September 23, 2016

Flathead National Forest
Attention: Forest Plan Revision
650 Wolfpack Way
Kalispell, MT 59901

Re: Mountain Biking, Public Safety, User Conflicts, and Wildlife Conflicts
Submitted via https://cara.ecosystem-management.org/Public//CommentInput?Project=46286

Dear Folks;

In this letter we will address mountain biking and its effects on public safety, other Forest users and wildlife. Overall, we urge adoption of Alternative C in its recommending essentially all roadless areas for Wilderness and for its prohibition on mountain biking and other forms of mechanized contraptions in recommended Wilderness. Alt. C alone, however, does carry forward the current Forest Plan’s recognition of the adverse impacts non-motorized recreation has on wildlife, so we once again must insist that Amendment 19 be carried forward into Alt. C.

Effects of Recreation on Wildlife

Firstly, the DEISs and proposed Plan are squarely at odds with research clearly demonstrating that grizzly bears and other wildlife are displaced by non-motorized activities like mountain biking and hiking. We attached Kate Kendall’s 1994 report to the IGBC in this regard to our 9/19/16 letter. Our much earlier comments in this planning effort and on the Draft NCDE Grizzly Bear Conservation Strategy also referenced Mace and Waller’s Final Report on the South Fork Grizzly Bear Study, which found hiking displaced grizzly bears from frequently used trails.

To this letter we attach Naylor et al.’s “Behavioral Responses of North American Elk to Recreational Activity,” as published in the Journal of Wildlife Management in 2009. These researchers conclude ranked recreation impacts to elk from ATVs, mountain bikes, hiking, and horseback riding - from most to least, respectively - and included the following “Management Implication:”

A comprehensive approach for managing human activities to meet elk objectives should include careful management of off-road recreational activities, particularly ATV riding and mountain biking, which caused the largest reductions in feeding time and increases in travel time [of elk].
The above is not intended to dismiss the impacts of hiking and horseback riding, but to put things into perspective as individuals and the agencies look for ways to minimize human impacts on each other and wildlife.

**Human-Wildlife Encounters/Conflicts**

When it comes to bears and mountain lions, there is also a concern that recreationists conduct themselves in a manner that minimizes the likelihood of being harmed by a forest predator in the event of a surprise encounter. In this regard, mountain biking and trail running have long been on agency radar as potentially life-threatening, both to bears and humans, due to the increased speeds involved. Even some mountain bike advocacy web sites warn “mountain biking is perhaps the most dangerous of the forms of recreating in bear country.” (See for example [http://www.singletracks.com/blog/beginners/biking-in-bear-country-a-guide-to-conflict-free-adventures/](http://www.singletracks.com/blog/beginners/biking-in-bear-country-a-guide-to-conflict-free-adventures/)).

The Interagency Grizzly Bear published a pamphlet about mountain biking in grizzly bear habitat, which we have attached to this letter. It warns, in part:

> Mountain bikes are capable of obtaining relatively high speeds, especially when going downhill . . . Most grizzly attacks are provoked by bears that have been startled at close range . . . Be especially cautious when traveling fast downhill on a trail with blind curves. Slow down and make noise before rounding such bends.

The Draft Plan, on page C-39, includes the following advice from MDFWP, but not as mandatory management standards:

- Using designs that facilitate maximum sight distance.
- Not incorporating banked corners that encourage mountain bikes or motorized trail bikes to corner at high speeds.

Glacier National Park and MDFWP grizzly bear managers are also concerned about trail runners, not just mountain bikes. GNP warns in bold print: “Trail running is highly discouraged.” (See [https://www.nps.gov/glac/planyourvisit/bears.htm](https://www.nps.gov/glac/planyourvisit/bears.htm)).

We’ve attached to this letter a 6/25/16 Facebook post by Tim Manley in which he posts a news article about a black bear mauling a marathon runner in New Mexico and notes:

> There are more and more foot and bike races in mountainous areas and this is something I have been worried about happening in NW Montana. I just don’t think it is a good idea to run down trails in areas with bears or mountain lions around . . . especially the races that occur overnight like they had a few years
back along the Swan Divide. In this article, it appears the female black bear was acting in defense of her cubs. They ended up killing her according to policy. In my view, they should run these races in places where people live . . . not where bears and lions live.

Importantly, and in contrast to statements made by the Flathead National Forest in its DEISs and elsewhere, the National Geographic article Manley points to concludes: "With the growth in human population comes an almost linear increase in bear attacks." (http://www.nationalgeographic.com/adventure/activities/trail-running/runner-attacked-by-bear-during-new-mexico-race/) And that’s also essentially what Kendall and others told the IGBC in 1994.

Yet all action alternatives in the DEIS would ignore the impacts of non-motorized recreation on grizzly bears by no longer buffering high-use trails out of/disqualifying them from grizzly bear Security Core habitat. (See our 9/19/16 letter for details in this regard). To ignore these impacts not only ignores the best available science, it is a public disgrace and act of negligence to do so as the Forest comes under increasing pressure from numerous forms of non-motorized recreation!

We have objected to ultra-marathon foot races and mountain bike races held on the Flathead and attempted to redirect them to the developed areas and trails of Whitefish Mountain Resort. This we have done to try to put such activities in a limited area where wildlife is already greatly displaced and the likelihood of human-wildlife encounters likely lessened. We’ve caught plenty of flack for doing so and a 9/22/12 response from the Tally Lake Ranger District stating “We have not received any reports since the advent of backcountry bicycling that any bicyclists or wildlife have been injured during a wildlife-bicyclist encounter on the Tally Lake Ranger District.”

Five days following Tim Manley’s Facebook post (above and attached), off-duty Flathead National Forest law enforcement officer Brad Treat was killed while “riding his mountain bike at a high speed along a narrow forest trail when he collided with a bear, leading to a fatal attack.” (7/2/16 Flathead Beacon article attached). Other news articles imply that he wasn’t carrying bear spray, though he likely had no time to deploy it. Based on interagency knowledge of and advice about how to minimize such bear encounters, one would think that a Forest Service employee would know better.

