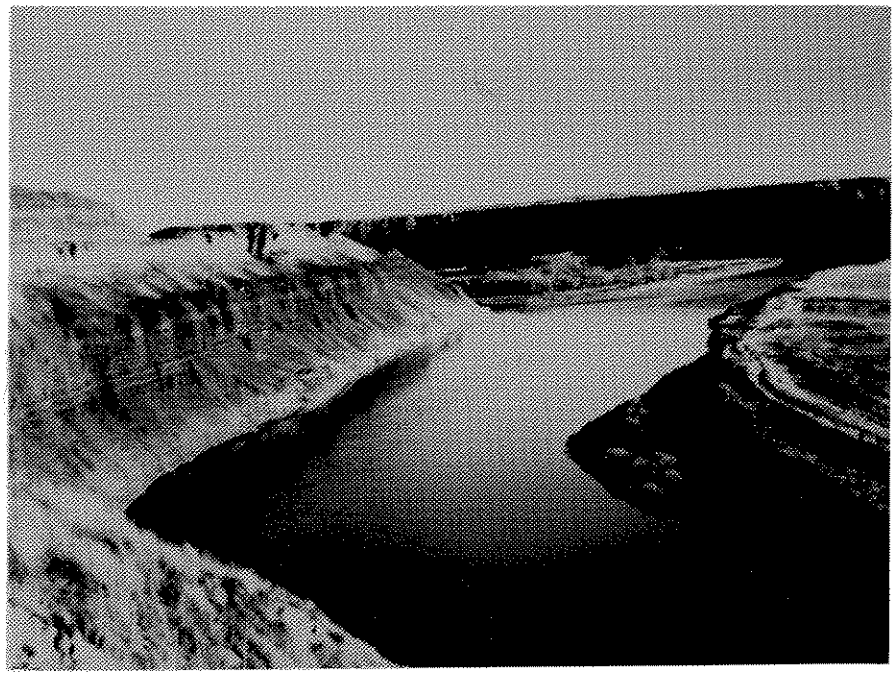
MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS

THE MISSOURI RIVER
MORONY DAM TO FT. BENTON
A FISH AND WILDLIFE ASSESSMENT

INTRODUCTION

The Missouri River has played a key role in the development of Montana. Today with its balance of water development projects and preserved areas, the river continues to contribute to the economic viability of the state as well as offering Montana people the amenity values so important to the Montana way of life.

The great falls of the Missouri have always been a barrier and as such marked the change between the headwaters aquatic ecosystems and the downstream systems. The classification of the river from Fort Benton downstream as wild and scenic was based, to a large degree, on the historical and recreational aspects of the river. Fish and wildlife investigations conducted subsequent to that classification have shown that the fish and wildlife populations now inhabiting the area are, to a substantial degree, dependent on the natural boundaries with the original falls area marking the upper limit of their habitat needs.



June 1981

The Missouri River east of Great Falls between Morony Dam and Fort Benton contains several potential sites for hydroelectric dams. Considerable interest has recently been expressed by the Bureau of Reclamation and the Montana Power Company to develop one of the dam sites in that area.

Bureau of Reclamation is studying the feasibility of 17 different dam options involving at least 9 sites. Options range from a high dam at Fort Benton with an afterbay in the Wild and Scenic portion to small, pump-back storage projects on the tributaries. The Montana Power Company is principally interested in the Carter Ferry site.

The probability of the Bureau of Reclamation constructing a dam is small. The most likely hydropower development is an MPC dam at Carter. In comparing the various dam proposals, it is tempting to conclude that the MPC site at Carter is more favorable from an environmental standpoint. However, serious impacts still result from the Carter proposal. Potential impacts of this development to the fish and wildlife resources of the area are discussed below.

POTENTIAL WILDLIFE IMPACTS OF PROPOSED CARTER FERRY DAM PROJECT

The proposed dam at Carter Ferry by Montana Power Company would inundate 3,100 acres of Missouri River bottom and "breaks" habitat, impacting many species of Montana wildlife. Among these are mule deer, pheasants, sharptail grouse, Hungarian partridge, Canada geese, various species of waterfowl, furbearers, nongame birds and mammals, and raptors. The impacts on several of these species will be discussed in detail as follows:

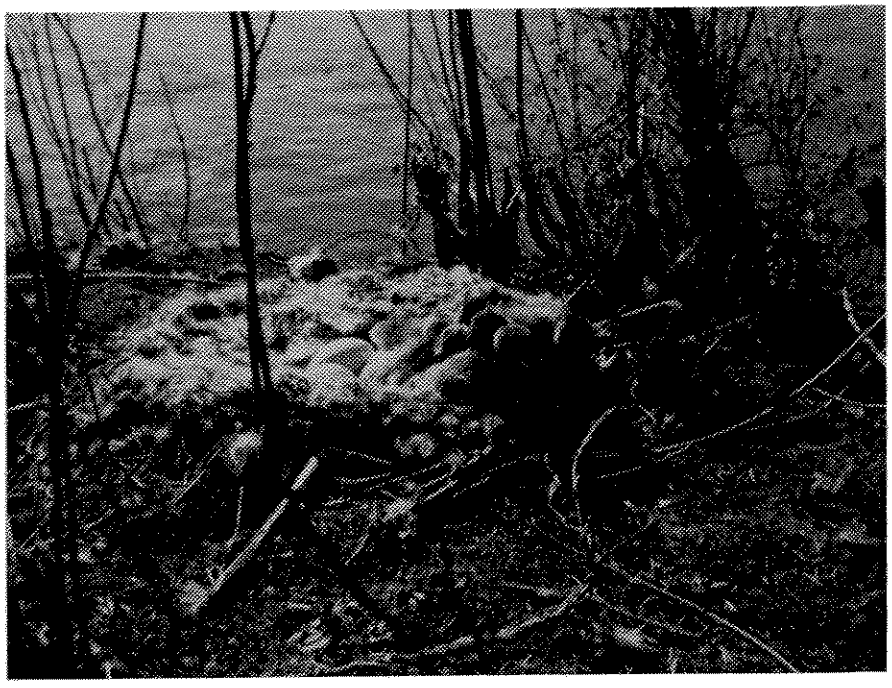
Canada Geese: During a 5-year wildlife inventory of the Missouri River from Morony Dam to Fred Robinson Bridge, Canada goose nest and production surveys were conducted during the spring of 1976 through 1980. A total of 470 nests was located and observed during these surveys. Based on 1979 and 1980 surveys, a minimum of 175 nests was found from Morony Dam to Robinson Bridge, a distance of 175 river miles. In 1979, an estimated 884 young geese were produced. This population has one of the highest reported nest success rates in North America at a 3-year average of 85.6%. By comparison, state and federal waterfowl management areas consider 70% nest success a sign of good management.

