

## **Appendix E. Habitat Standards and Monitoring Protocol**

### **Introduction**

The 1998 baseline reflects the best available habitat measures representing ground conditions inside the Primary Conservation Area (PCA) as of 1998. Habitat standards identified in the Conservation Strategy pertain to secure habitat, developed sites, and livestock grazing allotments. The standards demand that all three of these habitat 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 the 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 as formalized in the Conservation Strategy. 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 become 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 corrections made to the baseline will be documented, tracked, and reported in the Interagency Grizzly Bear Study Team (IGBST) annual reports. 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.

## Secure Habitat and Motorized Access Route Density

Secure habitat serves as a surrogate measure of human presence or absence on the landscape. For the purposes of the Conservation Strategy, sSecure habitat is defined as any contiguous area greater than 10 acres in size and more than 500 meters (m) from an open or gated motorized route. 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. The best estimates of secure habitat levels that existed per subunit in 1998 constitute the 1998 secure habitat baseline (Table 1). Measurement of secure habitat is based on configuration of motorized routes. Routes that are open to the public at any time during the non-denning season when grizzly bears are active (March 1- November 30) detract from secure habitat. Likewise, gated routes that are closed to the public but remain accessible to administrative personnel also detract from secure habitat. Decommissioned routes that effectively prohibit motorized use by the public and administrative personnel do not detract from secure habitat.

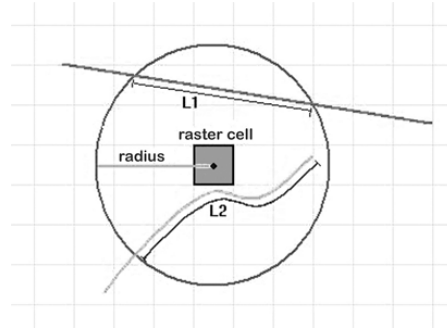
The density of motorized routes on the landscape is monitored inside the PCA, however, there are no mandatory standards for motorized route density. Monitoring protocol requires that open motorized access route density (OMARD) and total motorized access route density (TMARD) inside the PCA be ~~measured,~~ monitored, and ~~compared-reported~~ against 1998 levels annually.

~~Secure habitat is any contiguous area greater than 10 acres in size and more than 500 meters (m) from an open or gated motorized route.~~ OMARD ~~is a~~ measures ~~of~~ the density of ~~all~~ 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. Hence,

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routes that are gated to the public year-round and accessible only to administrative staff contribute to TMARD but do not count toward OMARD. OMARD is reported at levels  $> 1.6$  kilometer (km) per square kilometer (sq km) ( $> 1$  mile (mi) per square mile (sq mi)) while TMARD is reported at levels  $> 3.2$  km per sq km ( $> 2$  mi per sq mi). 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 into the ArcGIS software, which led to improved estimates for the 1998 baseline values of motorized route density. The new baseline measurements provide a more accurate and realistic estimate of road densities and do not reflect changes in the configuration of 1998 motorized routes. Instead, only the method from which road density is calculated has changed. Route density values are stored in a 30 m raster format and cell values correspond to densities within a 1.6 sq km (1 sq mi) moving window. 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 m (length of single cell) to get the total length of motorized routes within the moving window. This method tended to under-estimate route density in some cases, and over-estimate in others. The current algorithm instead accounts for all route segments within a cell and accurately measures the total length of routes intersecting the 1.6 sq km (1 sq mi) moving window based on actual line geometry (Figure 1).



**Figure 1** *Measurement of route density based on total length of routes within 1.6 sq km (1 sq mi) 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.

#### *Exceptions to the 1998 Baseline for Secure Habitat*

Three subunits, Gallatin #3, Henrys Lake #2, and Madison #2, were targeted in previous versions of the Conservation Strategy as needing improvement in secure habitat with respect to 1998 levels. The specific areas with potential for improvement identified in these three subunits fall within the [Custer](#) Gallatin National Forest boundary and hence, the quantity and timing of improvements was to be determined by the Gallatin National Forest Travel Management Plan (TMP). A primary factor contributing to impoverished secure habitat levels in these three subunits was motorized access on private land inholdings. Since 1998, the Gallatin National Forest conducted several land exchanges under the *Gallatin Range Consolidation and Protection Act* in areas inside and outside the PCA. These land exchanges resulted in the acquisition of formerly private parcels which are now administered as part of the Gallatin

National Forest. With implementation of the 2006 Gallatin TMP, many roads inherited from these exchanges have been permanently decommissioned. Non-system routes that are not maintained by the Forest Service have subsequently been closed, with a high priority given to road decommissions in the three subunits identified as in need of improvement. With full implementation of the Gallatin TMP very near completion, measurable increases in secure habitat with respect to 1998 baseline levels have been realized in the three targeted subunits. Consequently, the Custer Gallatin National Forest has proposed via a Forest Plan Amendment that the improved levels of secure habitat resulting from full implementation of the TMP constitute new baseline levels for these 3 subunits. This amendment effectively raises the bar for baseline conditions in the 3 identified subunits. These enhanced levels of secure habitat for the 3 targeted subunits will constitute new measures against which future change will be made (Table 1).

