

# REVIEW OF OIL AND GAS EXPLOITATION IMPACTS ON GRIZZLY BEARS

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**Abstract:** In Montana, the study of grizzly bears (*Ursus arctos*) and their habitat in areas proposed for oil and gas exploitation is in the beginning stages, with few base-line data available for predevelopment guidelines. A review of literature on grizzly bears indicates that exploration and development will be generally detrimental to the bears. Construction of roads into previously unroaded areas and increased use of the land by people appear to have the greatest impacts. Problems of man-bear confrontations in the Alaska pipeline experience include nonresidents' difficulties coping with resident wildlife species, illegal shooting of animals, attraction of animals to garbage at field camps, and harassment from aircraft and other motorized vehicles. Conflicts with grizzly bears prior to development of oil and gas must be determined in order to assess the effects of resource exploitation, including the cumulative influence of various land uses. Habitat essential for the survival of the grizzly bear must be identified and protected. If development occurs in areas of occupied grizzly bear habitat before adequate management data for grizzly bears are available, it should proceed cautiously, thus preventing irreversible damage to the habitat and the bear populations. If full development, is unavoidable, restrictions should be placed on road-building, exploration, wells, fuel production, and associated activities, especially at times when grizzly bears make heavy use of a locality.

Occupied grizzly bear habitat in northwestern Montana faces exploitation of oil and natural gas resources. Few research data are available on grizzly bears to guide management decisions.

Pending oil and natural gas leases on federal land and on occupied grizzly bear habitat in northwestern Montana are shown in Fig. 1. Historically, little development of oil and gas reserves had occurred in the mountains of the region. Some drilling, later abandoned, was done in the early 1900s in what is now Glacier National Park. Starting in the 1950s, large oil and gas fields were developed in the vicinity of the overthrust disturbed belt near Pincher Creek, Alberta.

In Montana, widespread seismograph studies and some exploratory drilling have been carried out since the 1950s. At least three "shut-in" natural gas wells are known to exist within occupied grizzly bear habitat northwest of Great Falls, Montana.

Extreme interest has been shown recently in the overthrust belt because of major finds in Utah and Wyoming and because of large producing fields in similar geological formations in Alberta. Leases have been applied for in occupied grizzly bear habitat on much of the federal land outside and some within classified wilderness. Lease applications have been made for over 404,858 ha of federally controlled land and on