All 470 nests were located on river islands which provide the actual nesting habitat for this species. These river islands with their preferred open willow nest cover and good side channel flows provide the secure nesting habitat which accounts for the birds' great success. In 1979 and 1980, data show that 61% of all goose nesting activity occurred above the mouth of the Marias River in the upper 30% of the river.

The upper river has approximately four times the nesting density as downstream areas. For example, the Morony Dam to Carter section had 1.9 nests per river mile while the section from PN Ferry to Robinson Bridge had only 0.48 nests per mile.

The proposed Montana Power Company dam at Carter Ferry would inundate 23 Canada goose nest sites while impacts immediately downstream from increased velocities and habitat loss could result in an additional loss of 7-10 nest sites for a total of

19% of the Canada goose production on the Missouri River. This would be a loss of an average annual production of approximately 170 young geese or equivalent to the annual Canada goose production of the Freezout Lake Waterfowl Management Area in the early 1970's.



The Missouri River from Morony Dam to Robinson Bridge has an extremely viable, stable and one of the most successful Canada goose breeding populations in North America. The proposed impoundments would severely impact this valuable resource.

Mule Deer. The major big game animal in the area is the mule deer. This species makes extensive use of the Missouri River breaks and bottoms. The river breaks provide the critical winter range for mule deer in this area as surrounding uplands are under intensive agricultural production. The riparian bottoms and river islands also provided secure fawning cover in early summer. Based on state Wildlife Division winter surveys,

this population has been rapidly expanding from a population low in the early 1970's. In 1976 aerial winter surveys found 467 mule deer in the Missouri River breaks from Morony Dam to Fort Benton, approximately 30 river miles. During winter 1980, 940 mule deer were found in this same area for a 100% increase in 4 years.

This increasing population trend continues today. With projected increases in hunting demands and the close vicinity to a major human population center, this population represents an important wildlife and recreational resource.

Expected losses due to impoundment could be quite high. The deer population adjacent to the immediate upstream dams -- Morony, Ryan, Cochran, etc. -- is essentially nonexistent with virtually no deer wintering in these areas. A 50% loss of the breaks habitat could result in even greater losses in deer numbers.

Beaver: Beaver caches counts were conducted as part of the overall wildlife inventory of the Missouri River. These counts provided an index to the distribution and density of beaver along the river. Based on 1979 observations, the beaver population from Morony Dam to the mouth of the Judith River would experience a 9% loss from impoundment at the Carter Ferry site. A significant beaver population also exists on Highwood Creek and it as well would face reduction from the proposed Carter Ferry Dam.

Again, these figures indicate only those direct losses from impoundment and do not cover downstream impacts due to potential changes in flow regime and resulting habitat alterations.

Upland game bird populations will also be impacted by the proposed Carter Dam. Pheasants, sharptails and Hungarian partridge populations utilizing the breaks and river bottom habitat types will face major reductions due to habitat loss.

Raptors utilizing this river section include the bald eagle. Ten of these birds wintered along the river from Morony Dam to Fort Benton in 1980. The riparian bottom at the mouth of Highwood Creek provided a roosting area for several of these birds. Several prairie falcons were also observed wintering along this section.

Breeding and wintering activity by peregrine falcons appear quite likely in the area as well.

POTENTIAL FISHERIES IMPACTS OF THE PROPOSED CARTER FERRY DAM PROJECT

The proposed Carter Ferry Dam would inundate approximately 15 miles of Missouri River and the lower portions of Highwood and Belt creeks. The fishery impacts of this development, however, would extend far beyond the project boundaries. The Department of Fish, Wildlife and Parks has conducted in-depth fishery research studies on the Missouri in this area since October 1975. These studies indicate that the river above Carter Ferry is vital for maintaining the integrity of fish populations downstream as far as Fort Peck Reservoir.

In large, warm water river systems, extensive upstream fish migrations are often noted during the spawning season and are associated with a movement to suitable spawning grounds. In the Missouri, several fish species make such runs into areas above Fort Benton and Carter Ferry from the Wild and Scenic reach and as far downstream as Fort Peck Reservoir.

Sauger, in particular, are dependent on the river upstream from Carter Ferry for reproduction and recruitment. Large concentrations of sauger move into this area during the spring, summer and early fall to spawn and feed. In Department of Fish, Wildlife and Park surveys, an average of 20.1 sauger per electrofishing hour* were sampled in the Missouri River above Carter Ferry compared to an average of 3.8 sauger per electrofishing

*An electrofishing hour is a standard scientific unit of measurement in fish population surveys.

hour downstream from Carter Ferry. Tag return evidence indicates that sauger utilizing the Missouri upstream from Carter Ferry for spawning and feeding come from as far downstream as the headwaters of Fort Peck Reservoir, a distance of more than 190 miles.

In addition to sauger, several other important fish species utilize the Missouri River upstream from Carter Ferry for spawning. Key species include walleye, shovelnose sturgeon, channel catfish, smallmouth and bigmouth buffalo, blue sucker and brown trout. The three most important commercial fish species harvested in the reservoir -- goldeye, bigmouth buffalo and smallmouth buffalo -- also spawn in the Missouri River upstream from the proposed Carter Ferry Dam.

Tag return evidence indicates movements of these fish often exceed 200 miles. Thus, both sport and commercial fisheries could be impacted by destruction of traditional spawning grounds.