Our intent here is not to trash the reputation of Mr. Treat. By all accounts in the press, he was a much admired and much loved member of the community and agency. Our intent here is to urge the Forest Service to insure that his legacy is that others learn from his demise and not meet a similar fate. Denial of the mistakes made will only help perpetuate them.

Will TLRD ignore this problem because it didn’t occur on TLRD? Will the final Forest Plan DEISs return to respecting continued implementation of A19 as the best application of the best available science, or will it pretend that it need place no limits on the number of non-motorized trails and roads it can retain on the landscape - as though that has no impact on wildlife and does not increase the likelihood of people and/or wildlife dying as a result of surprise encounters due to increase travel speeds?
User Conflicts, eBikes and Enforcement

The emergence of battery assisted mountain bikes, also known as eBikes, has thrown a whole new twist into the mountain biking debate. While a growing number of mountain bikers push to get mountain bikes allowed in already-designated Wilderness areas and on trails in areas recommended for Wilderness designation, they are simultaneously arguing that eBikes should not be allowed. This, purportedly, because eBikes have motors and because of “their potential impacts to wildlife and other users.” (See the attached comment letter from Amber Steed to the Flathead).

Firstly, The Wilderness Act had the foresight to prohibit “mechanized” contraptions, not just motors. Secondly, it is ironic to find mountain bikers that travel at many times the speed of hikers denying their negative impacts on those hikers, while simultaneously claiming that eBikes will negatively impact standard mountain bikers due to slightly increased speeds and daily range.

We agree, however, that eBikes, which often look little different from a standard mountain bike, pose a whole new problem for law enforcement. The Forest Service has failed miserably to reign in the unlawful us of noisy and smelly ATVs and dirt bikes. It would be virtually impossible to differentiate between standards bikes and eBikes if mountain bikes are allowed into the backcountry.

The fact that some mountain bikers are able to ride up Napa Ridge, north along Alpine 7, and down the Wire Trail in a partial day (compared to several days of hiking) is not a reason to allow it. It is instead the exact reason to disallow it as a high-paced infringement on the slower pace of otherwise undisturbed roadless lands. There are plenty of biking opportunities on roads and trails in the roaded portions of the Flathead. The quiet, slow-paced sanctity of the roadless lands must be protected.

In short, these are the types of conflicts and controversies The Wilderness Act was intended to help resolve. Your Alt. C would go far to stem these controversies in roadless lands by recommending them as Wilderness and managing them as such (no mechanized uses and not conflicts between standard mountain bikes and eBikes either). Include continued implementation of A19 in Alt. C to better account for all non-motorized recreation impacts and include in your recommendations the remaining “wilderness suitable” areas from your recent inventory and you’ve got a conservation and wildlands recreation legacy you can be proud of!

Focused Mountain Bike Recreation Areas

We have grave concerns about MA-7 Focused Recreation Areas that don’t fully account for adverse impacts to wildlife and other forest users. In this regard Whitefish Mountain Resort is an already highly-impacted area where wildlife is largely displaced from the mountain bike trails, etc.. Not so, however, with the proposed Crane Mountain area for mountain bikes. Moreover, the promoters of the Crane Mountain development have demonstrated a general disregard for wildlife and other forest users, with one of them being cited and fined for unlawful trail construction on the Ferndale side of Crane Mountain - trails that the Forest Service nonetheless refused to close and is now
apparently willing to condone via Focused Recreation Area status.

On the other side of Crane Mountain, the primary promoter acting as a Forest Service volunteer developed ramps, jumps and other “challenge features” on the “system” Crane and Beardance Trails that were not in accordance with management standards for these trails shared with hikers and horseback riders. As a result, the Forest Service and American taxpayer had to bear the cost of removing the non-compliant challenge features. (See the attached 10/17/12 letter from Richard Kehr to Keith Hammer).

In summary, we have grave concerns that development of a Crane Mountain Focused Recreation Area will have significant impacts to wildlife unaccounted for in the DEISs, will serve as a reward for unlawful trail-building activity, and will largely duplicate opportunities available at Whitefish Mountain Resort and elsewhere. We urge you to instead confine high-speed and “challenge feature” mountain bike opportunities to Whitefish Mountain Resort. We urge you to restrict mountain biking in the backcountry as in Alt. C, continue to apply A19 to adequately limit all motorized and non-motorized access to wildlife habitats, and to emphasize the dangers and inappropriateness of travelling at speeds - which increases the likelihood of surprising wildlife and other forest users while decreasing the time that bear spray can be deployed in the event of a human-wildlife encounter.

Thank you for this opportunity to comment.

Sincerely,

Keith

Keith J. Hammer
Chair

Attachments:

1. Naylor et al. 2009

2. IGBC pamphlet on mountain biking in grizzly bear habitat.

3. Facebook post by Tim Manley, 6/25/16.

4. Flathead Beacon article about the death of Brad Treat, 7/2/16.

5. Amber Steed comment submitted to Flathead NF, 9/15/16.

6. Rich Kehr letter to Keith Hammer re Beardance Trail, 10/17/12.
Behavioral Responses of North American Elk to Recreational Activity

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ABSTRACT Off-road recreation on public lands in North America has increased dramatically in recent years. Wild ungulates are sensitive to human activities, but the effect of off-road recreation, both motorized and nonmotorized, is poorly understood. We measured responses of elk (Cervus elaphus) to recreational disturbance in northeast Oregon, USA, from April to October, 2003 and 2004. We subjected elk to 4 types of recreational disturbance: all-terrain vehicle (ATV) riding, mountain biking, hiking, and horseback riding. Motion sensors inside radiocollars worn by 13 female elk recorded resting, feeding, and travel activities at 5-minute intervals throughout disturbance and control periods. Elk fed and rested during control periods, with little time spent traveling. Travel time increased in response to all 4 disturbances and was highest in mornings. Elk travel time was highest during ATV exposure, followed by exposure to mountain biking, hiking, and horseback riding. Feeding time decreased during ATV exposure and resting decreased when we subjected elk to mountain biking and hiking disturbance in 2003. Our results demonstrated that activities of elk can be substantially affected by off-road recreation. Mitigating these effects may be appropriate where elk are a management priority. Balancing management of species like elk with off-road recreation will become increasingly important as off-road recreational uses continue to increase on public lands in North America. (JOURNAL OF WILDLIFE MANAGEMENT 73(3):328–338; 2009)

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KEY WORDS all-terrain vehicles (ATVs), Cervus elaphus, elk, elk behavior, hiking, horseback riding, human disturbance, mountain biking, recreation.

