

WILDLIFE RESPONSES TO MOTORIZED WINTER USE IN YELLOWSTONE NATIONAL PARK

2015 Monitoring Plan December 15, 2014 to March 26, 2015

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Executive Summary

The collection of reliable information is essential for evaluating the effectiveness of management actions designed to minimize potential adverse effects of winter human recreation on wildlife in Yellowstone National Park. During winter 2015¹, we will continue the monitoring program of wildlife responses to motorized vehicles (i.e., snowmobiles, snowcoaches, wheeled vehicles) that was implemented during winter 2003. We will document levels of motorized winter use, distributions of wildlife along winter use road corridors (including on groomed roads), interactions between groups of wildlife and motorized winter vehicles, human behaviors in response to observed groups of wildlife, and an index of wildlife stress in relation to winter road corridors. The crew will use snowmobiles or wheeled vehicles to repeatedly sample three road segments from December 2014 through the end of March 2015. Observers will document the responses of observed groups of bison, elk, coyotes, wolves, moose, bald eagles, fox, bobcat, and trumpeter swans to motorized vehicles and associated human activities.

I. Adaptive Management Approach

Our approach for monitoring wildlife responses to winter recreation in Yellowstone National Park is as follows:

- Define management objectives for the winter use monitoring program with respect to potential effects of management decisions on wildlife;
- Coalesce and integrate information on the effects of winter human use on wildlife from previous monitoring efforts;
- Refine the selection of key response variables that will be measured during future winters to evaluate the potential effects of motorized winter recreation on wildlife;
- Define and refine sampling objectives for the winter use monitoring program with respect to potential effects of management decisions on wildlife;
- Develop, implement, and evaluate sampling and analytical protocols for estimating wildlife responses to motorized vehicles and associated human behaviors during winter;
- Continue to gain sampling design and statistical expertise through collaboration with a statistician;
- Contribute to long-term objectives and a rigorous monitoring program of key vital signs that includes data collection, analytical, and reporting protocols and can be implemented over the long term to assess wildlife responses to motorized winter use;

¹ Throughout the plan, winters are referred to by their ending year. Thus, the winter extending from November 2004 through April 2005 is referred to as winter 2005.

- Communicate our knowledge and discoveries to resource managers, the scientific community, and visiting public by preparing annual reports, manuscripts, educational presentations, and ideas for interpretive exhibits;
- Review the effectiveness of the monitoring program every year and, based on the principles of adaptive management, refine the program as necessary; and
- Recommend changes to motorized winter recreation as part of an adaptive management program to minimize the potential effects of winter motorized use on wildlife in Yellowstone National Park.

III. Approach (Winter 2015)

We will use a single 2-person crew to conduct an observational study that documents levels of motorized winter use, distributions of wildlife along 3 designated winter use road corridors, interactions between groups of wildlife and motorized winter vehicles, human behaviors in response to observed groups of wildlife in relation to winter road corridors where most wildlife-visitor interactions have occurred. The three road corridors that will be monitored include West Yellowstone to Madison Jct., Madison Jct. to Old Faithful, and Madison Jct. to Norris Jct., for a 4-day a week sampling schedule. Training and preparation of technicians for monitoring will occur during December 15-18, 2014. Monitoring efforts will begin during the week of December 22, 2014, and continue until late March 2015, after the closure of roads to the public for winter use.

An additional component would be to have Resource staff trained and available to work with Integrated Pest Management and Habituated Wildlife Management. With Yellowstone winter operations comes a myriad of management issues that involve wildlife in food areas including warming huts, concessions operations, lodging units and garbage storage facilities. Resource staff would be available to respond to habituated wildlife situations, remedy food and garbage storage facilities, and assist in hazing and/or trapping wildlife when necessary. These crews would also record these incidents and maintain a data log for annual record keeping.

