

Chapter 3 Habitat Standards and Monitoring

Introduction

Since 1986 ~~and prior to delisting of the Yellowstone population, grizzly bear,~~ habitats ~~for grizzly bears~~ in the Greater Yellowstone ~~Area Ecosystem (GYE)~~ have been managed under standards and guidelines specified in national forest and national park management plans, which included the *Interagency Grizzly Bear Guidelines* (IGBC 1986). These standards and guidelines ~~imposed upon public Federal lands~~ have been instrumental in recovery of the grizzly bear in the ~~GYAGYE~~.

The 1993 *Recovery Plan* required the ~~documentation-preservation and monitoring~~ of ~~the~~ habitat necessary to support a recovered population. This task led to the development of ~~the~~ ~~measurable~~ habitat criteria for the ~~GYA-GYE~~ that were first released for public comment in 1999. These same habitat criteria were included in the draft Conservation Strategy that was released for public comment in 2000. ~~Content analysis-Analysis~~ of ~~the~~ public comments ~~for both documents~~, as well as new information, ~~was~~ ~~ere~~ used to ~~develop-establish~~ the habitat standards ~~for a delisted Yellowstone population~~ in their 2007 Conservation Strategy. ~~This 2015 revision of the Conservation Strategy includes some changes to the 2007 document that help clarify habitat standards as they pertain to the 1998 baseline. Clarifying language to the application rules has also been inserted where necessary to provide better direction for application of these standards on a local project level. No substantive changes in the content of habitat standards have been made under this revision. However, some changes in habitat monitoring protocol have been made and are documented in this chapter.~~

~~Bear management units (BMUs) and subunits were identified to provide a basis for ensuring that habitats for bears were well distributed across the recovery area. The recovery area was divided into 18 BMUs and 40 BMU subunits. Due to their smaller size, subunits rather than BMUs proved to be better suited as a base for ensuring good distribution of bear habitat.~~

~~H~~The habitat standards identified in this document are factors ~~apply to Federal lands inside the Primary Conservation Area (PCA) and identify three factors that must will be maintained at or improved upon with respect to conditions that existed in identified 1998 levels:~~ 1) secure habitat, 2) number and capacity of developed sites, and 3) acreage of active commercial livestock grazing allotments. All three of these factors are linked to human activities that affect mortality and displacement of grizzly bears. These three standards apply only to public lands within the PCA, a safe haven located at the core of the ecosystem that accounts for approximately 47% of the Yellowstone grizzly bear's occupied range. The 1998 baseline for habitat standards was selected because studies showed that the Yellowstone grizzly bear population was increasing annually at a rate of 4 to 7 percent between 1983 and 2001 (Boyce *et al.* 2001, Harris *et al.* 2006). Habitat conditions in 1998 were considered representative of this time period since levels of secure habitat and developed sites had remained relatively constant in the 10 years preceding 1998 and beyond (USFS 2004). Hence, conditions in 1998 were believed to contribute to the population growth observed between 1983 and 2001. Habitat standards, as they apply to the 1998 baseline, impose measurable side boards on allowed levels of human activity inside the PCA and establish a clear benchmark against which future improvements and impacts of habitat can be measured. ~~In addition to the habitat standards, several other habitat factors will be monitored and evaluated to determine the overall condition of habitat for bears in the PCA. The habitat standards in this document are subject to revision based on the best available science and will be reviewed and updated as necessary.~~

~~Bear management units (BMUs) and subunits were delineated in the PCA to provide a basis for ensuring that grizzly bear habitat is well distributed across the recovery area. The PCA was~~

divided into 18 BMUs, each of which approximate in size the average *lifetime* range of an adult female grizzly bear in the GYE. BMUs were further subdivided into a total of 40 subunits (Fig 2, chapter 1?). Subunits, which are comparable in size to the average *annual* home range of an adult female grizzly bear, provided greater landscape resolution and proved to be better suited as a base for analyzing habitat use patterns and ensuring good distribution of bear habitat throughout the recovery zone (USDA 1985). Consequently, habitat conditions pertaining to the three standards are measured and compared against 1998 levels for each of the 40 bear management subunits within the PCA. To date, habitat-based criteria throughout the PCA have been successfully maintained at or surpassed 1998 levels. Adherence to these standards ensures that sufficient habitat for the Yellowstone grizzly bear will continue to be available into the foreseeable future. ~~The~~ Habitat standards in this document are subject to revision based on the best available science and will be reviewed and updated as necessary.

In addition to the habitat standards, several other habitat factors will be monitored and evaluated to determine the overall condition of habitat for grizzly bears in the PCA. These monitoring items include productivity of the four major foods: 1) winter-killed ungulates, 2) cutthroat trout, 3) whitebark pine seeds, and 4) alpine moths. ~~Production and availability of these four major foods have a positive effect on reproduction and survival rates of Yellowstone grizzly bears (Mattson et al. 2002, Merrill and Mattson 2003).~~

~~A~~The agencies responsible for habitat management in the ~~G~~~~Y~~~~A~~ ~~G~~~~Y~~~~E~~ ~~agree have committed~~ to continue ~~to~~ collecting the necessary information needed to evaluate ~~maintenance adherence~~ of these standards and monitor other habitat parameters ~~within throughout~~ the PCA. The overall goal for habitat management in ~~side~~ the PCA is to maintain or improve habitat conditions as of 1998, as measured ~~within each per~~ subunit ~~within the PCA~~, while maintaining options for resource management activities at approximately the same level ~~that as~~ existed in 1998. ~~H~~The habitat standards ~~and monitoring requirements~~ in this Conservation Strategy will, with time, be incorporated into national forest, and national park, ~~and BLM management~~ plans.

Outside the PCA, grizzly bears will be allowed to expand into adjacent areas considered biologically suitable and socially acceptable. Whereas lands within the PCA are managed primarily to maintain grizzly bear habitat, lands outside of the PCA boundary are managed with more consideration for human use (Service 1993). The key to successful management of grizzly bears outside the PCA lies in striking a sustainable balance that accommodates the needs of grizzly bears along with competing demands of human use. As such, an important management objective for areas outside the PCA is to maintain existing resource management and recreational uses and to allow agencies to respond to demonstrated problems with appropriate management actions. Such flexible management promotes acceptance and tolerance for grizzly bears. Today, roughly 66 percent of suitable habitat outside the PCA is occupied by grizzly bears (IGBST calculation).

Suitable habitat outside of the PCA is approximately 84 percent federally owned land administered by the six National Forests in the region (79%), National Park Service (3.6%), Bureau of Land Management (1%), and USFWS (0.5%). Federal land management agencies will work cooperatively with state wildlife agencies to meet identified habitat and population goals for grizzly bears in the GYE. ~~The three-state~~ grizzly bear management plans for Idaho, Montana, and Wyoming recommend and encourage land management agencies to maintain or improve habitats ~~that are~~ important to grizzly bears and to monitor habitat conditions outside the PCA. ~~Each All 3 states recognizes~~ acknowledge the importance of secure habitat, motorized access management, and road density issues ~~related as they pertain~~ to grizzly bears ~~and other wildlife~~. Consequently, secure habitat and total motorized route density is monitored on federal lands outside the PCA to identify potential threats to habitat and prevent them from negatively impacting the long-term viability of the Yellowstone population. This ~~Access management issues~~ has have also been recognized in each state's elk management efforts. Land

management agencies will work cooperatively with state wildlife agencies to meet identified population and habitat goals for grizzly bears in the GYE. ~~E.A. T and the process of implementing these state and federal grizzly bear management~~ goals will be coordinated by the Yellowstone Grizzly Coordinating Committee (YGCC) representing all ~~the respective~~ agencies in the ~~greater~~ Yellowstone area (~~see Chapter 6 Implementation and Evaluation~~).

Forest and ~~P~~ark plan standards and guidelines for other wildlife species will ~~indirectly~~ provide ~~some additional~~ habitat management direction for bears outside the PCA. By approval of this Conservation Strategy, Forest Service regional foresters in regions 1, 2, and 4 agree to add the grizzly bear to their ~~S~~sensitive ~~S~~species lists immediately upon ESA delisting of the species. Forest Service sensitive species direction requires that any project “*must not result in loss of species viability or create significant trends toward federal listing*” (~~USDA~~ Forest Service Manual (FSM) 2600 ~~2005~~). Sensitive species direction also requires the Forest Service to “*assist states in achieving their goals for conservation of endemic species*” (~~USDA~~ FSM 2600). A biological evaluation will be completed for all Forest Service projects potentially affecting the grizzly bear. These evaluations ~~will be completed and will be used to determine if whether~~ projects ~~will do or will do~~ not meet the habitat standards in this Conservation Strategy. If the biological evaluation ~~shows demonstrates~~ that the project ~~will does~~ not meet the habitat standards ~~in this Conservation Strategy~~, the project will be modified as necessary to ensure ~~that it will meet complete adherence with~~ these standards.

