SNOWMOBILE POSITION PAPER

prepared by
BLUEWATER NETWORK
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Snowmobiles

Snowmobiles are vehicles intended for travel primarily on snow, driven by a moving track or tracks in contact with the snow, and steered by a ski or skis in contact with the snow. Some modern snowmobiles are capable of speeds exceeding 100 mph.

Manufactured by the same companies who produce all-terrain vehicles, and personal watercraft, snowmobiles are one of the fastest growing markets of the motorized recreation industry. Approximately 2.3 million snowmobiles are in use today and annual sales are around 170,000 units.[1]

As of today, snowmobiles are permitted in roughly 30 park units, including Yellowstone (WY), Denali (AK), Grand Teton (WY), Voyageurs (MN), and Rocky Mountain (CO). Approximately 180,000 snowmobiles enter the Park System each year in the lower 48 States. Alaskan parks also allow large numbers of snowmobiles.[2]

Snowmobiles are a unique form of winter recreation. They are multiple impact machines that damage air and water quality, area wildlife, natural peace and quiet, public health, and visitor safety. The specific problems associated with snowmobiles have resulted in calls for strict regulations or bans.

Air and Water Quality

Snowmobiles, like personal watercraft and some all-terrain vehicles, are equipped with two-stroke engines. Two-stroke engines discharge up to one-third of their fuel unburned into the environment and are one of the largest unchecked sources of hydrocarbon pollution nationwide.

The concern with this discharge is threefold: the effect of toxic emissions on air quality, the discharge of raw fuel, and the effect of both on water quality.

Snowmobiles emit a number of pollutants including aldehydes, 1,3-butadiene, benzene, and other polycyclic aromatic hydrocarbons (PAHs). All are believed to cause deleterious health effects in humans and animals well short of fatal doses.[3] In the winter of 1995, snowmobiles in

Yellowstone National Park caused decades worth of park-wide automobile pollution.[4] According to engine data from the California Air Resources Board, seven hours of two-stroke engine use produces more smog-forming pollution than a modern car creates over 100,000 miles driven.[5] Snowmobiles create up to 1,000 times more carbon monoxide pollution than a typical car.[6]

Snowmobiles discharge a staggering one-third of their fuel unburned out their tailpipe. Every winter, snowmobiles dump more than 100,000 gallons of raw fuel and 2,500 gallons of raw two-cycle oil into the Yellowstone National Park ecosystem.[7] Nationwide, millions of gallons of raw fuel are dumped into the environment.

Studies confirm that water quality and marine ecosystems can be affected by the toxins released by snowmobiles. Air pollution at trailheads and snowmobile corridors which often run along rivers and streams increases the acidic and toxic concentrations of nitrogen, sulfate and hydrocarbon compounds in snow.[8] Elevated levels of NOx contribute to acid rain and acid snow.

Pollutants from snowmobile emission, including highly persistent PAHs, are "locked" within the snowpack.[9] The toxic effects of accumulated pollutants in the snowpack are magnified during the first few days of spring, when they are released during snowmelt, causing elevated acidity levels in surrounding waterways and resulting in higher death rates for aquatic insects and amphibians.[10] The impact of the spring release of pollutants may have far-reaching consequences for surrounding watersheds. Acidity fluctuations can disable a watershed's ability to regulate its own pH level, which could trigger system-wide problems and result in a long-term alteration of an entire ecosystem.[11]

Hazards to Public Health

The high amount of carbon monoxide released by snowmobiles has raised concern for public health. Common symptoms of carbon monoxide poisoning include dizziness, headaches, concentration lapses, throat irritation, impaired judgment and nausea. After over 1,000 reports by park employees complaining of these symptoms in 1993 and 1994, Yellowstone became the first park to test the amount of carbon monoxide being released by snowmobiles at park entrances. Levels were commonly found to exceed the National Ambient Air Quality Standard (NAAQS).[12] Some levels exceeded those found in cities with the worst air pollution in the country, such as Denver and Los Angeles. Yellowstone now pumps fresh air into fully enclosed ranger stations at the West Entrance, but concern for other park employees, other recreationalists, and gas station attendants still exists.

A study by Lori Marie Fussell-Snook found carbon monoxide pollution to be especially dangerous to snowmobilers who travel behind other snowmobiles.[13] Carbon monoxide readings behind a single snowmobile exceeded the 1 hour Montana exposure limit designated to protect public health.[14] Snowmobilers normally travel in large packs and must wait in long lines at some stations and park entrances. When that occurs, the carbon monoxide pollution and effects are

clearly magnified. Furthermore, the general consensus among medical professionals is that the impact of carbon monoxide exposure increases with increasing altitude. Because most snowmobile use occurs at higher altitudes, risks to human health are greater. Carbon monoxide poisoning may also be contributing to many unexplained snowmobile accidents.

