United States Department of Agriculture

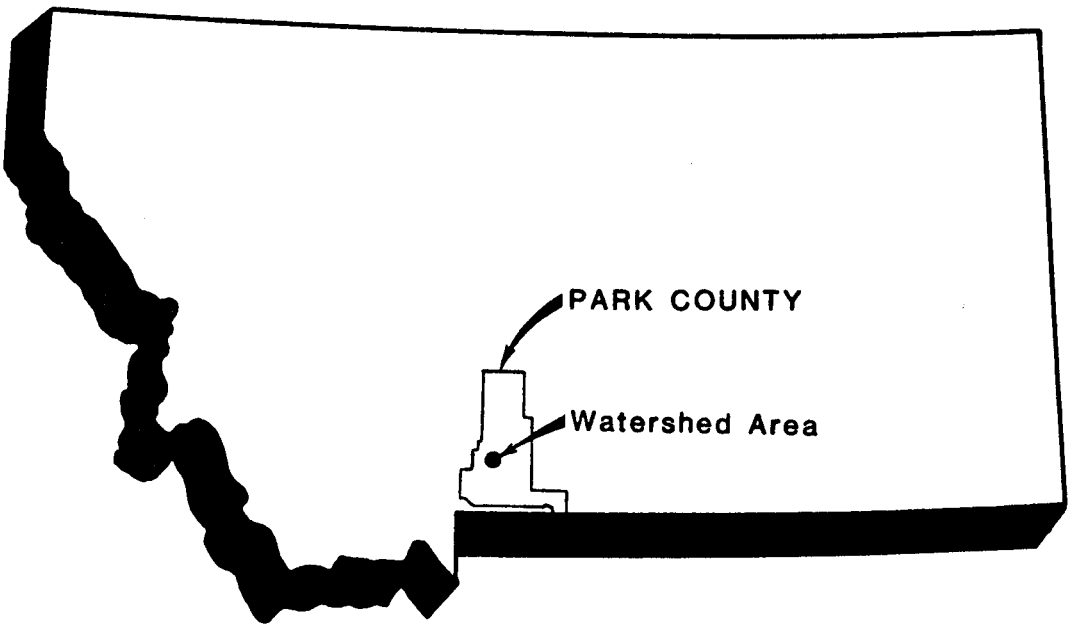
Soil Conservation Service

Bozeman, Montana

WATERSHED PLAN -- ENVIRONMENTAL ASSESSMENT

For Mill Creek Watershed

Park County, Montana



JUNE 1986

F I N A L

WATERSHED PLAN--ENVIRONMENTAL ASSESSMENT
MILL CREEK WATERSHED

Park County, Montana

ABSTRACT

This document describes a plan for water conservation using land treatment and structural measures to improve onfarm and delivery irrigation efficiencies. Planning considered no action and two different proposals to solving the problems. Economic benefits exceed costs of the recommended plan. Landowners will pay 45.5 percent of the $917,900 land treatment costs and the Mill Creek Water District will pay 42.7 percent of the $ 1,792,400 structural costs. Environmental impacts include improved fish spawning, water conservation, and more efficient use of existing croplands. This document is intended to fulfill requirements of the National Environmental Policy Act and to be considered for authorization of Public Law 566 funding.

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008), and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

Prepared by: Park Conservation District
Mill Creek Water District
U.S. Department of Agriculture, Soil Conservation Service

For additional information contact: Glen H. Loomis, State Conservationist, Soil Conservation Service, Room 443, Federal Building, 10 East Babcock Street, Bozeman, MT 59715 Phone 406-587-4813

WATERSHED AGREEMENT

between the

Park Conservation District (Conservation District)
Mill Creek Water District (Water District)
(Referred to herein as sponsors)

State of Montana
and the
Soil Conservation Service
United States Department of Agriculture
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by sponsors for assistance in preparing a plan for works of improvement for the Mill Creek Watershed, State of Montana, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to SCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and SCS a plan for works of improvement for the Mill Creek Watershed, State of Montana, hereinafter referred to as the watershed plan-environmental assessment, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions and stipulations provided for in this watershed plan and including the following:

1. The sponsors will acquire, with other than PL-566 funds, such landrights as will be needed in connection with the works of improvement. (Estimated cost $27,200)

2. The sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as implemented by 7 C.F.R. Part 21) when acquiring real property interest for this federally assisted project. If the sponsors are legally unable to comply with the real property acquisition requirments of the Act, it agrees that, before any federal financial assistance is furnished, it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the sponsor agrees that it will reimburse owners for necessary expenses as specified in 7 C.F.R. 21, 1006 (c) and 21.1007.

The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the sponsors and SCS as follows:

	Sponsors (percent)	SCS (percent)	Estimated Relocation 1/ Payment Costs (dollars)
Relocation Payments	43.7	56.3	0

1/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared in accordance with the percentages shown.

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3. The sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

4. The sponsors will obtain all necessary federal, state, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

5. The percentages of construction costs to be paid by the Water District and by SCS are as follows:

Works of Improvement	Water District (Percent)	SCS (Percent)	Estimated Construction Costs (Dollars)
All structural measures	50.0	50.0	1,446,900

6. Cost-sharing rate for the establishment of enduring land treatment practices is 50 percent of the average cost of installing the enduring practices in the selected plan for the evaluation unit. The estimated total financial assistance cost for enduring practices is $836,000.

7. The percentages of the engineering services costs to be borne by the Water District and SCS are as follows:

Works of Improvement	Water District (percent)	SCS (percent)	Estimated Engineering Service Costs (dollars)
All structural measures	0	100	260,400

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8. The SCS will assist the Conservation District in providing technical assistance to landowners or operators to plan and install land treatment practices shown in the plan. Percentages of technical assistance costs to be borne by the sponsors and SCS are as follows:

Works of Improvement Assistance Costs	Conservation District (percent)	SCS (percent)	Estimated Technical Assistance Costs (dollars)
Land treatment practice	0	100	$81,900

9. The Water District and SCS will each bear the costs of project administration that each incurs, estimated to be $14,500 and $43,400, respectively.

10. The Conservation District will obtain applications from owners of not less than 50 percent of the land presently flood irrigated, indicating that they will carry out the planned land treatment measures. Applications will be obtained before the first long-term land treatment contract is executed.

11. The Conservation District will provide assistance to landowners and operators to ensure the installation of the land treatment measures shown in the watershed plan.

12. The Conservation District will obtain agreement with landowners or operators to operate and maintain the land treatment practices for the protection and improvement of the watershed.

13. The Water District will be responsible for the operation, maintenance, and replacement of the structural measures by actually performing the work or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work.

14. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto, will be the actual costs incurred in the installation of structural measures. Average costs or approved variation will be used for land treatment practices payment determination.

15. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

16. A separate agreement will be entered into between SCS and sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

17. This plan may be amended or revised only by mutual agreement of the parties hereto, except that SCS may deauthorize or terminate funding at any time it determines that the sponsor(s) has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsor or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the sponsor(s) having specific responsibilities for the measure involved.

18. No member of, or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

19. The program conducted will be in compliance with all requirements respecting nondiscrimination, as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15), which provide that no person in the United States shall, on the grounds of race, color, national origin, sex, age, handicap, or religion, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity conducted or assisted by the Department of Agriculture.

Park Conservation District

RT 2
Address
Wilsall, MT 59086
Zip Code

By Otis I. Boyd

Title Chairman

Date 6-10-1986

The signing of this plan was authorized by a resolution of the governing body of the Park Conservation District adopted at a meeting held on

Bruce Malcolm. RT 1, Box 667 Emigrant, MT 59027
Address Zip Code

Date June 10, 1986

Mill Creek Water District

Box 15 E
Address
LIVINGSTON, MT
Zip Code

By Martin C Malone

Title Chairman

Date 6/9/86

The signing of this plan was authorized by a resolution of the governing body of the Mill Creek Water District adopted at a meeting held on June 9 86

Allen Trumbull. Rt. 38, Box 2173 Livingston, MT 59047
Address Zip Code

Date June 9, 86

Soil Conservation Service
United States Department of Agriculture

Approved by:

Glen H. Loomis

Glen H. Loomis
State Conservationist

June 18, 1986
Date

C O N T E N T S

C O N T E N T S (continued)

TABLES

C O N T E N T S (continued)

Figures

S U M M A R Y

Project Name:	Mill Creek Watershed Park County, Montana
Sponsors:	Park Conservation District Mill Creek Water District
Description of Recommended Plan:	The watershed contains 8,100 acres including 3,300 acres of irrigated land. Water conservation will be accomplished by improving onfarm and delivery irrigation efficiencies. Approximately 15,800 acre-feet less water will be diverted from Mill Creek annually. Some of this water will have a positive impact on trout spawning. Planned measures include one new diversion structure, 4.2 miles of canal, 11.6 miles of pressurized delivery pipelines, a wasteway structure, and new sprinkler systems on 2,160 acres of land presently flood irrigated.
Resource Information:	
Size of Watershed:	8,100 acres
Land Use:	3,300 acres irrigated hay and pasture 4,300 acres rangeland 500 acres roads, farmsteads, floodplain, etc.
Land Ownership:	96 percent Private 4 percent State
Number of Irrigated Operating Units:	30; Average Size 110 irrigated acres
Wetlands:	One Type 3 area of about 2 acres.
Prime Farmland:	None
Endangered Species:	None resident, but bald eagles frequent the area in winter and grizzly bears are resident in upper Mill Creek drainage.
Cultural Resources:	None identified in the project area.

Floodplains: No adverse effect

Problem Identification: Seasonal irrigation water shortages, along with low delivery and onfarm efficiencies, are causing reduced crop yields and loss of net income. The Mill Creek shortage of water, in late season, is severely restricting spawning of trout.

Alternatives Considered:

1. The no action (future without project) was defined and used as a basis of comparison for all other alternatives.

2. This alternative consists of installing onfarm pumping plants and sprinkler systems on approximately 70 percent of the presently flood irrigated acres.

3. The National Economic Development plan consists of installing a gravity pressurized pipeline system and needed onfarm sprinkler systems.

Project Purpose: Agricultural water management-irrigation

Principal Project Measures: Install one new diversion structure, 4.2 miles of canal, 11.6 miles of pressurized delivery pipelines, a wasteway structure, new sprinkler systems on 2,160 acres of land presently flood irrigated, and 840 acres of sprinkler system upgrading.

Project Costs:

	PL-566 Funds		Other Funds		Total Dollars
	$	%	$	%	$$
Land Treatment Measures	418,000	50	418,000	50	836,000
Structural Measures for Irrigation 1/	983,800	57	750,700	43	1,734,500
Project Administration	43,400	75	14,500	25	57,900
Technical Assistance	81,900	100		0	81,900

1/ Includes construction, engineering, and landrights.

Project Benefits:	Dollars	Percent
Reduced crop damage	$ 298,100	86.6
Improved fishery	24,400	7.1
Reduced OM&R	16,300	4.7
Reduced offsite crop damage	5,400	1.6

Impacts:

Land Use Changes - None

Natural Resources Changed or Lost-
Wooded Flood Plain - None

Wetlands - Two acres negatively impacted

Cultural Resources - None

Wildlife Habitat - Five acres negatively impacted

Fisheries - Improve streamflow on about 6 miles of Mill Creek

Prime Farmland - None

Other Impacts: None

INTRODUCTION [1/]

This watershed plan describes the problems identified and plan formulation, discloses the expected effects, and provides the basis for authorizing federal assistance for implementation.

The sponsoring local organizations (sponsors) who developed the plan are:

Park Conservation District (Conservation District)
Mill Creek Water District (Water District)

The U.S. Department of Agriculture, Soil Conservation Service (SCS), provided technical assistance for the development of this plan. Other federal, state, and local agencies provided input into the planning process.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008), and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq). Responsibility for compliance with the National Environmental Policy Act rests with SCS.

1/ All information and data, except as otherwise noted, were collected during a watershed planning investigation by the SCS and are on file in the SCS office, Bozeman, Montana.

PROJECT SETTING

The Mill Creek Watershed area is located in Park County, about 20 miles south of Livingston, Montana, and 30 miles north of Yellowstone National Park. The area is composed of about 8,100 acres of which 3,300 acres are irrigated from Mill Creek. The area lies on gently sloping fan and terrace deposits between the Yellowstone River and the Absaroka Mountain Range. Elevations range from 4,850 to 5,350 feet. See Location Map, Figure 1.

The area is bounded on the east by Mill Creek, on the north by the Paradise Canal, and on the west by the Yellowstone River. Mill Creek is a perennial stream above the project irrigation diversions with a drainage area of about 150 square miles. It is fed primarily by snowmelt from the Absaroka Range. The stream has been oversubscribed and water rights have been adjudicated.(1) Streamflows are adequate through May and June but rapidly diminish in July and August. Shortages begin in mid-July during dry years and occur every year after August 15. A court-appointed ditchrider is frequently used to assure that water right priorities are honored. Table A shows mean monthly streamflows for Mill Creek during an average and dry (80% chance) year. The values shown for an 80 percent chance year will be exceeded an average of 8 years out of 10. Figure 2 schematically shows the average streamflow during the month of August.

