

Ungulates, Highways and National Parks Or 'The Mountain Goats of U.S. 2'

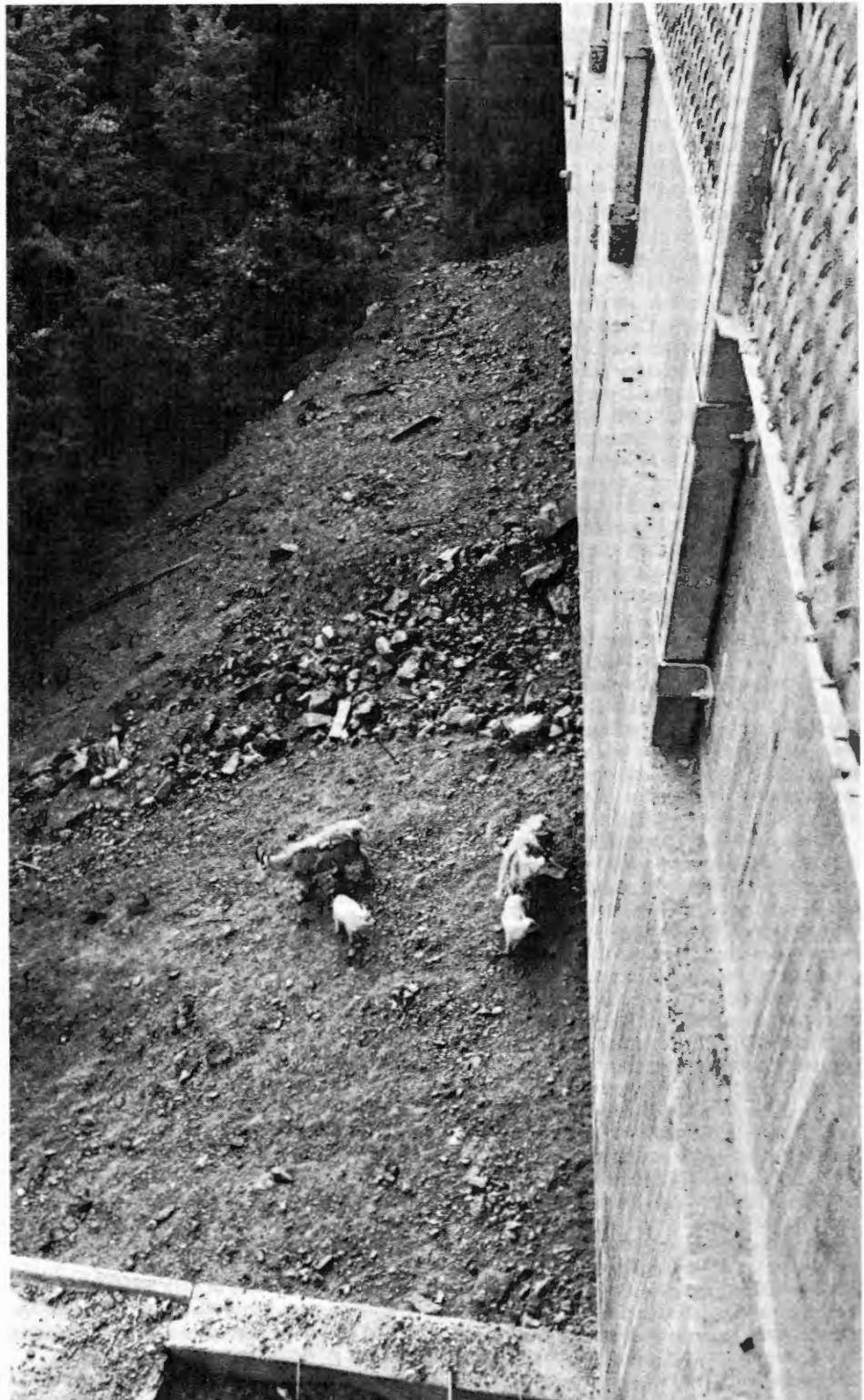
By Francis J. Singer, Cathy Pedevillano, and R. Gerald Wright

A problem common to all National Parks is to provide for visitor access yet protect natural resources from undue human disturbance. Wildlife in parks is particularly vulnerable to disturbance and mortality along park roads that traverse winter range or wildlife concentrations areas. This is especially true when roads carry through-traffic at high speeds. This paper presents some of the results of studies dealing with the reconstruction of U.S. Highway 2 in Glacier NP past a mineral lick extensively utilized by mountain goats. The findings of other published studies and the highway-ungulate observations of the senior author in the Rocky Mountain National Parks of western Canada (Banff, Jasper, Yoho, Glacier, Kootenay), also are discussed.

