Grizzly Bear Recovery Plan

Supplement: Habitat-based Recovery Criteria for the Yellowstone Ecosystem

Original Plan Approved: January 29, 1982
Revised Plan Approved: September 10, 1993

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3-6-07
Date

Habitat-based recovery criteria for the Greater Yellowstone Area

APPENDED TO THE 1993 GRIZZLY BEAR RECOVERY PLAN

As per a court settlement (Settlement dated March 31, 1997 and approved by the court on May 5, 1997 Fund for Animals v. Babbitt, 967 F. Supp. 6 (D. D.C. 1997)) and as recommended by Recovery Plan Task Y423, we have worked to "establish a threshold of minimal habitat values to be maintained within each Cumulative Effects Analysis Unit in order to ensure that sufficient habitat is available to support a viable population" (U.S. Fish and Wildlife Service 1993). On June 17, 1997, we held a public workshop in Bozeman, Montana, to develop and refine habitat-based recovery criteria for the Yellowstone grizzly bear population. A Federal Register notice notified the public of this workshop and provided interested parties an opportunity to participate and submit comments (62 FR 19777, April 23, 1997). After considering 1,167 written comments, we developed biologically-based habitat recovery criteria with the overall goal of maintaining or improving habitat conditions at levels of human activity that existed in 1998 when the population was increasing at 4-7 percent per year (Eberhardt 1995, Boyce et al. 2001, Harris et al. 2006).

The following 3 objective and measurable habitat criteria within the Recovery Zone (also known as the Primary Conservation Area (PCA)) (Figure 1) are appended to the Yellowstone Chapter of the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993) as per task Y423:

1. Secure Habitat Standard

The percent of secure habitat within each bear management subunit must be maintained at or above levels that existed in 1998 (Table 1). Temporary and permanent changes are allowed under specific conditions identified below. Figure 2 provides a summary of the secure area management rules. The rule set in Figure 2 will be used for management and evaluation of projects and habitat management actions as appropriate to achieve and maintain this standard.

Application Rules for Changes in 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 (CEM) 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.
- Temporary changes to secure habitat. Temporary reductions in secure habitat can occur to allow projects, if all of the following conditions are met:
    - Only one project is active per grizzly subunit at any one time.
    - Total acreage of active projects within a given Bear Management Unit (BMU) will not exceed 1% of the acreage in the largest subunit within that BMU (Table 2). The acreage of a project that counts against the 1% limit is the acreage associated with the 500-meter buffer around any motorized access route that

extends into secure habitat. Secure habitat is restored within one year after completion of the project.

Figure 1. Yellowstone Recovery Zone (Primary Conservation Area) boundary showing bear management unit (BMU) and subunit boundaries.

Figure 2. The rule set for secure habitat management in the Yellowstone Recovery Zone.

Criteria	Definition
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 Cumulative Effects Model (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 as per the CEM 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 recurring 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 (less than or equal to 3 years) 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.
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.

2. Developed Site Standard

The number and capacity of developed sites within the Recovery Zone will be maintained at or below the 1998 level with the following exceptions: any proposed increase, expansion, or change of use of developed sites from the 1998 baseline in the Recovery Zone (Table 3) 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 as campgrounds, trailheads, lodges, administrative sites, service stations, summer homes, restaurants, visitor centers, and permitted resource development sites such as oil and gas exploratory wells, production wells, plans of operation for mining activities, work camps, etc.

Application Rules for application of the developed site standard:

- Mitigation of detrimental impacts will occur within the affected subunit and will be equivalent to the type and extent of impact. Mitigation measures will be in place before the initiation of the project or included as an integral part of the completion of the project.
- Consolidation and/or elimination of dispersed camping will be considered adequate mitigation for increases in human capacity at developed campgrounds if the new site capacity is equivalent to the dispersed camping eliminated.
- 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 to enhance 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.
- To the fullest extent of its regulatory authority, the Forest Service will minimize effects on grizzly habitat from activities based in statutory rights, such as the 1872 General Mining Law. 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 Recovery Zone, to levels at or below the 1998 baseline will be accomplished in adjacent subunits when possible, or the closest subunit if this is not possible, or in areas outside the Recovery Zone adjacent to the subunit impacted. 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.

- Developments on private land are not counted against this standard.

3. Livestock Allotment Standard

Inside the Recovery Zone, no new active commercial livestock grazing allotments will be created and there will be no increases in permitted sheep Animal Months (AMs) from the identified 1998 baseline (Table 4). Existing sheep allotments will be monitored, evaluated, and phased out as the opportunity arises with willing permittees.

Application Rules for application of livestock standard:

- Allotments include both vacant and active commercial 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 Recovery Zone, 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.

Additional Habitat Indices to be Monitored

In addition to the 3 objective and measurable habitat criteria listed above, additional habitat indices will be monitored annually and used to assess any impacts of habitat changes on the Yellowstone grizzly bear population. The following habitat indices will be appended to the Yellowstone chapter of the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993) task Y423. There are no threshold values for these indices.

Food indices

Four food items have been identified as major components of the GYA 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 natural annual fluctuations in availability. During years when whitebark pine seeds are abundant, there are very few grizzly bear/human conflicts in the

Yellowstone area (Gunther et al. 2004). In contrast, during years when there are shortages of whitebark pine seeds, grizzly bear/human conflicts are more frequent and there are generally higher numbers of human-caused grizzly bear known and probable mortalities (Mattson et al. 1992*a*, Mattson et al. 1992*b*, Gunther et al. 2004).

These foods are very important to grizzly bears in the Yellowstone area. Introduced organisms, habitat loss, and other human activities have the potential to impact negatively the abundance and distribution of these foods. Because of wide natural variation in the annual abundance and distribution of these four major foods, it is not possible to establish threshold values of abundance for each food. Whitebark pine, ungulates, cutthroat trout, and army cutworm moths are to be monitored either directly or indirectly on an annual basis.

Food Indices Monitoring Protocol

Specifics of the monitoring protocols for bear foods are presented in Appendix A. To monitor these major foods and their importance to grizzly bears, the Interagency Grizzly Bear Study Team will survey and report on each food annually. Food 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 Interagency Grizzly Bear Study Team, including interpretations of how food availability influences population parameters and grizzly bear/human conflict rates. Results will be presented in the annual reports prepared by the Interagency Grizzly Bear Study Team. If declines in certain foods occur and, using the best available scientific data and techniques, the Interagency Grizzly Bear Study Team concludes these are related to significant increases in known and probable grizzly bear mortalities and that such increases could threaten the grizzly population, the Interagency Grizzly Bear Study Team will report this threat to the Yellowstone Ecosystem Subcommittee. Significant declines in important foods could also result in reductions in cub production. Since both numbers of human-caused mortalities and numbers of females with cubs are measurable demographic criteria monitored annually for the population, the relationship between any significant declines in important bear foods could be identified and related to changes in these demographic criteria.

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 may be changed to incorporate new technological advances in monitoring techniques or new knowledge of bear habitat use in the Yellowstone Area. Existing monitoring programs may be expanded as necessary beyond the Recovery Zone to areas currently being used by bears or areas predicted for future use by bears.

Habitat Effectiveness Index

The Yellowstone Grizzly Bear CEM was designed to assess the inherent productivity of grizzly bear habitat and to be a standardized index to measure changes in grizzly bear habitat over time (Dixon 1997, Weaver et al. 1986, Mattson et al. 2002). 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, Mattson et al. 2002). 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 Recovery Zone. 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.

HV 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. HE is that part of the energy potentially found in an area that is available to bears given their response to humans (Mattson et al. 2002). 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 seasonal HE values for each subunit from CEM are displayed in Table 5. The current level of HE for some subunits likely differs from the 1998 values. This is not due to changes in the level of human activity, as levels of secure habitat and developed sites have not changed since 1998, except to improve upon the 1998 baseline. 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. Any changes are not producing negative effects to grizzly bear population criteria is likely not detrimental to bears and in some instances has improved the seasonal HV.

Habitat Effectiveness Monitoring Protocol

The agencies will measure changes in seasonal HE values in each BMU and subunit by regular application of the CEM or the best available system, and compare outputs to the 1998 baseline (Table 5). 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.

Status of Private Lands Index

While the existing cumulative effects database accounts for private land development effects within the Recovery Zone, influences outside this area are not included. Outside the Recovery Zone, 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 southwestern Montana, southeast Idaho, and northwest Wyoming. This growth results not only in increased visitor use, but also increased residential development in important wildlife habitat adjacent to public lands.

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 (Servheen et al. 2004). This increased human use related to residential development results in the loss of wildlife habitat and increases in grizzly bear/human conflicts, resulting in higher bear mortality rates.

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. 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.

Status of Private Lands Index Protocol

Human-caused mortality related to private land conflicts will be monitored and must be managed within biologically sustainable limits to meet the standards in the Recovery Plan and the Conservation Strategy. This requires ongoing efforts to limit grizzly bear/human conflicts on private lands inside and outside the Recovery Zone.

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 Recovery Zone, 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, they 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.

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Table 1. The 1998 baseline values for secure habitat, OMARD >1 mile per square mile, and TMARD >2 miles per square miles for 40 BMU subunits in the GYA. Includes USFS, BLM, state, county, and private motorized access routes. Size is shown in thousands of acres[1].

Subunit name	BMU #	OMARD % > 1 mi/sq mi		TMARD % >2 mi/sq mi	% secure habitat	Size
		S1	S2			
Bechler/Teton	18	12.7	12.7	4.7	78.1	341.8
Boulder/Slough #1	4	2.2	2.2	0.1	96.6	180.5
Boulder/Slough #2	4	1.0	1.0	0	97.7	148.5
Buffalo/Spread Creek #1	17	10.1	10.2	4.1	88.3	142.1 (140.8)
Buffalo/Spread Creek #2	17	13.3	14.5	10.4	74.3[2]	325.1
Crandall/Sunlight #1	6	11.9	16.2	4.0	81.1	83.2
Crandall/Sunlight #2	6	13.6	14.6	8.9	82.3	202.2
Crandall/Sunlight #3	6	12.8	16.6	8.2	80.4	142.1
Firehole/Hayden #1	10	6.3	6.3	1.2	88.4	217.0
Firehole/Hayden #2	10	6.3	6.3	0.9	88.4	113.3
Gallatin #1	2	1.6	1.6	0.1	96.3	81.9
Gallatin #2	2	7.8	7.8	3.8	90.2	99.2
Gallatin #3	2	41.5	42.5	16.9	55.3	139.5
Hellroaring/Bear #1	3	20.8	21.5	13.5	77.0	118.4
Hellroaring/Bear #2	3	0.6	0.6	0.2	99.5	146.6
Henrys Lake #1	12	44.7	44.7	25.9	45.4	128.6 (122.2)
Henrys Lake #2	12	46.1	46.1	28.1	45.7	97.9 (89.6)
Hilgard #1	1	25.1	25.1	12.5	69.8	128.6
Hilgard #2	1	16.0	16.0	10.3	71.5	90.2
Lamar #1	5	7.0	7.0	3.3	89.4	192.0
Lamar #2	5	0	0	0	100	115.8
Madison #1	11	24.2	24.5	10.2	71.5	145.3
Madison #2	11	31.7	31.7	22.3	66.5	100.5 (95.4)

Subunit name	BMU #	OMARD % > 1 mi/sq mi		TMARD % >2 mi/sq mi	% secure habitat	Size
		S1	S2			
Pelican/Clear #1	8	1.3	1.3	0.4	97.8	69.1
Pelican/Clear #2	8	3.0	3.0	0.2	94.1	164.5
Plateau #1	13	19.0	19.2	9.8	68.9	183.0
Plateau #2	13	6.1	6.1	2.4	88.7	268.8
Shoshone #1	7	1.5	1.5	0.9	98.5	78.1
Shoshone #2	7	1.1	1.1	0.4	98.8	84.5
Shoshone #3	7	3.4	3.4	1.3	97.0	90.2
Shoshone #4	7	3.9	4.6	2.0	94.9	121.0
South Absaroka #1	16	0.4	0.4	0	99.2	104.3
South Absaroka #2	16	0	0	0	99.9	122.2
South Absaroka #3	16	2.1	2.1	2.3	96.8	222.7
Thorofare #1	15	0	0	0	100	175.4
Thorofare #2	15	0	0	0	100	115.2
Two Ocean/Lake #1	14	1.8	1.8	0.1	96.3	310.4 (238.1)
Two Ocean/Lake #2	14	0	0	0	100	91.5 (80.0)
Washburn #1	9	12.4	12.4	2.9	83.0	113.9
Washburn#2	9	3.6	3.6	0.7	92.0	92.2
Mean for PCA/total acres		10.4	10.7	5.3	85.6[2]	5,893.8 (5,782.4)

[1]Lakes >1 mile in size were removed from subunit totals, OMARD, TMARD, and secure habitat calculations. Numbers in parentheses are acres of subunit without these lakes.