IV. Data Collection Methods

This monitoring program is designed to evaluate the potential effects of motorized vehicles and associated human use on wildlife in Yellowstone National Park during winter. It is not designed to assess the potential effects of other forms of winter recreation (e.g., skiing, snow shoeing) on wildlife. Also, it is not directly designed to assess the factors associated with bison use of groomed roads. Other analyses and modeling projects have addressed this issue. The monitoring will generally follow sampling protocols established in 2003, which were based on Hardy (2001). Recommendations from Dr. John Borkowski, a statistician at Montana State University, have been incorporated into the 2015 monitoring protocol. This continuity will enable us to build upon baseline information collected by biologists from the Montana State University and Yellowstone National Park during 1999 to 2014 (Borkowski et al. 2006, White et al. 2009), and compare motorized use and wildlife responses among winters. Monitoring during winter 2015 will result in the accumulation and integration of multiple winters of data regarding the responses of bison and elk to human winter use. The proposed monitoring will also provide data

regarding bison use of groomed roads that can be compared to similar data collected during previous winters by Montana State University (Bjornlie and Garrett 2001, Bruggeman et al. 2006) and other NPS efforts (Jaffe et al. 2002).

The crew will conduct surveys along established roads used by snowmobiles and/or snowcoaches to collect data on wildlife behavior. The following road segments will be repeatedly sampled for wildlife and human use: 1) West Yellowstone to Madison; 2) Madison to Old Faithful; and 3) Madison to Norris. Monitoring of these road segments will provide a sample of areas with low and high intensity human and wildlife use. This information will be useful in assessing the need to sample low-intensity use areas as part of the long-term monitoring program for human winter use.

The 2-person crew based out of Mammoth will sample all road segments (Table 13). For safety purposes, both members of the 2-person crew will sample their assigned road segments together, unless additional safety measures have been arranged.

TABLE 1: WILDLIFE SAMPLING ROAD SEGMENTS

Road Segment	End Point	End Point
Madison to West Yellowstone	West Entrance Station	Madison Junction
Madison to Old Faithful	Madison Junction	Old Faithful
Firehole Canyon Drive	Canyon Drive Entry	Canyon Drive Exit
Norris to Madison	Madison Junction	Norris Junction

While traveling along each road segment, observers may use various pullouts and overlooks (e.g., Biscuit basin) that provide vantages of wildlife in areas that cannot be observed from the main road corridor.

The West Yellowstone to Madison road segment will include surveying along Riverside Drive, and the Madison to Old Faithful road segment will include surveying along Firehole Canyon Drive.

Each crew will determine the order in which their assigned road segments are sampled by choosing a random survey to begin the season. All routes will be surveyed before repeating a given road segment. Monitoring will be conducted between 0700 and 1700 Monday through Thursday.

Surveys of road segments will be conducted by a pair of observers driving snowmobiles at ≤ 50 kilometers (30 miles) per hour. Total time spent conducting the survey will be recorded as a measure of survey effort. Visibility will be categorized as good, fair (i.e., small, patchy areas of low visibility), or poor (i.e., large areas of low visibility within 100 meters [110 yards] of the road). Precipitation will be categorized as none, light rain, heavy rain, light snow, heavy snow, or fog. If conditions or visibility vary substantially along the road segment, then the observers will record the predominant condition for the segment.

The observers will travel along the selected road segment until a wildlife group (≥ 1 animal) is detected with the unaided eye. The observers will stop in a position where they can observe both the animals and the road. This will allow observers to record the presence of motorized vehicles/humans and animal behavior during an interaction. It is important to stop as far as possible from a group of animals so that the group can be observed with minimal influence on their behavior. The observers will record the following information: 1) time of observation; 2) UTM coordinates for the sighting; 3) species (if more than one species is observed at the same location, then the observer will record information for various species on different lines of the data sheet using different observation numbers for each species); 4) habitat type for the majority of the group (i.e., aquatic, burned forest, unburned forest, meadow, or geothermal); 5) group's direction (right, left, or on road); 6) perpendicular distance from the nearest animal in the group to the roadway; 7) group composition (males, females, young or unknown); and 8) the percentage of animals in the group that are engaged in various activities (see following paragraphs).

