

Appendix F. Habitat Baseline 1998

The 1998 baseline represents the most approximate estimate of ~~the~~ habitat standard measures reflecting ground conditions in 1998 within the Primary Conservation Area (PCA) ~~as of 1998~~. ~~That estimate relied on the best data available of what was known to be on the ground at the time. Baseline data establishes a set of information against which future improvements and/or impacts can be assessed. As new information is available, the database will be adjusted and will serve as a tracking system for monitoring improvements and evaluating habitat conditions and the need for mitigation measures in the future. Habitat standards identified in the Conservation Strategy pertain to secure habitat, developed sites, and livestock grazing allotments. All three of these parameters are to be maintained at or improved upon conditions that existed in 1998. The 1998 baseline represents the best estimate of what was known to be on the ground at that time and establishes a benchmark against which future improvements and/or impacts can be assessed. It also provides a clear standard for agency managers to follow when considering project effect analysis.- This appendix documents estimates for baseline values so that current and future habitat conditions throughout the PCA can be evaluated for compliance with habitat standards formalized in the Conservation Strategy.~~

~~Any new features identified that are not included in the existing 1998 baseline identified here will be reviewed as to their actual status in 1998. If the feature was indeed there in 1998 it will be added to the baseline tables or maps, otherwise it will be dealt with as per the standards identified in this document. In theory, the 1998 baseline should be a static measurement bound to a single point in time. In reality, this baseline continues to evolve as more reliable information is acquired; errors in the baseline are identified and corrected; and as new geoprocessing tools are developed to more accurately model secure habitat and estimate road densities. Since the release of the 2007 Conservation Strategy new information has been made available and some errors in the 1998 baseline have been identified. Consequently, baseline values have been adjusted where necessary to more accurately reflect 1998 ground conditions. The 1998 baseline database will continue to be improved upon when and if legitimate errors are identified. Features found to be erroneously excluded from the 1998 baseline will be reviewed as to their actual status in 1998. If reliable information is made available to substantiate the existence of these features in 1998 then corrections to the baseline will be made. All changes made to the baseline will be documented, tracked, and reported in the Interagency Grizzly Bear Study Team (IGBST) annual report. Baseline values presented in this appendix represent the best available information at this time and will serve as a basis for monitoring and evaluating improvements in habitat conditions and identifying any need for mitigation measures in the future.~~

~~Baseline information is also included here for Habitat Effectiveness (HE) and Habitat Value (HV) outputs from the Yellowstone Grizzly Bear Cumulative Effects Model. The HV information is presented to demonstrate the HV of secure habitats as compared to the entire subunit. HE will be monitored over time and the data presented here will serve as the baseline on which to evaluate changes in HE. No baseline was established for other habitat monitoring items.~~

Secure Habitat and Motorized Access Route Density

~~Using Geographic Information System databases created by each administrative unit the percent secure habitat, open motorized access route density > 1 mile per square mile and total motorized access route density > 2 mile/square mile was estimated as of 1998 for each BMU subunit (Table 2). OMARD is evaluated for each of two seasons, as access routes may be~~

Comment [LL1]: Must define OMARD & TMARD before stating how they are measured.

restricted in one season and not another. TMARD and secure habitat are single values by definition and do not vary by season. The contribution of private roads and state and county highways was also evaluated for each BMU subunit (Table 3). These values represent a minimum percent for OMARD, TMARD and a maximum percent for secure habitat even if all motorized access features administered by the land management agencies were obliterated or decommissioned on public lands. A standardized program (AML) that runs in the ARC/INFO software environment was used to make the calculations. The buffer command in ARC/INFO is used to buffer all relevant motorized access features by 500 meters. The area outside of this buffer is secure habitat. Motorized access route density is calculated using a moving windows process with 30 meter cells and a 1 mile square window. Maintaining or improving secure habitat at or above 1998 levels inside the PCA is a required habitat standard. To monitor compliance with this standard, secure habitat is annually measured and compared against 1998 levels for each bear management subunit. There are no mandatory standards for motorized route density, however, monitoring protocol requires that open motorized access route density (OMARD) and total motorized access route density (TMARD) be measured, monitored, and compared against 1998 levels annually.

Secure habitat is any contiguous area greater than 10 acres in size and more than 500 meters from an open or gated motorized route. OMARD measures the density of motorized routes (roads and trails) that are open to the public for one or more days during the non-denning portion of the year when grizzly bears are active (March 1 – November 30). TMARD measures the density of motorized routes open to the public and/or administrative personnel for one or more days during the non-denning season. Routes that are gated to the public year-round but accessible to administrative staff contribute to TMARD but do not count toward OMARD. OMARD is reported at levels > 1 mile per square mile while TMARD is reported at levels > 2 miles per square mile. State, county and private roads occurring on federal lands are included in these calculations; however, roads occurring on private inholdings reflect 1998 conditions and are not updated in the motorized access database through time.

Calculations for percentage of secure habitat, OMARD, and TMARD are generated using the Motorized Access Model, a suite of customized geoprocessing tools compatible with ArcGIS software. Algorithms built into the model generate a 500 meter buffer around all relevant motorized features. Areas larger than 10 acres in size that fall outside this buffer are designated secure habitat. Methods for measuring route density have greatly improved with advancements in geoprocessing tools since earlier versions of the Conservation Strategy were released. Starting in 2009 a more accurate method for measuring line density was implemented which led to changes in the 1998 baseline values for motorized route density. The new baseline measurements provide a more accurate and realistic estimate of road densities and do not reflect changes in the estimate of 1998 road conditions on the ground. Instead, only the method from which road density is calculated has changed. Route density values are stored in a 30-meter raster format and cell values correspond to densities within a one-square-mile moving window. However, in previous methods, the total length of motorized routes within the moving window was based on a simple absence or presence of motorized routes within a given cell. Cells containing one or more route segments were summed and then multiplied by 30 meters (length of single cell) to get the total length of motorized road within the moving window. This method tended to under-estimate route density in most cases. The current algorithm instead accounts for all route segments within a cell and accurately measures the total length of routes intersecting the one-square-mile moving window based on actual line geometry (Figure 1).

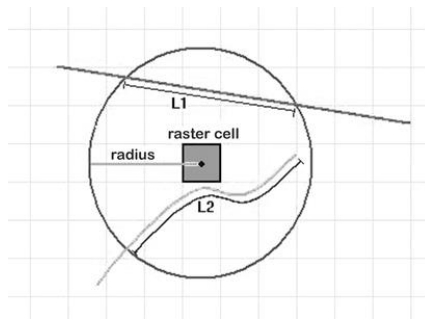


Figure 1 Measurement of route density based on total length of routes within 1-square-mile moving window.

The most current values for 1998 baseline levels of secure habitat, OMARD, and TMARD are presented in Table 1. These values, which are based on the best methods available, supersede those presented in the 2007 Conservation Strategy and comprise the benchmark against which all future change is to be measured.

The 1997 Targhee Forest Plan standards and guidelines, when fully implemented and adopted, meet the intent of the habitat standard for motorized access for this Conservation Strategy. Secure habitat percentages in tables 1 and 2 for those portions of the subunits on the Targhee National Forest (Henny's Lake 1 and 2, Plateau 1 and 2 and Bechler 1) are calculated using the process identified above. However, the actual standard for secure habitat is identified in the associated management area prescription in the 1997 Targhee Forest Plan. The values presented here are used for consistency with other administrative units and are unlikely to change significantly as the 1997 Targhee Forest Plan also has a standard for Open Motorized Access Route Densities and Total Motorized Access Route Densities.

