UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Sport Fisheries and Wildlife
North Central Region
Minneapolis, Minnesota

MEMORANDUM

To: Regional Director, Bureau of Reclamation, Region 6, Billings, Montana

From: Regional Director

Subject: Lower Musselshell Unit, Montana (BR) - Report of Bureau of Sport Fisheries and Wildlife

This is our report on the fish and wildlife aspects of your plan for development of the Lower Musselshell Unit in Petroleum and Garfield Counties, Montana. It has been prepared for inclusion in your feasibility report on the Unit, which has not yet been authorized for construction. This report has been prepared under the authority, and in accordance with the provisions, of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It has been reviewed and endorsed by the Montana Fish and Game Department, as evidenced by the appended letter dated April 11, 1966, from Mr. Frank Dunkle, Director, to Mr. Cecil E. Gubser, Supervisor, Missouri River Basin Studies. This report has also been reviewed by the Bureau of Commercial Fisheries and has the concurrence of that agency.

A reconnaissance report on the Musselshell Division was prepared by this Bureau in October 1963. The plan treated in that report has been modified as a result of further studies by the Bureau of Reclamation. Therefore, this document supersedes that earlier report.

DESCRIPTION OF THE PROJECT

The primary feature of the Lower Musselshell Unit will be a dam and reservoir on Flatwillow Creek, a tributary of the Musselshell River. Flatwillow Creek enters the Musselshell about 11 river miles above the town of Mosby. The damsite is about 1½ miles above the mouth of Flatwillow Creek (Map MO 1-8-2). The reservoir, when filled to its total conservation storage capacity of 70,819 acre-feet, will have a surface area of 2,290 acres. The project will serve irrigation, fish and wildlife conservation, and general recreation purposes. Pertinent reservoir data are shown in Table 1.

Table 1. Flatwillow Reservoir

Item	Elev. (m.s.l.)	Area (Acres)	Capacity (Acre-feet)
Top of Conservation Pool	2,652	2,290	70,819
Top of Inactive Pool	2,624	1,166	23,062*
Streambed	2,570	0	0

* Consists of 12,000 acre-feet for 100-year sediment accumulation and 11,062 acre-feet for fish, wildlife, and recreation pool.

It is our understanding that the guide contour for fee title acquisition of lands will be elevation 2,652 - the top of the conservation pool. Lands will probably be acquired in fee on legal subdivision lines above this contour. There will be a surcharge pool between elevation 2,652 and elevation 2,686 for use during periods of extremely high flow on Flatwillow Creek. Flowage easements will be acquired on the lands to be inundated during these periods.

Approximately 8,400 acres of irrigable lands will be served by the project. These lands lie along the Musselshell River between the mouth of Flatwillow Creek and Fort Peck Reservoir, a distance of about 65 river miles (Fig. 1). Almost 35 percent of these lands have been periodically irrigated by many small, private systems. However, the water supply is so erratic that crop failures are common. The plan of development for the Unit involves the extension of the existing irrigation systems and construction of additional small systems to serve the irrigable area. The lands will be irrigated by pumping from the Musselshell River. The tracts to be served are generally less than 300 acres in size and lie on benchlands less than 30 feet above the river. The pumping plants and distribution systems will all be privately constructed and operated.

The water supply for the Unit will consist of the unregulated flows of the Musselshell River and releases from Flatwillow Reservoir. Releases from the reservoir during the irrigation season will vary depending upon availability of water from the Musselshell. Reservoir releases will be used to supplement natural flows. There will be periods when an additional 10 c.f.s. will be released from the reservoir, beyond the volume needed for irrigation purposes, to act as a carrier flow to the irrigable lands. This carrier flow will be necessary because not all of the available water can be pumped from the Musselshell River for irrigation. No releases will be made from Flatwillow Reservoir during the nonirrigation season. The reservoir will have an annual fluctuation of about 25 feet.