Particulate matter (PM) emissions from snowmobiles present another serious health hazard. According to the EPA, particulate matter, a confirmed human carcinogen, is:

> ... the term for solid or liquid particles found in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Because particles originate from a variety of mobile and stationary sources (diesel trucks, woodstoves, power plants, etc.), their chemical and physical compositions vary widely. Particulate matter can be directly emitted or can be formed in the atmosphere when gaseous pollutants such as SO_2 and NO_x react to form fine particles.

PM is well known for creating smog conditions and causing health problems. Exposure to PM causes breathing problems, respiratory complications, and lung tissue damage. Exposure also causes cancer and can cause premature death. [15]

Wildlife Impacts

Numerous studies document the direct and indirect wildlife impacts attributed to snowmobile use.

To understand the direct and indirect impacts requires an understanding of the impact of winter upon wildlife. Winter is a critical period for wildlife, and is one of several natural regulatory controls on the growth of wildlife populations and on the activity and habitat use of individual animals. As winter progresses, many animals experience a negative energy balance, with more energy being used to survive than is being consumed in the form of forage, which makes their energy use patterns of critical importance. Any perturbation, natural or unnatural, to an animal's energy balance or stress level can have a substantial effect on survival and productivity, and can impair immune functions.[16] While winter climate itself, particularly snow, has an enormous impact on animal energy expenditures and stress, that impact is exacerbated by snowmobiling and trail grooming, due to the disturbance they cause to many species of wildlife. This increased stress threatens an animal's survival.

Direct impacts include the harassment, chasing, and killing of wildlife.[17] Coyotes, wolves, deer, and other wildlife have been brutally killed as a result of irresponsible and illegal snowmobile use. In Norway, two men were recently convicted for chasing a polar bear with snowmobiles.[18] The men received the heaviest fines ever imposed for disturbing a protected species. Here in the United States, the US Fish and Wildlife Service and Minnesota wildlife officials are investigating

the shooting death of a timber wolf.[19] Several witnesses saw a snowmobiler drive his vehicle directly into a pack of wolves feeding on a deer. The snowmobiler shot the wolves, fatally wounding one and possibly injuring others.

Direct impacts also include increased animal flight response, as documented in a number of species, including elk and mule deer.[20] Noise produced by snowmobiles, according to the Environmental Protection Agency, acts as a physiological stressor producing changes similar to those brought about by exposure to extreme heat, cold, or pain.[21] During winter, when energy expenditure is extremely important to an animal's survival, an additional stressor such as noise can throw off an animal's energy balance. Excessive noise is a serious threat to predator-prey relationships, mating, reproduction, raising young, and staking out territories.[22] These impacts also occur from great distances. A study by a team of Canadian scientists found that large ungulates such as caribou are disturbed by snowmobiles from distances of over 1250 feet.[23]

Indirect impacts are numerous and exert a considerable impact on wildlife, including birds, large and small mammals, and imperiled species. Groomed trails alter the critical energy use patterns of animals in the winter, which can disrupt population dynamics, movement and distribution patterns, habitat use, and, particularly in the case of Yellowstone bison, survival. Trails and roads allow bison and other species greater winter maneuverability.[24] Wildlife which utilize groomed roads to save energy and hunt are at a tremendous advantage over those that do not, which disrupts predator-prey relationships. This allows them to go beyond park boundaries, which for bison, has happened in record numbers over the past few years. Once outside park boundaries, bison are shot to stop the alleged transmission of brucelliosis to cattle (even though transmissions have never been documented in the wild).

Endangered and threatened species such as grizzly bears, gray wolves, bald eagles, and lynx have been found to be adversely impacted by snowmobile use as well.[25] Even though grizzlies den during the winter, indirect impacts of snowmobiles may reduce the amount of food sources (mainly carrion) on which grizzly are dependent during their crucial feeding time after den emergence.[26] The lack of access to carrion potentially results in reduced bear productivity and survival. Other sensitive species threatened are trumpeter swans, elk, and mule deer.[27]

Snowmobile compaction on off-road trails has serious adverse impacts on small mammals who live beneath the snow. Their habitat is compacted by the grooming of a trail or a road, or by one or more snowmobiles creating a packed trail on an ungroomed road. Compaction reduces the temperature of the interface between the snow and the soil and increases thermal conductivity.[28] These temperature changes may significantly decrease the winter survival of small mammals, which may result in broader ecological impacts, including disruption of predator/prey interactions. The compaction might also cause suffocation and death of small mammal as well as habitat fragmentation..[29]