Upon locating a group of wildlife, observers will stop in the manner described previously and scan the entire group, recording the activity percentages. Activity will be categorized as follows: 1) R = resting (i.e., bedded, floating asleep); 2) S = standing, perching, or floating in relatively stationary, vigilant position; 3) FD = feeding; 4) T = traveling (i.e., walking, swimming, or flying in a sustained manner); 5) AA = alarm/attention (including rise from bed, agitate [e.g., buck, kick, bison tail rise]); 6) FL = running/flying away from some stimulus; or 7) D = defensive attack/charge towards another animal (Chester 1976). Owing to the difficulties of observing precise behaviors at large distances with binoculars, activity will only be classified for that portion of the group that is within approximately within 500 meters of the road.

Once the initial wildlife observation/activity data is recorded, the observers will wait for a period of up to 10 minutes for a group (i.e., ≥ 1) of motorized vehicles to enter the zone within 500 meters of the wildlife group. During this waiting period, the observers will conduct additional scans of wildlife behavior at 5-minute intervals. Thus, a maximum of three scans per wildlife group could be conducted if no motorized vehicles interact with the wildlife group during the 10-minute waiting period (i.e., one upon initially locating the group, one five minutes later, and one at 10 minutes). However, if observers locate a wildlife group and record one initial scan, after which motorized vehicles arrive and interactions begin, then the initial scan will be the only one for that group. If the observers arrive when an interaction is already in progress, then no scan will be recorded for that group. The percentage of wildlife in the group engaged in various activities during each scan will be recorded using the activity categories described in the previous paragraph. The activity percentages will be recorded on the back of the data sheet and linked by observation number to the other recorded data.

If several assemblages of animals of the same species are located in the same vicinity, then the observers will define group membership based on how the assemblages of animals are distributed and moving in space. Factors that will be considered include the relative distances between individuals, degree and form of interaction, similarity or synchrony of behavior, and similarity of orientation. Clutton-Brock et al. (1982) concluded that red deer (*Cervus elaphus*) within 50 meters (55 yards) of each other were generally part of the same group based on measurements of the distances between nearest neighbors of deer. On average, ninety percent of red deer in the same group were engaged in the same activity, whereas only 56 percent of deer in different parties did the same thing at the same time.

As in winters 2003-2014, the sampling unit for this monitoring is the interaction between motorized vehicles and associated humans and an observed group of wildlife within 500 meters of the road. Though this definition of an “interaction” is somewhat arbitrary, the proposed 500-meter “interaction zone” will enable us to evaluate the influence of distance from a disturbance on wildlife responses to human activities. Thus, if any wildlife group member is within 500 meters of the road, then the observers will remain in a position along the road to observe the group until ≥ 1 motorized vehicle enters a zone within 500 meters of the group. The motorized vehicle could enter the 500-meter zone from either direction along the road corridor.

If an interaction with motorized vehicles occurs during the 10-minute waiting period, then the observers will categorize the human activity and wildlife response during a single interaction (i.e., one group of motorized vehicles and the response by the group of wildlife). They will then continue the survey to locate the next group of wildlife along the road segment. If motorized vehicles are already present within 500 meters of a group of wildlife when the observers detect the wildlife group, then the observers will begin recording the interaction upon detection. The observers will record the same time on the data sheet for wildlife detection and the arrival of motorized vehicle to indicate that the interaction was in already in progress. If an interaction does not occur within 10 minutes of the observers detecting a group of wildlife within 500 meters of the road, then the observers will continue the survey to locate the next group of wildlife.

Prior to departing an area with a group of wildlife, the observers will drive up to a position on the road approximately perpendicular to the group of wildlife and record the location of the group along the road segment using a GPS unit as well as the perpendicular distance and direction from the road to the nearest animal using a laser range finder.