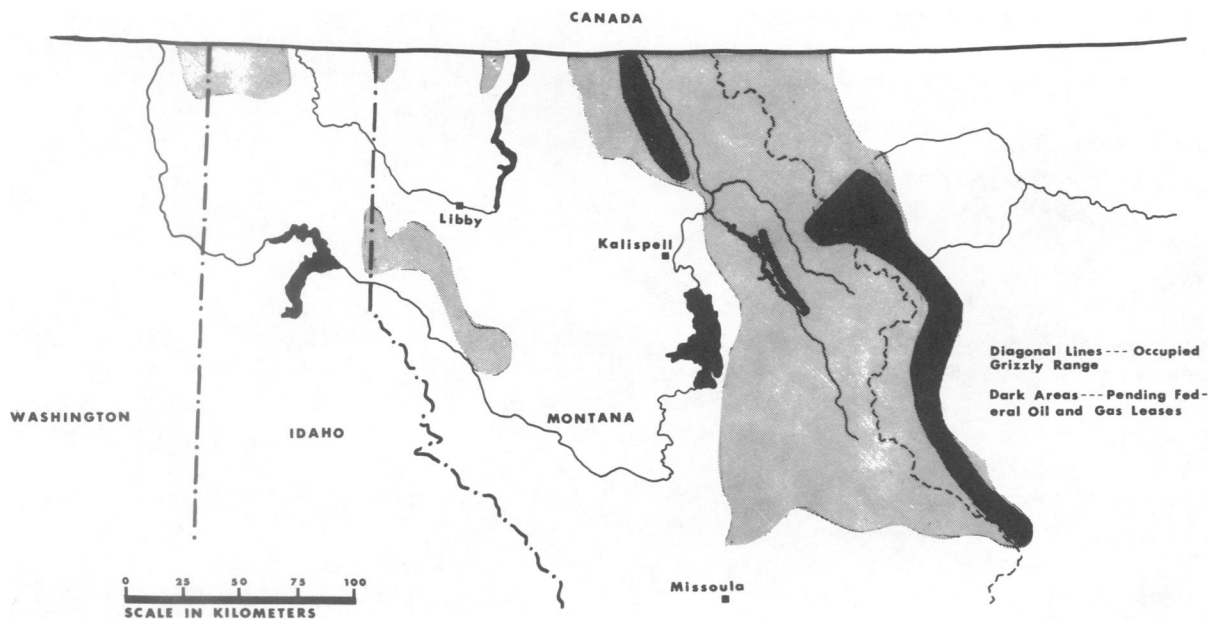


Fig. 1. Occupied grizzly bear habitat and pending federal oil and gas leases in northwestern Montana.

thousands of hectares of land with federal subsurface rights. The total area of private, Indian reservation, and state lands leased within occupied grizzly bear habitat is generally unknown, but most of the private land and some of the state lands appear to have been leased. The lease applications are a constantly growing phenomenon. Exploratory wells were drilled in 1976 and others were under way in 1977 on private, state, and Blackfoot Indian Reservation lands in the vicinity of the disturbed belt of the Lewis Overthrust (*Montana Oil Journal* 1976).

In the United States, oil and gas leasing is conducted under the Mineral Leasing Act of 25 February 1920. The Bureau of Land Management (BLM) within the Department of Interior (USDI) is responsible for issuing leases in all areas where mineral rights have been retained by the federal government. When BLM issues a lease, it grants to the lessee the right to explore for, drill for, extract, and market all of the oil and gas in the leased lands. The lease also grants, for a 10-year period, the right to construct and maintain improvements necessary for the production of oil or gas, so long as oil or gas are produced in profitable quantities. A lease on which actual drilling operations are ongoing at the time of normal termination will be extended for 2 years or as long as oil or gas is produced in paying quantities. Use of land in national forests may continue for as long as 50 years if a producing field is discovered (U.S. Forest Service 1976).

A review of literature on grizzly bears shows a number of impacts related to exploration, development, and production of oil and gas.

### Road Development

Hinman (1974) noted that north of the Brooks Range in Alaska, grizzly bears are most commonly found in the bottoms of river valleys, particularly in spring. Man's developmental activities also utilize the river valleys on the North Slope. Rivers provide the transportation corridors, campsites, and sources of gravel for road and other construction. The result is a magnification of the effect of man's presence by concentrating it in some of the most vulnerable and essential grizzly habitat. Singer (1976) documented the importance of river bottoms to grizzly bears on the western edge of Glacier National Park, Montana, during spring and fall.

Barrett and Bruns (1972), in making a subjective analysis of the oil and gas operations in the Pincher Creek region, said that road development appears to have the most significant impact. Many hectares of

habitat have been completely denied to native flora and fauna as a result of all-weather road construction, well sites, pipeline heater and pump buildings, railroads, and processing plants. Additional stress is placed on wildlife as a result of incidental human disturbance and heavy hunting pressure along roads and open slopes. Ditches, heavy traffic, and deep snowdrifts resulting from all-weather roads may hinder daily and seasonal movement of wildlife. The overall effect of industrial activity on big game species in the Pincher Creek area has been detrimental, as particularly evidenced by a pronounced decline in the number of grizzlies.

Stuart (1974) wrote that game departments in the northern Great Plains have been aware that accelerated prospecting and development of new oil fields during the past 2 decades has had an adverse impact on big game populations in the areas of activity. The adverse effects are due to increased poaching activities by exploration, drilling, and operating crews and the building and maintenance of roads in areas heretofore inaccessible to vehicle travel.