The average annual discharge of Flatwillow Creek at the reservoir site is 29,900 acre-feet, or about 40 c.f.s. However, this average figure is

misleading since in half of the months of record flows were less than 20 c.f.s., and in many years the stream has had zero flow for weeks at a time, especially in late summer and winter months. The annual discharge is boosted by May and June flows which have averaged 80 and 165 c.f.s., respectively, over the period of record.

About 65 miles of the Musselshell River will also be affected by development of the Unit. A summary of Musselshell flows, with and without the project, is shown in Table 2. The flows are monthly averages for the period of record. As in the case of Flatwillow Creek, during many years of the period of record there were times during late summer and winter months when zero flow was recorded.

Table 2. Average Flows - Musselshell River*

Month	Without the Project: Average Flow (c.f.s.)	With the Project: Average Flow (c.f.s.)	Difference (c.f.s.)
October	48	42	- 6
November	60	50	- 10
December	68	60	- 8
January	60	52	- 8
February	123	115	- 8
March	430	368	- 62
April	277	245	- 32
May	362	348	- 14
June	875	858	- 17
July	278	310	+ 32
August	73	115	+ 42
September	57	70	+ 13

* Based on historic flow record at Mosby 1935-61.

DESCRIPTION OF THE AREA

The Flatwillow Creek valley in the reservoir area averages about one mile wide, and is bordered by rolling hills and grass-covered benches. The Musselshell River valley averages over a mile wide and extends into the "Missouri Breaks" country, a wild and lonely area (Fig. 2). Here one can still find the remains of old log cabins used by "wolfers" and "wood-choppers" during early Montana history. The area is characterized by climatic extremes, including blizzards in winter and drouths in summer. The average annual rainfall is only 11.88 inches.

The project area is sparsely populated. Most of the inhabitants are ranchers. State Highway 20 connects Lewistown, population 7,408, and Jordan, population 557. Both of these towns are about 70 miles from the reservoir site. Winnett, population 360, is 22 miles west of the Mosby bridge, and is the closest town to most of the residents along the lower Musselshell River. Livestock production, with associated irrigated hay crops along the river bottom, comprise the principal agricultural economy. Oil exploration and development is the only other enterprise in the area not related to agriculture.

FISH AND WILDLIFE RESOURCES

Fish

Flatwillow Creek within the reservoir site is a narrow, winding stream with little vegetation along its banks (Fig. 3). Upstream irrigation practices contribute moderate amounts of sediment to the stream which eventually enters the Musselshell River. Flows in the creek are partially controlled by Petrolia Reservoir, a 515-acre State Water Board irrigation storage reservoir at the confluence of Flatwillow and Elk Creeks.

The fishery in Flatwillow Creek from the head of the reservoir site to its mouth is insignificant, both from the standpoint of use and productivity. Sedimentation, erratic streamflow, and lack of protective cover are undoubtedly responsible for this situation. Principal species which may be present are the same as those found in the Musselshell River; i.e., catfish, goldeyes, and carp.

Set-line fishing for channel catfish is particularly good in spring and early summer in the Musselshell. Fall fishing for sauger also is excellent. Fishing in the lower river is probably as good now as it ever has been. However, species such as sturgeon, ling, and buffalo, common before World War I, have largely given way to drum, carp, and goldeye. Because of the isolated nature of the stream, fishing pressure is slight. Much of the river is accessible only by unimproved dirt road, impassable except in fair weather. However, the stream bottom, timbered with willows, cottonwoods, buffaloberry, and juniper, has a special esthetic appeal for the explorer-fisherman who wants to get away from the crowded streams close to urban areas.

MRBS 7791

Fig. 1. Typical lands proposed for irrigation in the Lower Musselshell Unit. Photo by E. D. Berg, December 8, 1965.

MRBS 7788

Fig. 2. The lower Musselshell River valley. A small irrigated hay field can be seen at upper right of photo. This is a big, lonesome country, relatively inaccessible to hunters and fishermen. Photo by E. D. Berg, December 8, 1965.

It is estimated that the 65 miles of the Musselshell River which will be affected by the project are capable of supporting 2,500 fisherman days-use annually.