[2] These numbers were updated with new information since the Draft Final Conservation Strategy was released in 2003

Table 2. Square miles of secure habitat in various management categories for each of the 40 Bear Management subunits in the Yellowstone Recovery Zone. (Figures include inholdings within proclaimed Forest Service Boundaries). Large lakes greater than 1 mile/square mile excluded.)

SUBUNIT NAME	Subunit Area (mi^2)	Total Secure Habitat (mi^2)	Wilderness or Park Secure Habitat (mi^2)	Non Wilderness or Non Park Secure Habitat (mi^2)	Total Area of Non Wilderness or Non Park In Subunit (mi^2)	Maximum area of Secure Habitat Available for Projects Under the 1% Rule Set at any one time[1] (mi^2)
Bechler/Teton #1	534	417	322	95	197	5.3
Boulder/Slough #1	282	272	269	3	11	2.8
Boulder/Slough #2	232	227	227	0	0	
Buffalo/Spread Creek #1	220	194	187	7	9	5.1
Buffalo/Spread Creek #2	508	377[3]	300	77[3]	208	
Crandall/Sunlight #1	130	105	57	48	72	3.2
Crandall/Sunlight #2	316	260	175	85	139	
Crandall/Sunlight #3	222	178	97	81	123	
Firehole/Hayden #1	339	300	300	0	0	0 (3.4)[2]
Firehole/Hayden #2	177	152	152	0	0	
Gallatin #1	128	123	123	0	0	2.2
Gallatin #2	155	140	140	0	0	
Gallatin #3	218	120	8	112	209	
Hellroaring/Bear #1	185	142	101	41	81	2.3
Hellroaring/Bear #2	229	228	228	0	0	
Henrys Lake #1	191	87	0	87	191	1.9
Henrys Lake #2	140	64	0 0	64	140	
Hilgard #1	201	140	107	33	90	2.0
Hilgard #2	141	100	63	37	72	
Lamar #1	300	268	256	12	29	3.0
Lamar #2	181	181	181	0	0	
Madison #1	227	163	108	55	114	2.3
Madison #2	149	99	94	5	48	
Pelican/Clear #1	108	106	106	0	0	0 (2.6) [2]
Pelican/Clear #2	257	237	237	0	0	
Plateau #1	286	197	124	73	161	4.2
Plateau #2	420	372	298	74	119	
Shoshone #1	122	120	100	21	22	1.9
Shoshone #2	132	131	115	16	18	
Shoshone #3	141	136	131	5	9	
Shoshone #4	189	179	163	16	25	
South Absaroka #1	163	162	130	32	33	3.5
South Absaroka #2	191	190	174	16	16	
South Absaroka #3	348	337	266	71	82	
Thorofare #1	274	273	273	0	0	0 (2.7) [2]
Thorofare #2	180	180	180	0	0	
Two Ocean/Lake #1	372	358	358	0	0	0 (3.7) [2]
Two Ocean/Lake #2	125	125	125	0	0	
Washburn #1	178	148	148	0	0	0 (1.8) [2]
Washburn #2	144	133	133	0	0	
Total	**9035**	**7721[3]**	**6556**	**1166[3]**	**2218**	**39.7 (53.9)[2]**

[1] See Table 1 for a summary of the secure habitat management rule set.

[2] Area identified in parenthesis is potentially available for projects however, because the entire BMU is within a National Park or Wilderness Area, new road construction is highly unlikely. The total in parenthesis includes this potentially available area.

[3] These numbers were updated with new information since the Draft Final Conservation Strategy was released in 2003.

Table 3. The 1998 baseline for numbers of developed sites on public lands within each of the Bear Management Subunits in the Yellowstone Recovery Zone.[1]

Subunit	Administrative units	Permitted summer home complexes[1]	Developed campgrounds[2]	Trailheads	Major developed sites and lodges	Administrative or maintenance sites	Other developed sites[3]	Plans of operation for minerals activities[4]
Bechler/Teton	Targhee NF Yellowstone NP Grand Teton NP	0 0 0	1 0 8	5 2 3	2 0 1	4 2 3	17 2 10	0 0 0
Boulder/Slough #1	Custer NF Gallatin NF	0 0	0 1	1 7	0 0	0 1	0 3	6 2
Boulder/Slough #2	Gallatin NF Yellowstone NP	0 0	0 1	0 3	0 0	2 2	0 1	0 0
Buffalo/Spread Creek #1	Bridger-Teton NF Grand Teton NP	0 0	1 0	1 7	0 2	0 2	1 3	0 0
Buffalo/Spread Creek #2	Bridger-Teton NF	1	4	3	3	4	5	2
Crandall/Sunlight #1	Shoshone NF Gallatin NF	0 0	2 1	5 2	1 0	1 0	5 5	0 0
Crandall/Sunlight #2	Shoshone NF Gallatin NF	0 0	5 1	4 0	1 0	2 0	5 0	1 0
Crandall/Sunlight #3	Shoshone NF Wyoming Game and Fish	0 0	2 2	3 0	0 0	1 1	2 0	0 0
Firehole/Hayden #1	Yellowstone NP	0	1	5	1	6	13	0
Firehole/Hayden #2	Yellowstone NP	0	1	3	1	2	8	0
Gallatin #1	Yellowstone NP	0	0	3	0	1	0	0

[1] Note this table is from the USDA Forest Service, Forest Plan Amendment For Grizzly Bear Habitat Conservation For The Greater Yellowstone area National Forests, Final Environmental Impact Statement. (USDA Forest Service 2006). These figures differ slightly from the figures in the same table in the Draft Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. (U.S. Fish and Wildlife Service 2003). This table represents updated figures based on more accurate mapping.

Subunit	Administrative units	Permitted summer home complexes[1]	Developed campgrounds[2]	Trailheads	Major developed sites and lodges	Administrative or maintenance sites	Other developed sites[3]	Plans of operation for minerals activities[4]
Gallatin #2	Yellowstone NP	0	2	5	1	12	1	0
Gallatin #3	Gallatin NF Yellowstone NP	0 0	2 0	10 0	0 0	0 0	7 0	0 0
Hellroaring/Bear #1	Gallatin NF Yellowstone NP	0 0	5 0	12 1	1 0	1 0	5 1	8[5] 0
Hellroaring/Bear #2	Gallatin NF Yellowstone NP	0 0	0 0	1 0	0 0	1 2	0 0	0 0
Henrys Lake #1	Targhee NF	2	3	1	0	3	10	1
Henrys Lake #2	Targhee NF Gallatin NF	0 6	0 3	1 4	0 0	1 0	1 2	1 0
Hilgard #1	Beaverhead NF Gallatin NF	0 0	0 0	0 6	0 1	3 2	0 2	0 0
Hilgard #2	Gallatin NF Yellowstone NP	0 0	0 0	4 3	0 0	1 0	1 0	0 0
Lamar #1	Yellowstone NP Gallatin NF Shoshone NF Custer NF	0 0 0 0	1 2 0 0	5 5 0 1	0 0 0 0	3 6 0 0	2 4 0 0	0 6 0 2
Lamar #2	Yellowstone NP	0	0	0	0	4	0	0
Madison #1	Gallatin NF Yellowstone NP	0 0	1 0	11 0	0 0	1 0	9 0	0 0
Madison #2	Gallatin NF Yellowstone NP	8 0	2 0	1 1	1 0	6 2	6 1	0 0
Pelican/Clear #1	Yellowstone NP	0	0	2	0	0	0	0
Pelican/Clear #2	Yellowstone NP	0	1	4	1	4	3	0
Plateau #1	Targhee NF Gallatin NF Yellowstone NP	1 0 0	0 0 0	0 1 0	0 0 0	0 0 1	1 0 0	0 0 0

Subunit	Administrative units	Permitted summer home complexes[1]	Developed campgrounds[2]	Trailheads	Major developed sites and lodges	Administrative or maintenance sites	Other developed sites[3]	Plans of operation for minerals activities[4]
Plateau #2	Targhee NF Yellowstone NP	0 0	1 0	1 0	0 0	1 4	1 0	0 0
Shoshone #1	Shoshone NF	1	2	0	0	0	6	0
Shoshone #2	Shoshone NF	0	0	1	1	0	0	0
Shoshone #3	Shoshone NF	2	0	1	1	0	0	0
Shoshone #4	Shoshone NF	3	3	3	6	0	8	0
South Absaroka #1	Shoshone NF	0	0	0	0	0	0	0
South Absaroka #2	Shoshone NF	0	0	0	0	2	0	0
South Absaroka #3	Shoshone NF	1	3	4	1	1	4	0
Thorofare #1	Bridger-Teton NF Yellowstone NP	0 0	0 0	0 0	0 0	0 4	0 0	0 0
Thorofare #2	Bridger-Teton NF Yellowstone NP	0 0	0 0	0 0	0 0	2 0	0 0	0 0
Two Ocean/Lake #1	Yellowstone NP Bridger-Teton NF Grand Teton NP	0 0 0	2 1 0	3 0 1	1 0 0	3 0 0	2 0 1	0 0 0
Two Ocean/Lake #2	Yellowstone NP Bridger-Teton NF	0 0	0 0	0 0	0 0	2 1	0 0	0 0
Washburn #1	Yellowstone NP	0	2	8	2	7	6	0
Washburn #2	Yellowstone NP	0	1	6	0	1	4	0
Primary Conservation Area	All	25	68	164	29	115	168	29

[1] Single permitted recreation residences are classified as other developed sites in this table.

[2] Four trailheads on the Bridger-Teton National Forest are combined with the associated campgrounds and are considered a single developed site.

[3] Includes developed recreation sites, as well as community infrastructure sites, dams, and other miscellaneous facilities.
[4] Mining claims with plans of operation are considered developed sites for this baseline. Currently, not all sites have active projects.
[5] Includes one mineral materials site with an outside contractor.

Table 4. Number of commercial livestock grazing allotments and sheep animal months inside the Yellowstone Recovery Zone in 1998.[1]

Administrative unit	Cattle allotments		Sheep allotments		Sheep AMs[1]
	Active[2]	Vacant	Active[1]	Vacant	
Beaverhead-Deerlodge NF	2	3	0	0	0
Bridger-Teton NF	9	0	0	0	0
Caribou-Targhee NF	9	1	7	4	14,163
Custer NF	0	0	0	0	0
Gallatin NF	24	9	2	3	3,540
Shoshone NF	24	0	2	0	5,387
Grand Teton NP	1	0	0	0	0
Total in PCA	69	13	11	7	23,090

[1]Since 1998 five of the seven active sheep allotments on the Caribou-Targhee National Forest and the two active sheep allotments on the Shoshone National Forest within the PCA have been closed. As of 2004, there are only four active sheep allotments in side the PCA, totaling 7,130 AMs.

[2] One of the active cattle allotments on the Bridger-Teton National Forest was closed in late 2003.

