THE EFFECTS ON FISH AND GAME OF TWO PROPOSED ROUTES FOR INTERSTATE HIGHWAY ALONG ROCKY CREEK EAST OF BOZEMAN

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MONTANA FISH AND GAME DEPARTMENT

HELENA, MONTANA

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The difficulty of assigning dollar values to recreational resources is well recognized. While a highway may be constructed for a definite expenditure, a natural trout stream cannot be built or duplicated at any cost. It is one of the basic facts of wildlife management that habitat is the key to fish and game abundance. Suitable habitat is limited. For example, in a recent classification it was found Montana has only about 9,000 miles of fishing streams in the top four classes. Two-thirds of the people fishing in Montana prefer stream fishing as indicated by their fishing habits. Game habitat as well as fish habitat is dwindling. Any additional reduction of fish and game habitat must be carefully evaluated before proposed developments are built.

Information furnished by the Montana State Highway Department indicates two possible locations for the Interstate Highway east from Bozeman to the mouth of Rocky Canyon. The north location follows closely along Rocky Creek. The south location more nearly follows the present highway and would have considerably less effect on fish and wildlife habitat. Following are evaluations of the comparative effects of these two proposed highway locations on (1) fish and (2) game:

Comparative Effects Of The Two Proposed Highway Locations On Fish

As nearly as can be determined by map measurer, the proposed south highway location would involve a loss of about 0.25 miles of natural stream channel; the north location, a loss of 1.5 miles, or six times as much.

Rocky Creek rates relatively high on the statewide stream evaluation. It is in the Yellow, or Class III group, designated as of interest to a particular district of the state. At present most of the fishermen on Rocky Creek are from Bozeman.

Electric census in six 300-foot sections of the creek in September of 1957 showed good populations of fish present (Table 1). Physical characteristics of the habitat were excellent for trout and whitefish. In the representative sections shocked, Rocky Creek averaged 12 feet in width and 2 feet in depth. Cover was provided in the form of undercut banks, pools, boulders, and overhanging willows. Water temperatures ranged from 50° to 60° F. All of the data collected show Rocky Creek is a good fishing stream.

Undoubtedly fish populations will be drastically reduced in the sections affected by road construction. Stream meanders will be removed, and it is in the meanders that the majority of pools and other cover is found. Whitney and Bailey (1959) found that channel changes on Flint Creek due to highway construction near Philipsburg resulted in a loss of 94 percent (by number and weight) of game fish 6 inches and longer.

Also, more stream is affected than is actually changed. The loss of a desirable pool or resting area is reflected in adjacent stretches of stream. Involved too, may be some sections where the channel is not changed, but where the highway may closely parallel the stream. Here cover is often removed and the meander is rip-rapped to prevent washing. As was shown by Boussu (1954) in his study on Trout Creek near Bozeman, removal of cover can virtually eliminate fish from an area.

There are approximately 8.8 miles of stream adjacent to the 5.5 miles of highway construction. Over the present 190-day fishing season, the average use is estimated at 12 fishermen per day; an estimated total of 2, 280 fisherman days for the season on this stream section. The average use figure was determined from warden observations, and is a conservative estimate. The U. S. Fish and Wildlife Service (Nicholson, 1957) estimated the average daily expenditure by cold water fishermen in the Missouri River Basin during the period 1948 to 1954 was $7.38. Using this figure, the 2,280 fishermen on the 8.8 mile stretch