Recreational use of public lands in the United States has increased dramatically since the 1970s, especially off-road recreation such as all-terrain vehicle (ATV) riding (United States Department of Agriculture Forest Service 2004). Other popular types of off-road recreation include mountain biking, horseback riding, and hiking. Off-road recreation, especially ATV riding, can negatively impact wildlife (Knight and Gutzwiller 1995, Havlick 2002), but the topic has received little research attention. Only recently have a few studies examined effects of different types of off-road recreation on wildlife in a comparative manner (Taylor and Knight 2003, Wisdom et al. 2004a, Preisler et al. 2006).

Although effects of off-road recreation are not well-known, effect of roads and road use on wildlife has been well-documented (Trombulak and Frissell 2000). Wild ungulates such as North American elk (Cervus elaphus) have been shown to consistently avoid roads open to motorized vehicles across a variety of environments (e.g., Perry and Overly 1977, Lyon 1979, Edge and Marcum 1985, Cole et al. 1997, Rowland et al. 2000). Moreover, human disturbances associated with road access increases movements and decreases survival of elk (Cole et al. 1997). Accordingly, we evaluated effects of off-road recreation on elk because of the species’ noted sensitivity to human disturbances, combined with its economic, social, and recreational importance. We also selected elk for study because the species may habituate to some road uses and other human disturbances in nonhunted areas such as National Parks (Schultz and Bailey 1978). Elk may also habituate to human disturbances in urban fringe areas, where elk find refuge from hunting pressure (Thompson and Henderson 1998). We designed our study so that we monitored the same individuals before, during, and after disturbance events, thereby making it possible to detect potential habituation to those events.

Our objective was to evaluate effects of off-road recreational activities on elk behavior and to determine if different types of recreation elicited different responses. We were specifically interested in elk responses to 4 recreational activities: ATV riding, mountain biking, hiking, and horseback riding. We developed 4 hypotheses to guide our research: 1) off-road recreation (also called disturbance) produces a change in elk behavior patterns, altering the percentage of time that elk travel, rest, and feed; 2) different types of off-road recreation cause different behavioral responses in elk, with each type of recreation causing a different change in time spent traveling, resting, and feeding; 3) the time required for elk to return to predisturbance behavior patterns of traveling, feeding, and resting varies with each disturbance type; and 4) continued exposure to off-road recreation leads to conditioning of elk to the disturbance, resulting in reduced behavioral responses (i.e., habituation).

STUDY AREA
We conducted our research from April to October 2003 and 2004 at the United States Department of Agriculture Forest Service Starkey Experimental Forest and Range (hereafter, 2006).
Starkey), 35 km southwest of La Grande in northeast Oregon, USA (45°12′N, 118°3′W). In 1987, approximately 10,125 ha (25,000 acres) of elk summer range within the area was enclosed by a 2.4-m-(8-foot)-high elk-proof fence for long-term ungulate research (Thomas 1989, Bryant et al. 1993, Rowland et al. 1997). We conducted our study in the 1,453-ha northeast study area (Northeast) which was further subdivided by an elk-proof fence into 2 pastures, East (842 ha) and West (610 ha; Stewart et al. 2005). Vegetation was a mosaic of forests and grasslands dominated by ponderosa pine (Pinus ponderosa), grand fir (Abies grandis), Douglas fir (Pseudotsuga menziesii), bluebunch wheatgrass (Pseudoroegneria spicata), and Idaho fescue (Festuca idahoensis). The study area and its extensive history of ungulate research are described in detail in Wisdom (2005).

METHODS

Actiwatch Calibration
We used motion-sensitive accelerometers (Actiwatch™; Mini Mitter Company Inc., Sunriver, OR) to record elk behaviors. These sensors were housed in battery packs of Global Positioning System (GPS) collars worn by female elk. We calibrated sensors to detect 3 behaviors—feeding, resting, and traveling—using visual observations of 6 randomly selected, tame female elk (Gates and Hudson 1983, Kie et al. 1991). Sensors collected activity data over 1-minute time periods and calibration followed methods described by Naylor and Kie (2004).

During summer 2003 we observed tame elk equipped with activity sensors for 1,073 minutes over 12 observation periods (Trials), ranging from 25 minutes to 106 minutes each. To ensure that only one behavior was causing the Actiwatch measure, we selected data when we observed only one behavior during a given 1-minute period, providing 868 minutes of observations for analysis. We recorded elk behavior on a hand-held personal digital assistant (Newton MessagePad™; Apple Computer, Inc., Cupertino, CA) running Ethoscribe™ dedicated software (Tima Scientific™, Halifax, NS, Canada). We then identified class intervals for the range of Actiwatch measures associated with each behavior for each 1-minute recording period.

We used Discriminant Function Analysis (DFA) to establish the percentage of correct classifications of Actiwatch measures into each of the 3 behaviors (Naylor and Kie 2004). Sample sizes and frequencies of behaviors were not equal; therefore, prior probabilities in the DFA were proportional to sample sizes. Activity monitors on wild elk recorded activity over 5-minute periods. Consequently, we established class intervals for Actiwatch data associated with traveling, resting, and feeding for the time frame of 5 minutes. Actiwatches recorded the aggregate of motion over the recorded interval, not an average (Mini Mitter 1998). We estimated class intervals for the 5-minute periods for each behavior by ordering the 1-minute data chronologically and summing the recorded measure of each continuous 5-minute period where only one behavior occurred.