[1]Note this table is from the USDA Forest Service, Forest Plan Amendment For Grizzly Bear Habitat Conservation For The Greater Yellowstone area National Forests, Final Environmental Impact Statement. (USDA Forest Service 2006). These figures differ slightly from the figures in the same table in the Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. (U.S. Fish and Wildlife Service 2007). This table represents updated figures based on more accurate data.

Table 5. 1998 Habitat Effectiveness (HE) values by season from the Yellowstone Grizzly Bear Cumulative Effects Model (CEM) for each of the 40 Greater Yellowstone Area grizzly bear management subunits.[1]

Subunit	Spring (3/1-5/15) HE	Estrus (5/16-7/15) HE	Early Hyperphagia (7/16-8/31) HE	Late Hyperphagia (9/1-11/30) HE
Bechler/Teton#1	116	64	44	274
Boulder/Slough#1	105	105	119	853
Boulder/Slough#2	123	112	111	521
Buffalo/Spread Cr#1	79	86	78	267
Buffalo/Spread Cr#2	58	98	125	863
Crandall/Sunlight#1	53	94	78	800
Crandall/Sunlight#2	52	82	124	329
Crandall/Sunlight#3	53	50	156	208
Firehole/Hayden#1	96	189	162	244
Firehole/Hayden#2	45	843	66	342
Gallatin#1	139	144	198	635
Gallatin#2	104	97	105	585
Gallatin#3	78	69	89	599
Hellroaring/Bear#1	85	74	95	678
Hellroaring/Bear#2	117	99	98	628
Henrys Lake#1	41	39	32	178
Henrys Lake#2	41	41	33	225
Hilgard#1	99	68	91	614
Hilgard#2	81	97	132	902
Lamar#1	127	118	136	571
Lamar#2	132	167	180	795
Madison#1	53	115	227	390
Madison#2	41	60	147	63
Pelican/Clear#1	103	324	105	560
Pelican/Clear#2	105	2253	203	997
Plateau#1	26	49	36	109
Plateau#2	75	81	56	442
Shoshone#1	39	50	115	264
Shoshone#2	51	56	1424	387
Shoshone#3	65	57	583	484
Shoshone#4	57	78	327	392
South Absaroka#1	55	57	392	399
South Absaroka#2	41	45	339	250
South Absaroka#3	46	73	303	551
Thorofare #1	84	488	298	956
Thorofare #2	79	82	295	583
Two Ocean/Lake#1	115	1300	64	426
Two Ocean/Lake#2	117	2401	107	1079
Washburn#1	121	110	126	404
Washburn#2	99	86	85	272

[1] Bevins 1997, USDA Forest Service 1990. HE values are based on productivity coefficients depicting an average year (Mattson et al. in press). The higher the number the greater the habitat effectiveness.

Appendix A. Bear Foods and Related Monitoring Programs

The following monitoring programs will be updated and changed as necessary using the best available science, techniques, and technology.

Winter-killed Ungulate Carcass and Associated Bear Use Survey

During April and May of each year, YNP and the Interagency Grizzly Bear Study Team (IGBST) personnel conduct ungulate carcass surveys along 126.5 miles of survey routes on the Northern Winter Range, 82.5 miles of survey routes in the Firehole River drainage, 17 miles of survey routes in the Norris Geyser Basin, and 27 miles of survey routes in the Heart Lake area. Survey routes are hiked, snowshoed, or skied by teams of two people. All ungulate carcasses as well as bears and bear sign (tracks, scat, feeding sign) observed from the survey routes are recorded. Data collected include species, sex, and age class of ungulate carcasses found, estimated date and cause of death, scavenging by bears, species of bear using the carcass, use of carcass by other scavengers, and UTM location.

Cutthroat Trout Spawning Stream And Associated Bear Use Surveys

Beginning 1 May each year, 8 frontcountry streams (Lodge Cr., Hotel Cr., Hatchery Cr., Incinerator Cr., Wells Cr., Bridge Cr., Weasel Cr., and Sand Point Cr.) within or near the Lake Developed area, and 5 frontcountry streams (Sandy Cr., Sewer Cr. Little Thumb Cr., Arnica Cr., and 1167 Cr.) within or near the Grant Village development are checked daily to detect the presence of adult cutthroat trout (Andrascik 1992, Olliff 1992). Once adult trout are found (i.e., onset of spawning), weekly surveys of cutthroat trout on these streams and on an additional 7 backcountry streams (Cub Cr., Clear Cr., Columbine Cr., Flat Mountain Arm Cr., Delusion Lake Outlet, Trail Cr., and 1150 Cr.) are conducted. In each stream on each sample day, two people walk upstream from the stream mouth and record the number of adult trout observed. Sampling continues one day per week until most adult trout return to the lake (i.e., end of spawning). Counts are used to estimate the peak periods, relative magnitude and duration of spawning runs (Reinhart 1990). While making fish counts, observers record bear sign (e.g., bear sightings, fish parts, hair, scats, and tracks) and collect hair from DNA hair collection corrals. Track measurements and DNA from collected hair are used to determine the number, species, and association of family groups of bears.

Cutthroat Trout Population Monitoring Programs

Since the discovery of lake trout in Yellowstone Lake in 1994, park biologists have been developing and refining control techniques for lake trout removal and for assessing potential impacts to native Yellowstone cutthroat trout. The cutthroat trout population is monitored using four methods including fish traps, spawning stream surveys, large mesh gillnetting, and hydroacoustic technology.

Fish Trap Surveys. Information on the numbers of upstream and downstream migrants, and the size and age class of the cutthroat trout spawning migration are collected annually from weirs with fish traps erected each spring at the mouths of Clear Creek, Arnica Creek, and Bridge Creek, three tributaries to Yellowstone Lake (Koel 2001). The fish traps are generally installed during the month of May, the exact date depending on winter snow accumulation, weather conditions and spring snow melt. Fish passage, enumeration, and sampling occur through dip-netting trout that enter the upstream and downstream trap boxes and/or visually counting trout as they swim through wooden chutes attached to the traps. An electronic fish counter is also

periodically used. Other data collected include weights, lengths, sex and ages (based on collected scales) of captured fish. Daily instream flows and water temperatures are also collected. Continued operation of the Clear Creek, Arnica Creek, and Bridge Creek fish traps may be used for long term monitoring of the potential impacts of lake trout on the Yellowstone Lake cutthroat trout population.

Largemesh Gillnetting Surveys. A largemesh gillnetting program is also used to monitor the population structure of cutthroat trout in Yellowstone Lake. At each of 11 sampling sites around Yellowstone Lake, five 38.1 x 1.8 m monofilament gillnets spaced 100m apart, are set overnight in 2 - 6 m of water (Koel 2001). Lengths, weight, sex, stage of maturity, and scales for aging are collected for each captured fish. Continuation of this gillnetting operation may be used for long term monitoring of the potential impacts of lake trout on the Yellowstone Lake cutthroat trout population.

Hydroacoustic Surveys. Cutthroat trout density data will be gathered lakewide on Yellowstone Lake using hydroacoustic survey techniques (Koel 2001). One survey requires approximately 4 field days for a 2-person crew. Data analysis would require an additional 4 to 10 days of a trained biologist's time for each survey. Approximately three surveys will be conducted annually.

Whitebark Pine Surveys

Nineteen whitebark pine transects are currently visited annually. Each transect contains 10 marked trees. Cones are counted on each marked tree between July 15 and August 15 depending on annual phenology. The objective is to count cones after maturation, but before cones and seeds have been collected by red squirrels (*Tamiasciurus hudsonicus*) and Clark's nutcrackers (*Nucifraga columbiana*). Data is recorded on standard field forms and sent to the IGBST. The IGBST maintains the official ecosystem database. The presence or absence of blister rust and beetle infestations as well as grizzly bear, black bear, red squirrel, and Clark's nutcracker activity are noted for each transect.

Army Cutworm Moths

IGBST Monitoring Program. The IGBST and Wyoming Game and Fish Department currently monitor bear use of moth aggregation sites during radio tracking and annual grizzly bear observation flights. When army cutworm moths are present on the high elevation talus slopes, concentrations of grizzly bears are observed at the moth aggregation sites during these flights. The presence of bears at the aggregation sites is used as an indirect measure of the presence or absence of moths during a given year. This monitoring program does not provide direct information on the relative abundance of moths.

State of Montana Monitoring Program. Army cutworm moth larvae are agricultural pests which eat a wide range of host plants including small grains, alfalfa and sugar beets (Blodgett 1997). Moth outbreaks occur sporadically, when insect population potential is high and environmental factors are favorable to the insects' survival (Blodgett 1997). Because army cutworm moths are an agricultural pest, the State of Montana has a cutworm moth monitoring and forecasting program. The forecasting method employed by county extension agents entails trapping for army cutworm moths in agricultural areas between August and October. Extension agents set two army cutworm pheromone traps per county (G. Johnson, Montana State University, pers. commun.). Trap sites are located in agricultural areas often where soil has been tilled to seed winter wheat in the fall as moth larvae prefer such soft soils (G. Johnson, MSU,

pers. commun.). Extension faculty find the amount of fall moth activity can be indicative of moth egg lay (Blodgett 1997). When trap catches exceed 800 moths during the August through October trapping period, extension agents forecast potentially damaging larvae populations may appear the following spring (G. Johnson, MSU, pers. commun.).

Many factors can affect moth larval development. Abundant precipitation from May through July is harmful for the worms and can reduce local cutworm populations (Blodgett, MSU, pers. commun.). Army cutworm moth outbreaks have been noted in warm and dry years when rainfall from 1 May through 31 July was less than 4 inches (Blodgett 1997). If serious cutworm problems are suspected, agents see crop damage by the first of April. Fewer adult moths are trapped after warm and dry weather patterns with mild winters when there is a lack of early spring snow cover to insulate and protect larvae from freezing (G. Johnson, MSU, pers. commun.). Dry weather in the fall also contributes to the mortality of moth eggs and larvae (G. Johnson, MSU, pers. commun.). Pesticides also affect larval recruitment. Warrior, a synthetic pyrethroid, is an EPA registered army cutworm moth pesticide for use on wheat crops. Currently, pesticide companies are in the process of registering this pesticide for use on barley crops as well (G. Johnson, MSU, pers. commun.).

Since 1992, a Statewide army cutworm moth pheromone trapping program has been conducted in Montana. Twenty counties in Montana participated in the program in 1997 (Blodgett 19970). In fall 1998, MSU extension agents coordinated with extension agents at universities in Wyoming, Colorado and Nebraska to expand the moth trapping program to include county trapping efforts in their respective States. In addition to trapping for moths, extension agents plan to gather daily weather and temperature data to improve their forecasting technique (G. Johnson, MSU, pers. commun.). The IGBST, WGF, and YNP are currently evaluating methods for incorporating State army cutworm moth monitoring programs into existing grizzly bear foods monitoring programs.

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Appendix B.

Implementation Schedule

The following Implementation Schedule outlines actions and estimated costs for the grizzly bear (*Ursus arctos horribilis*) recovery program over the next 5 years. Functioning as a practical guide for meeting the species' recovery goals, this schedule indicates action priorities, action numbers, action descriptions, duration of actions, and estimated costs. In addition, parties with authority, responsibility, or expressed interest in implementing a specific recovery action are identified: however, this neither obligates nor implies a requirement for the identified party to implement the action(s) or secure funding for implementing the action(s). However, parties willing to participate may benefit by being able to show in their own budgets that their funding request is for a recovery action identified in an approved recovery plan and, therefore, is considered a necessary action for the overall coordinated effort to recover the grizzly bear. Also, section 7(a)(1) of the ESA, as amended, directs all Federal agencies to utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation threatened and endangered species.

Key to Implementation Schedule Priorities (column 1)

PRIORITY 1: An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

PRIORITY 2: An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

PRIORITY 3: All other actions necessary to provide for full recovery of the species.