Wildlife

The Flatwillow Reservoir site occupies a steep-sided narrow valley, about one mile wide (Fig. 4). The shallow creek meanders through this valley, which is vegetated largely with grass and sagebrush. Steep, grass-covered bluffs and benchlands occur on both sides of the valley. A few mature cottonwoods, almost totally lacking in understory cover, are scattered along the creek, and some junipers grow along the bluffs and coulees overlooking the stream channel.

The principal wildlife species using the reservoir site are mule deer, antelope, sage grouse, and rabbits. However, the whole area is heavily grazed by livestock, furnishes little permanent habitat for any of these game birds and animals, and is relatively unimportant for hunting. Aquatic habitat for fur animals and waterfowl is also marginal.

The presently irrigated lands along the Musselshell River are mostly devoted to alfalfa and native hay. Nonirrigated lands are used for grazing livestock. Both mule deer and white-tailed deer, pheasants, sage grouse, and rabbits are the principal game species found on the irrigated lands. These same species also occur on the nonirrigated areas. Neither the Flatwillow Reservoir site nor the dry lands included in the irrigable area provide significant hunting opportunities.

EFFECTS OF THE PROJECT ON FISH AND WILDLIFE RESOURCES

Fish

There is a fairly good potential for development of a trout fishery in Flatwillow Reservoir. However, both the incoming sediment load and the 25-foot annual fluctuation are undesirable features which will adversely affect the quality of the fishery. Also, since neither the reservoir nor the stream above will provide suitable spawning habitat, maintenance of the fishery will depend upon periodic stocking. By way of comparison, though, if trends at Yellow Water Reservoir (a nearby State Water Board project) are any indication, development of a good fishery in Flatwillow Reservoir will attract substantial numbers of anglers. The projected average annual use of Flatwillow Reservoir is estimated at 4,000 fisherman-days, evaluated at $8,000 - with the project.

The proposed scheme of operation of Flatwillow Reservoir, together with expected increase in irrigated acreage, will change the historical flow regimen of the Musselshell River. The biological productivity of this stream is already impaired by erratic flows, including periods of zero flow (Figs. 5 and 6). But considering the good fishing for sauger and

MRBS 7786

Fig. 3. Flatwillow Creek just above the damsite. Seasonal low flows preclude a permanent fishery in this stream. Photo by E. D. Berg, December 6, 1965.

MRBS 7785

Fig. 4. Flatwillow Creek about one mile above the damsite. Good wildlife cover is scarce along both the stream course and the grass-covered benchland overlooking the river bottom. Photo by E. D. Berg, December 6, 1965.

MRBS 7753

Fig. 5. The Musselshell River at Mosby, flowing about 1,500 c.f.s. At this rate of flow the river provides ample habitat for catfish, sauger, ling, carp, and goldeyes. Photo by Liter Spence, June 22, 1965.

MRBS 7789

Fig. 6. Musselshell River at Mosby flowing about 200 c.f.s. At this rate of flow fish habitat is severely restricted. Photo by E. D. Berg, December 8, 1965.

catfish now available during periods of favorable flow, it appears that the existing water quality is conducive to a productive fishery, and that a more favorable flow regimen could result in even better fishing.

However, there may be some detrimental effect on this fishery due to further reduction of the already low flows during the months of October through February. Also, there will be some years when all except the carrier flow will be diverted from the downstream end of the Musselshell, resulting in extremely low flows in this reach. This may be largely offset by increased flows, particularly in the uppermost 40 miles or so of the area of influence, during July, August, and September, a period when high temperatures and low flows have historically adversely affected the fishery. The relative importance of these compensating effects on the Musselshell River fishery is extremely difficult to determine, and for practical evaluation purposes the estimated fisherman day-use is expected to be about the same as it would be without the project. Table 3 indicates the effects of the project in terms of fisherman days-use.