Conservation Strategy Habitat Standards ~~Insideinside~~ the PCA

~~The most important issues to control on the landscape are the levels of human activities. Human activities resulting in mortality and displacement were the main reasons the grizzly bear was listed as threatened. Human activity is the primary factor negatively impacting availability and security of grizzly bear habitat in the GYE. This relationship between bears and habitat is extremely complex and difficult to quantify. However, unfettered human activity is known to result in the displacement and mortality of grizzly bears and was a significant contributing factor leading to listing the grizzly bear as a threatened species in 1975. Changes in human activities may have allowed bears to achieve recovered status. The key issues related to human activity are food storage, livestock allotments, motorized access, and site developments, as these were activities that either resulted in mortality or habitat displacement. Restrictions in human activities due to management practices implemented by IGBC in the mid-1980s correlate strongly with the steady increase in the Yellowstone grizzly bear population observed between 1983 and 2001 (Mattson and Knight 1991a). Habitat standards serve as sideboards on levels of human activity allowed on Federal lands inside the PCA, thereby reducing opportunities for grizzly-human conflicts and displacement of grizzly bears from valuable habitat.~~

~~Habitat standards identified in this document address 3 key factors related to human activity (motorized access, site development, and commercial livestock grazing) and specifically call for no net loss in secure habitat inside the PCA from what was known to exist in 1998 (Appendix F). Secure habitat is especially important to the survival and reproductive success of grizzly bears, especially adult females. It is the goal of habitat management agencies throughout the ecosystem to maintain or improve habitat conditions as of 1998 as measured per bear management subunit, while maintaining options for resource management activities comparable to levels that existed in 1998. The Yellowstone grizzly bear population achieved all demographic recovery criteria by 1998 with this management regime in place. These levels of secure habitat have been maintained and will continue to be maintained and improved where possible, long into the future. Potential impacts to grizzly bears and their habitat will be evaluated and mitigated using the criteria and standards in this Conservation Strategy in coordination with the state wildlife agencies.~~

~~It is the goal of the habitat management agencies to maintain or improve habitat conditions as of 1998, as measured within each subunit within the PCA, while maintaining options for resource management activities at approximately the same level as existed in 1998 (Appendix F). The grizzly population achieved all demographic recovery goals by 1998 with this management regime in place. The habitat standards identified here are similar to those identified in the draft Strategy, with some modifications in response to public comments and to increase the effectiveness of application. These standards apply only inside the PCA. Changes to these standards can be made by the YGCC, following appropriate public processes of the affected land management agencies, if monitoring indicates a need or better scientific information becomes available.~~

~~Existing forest and park plan standards and guidelines will provide grizzly bear habitat management direction outside the PCA. Land management agencies will cooperate with the appropriate state wildlife agency in development of additional future, area-specific grizzly bear management goals. All projects on federal public lands outside the PCA will be evaluated through the NEPA (National Environmental Policy Act) process. Potential impacts to grizzly bears and their habitat will be evaluated and mitigated using the criteria and standards in this Conservation Strategy in coordination with the state wildlife agencies. Appendix G presents an analysis of the potential for motorized access management changes both inside and outside the PCA.~~

~~Application rules specific to each habitat standard provide additional direction on how these standards are to be implemented at a Federal project level under each standard are the specific ways that each habitat standard will be applied to implement this Conservation Strategy. The following specific habitat standards and application rules apply to on all Federal lands inside the PCA, and will be monitored and maintained on subunits in the PCA.~~

Secure Habitat Standard

Secure Habitat Standard

~~Inside the PCA, the percent age of secure habitat within each bear management subunit must be maintained at or above levels that existed in 1998 (Appendix F). Authorized Federal projects that result in temporary or permanent changes to secure habitat must follow the Application Rules identified below. Secure habitat is defined as those areas ≥ 10 acres in size and more than 500 meters away from a motorized access route (open or gated) or recurring helicopter line during the non-denning period. Lakes larger than 1 square mile in spatial extent are excluded from secure habitat calculations. Gated routes that prohibit motorized access to the public but which are open to administrative personnel are counted against this standard and thus detract from secure grizzly bear habitat. Decommissioned routes which are closed to the public and administrative staff do not count against this standard. Temporary and permanent changes are allowed under specific conditions identified below. Appendix G provides additional information on definitions and rules for implementation of this standard. Figure 10 provides a summary of the secure area management rules. The rule set in Figure 10 will be used in management and evaluation of projects and habitat management actions as appropriate under this Conservation Strategy.~~

Application Rules for ~~Permanent~~ Changes ~~in~~ to Secure Habitat

~~Permanent changes to secure habitat. A project may permanently change secure habitat provided that replacement secure habitat of equivalent habitat quality (as measured by the Cumulative Effects Model or equivalent technology) is provided in the same grizzly subunit. The replacement habitat must either be in place before project initiation or be provided concurrently with project development as an integral part of the project plan.~~

Permanent changes to secure habitat associated with an authorized Federal project involving construction of a new motorized route (i.e., road or trail), relocation of an existing motorized route, or opening of a previously decommissioned route are allowed if and only if the following conditions are met:

- Any loss in secure habitat below 1998 levels must be replaced by restoring secure habitat of equivalent quality and quantity (e.g., through road decommissioning) in the same bear management subunit. Quality of replacement habitat must be assessed based on our best collective scientific understanding of grizzly bear habitat ecology, and the rationale for mitigation fully documented.
- Replacement habitat must be either in place before project implementation or provided concurrent with project development as an integral part of the project plan.
- Replacement habitat must remain in place for a minimum of 10 years before it can subsequently be replaced and mitigated for per application rules. *(This duration is based upon the generation time for a female grizzly bear, or the time it takes to replace herself.)*
- Reductions in secure habitat below 1998 levels due to activities based on statutory rights such as the 1872 General Mining Law or the Alaska National Interest Lands Conservation Act (ANLCA) must be mitigated for within the affected subunit or in the nearest possible subunit. In those rare cases where mitigation occurs in a subunit other than the affected one, subsequent changes to secure habitat in both subunits become permanent changes to the 1998 baseline.
- For those subunits identified as in need of improvement above 1998 levels (*Gallatin #3, Madison #2, and Henry's Lake #2*), maintain secure habitat at or above levels of the fully implemented 2006 Gallatin National Forest Travel Management Plan (Appendix F).
- Motorized routes on private land are not counted against this standard. However, for motorized routes (roads or trails) acquired through land exchanges or acquisition, and which are desirable to maintain for public use, mitigation is strongly encouraged but not required.

Application Rules for ~~e~~Changes to ~~s~~Secure ~~h~~Habitat:

Temporary reductions in secure habitat associated with authorized Federal projects are allowed can occur to allow projects, if analysis of secure habitat is conducted to ensure compliance with the habitat standard and all of the following conditions specified in the Application Rules for temporary changes are met. A Federal project refers to any activity requiring construction of a new road, reconstruction of an existing road, opening of a permanently restricted road, or recurring helicopter flights at low elevations (< 500 m above ground level). Application rules for temporary changes to secure habitat are as follows::

- Only one project affecting secure habitat may be active ~~per grizzly~~ within a given bear management subunit at any one time.
- Total acreage of ~~active projects~~ secure habitat affected within a given BMU ~~will must~~ not exceed 1% ~~percent~~ of the acreage ~~in of~~ the largest subunit within that BMU ~~(see Appendix G)~~. The acreage of a project that counts against the 1% limit is the acreage ~~associated with~~ within the 500-meter buffer around any motorized ~~access-project~~ route that extends into existing secure habitat.
- All temporary project roads that affect secure habitat will be in place collectively for no more than 3 consecutive years.
- Secure habitat ~~is must be~~ restored within one year ~~after completion of the~~ upon project completion.

Activities Allowed in Secure Habitat

The following activities are allowed in secure habitat without violating the standard:

- Activities that do not require re-opening of a decommissioned route; construction or reconstruction of motorized routes; or recurring low level helicopter flight lines.
 [LL1] Non-wheeled, over the snow use (i.e., snow machines) is allowed until research identifies a concern. Conflicts associated with winter-use activities that develop either during denning or after den emergence in the spring, can be addressed with local area restrictions.
- Helicopter use for short term (no more than 2 days in the duration of a project), or at higher elevation (> 500 meters above ground level with no landing). Aircraft used in emergency firefighting are allowed.
- Access to power line or utility corridors for occasional maintenance service that does not require new route construction.
- Project activities (e.g., temporary road construction / maintenance / use of recurring low level helicopter flights) that occur during the grizzly bear denning season between December 1 and February 28.

