

MANAGING FOREST ACCESS ROADS TO MEET WILDLIFE AND FISHERIES OBJECTIVES

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ABSTRACT - A limited number of forest access roads are needed to assist wildlife managers meet their objectives. More roads than this can become a significant detriment to wildlife populations. In this paper we briefly review problems associated with the proliferation of forest access roads in British Columbia. These include affecting wildlife and fisheries by habitat alterations, harassment, changing animal behaviour, displacement, disrupting predator/prey dynamics, encouraging other uses, plus increasing direct and indirect mortality. We then discuss the solution; access management education, planning, and implementation.

INTRODUCTION

The most significant effect of forest management on wildlife and fish populations is through altering the abundance, quality, and spatial relationships of habitat. Timber management, however, can have significant and long term impacts in other ways. In some portions of North America, the development and maintenance of forest access roads may be as important as altering habitat. In this paper, we review concerns of increasing vehicular access in portions of British Columbia and methods being employed to address this issue.

PROBLEMS

We do not view all forestry access roads as problems; many, if not most, help us meet management objectives. First and most importantly, these roads enable people to quickly and easily leave the confines of their homes and enjoy a variety of outdoor activities. This, of course, gives added value to forested lands and in turn, greatly increases public awareness of management issues. In some locations easy access may assist fish and wildlife managers to enhance habitats, and by distributing people, increase total harvest or viewing opportunities and thus recreational value.

As the number of roads proliferate, however, the law of diminishing returns takes effect. The benefit of each new road decreases and eventually, access roads become a problem (Figure 1) and a serious one for some species. In many portions of British Columbia, we have passed the inflection point (Figure 2).
Effects on Fish and Wildlife

Forest access roads can have a negative effect on fish and wildlife by altering habitat, harassment, changing animal behaviour, displacement, disrupting predator/prey dynamics, encouraging other uses, plus increasing direct and indirect mortality.

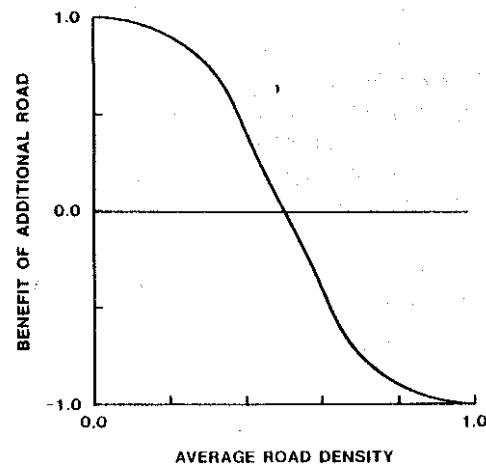


Figure 1

A hypothetical relationship between the benefit of a new road to wildlife and fisheries management and the average road density in the area.

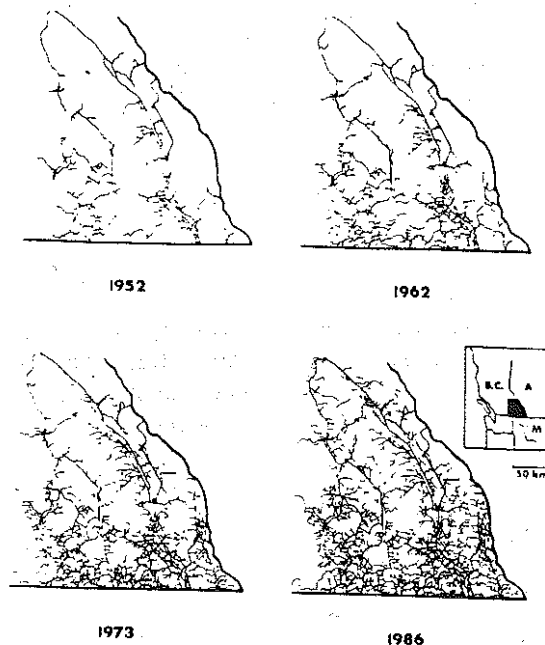


Figure 2

Maps of two wheel drive access road development in the Kootenay Region of British Columbia between 1952 and 1986. Dead-end roads entering cutting units or residences are not included (from McLellan 1990).