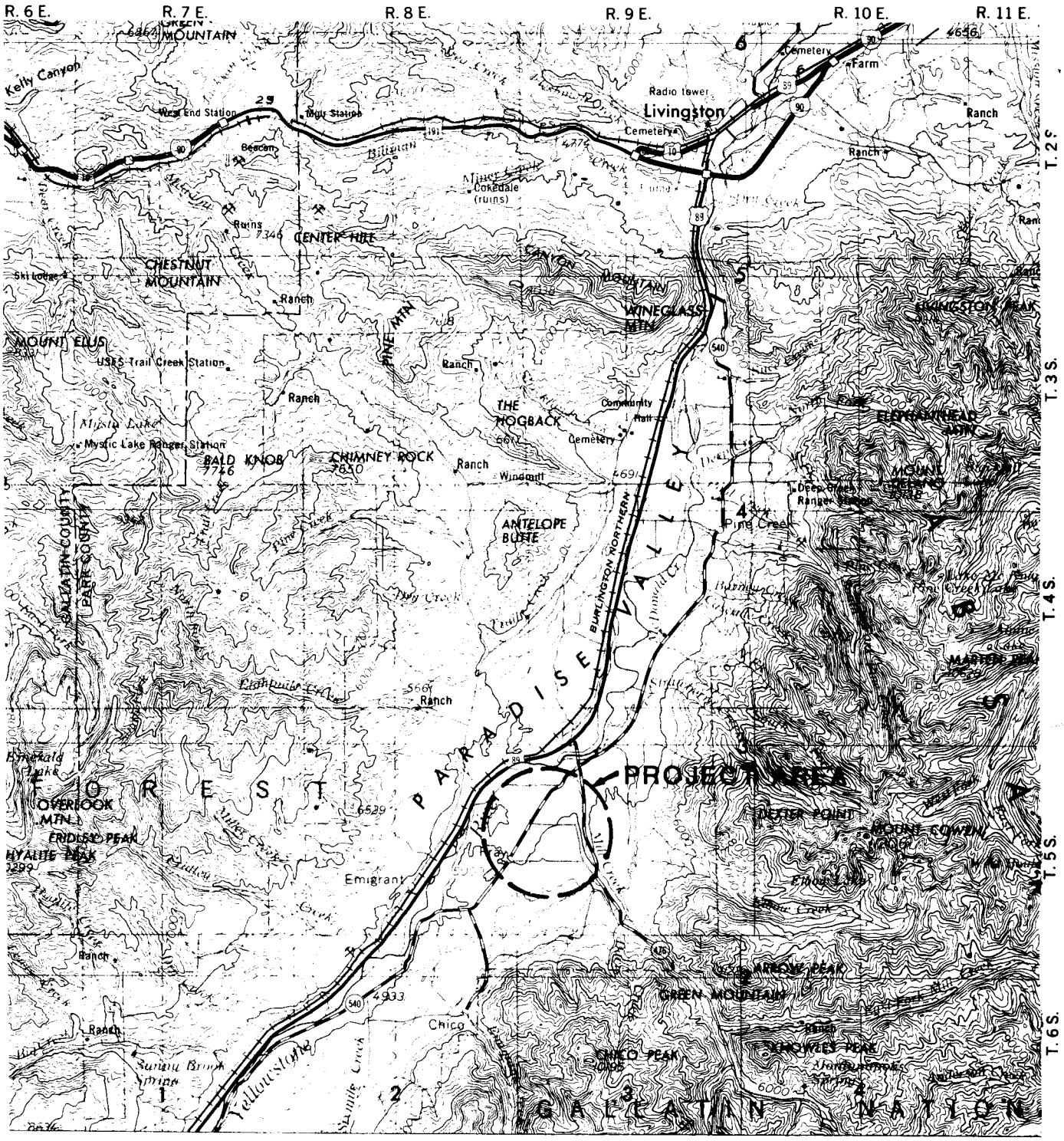
TABLE A - MILL CREEK STREAMFLOW ABOVE UPPER PROJECT DIVERSION (cfs)

	Average	80% Chance
April	69	54
May	480	380
June	830	660
July	330	260
August	105	83

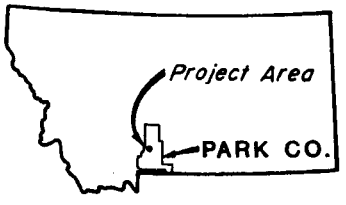
Mill Creek joins the Yellowstone River northeast of the project area. The Yellowstone River, which flows northward from Yellowstone National Park, is a nationally recognized blue-ribbon trout stream. It is especially famous for the Yellowstone cutthroat trout.

The climate of the area is semiarid with an annual precipitation of about 15 inches. Of this, about 10 inches or two-thirds occurs during the April through September period.(2) Winters are generally cold and summers are warm with occasional hot periods. The mean January temperature is 25 degrees F, and the mean July temperature is 68 degrees F. The growing season for alfalfa hay is from early May until mid-September.(3)

Three ditch systems serve most of the irrigated land in the watershed. Each has a separate diversion from Mill Creek. The ditches are often parallel, sometimes cross each other and often deliver water to the same lands. Each



Project Area Boundary



NOTE: Location map base is from the Bozeman AMS Quad, 1:250,000.

FIGURE 1

LOCATION MAP

MILL CREEK WATERSHE.

PARK COUNTY, MONTANA

SCALE: 1:250,000

system historically has been operated and maintained by an informal water user group. They were privately built and no federal funds were used. Water rights date to the late 1800's. Altogether, there are over 30 miles of delivery ditches serving the area in the three systems.

Mill Creek flows through a steep canyon onto a broad high bench area along the east side of the Yellowstone River valley. The bench area makes up the major portion of the project area.

The area is a smooth, broad, gravelly flat which consists of coarse well rounded cobblestone gravel with a few one to two foot boulders. The area is about 150 to 200 feet above the valley of the Yellowstone River. The area is either an outwash glacial terrace or an old alluvial fan of Mill Creek. The bench area is underlain by Quarternary deposits of unconsolidated sediments, which are alluvial, colluvial, and glacial in nature.

Landscape resources are primarily the gently sloping to slightly rolling project bench area. The Yellowstone River valley is to the west and the Absaroka Mountain Range is to the east. Population is dense when compared with other agricultural areas in Montana.

Over 90 percent of the soil in the area is deep and well drained. It has a six-inch thick gravelly loam surface layer. The subsoil, to a depth of about 17 inches, is very gravelly loam. Below this, to a depth of 60 inches, the subsoil is extremely gravelly sand. In some areas, these soils have a cobbly loam surface layer. Permeability is moderate to a depth of about 17 inches and very rapid below. The available water holding capacity is very low.

The other soil in the area is also deep and well drained. It has a loam surface layer, about six inches thick. The subsoil, to a depth of about 25 inches, is loam and silt loam. Below this, to a depth of 60 inches, the subsoil is extremely gravelly sand. Permeability is moderate to a depth of 25 inches and very rapid below. The available water capacity is low to moderate.

Land use in the watershed is 4,300 acres of rangeland, 3,300 acres of irrigated land and 500 acres of other land including floodplain land, roads and farmsteads. The irrigated land is presently about 70 percent pasture, 25 percent alfalfa-grass hay, and 5 percent barley which is mostly harvested as hay. Of the irrigated land, 1,140 acres are presently sprinkler irrigated. Ninety-six percent of the watershed is privately owned. There are 320 acres of state land within the watershed boundary. All the irrigated land is privately owned.

About 30 landowners own the 3,300 acres of irrigated land area. A typical farm unit has about 175 acres of irrigated land. Some of the irrigated farm units serve as a base for extended livestock operations. There are also a number of small, part-time irrigated units in the watershed.

Livingston (population 6,994) is the county seat for Park County (population 12,660) and principal service center for the watershed.(4) Major industries in Park County are railroad, timber, recreation and agriculture. The median family income, $18,042, and income distribution in Park County is similar to that of Montana as a whole. Current unemployment rate in Park County is 8.8 percent, 2.4 percent above the state average.(5)

PROBLEM AND OPPORTUNITY IDENTIFICATION

Two major water and related resource problems are identified.

1. Crop damage is occurring because of seasonal water shortages. Shortages along with low delivery and onfarm efficiencies are causing reduced crop yields and loss of net farm income.

2. Spawning of Yellowstone cutthroat trout is severely restricted because of low flows in Mill Creek, below the project diversions, in August and September.

Other problems or concerns identified are: (1) some presently sprinkled acres may revert back to flood irrigation due to high power costs; and (2) the decreasing net income threatens the viability of the area as an agricultural community.

Water Availability and Management

Project area operators are able to apply only 50 percent of the water that is required to optimize crop production. In most cases, not enough water is available to provide a full irrigation; in others, the interval between irrigations is too long. There is a shortage of water every year during August and September in Mill Creek. As a result, crop yields are only 39 percent of potential. The crop damages from reduced crop yields lower net income and have a negative impact on the economic stability of the area.

Overall project efficiency is very low, about 8 percent. There are approximately 30 miles of delivery canals. Seasonal delivery efficiency is about 54 percent. Losses occur from seepage and evaporation. Approximately 35 percent of the area is presently sprinkler irrigated, with wheel lines and gun-type systems and the efficiency averages about 45 percent. Approximately 65 percent of the area is flood irrigated with ditch systems, and the efficiency averages less than 10 percent. Overall seasonal onfarm efficiency is about 15 percent.

Average annual water diverted from Mill Creek, by the three ditch systems is 26,000 acre-feet. The maximum diverted flow is 150 cfs. Mean streamflow, diversions and uses in August are shown in Figure 2.

About 1,000 acres additional lands outside the project area also have water rights on Mill Creek. These areas are also short of water. About 750 of these acres have a junior water right. Part of any water conserved could be available for use on these lands.

Fisheries

Dewatering of spawning tributaries is one of the most limiting factors to the number of Yellowstone cutthroat trout in the Yellowstone River today. Dry

streambed conditions in the lower reach of Mill Creek below the project diversions in August and September severely restrict the spawning of Yellowstone cuttroat trout. About six out of ten years, there is zero flow for a seven-day period in the lower reach of Mill Creek. Mill Creek has the potential to be a significant spawning stream for the Yellowstone River if August and September flows below the project diversions could be increased. See Figure 2.

The State of Montana has identified the Yellowstone cutthroat trout as a species of special concern. This species spawns in June and July, with hatching and downstream cutthroat fry migration occurring four and one-half to six weeks later. Populations of the species, 20 miles upstream and 12 miles downstream on the Yellowstone River, are very low because of a lack of spawning tributaries. The nearest cutthroat spawning tributary is approximately 12 miles downstream. The mean number of cutthroat trout longer than 10 inches, is 70 per mile in the reach of the Yellowstone River near Mill Creek outlet. An upstream reach, within close proximity to significant spawning tributaries, has 192 per mile. The State Department of Fish, Wildlife and Parks has restrictions on fishing for cutthroat trout in the Yellowstone River area because of the small population.(6)

Other Concerns

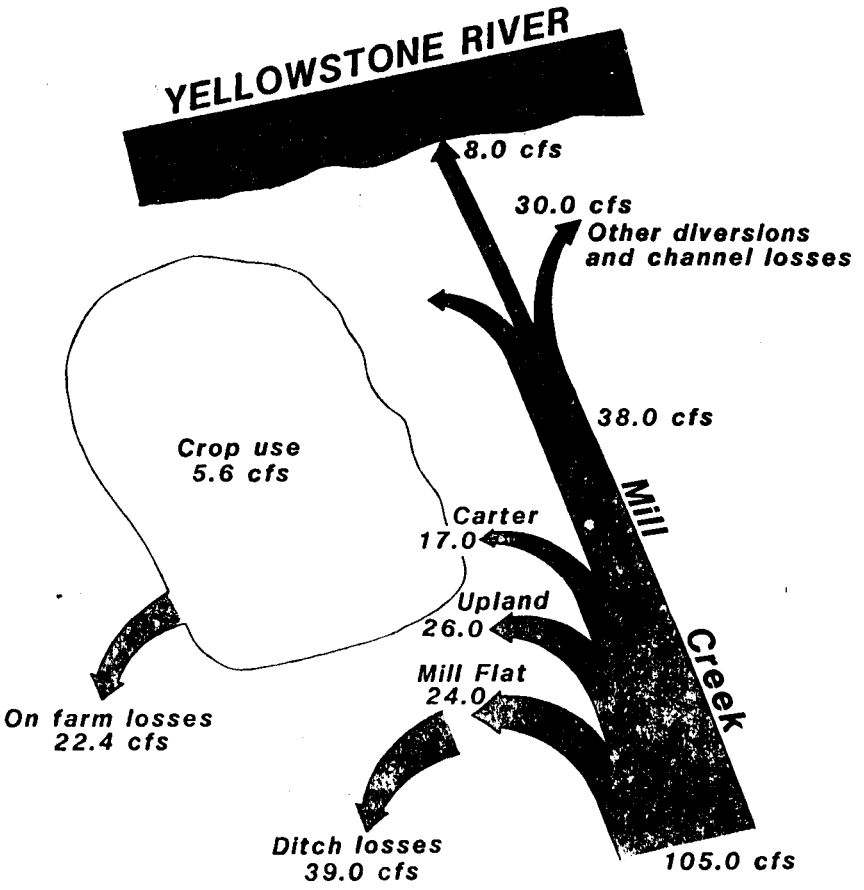
Present low farm income and high operating costs of pumped sprinkler systems are causing irrigators to seriously consider changing back to flood systems. Some have stated that they will go back to flood irrigating when their contracts with power suppliers end, if electric rates continue to increase. Annual electric power costs in 1984 to sprinkle irrigate averaged $16.30 per acre.

The future of the project area as an agricultural community could be threatened by subdividing activity because of present low farm income and high operating costs of pump sprinkler systems. Irrigators may consider selling their land to developers. They would do this even though they would rather continue farming.

FIGURE 2

MEAN STREAMFLOW AND DIVERSIONS IN AUGUST

Future without project conditions



INVENTORY AND FORECASTING

Scoping of Concerns

Federal, state, and local agencies and other interested groups or persons participated in the inventory and analysis of resources included an interactive process termed "scoping". Scoping helped ensure that all significant decisionmaking factors were addressed and that unneeded and extraneous studies were not undertaken. The importance of identified economic, social, environmental, and cultural concerns were evaluated (Table B). Those concerns of no significance or low significance to decisionmaking are not discussed or are only briefly discussed in the plan. Basic data concerning resources have been collected in order to determine the magnitude of project impacts. Significant concerns were used to compare alternatives.

