

EFFECTS OF WINTER RECREATION ON WILDLIFE OF THE GREATER YELLOWSTONE AREA: A LITERATURE REVIEW AND ASSESSMENT



Greater Yellowstone Winter Wildlife Working Group
Greater Yellowstone Coordinating Committee



October 1999



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Suggested citation:

Olliff, T., K. Legg, and B. Kaeding, editors. 1999. Effects of winter recreation on wildlife of the Greater Yellowstone Area: a literature review and assessment. Report to the Greater Yellowstone Coordinating Committee. Yellowstone National Park, Wyoming. 315 pages.

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Cover photo courtesy of the National Park Service.

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EFFECTS OF WINTER RECREATION ON MID-SIZED CARNIVORES (WOLVERINE, FISHER, MARTEN, LYNX, BOBCAT, RED FOX, AND WEASEL)

POPULATION STATUS AND TREND

Wolverines (*Gulo gulo*) are considered scarce or rare in the Greater Yellowstone Area (GYA). The GYA probably has a small population, but the actual status and range remain uncertain (Clark et al. 1989). Although the U.S. Fish and Wildlife Service has concerns about their population status as well as threats to their long-term viability, the wolverine has not been listed under the Endangered Species Act. The wolverine has been classified as a protected species in Idaho since 1965. It is a species of special concern in both Idaho (native species that are either low in numbers, limited in distribution, or have suffered significant habitat loss) and Montana (species highlighted for data acquisition and subsequent management efforts) and a Priority 3 species in Wyoming (knowledge of this species is so limited that it cannot be adequately evaluated). The wolverine is listed as a sensitive species by Region 4 (Intermountain Region) of the U.S. Forest Service and as sensitive in Idaho by Region 1 (Northern Region) (species for which population viability is a concern) (Clark et al. 1989).

Fishers (*Martes pennanti*) may exist in very low numbers within the portion of the GYA that includes the northern half of Wyoming, but they have been extirpated from the Montana portions of the GYA, and they were never known to occur in the Idaho portion of the GYA (Clark et al. 1989). The fisher is a species of special concern in Idaho and Montana and a Priority 3 species in Wyoming. Region 4 of the U.S. Forest Service lists it as a sensitive species (Clark et al. 1989).

Martens (*Martes americana*) are classified as "indicator species" on the Beaverhead, Bridger-Teton, Shoshone, and Gallatin national forests in the GYA. With appropriate management, the marten can be assured a healthy role in the GYA (Clark et al. 1989).

Specific information on the status and distribution of lynx (*Felis lynx*) in the GYA is not available. It is possible that the few reported sightings are of transient animals, but it is more probable that a small population persists in the GYA (Clark et al. 1989). The lynx has been proposed for listing under the Endangered Species Act. The lynx is a species of special concern in Idaho and Montana and a Priority 3 species in Wyoming (Clark et al. 1989). Region 4 of the U.S. Forest Service lists it as a sensitive species.

The bobcat (*Felis rufus*) and red fox (*Vulpes vulpes*) are managed as furbearers in all three states and may be hunted or trapped during the furbearer season. Populations are considered stable.

The weasel (*Mustela frenata*) is an unprotected species, and little is known about its status.

LIFE HISTORY

WOLVERINE

Wolverines remain active throughout the year, even during the most severe winter weather. They inhabit the coniferous forest zone, generally at higher elevations during the summer and mid- to lower elevations during winter. Lower elevation riparian areas may be important winter habitat. Wolverines generally avoid large parks, meadows, and clearcuts. Wolverines prefer to hunt around small mead-

ows, timbered thickets, cliffs, riparian areas, and ecotonal areas (Clark et al. 1989, USFS 1991).

Females den in late February to early March. The female may move the kits several times prior to weaning, which occurs when kits are 9–10 weeks old. The offspring normally remain near their natal area at reproductive maturation, establishing their home range near that of their mother (Copeland 1996).

Idaho wolverines den in high-elevation, subalpine cirque basins, locating the den beneath the snow in the tunnels and chambers associated with big boulder talus. Boulder caves beneath deep snow likely provide a stable thermal environment for the protection and rearing of kits. High-elevation subalpine habitat provides seclusion and reduces vulnerability to kit predation prior to weaning. Northeasterly aspects and glacial cirques provide persistent snow coverage and den stability until the mid-May weaning period (Copeland 1996).