The USDI (1975) noted that for initial exploratory work, minimum alterations are made in roadway systems. After decisions are made to drill in a given area, an improved road system is required for the transportation of heavy loads. Once production has been established, newly constructed roads are normally upgraded. The report continued (p. 8-17), "Land use and recreation activities may also be disrupted. Scenic views and vistas, wilderness qualities, and physical features are altered, at times permanently. Population density, employment, and cultural lifestyles would undergo long-term changes which affect access, utility networks, waste disposal, and creation of additional corridors."

### The Influence of Survey, Development, and Production personnel

Hinman (1974) said that during the preconstruction phase of the Alaska pipeline, one of the chief impacts upon wildlife was animal-people confrontations. Although policies ban the feeding of wild animals and the improper disposal of garbage — which attracts animals — infractions of these directives continue because of problems in enforcement. In some camps, the deliberate feeding of wild animals, particularly for the purpose of photography, is widespread even though officially banned. A fine of \$1,000 imposed by Alaska for feeding carnivores in an 8-km strip on either side of the 1,290-km pipeline has been ineffectual (Henning 1976).

## Disturbance and Bear Behavior

Quimby (1974), working in the Canning River drainage of Alaska, found that approximately 70 percent of the grizzly bears observed reacted strongly to aircraft disturbance. Helicopters caused the greatest disturbance. Marked animals, previously captured through the use of aircraft, tended to have the strongest reaction. By the time they were sighted from aircraft, 32 percent of the grizzly bears were already fleeing, several at a distance of 0.8 km and 1 bear at approximately 1.6 km. Grizzly bears appeared to be more sensitive to aircraft disturbance than caribou (*Rangifer tarandus*) or moose (*Alces alces*). Hinman (1974) mentioned that it is extremely difficult to enforce any aircraft restrictions against harassment of bears.

Disturbance of bears in or near dens may have a severe impact. Quimby (1974) found that helicopters could disturb grizzly bears sufficiently to cause them to abandon their dens on the Canning River in Alaska. In a "Statement on Proposed Beaufort Sea Nearshore Petroleum Leasing" (1975, unpublished), Lentfer pointed out, "We do not know how much disturbance bears denning in the wild will tolerate. We know that bears in zoos produce cubs successfully only if completely shielded from noise and visual disturbance for the normal denning period and for an additional several months following parturition." Knight et al. (1976) reported the possible disturbance of a denning grizzly bear in the Yellowstone ecosystem. The radio-marked bear abandoned its den after snowmobile activity nearby.

Research information is generally lacking on how disturbance may affect grizzly bear behavior in the Montana locations proposed for oil and gas leasing. Jonkel (1970) said that under natural conditions the behavior of bears seems recessive or defensive rather than aggressive, and only when hunted or when in close association with man through peculiar circumstances do they become dangerous. Wright (1909) observed that the grizzly was wary and, among other peculiarities, liked seclusion. He noted that grizzly bears would change routine instantly if intruded upon, and if molested to any extent would leave regular feeding grounds. Wright spent 25 years closely observing grizzly bears in Montana and nearby areas.

Geist (1971) said that human disturbances can cause severe alterations in the behavior of animal species, with repercussions on the physiology, population dynamics, and ecology of the animals.

Free-living ungulates, if hunted, stalked, and repeatedly frightened, will flee. This response is likely to

continue for a long time even if all hunting stops (Batchelor 1968).

According to Geist (1971), investigations conducted by agriculturists and experimental psychologists as well as evidence gained in reindeer husbandry and ungulate control in New Zealand give little cause for complacency. The evidence suggests that we should be much better informed on the direct and indirect effects of hunting, tourism, mineral exploration, construction, and harassment by light aircraft.

Geist (1971:417) continued: "For every stimulus the animal appears to attain an appropriate response, which reduces 'indecision'. If something unfamiliar appears, the animal experiences an alarm reaction, and prepares itself physiologically for flight. If severe disturbance follows, it forms an extremely strong aversion toward this object or situation. It (1) becomes excited if the unpleasant object or any evidence associated with it is sensed, and remains excited even after the object disappears; (2) avoids the locality where the disturbance was experienced; and (3) generalizes to all similar objects and localities and avoids them or becomes disturbed upon sensing them."