Developed Sites on Public Lands

Developed sites include all 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's centers, and permitted resource development sites such as oil and gas exploratory wells, production wells, plans of operation for minerals activities, work camps, etc. Developed sites on public lands inside the PCA are currently inventoried and tracked in existing GIS databases and are an input item to the Yellowstone Grizzly Bear Cumulative Effects Model (CEM). Table 4-2 displays the number of developed sites for each administrative unit by bear management unit (BMU) subunit as of 1998.

Activities based in statutory rights, such oil and gas leases and mining claimsplans of operation under the 1872 General Mining Law are also tracked as part of the developed site monitoring effort. Mining claims and or oil and gas leases do not in and of themselves constitute a site development, but have the potential to be developed sometime in the future. There were no oil and gas leases inside the PCA as of 1998 and 1,354 mining claims in ten of the subunits inside the PCA (Table 4)In 1998, a total of 1,354 mining claims had been filed throughout ten BMU subunits; however, no oil and gas leases existed inside the PCA. It is important to nNote that one mining claim does not necessarily mean a potential for one operating plan. Claims are often staked around known mineral deposits to protect the original claim and a single operating plans can sometimes encompass hundreds of claims. Furthermore, in addition, there are always a

number of filed claims, ~~filed that after more upon~~ detailed exploration, do not ~~prove to~~ have enough mineralization to be economically developed and consequently are never acted upon. Approved operating plans associated with mining claims or claim groups with approved operating plans are included as a separate category in the developed site baseline (Table 23). A complete list of all developed sites (names and types) comprising the 1998 baseline is documented in Table 3.

Livestock Grazing

The livestock allotment standard established in the Conservation Strategy requires that there be no net increase in the number or acreage of active commercial livestock grazing allotments or in permitted sheep animal months (AMs) inside the PCA from that which existed in 1998. Existing sheep allotments will be monitored, evaluated, and phased out as the opportunity arises with willing permittees. Sheep animal months (AMs) are calculated by multiplying the permitted number of sheep times the months of permitted use.

~~There were 88 commercial livestock grazing allotments inside the PCA in 1998 and 17,279 permitted sheep animal months (AMs) (Table 4). Allotments with less than 100 acres inside the PCA were not included. Where several allotments are managed as one, this was counted as a single allotment. Sheep animal months (AMs) are calculated by multiplying the permitted number of sheep times the months of permitted use. Actual use by sheep in many cases may have been less than the permitted numbers identified for 1998.~~

~~Allotments include both vacant and active grazing allotments. In 1998 there were 101 commercial livestock grazing allotments and 23,900 permitted sheep animal months (AMs) inside the PCA (Table 4). Of these, 83 were cattle and/or horse allotments and the remaining 18 were for sheep. Operational status of allotments is categorized as active, vacant, or closed. An active allotment is one with a current grazing permit, although a "no-use" permit can be granted on a year-by-year basis when a permittee chooses not to graze livestock. 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 active allotments inside the PCA would must remain the same as at or below the 1998 baseline levels. Combining or dividing existing allotments would be allowed as long as net acreage in allotments does not increase above 1998 levels. Any such use of vacant cattle allotments resulting in an increase in cattle numbers will only be done after an analysis to evaluate impacts on grizzly bears. Where chronic conflicts occur on cattle allotments inside the PCA, and an opportunity exists with a willing permittee, one alternative for resolving the conflict may be to phase out cattle grazing or to move the cattle to a currently vacant allotment where there is less likelihood of conflict.~~

Note: The following tables in this appendix represent the most current information available pertaining to habitat baseline values for 1998. These tables supersede tables of equivalent content from the 2007 Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area and the 2006 Forest Plan Amendment (FPA) for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests Record of Decision (ROD) and Final Environmental Impact Statement (FEIS).

~~Table 1. Number of Mining claims as of 1998 in bear management subunits in the Yellowstone Primary Conservation Area.~~

Comment [LL2]: I deleted this table (although "Track Changes" does not "Track" deleted tables) since we do not monitor & keep track of mining claims. Instead, we track Plans of Operation (associated w/ mining claims) as a category of developed sites in Table 2.

Table 21. The 1998 baseline values for secure habitat, open motorized access route density > 1 mile per square mile (OMARD), and total motorized access route density > 2 miles per square mile (TMARD) for the 40 Bear Management (BMU) Subunits in the Greater Yellowstone Area. Includes USFS, NPS, BLM, state, county, and private motorized access routes.

BMU subunit name	% OMARD > 1 mi / mi ²	% TMARD ⁽¹⁾ > 2 mi / mi ²	% Secure Habitat	Subunit Area (mi ²) (excluding lakes) ⁽¹⁾
Bechler/Teton	17.0	5.8	78.1	534.3
Boulder/Slough #1	3.2	0.3	96.6	281.9
Boulder/Slough #2	2.1	0.0	97.7	232.4
Buffalo/Spread Creek #1	11.5	5.3	88.3	219.9
Buffalo/Spread Creek #2	15.6	12.7	74.3	507.6
Crandall/Sunlight #1	19.3	7.2	81.1	129.8
Crandall/Sunlight #2	16.6	11.7	82.3	316.2
Crandall/Sunlight #3	19.2	10.6	80.4	221.8
Firehole/Hayden #1	10.4	1.7	88.3	339.2
Firehole/Hayden #2	9.0	1.5	88.4	172.2
Gallatin #1	3.6	0.5	96.3	127.7
Gallatin #2	9.5	4.5	90.2	155.2
Gallatin #3	46.0	22.9	55.3	217.6
Helroaring/Bear #1	23.1	15.8	77.0	184.7
Helroaring/Bear #2	0.1	0.0	99.5	228.9
Henry's Lake #1	49.0	31.2	45.4	191.2
Henry's Lake #2	49.9	35.2	45.7	140.2
Hilgard #1	29.0	15.3	69.8	201.2
Hilgard #2	21.0	13.6	71.4	140.5
Lamar #1	9.9	3.8	89.4	299.9
Lamar #2	0.0	0.0	100.0	180.8
Madison #1	29.5	12.5	71.5	227.9
Madison #2	33.7	24.0	66.5	149.4
Pelican/Clear #1	2.0	0.5	97.8	108.4
Pelican/Clear #2	5.4	0.4	94.1	251.6
Plateau #1	22.2	12.9	68.8	286.3
Plateau #2	8.5	3.5	88.7	419.9
Shoshone #1	1.5	1.1	98.5	122.2
Shoshone #2	1.3	0.7	98.8	132.4
Shoshone #3	3.9	2.1	97.0	140.7
Shoshone #4	5.3	2.9	94.9	188.8
South Absaroka #1	0.6	0.1	99.2	163.2
South Absaroka #2	0.0	0.0	99.9	190.6
South Absaroka #3	2.4	2.7	96.8	348.3
Thorofare #1	0.0	0.0	100.0	273.4
Thorofare #2	0.0	0.0	100.0	180.1
Two Ocean/Lake #1	3.5	0.3	96.3	371.9
Two Ocean/Lake #2	0.0	0.0	100.0	124.9
Washburn #1	16.1	4.2	83.0	178.3
Washburn #2	7.4	1.1	92.0	144.1
Mean for PCA/Total sq. miles	12.7	6.7	85.6	9,025.4

¹-(1) Lakes >= 1 square mile in size were excluded-removed from subunit total square mileage.

, OMARD, TMARD and secure habitat calculations. Numbers in parenthesis are square miles of subunit without these lakes.

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

~~Table 3. The 1998 baseline values for secure habitat, open motorized access route density > 1 mi per square mile (OMARD), and total motorized access route density > 2 miles per square mile (TMARD) for the 40 Bear Management (BMU) Subunits in the Greater Yellowstone Area. Includes only private roads and state and county highways. (These motorized features are not subject to management under this strategy and the values in this table represent a minimum percent for OMARD, TMARD and a maximum percent for secure habitat even if all motorized access features administered by the land management agencies were obliterated or decommissioned on public lands.)~~

~~[‡] Lakes > 1 square mile in size were removed from subunit totals, OMARD, TMARD and secure habitat calculations. Numbers in parenthesis are square miles of subunit without these lakes.~~

Comment [LL3]: I deleted this table since it is not pertinent to the baseline and can potentially be confused with actual baseline values for motorized route density.