FISHER

Fishers prefer extensive, continuous forest canopies such as those found in dense, lowland forests or mature to old-growth spruce-fir forests with high canopy closure. They remain active throughout the year. They appear to be restricted to areas with relatively low snow accumulations, and they travel along snowshoe hare trails or their own previously made trails when snow is deep and fluffy. They avoid open areas such as meadows, grasslands, and clearcuts, and they may be limited by snow depth. Brush piles and large diameter trees, snags, and hollow logs provide critical denning sites in winter. Females usually give birth in tree dens located in high cavities of large trees. The breeding period is March through April (Clark et al. 1989, USFS 1991, Ruggiero et al. 1994, Heinemeyer and Jones 1994).

MARTEN

Martens remain active throughout the year. They use a variety of forest types, but they are most active in older stands of spruce-fir. In the central Rockies, they are most often associated with old-growth forests in winter. They engage in more aboreal and subnivean activity than other carnivores. They forage on mice and voles, and, as the snow deepens, they switch to pine squirrels and hares. They use meadows, forest edges, and rock alpine areas. The young are born mid-March to late April. The young are reared in dens, and the mother moves the young among dens. The dens are important to recruitment and may represent a special habitat need (Clark et al. 1989, Ruggiero et al. 1994).

LYNX

Lynx are generally found in the northern boreal forest in association with snowshoe hare habitat. Early successional forests with high densities of shrubs and seedlings are optimal habitat for hares and, consequently, important for lynx as snowshoe hares are the major food of the lynx. Hares normally make up 80 percent of the lynx diet, even more when snowshoe hare density is high. Lynx prefer dense lodgepole pine forests for hunting snowshoe hares and higher elevation spruce-fir forests for denning. Mature forest stands are used for denning and cover for kittens as well as for travel corridors. Breeding occurs from mid-March to early April. During this time females seek out males by moving into male territories (Clark et al. 1989, USFS 1991).

BOBCAT, RED FOX, AND WEASEL

This group of carnivores remains active throughout the year. Bobcats use a wide variety of habitats. They need cover to stalk prey and avoid large open areas. Red foxes are also found in a variety of habitats, from heavily forested areas to open meadows and brushy

lowlands. Red foxes mate in late winter and den in crevices, caves, or burrows. Long-tailed weasels are extremely solitary (except during the mating period) and are voracious hunters. Weasels often tunnel beneath the snow following prey when hunting during winter (Fitzgerald 1977).

HUMAN ACTIVITIES

Winter recreational activities such as snowmobiling, cross-country skiing, backcountry skiing, and snowshoeing have the potential to affect wolverine, fisher, marten, lynx, bobcat, red fox, and weasel. These mid-sized carnivores have certain biological traits that suggest vulnerability to human uses (in this case, recreational activities) specifically during the stressful winter period. These include low population densities, low reproductive rates, large home range sizes, secretive behavior, and avoidance of humans. The home range sizes of some of the mid-sized carnivores require that they regularly cross snowmobile and cross-country ski trails.

Carnivore foraging behavior in forested areas may be disrupted along groomed trails and other travel corridors. Displacement or avoidance may occur due to noise of snowmachines or to human presence. Snowmobile trails may facilitate travel for some carnivores, but compaction of snow due to grooming or from snowmobile use off existing roads or trails may adversely affect the subnivean habitat of prey species and, therefore, impact foraging opportunities for carnivores.

Existing marked and groomed snowmobile trails and the expansion of these trail systems into new areas facilitates trapping of furbearers and may increase the accidental take of non-target carnivores.

POTENTIAL EFFECTS

Forest fragmentation as a result of timber harvest is a significant source of habitat loss specifically for the fisher, marten, and lynx (Clark et al. 1989, USFS 1991, Ruggiero et al. 1994). Habitat loss could also result from clearing routes for groomed snowmobile and cross-country ski trails. However, routes in the GYA are generally along existing roads and trails, which were developed and are used for summer travel. Dispersed winter activities typically occur within non-forested areas that require no clearing.

Trapping is the most direct way that humans affect carnivore populations, and it can be a significant source of mortality. Overtrapping and accidental trapping of non-target species are considered threats to this group of animals. Highway accidents are another direct human effect on carnivores (Clark et al. 1989, USFS 1991, Ruggiero et al. 1994).

Mortality resulting from an accidental collision with a snowmobile is possible, but the probability is low. Intentional killing of carnivores by a snowmobiler is possible, but most likely it would only occur in rare, isolated incidents.

Winter stress combined with human disturbance/harassment may cause increased mortality to wildlife. Most studies on this topic have been conducted on ungulates, however. Copeland (1996) found that human activities near wolverine dens during the denning and kit-rearing period may cause den abandonment and displace wolverines into suboptimal denning sites. This could result in lower reproductive success and/or kit survival.

