) and the shorelines of Jackson Lake (n=3). Bald eagles that nest along the Snake River may remain within their nest territories throughout the year, occasionally leaving for short periods during the non-breeding season to exploit abundant or ephemeral food sources elsewhere. In addition to spring, summer, fall, and winter use by resident breeding and non-breeding bald eagles, an unknown number of migrant bald eagles from northern latitudes spend much or all of the winter in this same area.

The number of occupied nesting territories in GTNP stayed relatively constant between 1990 (n=6) and 1999 (n=5) but more than doubled in 2001 and 2002 (n=12 each year), and 2003 (n=11). The annual number of eaglets fledged for all nesting territories averaged 5.9 and varied between 3 and 9 during this same period with 2002 showing a total of 8. The total number of young per territory and the total number of young per nest has remained relatively constant between 1990 and 2002.

Bald eagle management in GTNP involves annual nest location surveys, monitoring of annual nest territory occupancy and productivity, and seasonal area closures around active bald eagle nests. Seasonal area closures occur from February 15-August 15 and involve a 0.5-mile radius buffer zone around active bald eagle nests to provide protection from human disturbance.

Impact Analysis

When assessing the environmental consequences of the proposed action on bald eagles, it was assumed that eagles, as well as other wildlife and fish species inhabiting the Rocky Mountains have evolved, coexisted, and adapted to periodic fire disturbances in their habitats (Lyon et al. 2000). While some minor displacement of individual birds may occur in planned treatment areas and possibly even a loss during an uncontrolled wildfire, long-term benefits to bald eagle populations are expected as a result of restoration of fire-maintained habitat.

Fire can adversely affect bald eagles and their habitat in several different ways. A stand-replacing fire would likely change bald eagle use of a forest. Fires can burn trees within which eagles are nesting and could cause a nest to fail if the timing of this fire coincides with advanced egg incubation and brood-rearing activities. Heavy and persistent smoke can also adversely affect eagle reproduction. Fires that occur in and around a nest late in the rearing stage could cause eaglets to fledge early, when they are unable to sustain flight and increase the likelihood of mortality related to fire or predation. Intense fires have the potential of removing certain habitat component that are important to eagles, such as nesting and roosting trees and preferred perches used during foraging activities. Human activities associated with fire suppression can disturb eagles and disrupt egg incubation, foraging, and brood-rearing and, thereby, reducing reproductive success.

Fires can also benefit eagles and their habitat. Fires occurring along foraging habitat may, in the short-term, increase the number of perches used for foraging as a result of large trees dying and becoming snags. Patchy fires create mosaics in the understory and can provide more and healthier trees regeneration for replacement of habitat components associated with overstory woody vegetation (Harrington and Sackett 1991).

The number of occupied nesting territories and nest productivity were measures used to determine the level of impact to bald eagles resulting from the proposed action. In addition, the potential for human disturbance to nesting and foraging bald eagles was used as a means to assess indirect impacts to bald eagles. A "take" might occur if abandonment of a nest with eggs or young happens, or the loss of juvenile or adult birds resulted as a direct or indirect result of implementing an action.

Design Criteria for Planned Events or Wildland Fire Suppression Actions – Implementing the following project design criteria in planned fire events (e.g., mechanical treatments and prescribed burns) or in wildland fire suppression activities would proactively minimize fire-related adverse impacts to bald eagles and, in concert with adaptive management strategies, are expected to produce a "Not Likely to Adversely Affect" determination from the USFWS. Design criteria were derived, in part, from the Northwest National Fire Plan Project Design and Consultation Process website (http://www.blm.gov/fcp/) and are consistent with the Greater Yellowstone Bald Eagle Management Plan (Greater Yellowstone Bald Eagle Working Group 1996) and GTNP management guidelines.

- Project activity occurs outside of nesting season (February 1-August 15) in areas used by nesting bald eagles.
- Project activity occurs >1/2 mile from an active nest tree during the nesting season.
- Project activity occurs outside of winter roosting season (November 1-March 1) in areas used by winter roosting bald eagles. (No winter roost sites are known in GTNP.)
- Project activity occurs >1/2 mile from an active winter roost site during the winter. (No winter roost sites are known in GTNP.)
- Project activity protects all trees with active and inactive nests, as well as adjacent trees whose crowns touch the nest tree, from fire and mechanical damage.
- Project activity protects known or suspected perch trees from fire and mechanical damage.
- Project activity retains patches of young trees (generally in unburned or low intensity burn areas) as a recruitment source of future overstory trees except within hazardous fuel reduction areas (i.e., within 1/4 mile of structures).
- Project activity minimizes mortality to trees of desired species, size, and structure, with no more than 25% mortality of the basal area of overstory trees except within hazardous fuel reduction areas (i.e., within 1/4 mile of structures).
- Mechanical fuel reduction activities near nests would occur between one hour after sunrise and one hour before sunset to minimize impact to morning and evening foraging activities, or between August 16-January 31 when reproducing eagles and their offspring have left nesting areas.

- Fire Management personnel would consult with both the park's Resource Council and Fire Resource Advisor, and perform emergency consultation with the USFWS when necessary, regarding bald eagle nests and other sensitive areas proximate to fire incident areas during planned and unplanned events so that management actions can avoid or minimize impacts to bald eagles.
- The number of flights over active bald eagle nests during nesting season would be minimized.
- Helicopters/aircraft involved in fire management activities maintain greater than one-half mile distance from occupied bald eagle nests except in emergency situations as needed to protect human life or property.

The rationale for incorporating the above listed design criteria in fire-related activities are several-fold. Disturbances to bald eagles would be minimized by limiting project activities during important life history stages and within one-half mile of active nests. Protecting nest trees would facilitate future bald eagle nesting within a given nesting territory. Protecting trees with dbh >18" within bald eagle habitat and retaining forest canopy characteristics would insure important habitat components are available for perching (during foraging), roosting, and nesting. Protecting patches of young trees would provide for tree recruitment into overstory for future perching, roosting, and nesting by bald eagles.

Unplanned Events – Both wildland fire and fire suppression activities have the potential of affecting bald eagles and their habitat. However, adverse impacts occurring to bald eagles from wildland fire are unpredictable and considered to be an "Act of God" by the USFWS (50 CFR 402.05). In most cases, implemented mitigation measures and project design criteria would minimize the potential for adverse effects to bald eagles and consultation would not be necessary. Agency consultation with the USFWS would occur in the event that design criteria cannot be fully incorporated into fire management of an unplanned event and/or if suppression activities are expected to cause an adverse effect on bald eagles. This consultation, if needed, would be in the context of the emergency consultation process. The need for consultation, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual consultation, as needed.

Wildland fire use associated with the proposed action is expected to increase above current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised "Go/No-Go" process. No measurable adverse effects to bald eagles or their habitat are expected to result from unplanned events associated with the proposed action. Restoring the role of wildland fire in GTNP would benefit bald eagles in the long-term by creating more successional vegetative mosaics and improving habitat while simultaneously decreasing the likelihood of large, high-severity fires occurring in the future.

Planned Events – Planned events associated with the proposed action include a combination of prescribed burns and mechanical treatments. The need for consultation with the USFWS regarding planned events, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual review, as needed. In the event that design criteria cannot be fully incorporated into fire management of a planned event, GTNP would initiate USFWS consultation as soon as possible.

Desired Future Conditions" (DFCs) would be established for WUI areas and vegetation types to, in part, direct planned events. All planned events would be reviewed by GTNP's Resource Council and Fire Resource Advisor prior to project approval. This interdisciplinary team would review the specific tasks of each project action to ensure that all potential impacts of the proposed action have been adequately addressed and properly mitigated. The team would identify any new resource information obtained through the adaptive management process that may pertain to the management of specific species and make sure that all appropriate mitigation measures outlined in this biological assessment are applied to specific projects.

The proposed action has the potential of directly and indirectly affecting bald eagles through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species.

Mechanical treatments would be used to treat about 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year after that. Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence. Primary bald eagle habitat in GTNP occurs outside of developed areas although eagles can and do use WUI areas located in the vicinity of foraging habitat. As in the past, mechanical treatments would not occur within 1/2 mile from an active nest during the nesting season (February 1-August 15) and would protect all active and inactive nests and known or suspected perch trees.

Prescribed fire treatment acres would vary from season to season, but within a range that is similar to current annual variations. In the past ten years prescribed fire has treated as few as 20 acres and as many as 4,012 acres in a season (the annual average over this ten-year period is 1,486 acres). Annual use of prescribed fire is expected to vary based on weather conditions and modifications of program and resource objectives resulting from the Fire Management Plan's adaptive management strategies.

Prescribed fire is not expected to adversely affect bald eagles. Prescribed fires would not occur within 1/2 mile from an active nest during the nesting season (February 1-August 15) and would protect all active and inactive nests and known or suspected perch trees. Annual use of prescribed fire is expected to vary based on modifications of program and resource objectives resulting from the Fire Management Plan's adaptive management strategies.

Adverse effects to bald eagles or their habitat are not expected to result from planned events associated with the proposed action. Prescribed burns and mechanical fuel reductions have and would continue to be planned and implemented in a manner sensitive to critical life stages and protective of important habitat components. Implementing and/or adhering to the design criteria listed above would insure that impacts to bald eagles are minimized. If planned events are likely to adversely affect bald eagles these actions would incorporate additional NEPA compliance and consultation with the USFWS.

Cumulative Impacts

Residential development on private lands and recreational use of the Snake River outside of GTNP has increased dramatically in the recent past and this trend is expected to continue into the foreseeable future. However, in the face of past residential and recreational increases, the number of bald eagles nesting and producing young within the Snake Population Unit, including GTNP, has increased. The residential development and recreational use thresholds at which productivity of the Snake Population Unit eagle would decline is unknown but is not expected to occur as a result of this project or other projects proposed at this time.

Development activities have occurred and are expected to occur on private land within the home ranges of several resident bald eagle pairs in the vicinity of the park. GTNP has proposed building approximately 40 employee housing units on park land located immediately east and adjacent to planned affordable housing on the Jackson Hole Golf and Tennis Resort (JHGTR) property near the southern park boundary. Teton County land use regulations protect bald eagle nest sites by prohibiting development within one-quarter mile of a standing/occupied, active or inactive bald eagle nest without an "incidental taking permit or a statement of no jeopardy from the U.S. Fish and Wildlife Service, pursuant to the federal Endangered Species Act." The 400 m setback from active or inactive bald eagle nests is designed to minimize impacts to nesting bald eagles and has been adhered to in the vicinity of the JHGTR. GTNP would prepare an environmental assessment on the proposed employee housing project in the near future. However, the project area is over 2 miles away from the 2 nearest active bald eagle nests, both of which occur on private land located outside of GTNP.

An "Incidental Take" Statement for 18 bald eagles has been given to the Canyon Club development project within the Snake River Canyon in southern Jackson Hole by the USFWS because this potential "Take" was determined not to jeopardize the continued existence of the species. To date, no "take" of eagles has occurred as a result of that project.

Recreational activities such as floating, fishing, hiking, horseback riding, snow-shoeing, and skiing within bald eagle nesting and foraging areas could adversely impact nest occupancy and productivity if these activities occur in proximity to active nests. However, the park has been successful at minimizing human intrusion into the 0.5-mile radius spatial buffer around active bald eagle nests during the nesting season, thus minimizing disturbance to nesting eagles. GTNP also closes the Snake River riparian zone to human use during the winter and this action also helps minimize human-caused disturbances to nesting, foraging, and roosting bald eagles. There is no evidence that suggests current recreational use levels within GTNP or elsewhere in Jackson Hole has adversely affected bald eagle nesting. It is likely, however, that human recreational use of the Snake River, for example, may sometimes conflict with bald eagle foraging and may cause individual birds to be displaced from certain foraging areas when humans are present. In places of heavy recreational use, bald eagles appear to adapt to human presence and human-related disturbances by spatially and temporally adjusting their foraging activities and apparently do so without adversely affecting reproductive success (Harmata and Oakleaf 1992).