TABLE B - Evaluation of Identified Concerns and Degree of Potential Impacts

Economic, Social, Environmental, and Cultural Concerns	Degree of Significance to Decisionmaking	Degree of Potential Impact	Remarks
Floodwater and drainage	Low	None	
Erosion and sedimentation	Low	Minor	
Land use	Low	Minor	
Irrigation	High	High	
Prime and Important agricultural land	None	None	
Fisheries	High	Moderate	Mill Creek and Yellowstone Rvr.
Ground water	Low	Minor	
Water quality	Low	Minor	
Visual resource	Low	Minor	
Endangered and threatened plants and animals	Low	None	None resident in the area
Mineral resource	None	None	
Air quality	None	Minor	
Human health and safety	Low	Minor	
Wetlands	Low	Moderate	
Wildlife habitat	Low	Minor	
Cultural resources	Low	None	None impacted
Recreation	Medium	None	Downstream fishing
Farm income	High	Major	

High - Must be considered in the analysis of alternatives
Medium - May be affected by some alternative solutions
Low - Consider, but not too significant
None - Need not be considered in analysis

Existing Resources

Mill Creek is a free-flowing, unregulated stream without any upstream storage reservoirs. Water users are dependent on the natural fluctuating flow in the stream for their water supply. The estimated long-term average annual streamflow above the irrigation diversions is about 122,000 acre-feet. Over 90 percent of this comes in the April through September period with 49,000 acre-feet or 40 percent of the annual flow occurring during June. The rapidly diminishing streamflow in July and August is the determining factor in the water shortage problems for both the irrigation water users and the stream fishery.

Three major irrigation ditch systems presently serve the area. The Mill Flat Ditch is the largest and diverts water from Mill Creek the farthest upstream. The water right of the Mill Flat Ditch is about 90 cfs. The Upland Ditch diversion is located about 1,500 feet downstream and has a water right of about 60 cfs. It flows on a slightly slower grade and crosses the Mill Flat Ditch about 2 miles downstream. The Carter Ditch diversion is located about one mile further downstream. It has a water right of about 33 cfs. Most of the farms in the watershed are served by more than one supply ditch. There are over 30 miles of delivery ditches in the watershed.

The North Side Ditch diverts from Mill Creek about 1/2-mile above the Mill Flat Ditch. It serves about 750 acres on the opposite side of Mill Creek outside of the project area.

The gravelly soils have a total available water holding capacity of about 2.7 inches. Light, frequent applications of water are required for high production. During the peak growing season irrigations should be on a 5-day frequency. These soils also have a high intake rate (intake family 3.0), which makes surface flooding irrigation difficult. Production and water use efficiency are greatly improved with sprinkler irrigation.

Principal irrigated crops and present yields per acre are shown in Table C with and without sprinkler irrigation. Under present conditions, crop yields for all lands are reduced by the limited supplies of water. Current crop yields average about 39 percent of potential.

TABLE C - PRESENT IRRIGATED CROP ACREAGES AND YIELDS

Crop	Flood Irrigated		Sprinkler Irrigated	
	Acres	Yield	Acres	Yield
Barley-hay	95	2 tons	190	2.3 tons
Alfalfa Hay	520	2.5 tons	520	3.0 tons
(Fall Grazing)		1.0 AUM		1.0 AUM
Pasture	1,360	2.5 AUM	330	3.0 AUM
Idle-corners and ditches	185		100	

Use of the project area by big game and upland wildlife is incidental. Riparian areas along Mill Creek support a variety of nongame species throughout the late spring, summer, and fall.

Mill Creek is the second largest tributary of the Yellowstone River between Yellowstone National Park and Springdale, Montana, a distance of 85 miles. The Yellowstone River in this area is a blue ribbon trout fishery of national renown. Unique in that it is the longest free-flowing river in the lower 48 states, the Yellowstone draws fishermen, floaters, and sightseers from across the nation and the world. There is a very limited use of Mill Creek by fishermen.

Resident populations of fish in Mill Creek, although limited by low flows, are primarily rainbow, brown, and Yellowstone cutthroat trout and whitefish. Populations are in the range of 30 fish (all age classes) per 1,000 feet.

There is only one wetland area in the project area. About a two-acre Type 3 wetland is in the southwest part of the watershed. The water source for the area is primarily from waste flows from an irrigation canal.

No historic or cultural sites were identified that would be eligible for the National Register. Thirteen rock cairns and an old homestead were identified in the project area. The project will not impact any of these sites.(7) There are no sites listed in the National Register of Historic Places. The State Historic Preservation Officer has been consulted.(8)

No rare or endangered species of plants or animals are known to reside in the project area. Bald eagles use the outlet area of Mill Creek, when feeding out of the Yellowstone River, but none reside in the area. Grizzly bears reside in the upper Mill Creek drainage area. Peregrine falcons may fly through the area, but no known use of the area is made for nesting.(9)

The quality of water in all reaches of Mill Creek is excellent and suitable for irrigation, stockwater, cold water fisheries, and wildlife. Spring runoff temporarily increases suspended sediment and turbidity to moderate levels.

Forecasted Conditions

It is expected that future conditions will be much the same as present conditions without project action. Present low farm income and high operating costs of sprinkler systems are preventing irrigators from converting their flood systems to sprinklers.

Irrigators will continue to use the existing distribution system, which provides an inefficient means of conveying water. The future operation, maintenance and replacement of this existing diversion and delivery system is estimated to be $20,000 annually. Onfarm flood irrigation efficiencies will remain very low because of topography and soils limitations. The ongoing program will have an insignificant effect on improving irrigation water management. Cropping patterns and yields are expected to remain essentially the same.

The fishery will continue to be severely limited due to low or no flow during August and September. Restrictions on fishing will allow the declining cutthroat trout populations to stabilize at a lower level than if streamflow improvements were made. Recreational opportunities will suffer from these reduced fish populations.

Annual power costs for sprinkler irrigation have averaged $16.30 per acre during 1983-1984. Power rates have have been increasing over past years and are expected to increase in the years ahead. These projections have led many sprinkler irrigators to seriously consider reverting to flood irrigation when their electricity contracts expire in 1986 through 1992. This would not only reduce production on these lands, but would cause a more serious water shortage problem in the entire area.

The abandonment of pumped sprinkler systems was not evaluated in more detail because of the many unknown factors involved in the future farm economy. The areas of sprinkler and flood irrigated land are assumed to remain the same as present.

The future of the agricultural community in the watershed could be threatened by subdividing activity. Present low farm income along with high operating costs could cause irrigator to consider selling their land to developers. However, because of the strong desire to continue farming, the agricultural lands are projected to remain the same as present.

FORMULATION OF ALTERNATIVES

General

The formulation process objective was to develop a plan that had the greatest net economic benefits (National Economic Development) consistent with protecting the nation's environment.

A broad range of resource problems and potential opportunities was considered. Opportunities for public involvement, as well as input from federal, state and local agencies were provided throughout the identification process.

The opportunities to address the objective of maximizing net benefits were identified as: 1) sustaining and increasing net farm income; 2) conserving water for offsite irrigation usage; and 3) conserving water for offsite fishery usage. Plans were developed to address this objective by increasing project irrigation efficiencies, thereby increasing water availability for onsite crop use and for offsite fishery and crop use.

Formulation Process

Project formulation began by listing those systems and associated practices which would help achieve the project opportunities, while still recognizing beneficial and adverse effects in other evaluation categories.

Measures considered were: 1) onfarm irrigation water management; 2) gravity pressurized sprinkler systems; and 3) individual onfarm pumped sprinkler systems.

Upstream storage and improvement of surface irrigation systems were considered but excluded. Upstream storage would be costly and the existing system would still need major improvements. Soils and topography are not suitable for the installation of efficient surface irrigation systems.

The gravity pressurized sprinkler system was found to maximize net contributions to National Economic Development (NED). The system was broken down into four subsystems for incremental analysis. The costs of a new diversion structure, delivery canal, and wasteway structure were proportionately assigned to each subsystem based on acres served. Land treatment costs were calculated for each subsystem based on landowner needs. See Project Map, Appendix B.

TABLE D - Incremental Analysis of NED Plan

Description of Increment	Annual Cost: Incremental Cost	Annual Cost: Total Cost	Annual Benefits: Incremental Benefit	Annual Benefits: Total Benefit	Net Benefits
System A	$ 95,200	95,200	130,900	130,900	35,700
System B	10,600	105,800	13,400	144,300	2,800
System C	151,300	257,100	182,600	326,900	31,300
System D	46,200	303,300	59,400	386,300	13,200
Total		(303,300)		(386,300)	(83,000)

Evaluation of Alternatives

As a result of the plan formulation process, two plans in addition to a no-action alternative (Alternative 1) were developed for which costs, benefits, and effects of each were analyzed. Tentative plans were discussed with the sponsors and other agencies and at public meetings. The advantages, disadvantages, risk, and uncertainty of each plan were considered. Generally, viability of each alternative plan was determined by considering four aspects:

Completeness	-	The extent to which an alternative plan accounts for all investments and actions necessary to realize planned results.
Effectiveness	-	The extent to which an alternative plan alleviates the problems and achieves the opportunities identified.
Efficiency	-	The extent to which an alternative plan is most cost effective.
Acceptability	-	The extent to which an alternative plan is accepted by the public and compatible with existing laws, regulations, and policies.

The application of this formulation process, including the four aspects described above, effectively identified optimum levels. The following three alternatives have been identified:

Alternative 1	-	This alternative defines the no-action alternative (future without a project). It is used as a basis of comparison for the other alternatives.
Alternative 2	-	This alternative meets a number of the objectives but does not maximize net benefits. It includes onfarm pumped sprinkler systems and irrigation water management. It is also a nonstructural solution.
Alternative 3	-	This alternative is formulated to maximize net benefits. It includes installing a gravity pressurized sprinkler system and irrigation water management.

Alternative 1 - Future Without Project

Components: This alternative is basically a continuation of present conditions. It consists of foregoing implementation of the project. Most irrigators will continue to operate at a low level of irrigation water management.

Estimated Cost: Any costs will be borne by landowners and ongoing programs.

Effects: The future volume of water delivered to crops will continue essentially the same. The present overall project efficiency of 8 percent will not change. Irrigation water delivered to crops as a percentage of full irrigation water need will remain at 50 percent. Crop yields will remain at 39 percent of potential. The concerns relating to power costs will increase. The fishery in Mill Creek will continue to be severely limited.

Alternative 2 - Onfarm Pumped Sprinkler Systems

Components: This alternative would install individual onfarm pumping plants and sprinkler systems on presently flood irrigated acres. Approximately 70 percent (1,510 acres) of the flood irrigated acres would have sprinklers installed. Irrigation water management technical assistance would also be provided.

Estimated Cost: Total project installation cost would be $631,200. Of this, the P.L. 83-566 share would be $344,300 and the landowners who participate would spend $286,900. The average annual cost would be $92,180. Future needed delivery system replacement cost is not included.

Effects: Overall project efficiency will increase from 8 percent to 16 percent. Onfarm efficiency would increase from 15 percent to 37 percent. Irrigation water delivered to crops as a percentage of full irrigation water need would increase from 50 percent to 82 percent. Crop yields would increase from 39 percent to 54 percent of potential. Approximately 5,000 acre-feet of water conserved would be returned to Mill Creek annually. Average flows in August and September will not increase and there will not be any benefits to the fishery. Present losses in the delivery system by evaporation and seepage will continue and power usage will more than double. Average annual benefits of $106,730 will accrue. Net annual benefits would be $14,550.

This alternative does not meet the test of acceptability. Many of the irrigators presently irrigating with sprinklers are concerned about whether they can continue because of increasing power costs. This alternative is not acceptable to the local irrigators.

Alternative 3 - Gravity Pressurized System (NED)

Components: This alternative would install one new diversion structure, a pipe flume, 4.2 miles of canal, 11.6 miles of pressurized delivery pipelines, a wasteway structure, and other appurtenant structures. This would replace the three major delivery systems. Sprinklers would be installed on the 2,160 acres presently being flood irrigated, and the existing sprinkler systems would be upgraded. Technical assistance would be available on all irrigated acres.

Estimated Cost: The total estimated installation cost of the alternative would be $2,710,300. The average annual cost would be $247,300. Federal installation costs would be $1,527,100, and local costs would be $1,183,200.

Effects: Overall project efficiency would improve from 8 percent to 44 percent. Onfarm efficiency would increase from 15 percent to 54 percent. In at least eight years out of ten, irrigation water delivered to crops as a percentage of full irrigation water would increase from 50 percent to 100 percent. Crop yields would increase from 39 percent to 90 percent of potential. Crop damages caused by a shortage of water would be eliminated. Electricity use would be reduced by 83 percent. Fish spawning would be improved in Mill Creek. Average annual benefits would be $344,200. Net annual benefits would be $96,900.

The average annual amount of water diverted from Mill Creek to the project area would be reduced by 16,000 acre-feet. Average August and September flows, downstream of the project diversion in Mill Creek, would increase by 2,400 acre-feet.

The Yellowstone River fishery would be improved by the increased spawning of Yellowstone cutthroat trout in Mill Creek. An annual increase of 1,830 fisherman days on the Yellowstone River is expected as a result of the increased flow in Mill Creek.

Project Interaction

None of the alternatives developed will have any significant impact on any existing or expected federal or nonfederal project in the area. Both of the alternatives developed support local soil and water conservation activities.

Risk and Uncertainty

The adverse effects of drought would be least for Alternative 3 due to the higher irrigation efficiency and reduced water diversion requirements. A full water supply to crops can be assured for most years. Only during extreme periods of drought would there be less than a full water supply to crops.

Project crop yields with Alternative 3 are shown to be about 90 percent of estimated maximum potential yields. This reduced yield allows for rare water shortages, weather hazards, and management variations.

Some uncertainty will always exist in a free society wherein individuals choose the crops to be planted, cropping patterns, and farming practices. This uncertainty is minimized in that farmers operate for maximum profit and constantly strive to adopt improved methods and practices. Improved technology that is expected in the future has not been recognized in computing project benefits.