Natal dens are also important to recruitment for other carnivores, including the fisher, marten, and lynx. Minimal human disturbance

is an important feature when females choose a den site. Fisher and lynx are likely to move to another den if disturbed.

Snowmobile use has been shown to affect snowshoe hare (an important prey species for some carnivores, particularly the lynx) and red fox mobility (Schmid 1983).

Compaction of snowfields by snowmobiles alters the mild snow microenvironment, potentially affecting organisms that live within or beneath the snow by increasing temperature stress or restricting movement by compacting the air spaces between the snow and the ground (Schmid 1983, Boyle and Sampson 1985). Winter mortality of small mammals is markedly increased under areas compacted by snowmobiles. The reduction in population numbers of these small mammals could well reduce the population of species preying upon them (Bury 1978). Fitzgerald (1977) found that the long-tailed weasel often tunnels beneath the snow when hunting during the winter. Raine (1983) found that martens made less use of subnivean space when the snow surface was crusted, probably because of difficult access.

A significant effect on carnivores from winter recreational activities is displacement from or avoidance of high recreational use areas (*i.e.*, groomed trails, marked trails, destination areas, and play areas). Human use will increase where high recreational use areas exist or are provided. As the associated recreational use level increases, the impact on carnivores also increases (Ruediger 1996).

WOLVERINE

A study in Idaho found females sensitive to human activity near the maternal den. The subalpine cirque habitats selected by Idaho wolverines for denning are often preferred winter recreational sites for backcountry skiing and snowmobiling. If females are disturbed during the denning and kit-rearing periods,

they may move kits to suboptimal den sites, which may decrease reproductive success and kit survival. In two cases, human disturbance near maternal dens resulted in den abandonment by females and kits (Copeland 1996).

Humans access on snowmobiles or all-terrain vehicles in winter and early spring could cause behavioral disturbances. This disturbance may impair kit survival if females use less secure den sites (Ruggiero et al. 1994).

Other studies found that winter recreational activities affect denning. Nursery dens were abandoned by female and kits upon discovery of human tracks. Human activity around dens in Finland and Norway resulted in den abandonment (Idaho Department of Fish and Game et al. 1995).

FISHER

Fishers appear to be tolerant of moderate degrees of human activity including low-density housing, farm roads, and small-scale logging (Heinemeyer and Jones 1994). In New Hampshire, the presence of human activity and domestic animals appeared to have little effect on fisher movement (Heinemeyer and Jones 1994). Fishers in Maine tolerate a marked degree of human activity (Heinemeyer and Jones 1994). In Idaho, fishers were commonly observed in close proximity to occupied residences. They rarely flushed from their roost sites when researchers approached within a few feet. Females with kits may be more sensitive to disturbance and may move their kits periodically to new dens (Heinemeyer and Jones 1994).

Other studies show that fishers generally are more common where densities of humans are low and human disturbance is reduced. They are secretive, usually avoid humans, and seldom linger when they become aware of the presence of humans. The females use one to three dens and are more likely to move if disturbed. Indirectly, human activities may

lead to negative impacts on fishers through increased human access to fisher populations (USFS 1991, Ruggiero et al. 1994, Heinemeyer and Jones 1994).

LYNX

Human access into remote areas may have direct and indirect negative effects on lynx populations. During winter and summer, lynx travel along roadways, which may make them more vulnerable to human-caused mortality (Ruggiero et al. 1994). Lynx are believed to be susceptible to human-caused disturbances during the denning period, and it is believed that females will move kittens (thereby increasing the chance for mortality) in response to disturbance. Minimal human disturbance is an important feature of the den site (Ruggiero et al. 1994, Idaho Department of Fish and Game et al. 1995).

Lynx are specialized deep-snow predators, an adaptation that permits them to live year-round at high elevations, thereby minimizing competition during the physically stressful winter months. Snowmobile or cross-country ski trails allow lynx competitors to infiltrate high-elevation habitats during winter, thereby increasing competition for a limited food supply (Idaho Department of Fish and Game et al. 1995).