Table 3. Annual Fisherman Day-Use and Values

Item	Miles of Stream	Without the Project: Fisherman Days	With the Project: Fisherman Days	Net Benefits: Fisherman Days	Net Benefits: Value
Flatwillow Creek in Reservoir Area	11.5	--	--	--	--
Flatwillow Creek below reservoir	1.5	--	--	--	--
Flatwillow Reservoir	--	--	4,000	4,000	$8,000
Musselshell River below mouth of Flatwillow Creek	65	2,500	2,500	--	--

The commercial fishery potential of a single isolated project such as Flatwillow Reservoir is limited under present conditions of market availability, harvesting and processing technology, and relatively small pool size. In addition, the reservoir configuration and magnitude of yearly drawdowns indicate that fishery productivity may be limited. However, should the Montana Department of Fish and Game determine that periodic utilization of commercial species would be desirable in their fishery management program for the reservoir, it is estimated that annual food fish production would be 32,000 pounds valued at $4,800.

Additional quantities of fish may be available for industrial uses; however,

realization of such production would depend on the intensity of management, presence of suitable species, and the successful outcome of current studies in technology and gear research. No quantitative estimate of production for these uses can be given at this time.

Wildlife

All of the wildlife habitat, admittedly marginal, below elevation 2,652 will be inundated by Flatwillow Reservoir. Because of the 25-foot annual fluctuation, the reservoir shoreline will not provide habitat for terrestrial wildlife. Ducks will use the impoundment for resting during migration periods and may furnish a little hunting, but nesting habitat will be very limited.

The irrigable lands occur in small parcels, 100-300 acres in size, lying in meanders of the Musselshell River (Fig. 7). Of the 8,400 irrigable acres, about 5,450 acres will be irrigated for the first time, and the remainder will receive supplemental water. Wildlife use of the lands which have been periodically irrigated will not change significantly. However, when the dry lands are converted from pasture to irrigated crops, pheasant numbers will increase and more bird hunting opportunities will be provided. It is estimated that irrigation development will result in a net increase of 250 upland game hunter-days annually, evaluated at $600.

The irrigated fields, especially the alfalfa fields, will attract deer and antelope, and crop depredations by these animals may result. Fur-animal and waterfowl habitat will not be significantly affected by the development of additional irrigation.

PLAN OF DEVELOPMENT FOR FISH AND WILDLIFE RESOURCES

Fish

Construction of Flatwillow Reservoir will provide an opportunity to enhance the fishery in the 1-1/2 miles of stream below the Dam. (Fig. 8). In many cases, tailwater fisheries below reservoirs are a major attraction to anglers. Often a good fishery can be developed where none existed before by providing adequate flows from reservoir storage. The proposed plan of operation does not provide for a minimum instantaneous release from Flatwillow Reservoir during the nonirrigation season. This is unfortunate, even though the existing fishery in the 1-1/2 miles of stream between the dam and the Musselshell River is now insignificant. With a minimum release of about 15 c.f.s., a trout fishery could be developed in this reach of Flatwillow Creek. It would result in an increase of 600 fisherman days-use annually, evaluated at $1,800. A minimum release of 15 c.f.s. below Flatwillow Dam would also help prevent the occurrence of low flows in the Musselshell River during the nonirrigation season.

We have been informed by the Bureau of Reclamation that the available water

MRBS 7790

Fig. 7. The Musselshell River is characterized by lazy meanders from Mosby to its mouth. Flat lands inside the meanders can be irrigated by pumping from the river. Photo by E. D. Berg, December 8, 1965.

MRBS 7787

Fig. 8. Flatwillow Creek just below the damsite. A good fishery could be developed in the stream below the dam if an adequate minimum flow is provided. Photo by E. D. Berg, December 6, 1965.

supply will not permit continual releases of this magnitude and still fully serve the irrigation function. However, we urge that, should this project be authorized and constructed, consideration be given to this possibility, particularly if irrigation demand does not develop to the extent anticipated.

The downstream end of the Musselshell River has historically provided good quality habitat and supported a substantial warm-water fish population. In the interest of maintaining this habitat and the fishery it supports, minimum flows at the mouth of the Musselshell should not occur oftener or last longer, as a result of the project, than has been the case historically.