The impacts of past planned and unplanned fire management events on bald eagle nesting and reproducing in GTNP and in Jackson Hole appear to have been neutral and this trend is expected to continue if the proposed action is implemented. The number of occupied bald eagle nesting territories and nest productivity is expected to fluctuate annually but remain at or above levels recorded in the 1990's. Negative impacts to bald eagles resulting from the proposed action are expected to be minimal and are not expected to contribute to cumulative impacts to bald eagles in any measurable way.

Mitigation Measures

- All fire-related activities occurring within bald eagle habitat would be sensitive to critical life stages and habitat use by this species.
- Fire management personnel (firefighters and support personnel) would be briefed about Federally-protected species and procedures to minimize impacts.
- Annual monitoring of nest territory occupancy and productivity would be performed.

- Seasonal area closures would be maintained encompassing a 1/2 mile radius around active bald eagle nests between February 15-August 15 or later at the discretion of GTNP.
- Additional area closures may be enacted around bald eagle habitat if monitoring indicates they are warranted.
- Fire management personnel would consult with a park wildlife biologist if a bald eagle nesting area is included in a prescribed burn unit.
- Flight paths would be more than one mile from active bald eagle nests unless a different spatial restriction is warranted. In the event that a one-mile buffer cannot be achieved, areas within 1/2-mile of nests would be avoided, as much as possible, by aircraft (especially helicopters) ferrying supplies or personnel and by all aircraft using lakes for taking on water.
- The park would continue to support the objectives of the Greater Yellowstone Bald Eagle Management Plan.

Effects Determination and Summary of Rationale

A determination was made that implementing the proposed action **may affect but is not likely to adversely affect** bald eagles for the following reasons.

- All mitigation measures and design criteria would be fully implemented.
- Although bald eagles may be occasionally flushed from perches in proximity to fire control activities associated with unplanned events, these events are expected to be very infrequent and impacts are expected to be negligible and short-term and would not jeopardize reproductive success.
- Mechanical treatments in WUI areas located within bald eagle habitat may have negligible, short-term impacts on bald eagles but these areas already have reduced habitat effectiveness due to human presence.
- Management actions are not expected to jeopardize reproductive success of or increase the mortality risk to bald eagles.
- Mechanical treatments occurring within 1/2-mile of an active bald eagle nest would avoid the nesting season (February 1-August 15).
- No loss of nest, perch, or roost trees or primary aquatic foraging sites is anticipated as a result of proposed management actions.
- Activities associated with:1) fire control and suppression, such as fireline construction, burnout, patrol, mop-up, and monitoring fire effects; 2) hazard fuels removal with chainsaws that may include cutting, piling and burning; and 3) prescribed fire operations including project preparation, line location, firing operations, holding, patrol and mop-up, and fire effects monitoring are expected to have negligible, short-term effects on bald eagles if mitigation measures are followed.

Canada Lynx

Status

The Canada lynx was first proposed for listing as a threatened species under the ESA in July of 1998 and was formally listed in April 2000. The USFWS determined the lynx population in the United States was at risk as a result of human alteration and fragmentation of montane and boreal forests; low numbers caused by past exploitation and inter-specific competition for prey with bobcats and coyotes; and elevated levels of human access to their habitat. The final rule to list lynx in the lower 48 states emphasized the need for management and protection of lynx habitat on public lands (primarily public lands administered by the USDA-Forest Service and USDI-Bureau of Land Management) in order to ensure the continued survival of the species in the “contiguous United States distinct population segment”.

Background

Lynx are solitary carnivores generally occurring at low densities in boreal forests. Distribution and abundance of this species is closely tied to that of the snowshoe hares (*Lepus americanus*), their primary prey. In Wyoming, lynx occur primarily in spruce-fir and lodgepole pine forests with slopes of 8-12 degrees and at elevations from 7995-9636 ft (Ruediger et al. 2000). Densely regenerating coniferous forests and regenerating burned areas in mixed species forests provide excellent habitat for snowshoe hares and, therefore, are also important habitat for lynx. Aspen intermixed with spruce, fir, or lodgepole pine with extensive shrub growth and woody debris provide high quality habitat for snowshoe hares. Sagebrush-grassland covertypes support alternative prey for lynx such as white-tailed jackrabbits, mountain cottontails, and ground squirrels. Dense willow thickets and beaver pond complexes may also provide some foraging opportunities. Lynx denning habitat consists of late successional spruce-fir forests on north-facing slopes with relatively high densities of large diameter woody debris. Dispersal corridors, principally continuous conifer forests several miles in width, are critical for lynx travel and dispersal (Tanimoto 1998).

In Wyoming, the Canada lynx has been protected as a non-game species with no open season since 1973. It is considered rare in the State by the USFWS (1998) and is classified as a Category 2-Species of Special Concern by the Wyoming Game and Fish Department, indicating that habitat is limited and populations are restricted or declining (NPS 1998). Ruediger et al. (2000) reported the historical presence of lynx in western Wyoming from YNP through the Wind River and Wyoming Mountain Ranges. Fertig and Beauvais (1999) report lynx sightings in Teton and Lincoln counties of Wyoming from the mid-1980’s and 1990’s.

Historical information suggests that lynx were present but uncommon in YNP from 1880-1980 although the reliability of this information is questionable. Records of lynx in Wyoming show the highest concentrations of confirmed observations in the northwest corner of the state including YNP, GTNP, and the Teton, Gros Ventre, Absaroka, Beartooth, Wind River, and Wyoming Mountain Ranges (Reeve et al. 1986). Consolo-Murphy and Meagher (1999) and NPS (2002) documented 57 sightings and track reports of Canada lynx in YNP from 1893-1995 with most sightings and track records occurring after 1930. From 1995-2000, 5 unverified sightings of Canada lynx were reported in YNP, 3 on the Northern Range and 2 in the park interior (Gunther 2002, unpublished data). The veracity of these 5 sightings is questionable because Canada lynx are easily confused with bobcats by inexperienced observers. A number of studies conducted during the 1990’s to document the presence of rare carnivores in YNP failed to detect Canada lynx (Harter et al. 1993, Gehman et al. 1994, Gehman and Robinson 1998, and Murphy, unpublished data).

Occurrence Within the Project Area

Information on lynx abundance and distribution within GTNP is mostly lacking. Park records include 12 anecdotal lynx observations (NPS 2002a), but the veracity of these reports is unknown and none have been confirmed. Only 2 lynx sightings have been reported in GTNP in the past 10 years, one at the Murie Ranch in 1992 and one in Moran Canyon in 1998. A 169-km snow-track transect survey in northern GTNP and vicinity in 1998 found no evidence of lynx (S. Patla 2000, pers. comm.).

A research project focusing on determining the presence of Canada lynx in GTNP was conducted in 2001 and 2002. Pyare (2001, 2002) used summer hair-snare surveys and winter tracking techniques in an attempt to detect lynx and its 2 principle prey species (snowshoe hare and red squirrel). Possible lynx tracks and a day-bed were observed along Arizona Creek and productive snowshoe hare habitat was found near Grassy Lake Reservoir and Glade Creek.

A 3-year research study in YNP documented a female lynx and her male kitten in the east-central portion of YNP and a male in the Absaroka Mountains between Gardiner and Livingston, Montana; found probable lynx tracks near Le Hardy Rapids and Cub Creek; and found a possible lynx tracks near Mary Mountain (Murphy et al. 2003). These researchers cautioned that demonstrating lynx presence does not prove that resident individuals are present in YNP and that detected animals could be entirely transient or may be only partially resident in YNP.

Forest covertypes located in the northern, northeastern, and southwestern portions of the park are within the elevational range and appear to be generally suitable habitat for lynx. Based upon general habitat preferences and existing vegetative covertypes, potential habitat for Canada lynx is believed present in GTNP, although current occupation by lynx is unknown. Three years of surveying within and around GTNP has failed to detect lynx presence. Low habitat quality (e.g., low densities of snowshoe hares) make it likely that Canada lynx, if present, would also occur at very low densities, perhaps only as transients (S. Cain 2002, pers. comm.).

Impact Analysis

The measures used to determine the level of impact include the loss of potential habitat and displacement of individuals. Although the presence of a resident population of lynx within GTNP is considered unlikely, the presence of transient individuals moving through the park is possible.

Canada lynx inhabiting GTNP and the GYA have evolved in the presence of fire under historic fire regime conditions. In the past century, however, fire suppression has changed lynx habitat and it is likely these habitat changes were not positive to lynx. Fire exclusion has altered vegetative mosaics and species composition, and may have reduced the quality and quantity of habitat for snowshoe hares and adversely affected lynx (Ruediger et al. 2000). Fire exclusion in areas with infrequent fire returns has probably had only minor impacts. However, areas where the fire regime was historically frequent or mixed have become more homogeneous, composed of more shade-tolerant species with more canopy layers, and more susceptible to severe fires, insects, and diseases. Restoring fire as an ecological process can greatly benefit lynx habitat and periodic vegetation disturbances associated with fire maintain the successional forest mosaics that the snowshoe hare prey base requires, even at moderately long intervals (Rowe and Scotter 1973). Although short-term impacts of fire in localized areas may be detrimental to lynx, the long-term benefits are positive.

Koehler and Aubry (1994) and Witmer et al. (1998) suggest that fire can be either detrimental or beneficial to lynx depending upon the size of fires and their distribution across the landscape. Fires that affect forests within a natural disturbance regime may be neutral or beneficial to lynx while large, high-severity fires may adversely affect lynx. Because lynx populations oscillate to varying degrees with snowshoe hare populations, fires that create snowshoe hare cover and food generally benefit lynx (Heinselman 1973, Koehler and Brittell 1990). Most studies have found that densely regenerating forests typically produce the highest densities of snowshoe hare (Koehler 1990, Koehler et al. 1979, Weaver 1993, Koehler and Aubry 1994), a key element to lynx habitat. However, Beauvais (1997) found that snowshoe hares had a strong affinity for the higher elevation mature to late-successional spruce-fir forests and hares were out-competed by other species in early successional stages (less than 15 years of age). Similarly, Dolbeer and Clark (1975) found the highest densities of snowshoe hare in mature and late-successional spruce-fir forests. It remains unclear what role early-successional forests play in providing quality lynx foraging habitat in the Rocky Mountains.

Lynx usually do not cross openings greater than 100 meters and use travel corridors with tree densities of 180 stems per acre (450/ha). Therefore, fires that create large openings without leaving travel corridors between pockets of dense forest may be detrimental to lynx (DeVos 1952, Grange 1965).

In response to the uncertain status of lynx in the conterminous United States and to the ESA listing, an interagency lynx coordination effort between the USFWS, USFS, and BLM, and NPS was initiated in March 1998. In January 2000, a “Canada Lynx Conservation Assessment and Strategy” (LCAS) was completed and approved (Ruediger et al. 2000).

Potential habitat for Canada lynx was mapped in GTNP based upon habitat preferences and existing vegetative covertypes. Five Lynx Analysis Units (LAUs) were identified which include approximately 96,000 ac of potential lynx habitat (Table 2, Appendix 1-Fig. 3). No data on the quality of potential lynx habitat within GTNP LAU’s has been collected. But recent efforts to find evidence of lynx within and around GTNP has failed to document lynx presence and similar efforts in YNP have yielded evidence of only 3 lynx.