Table 4. The 1998 baseline for numbers of developed sites on public lands within each of the Bear Management Subunits in the GYA⁶.

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 mineral activities ⁴
Bechler/Teton	Targhee NF	0	1	5	2	4	17	0
	Yellowstone NP	0	0	2	0	2	2	0
	Grand Teton NP	0	8	3	1	3	10	0
Boulder/Slough #1	Custer NF	0	0	1	0	0	0	6
	Gallatin NF	0	1	7	0	1	3	2
Boulder/Slough #2	Gallatin NF	0	0	0	0	2	0	0
	Yellowstone NP	0	1	3	0	2	1	0
Buffalo/Spread Creek #1	Bridger-Teton NF	0	1	1	0	0	1	0
	Grand Teton NP	0	0	7	2	2	3	0
Buffalo/Spread Creek #2	Bridger-Teton NF	1	4	3	3	4	5	2
Crandall/Sunlight #1	Shoshone NF	0	2	5	1	1	5	0
	Gallatin NF	0	1	2	0	0	5	0
Crandall/Sunlight #2	Shoshone NF	0	5	4	1	2	5	1
	Gallatin NF	0	1	0	0	0	0	0
Crandall/Sunlight #3	Shoshone NF	0	2	3	0	1	2	0
	Wyoming Game and Fish	0	2	0	0	1	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
Gallatin #2	Yellowstone NP	0	2	5	1	12	1	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 mineral activities ⁴
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
Henry's Lake #1	Targhee NF	2	3	1	0	3	10	1
Henry's 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

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 mineral activities ⁴
Plateau #1	Targhee NF	1	0	0	0	0	1	0
	Gallatin NF	0	0	1	0	0	0	0
	Yellowstone NP	0	0	0	0	1	0	0
Plateau #2	Targhee NF	0	1	1	0	1	1	0
	Yellowstone NP	0	0	0	0	4	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	0	0	0	0	0	0	0
	Yellowstone NP	0	0	0	0	4	0	0
Thorofare #2	Bridger-Teton NF	0	0	0	0	2	0	0
	Yellowstone NP	0	0	0	0	0	0	0
Two Ocean/Lake #1	Yellowstone NP	0	2	3	1	3	2	0
	Bridger-Teton NF	0	1	0	0	0	0	0
	Grand Teton NP	0	0	1	0	0	1	0
Two Ocean/Lake #2	Yellowstone NP	0	0	0	0	2	0	0
	Bridger-Teton NF	0	0	0	0	1	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 mineral activities ⁴
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.

⁶ 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) and replaces the table on the 1998 baseline on developed sites that was in the Draft Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. (U.S. Fish and Wildlife Service 2003). These figures differ slightly from the figures in the previous table and it represents updated figures based on more accurate mapping.

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~~Livestock Grazing~~

~~There were 88 commercial livestock grazing allotments inside the PCA in 1998 and 17,279 permitted sheep AMs (Table 4). Allotments with less than 100 acres inside the PCA were not included. Where several allotments are managed as one, this was counted as a single allotment. Sheep animal months (AMs) are calculated by multiplying the permitted number of sheep times the months of permitted use. Actual use by sheep in many cases may have been less than the permitted numbers identified for 1998.~~

~~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 cattle numbers will only be done after an analysis to evaluate impacts on grizzly bears. Where chronic conflicts occur on cattle allotments inside the PCA, and an opportunity exists with a willing permittee, one alternative for resolving the conflict may be to phase out cattle grazing or to move the cattle to a currently vacant allotment where there is less likelihood of conflict.~~

~~It should be noted that the Caribou Caribou Targhee National Forest closed 2 sheep allotments and is keeping 2 additional sheep allotments vacant since 1998, resulting in a reduction of 7,889 sheep AMs over that shown for the Caribou Targhee in Table 4.~~

~~Table 5. Number of commercial livestock grazing allotments and sheep animal months inside the Yellowstone Primary Conservation Area in 1998.³~~

~~¹Since 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.~~

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

~~³Note 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) and replaces the table on the 1998 baseline on livestock allotments that was in the Draft Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. (U.S. Fish and Wildlife Service 2002). These figures differ slightly from the figures in the previous table and it represents updated figures based on more accurate information.~~

~~Habitat Effectiveness~~

~~Habitat effectiveness outputs from the Grizzly Bear Cumulative Effects Model (CEM, Dixon 1997, Weaver et al. 1986, Mattson et al. in press) as of 1998 are presented in Table 5. Habitat effectiveness as displayed in Table 4 is a relative measure of that part of the energy potentially derived from the area that is available to bears given their response to humans (Mattson et al. in press). The higher the number the greater the habitat effectiveness. The highest values in the estrous period are associated with cutthroat trout spawning streams, high vales in early hyperphagia are a result of moth aggregation sites and high values in late hyperphagia are primarily due to white bark pine. HE is calculated using the ICE9 software (Bevins, 1997), which evaluates information, contained in several Geographic Information System and tabular databases. The databases include digital maps of vegetation, ungulate winter ranges, and point, linear and dispersed human activities, coefficient tables that categorize the relative values of vegetation and human activities and tables that identify the type, intensity and duration of the human activities.~~

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Table 6. 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.[±]

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	110	852
Boulder/Slough#2	122	112	111	521
Buffalo/Spread Cr#1	70	86	70	267
Buffalo/Spread Cr#2	58	88	125	862
Crandall/Sunlight#1	52	84	78	800
Crandall/Sunlight#2	52	82	124	220
Crandall/Sunlight#3	52	50	156	208
Firehole/Hwyden#1	86	188	162	244
Firehole/Hwyden#2	45	842	66	242
Gallatin#1	120	144	188	625
Gallatin#2	104	87	105	585
Gallatin#3	78	60	80	500
Hall's Crossing/Deer#1	85	74	85	678
Hall's Crossing/Deer#2	117	80	88	628
Hayme Lake#1	41	20	22	178
Hayme Lake#2	41	41	22	225
Wilcoxd#1	80	68	81	614
Wilcoxd#2	81	87	122	882
Lamar#1	127	118	126	571
Lamar#2	122	167	188	785
Madison#1	52	115	227	280
Madison#2	41	60	147	62
Pelican/Clear#1	102	224	185	568
Pelican/Clear#2	185	2252	282	887
Plateau#1	26	48	26	188
Plateau#2	75	81	56	442
Choshone#1	28	58	115	264

[±] 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.

Shoshone#2	51	56	1424	287
Shoshone#2	55	57	582	484
Shoshone#4	57	70	227	202
South Absaroka#1	55	57	202	200
South Absaroka#2	41	45	220	250
South Absaroka#3	46	72	202	551
Therefore #1	24	482	202	256
Therefore #2	70	22	205	582
Two Ocean/Lake#1	115	1200	64	426
Two Ocean/Lake#2	117	2401	107	1070
Washburn#1	121	110	126	404
Washburn#2	20	26	25	272

Table 2. The 1998 baseline for number of developed sites on public lands in each bear management subunit inside the PCA.

