

**Wildlife and Wildlife Habitat Impact Issues and  
Mitigation Options for Reconstruction of U. S.  
Highway 93 on the Flathead Indian Reservation**

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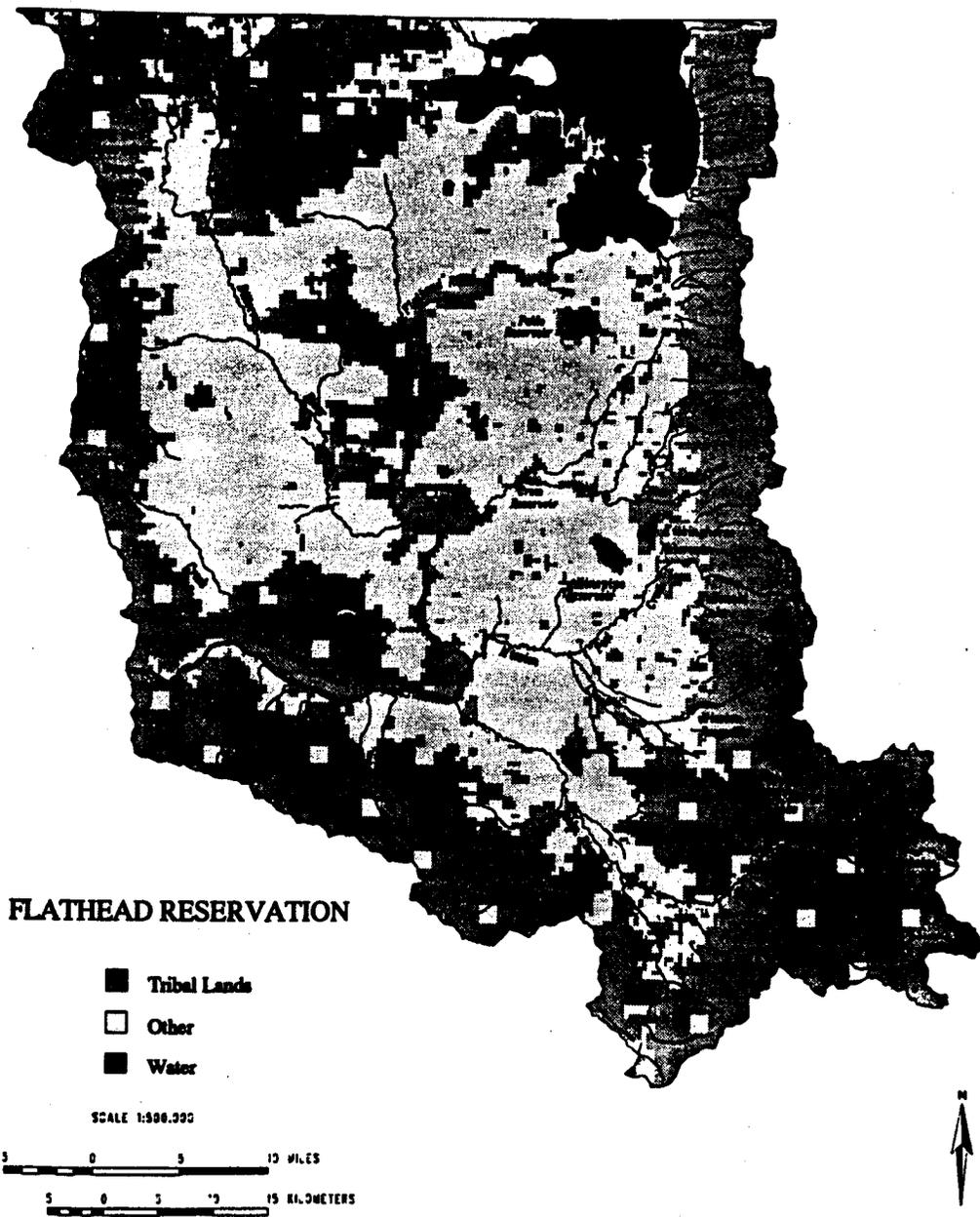
**Introduction**

Highway 93 is a major north-south federal highway, extending approximately 2,995 km (1,860 mi) from Jasper, Alberta southward through British Columbia, Montana, Idaho, Nevada and Arizona to its southern terminus at Phoenix. The highway's notoriety as an often slow, narrow, winding two-lane highway has been celebrated in a National Geographic Magazine article in 1992 and a 1995 Public Television Service documentary, along with countless articles, editorials and letters to editors. This paper examines the wildlife and wildlife habitat issues and mitigation proposals involved with the proposed reconstruction project for a 90.6 km (56.3 mi) segment of the highway located on the southern portion of the Flathead Indian Reservation.