The mid-sized carnivores in the GYA are particularly affected by human use of the following Potential Opportunity Areas:

- (2) Primary transportation routes
- (3) Scenic driving routes
- (4) Groomed motorized routes
- (5) Motorized routes
- (6) Backcountry motorized areas
- (7) Groomed nonmotorized routes
- (8) Nonmotorized routes
- (9) Backcountry nonmotorized areas
- (10) Downhill sliding (nonmotorized)
- (12) Low-snow recreation areas

MANAGEMENT GUIDELINES

A literature search produced little information on how winter recreational activities impact carnivores; research on carnivores is extremely expensive and is mostly non-existent on mid-sized carnivores. Biologists, land managers, and recreation specialists will therefore need to practice “adaptive management” and “professional judgement” when developing winter use or recreational management plans until more information is available.

Existing winter trail systems/play areas and the development of new trails or designation of new play areas, particularly new areas, should be considered a negative impact on mid-sized carnivores. To avoid impacts, public land managers should exclude recreational activities from important areas that are used by carnivores during the winter.

Copeland (1996) recommends that management exclude human recreational activities within a five-mile buffer of predicted wolverine denning habitat from January 1 to May 31. Recreational activities outside the restricted time period should be managed for minimal intensity (*e.g.*, institute skier/snowmobile quotas and/or weekend closures).

Wolverines were specific in the sites they selected for natal and maternal dens in central Idaho. For example:

- Dens were situated above 8,000 feet in elevation. Although this elevational demarcation may vary throughout the wolverine’s regional distribution, it is likely applicable within the Targhee National Forest.
- Dens tended to be within a north-northeast aspect range (between compass readings greater than 320 degrees and less than 130 degrees).
- Dens selected had zero vegetative overstory (bare-exposed rock cover type).

- Den sites tended to be in the concave physiographic landscape feature of a glacial cirque.

Conserving wolverines may require large refugia connected by adequate travel corridors. Refugia provide core habitat for wolverine populations. Security areas must be available to provide undisturbed seclusion for reproducing females. Federal land-use regulations need to provide flexibility in administering backcountry winter recreational access and management (Ruggiero et al. 1994, Idaho Department of Fish and Game et al. 1995).

Providing protected areas within optimal habitat in the western mountains may be important to the persistence of lynx (Ruggiero et al. 1994). A strict, no-access management program is not recommended, but, rather, a proactive effort that involves community education and participation to protect lynx (Idaho Department of Fish and Game et al. 1995).

In many cases managers may have to use professional judgement combined with common sense to conserve the mid-sized carnivores. When conflicts occur between winter recreational activities and protection of carnivores, managers should err on the side of the carnivores. The winter period is a critical time for survival because of the extremely harsh weather conditions in the Greater Yellowstone Area.

LITERATURE CITED

- Boyle, S. A., and F. B. Sampson. 1985. Effects of nonconsumptive recreation on wildlife: a review. *Wildlife Society Bulletin* 13:110–116.
- Bury, R. L. 1978. Impacts of snowmobiles on wildlife. Pages 149–156 *in* Proceedings, 43rd North American Wildlife and Natural Resource Conference.
- Clark, T. W., A. H. Harvey, R. D. Dorn, D. L. Genter, C. Groves. 1989. Rare, sensitive, and threatened species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services.
- Copeland, J. P. 1996. Biology of the wolverine in central Idaho. Thesis, University of Idaho, Moscow, Idaho, USA.
- Fitzgerald, B. M. 1977. Weasel predation on a cyclic population of the montane vole (*Microtus montanus*) in California. *Journal of Animal Ecology* 46:367–397.
- Heinemeyer, K. S., and J. L. Jones. 1994. Fisher biology and management in the western United States: a literature review and adaptive management strategy. Northern Region and Interagency Forest Carnivore Working Group, U.S. Forest Service, Missoula, Montana, USA.
- Idaho Department of Fish and Game, Nez Perce Tribe, and Sawtooth National Forest. 1995. Draft habitat conservation assessments and strategies for forest carnivores in Idaho.
- Raine, R. M. 1983. Winter habitat use and responses to snow cover of fisher (*Martes pennanti*) and marten (*Martes americana*) in southern Manitoba. *Canadian Journal of Zoology* 61:25–34.
- Ruediger, B. 1996. The relationship between rare carnivores and highways. Pages 24–38 *in* Proceedings of the Florida Department Transportation/Federal Highway Administration seminar on transportation-related wildlife mortality. Department of Transportation, Orlando, Florida, USA.

- Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. General Technical Report RM-254. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, USA.
- Schmid, W. D. 1983. Snowmobile activity, subnival microclimate and winter mortality of small mammals. *Bulletin of the Ecological Society of America* 53(2):37.
- USFS (U.S. Forest Service). 1991. Threatened, endangered, and sensitive species of the Intermountain Region. Intermountain Region, Ogden, Utah, USA.
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