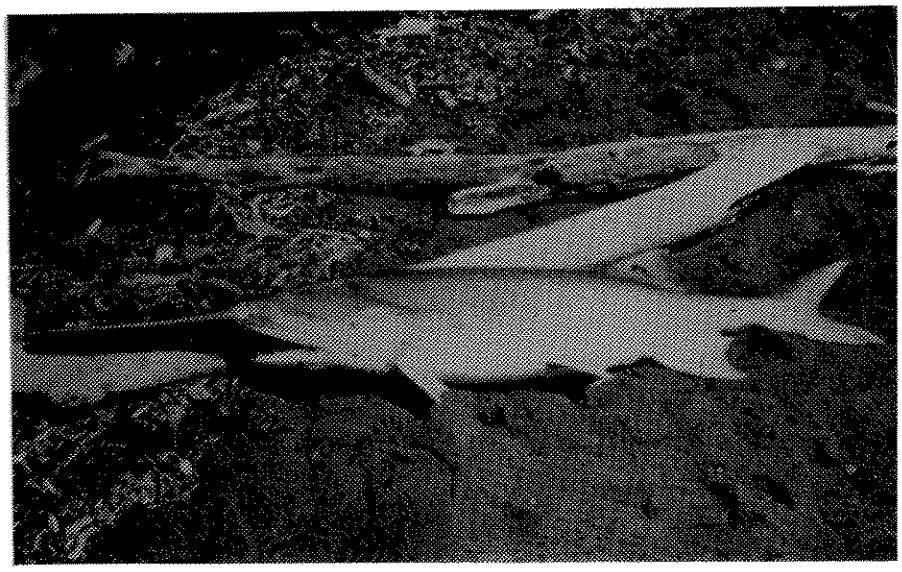
Electrofishing and tag return evidence indicates sauger and several other key fish species move back downstream into the reach of Missouri River below Carter Ferry after their spawning and feeding periods. A dam on the Missouri River at Carter Ferry blocking the fish migrations which have been identified would have obvious implications far beyond the project boundaries.

Creel survey statistics collected by the Department of Fish, Wildlife and Parks during the spring and summer of 1977 and 1978 indicate the Missouri River in the Carter Ferry area provides a substantial sauger fishery as well as an important fishery for walleye, northern pike and burbot. Fisherman success (catch) rates for these species in the Carter Ferry area are higher than average success rates reported elsewhere in the United States.

This river fishery would essentially be eliminated in the flooded area. Additionally, it would be difficult to establish a substantial self-sustaining fishery in a reservoir with a rapid flow through rate and sparse littoral zone.

A major concern of the proposed dam is its possible effect on the paddlefish migration which occurs in the Missouri River immediately downstream. The paddlefish is listed officially as a "Species of Special Concern - Class A" in Montana, and is considered "threatened" nationally.

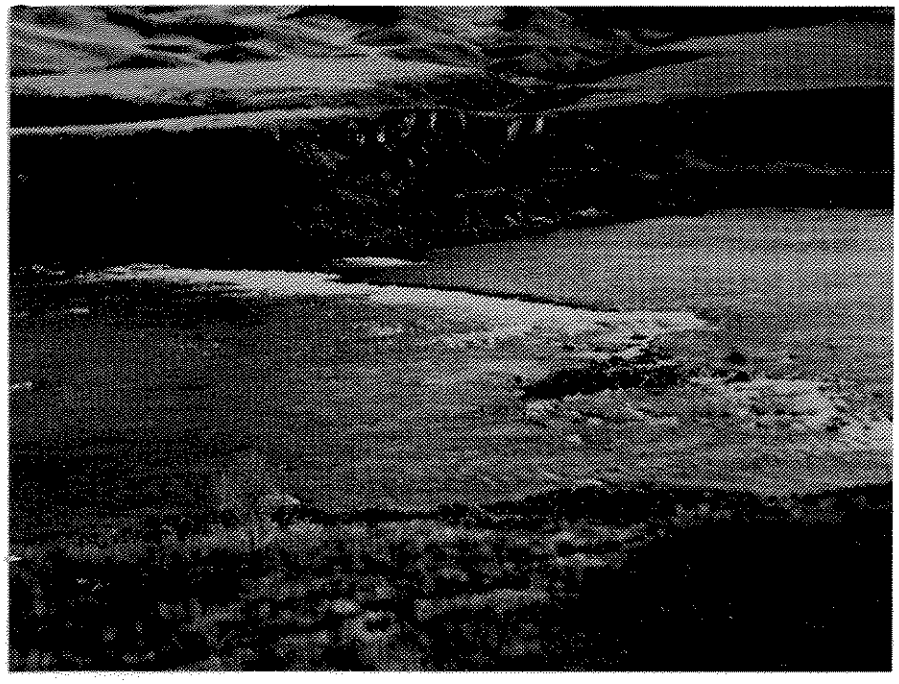
At one time, paddlefish were common throughout much of the Mississippi/Missouri River system. However, during the last 100 years, paddlefish numbers have declined considerably. Only six major self-sustaining paddlefish populations remain in the United States today, including the Missouri River/Fort Peck Reservoir population.



Paddlefish require water temperatures of at least 50 degrees F and moderately high turbidity during the spring runoff period and suitable substrate for successful spawning. Any change in channel configuration, water temperature, turbidity, and gas saturation as a result of new impoundment of the Missouri would be of considerable concern.

OTHER POTENTIAL IMPACTS

In addition to fish and wildlife values, the Missouri River upstream from Carter Ferry supports significant scenic and historic values which would be inundated by the proposed dam. The reach of the Missouri River immediately below Morony Dam, from the dam to several miles below Belt Creek, contains the last remaining whitewater portion of the Missouri River in existence. The whitewater segment has been utilized to some extent by whitewater enthusiasts for several years and recently an outfitter from Great Falls has begun commercial guided trips through the whitewater.



Also along the Missouri River upstream from Carter Ferry, several significant historic sites are found. North of the river and across from Belt Creek are the Sulphur Springs, significant in the Lewis and Clark Expedition. The Sulphur Springs were believed critical in restoring the health of Indian guide, Sacajawea, when she became critically ill. On the southern shore and downstream from Belt Creek is the site of the portage where the Lewis and Clark Expedition left the Missouri and portaged around the Great Falls of the Missouri. This site has since been donated to Council No. 315 of the Boy Scouts of America. Along the Missouri River downstream from the Sulphur Springs and portage area, several buffalo jump sites (pishkins) are found.

CONCLUSION

The fish and wildlife studies recently completed on the Missouri River provide strong evidence linking the river between Fort Benton and Morony Dam to the welfare of the entire river above Fort Peck. There are also substantial resident wildlife populations dependent upon the river bottom and breaks habitat type. Normally this type of information does not come to light until dam feasibiity studies are well advanced, often at times when developers are reluctant to change direction and abandon extensive investments in planning and design. Available now, this knowledge should be used to view viable alternatives to meet our energy needs while preserving Montana's amenity values. Discussion of these alternatives should be held before the commitment to further damming on the Missouri becomes irreversible.