**The Flathead Indian Reservation**

In 1804, when the Lewis and Clark Expedition passed through the area, they were welcomed by the Salish people. Later, under the Hellgate Treaty of 1855, the Tribes relinquished aboriginal land ownership claims to some 24 million acres of western Montana, northern Idaho and eastern Washington in exchange for a permanent homeland set aside for their exclusive use in what is today western Montana.

The opening of Reservation lands for non-Indian settlement in the early 1900s resulted in Indian ownership of only a small percentage of their Reservation (Fahey 1974). Given those events and continuing constant assaults on the natural resources of the Reservation and the cultural identity of the Tribes, the Tribal government has embarked on an active effort to re-purchase the land base of the Reservation and manage their natural resources. The Tribes and the approximately 6,843 Tribal members currently own approximately 60 % of the land base of the 1.25 million acre Reservation (Figure 1). The remainder of the land base is owned by the federal and state government and 16,130 non-Tribal members who reside on the Reservation (Federal Highway Administration and the Montana Department of Transportation 1995).



**Figure 1. Current land ownership (Tribal and Non-Tribal) of lands within the exterior boundaries of the Flathead Indian Reservation.**

The natural resources of the Reservation provide a strong economic base for the Tribes. The fish, wildlife and plant resources also provide for many subsistence and cultural needs of Tribal members. As a result, the Tribal government places a very high priority on sound natural resource management, not only for the current generation, but for generations to come.

### The Proposed Action

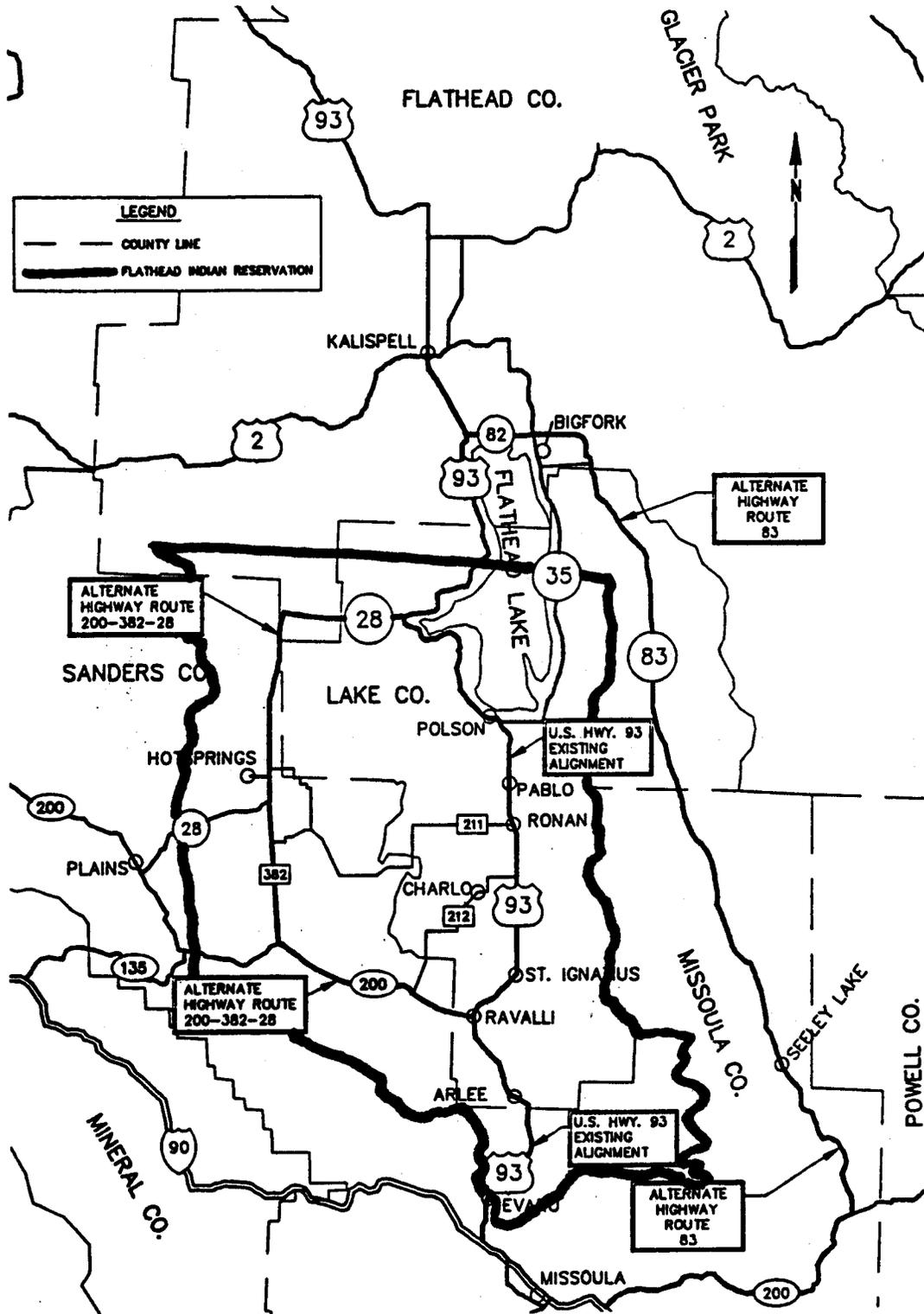
As stated in the Montana Department of Transportation's Draft Environmental Impact Statement (EIS) for the Highway 93 Reconstruction Project (Federal Highway Administration and the Montana Department of Transportation 1995), "the purpose of the proposed action is to improve the transportation system on U. S. Highway 93 (US 93) from Evaro, Montana (approximately 6.5 miles north of Interstate Highway 90 near Missoula, Montana) through Polson, Montana (a distance of approximately 56.3 miles) Figure 2)." The document further states that " Highway improvement that will preserve and enhance US 93 is needed because of its importance to the transportation system of Lake and Missoula Counties, the Flathead Indian Reservation, western Montana and the western United States.