Impacts on Vegetation

Several studies reveal that snowmobiles can have harmful impacts on vegetation, including saplings, shrubs, and grasses. Saplings, pine, and white spruce have a high sustained rate of severe damage, and even death, after passes by snowmobiles.[30] Snow compaction affects vegetation productivity and growth, organic matter decomposition, humus formation, and microbial activity, by decreasing soil temperature and slowing snowmelt.[31] In Alaska, the Denali Park Service found that traces of snowmobile trails existed long into the summer.[32]

Disruption of Natural Peace and Quiet

Land management agencies recognize that motorized recreation is destroying natural peace and quiet.[33] In the National Parks, "natural quiet" is a protected resource defined as the "sounds produced by the natural and cultural components of the park."[34] National Park Service policy mandates that the Park Service "strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources of the parks."[35] The Park Service must monitor, prevent or minimize unnatural sounds that adversely affect park resources or a Park's "scenic and aesthetic values," or which disturb Park users. To achieve these standards, "the operation of motorized equipment or sound devices that create unreasonable audio disturbances will be prohibited."

Snowmobile noise research conducted at the Pictured Rocks National Lakeshore revealed the unique and disruptive sound characteristics of these machines.[36] At Voyageurs National Park, noise from a single snowmobile could be detected from a distance of 400-600 feet depending on the terrain (flat or rolling), and from five snowmobiles noise could be detected at 800-1000 feet.[37] At Grand Teton National Park, noise from a group of 12 "quiet available" snowmobiles was still audible up to 11,000 feet from snowmobile trails.[38]

Based on noise characteristics alone, snowmobiles are incompatible with other forms of winter recreation such snowshoeing, cross-country skiing, wildlife observation, and hiking to enjoy natural sounds. A recent poll conducted by Colorado State University found that 95% of Americans rated the protection of natural peace and sounds as either somewhat or very important.[39] This same poll revealed that 9 out of 10 respondents indicated that snowmobiles in the National Parks should be banned or severely limited.

Safety Concerns

Snowmobiling is a dangerous sport. Some new models can exceed 100 mph. Over winters of 1994-1999, 535 people were killed on snowmobiles in the upper Midwest. In 1998, 32 people died in snowmobile-related accidents in Minnesota alone.[40] Nationally, 15,000 people were

treated in emergency rooms for snowmobile-related injuries in 1998.[41] These come at an enormous cost to families and society at large, with the mean hospital visit to treat snowmobile accident victims costing approximately $16,227.[42] What's more, the In Yellowstone National Park, Park Service data demonstrates that during the winters of 1995-1998, snowmobiles were involved in 67% of all motor vehicle accidents despite representing less than five percent of all motorized vehicles.[43]

A recent study in Alaska by Dr. Michael G. Landen of New Mexico State University found that people who snowmobile frequently are almost nine times more likely to suffer death or injury in accidents than automobile drivers on a per mile comparison.[44] Landen's report confirms that snowmobiles cause an extremely disproportionate number of casualties. During the winter of 2000-2001, 43 percent of all snowmobile fatalities in Michigan occurred on groomed trails.[45]

The dramatic advances in snowmobile power, weight, and traction, coupled with the industry message to "conquer" the mountain by driving up steep faces have made snowmobilers the US's likeliest victims of fatality by avalanche. During the 14 winters from 1985 to 1998, more snowmobile operators died in avalanches than did any other user group, and avalanche fatalities are on the rise.[46]

The National Park Service is required to regulate activities in order to ensure the safety of park visitors. The Park Service's Management Plan states that the:[47]

> ... Park Service will not allow a recreational activity in a park or in certain location within a park if it would involve or result in ... unacceptable levels of danger to the welfare or safety of the public, including participants.

Conflicts with Other Users

Snowmobiles have a considerable impact on other recreationists. In surveys by the Greater Yellowstone Coordinating Committee, Grand Teton, and M. Littlejohn of the University of Idaho, the noise, pollution, and number of snowmobiles was frequently reported by survey respondents as "what they liked least" about their experiences.[48] The Grand Teton survey found that 96 percent of respondents thought that snowmobiles had a negative impact on Grand Teton because of noise, pollution disturbance to wildlife and habitat, and conflicts with skiers.

Snowmobiles present a danger to non-motorized recreationalists, especially crosscountry skiers and snowshoers. While traveling at high speeds on winding trails, it is difficult for snowmobile operators to tell whether a slower moving skier or snowshoer is ahead. This problem is compounded during night operation because braking distances far exceed the range of standard snowmobile headlights.