Pearson (1975) stated that grizzly bear range in the Yukon Territory can support a density of approximately 1 grizzly per 27 km<sup>2</sup>. Populations exist in these densities over a considerable part of the Yukon wherever man has had only limited access. The large areas in south-central Yukon, where human activity has been concentrated since the turn of the century, probably supports a population of about one-half the above density.

The Yukon Territory has an area of 536,466 km<sup>2</sup>. Its resident human population is about 20,000; of this number, about 13,000 dwell in Whitehorse (*The Milepost* 1975). Montana has 380,927 km<sup>2</sup> and about 700,000 human residents. Kalispell, Montana, centered adjacent to Montana's grizzly range, has 11,300 people in the corporate city limits and 20,500 residents in the city zone, a population comparable to that of the Yukon.

## Spin-off Activities Resulting from Oil and Gas Development

Weeden (1971) stated that the present or foreseeable direct effects of petroleum development on animals, vegetation, soil, and water, though important, are insignificant when compared with the eventual secondary effects resulting from economic and population growth stimulated by petroleum extraction. Hinman (1974:161) said, "Perhaps the most profound effect of

the Alyeska Pipeline and oil development in the North in general will be the degree to which this development acts as a catalyst for further development.”

## MONTANA SITUATION

### Logging

In Montana, studies to determine the conflicts between logging and grizzly bears have just begun (Jonkel 1976). Definite answers will not be available for some time. Portions of occupied grizzly bear habitat have been uneconomical to log in the past because the timber extracted would not pay for the road-building. If access roads are built by energy companies, the additional impacts of logging are also likely to occur.

### Recreationists

Although limited information is available on the total numbers of recreationists using grizzly bear habitat, their total effect on the welfare of the bear is unknown at this time. Roads developed for oil and gas exploitation would probably increase the number of motorized recreationists. Many of the roads in bear habitat east of the Continental Divide are the result of past seismographic operations. Some of the roads have been closed by land administrators and many others have been closed through deterioration. Relatively few kilometers of the existing roads are suitable for four-wheel-drive vehicles or all-terrain vehicles. Many of the ranchers within occupied grizzly bear habitat on the Rocky Mountain Front have closed their lands to trespass during hunting seasons to all but horseback or foot travel. This closure has resulted from the many acts of motorized vandalism that occurred in the past.

### Subdivisions

Subdivision on private land has boomed in Montana in recent years. Scenic mountain foothills and river bottomlands are highly susceptible to development if access roads are built nearby. Most counties do not yet have land-planning programs that protect critical wildlife habitat from subdivision. In the localities where major subdivisions are occurring, 93 percent of the subdivisions are not even exposed to public review (*Great Falls Tribune* 1977).

Grizzly bears and subdivision development appear incompatible. For example, in 1976, 1 grizzly bear was credited with breaking into 30 cabins on the North Fork of the Flathead River. East of the Continental Divide on the Teton River, over 50 recent observations of grizzly bears have occurred around a site that has been

proposed for development of a large subdivision. It can be predicted that if much roadless federal land adjacent to private land is leased for oil and gas development, increased conflicts between grizzly bears and subdivision residents and workers will occur to the detriment of the grizzly bear.

### Domestic Livestock

Domestic livestock and grizzly bears have conflicted in the past (Murie 1948, Hubbard and Harris 1960). People generally think of the conflict in terms of grizzly bears eating or killing domestic livestock. Little information has been collected on how domestic livestock may compete with the bear (Border Grizzly Technical Committee 1975). Mealey (1975) described grizzly bear grazing and food habits in Yellowstone National Park. Plant species that appear to be very important in the diet of the grizzly bear are listed as highly palatable, decreaser species that are attractive to livestock, according to federal range management handbooks. East Front livestock may therefore compete with grizzly bears for food, particularly in mesic sites such as creek bottoms (Schallenberger 1976). Time-space conflicts have been reported between cattle and elk (Lonner 1974). The elk moved from their preferred grazing areas when cattle utilized the range. Similar reports have been made for moose (Schladweiler 1974) and bighorn sheep (*Ovis canadensis*) (Irvine 1969). Whether grizzly bears have adverse time-space relationships with cattle is unknown. More intensive research is needed to document livestock-grizzly bear relationships before oil and gas impacts are added to existing pressures in localities used by both domestic livestock and grizzly bears.