Specific concerns cited in the EIS include 1) the need to meet current design and safety standards; 2) reduction of substandard curve designs; 3) reduction of substandard vertical sections of the highway; 4) repair of inadequate shoulder width; and 5) replacement of inadequate storm runoff systems on the highway.

Current Average Daily Traffic (ADT) levels on US 93 range from 5,200 to 7,900 vehicles per day at counter stations, which is 2-3 times the ADT levels of other rural highways in Montana. The average annual growth in traffic volume on US 93 has been approximately 3 % during the past twenty years and is expected to double by design year 2015 (Federal Highway Administration and the Montana Department of Transportation 1995).

Additive to the increase in traffic volume is the rapid growth in population in western Montana. According to U. S. Bureau of Census statistics, the population of the Flathead Indian Reservation increased by 37 % during the period of 1970-1990 (Federal Highway Administration and the Montana Department of Transportation 1995).

Five alternative lane configurations were proposed by the Montana Department of Transportation (Federal Highway Administration and the Montana Department of Transportation



**Figure 2. Current route of U. S. Highway 93 on the Flathead Indian Reservation.**

(1995). Those alternatives consisted of 1) maintenance of the current two-lane configuration, 2) a two-lane configuration with a median lane, 3) an undivided four-lane highway, 4) a four-lane highway with a continuous median, and 5) a four-lane divided highway (Figure 3).

### Wildlife and Wildlife Habitat Issues

A wide variety of issues were voiced by members of the public and by Tribal, state, federal, county and municipal government representatives during scoping sessions for the proposed project in the early 1990s. The primary wildlife and wildlife habitat issues were 1) loss or degradation of wetland and riparian habitat; 2) loss or degradation of wildlife travel and habitat linkages; and 3) direct highway-related wildlife mortality.

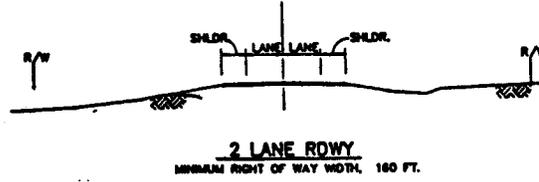
### Wetland Issues

The current existing route of U. S. Highway 93 passes through some of the best glaciated wetland habitat in the United States west of the Continental Divide. Wetland types in the area include Category I (ponds), Category II (marshes) and Category III (stream or riparian zones) Wetlands. The glaciated wetlands comprising Category I and II Wetlands extend over approximately 110 square miles. The functional value of these wetlands is high, dependant upon the land uses associated with individual tracts. Values include wildlife, fish and plant habitat, water storage, flood attenuation, groudwater recharge, sediment trapping, and recreation.