Rationale for Plan Selection

The sponsors selected the NED Plan (Alternative 3) as the recommended plan. The selection was based primarily on the extent of alleviating the major identified problems. The four tests of completeness, effectiveness, efficiency and acceptability, together with the evaluation factors, and inputs from individuals, groups, and agencies, were used in reaching the decison on the recommended plan.

The recommended plan provides the highest level for achievement of objectives. A full water supply will be achieved while also increasing flows in Mill Creek for other irrigators and improved fishery. Electric power usage will be reduced by over 80 percent.

The onfarm pumping alternative does not achieve a high level of solving the major problems. The delivery system would continue to be very inefficient. No offsite benefits to fisheries and other irrigators would be realized. Electric pumping costs are more than double present amounts.

There are no important unresolved conflicts between the recommended plan and preferences expressed by any agencies, groups, or individuals. There are no economically infeasible increments included in the recommended plan.

TABLE E -- SUMMARY AND COMPARISON OF ALTERNATIVE PLANS

Effects	Alternative 1 Future Without Project	Alternative 2 Onfarm Pumped Sprinkler	Alternative 3 (NED-Recommended)
Measures	---	Accelerated technical assistance, onfarm pumping plants and sprinkler systems	Accelerated technical assistance, diversion and canal system, pipeline distribution system, and sprinkler systems
Project Investment			
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT		$ 631,200	$ 2,710,300
Adverse, Annualized		92,180	247,300
Beneficial, Annualized		106,730	344,200
Net Beneficial		14,550	96,900
ENVIRONMENTAL QUALITY ACCOUNT			
Beneficial	26,000 acre-feet average annual water volume diverted from Mill Creek to project area	21,000 acre-feet average annual water volume diverted from Mill Creek to project area	10,000 acre feet average annual water volume diverted from Mill Creek to project area
	Mill Creek fishery will continue to be severely limited	Minor effect	Increase in fisherman days on the Yellowstone River by 1,830 annually
	541,000 KW-HR of electricity use for irrigation pumping	1,258,000 KW-HR of electricity use	90,000 KW-HR of electricity use

Effects	Alternative 1 (Future Without Project)	Alternative 2 (Onfarm Pumped Sprinkler)	Alternative 3 (NED-Recommended)
Adverse	Small acreage of wetlands in area	No effect	About 2 acres of Type 3 wetlands will have reduced water flowing into them
	About 15 acres of trees and brush along canals	No effect	About 5 acres of trees and brush will be adversely impacted by loss of seepage water from canals
	Dust, smoke, and fumes are associated with project operation and maintenance	Dust, smoke, and fumes increased slightly during construction period	Dust, smoke, and fumes increased slightly during construction period
	Vegetation is well established	Vegetation will need to be reestablished on disturbed area	Vegetation will need to be reestablished on disturbed areas
OTHER SOCIAL EFFECTS ACCOUNT			
Urban and Community Impacts			
Income Distribution Increased regional income--primary benefits, dollars annually	----	$106,730	$ 344,200
Employment Distribution			
Person-years of permanent seasonal agricultural employment created	----	-1.2	-0.2
Person-years of medium income employment in project construction created	----	3.3	21.9

Effects	Alternative 1 (Future Without Project)	Alternative 2 (Onfarm Pumped Sprinkler)	Alternative 3 (NED-Recommended)
OTHER SOCIAL EFFECTS ACCOUNT (continued)			
Person-years of medium income employment in service and trade activities	----	2.9	9.0
Life, Health, and Safety			
Displacement of people	----	None	None
Long-term Productivity			
Project irrigation efficiency (percent)	8	16	44
Onfarm irrigation efficiency (percent)	15	37	54
Crop yields as a percent of potential	39	54	90
REGIONAL ECONOMIC DEVELOPMENT ACCOUNT			
Positive Effect, Annualized			
Region		$ 219,120	$ 706,600
Rest of Nation		0	0
Negative Effect, Annualized			
Region		66,570	140,000
Rest of Nation		25,610	107,300

R E C O M M E N D E D P L A N

Purpose and Summary

The recommended plan is Alternative 3, NED. The purpose to be served is agricultural water management-irrigation. Works of improvement to reduce water shortage and conserve water include accelerated technical and financial assistance for onfarm irrigation water management and sprinkler systems, stream diversion and conveyance system, gravity pressurized pipeline delivery system, and individual gated and metered turnouts. The installation period for the works of improvement is six years.

Plan Elements

-Land Treatment-

Accelerated technical and financial assistance will be provided to install new sprinkler systems, upgrading sprinkler systems, and to improve irrigation water management. The accelerated program will supplement the ongoing program for the irrigated lands. The ongoing program will continue to provide assistance on dry cropland, rangeland and pastureland.

New sprinkler systems include the onfarm pipeline, irrigation risers, wheel move laterals, center pivots, and hand move laterals. Hand move laterals will only be cost shared on small areas, less than 15 acres. An estimated 2,160 acres of new sprinkler systems will be installed.

Upgraded sprinkler systems will be installed on about 840 acres. Upgraded systems will be cost-shared only where needed to meet the peak crop water requirements and the required irrigation frequency. Equipment needed may include new sprinkler nozzles, additional wheel or hand move laterals and center pivots and onfarm buried pipeline. Benefited acres for additional laterals will be based on field size divided by total number of laterals, including new ones.

Cost share for new or upgraded sprinkler systems will be 50 percent of the average cost. Average unit costs for these practices have been developed for the watershed. Wheel move laterals, center pivots; and hand move laterals will be cost shared based on an average cost per acre for the area effectively irrigated. These average costs are based on 1985 data. Actual costs will be reviewed annually to determine if changes are required.

Onfarm irrigation water management through accelerated technical assistance will be applied to all lands receiving financial assistance, approximately 3,000 acres. Water management plans will be developed for each participating farm unit. Landowners' participation in the program is voluntary, and they select the practices to be applied and other land use decisions. Approximately 2.7 staff years of accelerated technical assistance is needed for conservation planning, designing, and application of onfarm application systems.

Accelerated technical assistance will include collecting, analyzing, and developing basic irrigation data, including soils irrigation properties, crop consumptive use, and irrigation system design. Evaluation of planned and existing irrigation systems will include onsite testing of soils irrigation properties, irrigation system efficiency, and recommendation for improvement. Assistance on timing and scheduling of irrigations will also be included.

Land treatment will be accomplished through the voluntary development and implementation of PL-566 land treatment long-term contracts (LTC) between the Soil Conservation Service and the landusers. These contracts are developed with the landuser's input as to the rate and sequence of the practice installation. Long-term contracts will be written for the irrigated land but need not include the whole farm. The length of the LTC will be at least three years and not more than six years. All cost-shared land treatment is to be installed at least two years before expiration of the contract. The total contract cost in any long-term contract will not exceed $200,000 ($100,000 cost share).

Technical assistance for using proper irrigation water management will be provided by trained SCS personnel during the contract period. Irrigation water meanagement to control the rate, amount, and timing of water application will be required in all LTC's.

Technical and financial assistance will be provided only where it contributes to improving irrigation water management, thereby improving irrigation efficiency, reducing deep percolation, and increasing crop production. Assistance will not be provided where it would result in adverse impacts to significant concerns.

-Structural Measures-

Delivery of irrigation water will be accomplished by the installation of the following structural measures: diversion; headgate; pipeline; canals; wasteway; and gravity pressurized pipelines. Refer to Figure 3 and Project Map for system layout.

The diversion structure will provide streambed grade control. The diversion will be located near the present site of the North Side Ditch headgate. A concrete wall conforming to the existing Mill Creek streambed and side slopes will provide needed water surface, under most flow conditions, to allow adequate flow through headgate and into system. The wall will have provisions to attach temporary flashboards to raise the water level during unusually low creek flow periods. The structure will be designed to provide fish passage.

A new headgate and pipe structure will be installed to convey Mill Creek water across the county road and into the existing North Side Ditch. The headgate structure will be a weir drop inlet designed to minimize trash problems. The weir will have temporary check provision so that a minimum of sediment enters the system during high flows. In order to have adequate capacity during low flow, two corrugated metal arch pipes, each approximately 57 inches wide and 38 inches high, will be used to cross the county road. Gates will be installed on the pipe inlets.

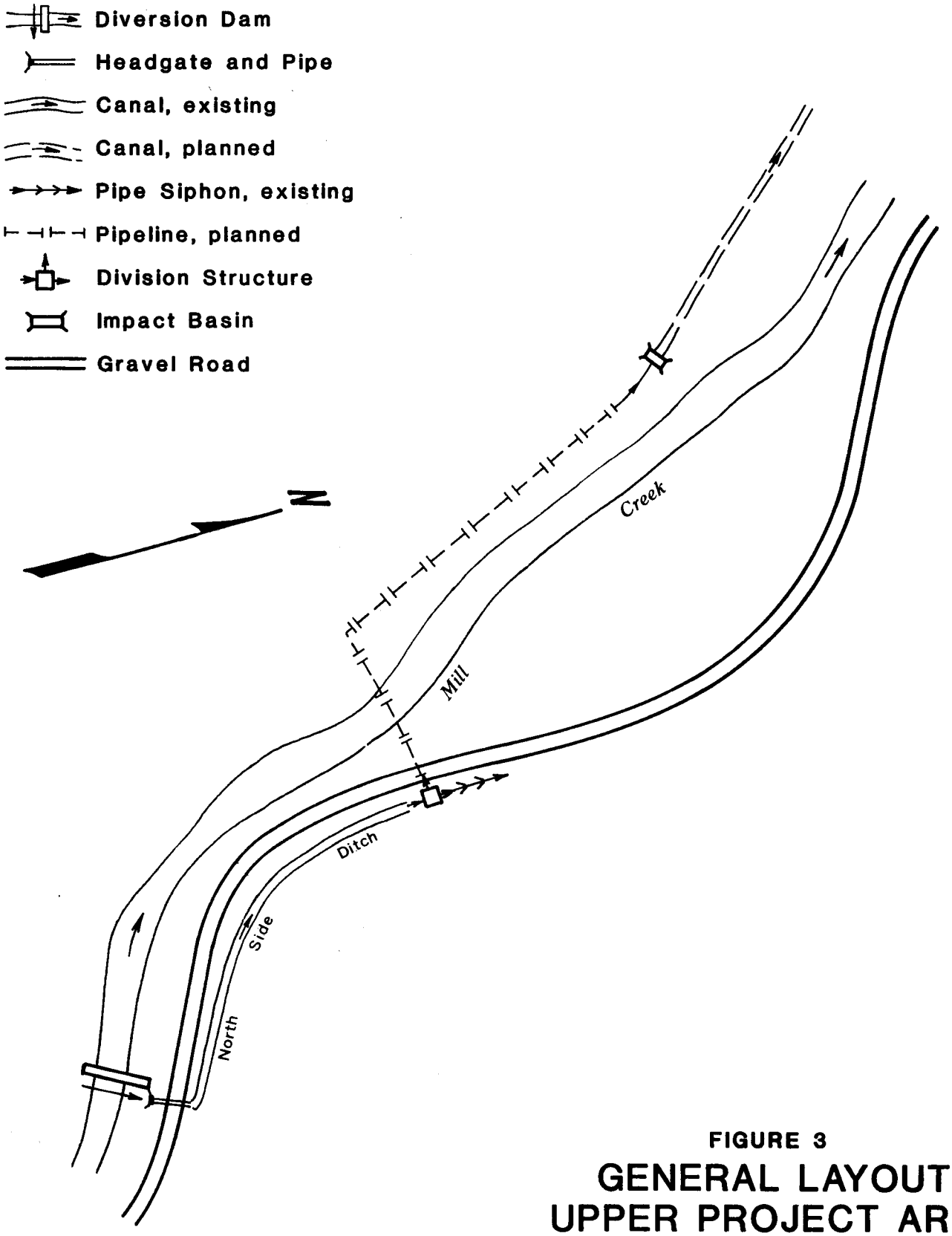


FIGURE 3

GENERAL LAYOUT UPPER PROJECT AREA

NOT TO SCALE

The North Side Ditch will be used to convey water for 1,800 feet. It has adequate capacity to handle the required irrigation flow needs of both systems. Erosion control is planned in the first 500 feet of ditch. The ditch will need some minor shaping, obstruction removal, and riprap for erosion control.

An inlet structure for a 32-inch diameter welded steel pipeline is planned just upstream of the existing siphon for the North Side Ditch. Provisions will be made to measure and divide canal flows near the pipe inlets.

The pipeline will convey project water over Mill Creek. The 770 foot long pipeline will continue downstream past an active eroding creek bank and outlet into a new canal. An impact basin will be used at the pipe outlet.

A four-mile long earth canal will convey irrigation water from the pipeline outlet to the pressurized pipeline system inlets. The capacity of the canal will range from 78 cfs at pipeline outlet to 40 cfs at lower end. Depths will range from 1.9 to 2.7 feet, and bottom width will be 10 feet.

Three (3) road crossings and three (3) major drainageways will need canal crossing structures. The road crossings will utilize pipe culverts to convey canal flow. Pipe culverts will also be used to pass natural runoff under canal fill section at drainageways.

Some isolated locations may require lining for seepage control where necessary for stability and safety purposes. Seepage control will be achieved by overexcavating and backfilling with fine grained material obtained from within project area.

A wasteway system is planned that consists of a concrete weir inlet, pipe conduit, and an earth channel, with flows terminating in an excavated pit. Wasteway flows will be seeped into the natural alluvial materials at the pit site. Maximum wasteway capacity will be 40 cfs.

Two (2) concrete pipeline inlet structures will control irrigation flows into the gravity pressurized delivery system. Each pipeline inlet will be a drop inlet structure with screens to keep debris and fish out of system. The pipelines will be gated and have inline flow meters to monitor system operation flow rates and volume of water usage.