SILT POLLUTION AND TROUT POPULATIONS

September 22, 1970

1. In recent years, water pollution has received much public attention--and rightly so. This is organic pollution; untreated wastes from an oil refinery, packing plant, and slaughter house, being dumped into the Yellowstone River.
2. This is Montana's industrial pollution locally called the "red tide." It is an iron compound periodically released into the Clark Fork River that directly kills fish.
3. Silt (or sediment) is another type of pollution. Unfortunately, it is not well recognized socially or legally as a pollutant. However, it continues to deteriorate many miles of trout environment each year.
4. Silt polluted streams are not trout streams - rather they produce fish as suckers or carp.
5. A supply of clean unpolluted water,
6. is necessary to naturally produce trout for the creel.
7. Let's look at Bluewater Creek, a stream 15 miles long where 6 years have been spent investigating silt, suckers and trout. The upper part of the stream carried on an average ½ ton/day; middle - 10 tons/day; lower - 30 tons/day.
8. In the upper part of the creek - all the requirements for trout are met. Clean water, undercuts, pools interspersed with riffles, and brushy vegetation in the creek bottom.
9. The lower part of the creek is not a trout stream - most everything that trout need in a stream for a home has disappeared.
10. For example, compare the clean riffle found in the upper part.
11. to the "silted in" riffle in lower Bluewater Creek.
12. How does this affect the food supply?

13. For every 100 insects/unit area in the upper part, there were only . . . (See slide)

14. The success of trout spawning was measured by trout eggs. Note the viable pink color.

15. The eggs were counted, put in plastic hatching boxes (Vibert boxes), and buried in clean gravel.

16. A standpipe was used to measure the supply of oxygen and rate of seepage through the gravel during the egg incubation time.

17. In the sunsilted upper part of the stream, most of the eggs hatched.

18. In the silty areas eggs died for lack of oxygen or sufficient seep water to wash away waste products. Look at the death-dealing agent - the silt that clogged up the pore spaces in the gravel.

19. Illustrated graphically, only 6% of the eggs failed to hatch in the upper part while not one egg hatched in the silty, lower Bluewater Creek.

20. The fish population was measured in the creek. Blocknets were used. Captured fish were marked and returned to the stream to obtain a population estimate. Nearly 70% of the trout marked were recaptured.

21. Ninety-four of every 100 fish collected in the upper part of the creek were trout, ... 20 of every 100, ... 1 of every 100.

22. Relating the <u>amount of silt</u> to the type of fish collected, we found that 6 of every 100 fish were trash fish in upper Bluewater, ...

23. How does silt get in the water? Over used rangeland.

24. Construction projects in or near streams.

25. Bank trampling by livestock.

26. Clearing floodplain vegetation.

27. The stream channel meandered laterally in the floodplain during high water without floodplain vegetation to stabilize the channel. Look at the valuable pastureland that was washed into the creek.

28. Basically the problem in Bluewater is poor use of irrigation water. Clean water is diverted from the creek by elaborate irrigation structures.

29. Take-off ditches, in many cases, are inadequate.

30. Flood irrigation on pastureland is the rule, not the exception.

31. Excess water is put on cropland.

32. And often accumulates in areas where it is unwanted.

33. This excess water accumulates in low areas and often the return ditches are inadequate.

34. The water collects and its quality is changed greatly. It is silty and warmer.

35. The ditches eventually return waste water into the streams. Sand Coulee dumping waste water into the Clarks Fork of the Yellowstone. Above the bridge (Change) the river is a trout stream. Below - fishermen do not bother to spend time fishing for trout.

36. What can be done to solve the silt problem? Keep our ranges in good shape. Little soil will be lost during runoff from this well-managed range.

37. Better application and more efficient use of water on pasture and cropland. These sprinklers pay for themselves by increased yields in crops.

38. Line waste return ditches. Note the amount of soil washed away where the ditch lining stopped.

39. Leave a buffer zone of vegetation between the stream and agriculture. This stops bank trampling by livestock and stops the stream channel from lateral cutting.

40. Basically the problem is keeping the topsoil on the land where it belongs; "Water in the soil - not soil in the water."

41. We have a choice to make by how we manage our land and water resources. If we choose the silt stream we have neglected our management responsibility.

42. And the kind of fish a silty stream will produce are trash fish - suckers and carp.

43. But a clean, unpolluted stream will produce naturally trout for our recreation.

44. If we accomplish this difficult job, we too can throw out our chests and be proud of our efforts.

A REVIEW OF MONTANA WATER LAW
AS IT PERTAINS TO MAKING RECREATION
A BENEFICIAL USE OF WATER

Talk by Henry Noble October 23, 1970
at Montana Water Development association meeting.

As people become more concerned with our environment and since "Ecology" has become a household word, the question of recreational use of water has become more and more important. For the last few legislative sessions, this subject has been presented to the legislature in one form or another and has been talked about among the legislators to a large extent. In addition, governmental administrative officers and elected officials are becoming increasingly concerned with the matter of solving the problem of recreational use of water in Montana.

The foregoing was not always the case. In Montana and elsewhere the use of water for recreational purposes was never given legal consideration and it was not thought to be a beneficial use. As is said in the extensive work 'Waters and Water Rights" recently published by the Allen Smith Company:

> "In the earlier court decisions, esthetic and recreational considerations were no more acceptable as the basis of a valid appropriation of water than as the basis of a riparian right. For example, a federal court in Colorado held that an appropriation could not be made to assure the continued flow of a stream through a canyon, the chief value of which was the scenic attraction of its waterfalls.[15] And the Utah Supreme Court rejected a claim of appropriation for irrigation of uninclosed and unoccupied public land for the sole purpose of propagating wild waterfowl.[16] In recent years, however, the importance of recreation as a beneficial use of water has been recognized in some of the statutes[17] and provision for recreational facilities has become an important feature of large water project developments."

Although I have not discovered any early decided cases from our Montana Supreme Court directly on the subject of whether recreational use is a beneficial use of water for which a valid appropriation can be made, an examination of the decisions of our courts over the years would lead one to the inescapeable conclusion that our early court would have scoffed at the thought of recreation being a beneficial use of water.