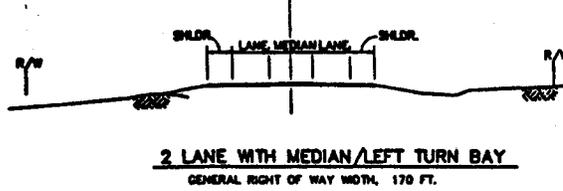
Three large manmade irrigation reservoirs, two of which are designated as National Wildlife Refuges, are located within two miles of the existing route of the highway. Other lands through which the route passes also include wetland habitats managed separately by the Tribes, the Montana Department of Fish, Wildlife and Parks and the U. S. Fish and Wildlife Service. Additional functional wetland habitat exists in many of the road ditches and other adjacent privately-owned lands.

This area provides seasonal habitat for a wide variety of waterfowl, upland gamebirds, nongame birds, raptors, small mammals, amphibians and reptiles. (Tribal Wildlife Management Program, unpublished data). The area also serves a high volume of recreational activity, including wildlife watching, hunting and fishing.

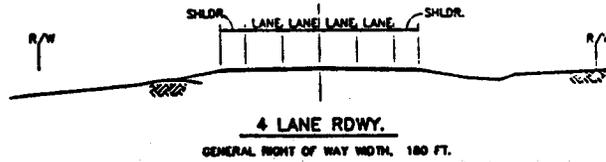
Alternative One: Two-lane highway.



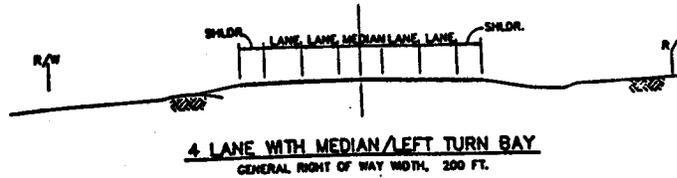
Alternative Two: Two-lane highway with continuous median lane.



Alternative Three: Four-lane highway.



Alternative Four: Four-lane highway with a continuous median lane.



Alternative Five: Four-lane divided highway.

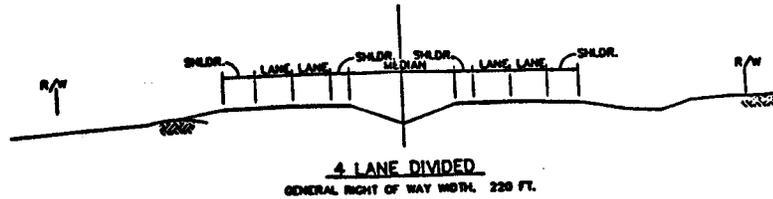


Figure 3. Alternative highway lane configurations proposed for U. S. Highway 93 on the Flathead Indian Reservation.

Current wetland impacts from the various proposed lane configuration alternatives are listed in Table 1. As might be expected with routing of the highway through the glaciated wetland complex, the acreage of impacted wetlands increases with the width of the right-of-way proposed. Generally, the wetlands impacted consist of approximately 15 % shallow ponds, 60 % marshes, and 25 % riparian wetlands.

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Table 1. Impacted wetland acreages delineated for proposed lane configuration alternatives.

Configuration A - Two-lane roadway	14.18 ha (35.44 acres)
Configuration B - Four-lane roadway	19.38 ha (48.46 acres)
Configuration C - Four-lane roadway with median	23.03 ha (57.70 acres)
Configuration D - Four-lane divided roadway	28.35 ha (70.88 acres)

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#### Riparian Habitat

The current route of Highway 93 crosses 24 creeks or drainages, as well as the Jocko and Flathead Rivers. Many of these riparian areas are associated with wetland habitats. All provide corridors of important riparian habitat used as breeding, foraging, and hiding cover, as well as travel corridors, for a large number of wildlife species. These areas also provide important yearround habitat and migration routes for fish.