The fishery benefit attributed to Flatwillow Reservoir in this report is predicated on the understanding that the reservoir will not be drawn down below elevation 2,624. Drawdown below this elevation would make access for fishermen even more difficult, and could endanger the survival of the fish populations, particularly the trout, during either severe winters or protracted hot spells in the summer. On the other hand, there may be occasions when drawdown below elevation 2,624 would facilitate chemical rehabilitation of the fish populations. Therefore, the reservoir should not be drawn down below elevation 2,624 feet except as may be required for fishery management purposes.

Wildlife

The project does not offer an opportunity to develop a substantial plan for enhancement of wildlife resources. Wildlife habitat is now sparse in the reservoir area, largely due to heavy grazing. Reservoir lands should be acquired in fee to appropriate legal subdivisions above the 2,652 contour, and all land lying above the conservation pool should be protected from grazing. This in itself will result in the development of desirable grasses and forbs attractive to upland-game populations, deer, and antelope.

RECOMMENDATIONS

It is recommended that:

(1) The report of the Regional Director, Bureau of Reclamation, include the conservation and development of fish and wildlife resources among the purposes for which the project is to be authorized.

(2) Federal lands and project waters in the project area be open to public use for hunting and fishing so long as title to the lands and structures remains in the Federal Government, except for sections reserved for safety, efficient operation, or protection of public property.

(3) Leases of Federal land in the project area reserve the right of public use of such land for hunting and fishing.

(4) A minimum instantaneous release of 15 c.f.s. be provided below Flatwillow Reservoir.

(5) The frequency and duration of historical minimum flows at the mouth of the Musselshell River during the irrigation season not be increased.

(6) Flatwillow Reservoir not be drawn down below elevation 2,624 feet except as may be required for fishery management purposes.

(7) Reservoir lands be acquired in fee title to appropriate legal subdivisions above the 2,652 contour, and that these lands be protected from grazing.

The cooperation and assistance provided by your staff during our investigations of this project is greatly appreciated. Please inform us of any significant changes in the project plan, so that we can revise this report, if necessary.

/s/ R. W. Burwell

R. W. Burwell

Attachment

STATE OF MONTANA

DEPARTMENT OF

FISH AND GAME

Helena, Montana
April 11, 1966

Mr. Cecil Gubser, Supervisor
Missouri River Basin Studies
Bureau of Sport Fisheries and Wildlife
P. O. Box 1381
Billings, Montana

Dear Cecil:

We have reviewed your report on Lower Musselshell Unit, Montana and concur with it.

Recommendations 4, 5 and 7 deserve particular attention if the project objective of fish and wildlife conservation is to be fulfilled. Number 4 pertains to minimum releases from Flatwillow Reservoir. The tailrace trout fishery created would be particularly desirable in this area where there is little trout stream fishing. Your prediction of 600 fisherman days annual use for Flatwillow Creek below the reservoir appears to us to be a conservative estimate.

Recommendation 5 pertains to minimum flows at the lower end of the Musselshell River. As you point out, a satisfactory minimum flow is important to maintenance of the sauger and catfish fishery in the river. We found a few northern pike in the Musselshell prior to the present population "boom" of this species in Fort Peck Reservoir. It may be that with sufficient river flows, northern pike runs, and in turn a fishery, may develop in the river. Then too, although we do not fully understand the relationship, we feel flows in the Musselshell may be important to the well being of channel catfish in Fort Peck Reservoir. Our observations indicate catfish in the reservoir congregate near the mouths of rivers, and we have found movement of catfish from the reservoir into Musselshell River.

It is assumed the protection from grazing specified in Recommendation 7 means fencing reservoir lands. This will be necessary in this instance if vegetative cover is to develop for wildlife.

We appreciate the opportunity to review and comment on your report.

Sincerely,

Frank H. Dunkle

FRANK H. DUNKLE
STATE FISH AND GAME DIRECTOR

FHD/eb