Table 2. Tabulation of Lynx Analysis Units (LAU’s) within GTNP. *Data source: GTNP GIS Office October 9, 2003.*

LAU	Total Area (ac)	Potential Habitat (ac)	Percent Habitat
Rockefeller	37,519	30,033	80%
Steamboat	18,498	15,734	85%
Two Ocean	29,954	20,201	67%
Webb	26,295	14,093	50%
Granite	37,561	16,140	43%
Totals	149,827	96,201	64%

GTNP relies on guidance provided in the LCAS (Ruediger et al. 2000) to determine if proposed management actions would be detrimental to lynx or their habitat. GTNP has, in the past, used both the “30% Criterion” and the “15% Conversion” measures (see below) described in the LCAS to assess impacts to lynx habitat. The intent in doing so is to provide a consistent and objective way to document and measure potential impacts to lynx and lynx habitat in GTNP.

30% Criterion – The LCAS states that "In the absence of guidance developed from a broad-scale assessment of landscape patterns that compares historical and current ecological processes and vegetation patterns, limit disturbance within each LAU as follows: if more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities by federal agencies."

15% Conversion - "Management actions (e.g., timber sales, salvage sales) shall not change more than 15 percent of [suitable] lynx habitat within a LAU to an unsuitable condition within a 10-year period."

An analysis of habitat suitability was performed by GTNP from which percentages of suitable and unsuitable lynx habitat within park LAUs was calculated (2004 unpubl. data; Table 3). The habitat suitability calculation shows that the percentage of unsuitable habitat within each of the 5 LAUs is well below the "30% Criterion" recommended by the LCAS (range 9-19%). Habitat suitability calculations within GTNP are believed to overestimate unsuitable habitat for several reasons. Vegetation data used to produce the lynx habitat suitability map was generated using satellite imagery from the early 1990's with an intended application scale at the eco-region level, (i.e., geographic areas from several hundred thousand to millions of hectares in size) and errors result when they are used at a finer scale.

Table 3. Tabulation of suitable and unsuitable lynx habitat within GTNP Lynx Analysis Units (LAU's). *Data source: GTNP Fire Management Office August 19, 2004.*

	LAUs (ac)				
Area Type	**Berry**	**Granite**	**Steamboat**	**Two Ocean**	**Webb**
Non-WUI					
Non-Habitat	7363	19596	2474	8802	14181
Suitable	24289	14330	14340	16463	12616
Unsuitable	4830	93	461	1729	1403
WUI					
Non-Habitat	171	1751	298	1003	36
Suitable	831	1693	968	1787	72
Unsuitable	18	16	15	220	1
Totals					
Non-Habitat	7533	21348	2773	9804	14218
Habitat	29968	16132	15784	20200	14092
Suitable	24289	14330	14340	16463	12616
% Suitable	81%	89%	91%	82%	90%
Unsuitable	5679	1801	1444	3737	1477
% Unsuitable	**19%**	**11%**	**9%**	**18%**	**10%**

Using the habitat suitability calculations presented in Table 3, a second analysis was performed to determine the percentage of suitable lynx habitat converted into an unsuitable condition as the result of management actions occurring in the past 10 years (i.e. 1994-2004) within each LAU (GTNP 2004, unpubl. data; Table 4). The habitat conversion calculation shows that the percentage of suitable habitat converted into an unsuitable condition is below the "15% Conversion" recommended by the LCAS in 4 of the 5 LAUs (range 9-11%). Only in the Two Ocean LAU (18%) does the estimated conversions exceed the 15% level and this is because of the inclusion of 2 prescribed burns totaling 1,831 acres in the calculation. Both the Jackson Lake Lodge Willow Prescribed Burn (1,101 acres) and the Cow Lake Prescribed Burn (730 acres) occurring within the Two Ocean LAU were low intensity burns caused only minimal vegetation structure changes within their respective fire perimeters. When this combined acreage is removed from the calculation, habitat conversion estimates within the Two Ocean LAU drop to 9%.

Table 4. Tabulation of the percentage of lynx habitat conversion from a suitable to an unsuitable condition in the past 10 years (1994-2004) within GTNP Lynx Analysis Units (LAU's). *Data source: GTNP Fire Management Office August 20, 2004.*

	LAUs				
Area Type	**Berry**	**Granite**	**Steamboat**	**Two Ocean**	**Webb**
Non-WUI					
Non-Habitat	7363	19596	2474	8802	14181
Suitable	26613	14424	14397	16466	12616
Unsuitable	2505	0	404	1727	1403
WUI					
Non-Habitat	171	1751	298	1003	36
Suitable	849	1708	983	2007	74
Unsuitable	0	0	15	220	1
Totals					
Non-Habitat	7533	21348	2773	9804	14218
Habitat	29968	16132	15784	20200	14092
Habitat Totals					
Suitable	26613	14424	14397	16466	12616
Unsuitable	3354	1708	1403	3954	1478
% Converted	**11%**	**11%**	**9%**	**18%**	**10%**
Revised * % Converted	**11%**	**11%**	**9%**	**9%**	**10%**

* Revised % Converted - Both the Jackson Lake Lodge Willow Prescribed Burn (1,101 acres) and the Cow Lake Prescribed Burn (730 acres) occurring within the Two Ocean LAU were low intensity burns that did not change vegetation structure within their respective fire perimeters. Therefore acreages of these 2 prescribed fires have been eliminated from the calculation.

The GTNP lynx habitat suitability and percent conversion models provide worst-case scenarios regarding percentages of suitable and unsuitable lynx habitat and conversions of habitat into unsuitable conditions due to certain data limitations. Several factors influence the accuracy of these calculations and tend to overestimate unsuitable habitat estimations and are presented below.

- Fires tend to burn in mosaic patterns ranging between unburned areas to high fire severity areas where almost all vegetation has been consumed within a defined fire perimeter. Areas of unburned or lightly burned vegetation almost always occur within a burn perimeter and simply using fire perimeters does not account for these ranges in fire severity and vegetative characteristics. The models used to create GTNP's lynx habitat suitability and percent conversion calculation re-classed areas within mapped fire perimeters, dating back 20 years, as unsuitable habitat.
- Fire severity research in GTNP since 2000 indicates that most fires have large areas within the burn perimeter where fire severity was low and little structural change occurred. It is difficult to detect vegetation change resulting from fires within many lightly burned areas a year or two after the burn and it is likely that many areas within burn perimeters continue to represent suitable lynx habitat.
- Wildland fire or other vegetation treatments that have occurred within lynx habitat within the last 15-20 years are considered to have converted lynx habitat into an unsuitable condition. Even areas with poor site potential, where regeneration is slow and the period for habitat to become suitable may be longer, are accounted for in the 15-20 year return interval. In reality, many fire perimeters used to map habitat suitability are associated with fires that burned from 1985-88 and, according to the models, would be returning to a "suitable" condition within the next few years if they are already in a suitable condition.
- Burned areas with lower fire severity may presently be suitable habitat or are expected to return to a suitable habitat condition in a much shorter time period. This may be particularly true for areas treated by prescribed fire and other low intensity treatments (e.g., mechanical, burn piles).
- A strong indication of fires burning in mosaic pattern is derived from a review of the vegetation data used to create the lynx habitat suitability and percent conversion calculation. The vegetation data were generated from satellite imagery taken in the early 1990's (Metadata from Land Characterization of Region 4 - GAP analysis, 1998) and burns used to define unsuitable habitat occurred before the satellite imagery was taken. Image analysis and interpretation show that variably sized areas within burn perimeters appear to represent suitable lynx habitat but it is unknown if the forest understory changed sufficiently to make them unsuitable. However, based on the recent fire severity data, it is likely that at least some of these areas remain in a suitable habitat condition.

Vegetation mapping for the entire park is currently being updated and, when completed, would provide a new and more accurate estimate of suitable and unsuitable lynx habitat.

<u>Design Criteria for Planned Events or Wildland Fire Suppression Actions</u> – Implementing the following project design criteria in planned fire events or in wildland fire suppression activities would minimize adverse impacts to Canada lynx and are expected to produce a "Not Likely to Adversely Affect" determination from the USFWS. These criteria were derived, in part, from the Northwest National Fire Plan Project Design and Consultation Process website (http://www.blm.gov/fcp/) and are consistent with the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000).

- Activity occurs ≥1 mile from known denning site with kittens present.
- Less than 30% of lynx habitat in an LAU is in an unsuitable condition.

- Less than 15% of lynx habitat in an LAU has been converted to an unsuitable condition in last 10 years.
- If action is ≤200 feet from human structures then the two previous criteria need NOT be met.
- Fire Management personnel would consult with both the park's Resource Council and Fire Resource Advisor, and perform emergency consultation with the USFWS when necessary, regarding Canada lynx and their habitat proximate to fire incident areas during planned and unplanned events so that management actions can avoid or minimize impacts to lynx.

The rationale for incorporating these design criteria in fire-related management activities are several. GTNP is believed to provide historical landscape vegetation patterns conducive to support lynx and past activities, except perhaps fire exclusion, have not substantially altered historical landscape vegetation patterns. Therefore, existing conditions appear to provide adequate foraging habitat to meet the needs of reproducing lynx. In the absence of guidance developed from a detailed assessment of landscape patterns comparing historical and ecological processes and vegetation patterns within GTNP (as per recommendations in the LCAS) and if more than 30% of potential lynx habitat within a LAU is currently in unsuitable condition, no further reduction of suitable conditions would occur as a result of vegetation management activities ("30% Criterion"). Management actions (e.g., mechanical treatments, prescribed burns) would not change more than 15% of lynx habitat within a LAU into an unsuitable condition within a 10-year period ("15% Conversion"). Areas of high human uses, such as WUI areas, are believed to have diminished habitat quality and reduced habitat effectiveness and hazardous fuel reduction within 200-500 ft of these structures may reduce habitat quality within these areas. Conducting project actions away from active denning sites would reduce human-caused disturbances to reproducing lynx.

<u>Unplanned Events</u> – Both wildland fire and fire suppression activities have the potential of affecting Canada lynx and their habitat. However, adverse impacts occurring to lynx from wildland fire are unpredictable and considered to be an "Act of God" by the USFWS (50 CFR 402.05). In most cases, implemented mitigation measures and project design criteria would minimize the potential for adverse effects to lynx and consultation would not be necessary. Agency consultation with the USFWS would occur in the event that design criteria cannot be fully incorporated into fire management of an unplanned event and/or if suppression activities are expected to cause an adverse effect on lynx. This consultation, if needed, would be in the context of the emergency consultation process. The need for consultation, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual consultation, as needed.

Wildland fire use associated with the proposed action is expected to increase above current levels and allow between 30-60% of natural starts to be managed as fire use. Each natural start would be reviewed using a revised "Go/No-Go" process. Short-term measurable adverse effects to lynx habitat are expected to result from allowing more wildland fires to burn. The extent of impact resulting from future wildland fire cannot be predicted but would be analyzed as part of the annual compliance review associated with annual reporting and briefing to the USFWS. Restoring the role of wildland fire in GTNP would benefit lynx in the long-term by creating more successional vegetative mosaics and improving habitat for their primary prey while simultaneously decreasing the likelihood of large high-severity fires occurring in the future.

Planned Events – Planned events associated with the proposed action include a combination of prescribed burns and mechanical treatments. The need for consultation with the USFWS regarding planned events, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual review, as needed. In the event that design criteria cannot be fully incorporated into fire management of a planned event, GTNP would initiate USFWS consultation as soon as possible.