#### Wildlife Habitat and Travel Linkages

While some riparian areas provide habitat and travel linkages for wildlife and fish, other areas bisected by the Highway 93 continue to maintain linkages between habitats on a larger geographical scale. An example is located in the Evaro Valley, at the southern end of the Reservation. The Evaro Valley is a narrow valley approximately 3.22-4.83 km (2-3 mi) in width. Some of the valley floor is forested, providing a linkage of land used by larger species of wildlife to cross from one side of the valley to the other.

The Evaro corridor is of special value because it still provides habitat used by rare species. The area has been used as yearround habitat by grizzly bears (*Ursus arctos*) (Servheen and Lee 1979, Jonkel 1991). More recently, the area has been viewed

as being possibly the best opportunity for grizzly bears from the Northern Continental Divide Ecosystem to move to the Bitterroot Ecosystem to the southwest (Mietz 1994). In fact, the Evaro corridor presents the only opportunity for larger species to cross the broad valleys of western Montana for approximately 161 km (100 mi) either to the north or south. It may have also served as a travel corridor for pioneering northern gray wolves (Canus lupus) to move from the northern Rocky Mountains to areas farther south in western Montana and northern Idaho. Unverified wolf observations in the Evaro area seem to support that idea.

Finally, the Evaro area seems to provide a route for large ungulates to cross the valley. Tribal Wildlife Conservation Officers report that approximately 50 deer are killed on the highway there each year (Tribal Fish and Wildlife Conservation Program, unpublished data). In addition, reports of road-killed black bears (Ursus americanus) and moose (Alces alces) have occasionally been reported by the public. Two other interesting observations from passing motorists related stories of black bears sitting patiently along the side of the highway waiting for a lull in traffic volume to cross the road.

Due to topography and the close proximity of the area to Missoula, Montana, a city of approximately 43,000, the area is very attractive as a site for commuters. In fact, development in the area has been extremely rapid in recent years. A study of wildlife use of the Evaro area conducted by the Tribal Wildlife Management Program and funded by the Montana Department of Transportation during the period of 1991-1993 indicated an increase of homesites from 34 structures in 1962 to 73 structures in 1972. By 1984, a three-fold increase had occurred, with a total of 221 homes in the study area. By 1990, the number had increased to 285 structures (Becker et al. 1993).

There has been an apparent impact upon wildlife use of the area due to human activity also. Based upon identified animal tracks in the snow along the right-of-way, the number of wildlife crossing observations in the areas with high densities of homes reflected little use by wildlife. However, those areas did reflect a high degree of use by domestic pets (i. e., dogs and cats). The only area that exhibited regular crossing use by wildlife, especially larger wild ungulates and carnivores, was a parcel of undeveloped forested Tribal land approximately one mile in width (Becker et al. 1993).

Other obstacles that may have played a role in low wildlife use of the area included a high density of forest access roads, a number of even-aged forest harvest blocks, commercial developments, a railroad, a petroleum pipeline and powerlines.

In the case of the railroad, petroleum pipeline and powerline routes, a factor affecting their use by larger species may be that those rights-of-way were regularly cleared of vegetative cover.

Three other areas along the existing route merit some consideration as wildlife travel corridors. Ravalli Canyon experiences considerable crossing by deer and other wildlife. There is not, however, evidence of significant highway-related wildlife mortality at that site. Two riparian crossings, Post Creek and Mission Creek, are also sites at which a substantial amount of wildlife traffic occurs. Neither are sites of much highway-related wildlife mortality, but each is characterized by good riparian habitat development, and each receives use by deer, bears, mountain lions, and a variety of other smaller species.

#### Direct Highway-related Wildlife Mortality

Direct wildlife mortality is inevitable along highway routes because nearly any location in which a highway might be located is composed of wildlife habitat. The existing route of Highway 93 passes through areas of wetland, riparian, grassland, canyon, coniferous forest, and agricultural habitats. Wildlife mortalities have been observed in each habitat, but specific problems have been documented in the glaciated wetlands area and in the Evaro Valley. These mortalities include a wide variety of smaller birds, mammals, amphibians and reptiles, as well as larger species such as white-tailed deer (Odocoileus virginianus), mule deer (Odocoileus hemionus), elk (Cervus elaphus), moose, black bears, and mountain lions (Felis concolor).