Figure 10. The rule set for secure habitat management in the Yellowstone Primary Conservation Area.

Criteria	Definition ^[LL2]
Software, Database, and Calculation Parameters	ARC/INFO using the moving window GIS technique (Mace et al. 1996); 30-meter pixel size, square mile window size and density measured as miles/square mile. Motorized access features from the CEM GIS database
Motorized Access Routes in Database	All routes having motorized use or the potential for motorized use (restricted roads) including motorized trails, highways, and forest roads. Private roads and state and county highways counted.
Season Definitions	Season 1—1 March to 15 July. Season 2—16 July to 30 November. There are no access standards in the winter season (1 December to 28 February).
Habitat Considerations	Habitat quality not part of the standards but 1) Replacement secure habitat requires equal or greater habitat value 2) Road closures should consider seasonal habitat needs.
Project	An activity requiring construction of new roads, reconstructing or opening a restricted road or recurring helicopter flights at low elevations.
Secure Habitat	More than 500 meters from an open or gated motorized access route or reoccurring helicopter flight line. Must be greater than or equal to 10 acres in size. Replacement secure habitat created to mitigate for loss of existing secure habitat must be of equal or greater habitat value and remain in place for a minimum of 10 years. Large lakes not included in calculations.
Activities Allowed in Secure Habitat	Activities that do not require road construction, reconstruction, opening a restricted road, or reoccurring helicopter flights. Over the snow use allowed until further research identifies a concern.
Inclusions in Secure Habitat	Roads restricted with permanent barriers (not gates), decommissioned or obliterated roads, and/or non-motorized trails.
Temporary Reduction in Secure Habitat	One project per subunit is permitted that may temporarily reduce secure habitat. Total acreage of active projects in the BMU will not exceed 1% of the acreage in the largest subunit within the BMU. The acreage that counts against the 1% is the 500-meter buffer around open motorized access routes extending into secure habitat. Secure habitat is restored within one year after completion of the project.
Permanent Changes to Secure Habitat	A project may permanently change secure habitat provided that replacement secure habitat of equivalent habitat quality (as measured by CEM or equivalent technology) is provided in the same grizzly subunit. The replacement habitat either must be in place before project initiation or be provided as an integral part of the project plan.

Subunits with Planned Temporary Secure Habitat Reduction	Secure habitat for subunits Gallatin #3 and Hilgard #1 will temporarily decline below 1998 values due to the Gallatin Range Consolidation Act. Upon completion of the land exchange and associated timber sales, secure habitat in these subunits will be improved from the 1998 baseline.
Subunits with Potential for Improvement	Access values for Henrys Lake #2, Gallatin #3, and Madison # 2 have the potential for improvement. The quantity and timing of the improvement will be determined by the Gallatin National Forest Travel Management Plan.
Proactive Improvement in Secure Habitat	A proactive increase in secure habitat may be used at a future date to mitigate for impacts of proposed projects of that administrative unit within that subunit. ^[LL3]
Exceptions for Caribou-Targhee NF	When fully adopted and implemented the Standards and Guidelines in the 1997 revised Targhee Forest Plan met the intent of maintaining secure habitat levels.

Developed Site Standard

~~On Federal lands inside the PCA, The the number and capacity of developed sites within the PCA will must be maintained at or below the 1998 level (Appendix F), with the following exceptions~~^[LL4]~~: any proposed increase, expansion, or change of use of developed sites from the 1998 baseline in the PCA (Appendix F) will be analyzed, and potential detrimental and positive impacts documented through biological evaluation or assessment by the action agency.~~

~~A developed site includes but is not limited to sites on public land developed or improved for human use or resource development such~~ Developed sites refer to those sites or facilities on public land with features intended to accommodate public use or recreation. Such sites typically are identified or advertised via visitor maps or information displays as identifiable destination sites promoted by the agency. Examples of developed sites include, but are not limited to: as campgrounds, picnic areas, trailheads, boat launches, lodges, rental cabins, summer homes, administrative sites lodges, service stations, summer homes, restaurants, visitor centers, and administrative sites. For the purposes of this Conservation Strategy, and permitted resource development sites such as oil and gas exploratory wells, production wells, and plans of operation for mining activities will also be tracked as developed sites, work camps (Dan, do we include work camps???), etc. Administrative sites are those sites or facilities constructed for use primarily by government employees to facilitate the administration and management of public lands. Administrative sites are counted toward developed sites and examples include headquarters, ranger stations, patrol cabins, park entrances, federal employee housing and other facilities supporting government operations. In contrast to developed or administrative sites, **Dispersed sites** are those not associated with a developed site such as a front-country campground. These sites are typically characterized as having no permanent agency-constructed features, have minimal to no site modifications, have informal spacing and possibly include primitive road access. Dispersed sites are not counted toward developed sites.

Application Rules for Developed Sites

Mitigation of detrimental impacts due to construction or expansion of developed sites will must occur within the affected subunit and will be of equivalent ~~to the~~ type and comparable in extent of impact. Mitigation measures will must be in place before ~~the~~ initiation of the project or included as an integral part of ~~the~~ completion of the project.

- ~~A New~~ New sites will require mitigation via removal of another site of equivalent type within that subunit to offset any increases in capacity for human capacity use, habitat loss, and increased access to surrounding habitats.

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- ~~E~~ Consolidation and/or elimination of dispersed camping sites will be considered adequate mitigation for construction of a minor day-use developed site or an increased capacity of use of an existing site in human capacity at developed campgrounds if the new increased site capacity is equivalent comparable to and offset by the decrease in use resulting from elimination of the dispersed sites camping eliminated. Such mitigation can be used only if it can be demonstrated that the dispersed sites have had consistent perennial use and can be closed in such a way that future use of the site is definitively curtailed.

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- ~~New sites will require mitigation within that subunit to offset any increases in human capacity, habitat loss, and increased access to surrounding habitats.~~

~~Administrative site expansions are exempt from human capacity mitigation expansion if such developments are necessary for enhancement of management of public lands and other viable alternatives are not available. Temporary construction work camps for highway construction or other major maintenance projects are exempt from human capacity mitigation if other viable alternatives are not available. Food storage facilities and management must be in place to ensure food storage compliance, i.e., regulations established and enforced, camp monitors, etc. All other factors resulting in potential detrimental impacts to grizzly bears will be mitigated as identified for other developed sites.~~

- ~~Land managers may improve the condition of developed sites for bears or reduce the number of sites. The improvements may then be used at a future date to mitigate equivalent impacts of proposed site development increase, expansion, or change of use for that administrative unit within that subunit.~~

- Expansion of administrative sites are exempt from human capacity mitigation if such developments are necessary for enhancing management of public lands and other viable alternatives are not available. Temporary construction of work camps for highway construction or other major camp maintenance projects are exempt from human capacity mitigation if other viable alternatives are not available. Food storage structures and management must be in place and all other factors resulting in potential detrimental impacts to grizzly bears will be mitigated as identified for other developed sites.

- Land managers may improve the condition of developed sites for bears or reduce the number of sites. The improvements may then be used at a future date to mitigate equivalent impacts of proposed site development increase, expansion, or change of use for that administrative unit within that subunit. [LL5]

- Modifications to existing developed sites that reduce resource damage, detrimental environmental impacts, and/or the potential for grizzly bear conflicts are allowed (e.g., installing a vaulted toilet to avoid damage to water resources or installing bear-resistant food storage structures to reduce conflict).

- To the fullest extent of its regulatory authority, the Forest Service will minimize effects on grizzly bear habitat from activities based in statutory rights, such as the (e.g., 1872 General Mining Law, Americans with Disability Act, ANILCA, etc.). In those expected few cases

where the mitigated effects ~~will~~ result in an exceedance of the 1998 baseline that cannot be compensated for within that subunit, compensation, ~~in the PCA,~~ to levels at or below the 1998 baseline will be accomplished in ~~adjacent subunits when possible, or the closest nearest~~ subunit ~~if this is not possible,~~ or in areas outside the PCA adjacent to the impacted subunit ~~impacted if the latter is not possible.~~ Mitigation for Mining Law site impacts will follow standard developed site mitigation to offset any increases in human capacity, habitat loss, and increased access to surrounding habitats. Access impacts relating to Mining Law activities will be mitigated per the applications rules for changes in secure habitat.