Disturbance Method
Field work began each year in April, when we fitted 16 female elk (8 animals/pasture) with GPS radiocollars containing Actiwatch activity monitors set to record at 5-minute intervals. We released these elk as part of a larger herd of approximately 24 and 97 individuals into the West and East pastures. We released the same female elk into the study area each year.

Following the early April release of elk we implemented a 14-day period of no human activity. We then randomly selected and implemented each of the 4 recreation activities, individually, for 5 consecutive days, with no other human activities occurring in the study area during a particular treatment. Each treatment period was followed by 9 days of control, during which no human activity occurred in the study area, thereby providing data on elk activity in the absence of human disturbance.

Elk may return to areas associated with disturbance within a few hours or days after cessation of human activity (Stehn 1973, Wisdom et al. 2004a). Consequently, we assumed that the 9-day control period between treatments provided sufficient time to allow animals to return to predisturbance activity patterns. The alternating pattern of 5-day treatments and 9-day controls allowed for us to replicate each of the 4 treatment types 3 times each year (Apr to Oct).

We applied each treatment by establishing approximately 32 km of routes, composed of trails and primitive roads, which encompassed all portions of the study area. We traveled these routes twice a day (once each morning and afternoon) during each 5-day treatment. To allow coverage of the entire study area by each of the 4 recreation activities, one group (1–3 people) of ATV riders covered the 32 km of routes each morning and afternoon, traveling at approximately 5.3–5.7 km/hour. By contrast, to cover the same distance along the routes required 2 groups of mountain bikers (each covering approx. 50% of the 32-km routes), traveling at 2.6–2.9 km/hour, and 3 groups of hikers and horseback riders (each covering approx. 33% of the 32-km routes), traveling at 1.6–1.9 km/hour. This design provided the same coverage of routes among all activities and saturated the study area such that all 4 activities were applied to all portions of East and West pastures (Wisdom et al. 2004b). Each treatment followed a tangential experimental approach in which observers did not directly pursue animals but remained along the predetermined routes (Taylor and Knight 2003). Each group of recreationists traveled together under an interrupted movement design, which allowed momentary stops to record observations of elk and take short rest breaks (Wisdom et al. 2004b).

During data collection in 2003, one elk activity monitor failed and 2 were not retrieved from the study area; therefore, we used data from 13 elk in our analysis. During 2004, one monitor was not retrieved and 2 monitored elk crossed from the East to the West pasture when a gate was left open at the end of a treatment week. Consequently, we
did not include data from these elk in our analysis, resulting in 13 elk for the analysis.

Data Analysis

We organized data for each replicate into 10-day periods, 5 days for each treatment paired with the last 5 days for its prior control. We calculated the difference in activities for each elk as percentage of time spent in each behavior within the treatment period minus percentage of time spent in each behavior during the paired control period. Consequently, a positive value for the activity difference indicated elk spent more time in that behavior during the treatment compared to the control, and a negative value indicated less time was spent. We then calculated and plotted the mean difference and 95% confidence intervals for each behavior per treatment, replicate, and year. We summarized behavior of female elk hourly and averaged it for each hour across all control periods to describe how animals allocated their activities in the absence of human disturbance.

We used a univariate procedure to check for a normal distribution of the residuals of activity differences between each treatment type and its control. Plots of residuals showed that data were normally distributed. We analyzed the activity difference for each year using a Proc Mixed Repeated Measures model (SAS Institute 2001) to test for differences among treatments, replicates, and treatment × replicate interaction, with each female elk repeatedly measured throughout the year. We determined covariance structure for each model using the lowest Akaike's Information Criterion score. For 2003, the covariance structure was a first-order ante-dependence (ANTE [1]); for 2004, we used a first-order autoregressive structure (AR [1]). A priori significance level for all statistical tests was 0.05. We adjusted significance level of all pairwise comparisons of least-square means using the Tukey Honestly Significant Difference procedure (Harris 1998).

To test for differences among pastures and time-of-day (morning or afternoon), we analyzed the activity difference for travel, resting, and feeding for each year using a Proc Mixed Repeated Measures model. This model included treatment, replicate, pasture, and time-of-day variables and all interaction terms. We adjusted significance levels of all pairwise comparisons using a Bonferroni critical value (Harris 1998).

RESULTS

Activwatch Calibration in Lotek GPS collars

Calibration of activity data with tame elk, using DFA based on 1-minute data, correctly classified 96.8% of resting, 92.9% of feeding, and 90.3% of travel activities (Table 1), with an overall correct classification of 93.3%. Ranges of Activwatch measures for each 5-minute data were estimated as 0–1,896 for resting, 1,900–5,135 for feeding, and ≥6,166 for traveling. We could not correctly classify Activwatch measures that were between these intervals and we discarded them from the wild elk dataset (<2% of data).

Treatment and Replicate Differences

Elk spent little time traveling during all control periods (<5% of each hr); feeding and resting comprised most of their activities (Fig. 1). Resting was highest at approximately 0800 hours (80% of their activity budget) and gradually decreased during daylight hours as feeding increased. Peak feeding activity occurred at dawn and dusk (Fig. 1). Activity budgets were similar for 2003 and 2004 (Naylor 2006).

Results of the mixed-model repeated-measures analysis of travel activity showed a treatment × replicate interaction in both 2003 and 2004 (2003 $F_{6,72} = 12.28, P < 0.001$; 2004 $F_{6,72} = 2.31, P = 0.042$; Table 2). Percentage of travel time also was different among treatments for both years (2003: $F_{3,36} = 32.25, P < 0.001$; 2004: $F_{3,36} = 7.65, P < 0.001$). In addition, there was a treatment × replicate interaction for resting (2003: $F_{6,72} = 15.11, P < 0.0001$; 2004: $F_{6,72} = 8.29, P < 0.0001$). We also found differences among treatments in resting time for both years (2003: $F_{3,36} = 10.60, P < 0.001$; 2004: $F_{3,36} = 11.62, P < 0.001$; Table 2).