High mortality levels of nongame birds, upland gamebirds, waterfowl, small mammals, amphibians and reptiles have been documented in the segment of the highway that passes through the glaciated wetland complex (Tribal Wildlife Management Program, unpublished data). In addition, a portion of the area annually exhibits extremely high highway-related mortality of painted turtles (Chrysemys picta). During a single summer, Fowle (1995) documented 205 road-killed turtles in one 4.5 mile section of the highway.

#### Mitigation Planning

Within the overall planning process for the highway reconstruction project, wildlife biologists employed by the Tribes, the Montana Department of Transportation, the Montana Department of Fish, Wildlife and Parks, and the U. S. Fish and Wildlife Service evaluated a variety of potential impacts of the

proposed project and potential mitigation options. These impacts and mitigation strategies were included in the Draft EIS for the project (U. S. Department of Transportation and the Montana Department of Transportation 1995).

In 1993, the Tribes and the Montana Department of Transportation entered into a "Memorandum of Agreement for Mitigation of Unavoidable Impacts to Wetlands by Highway Construction". The purpose of the agreement was establishment of a process for highway-related wetland mitigation. A set of sequencing requirements for wetland mitigation planning was incorporated into the agreement. The sequencing process, in order of priority entails the following steps.

1. Avoiding the impact altogether by not taking a certain action or parts of an action;
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
5. Compensating for the impact by replacing or providing substitute resources or environments.

The Tribes recommended that the Montana Department of Transportation undertake the following actions for wetlands mitigation.

1. Follow the sequencing requirements listed in the Memorandum of Agreement.
2. Establish a wetlands mitigation bank.
3. Maintain wetland hydrology by incorporation of highway design features that protect and maintain the natural hydrologic regime, particularly for those wetlands located downslope of the highway that receive water from sources upslope of the highway.
4. Minimize fill by incorporating highway design features such as minimum toe slopes in wetlands areas.
5. Revegetate exposed areas with native wetland/riparian species to reduce erosion, minimize sedimentation, provide habitat and reduce invasion by noxious weeds. Also, implement additional stabilization/control measures at perennial stream crossings where needed.
6. Minimize the horizontal extent of maintenance activities which are damaging to wetlands, such as brush removal, mowing, and use of herbicides.

In addition, site-specific recommendations for mitigation were discussed. These included the need to repair and restore wetland berms, replacement of portions of filled wetlands bisected by the highway with a causeway spanning the wetlands, and using a 1:6 slope ratio and no median to minimize wetland impacts.

Mitigation proposed for anticipated riparian habitat impacts overlaps that discussed earlier for wetland impacts, and mitigation that will be discussed later for wildlife travel corridors and fish passage. Acres of riparian wetlands that are likely to be lost are included in the impact assessments for wetland impacts. Specific riparian mitigation recommendations are generally related to maintaining riparian fish and wildlife habitat quality and functions.

To mitigate for anticipated wildlife and habitat impacts due to the reconstruction project, the Tribal Wildlife Management Program staff recommended construction of a crossing structure for wildlife and a series of steps to reduce potential animal/vehicle collisions (Figure 4). The proposal was not specific as to any particular lane configuration and in fact, was applicable to all of those considered. The proposal involved construction of an overpass using a precast bridge system to serve as the base for the overpass. The overriding consideration in determining the feasibility of designs was the realization that traffic on the highway and other development pressures would continue to increase in future years and the need to anticipate future wildlife needs had to take that fact into account.

To allow for wildlife passage under interstate highways and to reduce highway-related deer mortality, installation of highway underpasses has proved successful in Idaho for mule deer and moose (Jensen 1977) and in California (Ford 1980) and Wyoming (Ward 1982) and reduce highway-related mule deer mortality. Successful designs for underpasses which were used by wildlife, including bobcats (Lynx rufus), Florida panthers (Felis concolor coryi) have been reported by Foster and Humphrey (1982). Success of underpass designs was also reported on yearround ungulate range in Alberta as a method for wildlife to cross under busy highways (Woods 1990). Little use of the underpasses by bears and wolves was observed though (Gibeau, personal communication).