Subunit	Administrative units ¹	Summer home complexes ²	Developed campgrounds ³	Trailheads	Major developed sites and lodges	Administrative or maintenance	Other developed sites ⁴	Plans of Operation for minerals activities ⁵	Total number of sites per subunit
Bechler/Teton	C-TNF	0	1	5	2	4	16	0	60
	YNP	0	0	2	0	2	2	0	
	GTNP	0	8	3	1	4	10	0	
Boulder/Slough #1	CNF	0	0	1	0	0	0	6	20
	GNF	0	1	6	0	1	3	2	
Boulder/Slough #2	GNF	0	0	0	0	2	0	0	9
	YNP	0	1	3	0	2	1	0	
Buffalo/Spread Creek #1	B-TNF	0	1	1	0	0	2	0	18
	GTNP	0	0	7	2	2	3	0	
Buffalo/Spread Creek #2	B-TNF	1	4	3	3	5	5	1	22
Crandall/Sunlight #1	SNE	0	2	5	1	1	5	0	23
	GNF	0	2	2	0	0	5	0	
Crandall/Sunlight #2	SNE	0	5	4	1	2	5	1	18
	GNF	0	0	0	0	0	0	0	
Crandall/Sunlight #3	SNE	0	2	3	0	1	2	0	11
	WG&F	0	2	0	0	1	0	0	
Firehole/Hayden #1	YNP	0	1	5	1	6	13	0	26

<u>Subunit</u>	<u>Administrative units¹</u>	<u>Summer home complexes²</u>	<u>Developed campgrounds³</u>	<u>Trailheads</u>	<u>Major developed sites and lodges</u>	<u>Administrative or maintenance</u>	<u>Other developed sites⁴</u>	<u>Plans of Operation for minerals activities⁵</u>	<u>Total number of sites per subunit</u>
<u>Firehole/Hayden #2</u>	<u>YNP</u>	<u>0</u>	<u>1</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>8</u>	<u>0</u>	<u>15</u>
<u>Gallatin #1</u>	<u>YNP</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>4</u>
<u>Gallatin #2</u>	<u>YNP</u>	<u>0</u>	<u>2</u>	<u>5</u>	<u>1</u>	<u>12</u>	<u>1</u>	<u>0</u>	<u>21</u>
<u>Gallatin #3</u>	<u>GNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>2</u> <u>0</u>	<u>9</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>6</u> <u>0</u>	<u>0</u> <u>0</u>	<u>17</u>
<u>Hellroaring/Bear #1</u>	<u>GNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>5</u> <u>0</u>	<u>11</u> <u>1</u>	<u>0</u> <u>0</u>	<u>3</u> <u>0</u>	<u>7</u> <u>1</u>	<u>8</u> <u>0</u>	<u>36</u>
<u>Hellroaring/Bear #2</u>	<u>GNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>0</u> <u>0</u>	<u>1</u> <u>2</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>4</u>
<u>Henrys Lake #1</u>	<u>C-TNF</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>10</u>	<u>1</u>	<u>20</u>
<u>Henrys Lake #2</u>	<u>C-TNF</u> <u>GNF</u>	<u>0</u> <u>5</u>	<u>0</u> <u>3</u>	<u>1</u> <u>4</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>1</u> <u>2</u>	<u>1</u> <u>0</u>	<u>18</u>
<u>Hilgard #1</u>	<u>B-DNF</u> <u>GNF</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>6</u>	<u>0</u> <u>1</u>	<u>3</u> <u>2</u>	<u>0</u> <u>2</u>	<u>0</u> <u>0</u>	<u>14</u>
<u>Hilgard #2</u>	<u>GNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>4</u> <u>3</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>1</u> <u>0</u>	<u>0</u> <u>0</u>	<u>9</u>
<u>Lamar #1</u>	<u>YNP</u> <u>GNF</u> <u>SNE</u> <u>CNE</u>	<u>0</u> <u>0</u> <u>0</u> <u>0</u>	<u>1</u> <u>2</u> <u>0</u> <u>0</u>	<u>5</u> <u>6</u> <u>0</u> <u>1</u>	<u>0</u> <u>0</u> <u>0</u> <u>0</u>	<u>3</u> <u>6</u> <u>0</u> <u>0</u>	<u>2</u> <u>3</u> <u>0</u> <u>0</u>	<u>0</u> <u>6</u> <u>0</u> <u>2</u>	<u>37</u>
<u>Lamar #2</u>	<u>YNP</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>4</u>
<u>Madison #1</u>	<u>GNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>11</u> <u>0</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>8</u> <u>0</u>	<u>0</u> <u>0</u>	<u>21</u>
<u>Madison #2</u>	<u>GNF</u> <u>YNP</u>	<u>8</u> <u>0</u>	<u>2</u> <u>0</u>	<u>1</u> <u>1</u>	<u>1</u> <u>0</u>	<u>4</u> <u>2</u>	<u>5</u> <u>1</u>	<u>0</u> <u>0</u>	<u>25</u>
<u>Pelican/Clear #1</u>	<u>YNP</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>
<u>Pelican/Clear #2</u>	<u>YNP</u>	<u>0</u>	<u>1</u>	<u>4</u>	<u>1</u>	<u>4</u>	<u>3</u>	<u>0</u>	<u>13</u>

<u>Subunit</u>	<u>Administrative units¹</u>	<u>Summer home complexes²</u>	<u>Developed campgrounds³</u>	<u>Trailheads</u>	<u>Major developed sites and lodges</u>	<u>Administrative or maintenance</u>	<u>Other developed sites⁴</u>	<u>Plans of Operation for minerals activities⁵</u>	<u>Total number of sites per subunit</u>
<u>Plateau #1</u>	<u>C-TNF</u> <u>GNF</u> <u>YNP</u>	<u>1</u> <u>0</u> <u>0</u>	<u>0</u> <u>0</u> <u>0</u>	<u>0</u> <u>0</u> <u>0</u>	<u>0</u> <u>0</u> <u>0</u>	<u>0</u> <u>0</u> <u>1</u>	<u>1</u> <u>0</u> <u>0</u>	<u>0</u> <u>0</u> <u>0</u>	<u>3</u>
<u>Plateau #2</u>	<u>C-TNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>1</u> <u>0</u>	<u>0</u> <u>0</u>	<u>1</u> <u>4</u>	<u>1</u> <u>0</u>	<u>0</u> <u>0</u>	<u>7</u>
<u>Shoshone #1</u>	<u>SNF</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>6</u>	<u>0</u>	<u>9</u>
<u>Shoshone #2</u>	<u>SNF</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>
<u>Shoshone #3</u>	<u>SNF</u>	<u>2</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>
<u>Shoshone #4</u>	<u>SNF</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>6</u>	<u>0</u>	<u>8</u>	<u>0</u>	<u>23</u>
<u>South Absaroka #1</u>	<u>SNF</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>South Absaroka #2</u>	<u>SNF</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>
<u>South Absaroka #3</u>	<u>SNF</u>	<u>1</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>1</u>	<u>5</u>	<u>0</u>	<u>15</u>
<u>Thorofare #1</u>	<u>B-TNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>4</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>4</u>
<u>Thorofare #2</u>	<u>B-TNF</u> <u>YNP</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>2</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>2</u>
<u>Two Ocean/Lake #1</u>	<u>YNP</u> <u>B-TNF</u> <u>GTNP</u>	<u>0</u> <u>0</u> <u>0</u>	<u>2</u> <u>1</u> <u>0</u>	<u>3</u> <u>0</u> <u>1</u>	<u>1</u> <u>0</u> <u>0</u>	<u>3</u> <u>0</u> <u>0</u>	<u>2</u> <u>0</u> <u>1</u>	<u>0</u> <u>0</u> <u>0</u>	<u>14</u>
<u>Two Ocean/Lake #2</u>	<u>YNP</u> <u>B-TNF</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>0</u> <u>0</u>	<u>2</u> <u>1</u>	<u>0</u> <u>1</u>	<u>0</u> <u>0</u>	<u>4</u>
<u>Washburn #1</u>	<u>YNP</u>	<u>0</u>	<u>2</u>	<u>8</u>	<u>2</u>	<u>7</u>	<u>6</u>	<u>0</u>	<u>25</u>
<u>Washburn #2</u>	<u>YNP</u>	<u>0</u>	<u>1</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>4</u>	<u>0</u>	<u>12</u>
<u>Primary Conservation Area</u>	<u>All</u>	<u>24</u>	<u>67</u>	<u>161</u>	<u>28</u>	<u>117</u>	<u>168</u>	<u>28</u>	<u>593</u>

¹ Abbreviations for administrative units: B-DNF = Beaverhead-Deerlodge National Forest, B-TNF = Bridger-Teton National Forest, C-TNF = Caribou-Targhee National Forest, CNF = Custer National Forest, GNF = Gallatin National Forest, GTNP = Grand Teton National Park, SNF = Shoshone National Forest, WG&F = Wyoming Game and Fish, YNP = Yellowstone National Park.