Similarly, time elk spent feeding was different for the treatment × replicate interaction (2003: $F_{6,72} = 21.45, P < 0.001$; 2004: $F_{6,72} = 7.89, P < 0.001$). As with travel and resting, time spent feeding also was different among treatments (2003: $F_{3,36} = 16.41, P < 0.001$; 2004: $F_{3,36} = 13.35, P < 0.001$; Table 2).

Elk traveled more during ATV and mountain biking treatments than during controls in all 2003 and 2004 replicates (Fig. 2, Table 3). Elk traveled more than the controls during 5 of 6 hiking replicates and during 3 of 6 horseback riding replicates (Fig. 2, Table 3). Elk spent more time resting during 4 of 6 ATV treatments compared to controls. Elk rested less during mountain biking in contrast to controls during 4 of 6 replicates. Resting time by elk was not different from controls for 3 of 6 hiking replicates and was less than controls during 2 replicates. Elk rested more than controls during 4 of 6 horseback replicates (Fig. 3). Elk spent less time feeding compared to controls during 5 of 6 ATV replicates, 3 mountain biking replicates, 2 hiking replicates, and 4 horseback replicates (Fig. 4).

Mean travel during all ATV replicates in 2003 was higher than the other treatments (Fig. 2, Table 3). For 2004, travel during ATV riding was not different from other treatments except for being higher than horseback riding during replicate 2 (Fig. 2). Travel time by elk was higher during mountain biking compared to horseback riding for replicate 3 of 2003.

Table 1. Discriminant Function Analysis results, based on Actiwatch recordings (from 808 1-min record intervals collected over 12 trials) to discriminate among 3 behavior classes of Rocky Mountain elk at Starkey Experimental Forest and Range, La Grande, Oregon, USA, during summer 2003. We set prior probabilities to proportional in the Discriminant Function Analysis.

<table>
<thead>
<tr>
<th>Observed behavior</th>
<th>Classified behavior (min)</th>
<th>Total</th>
<th>% correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting</td>
<td>459</td>
<td>11</td>
<td>474</td>
</tr>
<tr>
<td>Feeding</td>
<td>20</td>
<td>299</td>
<td>322</td>
</tr>
<tr>
<td>Traveling</td>
<td>0</td>
<td>7</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>479</td>
<td>317</td>
<td>868</td>
</tr>
</tbody>
</table>

Mean travel during all ATV replicates in 2003 was higher than the other treatments (Fig. 2, Table 3). For 2004, travel during ATV riding was not different from other treatments except for being higher than horseback riding during replicate 2 (Fig. 2). Travel time by elk was higher during mountain biking compared to horseback riding for replicate 3 of 2003.
and 2004. Hiking and horseback treatments were similar in the percentage of time that elk traveled during both years. Time elk spent resting was greater during ATV treatments compared to other treatments for 3 of 6 replicates and was greater during the horseback treatment compared to mountain biking and hiking for 4 of 6 replicates. Resting time was similar during both mountain biking and hiking replicates each year (Fig. 3). Elk fed less during ATV riding compared to other treatments in 4 of 6 replicates (Naylor 2006: fig. 4, appendix 1, tables A4, A7). There was no difference in duration of feeding between mountain biking and hiking treatments during 2003 or 2004. Elk fed less during the horseback treatment compared to mountain biking and hiking for 2 of 6 replicates (Naylor 2006: fig. 4, appendix 1, tables A4, A7).

Figure 1. Activity budgets (% time spent traveling, resting, and feeding) of female elk during the first 2-week control periods of 2003 and 2004 at Starkey Experimental Forest and Range, La Grande, Oregon, USA. We averaged data for each hour, over 24-hour periods, expressed in Pacific Daylight Time.
Differences in elk behavior between treatments and controls were evident only during the periods of each day that treatments occurred. Elk behavior patterns were similar to control periods before treatments commenced each day, showed differences during each treatment activity, and returned to a predisturbance level approximately 1–2 hours after each treatment ended (Fig. 5). Behavior patterns outside the treatment times appeared unaffected by the treatment activity (Naylor 2006: appendix 1, figs. A2–A13).

Travel time by elk was greater than controls for ATV treatments both years, with the greatest response of the 4 treatments being for ATV replicate 1 of 2003. Travel response by elk to ATVs during 2003 declined with each treatment activity (Naylor 2006: appendix 1, figs. A2–A13). Differences in travel response between the high elk density (East pasture) versus low elk density (West pasture) areas, were all individual effects. For each treatment, elk travel time during hiking was the most variable among treatments, with travel time being higher than controls. Elk also reduced travel time during each horseback riding replicate in 2003, with no difference observed between the treatment and control for replicate 3. During 2004, travel response to horseback riding was less than that of 2003 and was not different from control periods in 2 of 3 replicates (Fig. 2). Overall, horseback riding caused the lowest travel response in elk among treatments. By contrast, elk were consistent in their travel time during all mountain biking treatments, with travel time being higher than controls. Elk travel time during hiking was the most variable among treatment responses, with no evident pattern.

Pasture and Time-of-Day Differences

Differences in travel response between the high elk density (East pasture) versus low elk density (West pasture) areas, considering time-of-day, replicate, and treatment indicated a 4-way interaction of these variables for both years (2003: $F_{6,132} = 21.94, P < 0.001; 2004: F_{6,132} = 6.40, P < 0.001$). All 3-way and most 2-way interactions were significant as were all individual effects. For each treatment, elk travel time in the 2 pastures was similar during mornings. Exceptions to this pattern were ATV, replicate 1 of 2003 and horseback riding, replicate 2 of 2003, when elk traveled more in the east than west pastures. Differences between pastures during the afternoons for 2003 were not significant (Naylor 2006: appendix 1, table A15) with the exception of replicate 1 of the ATV treatment, when travel time was higher in the west pasture ($P < 0.001$).