U.S. Highway 2 traverses the extreme southern tip of Glacier NP for a distance of 4.5 miles. There it bisects a movement corridor used by mountain goats seasonally travelling to and from a mineral lick located on the banks of the Middle Fork of the Flathead River. U.S. 2 is the only northern highway across the Continental Divide in Montana and it carries heavy truck traffic. Highway reconstruction in 1966 excluded the Glacier NP section, leaving the road there sinuous and narrow. This section of road was more difficult to negotiate and to keep clear of snow and ice than adjacent sections, and had a higher accident rate.

Visitors stopped along the roadway to view goats on the lick and probably had done so ever since the highway was constructed. In 1975 it was estimated that 64,000 people visited the goat viewing area and about $\frac{2}{3}$ probably saw goats. The area ranked as the second highest visitor use area in Glacier and affords the most significant mountain goat viewing area in North America. Studies of the road environment and the mountain goats in this area began in 1975. Although the very low average vehicle speeds (25-28 mph) past the lick area enabled drivers to stop for goats, still 13 near hits were observed, indicating the high potential for goat mortality if highway speeds were increased. The construction plan called for a design speed of 45 mph or greater, and therefore crossing facilities for mountain goats were considered mandatory. Constructing a highway bridge that allowed mountain goats to pass beneath seemed the best solution.

Many ungulates, e.g. mule deer, elk, white-tailed deer and caribou, will use underpasses, although pronghorn antelope will not. A goat overpass over the highway was rejected due to numerous safety hazards associated with such a structure on Trans-Canada 1 in Glacier NP, British Columbia. The hazards included shading of the pavement, black ice, and goat mortalities at the entrances. During highway reconstruction, a specially designed goat underpass was built and a second bridge over a canyon was altered to accommodate goat passages. The construction also included restrictive fencing upslope and a sheer wall downslope to eliminate goat access to the highway and cause them to use both underpasses. NPS management objectives and the high visitor use dictated that people be allowed access to view goats even though they tended to disturb the crossing goats, and their slow driving (or stopping) on the highway posed a conflict with faster through



Mountain goats are shown here using one of two highway underpass structures, Goat Bridge and Snowslide Bridge. The bridges afford goat movement downhill to the Walton Goat Lick in Glacier NP and uphill away from the lick. Cyclone fencing and retaining walls prohibit goat crossings of U.S. Highway 2 except under the bridges or around the ends of the structures.

traffic. To alleviate these problems, a new viewing site was constructed, away from the underpasses, consisting of a parking area with safe entry to and exit from the highway and a foot trail leading to an overlook viewing the lick.

Visitor use of this new goat viewing area was monitored in 1983 and 1984 after all construction was completed. Approximately 34 percent of all vehicles travelling Highway 2 pulled off into the parking area from May to September of both seasons. Visitors using this area numbered 73,660 in 1983, and 83,860 in 1984. About 63 percent of all visitors who used the parking area took the trail to the overlook to view goats. Visitors remaining in these designated areas did not disturb mountain goats utilizing the underpasses or mineral lick. Although use of this goat-viewing area was considerable, the problem of visitors and vehicles stopping on the highway during goat crossing remained, although at lower levels than before reconstruction. Eliminating highway shoulders near the bridges and temporary barricades and signs may alleviate this problem.

Reactions of the goats to the construction activities and artificial barriers were monitored during 1980 and 1981. During construction, goats initially hesitated in front of, butted, or attempted to crawl under temporary fences placed across their trails. However, goats eventually drifted with the fences, and within weeks, the rate of hesitations and physical contact became negligible. No physical injuries to goats occurred during construction, although eight groups inadvertently entered gaps in temporary fencing and were trapped for periods up to six hours; one of these groups eventually jumped off of the eight foot high wall. During the construction period mountain goats seemed undisturbed while at the lick. In comparison to the pre-construction data from 1975, the number of hesitations, runbacks and altered routes per crossing attempt declined by about one-half. Instead of ceasing to visit the lick by early August, a few goats in 1980 extended their visits to the lick throughout the fall and winter.

This increase in crossing frequency and success may have been due to the fact that goats always were allowed open access across the road during construction. Blasting was restricted to 0800-1200 hr. when few goats crossed the road; construction activity was not conducted in the main crossing area during key times (0600-0730 hr., 1800-2200 hr.; and between Aug. 15 and Oct. 1), traffic was stopped for crossing goats, and few visitors exited their vehicles. This reduction in vehicle speeds and in interference by visitors was more significant to crossing goats than the additional drillings, blasting, bulldozers and other operating equipment and construction workers.

Immediately following construction, mountain goats readily accepted the two new underpasses built for them. A total of 99.4 percent of observed goats used the underpasses; highway crossing success increased by 16 percent; the number of hesitations and runbacks per crossing attempt further declined; the incidence of erect tails, which indicate fear, declined in crossing goats, and the number of lick visits per goat per year doubled after completion of the underpass. The extension of lick visits into winter and doubling of lick visits per goat per year was interpreted as a return to more natural conditions following the underpass construction.