² Single permitted recreation residences are classified as other developed sites in this table.

³ Campgrounds with trailheads are sometimes combined and treated as single developed sites.

⁴ Includes developed recreation sites, as well as community infrastructure sites, dams, and other miscellaneous facilities.

⁵ Includes mining claims with plans of operation. Currently, not all sites have active projects.

Table 3. Developed sites (type and name) comprising the 1998 baseline per Bear Management Subunit inside the PCA.

<u>Bear Management subunit</u>	<u>Admin Unit</u>	<u>Name and type of developed sites</u>
<u>Bechler/Teton #1</u>	<u>CTNF</u>	<u>Developed Campgrounds:</u> Cave Falls. <u>Trailheads:</u> Coyote Meadows, Hominy Peak, S. Boone Creek, Fish Lake, Cascade Creek. <u>Major Developed Sites:</u> Loll Scout Camp, Idaho Youth Services Camp. <u>Administrative or Maintenance Sites:</u> Squirrel Meadows Guard Station/Cabin, Porcupine Guard Station, Badger Creek Seismograph Site, and Squirrel Meadows GS/WY Game & Fish Cabin. <u>Other Developed Sites:</u> Grassy Lake Dam, Tillery Lake Dam, Indian Lake Dam, Bergman Res. Dam, Loon Lake Disperse sites, Horseshoe Lake Disperse sites, Porcupine Creek Disperse sites, Gravel Pit/Target Range, Boone Creek Disperse Sites, Tillery Lake O&G Camp, Calf Creek O&G Camp, Bergman O&G Camp, Granite Creek Cow Camp, Poacher's TH, Indian Meadows TH, McRenolds Res. TH/Wildlife Viewing Area/Dam.
	<u>YNP</u>	<u>Trailheads:</u> 9K1 and Cave Falls. <u>Administrative or Maintenance Sites:</u> South Entrance and Bechler Ranger Stations. <u>Other Developed Sites:</u> Union Falls and Snake River picnic areas.
	<u>GTNP</u>	<u>Developed Campgrounds:</u> Grassy Lake Road campsites (8 individual car camping developed sites). <u>Trailheads:</u> Glade Creek, Lower Berry Creek, Flagg Canyon. <u>Major Developed Sites:</u> Flagg Ranch (lodge, cabins and campground including remote cistern and sewage treatment plant sites). <u>Administrative or Maintenance Sites:</u> Flagg Ranch Ranger Station, employee housing, maintenance yard, Snake River pit road construction staging area. <u>Other Developed Sites:</u> 3 Backcountry cabins (Upper Berry, Lower Berry, and Moose Basin), 5 Backcountry developed campsites (Berry Designated Horse Camp, Jackson Lake designated campsites (1 group, 3 individual)), 2 boat launches (Flagg Ranch, Yellowstone South Entrance.)
<u>Boulder/Slough #1</u>	<u>CNF</u>	<u>Trailheads:</u> Goose Lake/Grasshopper Glacier (administered by Gallatin National Forest). <u>Plans of Operation:</u> East Iron Mtn Beartooth Plateau 1, East Iron Mtn Beartooth Plateau 2, Iron Mountain Idaho Construction Metal, Crescent Creek Pan Palladium, Crescent Creek Chromium Corp America, and Crescent Creek Beartooth Platinum.
	<u>GNF</u>	<u>Developed Campgrounds:</u> Hicks Park. <u>Trailheads:</u> Upsidedown Creek, Independence, Sheep Creek, Copper Creek, Bridge Creek, Box Canyon. <u>Administrative or Maintenance Sites:</u> Box Canyon. <u>Other Developed Sites:</u> 2 recreation residences (Rasnick and Mandeville), Independence Mine Site (no plan of operations). <u>Plans of Operation:</u> 2 (Carolyn and Cray)
<u>Boulder/Slough #2</u>	<u>GNF</u>	<u>Administrative or Maintenance Sites:</u> Slough Creek and Buffalo Fork Cabins.
	<u>YNP</u>	<u>Developed Campgrounds:</u> Slough Creek. <u>Trailheads:</u> Specimen ridge, Slough Creek, and the Lamar Ford. <u>Administrative or Maintenance Sites:</u> Elk Tongue and Lower Slough patrol cabins. <u>Other Developed Sites:</u> Yellowstone River picnic area.
<u>Buffalo/Spread Creek #1</u>	<u>BTNF</u>	<u>Developed Campgrounds:</u> Pacific Creek CG/TH. <u>Trailheads:</u> Colter Dump. <u>Other Developed Sites:</u> Teton Horseback Adventures, Shoal Creek Outfitters Base Camp
	<u>GTNP</u>	<u>Trailheads:</u> Grand View Point, Two Ocean Lake, Christian Pond, Arizona Creek #1, Pilgrim Creek, Arizona Lake, Arizona Creek #2. <u>Major Developed Sites:</u> Moran Entrance Station housing, Jackson Lake housing. <u>Administrative or Maintenance Sites:</u> Moran Entrance Ranger Station, Jackson Lake Ranger Station. <u>Other Developed Sites:</u> Moran Post Office, Moran School, Colter Bay storage/staging area.
<u>Buffalo/Spread Creek #2</u>	<u>BTNF</u>	<u>Summer Home Complex:</u> Turpin Meadows. <u>Developed Campgrounds:</u> Box Creek CG/TH, Hatchet, Turpin Meadows, and Angles CG/TH. <u>Trailheads:</u> Turpin Meadows, Lava Creek, Clear Creek. <u>Major Developed Sites:</u> Heart Six Ranch, Turpin Meadows Ranch, and Togwotee Lodge. <u>Administrative or Maintenance Sites:</u> Buffalo Ranger District Office, Buffalo Ranger District Compound (Includes a gravel pit), Enos Lake Patrol Cabin, Nowlin Meadows Patrol Cabin, Hatchet administrative site. <u>Other Developed Sites:</u> UW Forestry Walk VIS, Four Mile Picnic Area, Lost Lake Info Station, Togwotee Overlook, Historic ranger station. <u>Plans of Operation:</u> 1 gravel pit
<u>Crandall/Sunlight #1</u>	<u>SNF</u>	<u>Developed Campgrounds:</u> Beartooth and Island Lake. <u>Trailheads:</u> Beartooth Lake, Island Lake, Clay Butte, Muddy Creek, Morrison Jeep. <u>Major Developed Sites:</u> The Top of the World Store complex. <u>Administrative or Maintenance Sites:</u> YNP highway maintenance site (which includes 2 summer residences). <u>Other Developed Sites:</u> Island Lake Boat Ramp, Beartooth Lake Boat Ramp, Clay Butte Lookout, Pilot/Index Overlook, and Beartooth Lake Picnic Area.
	<u>GNF</u>	<u>Developed Campgrounds:</u> Chief Joseph and Ovis Lake Road Camp. <u>Trailheads:</u> Broadwater, Clarks Fork Foot Trailhead. <u>Other Developed Sites:</u> Arbor Day Watchable Wildlife site, Kersey Lake rental cabin and boat dock, Round Lake rental cabin/warming hut, Clarks Fork fishing platform and interpretive exhibit, 1 recreation residence (summer home).