Desired Future Conditions" (DFCs) would be established for WUI areas and vegetation types to, in part, direct planned events. All planned events would be reviewed by GTNP's Resource Council and Fire Resource Advisor prior to project approval. This interdisciplinary team would review the specific tasks of each project action to ensure that all potential impacts of the proposed action have been adequately addressed and properly mitigated. The team would identify any new resource information obtained through the adaptive management process that may pertain to the management of specific species and make sure that all appropriate mitigation measures outlined in this biological assessment are applied to specific projects.

The proposed action has the potential of directly and indirectly affecting lynx through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Mechanical treatments would be used to treat about 60-100 acres per year for the next 6 years and possibly slightly fewer acres per year after that. Hazardous fuel reduction efforts are proposed to occur within WUI areas and some of these actions are expected to convert some suitable lynx habitat into an unsuitable condition. However, the majority of potential lynx habitat in GTNP occurs outside of developed areas. Most WUI areas are located adjacent to major roadways and/or in areas of high human use and are assumed to have a relatively low probability of lynx presence when compared to other areas of potential habitat within the park. Depending upon the environmental setting, mechanical treatments may reduce habitat quality and generate short-term noise effects that may displace individual lynx if present. If lynx displacement occurs, it is expected to be temporary and would not affect adults or kittens during critical life stages.

Prescribed fire treatment acres would vary from season to season, but within a range that is similar to current annual variations. In the past ten years prescribed fire has treated as few as 20 acres and as many as 4,012 acres in a season (the annual average over this ten-year period is 1,486 acres). Annual use of prescribed fire is expected to vary based on weather conditions and modifications of program and resource objectives resulting from the Fire Management Plan's adaptive management strategies. Short-term affects of prescribed fire may cause a small reduction in habitat, reduce habitat quality, and may displace individual lynx. The long-term affects are expected to be increased vegetative diversity that favors snowshoe hare, red squirrels, and other alternate prey species and creation denning habitat.

Prescribed burns and mechanical fuel reductions would be planned and implemented in a manner sensitive to critical life stages of and protective of important habitat components for lynx. Implementing and/or adhering to the "Design Criteria" listed above would insure that adverse impacts to lynx are minimized. The programmatic consultation agreement developed between GTNP and the USFWS would result in an annual review of planned and unplanned events. All planned events that do not comply with the above listed "Design Criterion" and are likely to adversely affect lynx or their habitat would incorporate additional NEPA compliance and consultation with the USFWS.

Compliance with LCAS – The 30% criterion for unsuitable habitat and the 15% conversion of suitable habitat into an unsuitable condition within each LAU were used to assess impacts of the proposed action on potential lynx habitat. For reasons stated above, these calculations are believed to over-estimate actual unsuitable habitat and are viewed as a “worst-case” scenario for potential lynx habitat in GTNP.

The 30% criterion (habitat suitability) analysis performed by GTNP (Table 3) showed that past disturbances associated with management actions (i.e., prescribed burns, and fuel reduction treatments) and wildland fire within the 5 LAUs in the past 15-20 years have not resulted in unsuitable habitat exceeding the 30% criterion in any LAU. The maximum disturbances associated with the proposed action within its 10-year timeframe (1,400 acres of prescribed burns annually, 1,000 acres of mechanical treatments), when added to estimations of existing unsuitable habitat, are not expected to exceed the 30% recommendation within any given LAU.

The revised habitat conversion calculation (Table 4) shows that the percentage of suitable habitat converted into an unsuitable condition is below the “15% Conversion” recommended by the LCAS in the 5 LAUs (range 9-11%). The maximum disturbances associated with the proposed action within its 10 to 20-year timeframe (1,400 acres of annual prescribed burns, 60-100 acres of annual mechanical treatments), when added to estimations of suitable habitat converted into an unsuitable condition, are not expected to exceed the 15% recommendation within LAUs.

Cumulative Impacts

Cumulative impacts to lynx and lynx habitat within the GYA are related to current and future land use practices occurring primarily on lands administered by the federal agencies (i.e., Bridger-Teton, Shoshone, Targhee, and Gallatin National Forests; YNP and GTNP) and the States of Wyoming, Montana and Idaho. Actions occurring on private lands may also contribute to cumulative impacts, but to a far lesser degree.

Management actions occurring in the GYA that may affect lynx include timber management, wildland fire use and management, prescribed fires, hazard fuel reduction programs, grazing (both inside and outside the park), and furbearer trapping. All of these activities, with the exception of trapping, have the potential of affecting lynx habitat by changing forest successional stages, and consequently, influencing snowshoe hares and lynx distribution and may contribute cumulatively to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for lynx. However, federal land management agencies in the GYA have identified LAU’s on lands they respectively administer and each agency considers protection of potential lynx habitat in relation to various management actions taken by these agencies and others.

Recent hazardous fuel reduction projects within GTNP may have contributed to lynx cumulative impacts in a very minor way and planned events associated with the proposed action may continue this trend. Hazardous fuel reductions around WUIs and prescribed burns could result in short-term displacements of lynx and reduce habitat quality within treatment areas and may minimally contribute to cumulative impacts to lynx. Allowing up to 30% of natural fire starts to burn would help restore wildland fire and its positive influence on lynx habitat into GTNP. The proposed action is not expected to increase, in the long-term, human presence within or improved access to lynx habitat that would further reduce habitat security and effectiveness. Therefore, the contribution of the proposed action to lynx cumulative impacts is expected to be minimal.

Mitigation Measures

- GTNP would continue following the recommendations of the Lynx Conservation Assessment and Strategy.
- Project-related impacts to potential lynx habitat would be analyzed annually by park personnel as part of the compliance review between GTNP and the USFWS.
- GTNP would continue to support research on lynx ecology.
- Historic, recent, and current information on lynx occurrence within GTNP and the GYA would be reviewed and the possible impacts of both planned and unplanned events on lynx would be assessed.
- No new roads or large openings would be created and, to the extent possible, permanent and temporary travel ways and machine-built firelines would be minimized and reclaimed so that barriers to lynx movement and increased access to potential lynx habitat by competitors can be avoided and connectivity within and between LAUs would be maintained.
- Construction of firebreaks on ridges or saddles within lynx habitat would be avoided whenever possible.
- Where feasible, fire management actions would be conducted in a manner that maintains adequate lynx denning habitat, such as retaining large dead and down woody debris.
- Prolonged disturbances around denning habitat would be avoided from May-August.
- Fire management personnel would consult with the park's Resource Council and Fire Resource Advisor when planning mechanical fuel reduction and prescribed burns, in order to minimize potential impacts to lynx.

Effects Determination and Summary of Rationale

A determination was made that implementing the proposed action **may affect but is not likely to adversely affect** Canada lynx for the following reasons.

- All mitigation measures and design criteria would be fully implemented.
- The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of the species within the GYA.
- Direct mortality of lynx is not likely because lynx are highly mobile and individuals are expected to leave wildland fire and planned event project areas.
- Adverse effects to lynx and their habitat resulting from planned and unplanned events are expected to be negligible and of a short-term duration. Lynx may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability.
- Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on lynx habitat.
- The proposed action adheres to programmatic and project planning standards recommended in the Lynx Conservation Assessment and Strategy. Implementing the proposed action would not result in unsuitable lynx habitat exceeding 30% of a given

LAU and would not convert more than 15% of suitable habitat into an unsuitable condition.

Grizzly Bear

Status

Grizzly bears once ranged over most of western North America, from the Arctic Ocean to central Mexico. Although still abundant throughout much of Canada and Alaska, the range of grizzly bears in the lower 48 states is confined to 6 separate areas in Wyoming, Montana, Idaho, and Washington covering less than 1% of its historic range in the lower 48 states (USFWS 1993). Grizzly bears currently inhabit much of the GYA, including portions of YNP, GTNP, and Bridger-Teton, Shoshone, Caribou-Targhee, Gallatin, and Custer National Forests.

Between 1800 and 1975, this grizzly population was reduced from an estimated 100,000 animals to less than 1,000 as a result of habitat destruction and intensive persecution from livestock interests (USFWS 1982). By 1974, some scientists estimated that fewer than 200 grizzlies remained in the GYA (Craighead et al. 1995). In 1975, grizzly bears were listed as threatened under the ESA in the lower 48 states. In 1982, a recovery plan for grizzly bear populations in the contiguous United States was completed and implemented (USFWS 1982). Guidelines for grizzly bear recovery were developed in 1983 by the Interagency Grizzly Bear Committee (IGBC 1986). The IGBC is comprised of representatives from the NPS, USFWS, USFS, BLM, and the state wildlife agencies of Idaho, Montana, and Wyoming. Recovery zones and population goals were established in the Grizzly Bear Recovery Plan (USFWS 1982) and revised Grizzly Bear Recovery Plan (USFWS 1993). These plans established 6 grizzly bear recovery zones in the contiguous United States, one of which encompasses a portion of the GYA including much of GTNP. The revised Grizzly Bear Recovery Plan established measurable population parameters as indicators of population status for the GYA (USFWS 1993). The USFWS would consider removing the GYA population of grizzly bears from threatened species status when these demographic recovery goals are met. The grizzly bear population recovery parameters for the GYA are:

- An average of 15 adult females with cubs-of-the-year over 6-years inside the recovery zone and within a 10-mile area surrounding area.
- Sixteen of 18 Bear Management Units (BMU's) occupied by females with young for 6 years; no 2 adjacent BMU's shall be unoccupied.
- Known human-caused mortality not to exceed 4% of the minimum population estimate based on the most recent 3-year sum of females with cubs.
- No more than 30% of this 4% mortality limit shall be females. These mortality limits cannot be exceeded during any 2 consecutive years for recovery to be achieved.
- Approximately 125,000 acres of GTNP are within the Primary Conservation Area as defined by the Conservation Strategy for the Grizzly Bears in the Yellowstone Ecosystem. Development within this recovery zone is restricted and requires an equivalent area within the conservation area to be restored as useable grizzly bear habitat.
- Prior to delisting, habitat-based recovery criteria, a conservation strategy that demonstrates that adequate regulatory mechanisms are in place to ensure long-term

protection of grizzly bears in the primary conservation area, and State plans that outline management strategies outside of the primary conservation area must be developed and approved by the USFWS.

After being listed as a threatened species in 1975, grizzly bear population estimates in the GYA continued to decline through the early 1980's. Starting in the mid-1980's, annual minimum population estimates have increased (Haroldson et al. 1998, Haroldson and Frey 2001), largely due to lower numbers of human-caused grizzly bear mortality, especially of adult female grizzly bears. In 2003, 53 unduplicated females with young were estimated in the GYA (Haroldson 2004). Absolute minimum population estimates for grizzly bears in the GYA based on counts of adult females with cubs-of-the year, have increased from a low of 99 in 1979 (Haroldson et al.1998) to a high of 354 in 2000 (Haroldson and Frey 2001). Eberhardt et al. (1994) evaluated population trends based on reproductive and survival rates and estimated a rate of increase of 4.6 percent annually since the mid- to late-1980's.

All grizzly bear population recovery parameters were achieved for the first time in 1994, but grizzly bear mortality limits were exceeded during the next 3 years (1995-97). All population recovery parameters were again achieved from 1998-2001 and habitat-based recovery criteria, a conservation strategy, and state plans are currently being developed. When completed, the USFWS would likely consider removing GYA grizzly bears from threatened species status.