Two (2) gravity pressurized pipeline systems originate at each of the two inlet structures, Systems A through D. See Table 3C for pipeline sizes, lengths, and capacities. All pipe will be welded steel or polyvinylchloride (PVC), with the welded steel located where the larger diameter pipe is needed.

Due to the gravelly and cobbly material that will be encountered in the pipe trench excavations, some finer grained bedding material may need to be brought to the site. This type of material is located at the north end of the project area.

Several pressure reducing stations are planned to keep operating pressure at a suitable level. Pressure relief valves are planned to reduce problems due to water hammer or surge. Air vents, pipeline drains, and concrete anchor blocks will be installed for the pipeline to function properly and allow for required operation and maintenance.

Forty-four (44) pipeline and two (2) canal farm delivery outlets are planned. Each outlet will be provided with a control gate and a water measuring device. This will provide the district with accurate flow data and provisions to control water distribution. The two canal outlets will serve about 70 acres below the delivery canal in the upper part of the project area. A minimum of one cost-shared outlet will be provided to each noncontiguous tract within a farm unit.

Additional cost-shared outlets are planned where the overall project costs are reduced. All costs for any other outlets will be nonproject costs.

Most of the landrights required for installation of structure elements will be on land owned and operated by Water District members. Exception will be county roads and other utility easements. A working arrangement with North Side Ditch Company will be needed.

About 42 acres of permanent easement and 99 acres of construction easement will be required for the pressurized pipelines. About 25 acres of permanent easement and 36 acres of construction easement are required for the canal installation. Of the 67 acres of permanent easement and 135 acres of construction easement, about 80 acres are cropland and 122 acres are rangeland. All needed landrights involve private land.

All practices will be installed in accordance with applicable local, state, and federal regulations. Water, air, and noise pollution will be controlled according to federal regulations. Areas disturbed when installing structural measures will be revegetated.

Mitigation Features

No significant loss of fish and wildlife habitat will occur as a result of implementing this plan, and no mitigation has been included. The U.S. Fish and Wildlife Service (FWS) and the Montana Department of Fish, Wildlife, and Parks participated in this determination. The SCS and FWS channel modification guidelines will be followed when structural measures are designed and installed.

Permits and Compliance

All activities related to the construction and operation of the facilities described will be accomplished in full compliance with all county, state, and federal requirements. The Water District will consult with the U.S. Corps of Engineers and, if needed, submit an application for a permit under Section 404 of the Clean Water Act. Montana's "Natural Streambed and Land Preservation Act," 1975, Senate Bill 310, applies to this plan. The Water District will

need to have the existing water rights amended to consolidate and change the point of diversion. A temporary permit for stream turbidity increase will also be needed from the state.

Costs

Installation costs for the plan include: (1) accelerated land treatment technical and financial assistance; (2) construction; (3) engineering services; (4) land and water rights; and (5) project administration (Tables 1 and 2). Cost share values shown are also a part of the watershed agreement.

Land treatment technical assistance costs include assistance for: (1) irrigation water management; (2) planning and administration of long-term contracts; and (3) engineering and construction inspection of land treatment practices. Costs of $81,900 will be furnished by PL-566.

Land treatment financial assistance costs are for: (1) onfarm mainlines and wheel line, center pivot, or handline sprinkler systems, on lands presently flood irrigated, and lands with gun-type sprinklers; and (2) renozzling, adding laterals, and replacing undersized mainlines on existing wheel line systems. Cost of $836,000 will be shared 50 percent PL-566 funds and 50 percent other funds.

Construction costs include the direct costs of labor and material based on engineers' estimate for diversion structure, canal, and canal structures, $342,700, and pipeline system, $1,104,200. All construction costs will be shared 50 percent PL-566 funds and 50 percent other funds.

Engineering services costs includes the direct cost of engineers and other technicians for surveys, investigations, designs, and preparation of plans and specifications for structural measures. Also included are costs of the necessary inspection service during construction and the preparing of operation and maintenance plans. Total engineering services costs are estimated to be $260,400. PL-566 pays 100 percent of these costs.

Landrights costs include all expenditures made in acquiring interest in land for project installation. Included would be either permanent easements or fee simple title for the canal right of way, pipeline rights-of-way, pipeline road crossings, and additional areas required for operation and maintenance of the system. Construction temporary easements will also be required. A flowage easement will be needed for wasteway operation. Total landrights costs are estimated at $27,200. All landrights are 100 percent other funds (no PL-566 funds).

Water rights costs include the actual cost or the value of rights acquired for carrying out, operating, and maintaining the project. The sponsor has assured SCS that existing water rights are adequate and there are no costs.

Project administration includes the costs of contract administration, needed permits, government representative, and relocation assistance advisory services. PL-566 and others will each bear the costs they incur. These costs are estimated at $43,400 PL-566 funds, and $14,500 other funds.

Total installation costs are estimated at $1,527,100 PL-566 funds and $1,183,200 other funds, totaling $2,710,300. A summary of costs is shown in Table 1.

Annualized costs include amortization of installation costs at 8-5/8 percent for the 50-year life of project period, and annual operation, maintenance, and replacement (OM&R) costs. These costs are estimated at $245,300. (Table 4)

Annual operation, maintenance, and replacement (OM&R) costs of the structural measures are estimated to be $10,700. All structural OM&R costs are the responsibility of the Water District. Annual OM&R costs of land treatment practices are estimated to be $46,200. These costs are part of the normal farm operating costs and are the responsibility of the landowners. Some of the land treatment practices, such as wheel lines, are not expected to have a 50-year life. Replacement costs for these measures are included.

Installation and Financing

Table F shows the planned sequence for installing structural measures and land treatment practices and estimated schedule of obligations for PL-566 and other funds.

The Water District is the sponsor responsible for the installation of all structural measures. They are also responsible for obtaining needed landrights, water rights, and permits, protection of public utilities, and coordinating with other state and county agencies.

The Conservation District will assume leadership for land treatment. Long-term contracts (LTC) will be entered into with SCS by the individual landowners or operators for financial assistance to install land treatment practices. The conservation district will obtain letters of intent from owners of at least 50 percent of land presently flood irrigated before the first LTC is signed.

The Water District has formally requested that SCS do all the structural measures contracting. The SCS will prepare invitations for bids, notices to prospective bidders, and will award and administer formal contracts for the installation of structural works. Formal contracting involves awarding contracts based on competitive bids. The Water District will provide their share of the contract cost in cash.

Acquisition of needed easements or rights-of-way will follow standard SCS procedures as outlined in Property Management Regulations in conformance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (PL-646). In cases where landrights are not obtained by donation or land exchange, every reasonable effort will be made to acquire the rights by

negotiation. Prior to initiation of negotiations, an appraisal of fair market value will be made by a qualified land appraiser. There are no relocations anticipated in the plan installation.

If cultural resources are determined to exist during construction, appropriate notice will be given to the Secretary of the Interior in accordance with Section 3 of Public Law 93-291. The SCS will take action to protect or recover, or both, any significant cultural resources discovered during construction.

Federal assistance for installing the works of improvement will be provided under the authority of the Watershed Protection and Flood Prevention Act, Public Law 566, 83rd Congress, 68 Stat. 666, as amended (PL-566).

Structural installation costs other than those allocated to PL-566 funds will be the responsibility of the Water District. The Water District is legally formed under state law and is not operated for profit. The Water District has the power to assess the shareholders or borrow monies as needed. Application will be made to the Montana Department of Natural Resources and Conservation for grant and loan monies to cover the balance of local costs.

The Water District has arranged that funds will be available when needed. It has analyzed its financial needs in relation to the scheduled installation and estimated operation and maintenance requirments of the works of improvement.

Financial and other assistance to be furnished by SCS for carrying out the plan are contingent on the appropriation of funds for this purpose. Other conditions for providing assistance are as follows:

1. Necessary landrights must be acquired and water rights certified by the Water District prior to the signing of a project agreement for any structural measures to be installed.

2. The Water District will acquire all necessary permits.

3. Agreements for operation and maintenance of all structural measures installed shall be agreed to in writing by SCS and the Water District.

4. Agreement will be reached between SCS and the Water District on the schedule of construction and on final plans and specifications.

TABLE F - Schedule of Obligations

Year	Measures	PL-566 Funds	Other Funds	Total Funds
1st	Engineering Services	$ 64,800	$ --	$ 64,800
	Accelerated Tech.Assistance	16,000	--	16,000
	Landrights	--	21,200	21,200
	Subtotal	$ 80,800	$ 21,200	$ 102,000
2nd	Construction	360,200	360,300	720,500
	Engineering Services	110,200	--	110,200
	Project Administration	20,000	7,000	27,000
	Landrights	--	6,000	6,000
	Land Treatment	68,000	68,000	136,000
	Accelerated Tech. Assistance	24,000	--	24,000
	Subtotal	$ 582,400	$ 441,300	$1,023,700
3rd	Construction	363,200	363,200	726,400
	Engineering Services	65,400	--	65,400
	Project Administration	20,000	7,000	27,000
	Land Treatment	175,000	175,000	350,000
	Accel.Tech.Asst.	16,000	--	16,000
	Subtotal	$ 639,600	$ 545,200	$1,184,800
4th	Engineering Services	20,000	--	20,000
	Project Administration	3,400	500	3,900
	Land Treatment	175,000	175,000	350,000
	Accelerated Tech. Assistance	12,000	--	12,000
	Subtotal	$ 210,400	$ 175,000	$ 385,900
5th	Accelerated Tech. Assistance	8,000	--	8,000
		$ 8,000	$ --	$ 8,000
6th	Accelerated Tech. Assistance	5,900	--	5,900
	Subtotal	$ 5,900	$ --	$ 5,900
	TOTAL	$ 1,527,100	$ 1,183,200	$2,710,300

Operation and Maintenance

The operation, maintenance, and replacement (OM&R) of structural measures will be the responsibility of the Water District. This reponsibility includes the financing of these actions. An operation and maintenance agreement will be executed prior to signing a project agreement. An operation and maintenance plan will be prepared for all structural measures. The agreements and plans will be in accordance with the SCS National Operation and Maintenance Manual.

Operation is the administration, management, and performance of non-maintenance items needed to keep completed works of improvement functioning as planned. Operation includes the managing of water by the diversion and pipe inlet structures to maximize water delivery while minimizing wastewater, flushing the pipeline to remove sediment accumulation, draining the pipeline to prevent freezeup, and operating the pipeline to provide adequate capacity within design parameters.

Maintenance is the work required to keep works of improvement in their original physical and functional condition or to restore them to such condition. Maintenance items include vegetation, concrete, pipeline, control gates, valves, riprap, debris, eroded areas, sediment, road crossings, and maintenance travelways. Major repair, as a result of severe storms or other causes, is also a responsibility of the Water District. All structural measures, are expected to have a 50-year life and no replacement costs are anticipated. Replacement of component parts, as necessary, will be done as a maintenance item.

Inspection of structural measures will be made annually by the Water District and an inspection report prepared. Soil Conservation Service personnel and, if possible, representatives of the Conservation District will be members of the inspection team. An SCS engineer will assist in conducting inspections at least every other year. The SCS will sign or co-sign the inspection reports. The Water District is responsible for conducting the annual inspection and preparing the report. If maintenance is required, an agreed-to date of accomplishment by the water district will be reached with SCS. A followup report will be made to document the cost of maintenance and that the maintenance or repair has been completed. Forms will be provided to the Water District for making these reports.

The SCS will review the Water District's inspection, operation, and maintenance reports. Evidence that inspections or needed maintenance are not being performed properly will be reported to the state conservationist.

The OM&R of the land treatment measures are the responsibility of the individual landowners and provisions for O&M will be included in the LTCs. O&M should continue after the contract is completed.

If any cost-shared measures include portable equipment, a separate operation and maintenance agreement between the landowner and SCS will be required. Portable equipment includes parts of sprinkler irrigation systems. A lien on

the land may be used to recover the federal investment if a violation of the agreement occurs. The operation and maintenance agreement will be for the life of the portable equipment. The life is 15 years for portable sprinkler equipment. Straight-line depreciation will be used to calculate repayment value.

Parts of the irrigation sprinkler systems are not expected to have a 50-year life. Replacement costs of these measures is the responsibility of the landowners.

TABLE 1 - ESTIMATED INSTALLATION COST

Mill Creek Watershed, Montana

Installation Cost Item	Unit	Number Nonfederal Land	Estimated Cost (Dollars) 1/		
			PL-566 Funds (SCS) 2/	Other Funds	TOTAL
LAND TREATMENT-ACCELERATED					
Irrigation Water Management	Acres	3,000	---	---	---
Sprinkler Systems, New or Improved	Acres	3,000	418,000	418,000	836,000
Technical Assistance	Person-Years	2.7	81,900	---	81,900
SUBTOTAL LAND TREATMENT			499,900	418,000	917,900
STRUCTURAL MEASURES					
Gravity Pipeline and Canal Systems	Miles	15.8	1,027,200	765,200	1,792,400
SUBTOTAL STRUCTURAL MEASURES			1,027,200	765,200	1,792,400
TOTAL PROJECT			1,527,100	1,183,200	2,710,300

November 1985

1/ Price Base 1985
2/ Federal agency responsible for assisting in installation of works of improvement.