<u>Bear Management subunit</u>	<u>Admin Unit</u>	<u>Name and type of developed sites</u>
<u>Crandall/Sunlight #2</u>	<u>SNF</u>	Developed Campgrounds: Fox Creek, Lake Creek, Hunter Peak, Crazy Creek and Lily Lake Campsites. Trailheads: Pilot Creek, Clarks Fork, North Crandall and Crazy Creek. Major Developed Sites: K-Z Lodge. Administrative or Maintenance Sites: Crandall admin site (2 residences, office, shop and bunkhouse), Crandall Game & Fish Cabin. Other Developed Sites: Crandall waste transfer site, Clarks Fork Overlook, Lily Lake Boat ramp, Swamp Lake Boat Ramp, and Reef Creek Picnic Area. Plan of Operations: Commercial sale gravel pit at Ghost Creek for Beartooth Hwy Construction.
	<u>GNF</u>	No Developed Sites
<u>Crandall/Sunlight #3</u>	<u>SNF</u>	Developed Campgrounds: Dead Indian, Little Sunlight. Trailheads: Little Sunlight trailhead and corrals, Dead Indian and Hoodoo Basin/Lamar. Administrative or Maintenance Sites: Sunlight Ranger Station. Other Developed Sites: Sunlight Picnic Area, Sunlight Bridge Overlook.
	<u>WG&F</u>	Developed Campgrounds: Sunlight Unit Campground #1, Sunlight Unit Campground #2. Administrative or Maintenance Sites: Sunlight Unit Complex.
<u>Firehole/Hayden #1</u>	<u>YNP</u>	Developed Campgrounds: Madison Junction. Trailheads: Nez Perce Cr, 7-Mile Bridge, Fountain freight road, Lone Star, and OK5. Major Developed Sites: Old Faithful. Administrative or Maintenance Sites: Norris employee/govt area, Norris hot mix plant, Madison employee/govt site, the Mesa Pit site; and the Mary Lake and Nez Perce patrol cabins. Other Developed Sites: Norris, Gibbon Meadows, Tuft Cliffs, Gibbon Falls, Madison, Buffalo Ford, Cascade, Firehole Canyon, Nez Perce, Feather Lake, Goose Lake, Excelsior picnic areas, Norris Geyser Basin Museum.
<u>Firehole/Hayden #2</u>	<u>YNP</u>	Developed Campgrounds: Bridge Bay. Trailheads: Divide, Beach Lake, and DeLacy Creek. Major Developed Sites: Lake. Administrative or Maintenance Sites: Lake gov't area and the Bridge Bay Marina. Other Developed Sites: Gull Point picnic area, Sand Point picnic area, 6 additional lakeshore developed picnic areas.
<u>Gallatin #1</u>	<u>YNP</u>	Trailheads: WK2, WK3, and WK6. Administrative or Maintenance Sites: Daly Creek patrol cabin.
<u>Gallatin #2</u>	<u>YNP</u>	Developed Campgrounds: Mammoth and Indian Creek. Trailheads: Rescue Creek, Lava Creek, Golden Gate, Bunsen Peak, and Fawn Pass. Major Developed Sites: Mammoth. Administrative or Maintenance Sites: Stephens Creek area, Gardiner gravel crusher/asphalt site, Xanterra headquarters site in Gardiner, Lower Mammoth employee housing area, YCC employee housing area, Indian Creek pit site, Deaf Jim patrol cabin, North Entrance Ranger Station, Fawn Pass and Winter Creek patrol cabins, Bunsen Peak radio repeater site, and Mt Holmes fire lookout. Other Developed Sites: Sheepeater picnic area.
<u>Gallatin #3</u>	<u>GNF</u>	Developed Campgrounds: Tom Miner, Red Cliff. Trailheads: Buffalo Horn, Sphinx Creek, Elkhorn, Wilson Draw, Tom Miner, Tom Miner Horse Facilities, Sunlight, Twin Cabin, Teepee Creek (Bozeman Ranger district). Other Developed Sites: Corwin Spring fishing and boat access, Yankee Jim fishing access and boat ramp, Elkhorn River Ford (horse access), Windy Pass rental cabin, Yankee Jim picnic area, Porcupine Creek recreation residence.
	<u>YNP</u>	No Developed Sites
<u>Hellroaring/Bear #1</u>	<u>GNF</u>	Developed Campgrounds: Eagle Creek campground, Eagle Creek horse facility, Bear Creek, Timber Camp, and Canyon. Trailheads: Cedar Creek, LaDuke, Little Trail Creek, Pine Creek, Palmer Mt. (3 developed trailheads), North Fork of Bear Creek, Joe Brown, Bear Creek, Sixmile. Administrative or Maintenance Sites: OTO Ranch, Blanding Station house and barn (horse facility), Hayes/McPherson property. Other Developed Sites: LaDuke picnic area, LaDuke bighorn sheep watchable wildlife site, 1 recreation cabin, Lonesome Pond camping area, McConnell fishing and boat access, Watchable Wildlife-Big Game Winter Range, Watchable Wildlife Site-fish. Plans of Operation: total 8; Counts (1), Mineral Hill Mine (3), and (2), Independence (1), Livingston (1).
	<u>YNP</u>	Trailheads: Crevice. Other Developed Sites: Crevice Cabin
<u>Hellroaring/Bear #2</u>	<u>GNF</u>	Trailheads: West Fork Mill Creek. Administrative or Maintenance Sites: Hellroaring Cabin and tack shed.
	<u>YNP</u>	Administrative or Maintenance Sites: Buffalo Plateau and Hellroaring patrol cabins.
<u>Henrys Lake #1</u>	<u>CTNF</u>	Summer Home Complexes: Big Springs SHA North, Big Springs SHA South. Developed Campgrounds: Big Springs, Flat Rock, and Upper Coffee Pot. Trailheads: Howard Creek. Administrative or Maintenance Sites: Sawtelle Peak Electronics Site, Keg Springs Seismograph Site, Big Springs Fire Tower. Other Developed Sites: Big Springs Interpretive Trail, Big Springs Bridge Fish Viewing, Johnny Sack Cabin, Big Springs Boat Ramp, Big Springs Snow Park/Warming Hut, Macks Inn Water Treatment Plant, Macks Inn Substation, County/State Sheds Complex, FAA Maintenance Sheds, Cold Springs Substation. Plans of Operation: Willow Creek Mining Site.