### Forest Fires

Forest disclimax created by fire represents important habitat for the grizzly bear (Jonkel and Cowan 1971, Martinka 1972, Schallenberger 1974). Fire suppression policies of this century have had an effect on the grizzly bear, but the magnitude is unknown. Berries, russet buffaloberry (*Shepherdia canadensis*) and huckleberry (*Vaccinium* spp.) among others, are important to grizzly bears in late summer and fall in Montana. These food species apparently thrive in old burns. Wet, quaking aspen (*Populus tremuloides*) habitat types (described by Lynch 1955) near Glacier National Park appear to produce plant species eagerly sought by grizzly bears. Vogl (1969) reported that aspen reproduction is helped by wildfire. More information is needed on the relationships of fire and grizzly bears. If

oil and gas exploitation occurs on forested lands, it seems highly unlikely that natural fire or even prescribed fire will play much of a role in the foreseeable future in locations associated with expensive industrial development structures.

### Wild Ungulates.

Cole (1972) reported that 58 percent of the feeding activities of grizzly bears during the March-May period in Yellowstone National Park was related to feeding or preying on ungulates. Craighead and Craighead (1972) also confirmed that animals weakened by severe winters and carcasses of winter-killed animals formed a considerable portion of the diet of Yellowstone grizzly bears in early spring. This factor may be critical wherever grizzly bears of northwestern Montana are as dependent upon large wild ungulates as those of Yellowstone National Park. Adverse effects of oil and gas exploitation upon wild ungulate populations could thus prove detrimental to grizzly bears. Also, the lack of wild ungulates could cause increased conflict with domestic livestock, which would result in further harm to the bears. More spring surveys are needed to determine existing relationships between ungulates and bears.

### DISCUSSION

Available information indicates that impacts of oil and gas exploitation should be considered primarily detrimental for grizzly bears in northwestern Montana. The greatest impacts appear to result from construction of roads into previously unroaded areas and from increased numbers of people. Past experience indicates that it is very difficult to prevent man-bear confrontations. Recurring confrontations ultimately reduce grizzly bear habitat and populations. If this loss is to cease, new ways to control industrial activities must evolve. Before oil and natural gas leasing proceeds on East Front public lands, we should determine how much wilderness habitat and how many grizzly bears

are going to be lost or affected at levels detrimental to the bear populations because of the *cumulative* impacts of developmental projects.

Hasty exploration and development of oil and natural gas resources could seriously reduce or eliminate grizzly bear habitat and populations. If careful research evaluation of the oil and natural gas situation indicates that grizzly habitat must be exploited, then development of these resources can be conducted under carefully controlled conditions.

The mineral leasing law of 1920 should perhaps be changed so that exploration leases can be granted on public lands, if necessary, without the present automatic provisions for development and production. If exploration shows that reserves are available, then the public could decide whether development and production impacts would outweigh other social costs. Exploration data on public lands should be made available to the public so that the land is not subjected to repeated exploratory activity by the various companies.

The foregoing discussion offers solutions for grizzly bear management. However, development may proceed in some regions of occupied grizzly bear habitat before adequate management data are available on the grizzly bear. If exploitation of oil and natural gas is unavoidable, adverse impacts could be minimized if pilot projects were established adjacent to existing roads, with exploration, development, and production greatly restricted during times when grizzly bears make heavy seasonal use of those areas. Restrictions on spin-off developments would also help to minimize the impacts and measure the effects of oil and gas operations on grizzly bears.

Finally, the long-term cost of protecting unique mountain wildland and resident species such as grizzly bears should be considered in the cost of exploiting oil and natural gas resources. Man must expect to give a little if he is to continue to have grizzly bears in presently occupied habitat.

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