Background

The life history of the grizzly bear is well documented and ongoing research continues to add substantive details and knowledge to this large dataset. Craighead et al. (1982) characterized essential grizzly bear habitat as space, isolation, sanitation, food, denning sites, vegetation types, and safety. Grizzly bears require large home ranges (50-300 sq mi for females; 200-500 sq mi for males), encompassing diverse forests interspersed with moist meadows and grasslands in or near mountains. In the spring, bears usually range at lower elevations and go to higher altitudes for winter hibernation. Food habits of grizzly bears in the GYA have been described by Knight et al. (1984) and are strongly influenced by seasonal variation in food availability. In general, whitebark pine nuts, graminoids, and ungulates are the most important foods in the grizzly bear's diet, but fish, small mammals, herbaceous vegetation, tubers, fruit, and insects are also used (Mattson et al. 1991). Ungulate carcasses are an important high quality food source for bears (Mattson 1997) and will often attract and hold bears in localized areas for periods of several days to a week or more. Typical den sites are situated on high, remote, mountain slopes where deep snow functions as insulation and persists until spring. Grizzlies often dig beneath the roots of large trees to create hibernacula. The greatest threat to grizzly bears is human-caused mortality. Grizzlies become habituated to humans because of attractants such as garbage, pet foods, livestock carcasses, and improper camping practices. These attractants usually lead to conflicts between people and bears, and the most common outcome is that the bear is eventually killed.

Occurrence Within the Project Area

Grizzly bear occurrence in GTNP has increased during the past 20 years, most likely in response to increases in bear densities throughout the GYA (Pyare et al. 2004). Grizzly bears are now relatively common in the southern GYA including the Gros Ventre Mountains southeast of GTNP and are regularly observed in the Teton Mountain Range north of Paintbrush Canyon and in the Badger Creek drainage (GTNP 2003). Grizzlies have been infrequently observed on the valley floor south of the Triangle X Ranch, in Death Canyon, and south of GTNP in the vicinity of Teton Village and along the Snake River south of Jackson. A map depicting grizzly bear distribution in GTNP is presented in Appendix 1-Figure 4.

Management of grizzly bears and grizzly bear habitat in GTNP follow the Interagency Grizzly Bear Guidelines (1986) and the park's Human-Bear Management Plan (GTNP 1989). These documents were developed to provide effective direction for the conservation of grizzly bears and their habitat to federal agencies responsible for managing land within the recovery zone. The objectives for managing grizzly bears in GTNP are to:

- Restore and maintain the natural integrity, distribution, and behavior of grizzly bears.
- Provide opportunities for visitors to understand, observe, and appreciate grizzly bears.
- Provide for visitor safety by minimizing bear/human conflicts, by reducing human-generated food sources, and by regulating visitor distribution.

In order to achieve grizzly bear management objectives in GTNP, the Human-Bear Management Plan (GTNP 1989) calls for educating the public and providing information on grizzly bear occurrence and how to avoid bear encounters, removing artificial food sources, enforcement of regulations, managing and controlling nuisance bears, and continuing to conduct grizzly bear research.

Management of grizzly bears in both the GYA and, more specifically, in GTNP has been highly successful in promoting grizzly bear recovery and reducing bear-human conflicts (e.g., property damages, incidents of bears obtaining human food, bear-inflicted human injuries) and human-caused bear mortalities in the park. Recreational and administrative facilities, human activities, and human waste (garbage and sewage) in GTNP are managed in a manner that results in relatively few human-caused grizzly bear mortalities. Bears that are typically very wary of humans will often tolerate people at close distances when carcasses are available due to the high quality of this bear food. Carcasses on or within 300 ft of roads may create large "bear-jams" and potentially pose a hazard to bears that could be hit by vehicles while approaching carcasses to scavenge. To reduce these risks, road killed carcasses of large animals located on and within 100 m of roads are dragged away from roads or are loaded into trucks and hauled to areas away from visitor activity.

Impact Analysis

Fire is a natural process integral to maintenance of healthy ecosystems in the Rocky Mountains. Grizzly bears lived with fire in their habitat for thousands of years and have evolved to maximize their ability to use burned areas and minimize the negative impacts of fire. Wildland fires typically create a mosaic pattern of burned and unburned vegetation on the landscape. The overall long-term impact of fire on grizzly bear habitat is that it increases habitat diversity, maintains the resilience and vigor of ecosystems, and is beneficial to grizzly bears (USFWS 2003).

Fire can create and maintain seral shrub communities used by grizzly bears by rejuvenating shrubs, releasing nutrients, and discouraging conifer dominance (Zager 1980). In addition, burns may create openings that enhance forb and grass production. These are important food sources, comprising up to 80% of the grizzly bear diet from May through July in Glacier National Park (Kendall and Keane 2001). Natural fire programs as well as prescribed burning for improved grizzly habitat are encouraged and practiced by some National Forests (Contreras and Evans 1986). Fires can promote and maintain many important berry-producing shrubs and forbs, as well as provide a medium for insects and in some cases carrion. Martin (1979) found that huckleberry was most productive on sites burned between 25-60 years previously. Huckleberry on sites left untreated for more than 60 years was least productive. Blanchard and

Knight (1990) found the most important immediate effect of fires on grizzly bears was the increased availability of some food items, such as carrion.

Fires may damage or reduce important grizzly foraging areas during the growing season by removing vegetation. Immediate sprouting of herbaceous vegetation following fire would provide some food benefit to bears, although usually not enough to compensate for losses, depending on the species, amount and quantity of bear foods in the area. In the long-term, up to 50 years after burns, fire can have a stimulating effect on whitebark pine reproduction, potentially benefiting grizzly habitat. Fire also would create openings in the forest and invigorate huckleberry production and would indirectly benefit the species through habitat improvement in the long-term. However, it could take 3-20 years for huckleberry to reach pre-burn coverage, depending on fire severity, elevation, slope, aspect, and edaphic and other factors (Arno et al. 1985, Coates and Haeussler 1986.

Indirect benefits to grizzly bears from forage enhancement would vary depending on the vegetation types burned, the extent and severity of the fires, and the overall landscape mosaic available to bears. Following the 1988 fires in Yellowstone, radio-telemetered grizzly bears avoided burned sites during 1989, but not in subsequent years (Blanchard and Knight 1996). They concluded that the short-term effects of the fires were beneficial to grizzly bears largely because of increased production of diet items such as forb foliage and tuberous root crops in burned habitats.

Direct mortality of grizzly bears due to fire (e.g., wildfire, prescribed burns) is unlikely, although it has been documented in Glacier National Park (NPS 2003) and is suspected in YNP. Grizzly bears may be displaced, at least temporarily, during fire events. The 1988 Yellowstone fires showed that wildland fire benefits to grizzly bears are vastly more positive than negative (Blanchard and Knight 1990). Of 21 marked bears with home ranges overlapping burns, only 1 female with cubs was presumed killed in the fires. After the fires, grizzly bears fed on carcasses of ungulates killed in the fires, grazed on newly emerged vegetation, foraged on ants and other insects inhabiting dead and down woody debris, and also continued foraging in non-burned areas. Bears drawn into burned areas, possibly attracted by carcasses, were less likely to have encounters with humans. Fires had no apparent effects on home range sizes, mean rates of movement, or choice of den sites, and bears used burned habitats in proportion to their availability within their ranges. A loss of whitebark pine seeds may have adversely affected grizzly bears in the short-term (Blanchard and Knight 1990). However, fire is an important process in whitebark pine ecology and, over the long-term, fires would have a beneficial impact by increasing the age class diversity in whitebark pine stands (Kendall and Keane 2001) and insuring the longevity of this important grizzly bear food source so long as the fires do not cause stand replacement.

Activities associated with prescribed fire operations including project preparation, fire line location, firing operations, holding, patrol and mop-up, and fire effects monitoring may temporarily displace grizzly bears, depending on the season. Mechanical fuel reduction typically occur only around developed areas in the park and while there could be some temporary displacement of bears due to noise and human presence and small amounts of habitat alteration, most if not all of this work would be conducted in WUI areas where grizzly bears use is discouraged.

The measures used to determine the level of impact include bear mortality, habituation (acquired tolerance to humans or human activities), food-conditioning (attraction to or reliance on human-originated food), human-bear conflicts, and the loss of habitat.

Design Criteria for Planned Events or Wildland Fire Suppression Actions – Implementing the following project design criteria in planned fire events or in wildland fire suppression activities would minimize adverse impacts to grizzly bears and are expected to produce a "Not Likely to Adversely Affect" determination from the USFWS. These criteria were derived, in part, from the Northwest National Fire Plan Project Design and Consultation Process website (http://www.blm.gov/fcp/) and are consistent with the Interagency Conservation Strategy Team (2003), Interagency Grizzly Bear Guidelines (1986) and the park's Human-Bear Management Plan (GTNP 1989).

- Project crews working in grizzly bear habitat, regardless of number of individuals and number of days would meet standards for sanitation, attractant storage, and access.
- Burned Area Emergency Rehabilitation Plans would not result in grizzly bears being attracted to reclamation areas in proximity to human uses or other high-risk areas.
- Prescribed fires would avoid areas where mature whitebark pine is a significant component of the vegetation unless current scientific information suggests otherwise.
- Projects avoid known denning areas within the denning season (November 15-April 15).
- Firelines would be reclaimed and would not function as motorized or non-motorized travel ways after the project.
- Fire Management personnel would consult with both the park's Resource Council and Fire Resource Advisor, and perform emergency consultation with the USFWS when necessary, regarding grizzly bears and their habitat proximate to fire incident areas during planned and unplanned events so that management actions can avoid or minimize impacts to grizzly bears.

The reasons for incorporating these design criteria in fire-related activities are several. Habitat protection commitments have been made by GTNP via the conservation strategy for the Yellowstone grizzly bear population (Interagency Conservation Strategy Team 2003) that specifically calls for a "no net loss" of secure habitat within the recovery zone. Adhering to sanitation, attractant storage, and access standards outlined in the Interagency Grizzly Bear Guidelines (1986) would minimize the potential for disturbance, direct mortality, or attracting bears leading to human/bear conflicts. Educating people that would be working and/or recreating in grizzly bear habitat would help reduce human/bear conflicts. Reclaiming disturbed sites in high-risk areas with palatable forage attracts bears and increases contact between bears and humans and results in a corresponding increased mortality risk for bears. Conducting project actions away from active denning sites would reduce human-caused disturbances to hibernating grizzly bears.

Unplanned Events – Both wildland fire and fire suppression activities have the potential of affecting grizzly bears and their habitat. However, adverse impacts occurring to grizzly bears from wildland fire are unpredictable and considered to be an "Act of God" by the USFWS (50 CFR 402.05). In most cases, implemented mitigation measures and project design criteria would minimize the potential for adverse effects to grizzly bears and consultation would not be necessary. Agency consultation with the USFWS would occur in the event that design criteria cannot be fully incorporated into fire management of an unplanned event and/or if suppression activities are expected to cause an adverse effect on grizzly bears. This consultation, if needed, would be in the context of the emergency consultation process. The need for consultation, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual consultation, as needed.

Wildland fire use associated with the proposed action is expected to increase above current levels (i.e., allowing between 30-60% of natural starts to be managed as fire use) and each natural start would be reviewed using a revised “Go/No-Go” process. Direct impacts to grizzly bears (i.e., mortality) resulting from wildland fires and suppression activities are possible, but considered unlikely. Short-term measurable adverse effects to grizzly bear habitat are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted. Once quantified, however, these impacts would be analyzed as part of the annual compliance review between GTNP and the USFWS. Restoring the role of wildland fire in GTNP would benefit grizzly bears in the long-term by creating more successional vegetative mosaics and improving habitat for their while simultaneously decreasing the likelihood of large, high-severity fires occurring in the future.

<u>Planned Events</u> – Planned events associated with the proposed action include a combination of prescribed burns and mechanical treatments. The need for consultation with the USFWS regarding planned events, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual review, as needed. In the event that design criteria cannot be fully incorporated into fire management of a planned event, GTNP would initiate USFWS consultation as soon as possible.