- Existing oil and gas and other mineral leases will be honored, and Proposed Applications for Permit to Drill (APDs) and operating plans within those leases will strive to meet the developed site standard. New leases, APDs and operating plans must meet the developed site standard and application rules.

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- Developments on private land are not counted against this standard; however, for developed sites acquired through land exchanges or acquisitions, and which are desirable to maintain, mitigation is strongly encouraged but not required. The rationale is to avoid restrictions that encumber acquisition and transformation of private land to public ownership. Once a parcel is transferred to public ownership any further development would be subject to the developed site standard. Acquired sites that pre-date 1998 may be amended to the 1998 baseline.

Livestock Allotment Standard

Inside the PCA, ~~there will be no new-net increase in acreage of~~ active commercial livestock grazing allotments ~~will be created and there will be no increases or~~ in permitted sheep Animal Months (AMs) on Federal land ~~from the identified that which existed in 1998 baseline~~ (Appendix F). Existing sheep allotments will be monitored, evaluated, and phased out as the opportunity arises with willing permittees.

Application Rules for Livestock Allotments

Allotments include both vacant and active commercial cattle/horse/sheep grazing allotments. Vacant allotments are those without an active permit, but may be used periodically by other permittees at the discretion of the land management agency to resolve resource issues or other concerns. ~~Reissuance of permits for vacant cattle allotments may result in an increase in the number of permitted cattle, but the number of allotments would remain the same as the 1998 baseline. Combining or dividing existing allotments would be allowed as long as acreage in allotments does not increase. Any such use of vacant cattle allotments resulting in an increase in permitted cattle numbers will be allowed only after an analysis by the action agency to evaluate impacts on grizzly bears. Where chronic conflicts occur on cattle allotments inside the PCA, and an opportunity exists with a willing permittee, one alternative for resolving the conflict may be to phase out cattle grazing or to move the cattle to a currently vacant allotment where there is less likelihood of conflict. Changes in livestock allotments inside the PCA may occur if the following conditions are met:~~

- Reissuance of permits for vacant cattle allotments may result in an increase in the number of permitted cattle, but the number of active allotments inside the PCA must not exceed the 1998 baseline.

- Combining or dividing existing allotments is allowed as long as the net acreage and number of active allotments does not exceed 1998 levels.
- Where chronic conflicts occur on cattle allotments inside the PCA, and an opportunity exists with a willing permittee, alternatives for resolving conflicts may include authorization of a non-use permit, livestock can be moved to a vacant allotment where there is less likelihood of conflict, or cattle grazing can be phased out on that allotment.

Habitat Monitoring

~~The primary objective of habitat monitoring will focus on evaluation of adherence to the habitat standards identified in this Strategy. Monitoring of other~~ The primary objective of habitat monitoring is to evaluate adherence to the habitat standards identified in this Strategy. However, additional important habitat parameters pertaining to four major food types of the grizzly bear diet will also be monitored to provide additional information to assist in evaluating the status of grizzly bear habitat and its ability to support a recovered grizzly bear population and the effectiveness of habitat standards. Changes to habitat monitoring protocol especially pertaining to open motorized route density (OMARD) and evaluation of habitat effectiveness are documented in Appendix F. Habitat standards and other habitat parameters will be monitored as follows.

Monitoring Secure Habitat and Motorized Access Route Density

Background

Motorized access is one of the most influential factors negatively affecting grizzly bear ~~use of~~ habitats. ~~Open~~ Road density has been utilized historically as a surrogate measure of human impacts ~~to grizzly bear habitat~~ presence on the landscape and consequently serves as the basis for identifying non-secure habitat. Restricted roads and motorized trails are important factors to be considered when in evaluating habitat availability and potential for ~~and~~ mortality risk to grizzly bears (McLellan and Shackleton 1988, Mattson and Knight 1991b, Mace et al. 1996, Schwartz et al. 2010, Proctor et al. 2012). ~~Grizzly bear researchers and Land managers throughout the GYE generally agree~~ recognize that availability of secure habitat, ~~defined as those~~ (areas more than 500 meters (550 yards) from a motorized access route) during the non-denning period, are especially important is crucial to the survival and reproductive success of grizzly bears, especially adult females ~~s~~ grizzly bears.

~~Motorized access parameters were measured and calculated using procedures identified in the 1998 IGBC Taskforce Report on Grizzly Bear/Motorized Access Management. For the Yellowstone PCA, the~~ Motorized access parameters including percent secure habitat, OMARD and TMARD are measured and monitored against levels that existed in 1998. percent of secure habitat, open motorized access route density (OMARD) greater than one mile/square mile, and total motorized access route density (TMARD) greater than two miles/square mile per subunit in 1998 is presented in Appendix F. No change in these parameters has occurred since 1998, as managers agreed to maintain these values pending the finalization of the Strategy. No net decrease in secure habitat with respect to 1998 levels has occurred on federal lands inside the PCA in any of the 40 bear management subunits since 1998. Instead, secure habitat inside the PCA has increased by 1.4 percent since 1998. This gain is approximate in size to the area of Yellowstone Lake.

Subunits with potential for improvement: ~~Several subunits, Henrys Lake #2, Gallatin #3, and Madison #2 have been identified as needing improvement in access parameters. The area with potential for improvement in these subunits is within the boundaries of the Gallatin National~~

~~Forest. However, a large percentage of the OMARD and TMARD values and secure habitat loss in these subunits is due to motorized access features on private land (Appendix G). The Forest is working on several land exchange efforts with private parties in these subunits. These land exchanges would allow management of the roads on these private parcels and increase the secure habitat in these subunits.~~

~~The Gallatin Range Consolidation Act will result in trading timber for land in the Gallatin #3 and Hilgard #1 subunits. The private land involved will become public land under the jurisdiction of the Gallatin National Forest. In order to complete the exchange, access values in these two subunits will temporarily decline below 1998 values. However, upon completion of this sale and land exchange, secure habitat and motorized access route density in these subunits will be improved from the 1998 baseline (Appendix F).~~

~~All the above-mentioned subunits on the Gallatin National Forest have the potential for improvement in the long term. The timing and amount of improvement will be determined through the Gallatin National Forest travel management planning process. This is a new effort since the release of the 2000 draft Conservation Strategy and may take several years to complete. The Travel Plan will amend the Forest Plan and set a new baseline for access values in these subunits. This travel plan revision will reduce the motorized access route density in these subunits and increase secure habitat.~~

Three subunits, Gallatin #3, Henrys Lake #2, and Madison #2 have been targeted as needing improvement in secure habitat and reduction in motorized route density with respect to 1998 levels. The specific areas in need of improvement identified in these three subunits fall within the Gallatin National Forest boundary and the quantity and timing of improvements was to be determined by the Gallatin National Forest Travel Management Plan (TMP). A large factor contributing to elevated OMARD and TMARD values and impoverished secure habitat values in these subunits were due to motorized access roads occurring on private land enclosures. Since 1998, the Gallatin National Forest conducted several land exchanges under the *Gallatin Range Consolidation and Protection Act* with private parties in the Gallatin #3 subunit and in other areas inside and outside the PCA. These land exchanges resulted in the acquisition of formerly private parcels in and adjacent to the Hyalite-Porcupine-Buffalo Horn Wilderness Study Area (Gallatin #3) which are now administered as part of the Gallatin National Forest. Consequently the Forest Service also inherited some private roads and many old timber harvest roads that caused a temporary decrease in secure habitat (mostly outside the PCA, but some inside). With implementation of the 2006 Gallatin TMP, many roads inherited from these exchanges have been permanently decommissioned. Additional access routes not designated for motorized use in the TMP have also been closed, with a high priority given to road decommissions in the three subunits identified as in need of improvement. With full implementation of the Gallatin Travel Plan very near completion, measurable increases in secure habitat and reductions in motorized route density with respect to 1998 baseline levels have been realized in the three targeted subunits. The Gallatin National Forest has proposed that increases in secure habitat due to full TMP implementation constitute new baseline levels for these 3 subunits (Appendix F). If approved, the elevated secure levels for these 3 subunits will serve as new measures against which future changes will be made.