[15]Empire Water & Power Co. v. Cascade Town Co., 205 Fed. 123, 128, 123 C.C.A. 355 (CA-8 Colo., 1913), reversing 181 Fed. 1011 (D. Colo., 1910).

[16]Lake Shore Duck Club v. Lake View Duck Club, 50 Utah 76, 80, 166 Pac. 309, L.R.A. 1918B 620 (1917): "To our minds it is utterly inconceivable that a valid appropriation of water can be made under the laws of this state, when the beneficial use of which, after the appropriation is made, will belong equally to every human being who seeks to enjoy it."

[17]Both "public recreation" and "scenic attraction" are named in the Oregon water rights statute as being in the public interest, Ore. Rev. Stat., sec. 537.170 and 543.225. Certain waters are withdrawn from appropriation for purposes including "maintaining and perpetuating the recreational and scenic resources of Oregon," Ore. Rev. Stat., sec. 538.110 to 538.300. In Texas, water may be appropriated for "game preserves, recreation and pleasure resorts," Tex. Gen. Laws 1957, ch. 118, amending Tex. Vernon's Civ. Stat., Art. 7470.

The Montana Constitution in Article III, Section 15, declares the use of water beneficially to be a public use in the following language:

> "The use of all water now appropriated, or that may hereafter be appropriated for sale, rental, distribution, or other beneficial use, and the right of way over the lands of others, for all ditches, drains, flumes, canals, and aqueducts, necessarily used in connection therewith, as well as the sites for reservoirs necessary for collecting and storing the same, shall be held to be a public use..."

In our statutory law section 89-802, originally enacted in 1885, provides that an appropriation of water

> "...must be for some useful or beneficial purpose and when the appropriator or his successor in interest abandons and ceases to use the water for such purpose, the right ceases..."

The federal government, as we all know, has increasingly become interested in the use of water for recreational purposes. Even in the case of the federal government, however, such an interest has been a fairly recent development. In the field of federal reclamation law, despite the long-standing recognition of recreation as an important adjunct of reclamation, no general statutory provisions for recreation development were enacted until 1965. There were cooperative agreements with the National Parks Service and with the Forest Service in the Department of Agriculture. The Water Project Recreation Act of 1965 is premised upon the basis that facilities for recreation and fish and wildlife enhancement should be an integral part of federal water projects. The Flood Control Act of 1944 and the Fish and Wildlife Coordination Act of 1934 both seem to recognize conservation and recreational use of water. The Flood Control Act provides that the water areas of such projects shall be open to public use and there shall not be any use of any such areas which is inconsistent with the laws for the protection of fish and game of the state in which the area is situated. The Fish and Wildlife Coordination Act deals with wildlife conservation in reclamation programs. It requires consultation with affected state officials when waters are to be impounded, diverted, or otherwise controlled by a federal agency or permitee and that project plans

> "shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits."

The act also provides that land and waters and interest therein may be acquired by federal construction agencies for wildlife conservation and development purposes as reasonably needed to preserve and assure for the public benefit the wildlife potentials of the project area.

Conservationists such as the Sierra Club have managed, on several occasions, to persuade congress to give statutory protection for some area of scenic or historic value. One of the most well known victories of the conservationists in this regard would be the congressional enactment protecting the Rainbow Bridge National Monument in Glen Canyon. The federal courts, also, are beginning to recognize recreational and environmental considerations.

States other than Montana have, in recent years, and now continue to take note of recreational uses of water. To again quote from "Waters and Water Rights":

> "Recreational uses are often indicated in the category of municipal uses as, for example, the water for public parks, resorts, and lakes. The statutes of several states list recreation as a beneficial use but do not specify the forms of recreation that may be included. Other statutes are more precise such as the Texas law which includes "public parks, game preserves, recreation and pleasure resorts." Decisions in a few states have indicated that the use of water for swimming, parks, and fishing is within the meaning of beneficial use. In Colorado beneficial use for recreational purposes includes irrigation of parks and the maintenance of lakes and reservoirs in the city. Some cases have approved beneficial uses for health and recreational facilities and for enjoying scenic area.
>
> "The category of recreational uses, already broad in outline, will surely receive more attention in the future as the limits of private and public recreation are carefully explored."

To return again to the subject of federal law, the Watershed Protection and Flood Prevention Act of 1954 recognized recreation and fish and wildlife as project purposes. While projects may not be developed primarily for recreation or for fish and wildlife, measures for recreation or for improvements for habitat or environment for the breeding, growth, and development of fish and wildlife may be included when such measures are an integral part of a watershed plan.

With the foregoing as a background, we can now directly consider Montana law, both case and statutory, as it relates to this subject.

As I have said before, I did not find consideration in Montana cases of the problem of recreational use of water in our early Supreme Court decisions. There is one reference in a 1940 case in 110 Mont. to an appropriation made for a "fish pond" but it is doubtful that the court was considering recreational use of water in this case. It is more likely that the pond in question was being used for irrigation and that the local people simply referred to the reservoir in question as the "fish pond."

However, in 1966 our Supreme Court in dictum definitely appeared to recognize recreational use of water as a public right. They did so in a case entitled Paradise Rainbow et al. v. Fish & Game Commission, 148 Mont. 412, 421 P. 2d 717. In that case a man by the name of DePuy was engaged in raising trout commercially and was diverting water into his trout ponds from Armstrong Spring Creek, a tributary of Yellowstone River in Park County. As a condition to issuing DePuy a license for his commercial fish ponds, the Montana Fish and Game Commission maintained that he should be required to have a fish ladder and said that the public had a prior right in the waters of the creek which would require DePuy to release some water through a fish ladder. The public right urged by the Commission was based on the fact that the public had used the creek as a fishing stream and natural fish hatchery before DePuy built his dam. Although our Supreme Court held that DePuy could not be required to build a fish ladder in this

specific case, it did say:

> "Such a public right has never been declared in the case law of this state. California, an appropriation doctrine jurisdiction, whose constitutional provisions relating to water rights are virtually the same as Article III, section 15 of the Montana Constitution, has recognized such a right and has upheld statutes requiring fishways. People v. Glenn-Colusa Irr. Dist., 127 Cal. App. 30, 15 P. 2d 549. Under the proper circumstances we feel that such a public interest should be recognized. This issue will inevitably grow more pressing as increasing demands are made on our water resources. An abundance of good trout streams is unquestionably an asset of considerable value to the people of Montana."