Desired Future Conditions” (DFCs) would be established for WUI areas and vegetation types to, in part, direct planned events. All planned events would be reviewed by GTNP’s Resource Council and Fire Resource Advisor prior to project approval. This interdisciplinary team would review the specific tasks of each project action to ensure that all potential impacts of the proposed action have been adequately addressed and properly mitigated. The team would identify any new resource information obtained through the adaptive management process that may pertain to the management of specific species and make sure that all appropriate mitigation measures outlined in this biological assessment are applied to specific projects.

The proposed action has the potential of directly and indirectly affecting grizzly bears through modification of suitable habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species.

Prescribed fire treatment acres would vary from season to season, but within a range that is similar to current annual variations. In the past ten years prescribed fire has treated as few as 20 acres and as many as 4,012 acres in a season (the annual average over this ten-year period is 1,486 acres). Annual use of prescribed fire is expected to vary based on weather conditions and modifications of program and resource objectives resulting from the Fire Management Plan’s adaptive management strategies. Prescribed burns may adversely impact grizzly bears in the short-term by altering plant communities and displacing grizzly bears from certain portions of habitat, but ultimately are expected to improve habitat conditions.

Mechanical treatments would be used to treat about 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly fewer acres per year after that. Mechanical treatments may cause very small reductions in grizzly bear habitat, reduce habitat quality, and generate short-term noise effects that may displace individual bears near WUI areas. However, these actions are not expected to adversely affect grizzly bears because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence.

Mechanical treatments and prescribed burns would be planned and implemented in a manner sensitive to critical life stages of and protective of important habitat components for grizzly bears. Implementing and/or adhering to the “Design Criteria” listed above would insure that adverse impacts to grizzly bears are minimized. The programmatic consultation agreement developed between GTNP and the USFWS would result in an annual review of planned and unplanned events. All planned events that do not comply with the above listed “Design Criteria” and are likely to adversely affect grizzly bears or their habitat would incorporate additional NEPA compliance and consultation with the USFWS.

Cumulative Impacts

Actions occurring on public lands within the recovery zone that may adversely affect grizzly bears or their habitat, such as oil and gas exploration and development, logging, and mining, are limited by the ESA (USFWS 1982) and are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing, which may impact grizzly bears through management actions
- Private land development
- Firewood cutting
- Road use/management
- Timber harvest (past)
- Recreation activities, especially big game hunting, that leads to human-bear conflicts
- Vegetation management
- Wildland fire and prescribed fires
- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression)
- Potential reduction in elk and bison populations

These activities and issues cumulatively contribute to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above listed activities as well as other unidentified actions occurring within the grizzly bear recovery zone does not appear to be adversely affecting population recovery as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996, Schwartz et al. 2002, Pyare et al. 2004).

The proposed action is not expected to increase, in the long-term, human presence within or improved access to grizzly bear habitat that would further reduce habitat security and effectiveness. The proposed action could result in short-term displacements of grizzly bears within planned treatment areas and would contribute, in a very minor way, to cumulative impacts to grizzly bear. A short-term increase in human presence during treatment activities could increase the risk of conflicts between humans and bears, but simultaneous implementation of project design criteria and mitigation measures would help insure these increases would not contribute to cumulative mortality risks.

The contribution of the proposed action to grizzly bear cumulative impacts is expected to be minimal. Implementation of project design criteria and mitigation measures would help insure that cumulative impacts associated with the proposed action would be very small.

Mitigation Measures

- No human foods or other bear attractants would be available during project activities at any of the project sites.
- Project crews would not carry firearms.
- Educate employees about packing out all food and other bear attractants. Project crews would carry bear pepper spray when conducting project activities and would have gone through the park's standard bear safety training program.
- Certain areas may be closed to public entry to promote separation of bears and humans at critical times and/or locations.
- All grizzly bear/human confrontations would be reported.
- Fire management personnel would consult with the park's Resource Council and Fire Resource Advisor when planning mechanical fuel reduction and prescribed burns, in order to minimize potential impacts to grizzly bears.
- Low-level flights would be minimized and avoid open alpine meadows where possible.
- GTNP would continue participating in ongoing grizzly bear research to assess bear abundance, distribution, and habitat selection. Research findings would assist park managers in protecting important habitats and planning activities that minimize impacts to bears.

Effects Determination and Summary of Rationale

A determination was made that implementing the proposed action **may affect but is not likely to adversely affect** grizzly bears for the following reasons.

- All mitigation measures and design criteria would be fully implemented.
- Adverse effects to grizzly bears and their habitat resulting from planned and unplanned events associated with the proposed action are expected to be negligible and of a short-term duration. Grizzly bears may avoid treatment areas during project implementation, but would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts are associated with prescribed burns or wildland fire use are expected to be small in scale and short-term in duration and, therefore, negligible because they would be within the historic range of fire impacts on grizzly bear habitat. Changes in habitat structure related to the project are unlikely to significantly alter habitat values because grizzly bears are habitat generalists and suitable, high quality habitat is abundant in GTNP and its vicinity.
- The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of this species within the GYA. Direct mortality of grizzly bears is not likely because bears are highly mobile and individuals are expected to leave planned event project areas and wildland fire areas.

Gray Wolf

Status

The subspecies of the northern Rocky Mountain wolf was initially listed as an endangered species in 1973 (38 FR 14678). Due to taxonomic concerns, the entire species (*Canis lupus*) was listed as endangered in the contiguous United States outside of Minnesota, where it was listed as threatened in 1978 (43 FR 9607). Although gray wolves are native to the GYA (Young and Goldman 1944), human persecution resulted in their extirpation by the 1930's (Phillips and Smith 1996).

Fourteen wolves representing 3 packs from Alberta were released into YNP in March 1995 and an additional 17 wolves from British Columbia were released into more widespread locations throughout YNP in 1996. Wolves reintroduced into YNP and central Idaho are classified "nonessential experimental" according to section 10(j) of the ESA of 1973, as amended (16 U.S.C. 1531). However, in national parks and wildlife refuges, nonessential experimental populations are treated as threatened species and all provisions of Section 7 of the ESA apply (50 CFR 17.83(b)). All wolves occurring elsewhere in the state of Wyoming are classified as nonessential experimental (59 FR 60256).

The recovery criterion for wolf restoration is to maintain at least 30 breeding pairs in 3 northern Rockies recovery areas (i.e., GYA, central Idaho, and northwest Montana). Once 30 pairs are established and reproducing across the 3 recovery areas for 3 successive years, in an equitable spatial distribution as defined by the USFWS, the gray wolf would be biologically eligible for removal from the endangered species list in Idaho, Montana, and Wyoming. Idaho and Montana have produced state wolf management plans and these plans have been accepted by the USFWS. As of mid-2004, the state of Wyoming had not finalized an accepted wolf management plan and, until that occurs, wolves will not be delisted.

Background

Wolf distribution varies depending upon prey abundance and includes a variety of habitats (e.g., grasslands, sagebrush steppes, coniferous and mixed forests, riparia, and alpine areas). Wolves tend to be flexible in their habitat needs and are considered habitat generalists. Key components of wolf habitat are: 1) a sufficient, year-round prey base of ungulates and alternate prey; 2) suitable and somewhat secluded denning and rendezvous sites; and 3) sufficient space with minimal exposure to humans (USFWS 1987).

Low elevation river bottoms that are relatively free from human influence provide important winter range for ungulates and wolves. Wolves are especially sensitive to disturbance from humans at den and rendezvous sites during the breeding period. Human activity near den sites can lead to pack displacement or physiological stress perhaps resulting in reproductive failure or pup mortality (Mech et al. 1991). Indirectly, wolves support a wide variety of other species; common ravens, coyotes, wolverines, mountain lions and bears feed on the remains of animals killed by wolves. Bald and golden eagles routinely feed on the carcasses of animals killed by wolves during the winter. As apex predators, wolves also help regulate the populations of their prey ensuring healthy ecosystems and greater biodiversity (Terborgh 1988). Small mammals also provide an important source of food during the non-winter months.

Occurrence Within the Project Area

At the end of 2003, at least 301 wolves in 27 packs occupied GYA. The Teton Pack is the only wolf pack currently using GTNP consistently, although observations of other wolves with unknown pack affiliations are occasionally reported in the park. The traditional home range of the Teton Pack includes a small portion of Grand Teton National Park with the remainder of its territory within the Gros Ventre River drainage. This pack first denned in Grand Teton National Park in 1999 and has continued to den in GTNP since. In spring 2004, the Teton pack consisted of about 18 wolves (9 adults and yearlings and 9 pups).

The Gros Ventre Pack resided in the vicinity of GTNP between 1999-2001 and may have ventured into the park from time to time. However, the pack quit producing pups after 2 adult Gros Ventre wolves were killed in control actions in summer 2000, Based on the lack of recent visual observations, winter track counts, and reported sightings, the Gros Ventre Pack is believed to no longer exist.

Wolf activity is concentrated in areas with dense populations of big game and, in the winter, wolves frequent elk feed grounds on the NER and in the Gros Ventre River drainage. There is no consistent wolf activity in the southern portion of GTNP but confirmed wolf sightings have been reported and the proximity of the southern portion of the park to the NER makes it highly likely that wolves use this area. Gray wolves are considered present throughout the project area but only in limited numbers.

Wolf management in the park consists of monitoring wolf population dynamics and gathering ecological data relevant to the wolf's return to the GYA. To determine territory sizes and locate dens, collared wolves are monitored using both ground-based and aerial telemetry. By observing dens, birthing dates are estimated and the number of pups counted. In addition, wolf deaths are investigated and wolf-prey relationships are documented by observing wolf predation directly and by recording characteristics of wolf prey at kill sites. Collaborative research is ongoing and represents pioneering work on wolf ecology. All management and monitoring activities are closely coordinated with the USFWS.

Impact Analysis

Actions that adversely affect wolves include human activity at or near den or rendezvous locations, disruptions of significant ungulate seasonal ranges, or reduction of ungulate populations. Wolves are most sensitive to human disturbance during the denning period (late spring) and may abandon a den site if disturbed by humans. Den abandonment requires the female to relocate the pups to the new den, which exposes the pups to increased risk of mortality from exposure and predation (USFWS 1987). In contrast, Thiel et al. (1998) reported that wolves, even while denning, have demonstrated tolerance to human activities and human disturbance at the den site does not seem to decrease pup survival.

Direct mortality of wolves due to fire is unlikely. Fire can be used to create browse for ungulates which, in turn, provides more prey for gray wolves. Heinselman (1973) concluded that enough early post-fire plant communities must exist within a gray wolf pack's territory in Minnesota to support a surplus of deer, moose, and beaver for prey. Frequent fires that promote ungulate browse in and around areas that are at least moderately remote offer ideal gray wolf habitat.

Fuel reduction activities typically occur around developed areas where human use is common and wolves are less likely to be present. Wolves hunting in the vicinity of mechanical treatment areas could be temporarily displaced due to noise and human presence during these activities.

The measures used to determine the level of impact to gray wolves include disturbance, possible site abandonment (i.e., wolf denning areas), direct mortality, habitat loss, and the effects of actions on primary prey.

Design Criterion for Planned Events or Wildland Fire Suppression Actions - Implementing the following project design criterion in planned fire events or in wildland fire suppression activities would help minimize adverse impacts to wolves and is expected to produce a “Not Likely to Adversely Affect” determination from the USFWS. These criteria were derived, in part, from the Northwest National Fire Plan Project Design and Consultation Process website (http://www.blm.gov/fcp/).