~~Several One other subunits were that was listed as needing improvement in the 2000 draft, Henrys Lake #1, Conservation Strategy (Plateau #1, Plateau #2, and Henrys Lake #1). The draft stated that upon full implementation of the access management changes in the revised Targhee Forest Plan, those subunits will be acceptable for OMARD, TMARD, and secure habitat. Those access management changes have been fully implemented and those subunits are no longer identified as having potential for improvement. This is due to road decommissioning that was completed following the signing of the 1997 revised Targhee Forest Plan and the 1999 FEIS for the Targhee Travel Plan (Open Road and Open Motorized Train~~

Analysis (motorized road and trail travel plan)). The 1998 baseline (Appendix F) for these subunits was modified to reflect the full implementation of the 1997 Targhee Forest Plan. Henrys Lake subunit #1 still has high levels of motorized access density and a low secure habitat level. However, much of the effect is due to motorized access routes on private lands. (Appendix F). Little opportunity remains for improvement on public lands inside this subunit due to the legal requirements to provide access to Sawtell Peak, state lands, mining claims, county, state, and federal rights-of-way, private lands, and summer homes.

Monitoring Protocol for Secure Habitat and Motorized Route Density

Motorized access parameters including 1) percent secure habitat, 2) open motorized access route density (OMARD) greater than one mile per square mile, and 3) total motorized access route density (TMARD) greater than two miles per square mile will be monitored utilizing Yellowstone Grizzly Bear Cumulative Effects Model (CEM) Geographic Information System (GIS) databases, are measured per bear management subunit using the Motorized Access Model described in Appendix F. Inside the PCA, these three parameters are calculated per bear management subunit and compared against 1998 levels on an annual basis. These measurements are reported annually within each subunit in the IGBST Annual Report, Yellowstone Grizzly Bear Investigations, and are posted online for public access at the IGBST website. Protocols are established for an annual update of motorized access routes and other CEM GIS databases for the PCA. To provide evaluation of motorized access proposals relative to the 1998 baseline, automated GIS programs are available on each administrative unit (Appendix G).

Monitoring Developed Sites

Background

Levels of human development sites on the landscape are known to displace have been shown to be an important predictor of grizzly bear survival in the GYE grizzly bears and this has some direct effect on habitat effectiveness (Schwartz et al. 2010). The primary concern related to developed sites is grizzly bear mortality connected to associated with food conditioning and bear habituation. Past attempts at modeling grizzly bear mortality in the GYE have focused on numbers of people spending the night as a primary factor related to grizzly bear mortality. Increased numbers of people using an area and potentially interacting with grizzly bears increases opportunities for human-grizzly conflict and is an important issue in evaluating the impacts from developed sites on grizzly bear survival. Contributing factors to the displacement and mortality of grizzly bears impacts to bears as a result of due to new or expanding developed sites could result from include increased spatial and temporal extent of human capacity at the site presence, temporary or permanent loss of grizzly bear habitat, increased length of time of use, limited access to important food sources increased access to surrounding areas or backcountry trails, and unsecured bear attractants.

The effects of the current number of Maintaining the number and human-use capacity of developed sites at 1998 levels are is considered the level that a sustainable threshold that can be accommodated on public lands within the PCA because the 1998 level of site development is allowing 1998 levels allowed a stable to increasing an increasing to stable grizzly bear population (Appendix F) from 1983 to 2001. CAH changes in human developed sites since 1998 have been are evaluated against the 1998 baseline (Appendix F) and have been determined acceptable under the standard for developed sites identified in this Strategy.

Monitoring Protocol for Developed Sites

~~Monitoring numbers of developed sites can indirectly assess displacement from habitat, habituation to human activities, and increased grizzly mortality risk. Changes in the number and human-use capacity of developed sites on public lands inside the PCA will be compiled annually per bear management subunit and compared to tracked with respect to the 1998 baseline (Appendix F). Changes in developed sites as measured against the baseline are currently inventoried in existing GIS databases and are an input item to the CEM. Are reported annually in the IGBST Annual Report Yellowstone Grizzly Bear Investigations. Appendix F displays the number of developed sites in the PCA within seven categories and will serve as the 1998 baseline.~~

Monitoring Livestock Grazing

Background

Interaction between livestock and grizzly bears has historically led to the relocation or removal of grizzly bears in the GYE (Knight and Judd 1983; Johnson and Griffel 1982; Anderson et al 2002; Gunther et al 2004). Grizzly bears tend to kill cattle and sheep regardless of the abundance of natural bear foods. Most grizzly bear - livestock conflicts tend to occur outside the PCA, and as grizzly bears continue to expand farther outside of the recovery zone, the number of conflicts will most likely continue to pose a challenge to grizzly bear managers (Gunther et al 2004). This is particularly true on domestic sheep allotments. ~~While there have been recent increases in bear depredations on cattle in the Greater Yellowstone Area, the number of allotments and distribution of cattle inside the PCA in 1998 did not preclude achieving the demographic recovery criteria. In the case of sheep allotments, conflicts are much more prevalent and more difficult to resolve without eventually phasing out sheep grazing in the PCA. Financial incentives with non-governmental organizations (NGOs) have been successful in retiring sheep grazing allotments on public land when willing participants were available (Gunther et al. 2004). These types of opportunistic partnerships between federal agencies, NGOs, and willing permittees are recommended as one possible method for resolving chronic conflicts on grazing allotments within prime grizzly bear habitat.~~

Inside the PCA there were There were 73 cattle and 15 sheep allotments inside the PCA as of 1998. A total of 17,279 sheep AMs were permitted inside the PCA in 1998 (Appendix F).

Two sheep allotments on the Caribou-Targhee National Forest within the PCA have been phased out since the establishment of the 1998 baseline, resulting in a decrease of 7,889 sheep AMs in the PCA.

Monitoring Protocol for Commercial Livestock Grazing

To ensure no net increase from the 1998 baseline, numbers and acreage of commercial livestock grazing allotments and numbers of sheep AMs on Federal land within the PCA will be monitored and reported to the IGBST annually by the permitting agencies. The number of allotments will be reported to provide useful information on the distribution of grazing inside the PCA.

Major Foods

Background

In addition to the 3 objective and measurable habitat criteria listed above, additional food indices will be monitored annually and used to assess any impacts of habitat changes on the Yellowstone grizzly bear population. Four specific food items have been identified as major components of the GYAGYE grizzly bear diet (Mattson *et al.* 1991). These are seeds of the whitebark pine, army cutworm moths, ungulates, and spawning cutthroat trout. These food sources may exert a positive influence on grizzly bear fecundity and survival and are some of the highest sources of digestible energy available to grizzly bears in the Yellowstone area (Mealey 1975, Servheen *et al.* 1986, Pritchard and Robbins 1990, Craighead *et al.* 1995). Each of these food sources is limited in distribution and subject to wide annual fluctuations in availability. During years when these food sources are abundant, there are very few grizzly bear/human conflicts in the GYAGYE (Gunther *et al.* 1997). In contrast, during years when there are shortages of one or more of these foods, grizzly bear/human conflicts are more frequent and there are generally higher numbers of known and probable human-caused grizzly bear known and probable mortalities (Mattson ~~et al.~~et al. 1992a, Mattson ~~et al.~~et al. 1992b, Gunther ~~et al.~~et al. 1997).

These foods are very important to grizzly bears in the GYAGYE. Introduced organisms, habitat loss, and other human activities have the potential to negatively impact ~~negatively~~ the abundance and distribution of these foods. Because of natural annual changes in abundance and distribution of these four major foods, threshold values of abundance for each food type have not been established. Whitebark pine, ungulates, cutthroat trout, and army cutworm moths are currently monitored either directly or indirectly on an annual basis. With the distribution and range of bears expanding in the GYE, additional food resources will become available.

~~By expanding the distribution and range of bears in the GYA, additional food resources will become available.~~

Monitoring Protocol of Major Foods

To monitor these major foods and their importance to grizzly bears, the IGBST will survey and report on each food annually, as per ~~the~~ detailed food monitoring protocols in Appendix E. There are no threshold values for the four food indices, however, fFood abundance data will be compared with information on numbers of grizzly bear/human conflicts, grizzly bear management actions, human-caused known and probable grizzly bear mortalities, and changes in the distribution of bears. This analysis will be completed by the IGBST, including interpretations of influences of food availability on population standards and grizzly bear/human conflict rates. Results will be presented in the annual reports prepared by the IGBST. If declines in certain foods occur and, using the best available scientific data and techniques, the IGBST concludes these are related to significant increases in bear-known and probable bear mortalities and that such increases could threaten the grizzly population, the IGBST shall recommend a petition for relisting (see Chapter 6, Implementation and Evaluation, for details on this process). Significant declines in important foods could also result in reductions in cub production. Since both human-caused mortality and numbers of females with cubs are measurable criteria monitored annually for the population, any significant decline in important foods would also be reflected in changes in these measurable population standards.

Monitoring these important foods also provides managers with some ability to predict annual seasonal bear habitat use, and estimate, prepare for, and avoid grizzly bear/human conflicts due to a shortage of one or more foods.