Table 1. ELECTRIC COUNTS DATA ON ROCKY CREEK, SEPTEMBER 1957

		No.	Spec.	Av.L.	Av.Wt.
SEC. I.	300 foot section below mouth of Bear Creek	25			
	9-10-57. Water temp. 60°F., Average width	11	LL	11.0	1.07
SEC. I.	300 feet, average depth 2 feet. Cover-	2	Rb	9.0	.31
	Rubble and boulders, undercut banks, pools.	7	LL	11.2	.52
	Bottom - 10% gravel.	1	Rb	9.2	.22
		3	Su	9.9	.46
		1	Rb	9.2	.22
		3	Su	9.9	.46
SEC. II.	300 foot section opposite Shadoan Lumber Co.	16	Wf	14.2	1.12
	9-13-57. Water temp. 56°F., Average width	21	LL	10.1	.73
SEC. II.	300 foot section opposite Shadoan Lumber Co.	1	Rb	17.3	1.26
	12 ft., Average depth 2 ft. Cover - rubble,	37	LL	16.3	.30
	undercut banks, pools, willow.	1	Rb	9.2	.36
	Bottom - mucky.	58	Su	9.1	.30
		1	Rb	9.2	.36
		58	Su	9.1	.36
SEC. III.	300 foot section opposite Chenolovich house.	1	Wf	14.9	1.42
	9-9-57. Water temp. 51°F.,	4	LL	17.1	1.22
SEC. III.	300 foot section opposite Chenolovich house.	13	Rb	14.5	1.03
	Av. width 12 ft., Av. depth 2 ft.	3	LL	12.0	.76
	Cover - boulders and rubble, undercut banks,	13	Rb	7.5	.23
	pools.	3	Su	12.0	.76
	Bottom - 5% gravel.				
SEC. IV.	300 foot section above Oxheim house.	11	LL	13.0	1.03
	9-9-57. Water temp. 55°F.,	13	Rb	7.5	.21
SEC. IV.	300 feet section above Oxheim house.	14	LL	13.5	1.02
	Av. width 12 ft., Average depth 2 ft.	4	Rb	7.5	.21
	Cover - boulders and rubble, undercut banks,	16	Su	7.4	.26
	pools.				
	Bottom - 10% gravel.				
SEC. V.	300 foot section opposite H. Bierig Ranch.	9	LL	15.5	1.24
	9-11-57. Water temp. 51°F.	11	Rb	7.2	.22
SEC. V.	300 feet section opposite H. Bierig Ranch.	1	Su	13.3	1.20
	Av. width 12 ft., Av. depth 2 ft.	11	Rb	7.2	.22
	Cover - Boulders and rubble, undercut banks,	1	Su	13.3	.60
	pools.				
	Bottom - 10% gravel.				
SEC. VI.	300 foot section 1/2 mile So. Bridger Club.	14	LL	10.8	.89
	9-10-57. Water temp. 50°F.	27	Rb	7.4	.22
SEC. VI.	300 feet section 1/2 mile So. Bridger Club.	20	Su	11.2	.70
	Av. width 12 ft., Av. depth 2 ft.	27	Rb	7.4	.22
	Cover - Rubble, undercut banks, pools.	20	Su	11.2	.70
	Bottom - 10% gravel.				
	Cover - Rubble, undercut banks, pools.				
	Bottom - 10% gravel.				

Abbreviations:

Eb	Eastern brook trout	Su	Sucker
LL	Brown trout	Wf	Whitefish
Rb	Rainbow trout		

of stream spent $16,826 annually or approximately $1,900 annually per stream mile.

The real value of Rocky Creek lies in its potential as a fishing stream. As the populati increases, the number of fishermen is expected to expand manyfold in the next few decades. At e same time fishing pressure can be greatly increased by relaxing regulations; for example, by allowing tourists unrestricted use of the stream as is done on certain waters in National Parks. Either or both of these factors will result in increased use of Rocky Creek until its full potential use is reached.

It is anticipated that Rocky Creek when managed for full utilization can furnish 6,400 man-day of fishing per mile each. year. This is a judgement estimate based on present concentrations of fishermen streams in heavily populated states. Using the $7.38 per day fisherman expenditure figure gives Rocky Creek a potential annual value of approximately $47,000 per stream mile. Either inflation or deflation could alter the potential annual value. It is anticipated if the habitat of Rocky Creek is maintained, the fisherman use will steadily increase from the present use to this full utilization.