It would certainly appear from the foregoing that our Montana Supreme Court might well formally recognize recreational use of water as a useful or beneficial purpose. This could be so even in the absence of an enactment by the legislature specifically declaring this to be so.

In recent years, we find there have been some legislative enactments which impliedly or specifically recognize recreational uses as beneficial uses of water. In 1965 our legislature enacted a law concerning county and municipal participation in flood control and water conservation. No doubt this enactment by our legislature was federally inspired and the legislature was framing its statute to comply with the federal legislation on the same subject so as to be eligible to receive federal aid. Section 1, Chapter 272 of the Laws of 1965, now Section 89-3301, R.C.M. 1947, specifically recognized recreation and wildlife as purposes which would be beneficial in the establishment of water conservation and flood control projects within the limits of city, towns, or counties.

Several enactments by the legislature in the last legislative session in 1969 recognized the recreational use of water as being a beneficial use. As many of you know, during the last session of the legislature, this particular subject received a great deal of attention from our lawmakers. Chapter 345 of the Laws of 1969, now sections 89-801, 89-801.1 and 89-801.2, R.C.M. 1947, gave legislative recognition to the appropriation of water by the Fish & Game Commission in such amounts as may be necessary to maintain stream flows necessary for the preservation of fish and wildlife habitat. This right to appropriate was given to the Fish and Game only as concerns certain "Blue Ribbon" trout streams but the principle was certainly acknowledged by the legislature. The law did provide that such uses would have a priority of right over other uses until the District Court should determine that these waters are needed for a use determined by the court to be more beneficial to the public. Here is probably the first recognition by the legislature of a principle that some uses may be more beneficial than others. The law specifically provided that no diversion was necessary of the water in question and the appropriation was made by the Fish and Game Commission simply by filing a written appropriation in the office of the County Clerk and Recorder of the applicable county and a copy of the notice with the Director of the Montana Water Resources Board. The act also provided that:

> "The unappropriated water of other streams and rivers not named herein may be set aside in the future for appropriation by the Fish and Game Commission upon consideration and recommendation of the Water Resources Board, Fish and Game Commission, State Soil Conservation Committee, the State Board of Health and approval of the legislature."

Whether these agencies intend to recommend other streams for similar treatment at the next legislative session is something that I have no information upon.

The Water Conservancy District Law adopted by our last legislature and now found in Section 89-3401 Et. Seq., R.C.M. 1947, specifically recognized recreational use of water. The law says that the organization of Conservancy Districts and the construction of works as defined in the law are public uses and will: "Enhance fish and wildlife habitat" and "improve recreational facilities." One of the purposes of the districts as set forth in the law is to "promote recreation" and "develop and conserve water resources and related lands, forest, fish and wildlife resources" and

> "to further provide for the conservation, development, and utilization of land and water for beneficial uses including, but not limited to, domestic water supply, fish, industrial water supply, irrigation, livestock water supply, municipal water supply, recreation, and wildlife."

In considering this subject we have been discussing it from the standpoint of surface water but the ground water enactment of our legislature in 1961 used, in my opinion, a broader definition of the term "beneficial use." The Ground Water Act in Section 89-2911 says "beneficial use" means any economically or socially justifiable withdrawal or utilization of water. It would certainly seem to me that recreational use of ground water would be socially justifiable. Our previous legislative enactments concerning beneficial use as we have noted, certainly did not specifically include such a broad definition of the term.

The question may arise as to whether the legislature may constitutionally declare recreation to be a beneficial use of water in Montana. In my opinion it could constitutionally do so. As early as 1910 the Federal Circuit Court for the District of Colorado in Cascade Town Co. v. Empire Water and Power Co. et al, held recreational use of water to be a beneficial use in rather flowery and lyrical language. In that case the litigant was using the seepage from the flow of the stream and the mist and spray from its falls to produce a luxuriant and exceptionally beautiful growth of vegetation on the floor and sides of the canyon, thus rendering the canyon and the stream with its falls flowing through it rare and beautiful and the chief attraction of a commercial resort. The court said that such use of the canyon, the stream and its falls therein constituted a "beneficial use" and operated as an appropriation of the waters in the stream within the requirements of the Colorado constitution and that the waters could not thereafter be impounded above the canyon and falls and piped away and used to generate electricity for sale as a commodity.

In the same case, it was held by the Colorado Court that the word "divert" didn't necessarily mean that the water has to be taken and carried away from the bed or channel of the stream.

In another federal case decided in 1960 in the United States District Court for the District of New Mexico entitled U. S. v. Ballard et al, 184 Fed. Supp. I, the court decided that the use by the New Mexico Fish and Game Commission of water for duck ponds was a beneficial use within the constitution of the state of New Mexico.

I have heard it expressed that a valid appropriation for recreational use which did not include diversion of the water could not be made in Montana. No doubt such views are based upon such cases as Sherlock v. Greaves, 76 P. 2d 87, 106 Mont. 206, where our Montana Supreme Court has said that an essential element of appropriation of water is diversion of such water. I am inclined to think that if our Supreme Court was presented with this question in the context of a legislatively authorized recreational use that it would hardly hold such a use to be invalid because the water wasn't actually diverted from the stream in question. Regardless of this, surely if the legislature decides to make recreation a beneficial use in Montana if there is any problem concerning diversion that could be taken care of in the legislative act itself.

I would conclude from my study of this subject that there is a very strong likelihood that our courts would hold recreation to be a beneficial use of water in this state without any legislative enactment on the subject. However, in order to make certain that this would be the result, and to avoid extended litigation on this subject, legislative enactment would be the better way to achieve such a status.