Key to responsible parties in column 6:

USFS = U.S. Forest Service
NPS = National Park Service
YNP = Yellowstone National Park
USGS = U.S. Geological Survey
MT = Montana Fish Wildlife and Parks Department
ID = Idaho Fish and Game Department
WY = Wyoming Game and Fish Department
GTNP = Grand Teton National Park

Action Priority	Action Number	Action Description	Action Duration	Responsible Parties	USFWS Lead	Total (annual) Costs	2007	2008	2009	2010	2011	Comments
3	Y423	Annual GIS layer updates	Complete	USFS, NPS	N	102,000	51,000	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Maintain Secure habitat	Complete	USFS, NPS	N	43,000	21,500	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Developed site limitation	Complete	USFS, NPS	N	1,000	500	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Livestock allotment management	Complete	USFS, NPS	N	1,000	500	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Ungulate surveys	Complete	YNP, USGS, MT, USFS	N	47,210	23,605	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Cutthroat surveys	Complete	YNP, USGS, ID	N	22,840	11,420	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Whitebark pine production surveys	Complete	YNP, USGS, WY, MT, USFS	N	55,703	27,851	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.

Action Priority	Action Number	Action Description	Action Duration	Responsible Parties	USFWS Lead	Total Costs	2007	2008	2009	2010	2011	Comments
3	Y423	Cutworm moth use surveys	Complete	USGS, WY, MT, GTNP	N	54,830	27,415	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y111	Bear demographic monitoring	Complete	YNP, USGS, WY, MT, ID, GTNP	N	678,193	339,097	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07. This monitoring is the same as demographic and monitors bear demographic response to habitat change.
3	Y423	Private land status	Complete	MT, WY, ID	N	12,600	6,300	0	0	0	0	Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.
3	Y423	Habitat effectiveness index	Complete	YNP, USFS, GTNP	N	30,000	15,000	0	0			Funding in FY07 is approximately 0.50 of full cost as this DPS is recovered and may be delisted in mid-FY07.

Responses to Public Comments Received on the DRAFT Habitat-Based Recovery Criteria

In response to Task #Y423 in the 1993 Grizzly Bear Recovery Plan and a court settlement (Settlement dated March 31, 1997 and approved by the court on May 5, 1997 Fund for Animals v. Babbitt, 967 F. Supp. 6 (D.D.C. 1997)), we developed habitat-based recovery criteria (HBRC) to be appended to the Recovery Plan. On June 17, 1997, we held a public workshop in Bozeman, Montana, to develop and refine habitat-based recovery criteria for the grizzly bear. A Federal Register notice notified the public of this workshop and provided interested parties an opportunity to participate and submit comments (62 FR 19777, April 23, 1997). After considering 1,167 written comments, we developed biologically-based habitat recovery criteria with the overall goal of maintaining or improving habitat conditions at levels that existed in 1998. We released these Draft Habitat-Based Recovery Criteria for additional public comment on July 16, 1999 (64 FR 38464). The comment period ended on September 14, 1999, during which we received comments from 15,750 individuals, organizations, and government agencies. A summary of these public comments was made available in January 2000 and is available online at http://www.fs.fed.us/r1/wildlife/igbc/Subcommittee/yes/cs/SumPC.htm. We also solicited peer review of this document, copies of which are available in the Administrative Record. We considered all comments received and summarize them below. Groups of similar concerns are categorized together under "Issues", followed by our "Response" to each.

A. General Comments.

Issue 1: Many people believed they were not adequately informed about the Draft HBRC or its availability for public review. Many commenters asked the Service why it held a public workshop to obtain input for the development of the Draft HBRC in Montana but not in Wyoming. Others believed that the public should have been more directly involved in the whole process of developing the Draft HBRC, not just given an opportunity to comment on the product generated by the agencies.

Response: The public was involved in the creation of the Draft HBRC. On June 17, 1997, prior to release of the Draft HBRC the Service held a public workshop in Bozeman, Montana, to develop and refine habitat-based recovery criteria for the grizzly bear. This meeting was advertised and open to the public. The sources from which paper and digital copies of the Draft HBRC could be obtained were listed in the Federal Register Notice (62 FR 19777, April 23, 1997). The public comments on the Draft were taken into consideration in the production of the final document.

Issue 2: Some commenters questioned the legality of the Service establishing road density standards without going through the NEPA process and asked that the standards found in the Draft HBRC be incorporated into land management plans via the appropriate processes. Some also thought that lawsuits brought by environmental organizations are directing Service actions and believed it was unfair.

Response: The U.S. Forest Service amended their forest plans in April of 2006 (USDA Forest Service 2006b, pp. 4-7), and through this NEPA process incorporated the access management, developed site, and livestock allotment standards described in the HBRC into the appropriate land management plans. The Forest Service complied with NEPA by conducting an

environmental impact analysis (USDA Forest Service 2004, USDA Forest Service 2006a). The Service must comply with the orders of the courts, regardless of what organization or individual brought the suit.

Issue 3: A few commenters asked that the Service define terms such as "viable population".

Response: Population viability is expressed in terms of the likelihood that a population will persist for a given period of time, usually 100 years, calculated from a model representing the known or estimated vital rates of the population. A "viable population" would nominally be one with a non-zero probability of persisting for 100 years. Population biologists prefer to calculate the probability of persistence, as Boyce et al. (2001, p.1, 10-11) did for grizzlies in the Greater Yellowstone Area (GYA), reporting that they had a 99.2 percent probability of persisting for 100 years, and a 96.1 percent probability of persisting for 500 years.

Issue 3: Some commenters thought that the Draft Habitat Based Recovery Criteria (Draft HBRC) failed to establish population size goals or incorporate density dependent reproductive rates into analyses. Some believed that population estimates are not enough to justify delisting the grizzly bear from the ESA.

Response: The purpose of the Draft HBRC is neither to establish population size goals nor to incorporate considerations of density dependence. Density dependence in cub survival has already been detected in the GYA. Schwartz et al. (2006b, pp. 28-29) found a density-dependent reduction in survival of young bears inside Yellowstone National Park, presumably due to increased population density. The population estimates indicate that the recovery goals have been met for several years.

Issue 4: Some commenters requested that the Service explicitly establish management responsibility for these habitat based recovery criteria. Who will monitor what and who will take action if habitat effectiveness declines?

Response: The agencies responsible for undertaking each management task are listed in Appendix I. of the Conservation Strategy. The land management agency on whose land the habitat effectiveness has declined will be responsible for its mitigation.

B. Using Science and Data to the Best Extent Possible.

Issue 1: These comments generally criticized various models and methods of data collection. For instance, one commenter believed it is dangerous for the Service to base the Draft HBRC on the assumption that the current population is recovered because this assumption is based on the number of unduplicated females with cubs-of-the-year. They argued that the Court found that basing population estimates on the number of unduplicated females with cubs-of-the-year was not scientifically justified, and they also argued that even the newer method using the Maximum Likelihood Estimator is plagued by many of the same biases since it still relies on sightings of females with cubs.

Response: The Service has carefully considered the scientific validity of the use of females with cubs of the year as per the court decision on the Recovery Plan. The specific wording in the court

decision on this issue was as follows: "Accordingly, the Service must reconsider the available evidence and its decision to adopt the population monitoring methodology that it has incorporated into the Recovery Plan." As per a court settlement (Fund for Animals. v. Babbit) and as recommended by Recovery Plan Task Y11, the Service has worked to "determine population conditions at which the species is viable and self-sustaining," and to "reevaluate and refine population criteria as new information becomes available" (U. S. Fish and Wildlife Service 1993, p. 44). Beginning in 2000, the Interagency Grizzly Bear Study Team, at the request of the Service, began a comprehensive evaluation of the demographic data and the methodology used to estimate population size and establish the sustainable level of mortality to grizzly bears in the GYA. Accordingly, the Interagency Grizzly Bear Study Team conducted a critical review of the current methods for calculating population size, estimating the known to unknown mortality ratio, and establishing sustainable mortality levels for the Yellowstone grizzly population (Interagency Grizzly Bear Study Team 2005, pp. 17-41; 2007). The product of this work is a report compiled by the Interagency Grizzly Bear Study Team titled Reassessing Methods to Estimate Population Size and Sustainable Mortality Limits for the Yellowstone Grizzly Bear (hereafter referred to as the "Reassessing Methods Document"). The Reassessing Methods Document evaluates current methods, reviews recent scientific literature, examines alternative methods, and recommends the most valid technique based on these reviews (Interagency Grizzly Bear Study Team 2005, pp. 17-41; 2007, pp. 2-10) (accessible at http://mountain-prairie.fws.gov/species/mammals/grizzly/yellowstone.htm). The end result of this review is a revised method customized for the Yellowstone grizzly bear population for calculating an index of total population size rather than minimum population size (Interagency Grizzly Bear Study Team 2005, pp. 17-31; 2007). The Reassessing Methods Document is a detailed effort to "reconsider the available evidence and its decision to adopt the population monitoring methodology that it has incorporated into the Recovery Plan", as directed by the court.

The Reassessing Methods Document does not use FCOY data alone to calculate population size. The method in the Reassessing Methods Document uses the corrected Chao2 estimator, which is derived from sightings and resightings of FCOY as described in Keating et al. (2002, p. 162) and the Interagency Grizzly Bear Study Team (2007, p. 7). This accounts for many of the biases inherent in FCOY data alone to estimate total population size. Population trend is calculated using reproductive rate and survivorship data in a life table and matrix projection model format (see Harris et al. 2006, pp. 44-45). This method will continue to be used to calculate population trend. The evolution of the science has been significant since the 1993 Recovery plan was written and we are committed to using the best available science.

Issue 2: Another commenter asked why the Service has not provided evidence to substantiate their use of a constant multiplier that relates the number of unduplicated females with cubs to the minimum number of females with cubs and the minimum population size.

Response: The scientists involved in making the recommendations in the Reassessing Methods Document recognized that the proportion of breeding females with cubs of the year varied annually. They investigated the possibility of varying the denominator but concluded they lacked sufficient data to do so. The revised method in the Final Reassessing Methods Document (Interagency Grizzly Bear Study Team 2007) uses regression analysis of all the data, thereby addressing this variation and providing an estimate of confidence about the mean.

Issue 3: A few commenters criticized the Service's use of certain studies as selective science. For example, one commenter questioned the Service's use of "more optimistic" population growth rates (Eberhardt et al. 1994, p. 362, Boyce 1995, p. 2) while failing to acknowledge more pessimistic estimates of population growth rate (Pease and Mattson 1999, p. 966). One commenter was critical of the application of Mace and Waller (1998, pp. 1005-1016), whose study took place in the Northern Continental Divide Ecosystem, to the GYA. Another commenter criticized the Service's exclusion of "essential information". Specifically, he/she claimed that "Boyce et al. (1999)", "Johnson (1999)", "Koteen (1999)", and Pease and Mattson (1999, p. 969) portray the Yellowstone grizzly bear population as one that is vulnerable to extinction and habitat degradation.