Elk travel time also differed between pastures during the afternoons in 2004 for ATV replicate 3, mountain bike replicates 2 and 3, and hiking replicate 2 (Naylor 2006: appendix 1, table A16). At these times, elk traveled more in the east pasture during the ATV treatment and more in the west pasture during biking and hiking. Differences in travel time between morning and afternoon in the same pasture showed some significance for 2003, with the morning disturbance causing the greater travel response (Naylor 2006: appendix 1, table A17). There were fewer differences in mean travel activity between mornings and afternoons in 2004 for the same pasture (Naylor 2006: appendix 1, table A18).

**DISCUSSION**

Activity budgets of elk during control periods were consistent with the literature on elk circadian cycles (Green and Bear 1990, Ager et al. 2003, Kie et al. 2005). Movements of elk (m/min), estimated from telemetry relocation data during the 2002 phase of our study, provided further evidence of elk circadian patterns of movement in the absence of human disturbance (Preisler et al. 2006). Our activity budgets during control periods provided a compelling basis for evaluating changes in activity budgets during each of the recreational activities.

Our results supported hypothesis 1, which postulated that off-road recreation produces a change in elk behavior. Results clearly demonstrated that activity budgets of elk were altered during off-road recreation treatments. Elk increased their travel time during most treatments, which reduced time spent feeding or resting. We recorded an increase in travel throughout the period of disturbance but it was generally greater in mornings than in afternoons. This response was similar to that recorded by Wisdom et al. (2004a), where movement rates of elk were higher than that
of controls in the hours immediately after initiation of the disturbance each morning. The reduced response by elk to each treatment in afternoons compared to mornings was likely due to elk moving away from the disturbance routes and avoiding them for the remainder of the day, which reduced the need for more travel and thus conserved energy (M. J. Wisdom, United States Department of Agriculture Forest Service, personal communication).

Figure 2. Mean and 95% confidence intervals of the difference in the percent travel time by elk between paired treatments and control periods. Data are for 13 female elk in the Northeast study area of Starkey Experimental Forest and Range, La Grande, Oregon, USA, 2003 and 2004. We calculated activity difference as percent time spent traveling during treatment minus that during control; negative values indicate activity less than that of the control. Treatments were all-terrain vehicle (ATV) riding, mountain biking (Bike), hiking (Hike), and horseback riding (Horse).
The reduced travel by elk in the afternoons also could be due to the benefits of conserving energy by remaining in a particular habitat. Presumably, more time spent hiding would outweigh the loss of energy caused by fleeing from disturbance. Our study did not include information on elk locations in relation to disturbance routes; therefore, we could not determine any shifts in habitat use during treatments. However, Preisler et al. (2006) demonstrated that elk in our study area moved away from the routes to hiding places near or against fences during 2002.

Hypothesis 2, which postulated that different types of human activity cause different behavioral responses in elk, also was supported by our results. The highest travel response by elk was during ATV exposure and was followed by increased resting time. This type of recreational activity may have forced elk to forgo foraging in favor of hiding until the disturbance ended. In contrast to this any disturbance during the mountain biking and hiking treatments resulted in feeding activity increasing. It is possible that, being quieter than the ATVs, mountain biking and hiking did not disturb elk once they moved away from the routes; elk were, therefore, able to make up any energy lost by resuming foraging activity.

For horseback riding, travel activity during 3 of the 6 replicates was not different from the controls, indicating that elk were not affected as much by this recreational activity. When elk did display an increased travel response to horseback riding, the effects on feeding and resting time were mixed.

Hypothesis 3, which postulated that time required for elk to return to predisturbance behavior varies with disturbance type, was not supported by our results. For all treatments, elk returned to behavior patterns similar to those of the controls once the disturbance ended each day (Naylor 2006: appendix 1, figs. A2–A13). Reduction in foraging time during treatments was not compensated for after the disturbance ended, because elk did not increase feeding intensity or duration beyond that of controls.

Our study design mimicked the daytime pattern of motorized traffic on National Forests (Wisdom 1998), most of which does not occur during peak elk feeding activity at dawn and dusk. Thus, our treatments did not overlap with peak feeding periods of elk. With their main intake of digestible material being unaffected by disturbances, reduced foraging time during treatments may not have had substantial short-term biological consequences for these elk. Elk may have satisfied their immediate nutritional requirements before and after disturbances occurred.

A potential disadvantage to elk is the energy expense of traveling during each disturbance, coupled with a loss in forage intake. A shift away from disturbance routes (as noted by Preisler et al. 2006) to areas of potentially lesser quality forage could have a cumulative effect on long-term body condition. Cook et al. (2004) suggested that if elk body fat was reduced below 9% as the animal enters winter, there is an increased probability of that individual not surviving winter. Comparisons of elk body condition before and after each treatment were beyond the scope of our study. Consequently, we could not conclusively assess long-term physiological effects of repeated disturbance to elk from April to October each year.

Hypothesis 4, which postulated that continued exposure to disturbance leads to conditioning of elk to the disturbance and results in unaltered or reduced behavioral responses (i.e., habituation), was partially supported by our findings.

A complicating factor in our evaluation of potential habituation of elk to recreation treatments is that we did not simultaneously evaluate changes in elk distributions. However, as part of the radiotelemetry monitoring of the same elk we studied, Preisler et al. (2006) found that elk moved away from travel routes during ATV riding with repeated ATV treatments. These movements allowed elk to resume activities similar to those of controls, while avoiding recreation routes. Such avoidance would not be considered habituation, but rather a different type of negative response to recreation.

Travel by elk during 2 horseback replicates was not different from control periods in 2004. Reduction in elk travel during horseback riding in 2004 compared to 2003 suggested that, unlike other treatments, elk may have habituated to horseback riding. Alternatively, elk could have simply avoided areas near horseback routes during 2004, as was done by elk in response to ATV treatments over time (Preisler et al. 2006). Under this possibility, elk could have maintained the same activity patterns as during controls, but farther away from travel routes.