It appears probable that the question of legally designating recreational use as a beneficial use of water will be presented to the next legislative session for enactment into law. As we have noted, other states have so designated the use of water for recreation, and the federal government has seemed to accept the principle, and some of the laws already adopted by Montana appear to accept this principle. The argument is made that designating recreational use as a beneficial use of water will preserve Montana water for use by Montanans as contrasted to such use by others outside of our state borders. This argument may have considerable validity as far as upstream use is concerned but less validity for downstream use. For example, if the maintenance of a certain stream level for fish and wildlife habitat is legally recognized by Montana and water appropriated for that purpose, it seems reasonable to suppose that upstream users would be required to leave the water in the particular stream so that the requisite level of water for fish and wildlife habitat will be available for these recreational purposes. The argument does not seem as valid to me for preserving Montana water as against possible users who are downstream outside of our state borders. If a Montana law should declare, using the former example, that a certain level of water can be maintained by appropriation for fish and wildlife habitat, wouldn't it seem that the water is kept in the stream thus making it more available to downstream users outside of the state? This would particularly be true if recreational use, which generally seems to be a nonconsumptive use, would have the same priority as other uses such as industrial, irrigation, domestic, stock watering, etc., and thus be entitled to the benefit of the Western Water Law principle, "First in Time, First in Right."

THE IMPACT ON FISH AND WILDLIFE FROM CURRENT LAND-USE PRACTICES IN MONTANA

by John C. Peters
Montana Fish & Game Department
Helena, Montana

Prior to this session on wildlife and recreation, people have reported on water quality management, on flood and erosion management, and on vegetation management. The kinds of management that occur on watersheds do have a profound effect on fish and wildlife populations and their habitat. Spraying sagebrush with 2,4-D, controlling grasshoppers with chlorinated hydrocarbons, clear cutting timber, overgrazing ranges by livestock, building hydroelectric dams, removing water from free-flowing streams for irrigation, and building roads will often result in a substantial decrease in the capacity of the environment to sustain fish and wildlife.

I believe it is no accident that the theme of the conference is "the interdisciplinary aspects of watershed management". The public is aware that serious environmental problems exist in our country. "The Potomac River is polluted", "Lake Erie is dead", "DDT has poisoned our lands and water" are reflections of public attitudes. Congress and state legislatures are being encouraged by the public to enact legislation to halt further environmental deterioration. All of us in all of the disciplines are being told to work together to preserve the quality of the environment.

In keeping with the interdisciplinary theme of the conference, we will report on two successful fish and game programs that involved the engineering community. While one program is essentially a research project, the other program is a full-time, on-going management activity. Both programs mainly consider trout streams and fisheries habitat. Let's consider the Montana landscape and set the stage for these programs.

Almost all the trout living in our streams are wild fish - trout that were spawned in the clean gravel of the stream itself. A hatchery fish, a "planter", can only survive for a short time in a stream. Studies all over the United States including Montana have shown that if a hatchery fish survives longer than two weeks, he can count himself lucky. Less than 1% of the fish planted in a stream survives from one year to the next. Putting a hatchery fish in a stream in many ways is like putting a tame dog into a pack of wolves.

Over 17.5 million fish were planted in Montana in 1967 and about 2.5 million of these were catchable-sized trout. Approximately 1.75 million fish were caught that year. Of these, about 3/4 were wild fish. Planting hatchery fish is a good example of a program that has been oversold. It continues at its present pace because so many people believe the only reason we have fish in our streams is a result of the hatchery. Therefore, the hatchery program continues to be supported by the public at the expense of more rational biological

programs. All of us need to adjust program priorities, but sometimes it is a difficult task to do so.

Montana has some of the most productive trout streams found anywhere in the world. Statistics show that the most intensively-managed fish ponds can carry up to 300 pounds/acre. Several of Montana's streams naturally sustain nearly that amount without any special management. O'dell Creek near Ennis carries about 220#/acre; the best parts of Little Prickly Pear Creek north of Helena carries about 225#/acre, and certain sections of the Beaverhead River near Dillon and Poindexter Slough carry about 275#/acre. We believe they are worth preserving; they are a valuable natural resource.

SEDIMENT RESEARCH PROGRAM

The most wide-spread pollutant in our state is sediment pollution. In 1961, we began a sediment pollution research project on Bluewater Creek in south central Montana. The sediment pollution in the study stream was primarily a result of agricultural operations in the drainage with irrigation return flow contributing heavily to the problem.

Six years later we were able to change a portion of the stream from one inhabited by trash fish to one inhabited by trout by locating and treating the principal sources of sediment pollution. The first phase of the research involved measuring the fish population and the sediment in the drainage. We found out where the trout in-

habited the stream and the amounts of sediment they were able to tolerate. At the same time, we were able to identify the major sources of sediment pollution in the drainage.

We considered how sediment harmed trout in the second phase of the investigation. Trout eggs were buried in clean gravel and a groundwater standpipe was utilized to measure changes in the intra-gravel environment while the eggs were incubating. We found that even moderate amounts of sediment transported by the stream would tend to drop out and clog up the gravel pore spaces, greatly reducing the amount of oxygen available to the developing eggs. Moreover, we found an accompanying decrease in the intra-gravel seepage rate which must be sufficiently large enough to wash away metabolic products given off by the developing eggs. Where sediment discharge was low, the trout eggs hatched; but where sediment discharge was moderate or high, the trout eggs failed to hatch.

The third phase of the project involved the utilization of erosion control measures to abate sediment pollution. Engineers from the Soil Conservation Service and Geological Survey provided technical assistance and a local landowner cooperated in the abatement program. A new irrigation waste water ditch system was designed and put in concrete, an eroding streambank was stabilized using riprap, and a portion of the floodplain fenced to restrict livestock use. The Fish and Game Department, a landowner, and the Soil Conservation Depart-

ment spent nearly $25,000.00 for these conservation measures.

Evaluation of the abatement program constituted the fourth phase of the program. We measured a 40 percent reduction in the sediment discharge following the abatement program. Accompanying the improvement in water quality, we found that trout became the dominant fish species in the heretofore polluted part of the stream, almost immediately replacing the trash species. The pollution abatement did the job it was supposed to do! The stream had the capacity to flush itself clean and the environment again became liveable for trout.

More sediment pollution abatement work is desirable on Bluewater Creek. We have budgeted money to do the additional work. However, we will have to convince the local landowners that such work is useful to their agricultural operations before we can initiate the additional programs for abatement. Therefore, we have started the fifth phase of our program but it is not yet operative.

Our long-range goal for this research project is to use this stream as a "showcase" to encourage the agricultural community to participate in more of this work. The expertise of the engineering community has played a significant role in the success of this project.