It is obvious from this that it is important to preserve as much of the natural stream channel as possible. Therefore, insofar as the fishery on Rocky Creek is concerned, the south location, with fewer and less extensive channel changes, would definitely be the more desirable

Comparative Effects Of The Two Proposed Highways On Game

1. AMOUNT OF HABITAT AFFECTED

a. Flood plain habitat:

The northern route which runs along Rocky Creek will extend over approximately 24,000 linear feet of flood plain type habitat. As we assume the entire right-of-way width of 300' will be affected, approximately 165 acres of this habitat is involved. The southern route which runs along the old highway will only involve approximately 20 acres of this type.

b. Heavy cover type:

A considerable amount of heavy cover (willow, cottonwood, etc.) is included in the flood plain. According to personnel of the Bozeman Highway Department office this heavy cover will not be cut out for the entire 300' right-of-way width. Apparently 150' is the width of clearing for highway sections which do not include frontage road. Sections with a frontage road will be cleared for a width of 225'. A map measurer was used on the enclosed map to obtain the length of these various sections. Consequent calculations indicate approximate acreage of heavy cover which will be cleared as follows: Northern route 50 acres, southern route 5.5 acres.

c. Stream side habitat:

Using a map measurer as above, actual stream side mileage which will be affected is approximately 2.1 miles for the northern route and 0.3 miles for the southern route.

2. WILDLIFE SPECIES INVOLVED

The wildlife species involved are many. However, we are concerned here only with those classified as either game or fur.

a. Deer

There is a small deer herd which use the Rocky Creek flood plain during parts of the year, principally in the late winter, spring and early summer. They use this area to obtain three of the essential necessities: food, cover, and water. The exact size of this herd is not known, but studies which have been conducted in other areas comparable to this and through observations made by local individuals and Fish and Game personnel would indicate a density of approximately one deer to every seven acres during the period when this area is use

b. Upland Game Birds

Chinese pheasants and ruffed grouse are known to inhabit the Rocky Creek area. Upland game bird hunting in this area is not particularly good although they are hunted by local residents. Effects of construction of either route will be negligible.

c. Waterfowl

Various species of ducks are known to use the beaver ponds now existing immediatel west of the Bridger Club. Effects of construction of either route will be negligible.

d. Fur Bearers

There are known to be at least two beaver colonies in the stream sections which will be directly affected by this highway construction. Both of these colonies will be involved with the construction of the northern route. Only one with the construction of the southern route.

Muskrat are known to exist in Rocky Creek. Estimates by game personnel would indicate that two colonies would be affected by the construction of the southern route. Effects would be negligible. Mink are occasionally trapped along Rocky Creek. Although the density of mink in this area has not been determined, comparable areas which have been studied would lead one to estimate the population density to be between 5 to 10 per stream mile. Effects of construction of either route have not been determined, but would probably be negligible.

3. Monetary Values

Deer

(1) Northern Route:

The northern route would destroy approximately 165 acres of deer habitat and thus displace about 23 deer. Assuming a 45% production rate, which is conservative, 10 deer would be lost to the harvest potential. According to studies conducted by the Fish and Wildlife Service (Nicholson, 1957) the average deer hunter in this area expended $7.00 (actual figure-$6.99) per trip in 1951 and hunted 5 days to get a deer. Since our present hunter success is 100%, we can estimate the present potential value which the northern route will cost in terms of deer habitat as follows: $7.00 X 5 X 10 X 1 = $350 per year. Future potential will depend on hunter population increase and the resultant lower hunter success. If we can assume that the hunter of the future will be satisfied with 20% success (Michigan hunters are 18% successful), and will hunt 10 days to get a deer (this number of man days is indicated at present by some Montana checking station reports), the future potential could be: $7.00 $7.00 X 10 X 10 X 5 = $3500 per year.

(2) Similar calculation for the southern route give us a present potential of $350 and a future potential of $1000.

Fur Bearers

(1) The north route will eliminate at least two beaver colonies with a total production of eight beaver worth $10 each or a total of $80 per year.

(2) The south route will eliminate one beaver colony with a total production worth $40 per year.

SUMMARY OF FISH AND GAME LOSSES INVOLVED IN TWO PROPOSED HIGHWAY LOCATIONS BASED ON POTENTIAL MAXIMUM USE AND PRESENT DAY SPORTSMEN'S EXPENDITURES:

ESTIMATED ANNUAL LOSS

	SOUTH ROUTE	NORTH ROUTE
FISH	$11,750	$70,500
GAME	$ 1,040	$ 3,580

Present day values, future values, potential use and other values can be estimated however, the important consideration is that fish and game habitat once destroyed cannot be replaced.

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