TABLE 2 - ESTIMATED COST DISTRIBUTION
Structural Measures
Mill Creek Watershed, Montana
(Dollars)1/

	Installation Cost--P.L.566 Funds				Installation Cost--Other Funds				Total
	Construction	Engineering	Project Admin.	Total PL-566	Construction	Land Rights	Project Admin.	Total Other	Installation Cost
STRUCTURAL MEASURES									
Canal System	171,300	61,700	10,300	243,300	171,400	16,000	3,500	190,900	434,200
Pipeline System									
System A	179,600	64,700	10,800	255,100	179,600	3,100	3,600	186,300	441,400
System B	9,300	3,300	500	13,100	9,300	400	200	9,900	23,000
System C	272,000	97,900	16,300	386,200	272,000	5,500	5,400	282,900	669,100
System D	91,200	32,800	5,500	129,500	91,200	2,200	1,800	95,200	224,700
Subtotal	552,100	198,700	33,100	783,900	552,100	11,200	11,000	574,300	1,358,200
TOTAL	723,400	260,400	43,400	1,027,200	723,500	27,200	14,500	765,200	1,792,400

November 1985

1/ Price Base 1985

TABLE 3B - STRUCTURAL DATA
CHANNEL WORK (IRRIGATION CANAL)
MILL CREEK WATERSHED, MONTANA

Channel Name Reach	Station	Design Discharge (cfs)	Water Surface Elevation Feet (msl)	Hydraulic Gradient (ft/ft)	Channel Dimensions Bottom Gradient (ft/ft)	Bottom Width (ft)	Bottom Elev. (ft-msl)	Side Slopes	"n" Value Aged	"n" Value As Built	Velocities (ft/sec) [1/] Aged	Velocities (ft/sec) [1/] As Built	Excavation Volume (cu yds)	Type of Work [2/]	Existing Chanl. Type [3/]
North	0+50		5350.9				5348.8	1.5:1							
Mill		110		.0176	.0194	6			.045	.045	5.78	5.78	183	III	M(1966)
Creek	6+70		5340.0				5336.8	1.5:1							
Ditch		110		.0024	.0024	6			.035	.025	3.25	4.15	376	III	M(1966)
	19+40		5337.0				5333.8	1.5:1							
		78		.0325	--32" diameter pipeline--				.012	.012	14.41	14.41	--	I	0
	27+10		5312.0				5309.3								
		78		.001	.001	10		1.5:1	.035	.025	2.07	2.62	30,300	I	0
	87+00		5306.0				5303.3								
Mill		70		.001	.001	10	[4/]	1.5:1	.035	.025	2.01	2.54	13,900	I	0
Creek	170+00		5293.7				5291.2								
Canal		70		.001	.001	10		1.5:1	.035	.025	2.01	2.54	7,200	I	0
	200+00		5290.7				5288.2								
		40		.001	.001	10		1.5:1	.035	.025	1.69	2.13	3,800	I	0
	220+00		5288.7				5286.9								

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1/ Velocities based on design discharge.
2/ I Establishment of new channel including necessary stabilization measures.
III Cleaning out manmade channel.
3/ M - Manmade ditch (date of original construction).
O - None or practically no defined channel.
4/ Road crossing head losses of 3.8 feet included.

TABLE 3C - STRUCTURAL DATA--PIPELINE DISTRIBUTION SYSTEM
Mill Creek Watershed, Montana

Pipeline Name	Length (Ft.)	Diameter (Inches)	Design Capacity (cfs)
System A			
Line A	15,460	22 to 12	20.28 to 2.94
Line A-1	1,650	10 and 8	2.06 to 1.03
System B			
Line B	2,500	10	1.70
System C			
Line C	18,820	24 to 8	27.14 to 1.30
Line C-1	2,200	10	2.57
Line C-2	2,660	8	1.44 to 1.03
Line C-3	2,660	12 and 10	3.73 to 2.23
Line C-4	1,000	12	2.67
Line C-5	660	12	3.41
Line C-6	1,650	10 and 6	2.56 to .5
System D			
Line D	10,960	18 to 8	10.35 to 1.22
Line D-1	1320	10	2.23

November 1985

TABLE 4 - ANNUALIZED ADVERSE NED EFFECTS
Mill Creek Watershed, Montana
(Dollars)1/

Evaluation Unit	PROJECT OUTLAYS		TOTAL
	Amortization of Installation Cost	Operation, Maintenance Replacement	
All Structural Measures and Accelerated Land Treatment	190,400	56,900	247,300
GRAND TOTAL	190,400	56,900	247,300

November 1985

1/ Price Base 1985, discounted and annualized at 8-5/8 percent interest rate for 50 years on an average annual equivalent basis.

TABLE 6 - Comparison of NED Benefits and Costs
Mill Creek Watershed, Montana
(Dollars) 1/

Evaluation Unit	Irrigation	Recreation	Total	Average Annual Cost 2/	Benefit Cost Ratio
All structural measures and accelerated land treatment	319,800	24,400	344,200	247,300	1.4 to 1.0
Grand Total	319,800	24,400	344,200	247,300	1.4 to 1.0

November 1985

1/ Price Base 1985
2/ From Table 4

EFFECTS OF RECOMMENDED PLAN

General Effects

Water conservation accomplished with the plan will result in 2,300 acre-feet of additional water in the watershed used to reduce crop damage and 16,000 acre-feet of water per year available to the stream fishery and offsite irrigators.

Total annual benefits will be $344,200. These benefits result from the reduction of crop losses from inadequate soil moisture during the growing season, reduced electricity and pumping operation costs, and from increased recreational opportunities. Average annual project costs are $247,300 and remaining net benefits will be $96,900.

Overall project irrigation efficiency will improve from 8 percent to 44 percent. In at least eight years out of ten, irrigation water delivered to crops as a percentage of full irrigation water supply would increase from 50 percent to 100 percent. Crop yields would increase from 39 percent to 90 percent of potential. Crop damages caused by a shortage of water would be nearly eliminated. Crop yields expected for the 3,300 acre irrigated area are shown in Table G. A shift toward a more intensive cropping pattern is expected with the improved dependability and quantity of water supply.

TABLE G - Future Crop Acreages and Yields

	Without Project		With Project	
Crop	Acres	Yield	Acres	Yield
Barley-Hay	285	2.2T	560	2.8T
Alfalfa Hay	1,040	2.7T	1,980	4.5T
(Fall Grazing)		1.0AUM		1.0AUM
Pasture	1,690	2.6AUM	760	6.0AUM
Idle	285			

installation would eliminate the majority of the energy consumption for pumps on 1,140 acres. Present annual power usage will be reduced from 541,000 KW-HR to 90,000 KW-HR.

The average annual amount of water diverted into the project area from Mill Creek would be reduced from 26,000 acre-feet to about 10,000 acre-feet. Average annual diversions to offsite irrigated lands are estimated to increase 200 acre-feet. During August and September the streamflow below the project area diversions will increase about 2,400 acre-feet during an average year. Figure 4 shows mean streamflows and diversions in August for the future without and with project conditions. The frequency of having zero flow at the mouth of Mill Creek, for a 7-day period will be reduced from about 60 percent to about 20 percent. Benefits to the fishery, from increased fisherman days, are estimated to be $24,400 annually.

An increase of about 2,200 catchable cutthroat trout will be added to an 18-mile reach of the Yellowstone River. This will result in an annual increase of 1,830 fisherman days on the Yellowstone River.

Resident trout in about 6.4 miles of Mill Creek will also benefit from year-round flows. About 30 trout (all age classes) per 1,000 feet of stream will be added to the existing low population. No dollar benefits are included for this increase.

The project will strengthen the future of the area as an agricultural community. Irrigators would be able to increase their net income, be encouraged to do long-range planning and develop a high level of operating efficiency. The concern of unknown future power rates would be eliminated. The pressure to sell land to developers would be reduced. Approximately 30 landowners would benefit from installation of the recommended plan.

The project is expected to reduce onfarm employment annually by 0.2 person-years, mainly through reduced labor inputs for irrigation and harvesting activities. Increased crop production would have indirect or secondary effects on external economics--an expected 9.0 person-years of increased employment annually. Construction would create 21.9 person-years of skilled and semi-skilled labor employment.

Long-term projections of natural resource use indicate a continuing agricultural economy composed principally of irrigated hay and livestock operations. The watershed plan provides long-term protection and conservation of both land and water resources.

About five acres of woody vegetation, primarily trees that use ditch seepage for part of their water supply, will probably be impacted due to the abandonment of these ditches. These trees are used principally by songbirds and adverse environmental effects are considered to be minor. A two-acre Type 3 wetland will have less irrigation wastewater flows and will be impacted also.

Relationship to Other Plans, Policies, and Controls

This watershed project is located in Water Resources Region 10, Subregion 07. This plan is not being considered jointly with any other project.

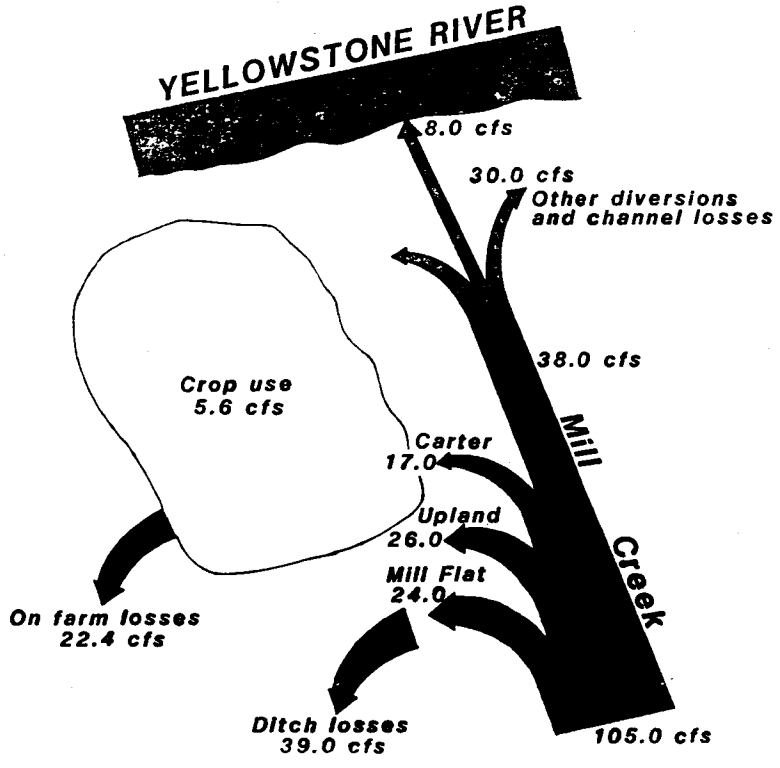
The project was identified in the Montana Cooperative River Basin Study of potential gravity sprinkler irrigation systems. The Park Conservation District has identified efficient use of water as a priority for assistance.

Effects of the project on particular resources that are recognized by certain federal policies have been summarized in Table H.

FIGURE 4

MEAN STREAMFLOW AND DIVERSIONS IN AUGUST

Future without project conditions



Future with project conditions

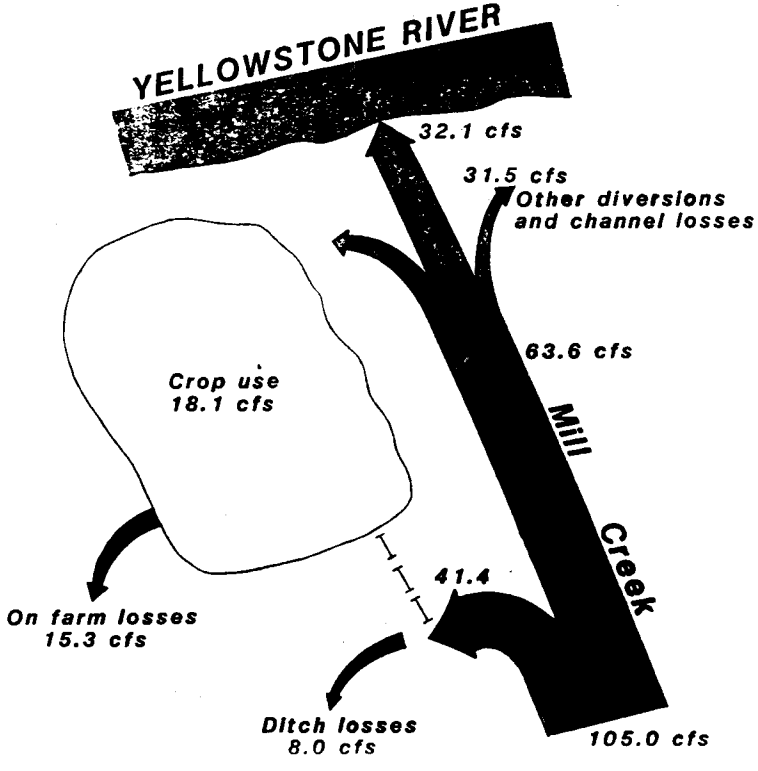


TABLE H - Effects of the Recommended Plan on Resources of Principal National Recognition

Types of Resources	Prinicipal Sources ofces of National Recognition	Measurement of Effects
Air quality	Clean Air Act, as amended, 42 USC 1857h-7, et seq.	No effect
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended, 16 USC 1451, et seq.	Not present in planning area
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended, 16 USC 1531 et seq.	No effect
Fish and wildlife habitat	Fish and Wildlife Coordination Act, 15 USC, et. seq.	About 5 acres of trees degraded Improved fishery on 24.4 miles of streams
Flood plains	Executive Order 11988, Flood Plain Management	No effect
Historic & cultural properties	National Historic Preservation Act, 16 USC 470a, et seq.	No effect in planning area
Prime and unique farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.	Not present in planning area
Water quality	Clean Water Act (Federal Water Pollution Control Act), 33 USC 1251 et seq.	No effect
Wetlands	Executive Order 11990, Protection of Wetlands, Clean Water Act of 1977, 42 USC 1857h-7 et seq.	About 2 acres of Type 3 degraded
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended 16 USC 1771, et equ	Not present in planning

CONSULTATION AND PUBLIC PARTICIPATION

Agency consultation and public participation were an integral part in all phases of planning and environmental evaluation conducted by the sponsors and SCS. Contacts, persons attending meetings, and contents of meetings are documented in the project documentation files.

A meeting to discuss the watershed and assess local interest was held in February 1984, prior to the completion of the Montana Intergovernmental Clearinghouse Review. The SCS requested planning authorization based on initial studies, and authorization was granted in March 1985. Federal, state, and local agencies, together with the public, were notified that planning authorization was granted.