An overpass structure was preferred because the use of underpasses was not deemed as a feasible solution to ensure use by grizzly bears and gray wolves. Additionally, overpasses have been recommended as a feasible design to facilitate crossing of busy highways by European brown bears in southern France (Pyrenees Atlantiques Planning Authority 1992). As envisioned,

earth would be placed atop the arched spans crossing above the highway, and vegetation would then be developed on the structure to provide cover for animals using it (Figure 4). The wildlife overpass envisioned for this project would utilize a precast

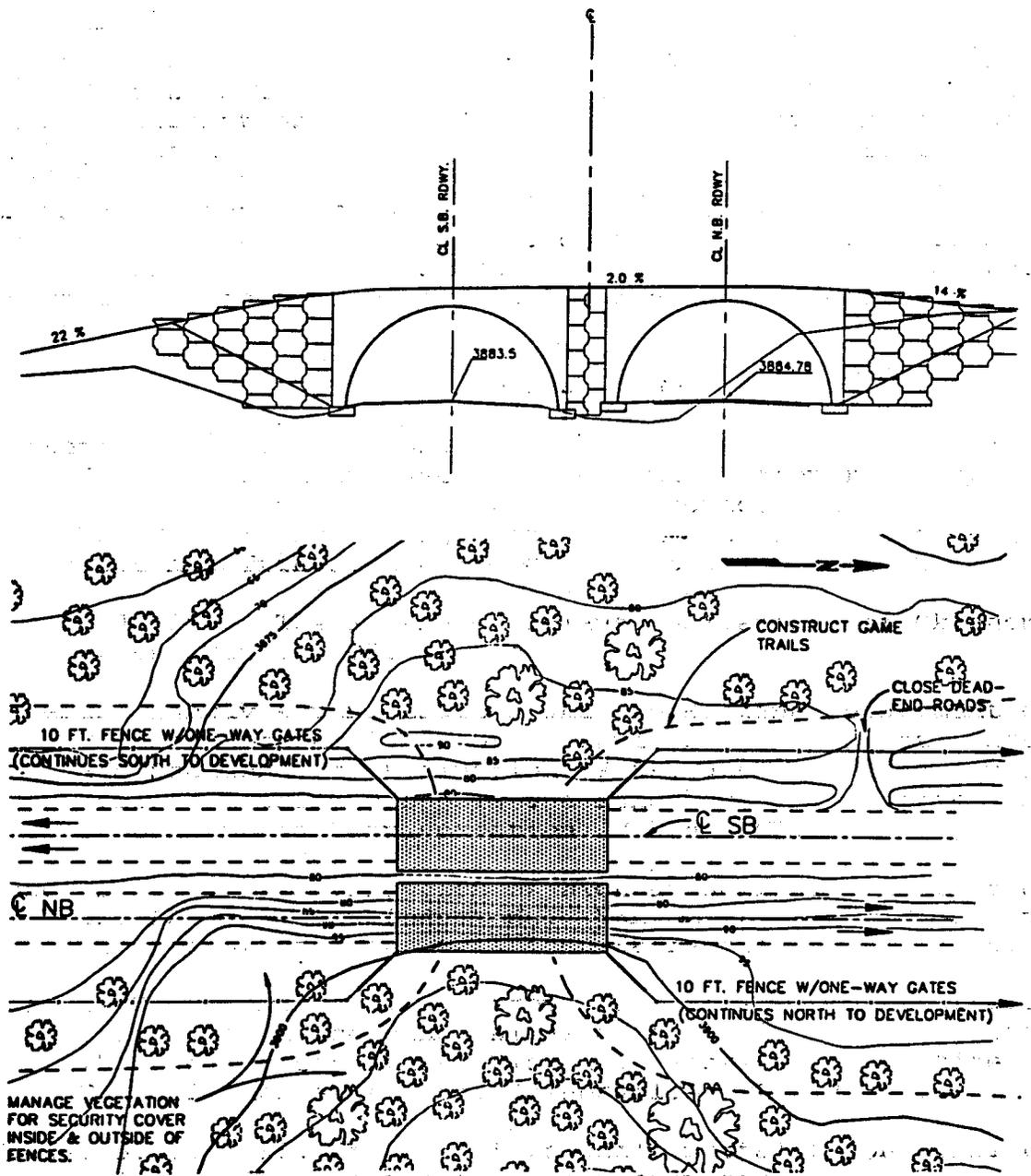


Figure 4. Wildlife overpass proposed at the Evaro Corridor on the Flathead Indian Reservation.

arch bridge system to allow wildlife to cross over the highway right-of-way while traffic passed through the span beneath the overpass. The proposed overpass would measure approximately 50 m (164 ft) across the top.