Existing monitoring programs will be continued under this Conservation Strategy; however, monitoring programs may be changed to incorporate new technological advances in monitoring techniques or new knowledge of bear habitat use in the Greater Yellowstone Area. Existing monitoring programs may be expanded beyond the PCA to areas currently being used by bears or areas predicted for future use by bears.

Winter-killed Ungulates

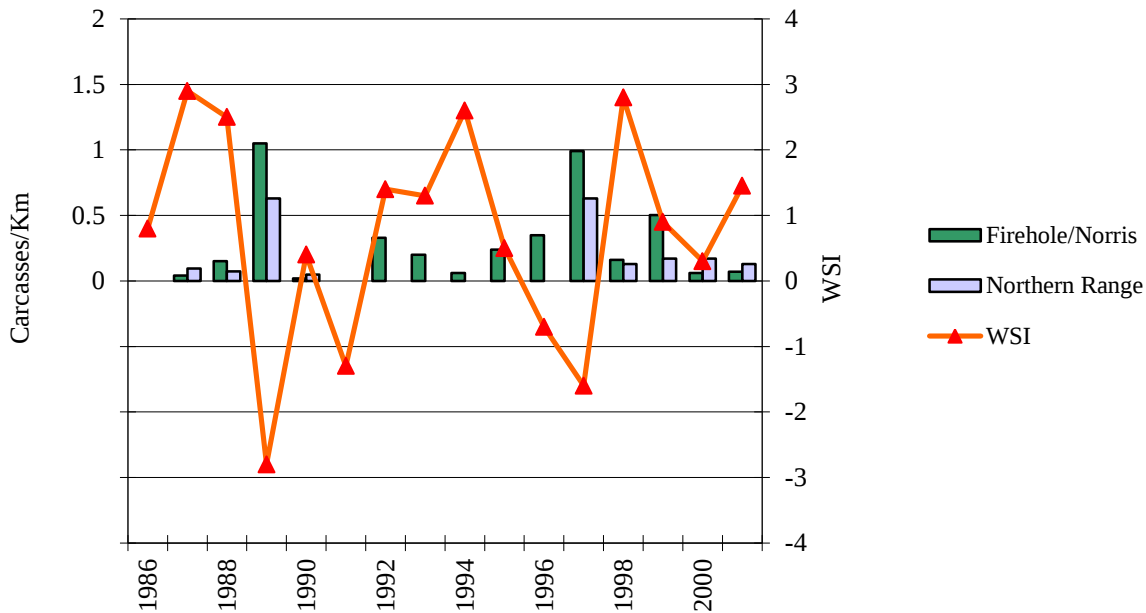
Background

The GYAGYE is unique among areas in North America inhabited by grizzly bears in that ungulates are a major food source, as indicated by bear scats (Mattson 1997), feed site analysis (Mattson 1997), and bear hair isotope analysis (Hildebrand ~~et al.~~et al. 1999). On average, approximately 79% of the diet of adult male and 45% of the diet of adult female grizzly bears in the GYAGYE is meat (Hildebrand ~~et al.~~et al. 1999). In contrast, in Glacier National Park, over 95% of the diets of both adult male and female grizzly bears is vegetation (Hildebrand ~~et al.~~et al. 1999). Ungulates rank as the second highest source of net digestible energy available to grizzly bears in the GYAGYE (Mealey 1975, Pritchard and Robbins 1990, Craighead ~~et al.~~et al. 1995). Ungulates are also important to bears because they provide a high quality food source during early spring before most plant foods become available. Grizzly bears with home ranges in areas with few plant foods depend extensively on ungulate meat (Harting 1985). Grizzly bears feed on ungulates primarily as winter-killed carrion from March through May (Mattson and Knight 1992, Green ~~et al.~~et al. 1997). Carcass availability fluctuates with winter severity (Figure 11).

Monitoring Protocol

There are currently 30 spring ungulate carcass survey routes in Yellowstone National Park (YNP) and 11 on the Gallatin National Forest (Haroldson ~~et al.~~et al. 1998). Under this Conservation Strategy, monitoring of winter-killed ungulate carcass availability along these survey routes will continue and the results summarized and reported annually. ~~Data from these survey efforts will also be used to update productivity values in the CEM.~~ Current survey methods may be redesigned or modified when appropriate.

Figure 1. Winter Severity Index (WSI) derived for elk on the Northern Range and ungulate carcasses/km along transects in two survey areas, Yellowstone National Park, 1986-2001 (Podrutzny and Gunther 2002).



Cutthroat Trout

Background

Due to their high digestibility and protein and lipid content, spawning cutthroat trout are one of the highest sources of digestible energy available to bears in Yellowstone National Park (Mealey 1975, Pritchard and Robbins 1990). Grizzly bears are known to prey on cutthroat trout in at least 36 different streams tributary to Yellowstone Lake (Hoskins 1975, Reinhart and Mattson 1990). In 2002, Haroldson *et al.* (in review a) estimated that approximately 69 to 85 grizzly bears per year frequented and likely fished spawning streams tributary to Yellowstone Lake. In 1994, non-native lake trout were discovered in Yellowstone Lake. Lake trout could depress the native cutthroat trout populations and associated bear fishing activity (National Park Service 1994).

Monitoring Protocol

The Yellowstone Lake cutthroat trout population is currently monitored using gillnets, fish weirs, spawning stream surveys, and hydroacoustic techniques (Appendix E). YNP will provide an annual summary to the IGBST. Current survey methods may be modified or redesigned as appropriate.

Moth Aggregation Sites

Background

Alpine moth aggregations are an important food source for a significant portion of the Yellowstone grizzly bear population (Mattson *et al.* 1991). As many as 55 different grizzly bears have been observed feeding at moth sites on a single morning (Annual Report 2002 in

prep). Some bears may feed almost exclusively on moths for a period of over one month (French [et al. et al.](#) 1994). Moths have the highest caloric content per gram of any other bear food (French [et al. et al.](#) 1994) and are available during the late summer/early fall periods when bears are consuming large quantities of foods in order to acquire sufficient fat levels for winter (Mattson [et al. et al.](#) 1991). A grizzly bear feeding extensively on moths over a 30-day period can consume 47%, close to half, of its annual energy budget of 960,000 calories (White 1996). Moths are also valuable to bears because they are located in relatively remote areas, thereby reducing the potential for grizzly bear/human conflicts during the late-summer tourist months. During years when moths are abundant on high elevation moth sites, there are few grizzly bear/human conflicts at nearby low elevation human developments (Gunther [et al. et al.](#) 1997). During years when moths are absent from the high elevation talus slopes, there are more grizzly bear/human conflicts at nearby low elevation human developments (Gunther [et al. et al.](#) 1997).

Figure 2. The annual number of confirmed moth sites in the Greater Yellowstone Area, the number used by bears, and the total number of telemetry relocations or aerial observations of bears recorded at each site, 1986-2001 (Bjornlie and Haroldson 2002).

Year	Number of confirmed moth sites ^a	Number of moth sites used ^b	Number of locations or observations ^c
1986	5	2	8
1987	6	4	15
1988	7	4	43
1989	11	9	47
1990	13	10	69
1991	16	14	144
1992	19	15	88
1993	19	2	4
1994	20	7	14
1995	23	13	28
1996	24	14	69
1997	24	14	67
1998	26	17	124
1999	27	17	144
2000	27	14	78
2001	27	16	98
Total			1,040

^a The year of discovery was considered the first year a telemetry location or aerial observation was documented at a site. Sites were considered confirmed every year thereafter regardless of whether additional locations were documented.

^b A site was considered used if ≥ 1 location or observation was documented within the site that year.

^c May include replicate sightings or telemetry relocations.

Monitoring Protocol

Bear use of moth aggregation sites has been noted during radio tracking and observation flights. Bear use of these sites will be used as an indirect measure of moth abundance. Aerial surveys for moth use will be conducted annually on representative moth feeding sites (Figure 12). Results will be summarized and reported in the IGBST Annual Report.

Whitebark Pine Cone Production

Background

Due to their high fat content and potential abundance as a pre-hibernation food, whitebark pine seeds are an important fall food for bears in the ~~GYAGYE~~ (Mattson and Jonkel 1990). Yellowstone grizzly bears consume whitebark pine seeds extensively when whitebark cones are available. Bears may feed almost predominantly on whitebark pine seeds when production exceeds 22 cones per tree (Mattson ~~et al.~~et al. 1992). During years of low whitebark pine seed availability, grizzly bears often seek alternate foods at lower elevations in association with human activities, leading to increased nuisance bear management actions and human-caused grizzly bear known and probable mortalities during the fall (Mattson ~~et al.~~et al. 1992, Knight and Blanchard 1994, Gunther ~~et al.~~et al. 1997). During years when whitebark pine nuts are abundant, there are generally very few grizzly bear/human conflicts during the fall season (Mattson ~~et al.~~et al. 1992, Gunther ~~et al.~~et al. 1997).