Two public meetings were held. Each was advertised in local news media. A notice was sent to individuals, agencies, groups, and all irrigation shareholders within the project boundaries. The local newspaper published reports on meetings and helped inform local citizens of events and planning progress.

A public meeting was held at a school in the project area on October 15, 1984. The purpose was to inform the public of progress, present problems and opportunities that had been identified, present potential alternatives, and receive input from the public on their concerns, additional problems, and opportunities. Approximately 25 people attended the meeting. No agencies other than SCS attended the meeting. Many questions were asked that helped in understanding the project approach to be used. Discussions included the location of the delivery canal, dry streambed conditions in lower end of Mill Creek in August and September, and the formation of a legal sponsor.

A second public meeting was held during the draft review period for the watershed plan. The purpose was to present the finding of the study, including problems and opportunities, alternatives and the selected plan.

Intensive planning and evironmental evaluation began in early 1985. Federal, state, and local agencies participated in the scoping process. SCS specialists consulted with various federal, state, and local agencies and the sponsors on specific items and to provide appropriate opportunities for participation.

Meetings were held with the sponsors. These meetings were held to keep the sponsors fully informed of planning progress, presenting results of studies and analysis, and obtaining their input and decisions.

Informal consultation with U.S. Fish and Wildlife Service (FWS), in accordance with Section 7 of the Endangered Species Act, was completed in December 1981. The FWS and Montana Department of Fish, Wildlife and Parks participated in the

evaluation of fish and wildlife habitat and formal scoping.

A cultural resource inventory of the project area was completed. The State Historic Preservation Officer was consulted and concurred in the finding that no cultural resources will be affected.

The following agencies and groups were requested to comment on the draft plan:

Corps of Engineers' District Engineer's Office
Fish & Wildlife Service National and Regional Office
U. S. Department of the Interior (Geological Survey Distirct Office)
Environmental Protection Agency (Regional Office)
Office of the General Council, USDA
Governor of Montana
Montana Intergovernmental Review Clearninghouse
Montana Department of Highways
Montana Department of Health and Environmental Sciences
Montana Bureau of Mines and Geology
Montana Department of Natural Resources and Conservation
Montana Department of Commerce
Montana Department of State Lands
Montana Association of Conservation Districts
Montana Environmental Quality Council
Montana Department of Fish, Wildlife and Parks
Montana Bureau of Land Management
Park Electric Co-op. Inc.
Montana Water Development Association
Trout Unlimited
Sierra Club
League of Women Voters
Audubon Society
Montana Wildlife Federation
Natural Resources Defense Council, Inc.
National Wildlife Federation
Agricultural Stabilization and Conservation Service (State Office)
Forest Service (Regional Office)

LIST OF PREPARERS

Name/Title	Education	Experience (Years)	Other (License, etc.)
SCS, Multistate Planning Staff			
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SCS, State Staff			
Ronald F. Batchelor Biologist	B.S.-Wildlife Mgmt. M.S.-Fish & Wildlife Mgmt.	Biologist (25) Forester (4)	Certified Wildlife Biologist
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Eddie Juvan Geologist	B.S.-Eng. Geology	Geologist (26) Soil Scientist (6)	Prof. Engr. Geol.
Robert G. Lund Carto. Tech.	Drafting-2 yrs. in junior college	Carto. Tech. (13) Surv. Tech. (5)	

LIST OF PREPARERS (continued)

Name/Title	Education	Experience (Years)	Other (License, etc)
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Outside SCS

Chris Clancy, Fisheries Biologist, Montana Department of Fish, Wildlife, and Parks
Bill Jones, Biologist, U.S. Fish and Wildlife Service
Mike Ryan, Archaeologist, Forest Service

The draft watershed and environmental assessment plan was reviewed and concurred in by state staff specialists having responsibility for engineering, soils, agronomy, range conservation, biology, forestry, and geology. This review was followed by review of the document and supporting data by the West National Technical Center.

I N D E X

R E F E R E N C E S

1. State of Montana, Department of Natural Resources and Conservation. Water Right Listing by Source Name. June 24, 1983.

2. U.S. Department of Commerce, NOAA. Climatography of the United States No. 81. September 1982.

3. U.S. Department of Agriculture, Soil Conservation Service. Irrigation Guide for Montana. February 1974.

4. U. S. Department of Commerce, Bureau of the Census. 1980 U.S. Census.

5. State of Montana, Employment Service. Communication by phone with Job Service in Livingston, MT. July 1985.

6. Montana Department of Fish, Wildlife and Parks. Communications and and correspondence with Soil Conservation Service.

7. Archaeological Report (Mike Ryan, Archaeologist, Forest Service). 1985.

8. Exchange of correspondence between the Soil Conservation Service and the State Historic Preservation Officer. 1985.

9. Exchange of correspondence between the Soil Conservation Service and the U.S. Fish and Wildlife Service. 1985.

APPENDIX A

ENVIRONMENTAL EVALUATION

LWS TALKED TO Dorothy Beasley ABOUT

ENVIRONMENTAL CONSIDERATIONS

Environmental and cultural resources routinely evaluated in project planning include threatened and endangered species, historic and archaeological sites, wetlands, floodplains, wildlife and fishery resources, ecologically or environmentally unique and/or sensitive areas, visual resources, and water quality. Impacts on these resources resulting from implementation of planned alternatives were determined by an environmental evaluation team consisting of representatives of the U.S. Fish and Wildlife Service, Montana Department of Fish, Wildlife and Parks, and the Soil Conservation Service and are described below.

1. Threatened and endangered species - In accordance with Section 7 of the Endangered Species act, informal consultation with the Montana Endangered Species office of the Fish and Wildlife Service was requested May 30, 1985. The Fish and Wildlife Services response indicates that three listed species--grizzly bear, bald eagle, and peregrine falcon--may occur in or adjacent to the project area.

   A. Grizzly bears are found in the upper Mill Creek basin within the Absaroka-Beartooth Wilderness of the Gallatin National Forest. No grizzly bears are known to have occurred within the project area in recent years. Impacts associated with implementing the planned alternative are not expected to impair grizzly bear activities within the upper Mill Creek watershed. No landuse conversions are planned as part of the project. Construction activities are confined to irrigation water delivery systems, essentially on-farm, and to a new diversion structure on Mill Creek adjacent to a well-travelled county road.

   B. Bald eagles occasionally roost in the riparian woodland of lower Mill Creek when feeding out of the Yellowstone River. No eagles are known to nest in the area. Additional late summer flows in Mill Creek resulting from project implementation should be of benefit to any bald eagles feeding in the area through the expected increase in forage base (trout) available to eagles. No construction activities will occur in areas of the project used by bald eagles.

   C. Peregrine falcons may fly through the area, however, use of the project area is incidental and no roosting or nesting is known to occur. No construction activities are likely to occur in areas of the project that might provide either roosting or nesting habitat.

2. Wetlands - There is one small wetland identified in the project area. A Type 3 wetland of about two acres is located in the southwestern portion of the project area. This wetland is characterized by saturated soils supporting a solid stand of cattails. The wetland contains no areas of standing water. The water source for this wetland is primarily from waste flows from an irrigation canal. Reorganization of the irrigation system in the vicinity of this wetland may likely, over time, reduce the flow of water necessary for the continued maintenance of this irrigation induced wetland.

3. Historic and archaeological resources - A cultural resources inventory was conducted by J. Michael Ryan, Archaeologist with the U.S.D.A. Forest Service. No sites were identified that are eligible for the National Register. The State Historic Preservation Officer has been consulted and concurrence has been obtained.

4. Flood plains - Implementation of planned alternatives has been judged to be compatible with rules and regulations governing federal actions within a flood plain. Design and installation of the Mill Creek irrigation diversion supplying water to the project will be in compliance with Montana's "Natural Streambed and Land Preservation Act" and the Channel Modification Guidelines developed jointly by the Soil Conservation Service and the Fish and Wildlife Service.

5. Visual Resources - Impacts to the visual landscape associated with the installation of structural and land treatment measures in the project area were assessed. Visual impacts to the landscape resulting from implementation of planned alternatives are judged not to be significant. The irrigation water delivery pipeline and supports conveying water across Mill Creek to the irrigated areas will be visible to motorists travelling the county road for but a brief moment. This stream crossing is judged not to be a significant intrusion to the visual landscape.

6. Water quality - No serious water quality problems associated with current or planned irrigation systems have been identified. Shortage of late season irrigation water has contributed to the dewatering of about 6.4 miles of Lower Mill Creek. The recommended plan will provide late season flows in lower Mill Creek of sufficient quantity and quality to support cutthroat trout spawning in eight out of ten years.

7. Wildlife resources - Use of the project area by upland game is incidental. No resident game birds occur on the area with the exception of ruffed grouse along the Mill Creek stream corridor. Big game use is confined to the riparian woodland along Mill Creek where mule and white tailed deer are found. Numerous song birds and raptors use the riparian woodland of lower Mill Creek. This riparian flood plain averages between 600 and 1,000 feet in width for the 6.4 miles within the project area. The quality of this woodland is excellent with its abundance of mature black cottonwood trees, variety of understory shrubs, and abundance of grasses and forbs that provide both vertical and horizontal plant diversity.

   About five areas of woody vegetation, primarily cottonwood trees that use ditch seepage for part of their water supply, may be imparted due to abandonment of these ditches. Irrigation of adjacent fields may provide water sufficient to sustain these trees. Some trees may be retained as windbreaks with water provided to maintain them. These trees and shrubs, although very linear, do serve as habitat for songbirds. Potential adverse environmental impacts associated with their possible loss is considered minor based on their close proximity to the well developed and extensive riparian woodland of Mill Creek.

   Implementation of the planned alternative has been judged to have little or no impacts on the areas wildlife resource.

8. Fishery resources - The upper Yellowstone River contains a highly regarded population of Yellowstone cutthroat trout, however, many tributary streams no longer contain viable populations in their lower reaches. Dewatering for irrigation, removal of streamside vegetation, and increased soil erosion have eliminated cutthroat from many tributaries. Streams dewatered for irrigation during July and August can interrupt Yellowstone cutthroat spawning runs and have a severe impact on the recruitment of trout to the upper Yellowstone River.

   As with other tributaries, spawning of Yellowstone cutthroat in Mill Creek is severely restricted because of low late season flows below existing diversion structures. The lack of successful spawning in Mill Creek has depressed cutthroat trout numbers in the Paradise Valley region of the Yellowstone River due to the lack of other suitable tributary streams. With implementation of the recommended alternative, satisfactory spawning flows will be maintained in the lower six miles of Mill Creek eight out of ten years. With projected flows, this major tributary stream can be expected to contribute substantially to the recruitment of cutthroat trout in the mid-reach of the upper Yellowstone River.

   For a more detailed discussion of the Yellowstone cutthroat trout fishery refer to Attachment 1.

9. Ecologically unique and/or sensitive areas - No ecologically unique and/or sensitive environments were identified within the boundaries of the project area.

Conclusion

There are no significant environmental problems, conflicts, or disagreements among groups or agencies. Based on information gathered, there are no significant impacts requiring the preparation of an environmental impact statement.

TABLE
MILL CREEK WATERSHED
ENVIRONMENTAL EVALUATION SUMMARY

Environmental Factors	Present Status or Setting	Effects 1/ Future w/o Project	Changes in Quality of Environment Alternatives and Anticipated Impacts	
		1	2	3
A. Visual Resources				
1. Visual quality and aesthetics				
a. Landform	Rural farmland setting	D	A	A
b. Vegetation	Irrigated hay and pasture, rangeland, riparian woodland	D	A	A
c. Water	No flat water bodies, 6.4 miles of Mill Creek borders project on the east, the Yellowstone River on the North	A	B	C
B. Quality Considerations of Air, Land, and Water				
1. Air				
a. Installation period	----	A	A	A
b. Project duration	Good	A	A	A
2. Land				
a. Soil erosion--wind	Low	A	A	A
b. Soil erosion--water	Low	A	B	B
c. Recreation lands	Not significant	-	-	-
d. Changes in natural plant communities	No land use changes	A	A	A
e. Wetlands	Trees along existing canals	A	A	D
f. Riparian lands	Two acres of Type 3 wetlands	A	A	E
g. Floodplains	6.4 miles of riparian woodland on Mill Creek	A	A	A
3. Water	Mill Creek floodplain	A	A	A
a. Perennial streams				
1. Mill Creek	Instream flow shortage during late summer	A	A	C
b. Ponds, lakes reservoirs	None	-	-	-

Environmental Factors	Present Status or Setting	Effects 1/ Future w/o Project	Changes in Quality of Environment Alternatives and Anticipated Impacts	
		1	2	3
C. Biological Resources and Selected Ecological Systems				
1. Threatened or endangered plants and animals	None resident to area, bald eagles may occasionally use riparian woodland			
2. Wildlife habitats				
a. Wetlands	Two acres low quality Type 3 wetland	A	A	E
b. Uplands	No resident game animals	-	-	-
c. Riparian	Mule and white-tailed deer, ruffled grouse, raptors, songbirds	A	A	A
3. Coldwater fish populations				
a. Mill Creek	Lack of spawning habitat	A	A	C
b. Yellowstone River	Depressed cutthroat recruitment due to lack of spawning habitat	A	A	C
4. Ecologically unique areas	None	-	-	-
D. Historic, Archaeological and Unique Geological Resources				
1. Historic sites	None	-	-	-
2. Archaeological Sites		A	A	A
3. Geological Sites	None	-	-	-

1/ Future Conditions
A = Essentially no change from present condition
B = Small increase over present condition
C = Moderate to large increase over present condition
D = Small decrease over present condition
E = Moderate to large decrease over present condition
- = Considered but not applicable
The anticipated impacts are compared with effects of the future without project and based on changes in quality of the environment.