Habitat Alteration - Within cutting units, skid roads, secondary roads, and landings can account for approximately 20%, 6%, and 3% of the area respectively (Thompson 1988). Secondary roads leading to cut blocks increase their area of influence. Although roads alter a relatively small amount of habitat, their influence can be dramatic and more often than not, permanent. Although animals use roads for travelling, sunning, dusting, and obtaining crop gravel, road surfaces, unlike cut openings, are non-habitat for feeding and cover and generally result in a net habitat loss. The fact that forest roads are often constructed at the base of slopes or adjacent to streams or water bodies results in alteration or loss of important stream side or riparian vegetation. Additional impacts on wildlife habitat in these areas can occur from increased use of riparian margins by the general public. Additionally, increased access often results in the removal of snags adjacent to forest roads by firewood cutters (Lyon 1984), particularly where larch (*Larix occidentalis*) is found.

Road margins are sometimes seeded to grasses and legumes for erosion control and several animal species are attracted. Forage value may increase and be beneficial, but attracting animals to roadsides may result in increased mortalities due to collisions or shooting.

Roads also affect fish. In addition to catastrophic discharges of sediment resulting from major washouts and grade failures, even well constructed roads, landings and trails gradually produce sediment and will do so for as long as they exist. Because fine sediments in spawning or rearing redds reduce fry emergence and survival, the continual erosion of exposed road surfaces has significantly reduced fish carrying capacity.

Harassment - Most animals flee when people or machines approach too close. The significance of this remains uncertain, but for smaller species, it is probably minor or even non-existent. Reactions by larger animals will depend on many variables including the distance between vehicle and animal, amount of cover, and the animal's past experiences (Singer and Beattie 1986). Animals using open cutting units in hunted areas usually have strong reactions to vehicles and these disrupt normal activities, are energetically expensive and result in incomplete use of cutting units.

Change in Behaviour - Animals habituate to human activities provided these are frequent and innocuous (Geist 1970). Use of roads and road sides by large mammals in national parks is a clear case of habituation. Outside of parks, animals may also

habituate to traffic in winter, spring and summer. Habituation permits more complete use of the habitat, however, it makes animals more vulnerable to legal and illegal hunting. This may be of concern for species such as caribou and grizzly bears which are sensitive to overharvest.

Displacement - The significance of harassment is limited because vehicles on roads are predictable in space and time. Animals usually avoid roads by enough distance so they are not disturbed by a passing vehicle. The amount of displacement depends on cover in the form of vegetation, topography, or darkness (Lyon 1979, McLellan and Shackleton 1988), traffic volume (Perry and Overly 1976), and the degree of habituation. The significance of displacement depends on how limiting are habitat that the animals are displaced from. In general, as road density increases, animals find fewer areas to move into and populations decrease.

Changing Predator/Prey Dynamics - It has been suggested that an antipredator strategy of woodland caribou is to space out to a level where wolves are not an efficient predator (Bergarud et al. 1984). During winter, snow, except when crusted, decreases the efficiency of wolves and thus caribou can become more concentrated than during other seasons. There is concern that snow machine trails on roads permit wolves access to and throughout caribou winter ranges and consequently, they can become very efficient. Because wolf numbers can be maintained in an equilibrium with moose or deer, brief seasonal shifts to caribou may greatly reduce or even eliminate these vulnerable animals.

Increased Mortality - Because the majority of forest roads are not designed to promote high-speed traffic, mortality caused by collisions is not usually an important consideration (Lyon 1984). Forest roads do increase the efficiency of legal and illegal hunters and fishermen. Legal harvest can be reduced by changing season length and timing, age/sex/size restrictions, equipment or bait restrictions, or by limiting the number of permits. Increasing road access also improves the efficiency of illegal hunters or fishermen and, given a fixed number of enforcement officers, decreases the number of officers per distance of road, and thus decreases the probability of being caught. If managers consider the hunting or fishing kill to be excessive, it is relatively easy to reduce the legal take. Once an area is accessed to where illegal kill alone is excessive, it becomes very difficult and expensive to reduce mortalities. For species such as caribou and grizzly bears that are both vulnerable to illegal killing and have low reproductive rates, access is an important factor

that may determine their continued existence in some locations (McLellan 1990).