In addition to the overpass design described above for the Evaro area, several other design features and ongoing proactive management activities needed to be incorporated into the proposed mitigation project for the area. These design features were planned to enhance the potential for wildlife use of the structure. They included the following:

1. Construction of a 3 m (10 ft) high fence on both sides of the highway leading away from the overpass to assist in directing larger wildlife toward the overpass.
2. Construction of one-way gates at specific locations to move animals trapped inside the fences through the fences to safety.
3. Management of vegetation between the drift fences and the highway edges to entice animals caught inside the fence to move toward the one-way gates and out through the fences.
4. Alteration of existing wildlife trails to facilitate animal movement toward the overpasses.
5. Installation of animal warning signs in the area to warn motorists of potential animal collision hazards.
6. Closure and revegetation of all access approaches within 500 m (1640 ft) of the overpass structure.

The adverse impacts of past and ongoing activities on the Evaro area was discussed earlier. The Tribal Council and the Missoula County Board of Commissioners have signed an agreement to work together to attempt to enhance land-use planning efforts to lessen the impacts of homesite development in the area. To reduce the impact of the high density of forest management roads in the area, the Tribal Wildlife Management Program has built into all recent timber sales on Tribal lands minimum open road density guidelines for grizzly bear habitat.

The wildlife travel corridor at Ravalli Canyon proved difficult to develop mitigation recommendations. Due to the fact that the canyon contains the highway, the Jocko River, an active railroad right-of-way, human dwellings, access roads and a powerline right-of-way, the potential for constructing a viable crossing structure there was nearly impossible. As a result, installation of wildlife crossing warning signs throughout the area was recommended to attempt to increase public awareness of the situation.

The riparian zone located along Mission Creek provides an avenue for wildlife to cross the highway and enter the City of St. Ignatius. Such movements by deer are not encouraged due to nuisance complaints and the potential for the deer to attract predators such as mountain lions and bears into town. As a result, the recommendation for mitigation at this crossing was to design a bridge/overpass that could be used by humans, but one that will preclude passage by larger species of wildlife.

The riparian corridor at Post Creek, in contrast with the one at Mission Creek, provides a good opportunity to correct a habitat linkage problem that currently exists. The creek is presently spanned by a small bridge which does not allow good wildlife passage. As a result, construction of a larger bridge that would allow passage by large ungulates was recommended.

High levels of highway-related wildlife mortality was documented primarily at Evaro and in the glaciated wetland complex. The mitigation designs recommended for the Evaro area should result in substantial reductions in the numbers of animals presently killed on the highway, as well the potential for future mortalities.

Highway mortality in the glaciated wetlands consisted largely of summer mortalities of painted turtles. A study conducted there (Fowle 1995). The researcher provided a set of recommendations for reducing the levels of turtle mortality which include the following:

1. Construction of bridges to pass over heavily-used crossing areas.
2. Construction of prototype culvert designs for testing potential of such various types of structures.
3. Monitoring movements of turtles to determine use of the structures.
4. Installation of drift fences or barriers to funnel turtles to culverts.
5. Use of pitfall traps to collect turtles that would otherwise attempt to cross the road and otherwise be killed and then manually move them to other locations.
6. Installation of turtle crossing warning signs to enhance motorists' awareness of the situation.
7. Future monitoring and research to gain a better insight into the ecology of the local turtle population.

Wildlife species other than painted turtles are also killed on Highway 93 in the wetland complex. Each year, numerous upland gamebirds, nongame birds, waterfowl, small to medium-sized mammals, amphibians and reptiles are killed in the area. The

potential to reduce the numbers of these mortalities is very limited. Installation of wildlife crossing signs may provide a method to increase public awareness of the problem, but an effort to reduce the mortalities will need to come from the drivers of the vehicles.

The final chapter of this process has yet to be written. The preferred alternative proposed by the Montana Department of Transportation in the EIS for the project was a combination of Lane Configurations B through D, i. e., a four-lane highway for most of the distance of the segment. In a February 29, 1996 letter to the Department of Highways, the Tribal Council voiced their preference for an improved two lane highway for all 90.64 km (56.3 mi) of the reconstruction project. At this point in time (April 1996), the Department of Transportation has not formally responded to the Tribal Council's recommendations.

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