Response: The Service is required by the ESA to use the best available science in its rule-making. All of the authors of the papers cited by these commenters have made important contributions to the knowledge of grizzly bear biology or management. However, this Issue brings to light a difficulty encountered with some of the public comments received on these documents. Citations were sometimes incomplete, leaving us to decipher, for example, which of the thousands of scientific papers published by people named Johnson in 1999 was being referenced (4,777 hits for "Johnson 1999" are listed in the Scopus database of scientific literature). Two of the references cited in the above Issue are unknown to us. We were unable to identify "Boyce et al. (1999)" or "Johnson (1999)." We strongly suspect that the "Boyce" referred to is M. S. Boyce, a Professor in the Biological Sciences Department at the University of Alberta, and that the "Johnson" referred to is C. J. Johnson, a Post-doctoral Fellow at the University of Alberta who conducted research in Boyce's lab from 2000 to 2003. We contacted Mark Boyce and asked him to send us reprints of the papers attributed to himself and Chris Johnson. Boyce was the senior author of two multi-authored publications in 1999, which could be cited as "Boyce et al. (1999)." However, neither of those publications dealt with grizzly bear management. C. J. Johnson has published on population modeling, but no publication that could be referred to as "Johnson (1999)," and authored by C. J. Johnson, was known to Boyce. We have not seen the publication cited as "Koteen (1999)", but we have seen it cited elsewhere as her Masters thesis, which we believe is substantially similar to Koteen (2002, pp. 341-411), which is a book chapter with exactly the same title as the thesis. We considered the results of Koteen (2002, pp. 341-411) in the Proposed and Final Rule, and we have included it in the Administrative Record. Thus, the Service, after expending considerable effort to do so, has considered the conclusions of the scientists cited above in its rule-making.

An important difference between Pease and Mattson (1999, p. 964) and other population growth rate estimates (Eberhardt et al. 1994, p. 362, Boyce 1995, Harris et al. 2006, p. 48) is related to their treatment of conflict bears. Pease and Mattson (1999, p. 967) assumed that grizzly bears with any history of conflict would always retain their management-trapped status. The findings of Haroldson et al. (2006, p.42) challenge this assumption, finding that while survival of conflict bears decreases during the year of the conflict and the next year, survival returns to approximately normal within 2 years. Meaning, management-trapped bears do sometimes return to foraging on non-human food sources and away from human developments. Based on the number of management-trapped bears each year and the total number of radio-collared bears monitored that year, we found that approximately 40 percent of the known minimum population from 1998-2005 (i.e., total number of bears captured for research purposes)

were involved in management actions (Haroldson 1999, p. 3; Haroldson 2000, p. 3; Haroldson 2001, p. 3; Haroldson et al. 2002, p. 4; Haroldson et al. 2003, p. 4; Haroldson et al. 2004, p. 3; Haroldson et al. 2005, p. 4; Haroldson et al. 2006, p. 4). This percentage of the population involved with a management-trapped status is much lower than the 73 percent predicted by Pease and Mattson (1999, p. 967).

Regarding the assertion that the Yellowstone grizzly bear population is vulnerable to extinction and habitat degradation, we think the probability of this population going extinct is extremely low (Boyce et al. 2001, pp. 1, 10-11). Furthermore, we have concluded that the likelihood of habitat degradation severe enough to threaten grizzly bears with extinction is extremely remote, given the adaptive management and intensive habitat and population monitoring protections afforded by the Conservation Strategy.

Issue 4: Some commenters thought that the draft HBRC used outdated and flawed existing road inventories.

Response: The 1998 baseline for roads is calculated using the best available road layers compiled by each GYA National Forest (USDA Forest Service 2006a, pp. 198-200). There is no evidence presented by anyone that these road data are inaccurate to a level that would in any way influence grizzly bear management or survival.

C. Habitat Protections and the 1998 Baseline.

Issue 1: One recurring topic for further consideration was the use of lands outside the Recovery Zone by bears and how this land should be managed. Many comments asked for more protection of grizzly bear habitat and suggested that the size of the Recovery Zone be expanded to include areas currently occupied by grizzly bears. They argued that the Recovery Zone boundary was established at a time when grizzly bear numbers were low and that the current Recovery Zone cannot support a viable population. A few called for a bigger recovery area for the bears to absorb changes in food supply and habitat quality. Others contended that public lands are multiple use lands and should be managed as such. Some individuals thought that protected areas should not be increased because there are enough bears in the GYA.

Response: The PCA, which is a subset of the suitable habitat, contains between 84 and 90 percent of the females with cubs that are the most important age and sex group to the population (Schwartz et al. 2006a, p. 64). The population has been growing at 4-7 percent per year since 1983 in areas within the suitable habitat line while most of the females with cubs continue to expand in numbers and range inside the PCA. Thus, the Service believes that all the biological evidence demonstrates that the PCA, within the suitable habitat line, contains the habitat necessary for a healthy and viable grizzly bear population in the long-term. Inside the suitable habitat line outside the PCA, 60 percent of the habitat is Designated Wilderness, Wilderness Study Area, or Inventoried Roadless Area. Furthermore, the Service believes that the habitat outside the suitable habitat line has minimal biological value to grizzly bears and is not necessary to maintain a biologically recovered population in a significant portion of its range in the foreseeable future. Because habitat inside the PCA will be protected by the habitat standards in the Conservation Strategy, areas outside of suitable habitat will not affect the trajectory and health of the Yellowstone population now or in the future.

Issue 2: Many comments urged the Service to establish and protect linkage zones to mitigate the effects of genetic isolation.

Response: The effects of genetic isolation can be mitigated by either natural immigration or augmentation. There is an ongoing process to identify and implement management on linkage areas for wildlife in order to maintain and improve the potential for wildlife movement between all the large blocks of public land in the Northern Rocky Mountains (Servheen et al. 2003, p. 3) This is an interagency effort involving 13 State and Federal agencies cooperating to facilitate linkage across private lands, public lands, and highways (Interagency Grizzly Bear Committee 2001, p. 1). A written protocol and guidance document has been developed on how to implement linkage zone management on public lands (Public Land Linkage Taskforce 2004, pp. 3-5). There have been several documents produced on private land linkage management including Making Connections from the Perspective of Local People (Parker and Parker 2002, p. 2), and the Swan Conservation Agreement (U.S. Fish and Wildlife Service 1997), a collaborative linkage zone management document. There have been several analyses of linkage zone management in relation to highways including identification of multiple linkage areas in southeast Idaho from Idaho Falls to Lost Trail Pass (Geodata Services, Inc. 2005, p. 2) and the effects of highways on wildlife (see Waller and Servheen 2005, p. 998). There was also a workshop in the spring of 2006 on implementing management actions for wildlife linkage, the proceedings of which are available online at www.cfc.umt.edu/linkage. The linkage zone effort is a multi-agency program that is an ongoing program and is identified as a task in the Grizzly Bear Recovery Plan (U.S. Fish And Wildlife Service 1993, p. 36). This linkage work is not directly associated with the delisting of the Yellowstone grizzly population and will continue to address ways to improve cooperation and affect management on public lands, private lands, and highways in linkage areas across the northern Rockies. The objective of this work is to maintain and enhance movement opportunities for all wildlife species across the Northern Rockies.

Issue 3: A few people were concerned that the Draft HBRC did not consider adverse future conditions and overall habitat trends. These conditions include extreme drought, human population growth, exotic species, high mortality rates of females, increased extraction of natural resources, and/or other human related activities. Many people supported additional habitat protection through road closures, limiting resource extraction industries, and extending habitat standards to the entire GYA and believed that such habitat protections are necessary to sustain a healthy grizzly bear population in this area.

Response: The range of possible outcomes of speculation about the future and the uncertainty associated with such speculation provides little of management value. Instead of such a compound uncertainty approach, the management system outlined in the Conservation Strategy depends on monitoring of multiple indices including production and availability of all major foods, and monitoring of grizzly bear vital rates including survival, age at first reproduction, reproductive rate, mortality cause and location, dispersal, and human-bear conflicts. These data will be used in an adaptive management system to monitor the real-time status of the population and its relationship with major foods and environmental variables in order to allow managers to implement adaptive management actions to respond to changes in ecological conditions and/or vital rates with directed management actions. The continued monitoring of these multiple

indices will allow rapid feedback about the success of management actions and further ensure that the Yellowstone grizzly bear population remains biologically recovered within a significant portion of its range in the foreseeable future.

Issue 4: Many people asked why the habitat levels of 1998 were selected as a benchmark. They stated that there is no justification within the document for doing so and that habitat criteria should be based on the demonstrated needs of grizzly bears. Some commenters believed that the Draft HBRC is reacting to political and economic pressures of industry instead of establishing scientific habitat criteria based on the demonstrated needs of grizzly bears. Some believed that habitat has degraded since the bear was listed, and habitat quality in 1975 should be used as a benchmark.

Response: The year 1998 was chosen because we know that road densities and site developments had been roughly the same during the previous ten years (USDA Forest Service 2004, p. 27) and that during these years, the population was increasing (Eberhardt and Knight 1996, p. 419; Harris et al. 2006, p. 48). Therefore, the selection of any other year between 1988 and 1998 would have resulted in approximately the same baseline values for roads and developed sites. This year was chosen as it was representative of the habitat conditions that allowed the population to continue to increase at 4-7 percent per year. We did not select baseline habitat values from years before 1988 because habitat improvements that occurred after the implementation of the Interagency Grizzly Bear Guidelines (USDA 1986, pp. 6-21) would not have been reflected in these earlier years. The year 1975 was not used because we do not possess reliable data about road densities, site developments, and secure habitat at that time.

Issue 5: Several commenters criticized the failure of the Service to relate habitat conditions to demographic parameters and requested that a habitat-based Population Viability Analysis (PVA) be developed and run. Such a PVA would allow the Service to establish threshold habitat values based on demonstrated grizzly bear needs.

Response: A PVA based on possible future habitat conditions relies upon too many speculative variables. Given the compound uncertainties associated with projections of possible future habitat changes, predicted responses of grizzly bears to multiple possible future conditions, and assumed changes to vital rates in response to any such possible future habitat changes, it is unlikely that a formal PVA based on possible future habitat conditions would provide an accurate representation of future population viability for Yellowstone grizzly bears. Instead of such a compound uncertainty approach, the management system outlined in the Conservation Strategy depends on monitoring of multiple indices including production and availability of all major foods; and monitoring of grizzly bear vital rates including survival, age at first reproduction, reproductive rate, mortality cause and location, dispersal, and human-bear conflicts. These data will be used in an adaptive management system to monitor the real-time status of the population and its relationship with major foods and environmental variables in order to allow managers to implement adaptive management actions to respond to changes in ecological conditions and/or vital rates with directed management actions. The continued monitoring of these multiple indices will allow rapid feedback about the success of management actions to address the objective of maintaining a biologically recovered population.

Issue 6: Several commenters requested that the Service establish exact values for the amount of secure habitat and acceptable road densities instead of just using the 1998 levels as "acceptable".

Response: The Service has in effect established the exact amount of secure habitat and road densities existing in 1998 as adequate by designating that year as the habitat baseline. The threshold values that existed in 1998 are the exact values that must be maintained.

D. Improve Degraded Habitat.

Issue 1: Many comments were received asking the Service to 'restore degraded habitat'. Many commenters thought that the Service should establish a time line for grizzly bear recovery and for improvements in certain subunits (Henry's Lake 1, Henry's Lake 2, Gallatin 3, Plateau 1, Plateau 2, and Madison 2) to occur.

Response: The habitat identified by the Draft Conservation Strategy that was in need of improvement was on the Targhee and Gallatin National Forests. The high road density values and subsequently low levels of secure habitat in these subunits is primarily due to motorized access on private land (see U.S. Fish and Wildlife Service 2007, pp. 145-153). Since the Draft Conservation Strategy was released for public review, progress on both forests has been made.

The Gallatin National Forest is working on several land exchange efforts with private parties in these subunits. These land exchanges allow management of the roads on these private parcels and increase the secure habitat in these subunits. The Gallatin Range Consolidation and Protection Act of 1993 (Pub. L 103-91) and the Gallatin Range Consolidation Act of 1998 (Pub. L 105-267) will result in trading timber for land in the Gallatin No. 3 and Hilgard No. 1 subunits. The private land involved will become public land under the jurisdiction of the Gallatin National Forest. Upon completion of this sale and land exchange, secure habitat and motorized access route density in these subunits will improve from the 1998 baseline (see U.S. Fish and Wildlife Service 2007, pp. 133-144). The timing and amount of improvement will be determined through the Gallatin National Forest travel management planning process. The Travel Plan for the Gallatin National Forest was revised and the Final Environmental Impact Statement and Record of Decision approved (Gallatin National Forest 2006, pp. 82-85) on December 6, 2006. The Travel Plan amended the Gallatin Forest Plan and set a 1998 baseline for access values in these subunits.