Monitoring Protocol

Currently there are 19 whitebark pine cone production transects (Figure 13) within the ~~GYAGYE~~, nine of which have been monitored on an annual basis since 1980 (Knight ~~et al.~~et al. 1997). Monitoring of whitebark pine cone production using current or modified methods will continue under this Conservation Strategy. New transects may be added or methods changed as knowledge of bear use of this resource evolves. Results will be summarized and reported in the IGBST Annual Report.

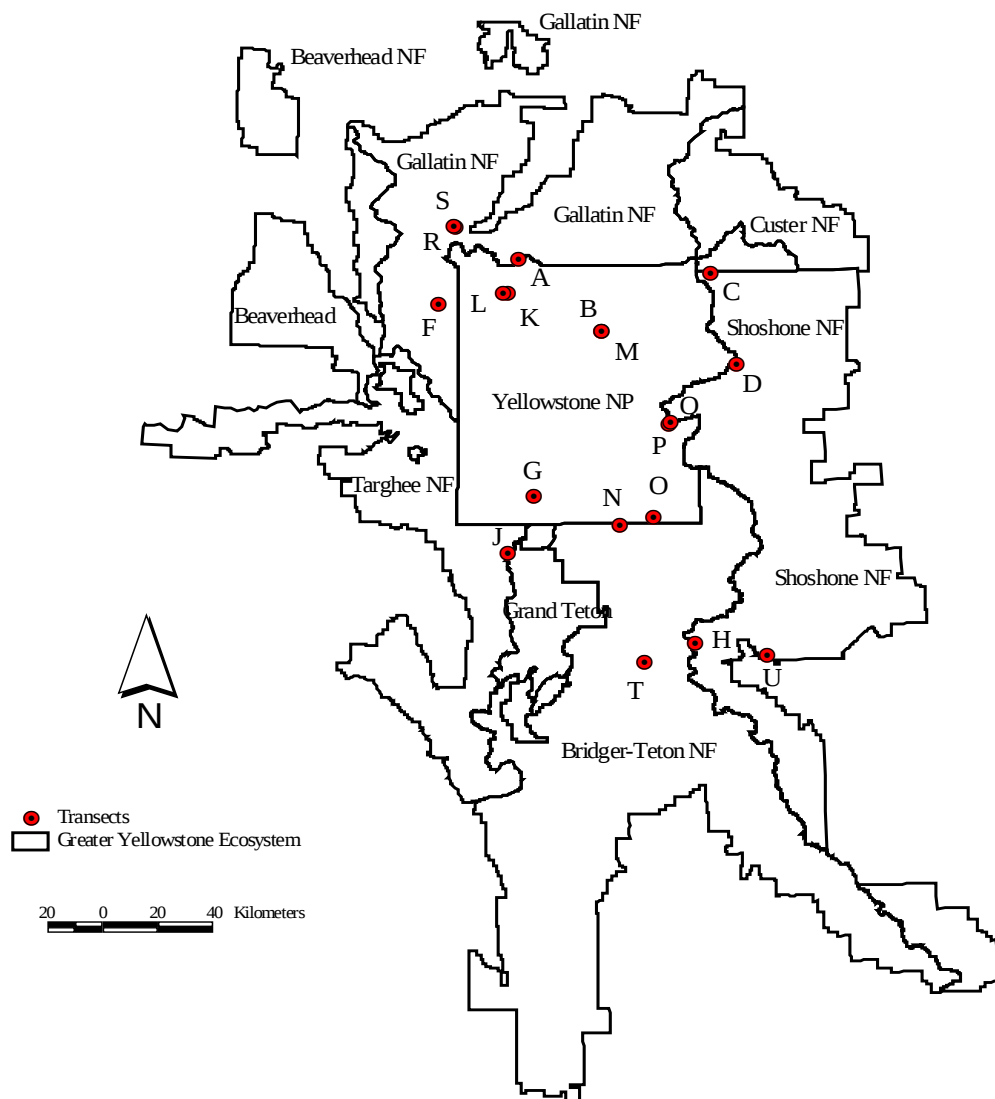


Figure 3. Location of whitebark pine cone transects.

White Pine Blister Rust Infection

Background

Whitebark pine mortality due to white pine blister rust exceeds 90% throughout the northwest U.S. (Kendall and Arno 1990). Although tree mortality has been low to date in the GYAGYE, some whitebark pine stands are infected with blister rust. The extent of the blister rust infection and the future effects it will have on whitebark pine in the GYAGYE are unknown.

Monitoring Protocol

Along each whitebark pine cone transect, each tree will be examined for presence of blister rust, and the data recorded. Results will be recorded and reported annually by the IGBST.

Habitat Effectiveness and Habitat Value

Background

The Yellowstone Grizzly Bear CEM was designed to assess the inherent productivity of grizzly bear habitat and to assess the effects of human activities on bear use of that habitat (Dixon 1997, Weaver et al. 1986, Mattson et al. in press). The model uses GIS databases and relative value coefficients of human activities, vegetation, and key grizzly bear foods to calculate Habitat Value (HV) and Habitat Effectiveness (HE) (Weaver et al. 1986, Bevins 1997, Mattson et al. in press). The CEM is the result of more than a decade of interagency effort. Interagency mapping protocols and procedures (Mattson and Despain 1985) have been developed and approved for the PCA. Research is limited as to what level of human activity on backcountry trails actually displaces bears from these habitats. Additional information on human use in the backcountry may help determine the relationship between human activities and bear use.

Habitat Value in the CEM is a relative measure of the average net digested energy potentially available to bears in a subunit for each of four seasons. Habitat Effectiveness is that part of the energy potentially derived from the area that is available to bears given their response to humans (Mattson et al. in press). It is recognized that motorized access and site developments are the primary human activities influencing grizzly bear use of habitats. However, there are other activities that collectivity may have significant impact on the effectiveness of the habitat for bears. The CEM can be used to estimate the cumulative effects of all human activities on the availability of habitats and associated foods to bears. The 1998 baseline seasonal HE values for each subunit from CEM are displayed in Appendix F.

The current level of HE for some subunits likely differs from the 1998 baseline. This is not due to changes in the level of human activity, as human activity has not significantly changed since 1998. Rather, several wildfires and prescribed fires have occurred which changed HV. Since HE is calculated as a percentage of the HV, this has resulted in a corresponding change in HE. The change is likely not detrimental to bears and in some instances has improved the seasonal HV.

Monitoring Protocol

The agencies will measure changes in seasonal Habitat Effectiveness in each BMU and subunit by regular application of the CEM or the best available system, and compare outputs to the 1998 baseline (Appendix F). CEM databases will be reviewed annually and updated as needed. These databases include location, duration, and intensity of use for motorized access routes, non-motorized access routes, developed sites, and front country and backcountry dispersed

uses. Emphasis and funding will continue to refine and verify CEM assumptions and to update databases.

Representative trails or access points, where risk of grizzly bear mortality is highest, will be monitored when funding is available. CEM databases will be updated to reflect any noted changes in intensity or duration of human use.

Hunter Numbers

Background

The number of elk hunters in Wyoming, Idaho, and Montana who recreate in the PCA (Figure 14) were estimated and compared to grizzly bear known and probable mortalities, both verified and probable, from 1987 to 1997 to determine if bear mortality is correlated to hunter numbers. The data show there is little relationship between hunter numbers and human-caused grizzly mortality.

The highest source of grizzly bear mortality in the GYAGYE has been due to interactions with hunters. While the number of hunters using the PCA has not increased significantly, the number of grizzly bear known and probable mortalities due to interactions with hunters increased in the last decade. Possibilities for why this occurred include bears learning to seek hunter-killed game, and bear distribution shifting to elk hunting units that open early (Haroldson *et al.* *et al.* in review *b*). Nearly all known and probable bear mortalities occur as surprise encounters, at big game carcasses, or at hunter camps.

Figure 4. Estimated numbers of elk hunters within the grizzly bear recovery zone plus a 10-mile perimeter in Idaho, Montana, and Wyoming for the years 1991-2001.