ATTACHMENT 1

The Yellowstone Cutthroat of the Upper Yellowstone River, Montana

From its beginning in the Teton Wilderness of northwestern Wyoming to its meeting with the Missouri in North Dakota, the Yellowstone River changes from a cascading mountain stream to a cold-water river of national acclaim to a broad, meandering prairie waterway. Along the way fish populations make equally dramatic changes. The Yellowstone is the longest free-flowing river remaining in the United States south of Alaska.

Below Gardner, Montana common game fishes of the upper Yellowstone River include Yellowstone cutthroat rainbow, brown trout and mountain whitefish. Brook trout occur in some tributary streams but not in the river. Common non-game fishes of the upper river are longnose, white and mountain suckers, longnose dace and mottled sculpin.

The upper Yellowstone River supports a nationally renowned cold-water fishery, and has been classified by the Montana Fish and Game Commission as a Blue Ribbon stream from Gardner to Big Timber. This 103 mile reach of river is the longest single stretch of Blue Ribbon stream in Montana, and contains nearly 25 percent of the state's Blue Ribbon waters. Fishermen come from across the country and the world to fish the upper Yellowstone River. Together with the Madison and Big Hole Rivers, the upper Yellowstone is considered among the country's premiere trout fishing waters.

The Yellowstone cutthroat, a species of special concern in Montana, is the only trout native to the upper Yellowstone River. The rainbow and brown trout occurring in the river were introduced around the turn of the century.

Because it is easier to catch than either browns or rainbows, the Yellowstone cutthroat has become a popular sport fish. Under favorable conditions it can grow to trophy size. It inhabits highly scenic environments and is a strikingly beautiful fish--bronze colored with prominent black spots and a scarlet slash under the jaw. Its popularity has warranted restrictive fishing regulations to protect the species.

Today the stronghold for the Yellowstone cutthroat is in Yellowstone National Park. Outside the park, however, this fish has suffered many of the same declines experienced by other subspecies of cutthroat. Today the Yellowstone cutthroat is found only in a fraction of its original range. This decline can be attributed almost entirely to the activities of man. The principal reasons were genetic contamination of the native stock by crossbreeding with closely related species, competition with introduced species such as brown and brook trout, and alteration of cutthroat habitat.

The upper Yellowstone still contains a highly regarded but remnant population of cutthroat, however, many tributaries no longer contain viable populations in their lower reaches. Dewatering for irrigation, removal of streamside vegetation and increased soil erosion resulting from logging and other watershed disturbances have eliminated cutthroat from many tributary streams. Streams dewatered for irrigation during July and August can interrupt Yellowstone cutthroat spawning runs and have a severe impact on the recruitment of cutthroat to the Yellowstone River. It appears this fish does not spawn in the river.

Yellowstone cutthroat live most of the year in the mainstem of the Yellowstone River and ascend suitable tributaries to spawn during June and July. The tributaries of the upper river illustrated in Figure 1, with the exception of Mill Creek, support significant spawning runs of cutthroat. Following spawning, adult cutthroat return to the Yellowstone River leaving their eggs to incubate in the gravels of tributary streams. In about 4 1/2 to 6 weeks cutthroat fry emerge from the gravels and drift downstream to the Yellowstone where they will spend their lives.

Between Gardner and Big Timber approximately 18 major tributary streams do not support significant spawning runs of Yellowstone cutthroat. The most common explanation for the lack of spawning is the dewatering of streams during spawning and the period following when eggs are in the gravels. The dewatering of potential spawning streams has had a profound impact on the population levels of Yellowstone cutthroat. On the average, many tributary streams of the upper Yellowstone begin to dry up by late July and most are dry during August. This effectively eliminates successful hatching because of the desiccation of eggs in stream gravels. Hence, these dry tributaries contribute little to the recruitment of cutthroat to the Yellowstone River.

A study of migration patterns of adult Yellowstone cutthroat trout conducted by the Montana Department of Fish, Wildlife and Parks points to the importance of maintaining flows in tributary streams during the summer months.

Yellowstone cutthroat trout display a high degree of homing instinct during spawning to what is probably their natal tributary. It appears adult cutthroat return to spawn in the stream in which they were hatched. Cutthroat in reaches of the Yellowstone River which have a number of spawning streams nearby migrate only a short distance to spawn, while cutthroat inhabiting reaches of the river with few spawning tributaries must travel much longer distances to spawn. Cutthroat that live in the extreme upper river reach near Gardner (Figure 1, Section A) move short distances to spawn in Bear, Mol Heron, Cedar and Tom Miner Creeks, and most cutthroat that inhabit the lower reach (Section D) near Springdale move into Locke and Peterson Creeks to spawn. Cutthroats inhabiting the mid reach of the upper river (Figure 1, Sections B & C) must migrate longer distances to spawn. Trout in Section B must migrate upstream between 25 and 35 miles to successfully spawn, while trout in Section C must move upstream 8 to 12 miles to reach Nelson Spring Creek, their principal spawning tributary.

These migratory spawning patterns demonstrate that many cutthroats inhabiting the Yellowstone River in Paradise Valley were hatched in tributary streams many miles upriver. The apparent reason for such a long upstream spawning migration is that nearly all tributary streams are dewatered during the summer and are unfit for cutthroat spawning. Under existing conditions, very few cutthroat trout are able to ascend to Mill Creek to spawn. Should satisfactory flows be maintained in the lower six miles of Mill Creek during July, August and early September, this major tributary stream could contribute significantly to the recruitment of cutthroat trout to the Paradise Valley region of the Yellowstone River.

Cutthroat Trout Populations of the Upper Yellowstone River, Montana

The average number of cutthroat trout, ten inches long or longer, occurring in four sections of the upper Yellowstone during 1982-1985 is presented in Table 1.

Table 1

Average Number of Yellowstone Cutthroat Trout Ten Inches or Larger Per Mile in Four Yellowstone River Sections During 1982-1985.

Section 1/	No. Yellowstone Cutthroat
A	192
B	70
C	71
D	144

1/Refers to Figure 1 for location of river sections

As can be observed, sections A and D support the greatest numbers of large cutthroat trout in the upper river. This is believed attributable to their close proximity to suitable spawning tributaries--streams that maintain flows through the summer and early fall.

Projected Increases in Yellowstone Cutthroat Numbers

Predicting increases in Yellowstone River cutthroat trout numbers resulting from improvement of Mill Creek spawning habitat is both difficult as well as complex. The following discussion provided by the Montana Department of Fish, Wildlife and Parks is based on reasonable assumptions.

As stated earlier, very few cutthroat trout are able to ascend Mill Creek to spawn. During June and July of 1983, only four migratory trout were electrofished on four occasions in a one-half mile section of lower Mill Creek. During the same period electrofish sampling in Tom Miner, Mol Heron and Cedar Creeks revealed strong spawning migrations within these streams.

Data show that in the upper Yellowstone River where perennial tributaries flow, the cutthroat population of ten inch and longer fish is 2.75 times larger than the river population in the vicinity of Mill Creek. Mill Creek has the potential to support a level of cutthroat recruitment to the Yellowstone River equal to or greater than either Mol Heron or Cedar Creeks of the upper river. Since Mill Creek is a larger stream it contains more potential spawning sites and greater potential to add recruitment to the Yellowstone than either upper basin streams. Mill Creek will produce 1.5 times the difference in recruitment between river Sections A and B, and assuming a 50 percent mortality, 92 additional catchable size cutthroat trout per mile could be added to the mid river population. This figure would apply to at least eight miles of river. A smaller figure, one half the projected increase, or 46 fish would be added to an additional ten miles of river. These increases would be as follows:

8 miles of river x 92 =	736
10 miles of river x 46 =	460
Total additional fish	1,196

A conservative increase of about 1,200 cutthroat trout ten inches or longer would be added to an 18 mile reach of the upper Yellowstone River as a result of maintaining satisfactory spawning flows in Mill Creek as part of the Mill Creek Watershed Project. A catchable trout is considered to be any fish, longer than seven inches in length. Using this criteria, an additional 1,000 trout between seven and ten inches in length would be added to the river trout population. This would increase catchable cutthroat trout by approximately 2,200 fish in 18 miles reach of the upper Yellowstone River. These increases in fish numbers pertain to population levels anticipated approximately six years or longer following completion of the watershed project.

The increase of 2,200 catchable trout in the Yellowstone River equates to 1,830 additional fishermen days per year when, on the average, each fish is caught 2.5 times per year, and three fish constitutes a fisherman day.

$$2,200 \times 2.5 \div 3 = 1,830$$

Resident trout in Mill Creek would also benefit from year-round flows. Current data suggests that resident populations are quite low, even where year-round flows exist. Current populations are probably in the range of 30 fish per 1,000 feet of stream and consist of cutthroat and rainbow trout and mountain whitefish. If an additional 30 trout per 1,000 of stream were added to the 6.4 miles of Mill Creek benefiting from the project, an increase of 155 trout (all age classes) per mile could be expected with project.

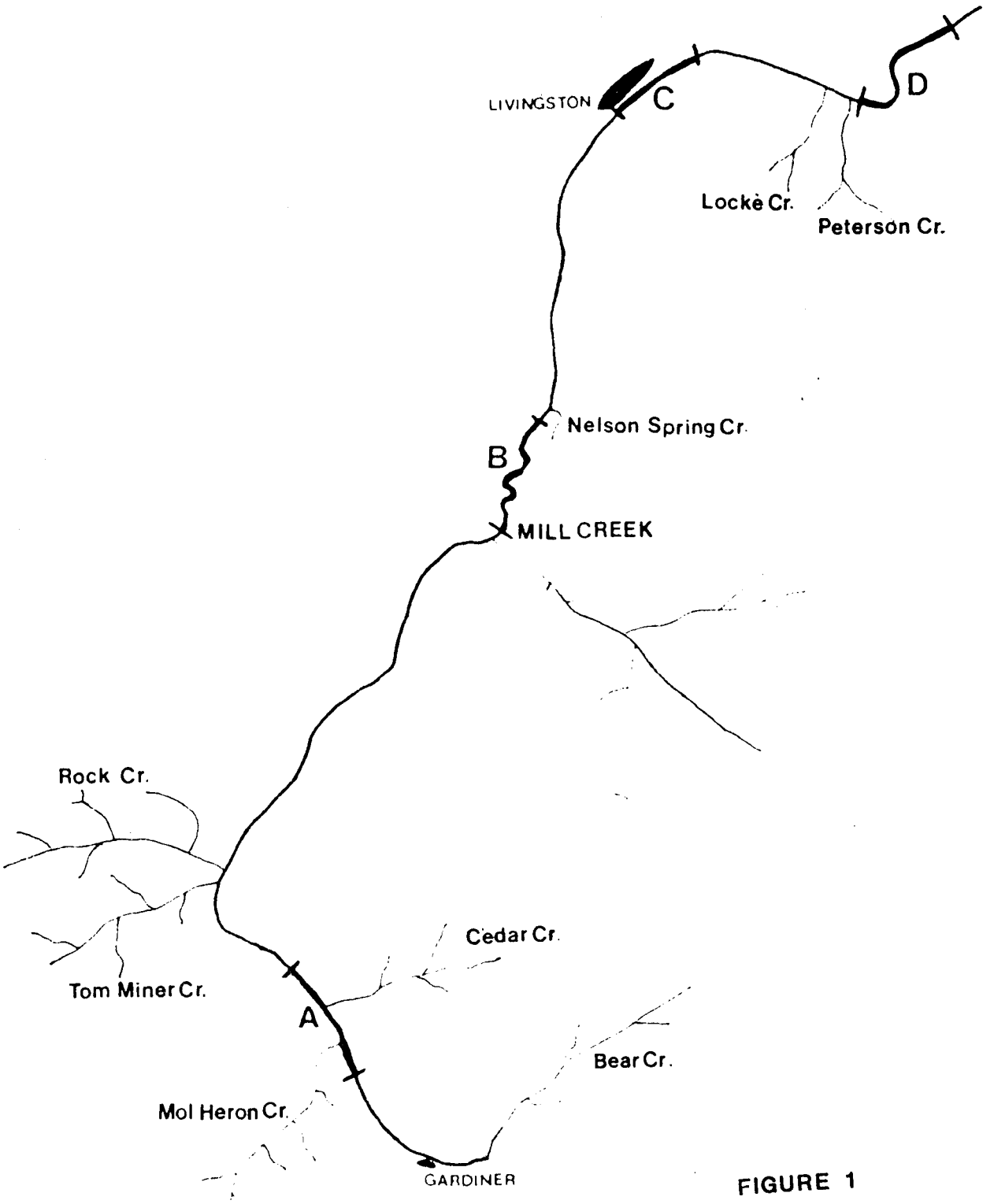


FIGURE 1

MILL CREEK AND UPPER

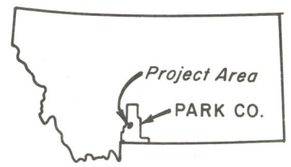
YELLOWSTONE DRAINAGE

APPENDIX B

PROJECT MAP

LEGEND

- WATERSHED BOUNDARY
- BENEFITED AREA
- PIPELINE (PROPOSED)
- STRUCTURES (PROPOSED)
- CANAL (PROPOSED)



LOCATION MAP

PROJECT MAP

MILL CREEK WATERSHED

PARK COUNTY, MONTANA

1/2 0 1

SCALE IN MILES

Pray

ARROWHEAD SCHOOL

RIVER ROAD

EAST MILL CREEK ROAD

Mill Creek

YELLOWSTONE RIVER

EAST RIVER ROAD

MILL FLAT DITCH

UPLAND DITCH

SIDE DITCH

NORTH MILL FLAT DITCH

DITCH

WASTEWAY

STRUCTURE

DITCH STRUCTURE

Davis Creek

C, C6, A, C5, C4, A1, C3, C2, C1, D1, D, B

7 8 12 13 14 17 18 19 20 23 24 25 26 27 28 29 30 31 32 33 34 35 36 2 3 4 5

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