The Conservation Strategy identified several subunits within the boundaries of the Targhee National Forest inside the PCA that need improvement in terms of motorized access (Plateau No. 1, Plateau No. 2, and Henry's Lake No. 1). The Conservation Strategy states that upon full implementation of the access management changes in the revised 1997 Targhee Forest Plan, those subunits will have acceptable levels of road densities and secure habitat due to the decommissioning of roughly 433 miles of roads within the PCA (U. S. Fish and Wildlife Service 2007, pp. 43-44). As of 2005, the Targhee National Forest completed this decommissioning work (USDA Forest Service 2006a, pp. 200-202). The 1998 baseline for these subunits was modified to reflect these anticipated road closures upon full implementation of the 1997 Targhee Forest Plan (U.S. Fish and Wildlife Service 2007, pp. 133-144). Henry's Lake subunit No. 1 and No. 2 still have high levels of motorized access density and a low secure habitat level due to motorized access routes on private lands as well as county roads, State and Federal highways, and roads to special use sites (e.g., Federal Aviation Administration radar site on Sawtell Peak) that cannot be closed.

Overall, the improvements made to degraded habitat on these two National Forests have increased the amount of secure habitat available to grizzly bears to the levels recommended in the Final Conservation Strategy. These levels of secure habitat will continue to support a stable to increasing population of grizzly bears.

Issue 2: A few commenters noted that simply closing a road does not necessarily mean that improved habitat will result and suggested other techniques such as stand improvement.

Response: The intent of road closures is to improve habitat security and reduce mortality risk and displacement. The newly secure habitat may not provide any additional food or cover after road closure, but it will reduce the chance of human/grizzly conflicts, which is a primary source of mortality.

E. Access Management and Secure Habitat.

Issue 1: Some commenters questioned why non-motorized trails are excluded from Total-Motorized-Access-Route-Density calculations while motorized access trails are included, especially in light of the increase in conflicts between hunters and grizzly bears in the last decade.

Response: Non-motorized trails were excluded from the motorized access calculations because they are closed to motorized access. There is no way to measure trail use levels on all non-motorized trails and many backcountry users travel off-trail. This off-trail travel is especially common in hunters who usually seek game animals in areas away from established trials. Thus, limitations on trail use would have limited value in reducing bear/hunter encounters.

Issue 2: One commenter criticized the 10-acre minimum size required for secure habitat and thought it should be much larger. A few other commenters thought the 70 percent habitat security standard is inadequate to guarantee quality grizzly bear habitat and questioned the scientific rationale for choosing 70 percent.

Response: The definition of secure habitat was not limited to very large areas because this would eliminate protection for all secure habitat areas of smaller size. The Service believes that all secure habitats are important and that secure pockets of habitat are very important for grizzly bears, particularly in peripheral areas. The average percentage of secure habitat in each of the 40 subunits inside the PCA is 85.6 percent, and 20 of these 40 subunits are more than 90 percent secure habitat. The levels of secure habitat in the GYA are higher than the percentage of secure habitat in the home ranges of adult female grizzly bears reported by Mace et al. (1996, p. 1400) in the NCDE and by Wakkinen and Kasworm (1997, p. 24) in the Selkirk and Cabinet-Yaak ecosystems, where 44-68 percent of the composite adult female home range was within secure habitat.

Issue 3: Many commenters opposed the idea of allowing 1 percent of a Bear Management Unit's secure habitat to be disturbed by temporary projects, saying that this provision will lead to an excessive amount of disturbance in secure grizzly bear habitat. Many of these commenters noted that there is no justification of this level within the Draft HBRC. In contrast, several commenters noted that some level of disturbance is necessary for land management.

Response: Temporary changes in secure habitat may reduce secure habitat for a period no longer than 3 years and can be no larger than 1 percent of the largest subunit size within that Bear Management Unit. All secure habitat would be restored upon completion of a temporary project. There will be no net loss of secure habitat in any subunit. The reason the 1 percent level was deemed acceptable was that there were limited ongoing timber harvest activities that temporarily affected secure habitat throughout the 1990s while the population was increasing at a rate between 4 and 7 percent per year. There are no biological data that demonstrate that the temporary 1 percent level of secure habitat disturbance in any subunit has had any detrimental impact on the grizzly bear population.

Issue 4: Many commenters called for greater management of snowmobile use in grizzly bear habitat. They noted that, in most areas, snowmobiles are permitted to go anywhere they wish and that snowmobiling season extends into April, a time when bears are emerging from their dens in a state vulnerable to disturbance and displacement. Similar comments were received on the issue of ORV's. These commenters believed that the Service needs to address this issue in more detail.

Response: The Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests includes a guideline stating that inside the PCA, localized area restrictions will be used to address conflicts with winter use activities, where conflicts occur during denning or after bear emergence in the spring (USDA Forest Service 2006a, p. 37). Bears tend to den in remote areas with characteristics that are not entirely conducive to snowmobiling (steep, forested habitats) and much of the area identified as suitable grizzly bear denning habitat is not used by snowmobiles due to its terrain and vegetation (USDA Forest Service 2006a, p. 92). Eighty-eight percent of the known dens in the GYA are located in areas where snowmobile use does not occur (USDA Forest Service 2006a, p. 92). Suitable denning habitat is well distributed on the forests. Five of the 6 GYA National Forests consulted with the Service in 2001 on the effects of snowmobiles on denning grizzly bears. Our best information suggests that current levels of snowmobile use are not appreciably reducing the survival or recovery of grizzly bears. Most information is largely anecdotal, although there is sufficient information to indicate that some individual bears have the potential to be disturbed. The Forest Service has been monitoring known grizzly bear dens in areas open to snowmobiles for the last three winters in cooperation with us and the Interagency Grizzly Bear Study Team. No disturbance has been documented (Gallatin National Forest 2006, p. D-68). Monitoring will continue to support adaptive management decisions to limit snowmobile use in areas where disturbance is documented or likely to occur.

F. Habitat Value and Habitat Effectiveness Values

Issue 1: Some commenters thought that habitat effectiveness values should be maintained at 1998 levels and that any replacement secure habitat should be of the same habitat value.

Response: Habitat effectiveness is the energy and resources available to bears in each habitat unit given the response to bears to the levels and types of human activity on the landscape. The primary human activities that influence habitat effectiveness are motorized access and human site developments, both of which are strictly regulated under the Conservation Strategy (U.S.

Fish and Wildlife Service 2007, pp. 36-45). Thus, the habitat management system in place will maintain habitat effectiveness levels to the 1998 baseline levels except for those impacts that do not directly involve humans such a the impacts of wildfire on vegetation type and productivity. We agree that any replacement secure habitat should be of equal habitat value and included this stipulation in both the Draft HBRC and this Final HBRC Supplement to the Recovery Plan.

Issue 2: Some commenters noted that the Cumulative Effects Model that is used to calculate Habitat Value and Habitat Effectiveness is just a theoretical model. It has not been verified by independent scientists or related to demographic parameters.

Response: Models like the Cumulative Effects Model (CEM) are theoretical constructs that attempt to approximate reality. Such models are always evolving as better technology and methods become available. The Interagency Grizzly Bear Study Team continues to test the assumptions and hypotheses of the CEM and update it in cooperation with university scientists and the United States Forest Service (USFS). The CEM provides a relative measure or index of temporal change in the ecosystem and of spatial change and variation across the ecosystem. Models of complex natural systems will never be perfect. There will be continual, ongoing efforts to improve the CEM on an annual basis. At this time, the CEM is not adequate to relate habitat values to demographic parameters but the Interagency Grizzly Bear Study Team will continue to pursue this goal.

G. Developed Sites.

Issue 1: Some commenters wanted greater protection for grizzly bears while others wanted to reduce the economic impacts from grizzly bear recovery on their livelihoods. Some believed that more habitat needs to be protected from site development. Others asked how increased visitor use and a desire for more amenities in Yellowstone will be addressed.

Response: If the use of an existing developed site is to be increased, expanded, or changed in nature, the impacts will be mitigated by reducing the capacity or eliminating another developed site in that bear management subunit. Any such changes will be analyzed with a biological evaluation or biological assessment. The existing level of site developments within the PCA has allowed the grizzly population to increase at 4-7 percent per year. The management system in the Conservation Strategy limits increases in amenity site developments inside the PCA to assure adequate secure habitat and no increases in mortality risk for the grizzly population.

As visitor use increased throughout the 1980s and 1990s (USDA Forest Service 2006a, p. 184), the grizzly bear population was increasing at a rate between 4 and 7 percent annually (Harris et al. 2006, p. 48). As human populations and recreational activity have increased in the GYA National Forests, additional regulations have been implemented to limit bear/human conflicts such as the food storage orders in all suitable habitat on National Forest lands and comprehensive State and Federal information and education programs that explain how to coexist with bears. These efforts will continue so that the potential negative impacts of increasing human populations and recreationists on the Yellowstone grizzly bear population are adequately mitigated.

H. Livestock Grazing

Issue 1: The issue of livestock grazing on public lands is highly volatile. Many believed that there should be no grazing on public lands, while others thought that the livestock industry is being portrayed inaccurately as exploiters of the land. Commenters were concerned about both the limitation of grazing allotments and the application of grizzly bear habitat standards outside the Recovery Zone. Several commenters asked that grazing within Grand Teton National Park be eliminated.

Response: The Service has established a management system in the Conservation Strategy (U.S. Fish and Wildlife Service 2007, p. 45) that balances livestock grazing on public lands with the needs of grizzly bears. The vast majority of public lands in grizzly bear habitat in the GYA are managed with no livestock grazing. While livestock grazing allotments are a legitimate use of some public lands, we recognize that such grazing, especially sheep grazing, can lead to some grizzly bear mortality. In light of this and past management experience, the Service endorses an approach that includes minimizing livestock allotments with recurring conflicts. The U.S. Forest Service has stated that "Inside the PCA, no new active commercial livestock grazing allotments would be created and there would be no increases in permitted sheep animal-months from the identified 1998 baseline. Existing sheep allotments would be monitored, evaluated, and phased out as opportunities arise with willing permittees. …Outside the PCA, in areas identified in State management plans as biologically suitable and socially acceptable for grizzly bear occupancy, livestock allotments or portions of allotments with recurring conflicts that cannot be resolved through modification of grazing practices may be retired as opportunities arise with willing permittees." (USDA Forest Service 2006a, pp. 36-37). This approach to livestock grazing is a logical and responsive way to manage grizzly/livestock conflicts. There are three livestock allotments within Grand Teton National Park, all of which are cattle allotments with no recurring conflicts with grizzly bears in the last decade. These allotments do not represent a significant source of mortality for grizzly bears.

I. Monitoring Protocols and Triggers for Management Responses.

Issue 1: Several commenters asked the Service to identify the changes in habitat that will initiate a change in management strategies and what those modified management strategies will entail.

Response: The habitat-based recovery criteria are the 1998 levels of road densities, secure habitat, developed sites, and livestock allotments. A Biology and Monitoring Review will be triggered by failure to meet any of the habitat standards described in the HBRC and the Conservation Strategy pertaining to road densities, levels of secure habitat, new developed sites, and number of livestock allotments in any given year. A Biology and Monitoring Review is lead by the Interagency Grizzly Bear Study Team and will examine habitat management, population management, or monitoring efforts of participating agencies with an objective of identifying the source or cause of failing to meet a habitat or demographic goal. This review will also provide management recommendations to correct any such deviations. If the Review was triggered by failure to meet a habitat standard, the Review would examine what caused the failure, whether the measures of the Act are necessary to assure the survival of the population, and what actions may be taken to correct the problem. This Review will be completed and made available to the public within 6 months of initiation.