<u>Bear Management subunit</u>	<u>Admin Unit</u>	<u>Name and type of developed sites</u>
<u>Henry's Lake #2</u>	<u>CTNF</u>	<u>Trailheads:</u> Targhee Creek. <u>Administrative or Maintenance Sites:</u> Defosses Cabin. <u>Other Developed Sites:</u> Howard Springs Family Picnic/Wayside Area. <u>Plans of Operation:</u> Turquoise Mountain Mine
	<u>GNF</u>	<u>Summer Home Complexes:</u> Clark Springs (8 lots), Rumbaugh Ridge (5 lots), Romsett (9 lots), Lonsomehurst A, Lonsomehurst B. <u>Developed Campgrounds:</u> Lonsomehurst, Cherry Creek, Spring Creek. <u>Trailheads:</u> Basin, Watkins Creek, Targhee Pass, West Denny Creek. <u>Other Developed Sites:</u> Basin rental cabin, Lonsomehurst boat ramp.
<u>Hilgard #1</u>	<u>BDNF</u>	<u>Administrative or Maintenance Sites:</u> McAtee Cabin, Indian Creek Cow Camp, and Shedhorn Cow Camps.
	<u>GNF</u>	<u>Trailheads:</u> Upper Buck Ridge, Cinnamon, Meadow Creek Cutoff, Cache Creek, Lower Buck Ridge, Taylor Falls/Lightning Creek. <u>Major Developed Sites:</u> Covered Wagon Ranch. <u>(Administrative or Maintenance Sites:</u> Cinnamon Cabin, Cinnamon Mountain Lookout. <u>Other Developed Sites:</u> Yellow Mule Rental Cabin, Buck Creek Recreation Residence.
<u>Hilgard #2</u>	<u>GNF</u>	<u>Trailheads:</u> Eldridge, Wapiti, Lower Wapiti/Albino Lake, Sage/Elkhorn. <u>Administrative or Maintenance Sites:</u> Eldridge Cabin. <u>Other Developed Sites:</u> Wapiti rental cabin.
	<u>YNP</u>	<u>Trailheads:</u> WK1, WK5, and WK4.
<u>Lamar #1</u>	<u>YNP</u>	<u>Developed Campgrounds:</u> Pebble Creek. <u>Trailheads:</u> 3K1, 3K3, 3K4, Trout Lake, and Lamar. <u>Administrative or Maintenance Sites:</u> The Northeast Entrance Ranger Station and supporting govt operation, the Lamar Buffalo Ranch Ranger Station/Institute, and the Cache Creek patrol cabin. <u>Other Developed Sites:</u> Warm Creek picnic area, Buffalo Ranch/Lamar River picnic area.
	<u>GNF</u>	<u>Developed Campgrounds:</u> Soda Butte, Colter. <u>Trailheads:</u> Republic Creek; Lady of Lake (lower) and parking lot, Lady of Lake 1, Woody Pass, Daisy Pass, Lost Wolverine. <u>Administrative or Maintenance Sites:</u> Cooke City guard station and warehouse, 2 nd Forest Service warehouse, Highway borrow pit, mine tailings repository, old mine buildings at Woody Pass trailhead, mine reclamation pond. <u>Other Developed Sites:</u> Cooke City dump (SUP), Beartooth Highway Interpretive site (near Silver Gate), and Cooke City burn pile. <u>Plans of Operation:</u> 6, all New World Mine.
	<u>CNF</u>	<u>Trailheads:</u> Abundance Lake/upper Stillwater (Custer admin by Gallatin). <u>Plans of Operation:</u> Cray Placer and New World Mine. (note: this TH is in the Gallatin coverage).
	<u>SNF</u>	<u>No Developed Sites</u>
<u>Lamar #2</u>	<u>YNP</u>	<u>Administrative or Maintenance Sites:</u> Calfee Creek, Upper Miller Creek, Cold Creek, and Lamar Mountain patrol cabins.
<u>Madison #1</u>	<u>GNF</u>	<u>Campgrounds:</u> Cabin Creek. <u>Trailheads:</u> Potamogeton, West Fork Beaver Creek, Whit's Lake, Johnson Lake, Tepee Creek (Hebgen RD), Red Canyon, Kirkwood, Cub Creek, Fir Ridge, Hebgen Mountain, Cabin Creek. <u>Administrative or Maintenance Sites:</u> Building Destruction Site. <u>Other Developed Sites:</u> gravel pit, Tepee Creek snowmobile parking area, Watchable Wildlife Site at Beaver Creek, Beaver Creek rental cabin, Cabin Creek rental cabin, Hebgen Dam fishing access and admin site, Yellowstone Holiday picnic area, and North Shore picnic area.
	<u>YNP</u>	<u>No Developed Sites.</u>
<u>Madison #2</u>	<u>GNF</u>	<u>Summer Home Complexes:</u> California (2 lots), Lakeshore A (6 lots), Lakeshore B (8 lots), Lakeshore C (3 lots), Lakeshore E (19 lots), Baker's Hole (3 lots), Railroad (3 lots), Horse Butte (2 lots). <u>Developed Campgrounds:</u> Rainbow Point, Baker's Hole (includes watchable wildlife site). <u>Trailheads:</u> Rendezvous Ski Trail (includes 2 cabins and a biathlon range). <u>Major Developed Sites:</u> Madison Arm Resort. <u>Administrative or Maintenance Sites:</u> West Yellowstone Ranger Station, WY Interagency Fire Center (Includes crew quarters IAFCC, fire control center and mixing site), Bison capture facility (SUP), Game Warden Residence. <u>Other Developed Sites:</u> Solid Waste Transfer Station (SUP), Madison picnic area/boat ramp, Rainbow Point picnic area/boat ramp, Horse Butte Lookout/Picnic Site, South Plateau shooting range.
	<u>YNP</u>	<u>Trailhead:</u> Cable Car. <u>Administrative or Maintenance Sites:</u> West Entrance Ranger Station/housing complex, and the Cougar Cr patrol cabin. <u>Other Developed Sites:</u> Madison River picnic area.
<u>Pelican/Clear #1</u>	<u>YNP</u>	<u>Trailheads:</u> Lower Falls and Sour Creek.
<u>Pelican/Clear #2</u>	<u>YNP</u>	<u>Developed Campgrounds:</u> Fishing Bridge RV Park. <u>Trailheads:</u> Pelican Valley, 9-mile, Clear Creek, and Avalanche Peak. <u>Major Developed Sites:</u> Fishing Bridge store/gas station/employee housing/museum. <u>Administrative or Maintenance Sites:</u> East Gate Ranger Station/housing complex, the Fern Lake, Pelican Cone, and Pelican Springs patrol cabins. <u>Other Developed Sites:</u> Steamboat Point, Lake Butte, and Sylvan Lake picnic areas.
<u>Plateau #1</u>	<u>CTNF</u>	<u>Summer Home Complexes:</u> Moose Creek SHA. <u>Other Developed Sites:</u> Lucky Dog Lodge/TNC/SUP