- Project or activity occurs ≥1 mile from occupied den site or rendezvous site from April 15-August 15.
- Fire Management personnel would consult with both the park’s Resource Council and Fire Resource Advisor, and perform emergency consultation with the USFWS when necessary, regarding gray wolves and their occurrence proximate to fire incident areas during planned and unplanned events so that management actions can avoid or minimize impacts to wolves.

The rationale for incorporating this design criterion is that project activities occurring more than a mile from a rendezvous or den site, or outside of these critical times, are unlikely to disrupt or inhibit life history behavior to a point where abandonment or mortality would occur.

Unplanned Events – Both wildland fire and fire suppression activities have the potential of affecting gray wolves and their habitat. However, adverse impacts occurring to wolves from wildland fire are unpredictable and considered to be an “Act of God” by the USFWS (50 CFR 402.05). In most cases, implemented mitigation measures and project design criteria would minimize the potential for adverse effects to wolves and consultation would not be necessary. Agency consultation with the USFWS would occur in the event that design criteria cannot be fully incorporated into fire management of an unplanned event and/or if suppression activities are expected to cause an adverse effect on gray wolves. This consultation, if needed, would be in the context of the emergency consultation process. The need for consultation, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual consultation, as needed.

Wildland fire use associated with the proposed action is expected to increase above current levels by allowing between 30-60% of natural starts to be managed as fire use. Each natural start would be reviewed using a revised “Go/No-Go” process. Direct impacts to wolves (i.e., mortality) resulting from wildland fires are considered possible, but unlikely. Short-term measurable adverse effects to wolf habitat (i.e., prey base) are expected to result from allowing more wildland fires to burn but the extent of these impacts cannot be predicted.

Planned Events – Planned events associated with the proposed action include a combination of prescribed burns and mechanical treatments. The need for consultation with the USFWS regarding planned events, or lack thereof, would be confirmed via annual reporting and briefings to the USFWS. Adjustments to the program would be made during this annual review, as needed. In the event that design criteria cannot be fully incorporated into fire management of a planned event, GTNP would initiate USFWS consultation as soon as possible.

Desired Future Conditions” (DFCs) would be established for WUI areas and vegetation types to, in part, direct planned events. All planned events would be reviewed by GTNP’s Resource

Council and Fire Resource Advisor prior to project approval. This interdisciplinary team would review the specific tasks of each project action to ensure that all potential impacts of the proposed action have been adequately addressed and properly mitigated. The team would identify any new resource information obtained through the adaptive management process that may pertain to the management of specific species and make sure that all appropriate mitigation measures outlined in this biological assessment are applied to specific projects.

The proposed action has the potential of directly and indirectly affecting wolves through modification of habitat, disturbance and displacement, and changing the risk of mortality to individuals of this species. Mechanical treatments would be used to treat approximately 60-100 acres per year for the next 6 years (mostly in WUI areas) and possibly slightly fewer acres per year after that. However, these actions are not expected to adversely affect wolves because WUI sites and their immediate vicinity already have reduced habitat effectiveness due to human presence. The vast majority of wolf habitat in GTNP occurs outside of developed areas.

Prescribed fire treatment acres would vary from season to season, but within a range that is similar to current annual variations. In the past ten years prescribed fire has treated as few as 20 acres and as many as 4,012 acres in a season (the annual average over this ten-year period is 1,486 acres). Annual use of prescribed fire is expected to vary based on weather conditions and modifications of program and resource objectives resulting from the Fire Management Plan’s adaptive management strategies.

Prescribed fire can be effective in maintaining and restoring wolf habitat and is not expected to pose a direct threat to individual wolves. Prescribed burns may adversely impact wolves in the short-term by altering plant communities used by their primary prey and displacing individuals from certain portions of habitat, but ultimately would improve habitat conditions. The long-term affects can create vegetative diversity that favors prey and their respective forage.

Direct mortality of wolves as a result of planned events is not anticipated because wolves are highly mobile and would likely leave project areas when burns are present. Wolves may avoid treatment areas during project implementation, but this avoidance would not result in a long-term loss of important habitat or a reduction in overall population viability. Any project impacts are expected to be small in scale and short-term in duration and, therefore, negligible. Changes in habitat structure related to the project are unlikely to significantly alter habitat values because wolves are habitat generalists and suitable, high quality habitat is abundant in GTNP.

Mechanical treatments and prescribed burns would be planned and implemented in a manner sensitive to critical life stages of and protective of important habitat components for wolves. Implementing and/or adhering to the “Design Criterion” listed above would help insure that adverse impacts to wolves are minimized. The programmatic consultation agreement developed between GTNP and the USFWS would result in an annual review of planned and unplanned events. All planned events that do not comply with the above listed “Design Criterion” and are likely to adversely affect gray wolves or their habitat would incorporate additional NEPA compliance and consultation with the USFWS.

Cumulative Impacts

Activities occurring within wolf habitat that may adversely affect wolves in the GYA are limited and, for public land management actions, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above listed activities as well as other unidentified actions occurring within the wolf habitat does not appear to have adversely affected population recovery as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. The proposed action is not expected to increase, in the long-term, human presence within or improved access to wolf habitat that would cumulatively reduce habitat security. Hazardous fuel reductions around WUIs and prescribed fires associated with the proposed action could result in short-term displacements of wolves within planned treatment areas and this increase would contribute, in a very minor way, to cumulative impacts to this species. However, hazardous fuel treatments and prescribed fires are not expected to create long-term improved access and increased human activity within wolf habitat that would reduce habitat security and effectiveness cause a loss of high quality habitat. Allowing between 30-60% of natural fire starts to be managed as fire use would help restore wildland fire and its positive influence on the habitats of wolf prey species.

The proposed action is not expected to result in measurable adverse effects to wolves or influence recovery of this species and the contribution of the proposed action to cumulative wolf impacts is expected to be minimal.

Mitigation Measures

- Certain areas may be closed to entry to promote separation of wolves and humans at critical times and/or locations.
- Participate in ongoing wolf research to assess abundance, distribution, and habitat selection, including the location of dens. Research findings would be used in protecting important habitats and planning recreational activities that minimize impacts to wolves.
- Fire management personnel would consult with the park’s Resource Council and Fire Resource Advisor when planning mechanical fuel reduction and prescribed burns, in order to minimize potential impacts to wolves.

Effects Determination and Summary of Rationale

A determination was made that implementing the proposed action **may affect but is not likely to adversely affect** gray wolves for the following reasons.

- All mitigation measures and design criteria would be fully implemented.
- The proposed action is not expected to have adverse, individual or population level impacts nor would it jeopardize the recovery of the species within the GYA.
- Direct mortality of gray wolves is not likely because wolves are highly mobile and individuals are expected to leave wildland fire and planned event project areas.
- Adverse effects to gray wolves and their habitat resulting from planned and unplanned events are expected to be negligible and of a short-term duration. Gray wolves may avoid planned treatment areas during project activities but this avoidance would not result in a long-term reduction in habitat effectiveness or population viability.
- Changes in vegetative structure resulting from fire are unlikely to adversely alter habitat effectiveness in the long-term because they would be within the historic range of fire impacts on wolf habitat (i.e., ungulate habitat).

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APPENDIX 1 – FIGURES

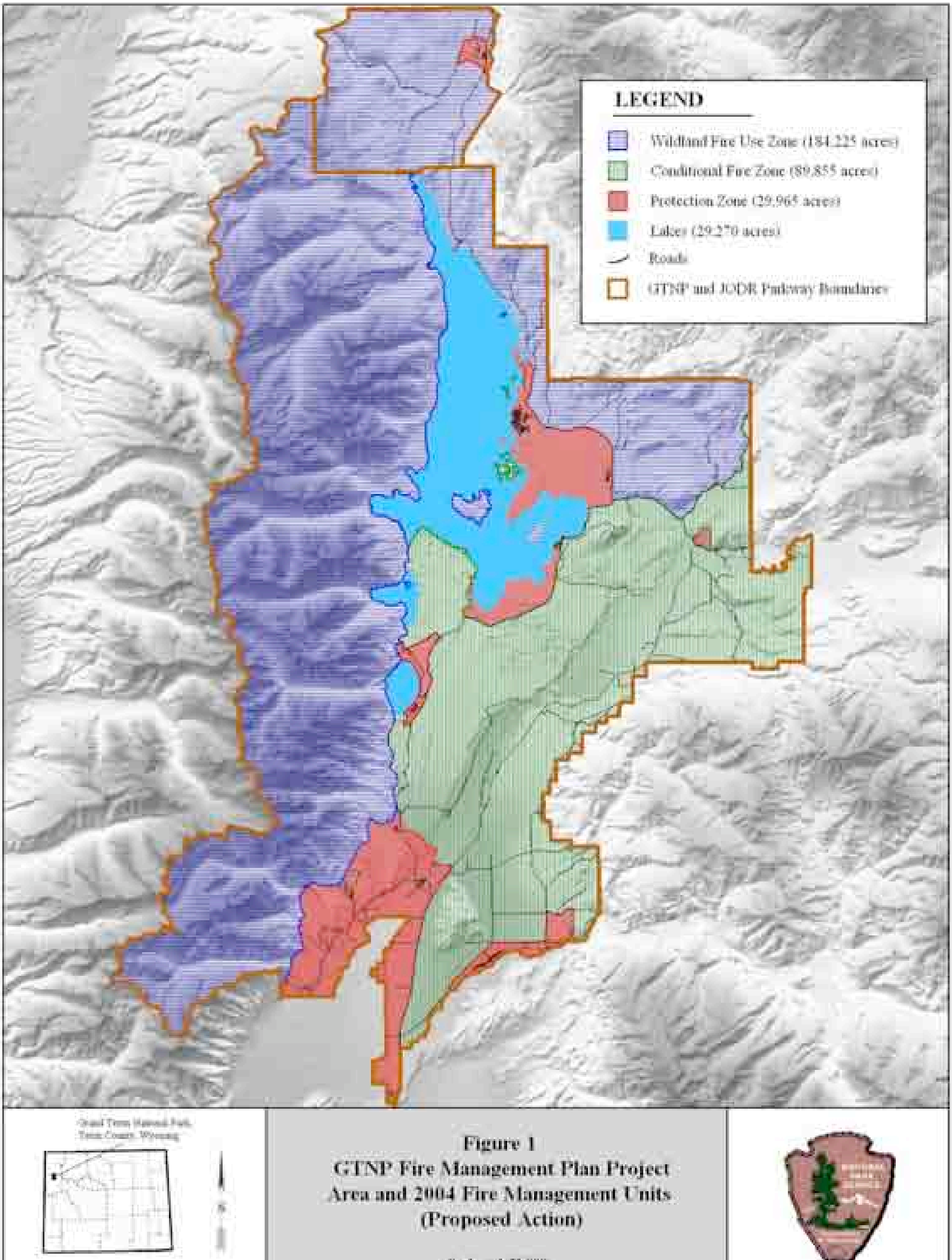
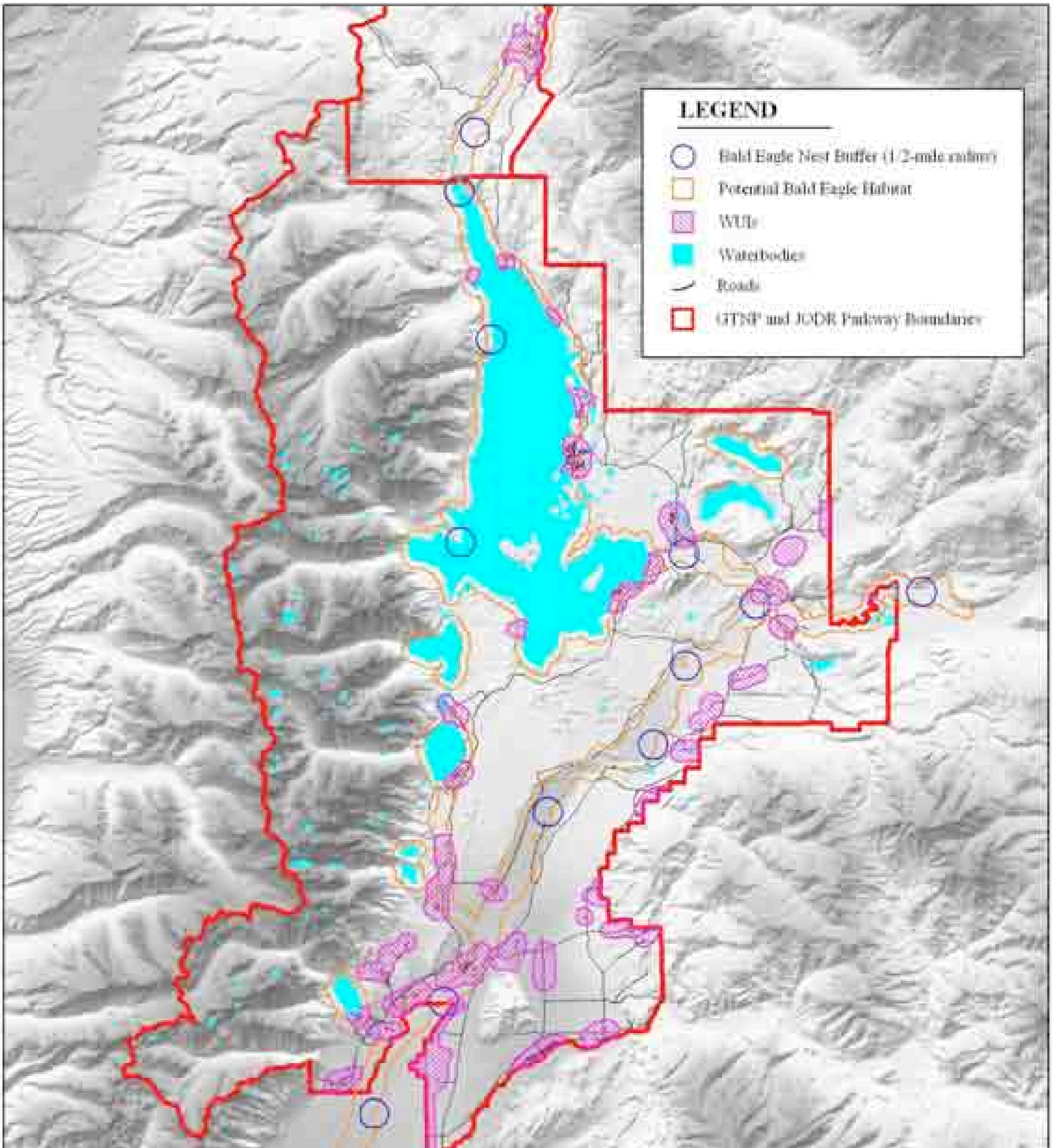