The specific recommendations of a Biology and Monitoring Review will be determined by the circumstances that triggered it and the information gathered during the process. Although it is not possible to describe precisely what the management recommendations may include, it is likely that they will focus on eliminating the roads, developed sites, or livestock allotments that caused the habitat standards to not be achieved.

Issue 2: People questioned the effectiveness of the monitoring system to detect changes in habitat quality and to take appropriate action before such changes negatively impact the Yellowstone grizzly bear population. Some commenters cited Walters and Holling (1990, pp. 2060-2068) and Doak (1995, pp. 1370-1379) who concluded that grizzly bear biology is characterized by long time lags and great variability between habitat changes and resulting population-level effects.

Response: Doak (1995, p. 1372) assumes all bears in source habitat go to sink habitat and that females move at the same rate. Doak's system (1995, p. 1374) also monitors only female survival, not any other parameters. The monitoring systems in the Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 25-60) are more detailed and sophisticated and would detect changes in vital rates in response to habitat changes sooner than the system in described by Doak (1995, pp. 1371-1372). Additionally, Mattson (1998, pp. 133-134) found that there was an immediate and detectable impact on grizzly bear survival in poor whitebark pine years. Since we will be monitoring a suite of vital rates including survival of radio-collared bears, mortality of all conflict bears, and fecundity, we feel confident that we will be able to detect the consequences of significantly reduced habitat productivity.

Walters and Holling (1990, pp. 2060-2068) describe adaptive management and "learning by doing". The Service espouses the description of adaptive management given by the Interagency Grizzly Bear Study Team (2005, pp. 44-45). This description consists of six steps: 1) assessment of the current system and development of testable hypotheses; 2) design of management actions, monitoring, and research that will help address the hypotheses; 3) implementation of the management, monitoring, and research; 4) monitoring of management actions through collection of data designed to answer hypotheses; 5) evaluation of management outcomes against predictions made by hypotheses; and 6) adjustments to management design, objectives, direction as indicated by the evaluation. The multiple indices used to monitor both bear foods and bear vital rates provide a dynamic and intensive data source to allow the agencies to respond to results that might indicate problems. The monitoring system in place in the GYA under the Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 25-60) is one of the most detailed monitoring systems developed for any wildlife species.

Issue 3: Several commenters believed that monitoring protocols were not specific enough. They suggested additional parameters to be monitored including trail and road use.

Response: The Service is satisfied that the multiple indices monitored in the Conservation Strategy provide detailed, fine-scaled, annual measures of the factors that are indicative of the status and health and needs of the GYA grizzly bear population. There is no reliable way to monitor trail use at all non-motorized trails due to their dispersed nature. The Service considers the 1998 baseline (i.e., HBRC) to adequately address the issues of both motorized and non-motorized recreation through access management and limitations on site development. Inside the PCA, the vast majority of lands available for recreation are accessible

through non-motorized travel only (USDA Forest Service 2006a, p. 179). Motorized recreation during the summer, spring, and fall inside the PCA will be limited to existing roads as per the standards in the Conservation Strategy that restrict increases in roads or motorized trails. Similarly, recreating at developed sites such as trailheads, lodges, downhill ski areas, and campgrounds will be limited by the developed sites habitat standard described in the HBRC which limits the number and capacity of existing developed sites at 1998 levels.

Limitation of recreation throughout the GYA is not currently necessary, as evidenced by the increasing grizzly bear population since the 1980's (Harris et al. 2006, p. 48). The adaptive management approach described in the Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 25-60) which includes monitoring food production; the impact of disease and insects on food production; bear mortality locations, numbers, and causes; bear reproductive success; and age-specific survival will allow management agencies to respond with adequate restrictions and enforcement if recreation on public lands in the GYA becomes detrimental to the Yellowstone grizzly bear population.

Issue 4: Many people were concerned about the reduction in natural food sources. Some gave examples of how to prevent this from occurring (e.g., stop spraying Army cutworm moths in the lowland valleys adjacent to the GYA, stop management plans to reduce bison and elk herds), while others provided alternative food source ideas (e.g., redistributing roadkill ungulates and lake trout killed in control efforts, vegetation manipulation). They saw the key to monitoring these unique food sources is to take action when a downward trend is indicated before the food sources are lost and the grizzly population threatened. They suggested a system of threshold levels for the four major foods that would trigger specific management responses.

Response: Artificial feeding of grizzly bears is neither necessary nor desirable, and there is no evidence to suggest that spraying of army cutworm moths has any population-level effects on grizzly bears (Robison et al. 2006b, pp. 1706-1710). Aside from the well-documented association between whitebark pine cone crop size and subsequent management actions on grizzly bears (Mattson et al. 1992, p. 432), we have not been able to detect any cause-effect relationships between abundances of the other 3 major foods and grizzly bear vital rates. Those foods have either fluctuated (e.g., ungulates, army cutworm moths) or declined (e.g., cutthroat trout) during the period in which the GYA grizzly population grew at a rate of between 4 percent and 7 percent. Due to the natural annual variation in abundance and distribution in the 4 major food sources, there is no known way to calculate minimum threshold values for grizzly bear foods. We consider the establishment of habitat thresholds for food sources to be unrealistic. The 1998 baseline will address these issues adequately through access management and limitations on site development. Managers will use an adaptive management approach that addresses poor food years with responsive management actions such as limiting grizzly bear mortality, increasing Information and Education (I & E) efforts, and long-term habitat restoration (i.e., revegetation, prescribed burning, etc.), as appropriate. The multiple indices used to monitor both bear foods and bear vital rates provide a dynamic and intensive data source to allow the agencies to respond to potential problems. We believe the adaptive management system described in the Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 25-60) is one of the most detailed monitoring systems developed for any wildlife species and ensures the maintenance of a recovered grizzly bear population in the GYA.

Issue 5: A few criticized the Draft HBRC because it does not discuss how the loss of any of the food sources would affect grizzly bear demographics.

Response: The extent to which natural foods will change across the landscape and the resulting impacts on bears is impossible to calculate with any degree of certainty. With the exception of whitebark pine, there are not any documented relationships among grizzly bear demographic rates and the consumption of the other major grizzly bear foods (cutthroat trout, army cutworm moths, and ungulates). The response of bears in years of low whitebark pine seed production suggests that the loss or near extirpation of whitebark pine trees could reduce survivorship for some grizzly bears, especially those involved in grizzly bear/human conflicts (Mattson et al. 1992, p. 439; Haroldson et al. 2006, p. 39). It is important to note that the annual abundance and distribution of whitebark pine seeds vary naturally and are not predictable. During years with little or no whitebark pine seed production, grizzly bears switch to alternative foods.

The compound uncertainties associated with projections of possible future habitat changes, predicted responses of grizzly bears to multiple possible future conditions, and assumed changes to vital rates in response to any such possible future habitat changes create a wide realm of possible responses. Rather than such a compound uncertainty approach, the management system outlined in the Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 25-60) depends on monitoring of multiple indices including production and availability of all major foods; and monitoring of grizzly bear vital rates including survival, age at first reproduction, reproductive rate, mortality cause and location, dispersal, and human-bear conflicts. These data will allow managers to use an adaptive management approach that addresses poor food years with responsive management actions such as limiting grizzly bear mortality, increasing I & E efforts, and long-term habitat restoration (i.e., revegetation, prescribed burning, etc.), as appropriate. The continued monitoring of these multiple indices will allow rapid feedback on the success of management actions to address the objective of maintaining a recovered population.

Issue 6: Commenters were concerned that the monitoring protocol for winter-killed ungulate carcass surveys was too vague and needs to be readdressed. Several people were concerned with the competition between wolves and grizzlies for winter-killed ungulates and elk calves.

Response: The techniques used in monitoring winter-killed carcasses are described by Green et al. (1997, p. 1042-1043). Although these methods result in a convenience sample, rather than a random sample, it is adequate because the authors do not intend to infer the results beyond the immediate study area.

Several researchers have modeled or investigated in the field the effects of newly reintroduced wolves on ungulate availability to grizzly bears (Wilmers et al. 2003, pp. 914-915; Barber et al. 2005, pp. 42-43; Vucetich et al. 2005, pp. 266-268). The results of those investigations suggest that wolves have had little effect on ungulate availability to grizzly bears in the GYA.

Issue 7: Comments were made on the lack of monitoring army cutworm moth aggregation sites outside the park and on the monitoring protocol itself. For instance, some commented that the indirect measure of moth presence or absence by documenting grizzly bear use of moth sites is misleading and will not adequately inform managers of trends in this food source in time for them to respond with management actions. A few

commenters were concerned about army cutworm moths being classified as "agricultural pests."

Response: There is no accurate method available to monitor moth numbers across thousands of square kilometers of alpine habitat. The method currently used quantifies bear use of moth sites as an index of moth presence and distribution. Although it is known that moth abundance fluctuates in the spring on agricultural lands on the plains (Burton et al. 1980, pp. 4-5) and that moth flights vary in magnitude along their migration routes (Hendricks 1998, p. 165), we are not able to predict where army cutworm moths will occur on the landscape each year except by observing where bears use this food source. The Interagency Grizzly Bear Study Team is currently sponsoring the development of spatial models to predict where potential army cutworm moth habitat is (Robison et al. 2006a, p. 88). The Interagency Grizzly Bear Study Team has not documented an association between grizzly bear use of moth aggregation sites and variation in vital rates and the direct monitoring of army cutworm moth abundance and status is not necessary at this time. Lastly, there are no data indicating that their classification as agricultural pests or pesticide use to control them is negatively affecting grizzly bears in the GYA (Robison et al. 2006b, p. 1710)

Issue 8: Some commenters believed that monitoring of cutthroat trout needs to encompass the whole grizzly bear recovery area instead of focusing on Yellowstone Lake and its tributaries. Others thought that the monitoring protocol needs to include specifics, such as how the results will be used and how these results may affect other fish species.

Response: The State wildlife management agencies monitor cutthroat trout outside of the Parks, but it is only within the drainage of Yellowstone Lake that spawning cutthroat trout are thought to be both a major food for grizzly bears and subject to predation by non-native lake trout. In light of recent evidence (Felicetti et al. 2004, p. 496) that concludes that grizzly bears, particularly reproductive females, are less dependent on this food source than previously thought (Reinhart and Mattson 1990, p. 349; Mattson and Reinhart 1995, pp. 2076-2079), the Service feels that adequate monitoring mechanisms are in place. Yellowstone National Park has active programs of lake trout eradication and monitoring in place that will continue in the foreseeable future, and the Idaho Department of Fish and Game (IDFG) will monitor cutthroat trout outside of the PCA (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, p. 10). Yellowstone National Park considers the control of exotic species such as lake trout to be "…essential to the continued health of the park's ecosystem" (Yellowstone National Park 2003, p. 33). The details of the lake trout monitoring program can be found in the Final Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 130-131). The purpose of the monitoring program for cutthroat trout is to allow managers to make informed decisions about effective management responses such as gillnetting, fishing regulations, hatchery programs, etc., using the best available science.

Issue 9: Commenters believed that monitoring whitebark pine is not enough and suggested that actions to prevent whitebark pine decline be implemented by the National Parks and National Forests.