In contrast to horseback riding, elk travel time during mountain bike riding was above that of controls for each year and was consistent among years. Thus, elk showed no evidence of habituation to mountain biking. Similarly, elk travel time in response to hiking was above that of control periods, with the exception of replicate 1 for 2003, suggesting a similar response by elk to each hiking disturbance (i.e., no habituation).

Table 3. Weekly averages and standard errors of percent time spent traveling above that of paired control periods for 43 female elk at Steckey Experimental Forest, La Grande, Oregon, USA, 2003 and 2004. A positive number indicates elk spent more time traveling during the treatment compared to the control period (no human activity) and a negative number indicates less time was spent traveling. ATV = all-terrain vehicle riding, Bike = mountain biking, Hike = hiking, and Horse = horseback riding.

<table>
<thead>
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<th>Replicate</th>
<th>ATV</th>
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<th>Hike</th>
<th>Horse</th>
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</table>
MANAGEMENT IMPLICATIONS

A comprehensive approach for managing human activities to meet elk objectives should include careful management of off-road recreational activities, particularly ATV riding and mountain biking, which caused the largest reductions in feeding time and increases in travel time. Evidence of little or no changes in travel by elk as a response to horseback riding can also be used by managers when planning access to

Figure 3. Mean and 95% confidence intervals of the difference in percent resting time by elk between paired treatment and control periods. Data are for 13 female elk in the Northeast study area of Starkey Experimental Forest and Range, La Grande, Oregon, USA, 2003 and 2004. We calculated activity difference as percent time spent resting during treatment minus that during control, so negative values indicate activity less than that of the control. Treatments were all-terrain vehicle (ATV) riding, mountain biking (Bike), hiking (Hike), and horseback riding (Horse).
areas where disturbance of elk is to be minimized. Such resource allocation trade-offs between management of elk and off-road recreation will become increasingly important as off-road recreation continues to increase on public lands.

ACKNOWLEDGMENTS

Funding was provided by the Oregon Department of Parks and Recreation, Oregon Department of Fish and Wildlife, and Pacific Northwest Region and Pacific Northwest
Figure 5. Feeding activity (%) of 13 female elk for replicate 2 of each treatment and its paired control during 2003 at Starkey Experimental Forest and Range, La Grande, Oregon, USA. Area between dotted vertical lines represents times (hr) treatments occurred. Results in this figure typify the pattern of elk activity returning to that like controls each day after a recreation treatment ended.
wish to thank K. Mundy and > 50 individuals who assisted with data collection by participating in recreation activity treatments.

LITERATURE CITED


Harris, M. B. 1998. Basic statistics for behavioral science research. Allyn & Bacon, Needham Heights, Massachusetts, USA.


Associate Editor: McCorquodale.
ENCOUNTERS

If a grizzly bear is encountered while biking, your actions can affect the outcome. Maintaining a safe distance and manner that does not threaten the bear provides options for both you and the bear. A "cool" head is necessary to avert harm to yourself or the unnecessary killing of a grizzly bear.

If you encounter a grizzly bear, your first option should be to back out of the situation. Keep calm, avoid direct eye contact, back up slowly and speak in a soft monotone. Never turn your back on a bear.

Never Run. Do not climb a tree unless you have time to climb at least 10 feet before the bear reaches you. Remember, bears can run very fast!

If the bear charges, stand your ground. Bears often "mock charge" or run past you. Shooting a bear when it is charging is not recommended. The bear almost always lives long enough to mauл the shooter severely.

As a last resort, play dead. Roll into a ball, covering your neck and head with your hands and arms. Stay in a tucked position until you are sure the bear is gone. Many people have survived bear attacks using this tactic.

In cooperation:
Interagency Grizzly Bear Committee • Wyoming Game & Fish Department
US Fish & Wildlife Service
Mountain biking is an exciting new sport enjoyed by many people. While this area has excellent opportunities for mountain biking, it is also Grizzly Country. If you choose to mountain bike and camp in this area, you need to learn about grizzly bears and how to avoid having a confrontation with one. Remember, mountain biking is limited to established roadways in national parks and not allowed in wilderness areas in national forests.

SAFE MOUNTAIN BIKING PRACTICES

While Biking

Bike with Friends—Because there is safety in numbers, always try to travel in pairs or groups of people.

Learn to recognize the signs of grizzly bear activity and avoid using these areas. Typical signs of grizzly bear use include fresh tracks, scat greater than 2 inches in diameter, diggings and partially eaten or buried animal carcasses lying along the trail.

Make Noise on a Regular Basis—Mountain bikes are capable of obtaining relatively high speeds, especially when going downhill. We recommend that you attach noise makers to your bike and make loud noises when traveling through timber and brush. Most grizzly attacks are provoked by bears that have been startled at close range.

Don’t Surprise Bears—Be especially cautious when traveling fast downhill on a trail with blind curves. Slow down and make noise before rounding such bends.

If you see or smell a carcass, don’t investigate. Turn around or make a wide circle around it.

Never approach a bear to get a picture. All bears have a limit as to how close they will let you approach and will defend themselves when they feel threatened.

In Camp

Always keep a clean camp and follow the forest and park regulations on food storage. Avoid attracting and rewarding a bear with food.

Remember, all food and beverages; including canned food, pop and beer; garbage; grease; processed livestock or pet food; and scented or flavored toiletries (toothpaste) are bear attractants.

All of these items need to be stored in a bear-resistant container or vehicle, or hung at least 10 feet off the ground and 4 feet from any vertical support. Cars, pickup cabs, hard-sided campers and camper shells are all considered bear resistant.
There are more and more foot and bike races in mountainous areas and this is something I have been worried about happening in NW Montana. I just don't think it is a good idea to run down trails in areas with bears or mountain lions around... especially the races that occur overnight like they had a few years ago along the Swan Divide. In this article, it appears the female black bear was acting in defense of her cubs. They ended up killing her according to policy. In my view, they should run these races in places where people live...not where bears and lions live.