State	Year										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Idaho ^a	2,292	2,573	2,962	2,682	2,366	3,102	2,869	2,785	2,883	NA ^b	2,914
Montana ^c	18,264	16,062	16,092	16,477	15,288	16,108	NA	NA	14,298	14,872	12,504
Wyomin ^d	16,233	17,154	17,105	17,053	17,464	16,283	17,458	15,439	15,727	12,812	13,591
Total	36,789	35,789	36,159	36,212	35,118	35,493			32,908		29,009
^a Idaho and Wyoming numbers include archery and gun hunters. ^b NA = hunter number estimates not currently available. ^c Gun only season. ^d A percentage of total hunter numbers was used in hunt areas 61 to 63, 67, 68, 73, and 83 because a portion of the hunt area falls outside the designated area.											

State and federal wildlife agencies have attempted to reduce the loss of bears to hunters by expanding information and education programs. “Living in Bear Country” workshops are conducted regularly in many GYAGYE communities, and licensed outfitters and guides have increased training for their members and clients.

Monitoring Protocol

Data from state wildlife agencies on big game herd units or hunting districts will be used as an index to backcountry use during the hunting season. Hunter use levels combined with numbers of grizzly bear/human conflicts will be used to identify when and where to increase public education efforts and develop appropriate management actions to minimize grizzly bear/human conflicts that result in bear mortality.

Private Land Development

Background

While the existing cumulative effects database accounts for private land development effects within the PCA, influences outside this area are not included. Outside the PCA, several factors influence state and federal grizzly bear management programs. Among the most important is the rapidly accelerating growth of human populations in some areas in grizzly bear habitat in western Montana, southeast Idaho, and northwest Wyoming. This growth results not only in increased visitor use, but also increased residential development on important wildlife habitat adjacent to public lands. This increased human use, primarily residential development, results in the loss of wildlife habitat and permanent increases in grizzly bear/human conflicts, resulting in higher bear mortality rates.

Activities associated with permanent human presence often result in continual management actions that adversely impact bears. Many of these activities occur on or are associated with private lands. Private lands account for a disproportionate number of bear deaths and conflicts (Figures 15 and 16).

Management agencies devote significant efforts toward private landowner outreach programs to minimize grizzly bear/human conflicts and to manage bears and potential conflict situations on such sites. Both the Montana Fish, Wildlife & Parks Department and the Wyoming Game and Fish Department employ bear management specialists devoted specifically to managing grizzly bear/human conflicts on private lands and to working with private landowners to minimize such conflicts.

It is recognized that federal land management and state wildlife agencies do not have direct management authority over private lands and that these agencies do not have the ability to respond to all private land development by management actions on public lands. As private lands are developed and as secure habitat on private lands declines, state and federal agencies will work together to explore options that address impacts from private land development.

Monitoring Protocol

Human-caused mortality related to private land conflicts will be monitored and must be controlled to meet the standards in this Conservation Strategy. This requires ongoing efforts to limit grizzly bear/human conflicts on private lands inside and outside the PCA.

To assist in minimizing grizzly bear/human conflicts on private lands, a need exists to develop a protocol to categorize private lands and report changes. The objective is to provide a system for monitoring the status of grizzly bear habitat on private lands within the PCA, and to direct management efforts, conservation actions by private organizations, and outreach efforts to the public in areas where private lands are being developed. The protocol should provide a qualitative and quantitative system for classifying the potential of private land parcels as productive and secure grizzly bear habitat.

While the sole responsibility for monitoring the status and condition of private lands does not lie with the states, the states will assist private non-profits and other entities to categorize and prioritize potential lands suitable for permanent conservation. The quality and availability of land parcel data varies greatly within and among states and is generally available through the various county governments. Therefore, the methodology to monitor private land status and condition will be specific to data availability by county/state.

Figure 5. Land ownership where known and probable human-caused grizzly bear mortalities occurred in the Greater Yellowstone Area during 1987-2001.

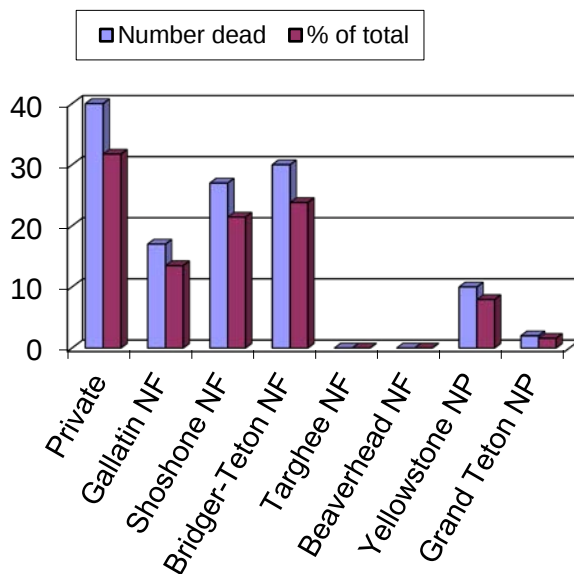
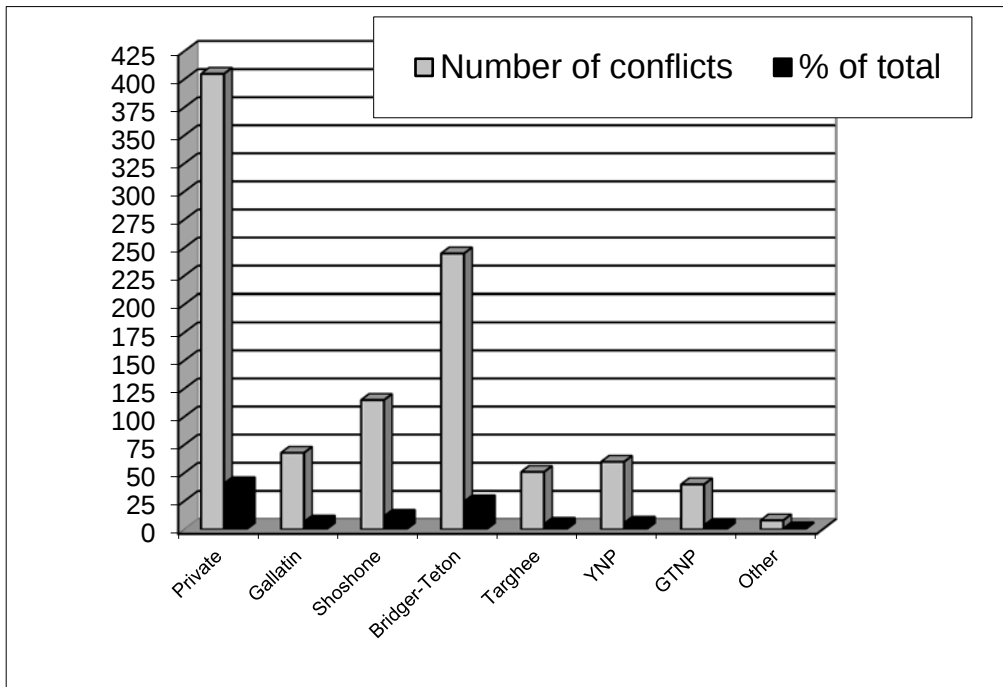


Figure 6. Land ownership where known grizzly bear/human conflicts occurred in the Greater Yellowstone Area 1992-2000.



Habitat Connectivity

Background

Excessive clearing widths, increased speeds, increased traffic volume, and widened roads, e.g., four lanes, passing lanes, and wide shoulders, are known to cause increased road mortality and/or reduce habitat connectivity (Proctor 2003, Clevenger ~~et al.~~ et al. 2002).

Vehicle size and numbers continue to increase on the roads in the GYAGYE. As existing roads age and deteriorate, plans are developed to reconstruct these roads to support increases in the size and numbers of vehicles. Federal and state highway departments prefer to design roads that allow increased speed, have wider road surfaces, including wider shoulders, and wide vegetation clearing widths for visibility. A combination of any or all of these design standards results in increased driver comfort and higher speeds. This increase in speed results in increased wildlife mortality (Gunther ~~et al.~~ et al. 1998).

Certain road improvement designs can cause reduction of bear crossings. This results in elimination of traditional dispersal routes and fragmentation of home ranges in the GYAGYE.

Monitoring Protocol

Monitoring and surveys will be conducted before designs are initiated. These surveys or analyses will include known bear crossing areas, bear sighting information, ungulate road mortality data, bear home range analysis, and game trail information. This information will be used to complete a connectivity analysis to identify important crossing areas.

To ensure that habitat connectivity is addressed for new road construction or reconstruction in the GYAGYE, federal land management agencies will evaluate habitat connectivity during the NEPA analysis process.

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