Figure 1
GTNP Fire Management Plan Project Area and 2004 Fire Management Units (Proposed Action)

Scale = 1:25,000



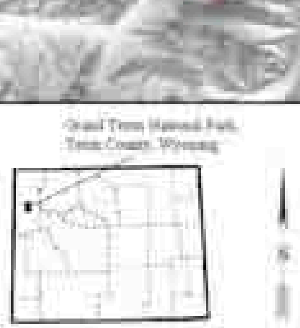
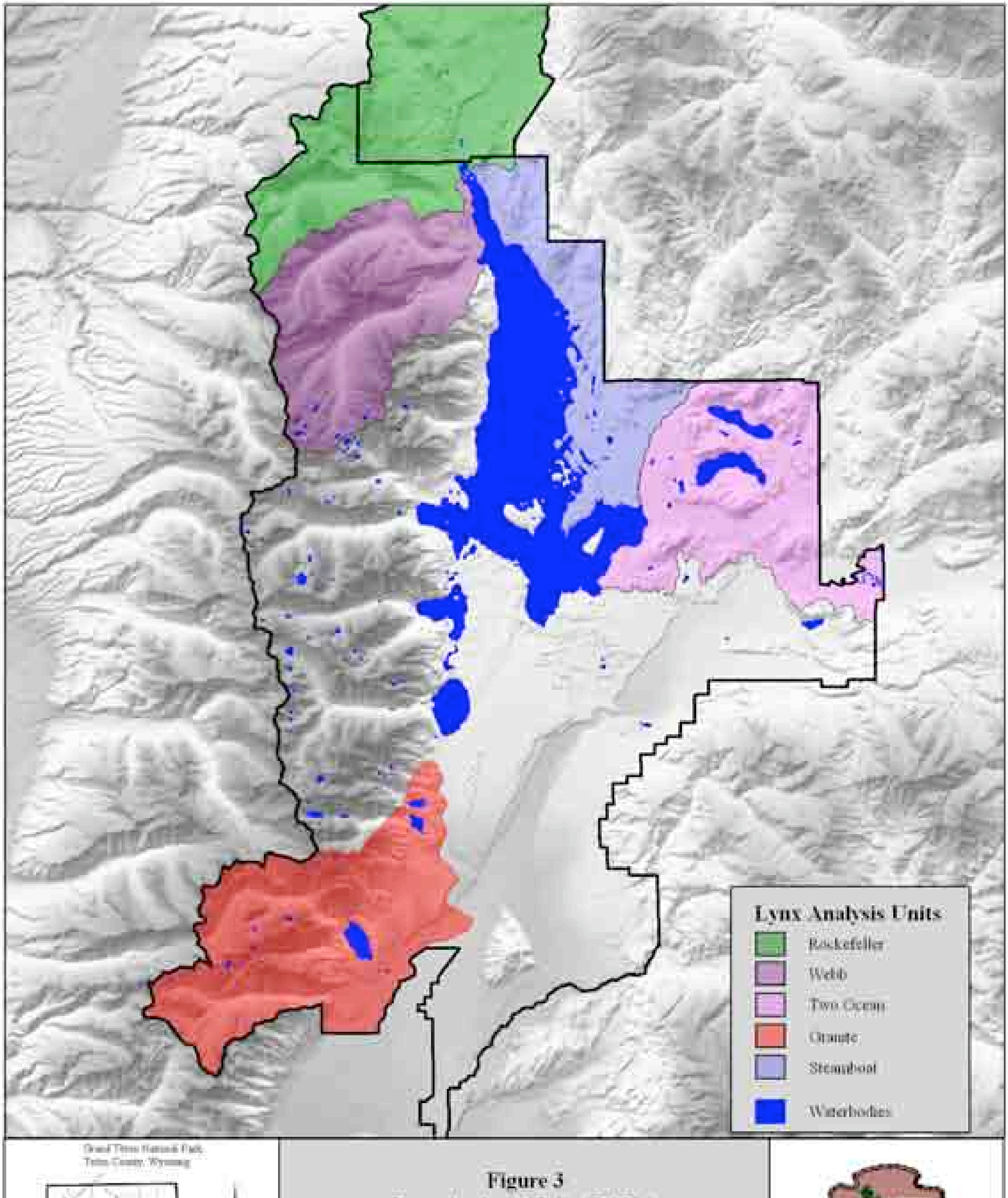


Figure 2
Bald eagle habitat, 1/2-mile radius nest buffers and WUI areas in GTNP.

Scale = 1:25,000



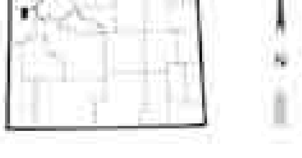


Figure 3
Lynx Analysis Units (LAUs)
in Grand Teton National Park

Scale = 1:25,000

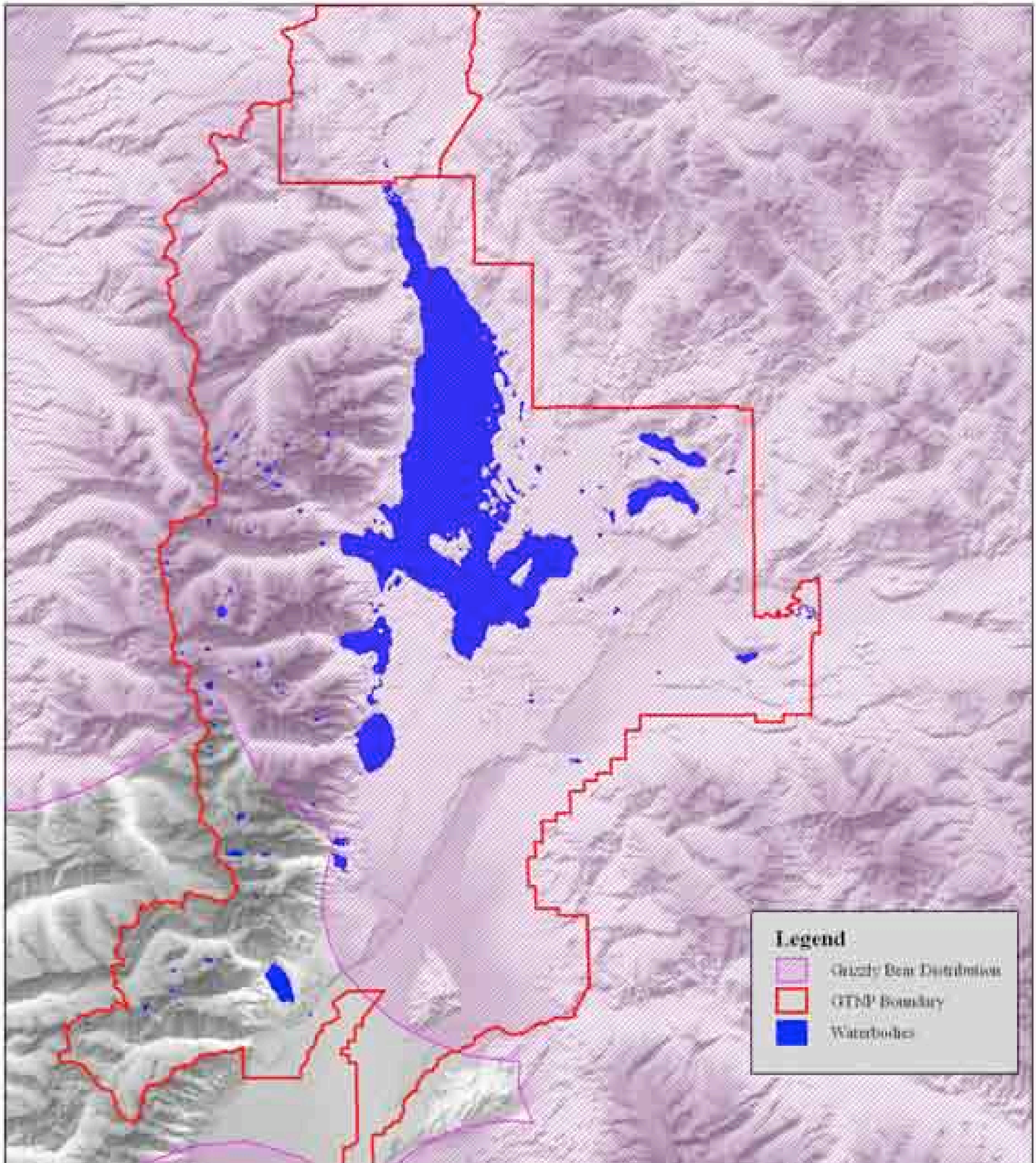


Figure 4
Grizzly bear distribution
in Grand Teton National Park

Scale = 1:25,000