<u>Bear Management subunit</u>	<u>Admin Unit</u>	<u>Name and type of developed sites</u>
	<u>GNF</u>	<u>No Developed Sites.</u>
	<u>YNP</u>	<u>Administrative or Maintenance Sites:</u> South Riverside patrol cabin.
<u>Plateau #2</u>	<u>CTNF</u>	<u>Trailheads:</u> Moose Creek/Trail Canyon. <u>Administrative or Maintenance Sites:</u> Warm River Springs GS/Cabin. <u>Other Developed Sites:</u> Snow Creek Pond Disperse sites
	<u>YNP</u>	<u>Administrative or Maintenance Sites:</u> Cove, Outlet, 3 Rivers, and Buffalo Lake patrol cabins.
<u>Shoshone #1</u>	<u>SNF</u>	<u>Summer Home Complexes:</u> Moss Creek (7 lots). <u>Developed Campgrounds:</u> Newton Creek and Rex Hale. <u>Other Developed Sites:</u> One summer home across from Newton Creek Campground (isolated lot E), the Fire Memorial, Robbers Roost Cabin (Cow Camp), Newton Springs Picnic Area, Blackwater Pond Picnic/Fishing Area, Palisades Interpretive Site.
<u>Shoshone #2</u>	<u>SNF</u>	<u>Trailheads:</u> Blackwater. <u>Major Developed Sites:</u> Blackwater Lodge.
<u>Shoshone #3</u>	<u>SNF</u>	<u>Summer Home Complexes:</u> Eagle Creek (8 lots), Kitty Creek (14 lots). <u>Trailheads:</u> Kitty Creek. <u>Major Developed Sites:</u> Buffalo Bill Boy Scout Camp.
<u>Shoshone #4</u>	<u>SNF</u>	<u>Summer Home Complexes:</u> Grinnell Creek (2 lots), Pahaska (2 lots), Mormon Creek (13 lots). <u>Developed Campgrounds:</u> Eagle Creek, Three Mile, Sleeping Giant. <u>Trailheads:</u> Fishhawk North, Eagle Creek, and Pahaska. <u>Major Developed Sites:</u> Elephant Head Lodge, Absaroka Mountain Lodge, Shoshone Lodge, Cross Sabers Lodge, Goff Creek Lodge, and Pahaska Tepee. <u>Other Developed Sites:</u> Sleeping Giant ski area, Wyoming Game and Fish cabin, Wayfarers Chapel, 1 summer home near Game and Fish cabin (50 Mile, isolated lot C), summer home lot A, summer home lot B (both lots are across from Eagle Creek summer home complex), West Gateway Interpretive Site, and Cody Peak Interpretive Site.
<u>South Absaroka #1</u>	<u>SNF</u>	<u>No Developed Sites.</u>
<u>South Absaroka #2</u>	<u>SNF</u>	<u>Administrative or Maintenance Sites:</u> Venus Creek Cabin, Needle Creek Administrative site (with 2 cabins).
<u>South Absaroka #3</u>	<u>SNF</u>	<u>Summer Home Complexes:</u> Pinnacles (20 lots). <u>Developed Campgrounds:</u> Brooks Lake, Pinnacles (23) and the dispersed campground near Brooks Lake Campground (23 sites). <u>Trailheads:</u> Long Creek/Dunoir, Brooks Lake, Pinnacles Trailhead, and Bonneville. <u>Major Developed Sites:</u> Brooks Lake Lodge. <u>Administrative or Maintenance Sites:</u> Wolf Creek. <u>Other Developed Sites:</u> Brooks Lake boat ramp, transfer corral/Bud Betts, Transfer Corral/Paul Gilroy, Transfer Corral/Bridger Teton Outfitter on Brooks Lake Creek, Winter Cabin/warming hut.
<u>Thorofare #1</u>	<u>BTNF</u>	<u>No Developed Sites.</u>
	<u>YNP</u>	<u>Administrative or Maintenance Sites:</u> Cabin Creek, Howell Creek, Trail Creek, and Thorofare patrol cabins.
<u>Thorofare #2</u>	<u>BTNF</u>	<u>Administrative or Maintenance Sites:</u> Hawk's Rest patrol cabin (USFS) , WY G&F patrol cabin.
	<u>YNP</u>	<u>No Developed Sites.</u>
<u>Two Ocean/Lake #1</u>	<u>YNP</u>	<u>Developed Campgrounds:</u> Lewis Lake and Grant Village. <u>Trailheads:</u> Shoshone Lake, Heart Lake, and Riddle Lake. <u>Major Developed Sites:</u> Grant Village. <u>Administrative or Maintenance Sites:</u> Heart Lake and Harebell patrol cabins, and Mt Sheridan fire lookout. <u>Other Developed Sites:</u> West Thumb warming hut, and the Frank Island picnic area.
	<u>BTNF</u>	<u>Developed Campgrounds:</u> Sheffield Creek Campground/Trailhead.
	<u>GTNP</u>	<u>Trailheads:</u> Sheffield Creek. <u>Other Developed Sites:</u> Snake River Picnic Area.
<u>Two Ocean/Lake #2</u>	<u>YNP</u>	<u>Administrative or Maintenance Sites:</u> Peale Island and Fox Creek patrol cabins.
	<u>BTNF</u>	<u>Administrative or Maintenance Sites:</u> Fox Park Patrol Cabin. <u>Other Developed Sites:</u> Huckleberry Lookout Historic Site (straddles Two Ocean Lake #2 and Buffalo/Spread Creek #1 subunits).
<u>Washburn #1</u>	<u>YNP</u>	<u>Developed Campgrounds:</u> Tower and Canyon Village. <u>Trailheads:</u> Lower Blacktail, Upper Blacktail, Blacktail Plateau Rd/ski trail, Hellroaring, Wraith Falls, Mount Washburn, Dunraven Pass, and Howard Eaton. <u>Major Developed Sites:</u> Canyon Village and the Roosevelt Lodge complex. <u>Administrative or Maintenance Sites:</u> Frog Rock and Grebe Lake pits, Tower Ranger Station (Includes maintenance building and employee housing), and the Upper Blacktail, Lower Blacktail, and Observation Park patrol cabins; and the Mount Washburn fire lookout. <u>Other Developed Sites:</u> the Lava Creek, Antelope Creek, Dunraven Pass, Dunraven, and Howard Eaton picnic areas; and the Yancey's Hole cookout site.
<u>Washburn #2</u>	<u>YNP</u>	<u>Developed Campgrounds:</u> Norris. <u>Trailheads:</u> Bighorn Pass, Winter Creek, Solfatara Creek, Grizzly, Grebe, and Ice Lakes. <u>Administrative or Maintenance Sites:</u> Ice Lake gravel pit. <u>Other Developed Sites:</u> Apollinaris Springs, Beaver Lake, Norris Junction, and Virginia Meadows picnic areas.

Table 5. Number of commercial livestock grazing allotments and sheep animal months inside the Yellowstone Primary Conservation Area in 1998.

<u>Administrative unit</u>	<u>Cattle allotments</u>		<u>Sheep allotments</u>		<u>Sheep AMs</u>
	<u>Active</u>	<u>Vacant</u>	<u>Active</u>	<u>Vacant</u>	
<u>Beaverhead-Deerlodge NF</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Bridger-Teton NF</u>	<u>9</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Caribou-Targhee NF</u>	<u>11</u>	<u>1</u>	<u>7</u>	<u>4</u>	<u>14,163</u>
<u>Custer NF</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Gallatin NF</u>	<u>23</u>	<u>9</u>	<u>2</u>	<u>3</u>	<u>3,540</u>
<u>Shoshone NF</u>	<u>24</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>5,387</u>
<u>Grand Teton NP</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Total in PCA</u>	<u>71</u>	<u>12</u>	<u>11</u>	<u>7</u>	<u>23,090</u>

Habitat Value of Secure Habitats

The decision to set the baseline for secure habitat at the levels existing in 1998 required an evaluation of the relative habitat quality of the existing secure habitats. Secure habitat should meet the seasonal habitat needs of the bear and should be representative of seasonal habitats in the entire analysis area (IGBC 1998). The Yellowstone Grizzly Bear Cumulative Effects Model (CEM) was used to compare the average habitat value of the secure habitat to that for the entire subunit for each of six categories (Table 7). These averages were not compared statistically as secure habitats in each subunit showed similar proportions of each category as compared to the subunit average. Habitat value was used rather than habitat effectiveness so that the presence or absence of human activities did not influence the comparison. Had existing secure habitats shown lower habitat value than the subunit average, it might have been necessary to recommend closing roads to create appropriate seasonal secure habitat.

It should be noted that habitat effectiveness, which is habitat value reduced by the presence of human activities, is much higher in secure habitats than non-secure habitats. Motorized access routes reduce habitat values more than any other human activity. Secure habitats do not contain motorized access routes.

Table 7. Percent of 6 habitat value categories in each of 40 Greater Yellowstone Area grizzly bear management subunits and percent of the 6 habitat value categories in secure habitat in each subunit.[±]

[±] Habitat value or habitat productivity as measured by the Yellowstone grizzly bear cumulative effects model (CEM) (Mattson et al. in press). Large lakes >1 mi² were excluded from this analysis.

Table 7 (continued). Percent of 6 habitat value categories in each of 40 Greater Yellowstone Area grizzly bear management subunits and percent of the 6 habitat value categories in secure habitat in each subunit.¹

¹—Habitat value or habitat productivity as measured by the Yellowstone grizzly bear cumulative effects model (CEM) (Mattson et al. in press). Large lakes >1 mi² were excluded from this analysis.