#### ~~Protocol for measuring Open Motorized Road Density (OMARD)~~

~~Previous to this version of the Conservation Strategy, OMARD was measured for two distinct non-denning grizzly bear seasons; Season 1 (March 1—July 15) and Season 2 (July 16—November 30). However, the timing of seasonal route closures on National Forest lands throughout the ecosystem does not typically correspond with grizzly bear seasons. Technically, if a motorized route is open to the public for even one day in a given season, the road contributes to that seasonal measurement of OMARD. For most motorized routes on Forest land, the period open to public motorized use overlaps some portion of both seasons, and hence, there is very little measurable difference between seasonal route densities. For this reason, seasonal differences in OMARD are no longer tracked and reported. Instead, a single measurement of OMARD for the entire non-denning season of the year (March 1—November 30) is to be measured, monitored, and reported annually per bear management subunit.~~

**Comment [LLA-1]:** This section can be deleted since the idea that the 2007 CS required seasonal monitoring of OMARD is a misnomer. Nowhere in the 2007 CS is season 1 and season 2 OMARD mentioned (including appendices). The specified protocol was to monitor OMARD only; however, for some unknown reason, S1 and S2 was monitored and reported since 2007.

#### *Cumulative Effects Model*

With previous versions of the Conservation Strategy, the Cumulative Effects Model (CEM) was the requisite tool for estimating effectiveness and quality of habitat when evaluating project impacts. With this version of the Conservation Strategy the CEM will no longer serve as the requisite tool for evaluating impacts of competing project scenarios. Instead, the current tool for conducting project impact analyses is the Motorized Access Model which was established concurrent with the CEM.

The CEM was a computerized model designed in stages during the 1980s and 1990s as a tool for evaluating relative change in grizzly bear habitat quality due to human activities. The model led to construction of useful spatial data layers reflecting various habitat components and delineating management boundaries relevant for monitoring secure habitat. Some of these layers were subsequently incorporated into the Motorized Access Model. The CEM was considered the best available science at the time; however, the utility of the CEM has since been questioned and is no longer the endorsed protocol for reporting habitat metrics. The rationale for this change in protocol is many-fold, least not is the inability to verify or ground truth in a statistically defensible manner the validity of numerous numerical coefficients residing at the core of the model (Boyce *et al.* 2001, Borkowski 2006). Furthermore, the process for developing vegetation coefficients described by Mattson *et al.* (2004) proves to be highly technical and complex, making it difficult to interpret and implement. Therefore, updating the vast array of coefficients with any reasonable degree of reliability poses a daunting challenge as the grizzly bear population expands, broad landscape changes occur, or new information becomes available. In addition, many of the CEM geospatial datasets are approaching three decades in age and there is no operative mechanism in place to systematically update all existing data layers to reflect current conditions. Collectively, neither the vegetation spatial data nor the multitude of coefficients have proven accurate enough for site-specific project analyses, as past modeling efforts have shown (Dixon 1997). Finally, the format of GIS datasets designed to interface with the CEM are now obsolete and the program code would need to be completely re-vamped to accommodate current geospatial data formats. This is especially problematic since few members of the CEM technical modeling team remain employed in the GYE and there is no technical documentation of the underlying source code for the CEM algorithms (Dixon 1997). In short, the CEM is a high maintenance operation that is difficult to execute and interpret. The

Motorized Access Model will instead continue to be used to calculate and monitor secure habitat and motorized route density inside and outside the PCA.

### **Developed Sites on Public Lands**

Developed sites include all sites on public land developed or improved for human use or resource development. Examples of developed sites include, but are not limited to, 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. Table 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 as oil and gas leases and mining plans 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. It is important to note that one mining claim does not necessarily mean a potential for one operating plan. In 1998, approximately 1,354 mining claims associated with 28 plans of operation had been filed throughout nine BMU subunits; however, no oil and gas leases existed inside the PCA. Claims are often staked around known mineral deposits to protect the original claim and a single operating plan can sometimes encompass hundreds of claims. Furthermore, a number of filed claims, upon detailed exploration, do not have enough mineralization to be economically developed and consequently are never acted upon. Approved operating plans associated with mining claims or claim groups are included as a separate category in the developed site baseline (Table 2). A detailed itemized list of all developed sites (names and types) compromising 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.

In 1998 there were 101 active or vacant 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 and acreage of active allotments inside the PCA must remain at or below 1998 baseline levels. Combining or dividing existing allotments is allowed as long as net acreage in active allotments does not increase above 1998 levels. Any such use of vacant cattle allotments resulting in an increase in cattle numbers will only be allowed 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.