Black bear mauls New Mexico marathon runner during race
A New Mexico marathon runner was less than 3 miles from the finish line of an...
Officials: West Glacier Cyclist Collided with Bear Before Fatal Attack

Wildlife managers removing traps, cameras as search for bear winds down

BY JUSTIN FRANZ & DILLON TABISH // JUL 2, 2016 // NEWS & FEATURES
A 38-year-old West Glacier man was riding his mountain bike at a high speed along a narrow forest trail when he collided with a bear, leading to a fatal attack earlier this week, according to a preliminary investigation by Montana wildlife officials.

Brad Treat, 38, of West Glacier, was killed while mountain biking on the Green Gate/Half Moon trail system. Treat grew up in the Flathead Valley and graduated from Flathead High School in 1996.

Wildlife response team investigator Brian Sommers says he believes Treat was riding at a high rate of speed on a narrow trail when he collided with the bear that then attacked him. A family member who was biking with Treat was not attacked and was able to summon help.

“Sight visibility at the location of the collision is very limited and the collision was unavoidable,” FWP officials said in a press release Saturday. “The bear reacted which led to the attack.”

Three days after the fatal mauling, the search for the animal is winding down, although the investigation is continuing. John Fraley, FWP spokesperson, said officials were removing bear
traps and cameras from the forested area near West Glacier.

Authorities initially identified the bear as a grizzly, but state wildlife managers have collected DNA samples from the scene to officially confirm whether it was a grizzly bear or black bear.

Treat, a law enforcement officer with the U.S. Forest Service in the Hungry Horse District, was pronounced dead at the scene. His body was transported out by an off-highway vehicle and was taken to the Montana State Crime Lab in Missoula. Flathead County Sheriff Chuck Curry said an autopsy would be conducted to gather information about the bear that killed Treat.

The Green Gate/Halfmoon trail system off U.S. 2 remains closed and posted by U.S. Forest Service officials in the interest of public safety. Forest Service roads closed in that area include Pack Trail, Hog Haven, Belton Point Road, Halfmoon Lake Road, Belton Ski Course and Ryan Road. Landowners in the area are exempt from the road closures, although everyone is reminded to use caution while traveling through the area.

In fall 2015, a black bear fatally attacked an elderly woman in her home near Kalispell. Barbara Paschke, 85, died Oct. 1 from injuries she suffered during a black bear attack inside her Ashley Lake home on Sept. 27. According to FWP, Paschke had been providing supplemental feed to bears and was previously cited in 2012. Wildlife managers suspended the search after failing to locate the animal.

If the attacking bear is identified as a grizzly, it would be the first fatal grizzly attack in Northwest Montana since 2001, when an elk hunter was killed on the Blackfoot Clearwater Game Range near Ovando.
Grizzly bear attacks are rare in the Glacier region but not unheard of. Since Glacier National Park was created in 1910, there have been 10 fatal grizzly attacks in the national park, the most recent in May 1998 when a 26-year-old man was killed hiking in the Upper Two Medicine Valley.

Northwest Montana is home to the largest grizzly bear population in the lower 48 states with approximately 1,000 bears living in the region. Grizzlies are listed as threatened under the Endangered Species Act.

There have been six fatal grizzly bear attacks since 2010 in the Yellowstone region of Montana, Wyoming and Idaho.

*This story will be updated when more information becomes available.*
Officials: West Glacier Cyclist Collided with Bear Before Fatal Attack – Flathead Beacon

Obama Administration Supports Structure, Not Price of CSKT Water Compact

NASA ‘LAUNCH’ Program Takes Off at Salish Kootenai College

College to Break Ground on New Housing Complex This Summer
Greetings,

Thank you for taking comment on your plan. I support continuing to allow current access to cyclists (non-motorized variety) within the FNF. However, I strongly encourage acknowledgment of electric bikes as motorized and their use restricted accordingly. It is critical that the FNF recognize this emerging user group and their potential impacts to wildlife and other users. Look to other states (e.g., Utah) that have already made headway in this and taken a proactive approach. Similar to the complications posed by drones, E-bikes are going to require creative thinking and progressive management to maintain fair access and experiences for users and the resources we share.
Keith Hammer
Swan View Coalition
3165 Foothill Road
Kalispell, MT 59901

Dear Keith,

Thank you for taking the time to join us on the Beardance Trail hike yesterday. This trail showcases the beautiful area within which we live and recreate.

I am using this letter to document management action for the Crane and Beardance Trails. I am sending this same letter to Ron Cron.

The Beardance and Crane Trails are managed for non-motorized use. The trails allow for hiking, horse and mountain bike recreation.

We noted that the Beardance Trail location accessed via Forest Road 10222, the “old” location, is preferred over the trail location on Forest Road 9755. We will make this correction to the trail information we provide to the public and insure that signing is adjusted on the ground.

Volunteers have provided valuable trail maintenance and improvement work over the years. Trail brushing, new stone culverts and trail improvement in wet areas by volunteers have improved the trail experience while maintaining trails to standards established for these trails.

At a number of locations, constructed mountain bike features have been added by volunteers and others. Some of these features provide a path through wet areas or water crossings while other features were added for the sole purpose of providing challenge features for mountain bikers.

Forest Service system trails are designed and maintained to a standard which includes maintaining structures so they are safe for the allowed recreation use (Forest Service Manual 2350, and Forest Service Trails Management Handbook 2309.18). The challenge features, which were constructed by various parties, are not consistent with the management direction for these trails, they are not designed to meet recognized trail standards, nor are all of the features being adequately maintained.

For these reasons, I have directed my staff to remove existing constructed challenge features. The features that will remain will be those that provide trail passage over wet areas. Removal work will likely begin this fall but may not be finished until next spring.

If you have any questions, please feel free to contact me.
Sincerely,

RICHARD H. KEHR JR.
District Ranger

cc: Chip Weber, Becky R Smith, Shannon B Connolly, Joy Sather, cronauto