During an interaction, the observers will record the following information regarding human activity within the interaction zone: 1) the time motorized vehicles enter the 500-meter zone; 2) the number of motorized vehicles (snowmobiles, snowcoaches, wheeled vehicles) in the group; 3) the shortest distance from a motorized vehicle to the nearest animal during the interaction; 4) whether the group is administrative or guided; 5) whether the group stops within the interaction zone (reaction = N if they do not) and how long they remain (seconds); 6) the number of humans that dismount the vehicles (e.g., step off snowmobile or step out of the snowcoach); 7) the number of humans that approach an animal; 8) the number of humans that initiate behaviors to attract the attention of wildlife (e.g., yelling, whistling, throwing objects); and 9) if wildlife movement is impeded, altered, or hastened by the motorized vehicles. The duration of the entire interaction, from the time at which motorized vehicles enter the 500 meter zone to the time that same group leaves the 500 meter zone, will also be recorded.

In addition, observers will categorize wildlife responses to the motorized vehicles and associated human behavior by recording the percentage of animals in the group that respond in various manners. Response behaviors will be categorized as follows: 1) N = no apparent response; 2) LR = look/resume; 3) T = walk/swim away from disturbance; 4) AA = alarm/attention (including rise from bed, agitate [e.g., buck, kick, bison tail rise], jump snow berm); 5) FL = flight away from disturbance; or 6) D = defensive attack/charge (Chester 1976). Responses will only be recorded for those animals within approximately

500 meters of the road. In other words, if animals in a group of bison occur within a distance of 300 to 600 meters from the road, then the response behavior will only be recorded for those animals within 500 meters of the road. Observers will also record the maximum distance that an animal moves during the interaction. If a group moves 20 meters in reaction to motorized vehicles and associated humans, but one animal in that herd moves 100 meters before stopping, 100 meters would be the maximum distance moved for that interaction.

As mentioned previously, observers will categorize the human activity and wildlife response during a single interaction (i.e., one group of motorized vehicles and the response by the group of wildlife) before continuing the survey to locate the next group of wildlife along the road segment. Thus, each group of wildlife will only be sampled once during a given survey of the road segment. The observers will continue monitoring and recording the interaction until the original motorized group has departed the 500 meter perimeter around the wildlife group. Therefore, if motorized group A arrives and “interacts” with the wildlife, and separate motorized groups B and C arrive later, then the observers will terminate data collection for this interaction when the *initial* motorized group (i.e., group A) leaves the 500-meter interaction zone; despite the continued presence of motorized groups B and C. In addition, no single interaction will be monitored for >30 minutes.

All data collected during the survey will be recorded on field data forms. In some situations, wildlife will react in response to the observers, before an interaction with other motorized vehicles occurs. In these cases, observers will record a “Y” in the column titled RTO (i.e., “reaction to observers”) to indicate this observer influence.

Once the survey of a selected road segment is completed, the observers will travel to the next randomly selected road segment and begin that survey. If no animals of species of interest are detected along the selected road segment, then the observers will travel to the next randomly selected road segment and begin that survey. Thus, depending on traffic and wildlife movement patterns, it is possible that the same road segment may be sampled more than once per day.

IV. Data Management

Field observations recorded on data sheets will be entered into Excel files. Each week, crews will forward their district’s data to their supervisor in Mammoth, who will serve as the central data manager and be responsible for maintaining the overall databases. Crew members will be responsible for initially error-checking their data and safely maintaining the original datasheets.

TABLE 2: ESTIMATED COST FOR WILDLIFE MONITORING STRATEGY

Item	Estimated Cost
Personnel costs (2 Bio Techs GS-404-09/1@ 4 months)	\$37,000
Vehicle and Fuel	\$4,000
Supplies and Equipment	\$4,000
Statistical Analysis	\$2,000
Total Project Cost	\$47,000

VI. References

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