Cumulative Effects - Forest access roads not only open an area to hunters, fishermen, and other recreationists, but also to squatters, permanent settlers, ranchers, and other resource extraction industries. These more permanent activities can have very significant impacts on several species.

Effects on the Variety of Opportunities

Forest access roads not only impact fish and wildlife populations and how we manage them, they also effect recreational opportunities available and industries such as guide and outfitting and trapping. In general, an increase in access results in a decrease in opportunities for "wilderness" types of recreation. This type of recreation demands a low density of users as much as it demands a pristine environment and a lack of motorized use. To manage for an increasing demand for wilderness recreation with the constraints of current commitment on the land base, access management is a way of integration by compromise. Although far from pristine, a well planned forest development with access control can provide a wilderness type experience to many people.

Because road access improves the efficiency of hunters and fishermen, increased access must be matched with more restrictive harvest regulations in many locations. Managers have a variety of options when faced with limiting harvest. Access management is a method which not only reduces take, but increases the variety of opportunities available to sportsmen.

SOLUTIONS

Access planning and management is the solution to the problem of forest access road proliferation. Although it may sound simple, it is not. Access planning and management involves a high level of public education and involvement plus the financial cost of closing and maintaining road closures. Changes in legislation in British Columbia may also be required for proper enforcement of road closures.

Public Education and Involvement - Initially, most people fail to realize that the access roads they use to get to wild country will eventually eliminate the wilderness they seek. Most hunters and fishermen also fail to see the connection between increased access and more restrictive regulations. Conservationists are often unaware of the overwhelming effect that access has on some sensitive species. Without understanding these relationships, most people do not want access

management. Because public backing and involvement is essential to develop and implement an access plan, public education is most important. An education program involving public presentations plus involvement in schools and with the media is needed. Even with an educated public, signs must be used to inform people why an access management plan has been implemented and even why specific roads have been closed.

Planning - Access management cannot be done on a road by road, ad hoc, basis. In British Columbia, the Ministry of Environment and Ministry of Forests have worked together to develop a comprehensive planning process that serves to encourage public involvement, increase awareness, and provide the flexibility of access management for all recreational and industrial uses. The process, called "Coordinated Access Management Planning" (CAMP) has been in practice since the early 1980's and has been implemented in several areas of the Province.

Closing Roads - Depending on the type of road and the purpose of closure, two main types of closures can be used: general closures that prevent all vehicles from passing or selective closures that only stop some vehicles or may restrict access seasonally.

Closing roads to all vehicles usually involves physical blockage. If a road is not required for a considerable length of time (>30 years), or has inherent environmental problems, the best solution may be to "put the road to bed". This involves stabilizing the surface by removing all water crossings, cross ditching (water bar), and grass seeding. The road may be permanently removed and the site recontoured and returned to forest. Less extreme physical closures include removing bridges, digging deep ditches or "tank traps", making "Kelly Humps" by alternately raising and lowering a bulldozer blade to create a series of large mounds, placing barriers such as large rocks, and partial recontouring (about 100 m) have proved effective for most vehicles if strategically located. The type of physical closure will depend on terrain, objectives, and funding. In general, the longer the road or more desirable the destination, the greater effort people will make to get past closures. Most physical closures require periodic maintenance.

Selective closure are more difficult to maintain than general closures because some people dislike being restricted when others can pass. Rules governing people permitted to pass must be enforced or support for access management may be severely compromised.

Gates, in conjunction with signs, are selective

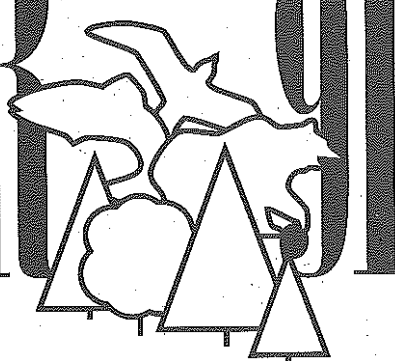
closure that work well in an industrial area. Sign only closures are also used but appear to only work well in locations without a desirable destination. Sign only closures for hunters, although violated from time to time, greatly reduce the number of vehicles using a road.

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