STREAM PRESERVATION PROGRAM

In 1963, the Montana legislature enacted a stream preservation

law for a two-year trial period. The 1965 legislature gave the Fish and Game Department a permanent law and is the foundation of our stream preservation program. Therefore, we have been working on a day-to-day basis with the road building community for the last seven years to carry out the intent of this law. We believe the succes of our program is a result of the excellent channels of communication between the engineer and the biologist. We really understand each other's problems and work together as a team in the problem-solving arena.

What has been accomplished. From July 1, 1963 when the first law became effective, until June 30, 1969 we have reviewed legal notices for 259 projects. Of these, we asked for special considerations on 88 projects, roughly one out of every three.

Following are the highlights of what has been accomplished during the first six years with the law. Proposed road alignments were moved to avoid encroaching upon the Madison, Big Hole, Missouri and Blackfoot Rivers. Meanders were designed and built in Prickly Pear Creek, the St. Regis River and the Clark Fork River so that the channel was as long after construction as before. Extra bridges to preserve natural meanders were built in the Beaverhead and Missouri Rivers and are planned for the Blackfoot River. Brushy floodplain vegetation, removed to facilitate construction, has been replaced. Channel excavation has been limited to those times of the year when trout are not spawning and eggs are not in the redds. An elevated and inde-

pendent alignment has been proposed and been designed to preserve the St. Regis River and its scenic canyon. All of these fishery-saving accomplishments have been made by working with the State Highway Department with the concurrence of the Bureau of Public Roads, through the effective medium of a good law, which established the framework.

Fringe benefits. By asking them to follow the intent of the Stream Preservation Law, we now have written agreements with the following federal agencies: Forest Service, Bureau of Public Roads, Bureau of Reclamation, Fish and Wildlife Service, Soil Conservation Service, and the Bureau of Indian Affairs. The agreement with the Soil Conservation Service allows the Fish and Game Department to review each project under the Agricultural Conservation Program that involves work in a stream or river. No federal cost-sharing is allowed on channel work under ACP unless it meets with our written approval. Since channel stabilization work has increased in recent years to the fifth largest expenditure of funds under ACP, this has become an important part of our stream preservation program.

The Bureau of Public Roads has also followed the intent of the law. We have established liaison with the BPR that allows us to review all Bureau designed projects from the preliminary alignment to the final construction phase.

Depending on individual forests in the region, we have established fair to excellent cooperation with the U.S. Forest Service. There are few problems with high design forest roads as a rule. It is the smaller logging roads designed within the Forest Supervisor's offices that often are troublesome.

In 1969, the Montana legislature appropriated $100,000.00 to the Department for the construction of recreation lakes. Involved in this program is the utilization of highway fills to impound water. The Fish and Game Department pays the difference in cost between a fill designed for a roadway and a fill designed for a dam embankment. The department has hired an engineering consulting firm to provide the design and right-of-way investigation work necessary for the development of plans and specifications. The State Highway Department provides us at cost with core log data necessary for material and foundation evaluation and with aerial photography necessary for site mapping. This is an example of an extremely efficient use of public money and illustrates what agencies can do when they are really willing to cooperate with each other.

What is left to be done. Almost all of our effort in preserving the stream environment has been devoted to the preconstruction phase of road building. This phase allows us (1) to review and adjust alignments, and (2) to work out measures for fishery mitigation. However, this effort does not do the entire job for maximum protection of the environment. Our effort up to now only enables us to

keep between two-thirds and three-fourths of the stream environmental problems in our management grasp. However, to improve our ability to preserve the entire stream environment, we must get involved on a day-to-day basis during the construction phase of road building. This will involve a great improvement in our understanding of just what can be done and what cannot be done when the contractor is building the road. We may have to change or refine certain measures for habitat mitigation once this knowledge gap is closed. Trained biologists must be hired to work with the construction engineer in this important problem area.

Under our D-J fisheries program, we have evaluated a few of the channel mitigative measures to determine their value for fish. But we do not have the money or manpower to begin to evaluate all the important measures that have been designed and constructed for aquatic life. We need more money and people to do this work. Until such a program is operating, we are proceeding under the belief that channels that behave well hydraulically also provide the best environment for fish. With or without a more adequate evaluation program, we must work closely with the engineering community to better understand flow in natural channels as it relates to fish.

Conclusions. The Stream Preservation Law has provided protection for the trout stream environment in Montana. It has shown the public that a construction agency and a conservation agency can work

together given the necessary legal framework. One measure of the relative effectiveness of the program is the $100,000.00 appropriation for the Recreation Lakes Program granted to the Fish and Game Department by the 1969 legislature. This program would not be possible without the close cooperation of the State Highway Department, cooperation initiated by state law which detailed agency responsibilities.

This law is a social document that applies a mixture of biological and engineering principles to protect a part of the environment. It illustrates that the public wants to maintain a quality environment and will pay for it. Yet this success has been achieved without economically penalizing the road building effort. Apparently the myth that this law would scuttle the road building program in Montana has vanished. The largest public works program ever conceived and funded by Congress continues in Montana and elsewhere. But there is a difference. We have a legal document which has helped us and the road builders minimize some of the destructive forces in that massive program.

THE ENVIRONMENTAL CRISIS

The vast majority of the public today believes there is indeed an environmental crisis. For example, a few days ago much of the east coast of the United States was strangled by polluted air for

nearly one week. A free-flowing, unpolluted river is a rare entity in our country. It is nearly impossible to find a landscape in our nation that has not been damaged in some way by man's short-sightedness.

However, we have tried to accent the positive and tell you about two fairly successful programs in our state involving the engineering community. It certainly would not be difficult to point out several outstanding examples in Montana where man is not living in harmony with his environment. Fish and wildlife are very sensative and respond quickly to environmental deterioration. They are useful indicators in measuring the state of health of the environment.

We will have to work together as a team to solve our environmental problems. We have the technical tools available now to solve many of the problems. We lack the necessary political and social institutions to quickly reduce the environment crisis.

It will take an interdisciplinary approach to get the job done. People representing all the disciplines using knowledge of the physical, natural, and social sciences must work together as partners. The mistakes that were made in the past often were a result of "tunnel" vision. We need to look at the broad view; otherwise there is the risk of making the same mistakes over again. We in the fish and

game business want to be involved and add our input into the problem-solving, decision-making processes. Just as you can help us, we can help you.

Presented at the Symposium on the Interdisciplinary aspects of Watershed Management, August 5, 1970.