By 1983 and 1984, the mountain goats were well habituated to the crossing structures and 100 percent of all observed goats used the underpasses to cross the highway. Loud vehicles passing by and people stopped on the bridge presented the greatest distur-

bance to crossing goats, and would sometimes result in hesitations, runbacks, delayed crossings, and erect tails. These reactions occurred less frequently after the underpass construction than before. Goats seemed to prefer using the highway bridge underpass which afforded greater visibility, but would sometimes switch to using the goat bridge when confronted with high levels of vehicles and visitors. During undisturbed crossings, mountain goats would often dustbathe, bed or lick eroded road salts underneath the bridges. Lick visits continued to extend into winter as several goats began using the lick in April of 1983 and February of 1984.

The guidelines for ungulate crossing facilities used in this study were based upon other work with mule deer, elk and caribou. They include: (a) where average highway speeds exceed 35 mph, crossing structures are often justified for safety reasons, (b) underpasses or other crossing structures should not be confining (24 feet $\times$ 24 feet for mule deer, 12-24 feet $\times$ 24 feet plus for goats), (c) the visual window presented by an underpass should be as large as possible, (d) crossing structure should be placed on a natural movement route, (e) fencing should parallel rather than bisect movement routes and should be totally restrictive, (f) park visitors should be restricted from the crossing structures to the maximum extent possible, (g) cover or shielding near the entrance to the underpass or other crossing structure will increase

its acceptance by ungulates.

Acceptance of the Glacier highway underpasses by mountain goats is among the highest known for any free-ranging ungulate herd. In the first year of use, 99.4 percent of all goats used the underpasses with only 550 feet of lead-in fencing. Only 61% of a mule deer herd used a more confining underpass with two miles of fencing on I-70 near Vail, Colo., and 15 miles of lead-in fencing were required on I-80 in Wyoming to force mule deer to use the crossing structures.

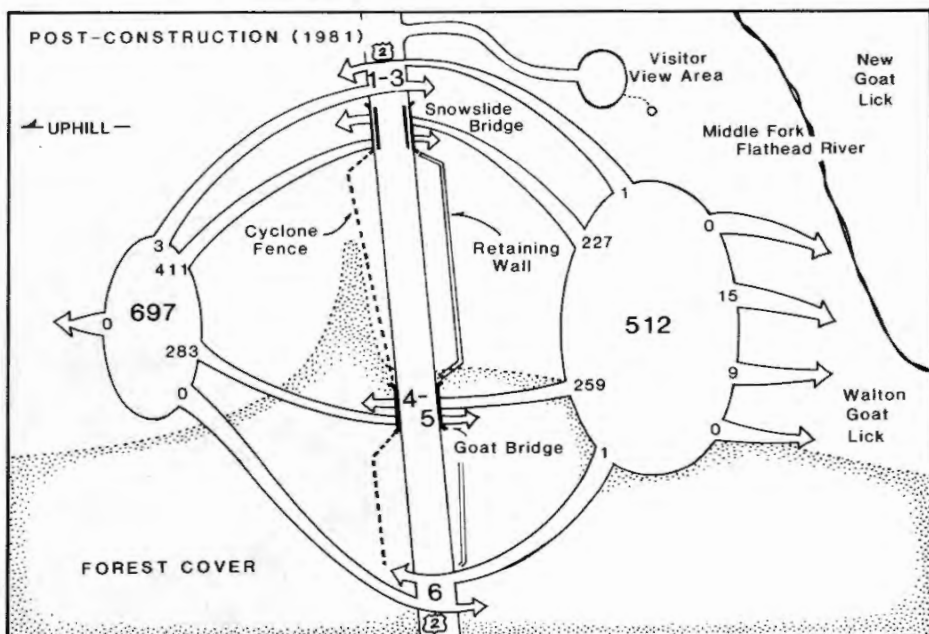
We attribute the high acceptance of the underpasses on U.S. 2 to strict adherence to the above guidelines and to the step-wise progressive construction of the facilities. The high number of lick visits per year for each goat also provided them the opportunity to encounter the facilities repeatedly and to adapt to them. Protection of goats from hunting and harassment also contributed to goat adaptation.

The need for ungulate highway crossing facilities in national parks is evident from the above examples. These should be seriously considered whenever large numbers of visitors and vehicles travel through ungulate concentration areas to insure the safety of both humans and wildlife.

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Off-highway mountain goat viewing area affords visitors in Glacier NP the opportunity to see the goats without running the risks entailed in trying to observe from the highway.



Two goat bridges under U.S. Highway 2 and a new, off-highway visitor viewing area deal with the problems and opportunities presented by mountain goats and an established salt lick in Glacier National Park.