Solutions

Regulation of two-stroke engines:

Two-stroke engines are outdated. In other vehicles, such as automobiles and motorcycles, such inefficient motors have been phased-out by the Environmental Protection Agency (EPA) since 1972 in favor of cleaner and newer technology. Two-stroke engines are tremendously more polluting than the average car on the road today. According to the California Air Resources Board (CARB), a typical two-stroke used for only seven hours creates as much smog-forming pollution as driving a car for more than 100,000 miles.[49] Recently, CARB and EPA have taken strides to tighten regulations on two-stroke marine motors. In 1991, CARB began regulating off-road vehicles, with snowmobiles as a category. Currently, the EPA is developing emission regulations for snowmobiles. Final regulations are expected by the end of 2002.

Bluewater Network is working with EPA and CARB to develop strong regulations. Current technologies used for other recreational vehicles are four-stroke, direct fuel injected and catalyst engines. Despite the regulation of two-stroke engines in other recreational vehicles, snowmobile manufacturers have yet to design or market a snowmobile which utilizes cleaner technology. If manufacturers do not voluntarily begin to build cleaner products, regulators will have to force technological improvements in order to protect the environment.

Restrict use in certain areas

Snowmobile use is inherently incompatible with National Park System, as well as other wilderness areas. The adverse impacts of snowmobiles on air, water, vegetation, wildlife, and public safety demonstrate that there are some areas in which snowmobiles do not belong. Because snowmobiles are incompatible with the very mandates, missions, and concepts of wilderness areas, a full ban on the use of snowmobiles, except in the case of emergency vehicles, search and rescue vehicles, and agency use, is essential..

The Greater Yellowstone Coordinating Committee, Grand Teton National Park, Rocky National Mountain Park, Lassen Volcanic National Park, Acadia National Park, Theodore Roosevelt National Park, Voyageurs National Park, Denali National Park, and Glacier National Park have all examined snowmobile use and found it to have negative impacts on air quality, wildlife, peacefulness, and on visitor experience. Acadia, Lassen, and Glacier have determined the effects to be so consequential that they have prohibited snowmobiles. Yellowstone is in the midst of doing an environmental impact assessment.

In other areas, such as U.S. Forest Service lands and other parks, the issue of snowmobile use needs to be examined. The managing agencies need to make a determination as to whether such use harms the land, and whether such use should be prohibited or strictly regulated.

Recreationalists, environmentalists, governing bodies, and others must join together to recognize that thrills for a few should not become a safety and environmental hazard for the majority.

END NOTES

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[2] National Park Service Snowmobile Survey. 1999.

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[4] Calculation based on figure from the U.S. Environmental Protection Agency, California Air Resources Board, and the National Park Service.

Snowmobile Hydrocarbon Emissions: [60,110 snowmobiles entered Yellowstone last winter] x [5 hours average ride] x [216 grams per horsepower-hour of snowmobile hydrocarbon (HC) pollution] x [100 average horsepower] x [0.8 load factor] = 5,193,504,000 grams of HC pollution = 11,439,436 pounds of HC pollution.

Automobile emissions: [961,409 automobiles entered Yellowstone last year] x [120 miles average distance] x [.8 grams per mile of automobile HC emissions] =92,295,264 grams of HC pollution = 203,293 pounds of HC pollution.

[11,439,436 pounds of HC pollution] / [203,293 pounds of HC pollution] = 56.

[5] Based on current CARB data: http://www.arb.ca.gov. April 15, 2002.

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[7] Raw fuel emissions are calculated using EPA data which confirms that 25% of the fuel "consumed" by a two-stroke engine is emitted "out the tailpipe" unburned.

Calculation: [220,000 gallons of fuel] x [.25 emissions percentage] = 55,000 gallons of fuel.

Sources: According to the Montana Department of Environmental Quality, service stations within Yellowstone National Park pumped 220,000 gallons of fuel for snowmobile use during the winter of 1995. The United States Environmental Protection Agency confirms that 25-30% of the fuel "consumed" by two-stroke engines (which power snowmobiles), enters the environment, unburned, "out the tailpipe."

55,000 gallons is an extremely conservative estimate based on fuel purchased within the park only. A large percentage of visitors fuel their machines outside park boundaries. Unburned fuel emissions are even more staggering if we consider the following calculation: if each visiting snowmobile burns only one tank of fuel (10-12 gallons), each machine dumps roughly 3 gallons of raw fuel into the park per visit. The 60,000-70,000 snowmobiles visiting Yellowstone every year therefore dump closer to 180,000-210,000 gallons of unburned gasoline and motor oil directly into the park ecosystem.

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