Response: In response to concerns about threats to whitebark pine in the GYA, the Whitebark Pine Subcommittee was formed in 1998 to monitor the health of whitebark pine and the overall

ecological importance of whitebark pine in the GYA. This group of USFS, National Park Service (NPS), and United States Geological Survey (USGS) managers and researchers gathers information on the status of whitebark pine and implements various restoration techniques and management responses. Current work on whitebark pine includes planting in several areas, cone collection from healthy trees, silvicultural treatments to improve growth and establishment, prescribed burning to encourage natural whitebark pine seedling establishment, and surveys for healthy trees that may possess blister rust resistant genes. Through its Forest Health Protection program, the Forest Service is also investigating the use of the pheromone verbenone to locally control mountain pine beetles (Kegley et al. 2003, pp. 1, 5; Kegley and Gibson 2004, pp. 1, 3). Both inside and outside of the Parks managers are attempting to restore natural fire regimes to the GYA, which is expected to reduce the effects of mountain pine beetles, white pine blister rust, and dwarf mistletoe. In 2004, the Greater Yellowstone Whitebark Pine Monitoring Working Group was formed. This is an interagency team of resource managers, statisticians, and researchers formed to assess the status of whitebark pine, its threats, and restoration options in the GYA. The Whitebark Pine Monitoring Working Group monitors transects throughout the GYA annually for white pine blister rust infection, mountain pine beetle infestation, and whitebark pine survival and publishes these data in annual reports available to the public. With the interagency cooperation and support for whitebark pine conservation in the GYA, we are confident that monitoring programs are adequate to detect potential declines in whitebark pine in the GYA and that any such declines will be mitigated to the extent possible.

J. Grizzly Bear Conflicts.

Issue 1: Many commenters believed that there needs to be an increase in backcountry user awareness and policy, not just more road closures. Some believed that the Draft HBRC needs to be more explicit and call for specific regulations and enforcement regarding outfitters and hunters. Such actions may include regulations requiring all hunters to carry pepper spray, construction and maintenance of bear poles, and implementing programs that monitor hunter self defense claims which result in grizzly bear mortality and using these data to search for patterns among and between incidents.

Response: Between 1980 and 2002, 19 percent (50/257) of human-caused grizzly bear mortalities were related to hunting (Servheen et al. 2004, p. 21), so an increase in backcountry user awareness would be beneficial. The affected States of Wyoming, Montana, and Idaho have cooperated with the Service to address conflicts between grizzly bears and hunters through extensive I & E programs. The Wyoming Game and Fish Department (WGFD) coordinates with its information specialists to help people avoid grizzly bear/human conflicts. The WGFD has held over 150 workshops and programs throughout 18 communities in Wyoming, attended by over 6,000 people (Servheen et al. 2004, p. 3). Grizzly bear encounter management is a core subject in basic hunter education courses taught by the WGFD and outfitters and guides teach a bear encounter class designed specifically for others in their field annually (Servheen et al. 2004, p. 3). Additionally, all limited quota big game license holders hunting in occupied grizzly bear habitat are mailed bear encounter and conflict management informational materials. In Montana, black bear hunters are required to pass a bear identification test before obtaining their license. The Montana Department of Fish Wildlife and Parks (MTFWP) tries in numerous ways to communicate with hunters, including airing public service announcements on local media stations, talking with hunters at hunter check stations, posting informational signs at trailheads,

distributing numerous brochures about avoiding grizzly bear/human conflicts, and backcountry patrols of hunting camps (Servheen et al. 2004, p. 5-6, 8). Because Idaho has experienced less grizzly bear activity and subsequent conflicts than Montana or Wyoming, educational outreach in Idaho has focused on educating community members of the Island Park area. The IDFG has conducted at least 20 "Living in Bear Country" workshops in the upper Snake River region (Servheen et al. 2004, p. 10). These I & E efforts will continue to be the primary way in which agencies attempt to reduce conflicts between grizzly bears and hunters.

Issue 2: Some believed there should be a hunting season on grizzlies and that if the grizzlies were hunted they would be afraid of people and avoid them, thereby reducing grizzly bear/human conflicts.

Response: Decisions about establishing grizzly bear hunting seasons are outside the scope of this document. The objective of the Draft HBRC is to establish habitat criteria that will meet the needs of a recovered grizzly population.

Issue 3: People suggested that the Final HBRC be more specific regarding outreach goals such as continuing the outfitter/hunter program in an effort to reduce human caused mortality in the GYA. Some people believed that the food storage criteria should apply to all land occupied by grizzly bears to reduce human-bear conflicts.

Response: Although the objectives of this document are limited to establishing habitat criteria that will meet the needs of a recovered grizzly population, we recognize the importance of outreach and I & E efforts to the long-term conservation of the GYA grizzly bear population. The details related to implementing effective outreach efforts and preventing and responding to grizzly bear/human conflicts are in the Final Conservation Strategy (U.S. Fish and Wildlife Service 2007, pp. 59-62) and the State management plans (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 13-18; MTFWP 2002, pp. 26-28, 46-49, 54-56, 63-66; WGFD 2005, pp. 25-35). Over two-thirds ($2,393,200 of $3,496,337) of the anticipated costs of managing the GYA grizzly bear population are for managing grizzly bear/human conflicts and I & E efforts (U.S. Fish and Wildlife Service 2007, p. 154). This level of commitment by responsible agencies demonstrates their understanding that I & E efforts and conflict management and prevention are crucial elements of maintaining a healthy Yellowstone grizzly bear population.

The USFS currently has food storage orders in most Service-defined suitable habitat and will have food storage orders in effect in all suitable habitat found within National Forests by 2008. For a complete map of when and where food storage orders will take effect on National Forest lands in the GYA, please see http://mountain-prairie.fws.gov/species/mammals/grizzly/yellowstone.htm. Collaborative efforts to improve garbage storage on private lands are extensive and will continue in the future (see Servheen et al. 2004, pp. 6-7). These efforts involve State wildlife agencies, non-governmental organizations, waste management companies, and private landowners responding to and addressing problems with garbage storage to avoid future grizzly bear/human conflicts.

Issue 4: Many responses concerning livestock grazing and grizzly bear/livestock conflicts thought that the removal of livestock allotments in and around the Recovery Zone is necessary.

They thought the management emphasis should be on protecting bears and enhancing bear habitat.

Response: While the multiple use mandates guiding National Forest management can result in conflicts between competing uses, the Service must make its decisions based on scientific data. In light of this requirement, the Service focuses on whether or not grizzly bear mortalities resulting from conflicts with livestock affect overall population trajectory. The Service has established nuisance bear management guidelines that are strategic in nature and provide managers with a framework to assess conflicts on a case-by-case basis. Grizzly bears depredating on lawfully present livestock on public lands may or may not be removed from the population, depending on several factors such as location of the conflict, severity of the incident, age and sex of the bear, and conflict history of the bear (U.S. Fish and Wildlife Service 2007, p. 59). To further ensure that human-caused grizzly bear mortality does not negatively impact the population, the Interagency Grizzly Bear Study Team has established biologically sustainable mortality limits (Interagency Grizzly Bear Study Team 2005, pp. 31-41) that Federal and State agencies in the GYA have agreed to adhere to by signing the Conservation Strategy.

Issue 5: Some commenters said monitoring and reporting of livestock conflicts is an important first step toward reducing bear/livestock conflicts, but problem areas must be identified, and management procedures described in the Final HBRC. Some believed the Service should also work on addressing grizzly bear/cattle conflicts and closing cattle allotments. Many believed that the Service should work more closely with landowners and permittees to decrease livestock-bear encounters.

Response: Through the coordinated monitoring of grizzly bear/human conflicts, the Interagency Grizzly Bear Study Team identifies areas of concentrated conflicts annually (Gunther et al. 2006, pp. 58-59). Managers can then focus efforts to prevent grizzly bear/human conflicts in these areas in subsequent years. All three State management plans contain direction on reducing grizzly bear/livestock conflicts and cooperating with private land owners to reach this goal (Idaho's Yellowstone Grizzly Bear Delisting Advisory Team 2002, pp. 15-16; MTFWP 2002, pp. 46-48; WGFD 2005, pp. 29-30). Regarding the phasing out of livestock allotments, the Service will focus on sheep allotments inside the PCA because of the high probability of conflict when grizzly bears encounter sheep. Since 1998, the number of sheep allotments inside the PCA has been reduced from eleven to two, with a corresponding reduction in the number of sheep grazed (USDA Forest Service 2006a, p. 167-168). The remaining 2 sheep allotments inside the PCA on the Targhee National Forest will be retired as opportunities arise with willing permittees. Because it has been demonstrated that grizzly bears and cattle are more likely to coexist without conflict than grizzly bears and sheep, the phasing out of cattle allotments inside the PCA will only occur when there are recurring, irresolvable conflicts on these allotments or if willing permittees volunteer to waive their permits back to the government. On GYA National Forest lands outside the PCA that are in areas identified as suitable by State management plans, cattle and sheep allotments with recurring conflicts that cannot be resolved will be retired as opportunities with willing permittees arise (USDA Forest Service 2006a, p. 37; USDA Forest Service 2006b, p. 6).

K. Private Land Issues.

Issue 1: Many commenters thought that the categorization and prioritization of private lands is an infringement on their Fifth Amendment private property rights, especially if land was categorized without the landowner's consent. Many had similar objections to road closures that connect to private property. Both landowners and conservation groups requested that they be involved with the categorization and prioritization of private lands in the future.

Response: Categorization identifies the level of development in areas in order to allow more efficient assistance to private land owners regarding bear human conflict avoidance. This would primarily be accomplished by county authorities in cooperation with State wildlife management authorities. Management of bear/human conflicts is a way to help private land owners minimize conflicts with bears on their property. The consideration of private land activities on grizzly/human conflicts is fundamental to the proper management of grizzly bears and to human safety. Because a disproportionate number of grizzly bear/human conflicts occur at site developments on private lands (see Servheen et al. 2004, p. 15) and the Service has no direct authority over private lands, the Service recommends that private land owners become involved in efforts to reduce these conflicts. These conflicts often lead to grizzly bear mortality so the Service makes such recommendations based on its responsibility and jurisdiction to promote grizzly bear conservation and welfare. This recommendation was made in the context of private landowners managing their lands for grizzly bear conservation and was not intended to encourage other private citizens to attempt to direct land management on private lands that they do not own.

Issue 2: An additional goal mentioned by some commenters was the need for conservation easements in important grizzly bear habitat.

Response: We recognize that the conservation of private lands is an integral component of long-term grizzly bear conservation and cooperate with the States, Counties, and non-governmental organizations to support this goal. Landowners may enter into conservation easements with land conservation organizations at any time.

L. Financial Costs Associated With the Draft HBRC.

Issue 1: Many people commented on the cost of the overall program, noting that the Federal government should shoulder the financial burden of grizzly bear management.

Response: As presented in the Conservation Strategy, the total new costs to the States for implementing the Conservation Strategy and the HBRC to sustain a recovered grizzly bear population in the GYA are relatively minimal, roughly $200,000 above what is spent currently (U.S. Fish and Wildlife Service 2007, p. 154). The USFS and NPS, the primary managers of grizzly bear habitat, anticipate the largest increase in new costs, roughly $750,000 greater than current expenditures (U.S. Fish and Wildlife Service 2007, p. 154). Federal agencies such as the NPS, the USFS, and the USGS expect that sixty percent of the anticipated costs of implementing the HBRC and the Final Conservation Strategy will be their responsibility.

Issue 2: There were many comments related to the economic effects of grizzly bears on local economies and particularly to ranchers. Some people thought that as grizzly bear numbers increase, additional restrictions are placed on the ranching industry, eventually

driving some operators out of business. Other people noted that tourists visiting the GYA to see grizzly bears bring money into local communities, stimulating the economy of towns in proximity to bear habitat.

Response: The HBRC will be implemented by the National Parks and National Forests. The Final Environmental Impact Statement (EIS) for the Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests includes an analysis of the potential economic impacts of implementing the Conservation Strategy, including the HBRC (USDA Forest Service 2006a, pp.242-254). This Final EIS concludes that the negative economic impacts of implementing the Conservation Strategy would be minimal to livestock operators and do not outweigh the positive effects to grizzly bears (USDA Forest Service 2006a, pp. 251-252).

Issue 3: Some commenters were concerned about the effects on the economy if there were increased restrictions on big-game hunting due to hunter conflicts with grizzly bears.

Response: There are not expected to be any restrictions on big game hunting.

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