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Before the Federal Energy Regulatory Commission

APPLICATION FOR AMENDMENT OF LICENSE
MYSTIC LAKE WATER POWER PROJECT
APRIL 1985

MYSTIC LAKE WATER POWER PROJECT NO. 2301

THE MONTANA POWER COMPANY
40 E. BROADWAY
BUTTE, MONTANA 59701

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BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

APPLICATION FOR AMENDMENT OF LICENSE

(1) The Montana Power Company applies to the Federal Energy Regulatory Commission for an amendment of license for the Mystic Lake Water Power Project.

(2) The exact name and business address of the Applicant is:

The Montana Power Company
40 East Broadway Street
Butte, Montana 59701

(3) The Applicant is a corporation, organized under the laws of the State of Montana and is licensee for the Mystic Lake Water Power Project, designated as Project No. 2301 in the records of the Federal Energy Regulatory Commission, originally issued on the 12th day of October, 1962.

(4) The amendment of license proposed and the reasons why the proposed changes are necessary are:

The proposed amendment to Article 34(c) of the License seeks to change the time period to maintain a minimum water surface elevation of 7,663.5 feet (USGS datum) from July 1 to September 15 of each year to July 10 to September 15 of each year.

This change is necessary because adherence to the July 1 refill date results in the unnecessary and wasteful spillage of water and in the consistent loss of potential generation at the Mystic Lake Water Power Project. (See Section 1.1).

(5)(i) The statutory or regulatory requirements of the state(s) in which the project would be located that affect the project as proposed with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes are:

There are no statutory or regulatory requirements that would impact upon the Applicant's proposed actions.

(ii) See Answer to (5)(i) above.

(6) The United States Department of Agriculture, Forest Service, by letter dated April 25, 1985, a copy of which is attached as Appendix 1, has informed Applicant that the delay in reaching full pond or the recreation level at Mystic Lake for ten days

(July 1 to July 10) will not adversely impact recreationists using the lake or lakeshore.

7. The State of Montana, Department of Fish, Wildlife and Parks by letters dated April 15 and April 22, 1985, copies of which are attached as Appendix 2, has informed Applicant that the Department does not object to a delay in reaching full pond or the recreation level at Mystic Lake for ten (10) days until July 10.

8. The United States, Department of Interior, Fish and Wildlife Service, by letter dated April 15, 1985, a copy of which is annexed as Appendix 3, has informed Applicant that the Service does not object to a delay in reaching full pool or the recreation level at Mystic Lake for ten (10) days until July 10.

9. Applicant requests swift consideration of its proposed amendment so that, if the amendment is approved, it may begin to convert to the July 10 refill date no later than June 1, 1985. If the amendment process cannot be completed before June 1, 1985, then this amendment shall be considered in the alternative an application for variance of a license condition for a period of one (1) year or less. If this is the case, the Director of the Office of Electric Power Regulations or his designee can act upon this matter pursuant to 18 CFR, Section 375.308(b).

The Montana Power Company

By: W. P. Schmechel
W. P. Schmechel
Chief Executive Officer

ATTEST: [signature]
Assistant Secretary

United States Department of Agriculture
Forest Service
Custer National Forest
2602 1st Avenue N.
P.O. Box 2556
Billings, MT 59103

Reply to: 2770

Date: April 25, 1985

Montana Power Company
ATTN: Mike Mannion
40 East Broadway
Butte, MT 59701

APR 29 1985

Dear Mr. Mannion:

The Custer National Forest has no objection to a permanent amendment to the Mystic project which would allow Mystic Lake to reach "recreation level" on July 10 rather than July 1 each year.

There is essentially no recreation boating on the lake, and the delay of 10 days to reach 7663.5 will have no significant effect on the recreation visitor to the area.

Sincerely,

John P. Filius

DAVID A. FILIUS
Forest Supervisor

cc:
Beartooth District

Montana Department of Fish, Wildlife & Parks

APR 16 1985

1125 Lake Elmo Drive
Billings, MT 59105
April 15, 1985

Mr. Mike Manion
Legal Department
Montana Power Co.
40 East Broadway
Butte, MT 59701

Dear Mr. Manion:

Thank you for the opportunity to comment on Montana Power Company's (MPC) final report concerning the delay in attaining the recreational pool elevation at Mystic Lake.

We have reviewed exhibit B of MPC's permanent ammendment to their FERC license requesting a variance in the delay of fill from July 1 to July 10 and found it satisfactory. The 10 day variance would not seriously affect trout movement into spawning areas or impair zooplankton development. Spawning rainbow trout would be confronted with the same low lake elevations regardless of the July 1 or July 10 refill deadline and use of all spawning areas would not likely change.

In the event MPC could not obtain final approval of their proposed ammendment, a temporary variance allowing attainment of the recreational pool elevation (7,663.5 feet) by July 10, 1985 would be acceptable.

Sincerely,

Steve McMullin
Regional Fisheries Manager

SM:dc

Montana Department of Fish, Wildlife & Parks

APR 1985

1420 East Sixth Avenue
Helena, Montana 59620

April 22, 1985

Mike Manion
Montana Power Company
40 East Broadway
Butte, Montana 59701

Mr. Manion:

The Mystic Lake Water Project comments which you have received from Al Elser in our Fisheries Division will adequately express any concerns the Parks Division may have with this project.

Thank you for this opportunity to comment,

Don Hyppa

DON HYYPPA
Administrator
Parks Division

PRP/lmp
cc: Mary Gail Sullivan
LeRoy Ellig
Ray Berntsen

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101-1396

APR 16 1985

IN REPLY REFER TO:

ES

April 15, 1985

Mystic Lake Water Project
FERC No. 2301

Mr. Mike Manion
Montana Power Company
40 East Broadway
Butte, Montana 59701

Dear Mr. Manion:

We have reviewed the Recreational Resources (Exhibit A) and Fishery Resources (Exhibit B) studies which were transmitted with your letter of April 8, 1985.

We concur with the conclusions reached in these studies that a delay in attainment of the recreational level of Mystic Lake from July 1 to July 10 will not adversely affect recreational or fishery resources. Consequently, we have no objection to either a permanent amendment, or a temporary variance to the FERC license for Mystic Lake Water Project (FERC 2301) which would allow for a July 10 attainment date for the recreational pool level (elevation 7,663.5 feet).

Sincerely,

John G. Wood

John G. Wood
Field Supervisor
Ecological Services

cc: Regional Supervisor, Montana Department of Fish, Wildlife, and Parks, Billings, MT
Director, Montana Department of Fish, Wildlife, and Parks, Helena, MT
District Ranger, Beartooth District, Custer National Forest, Red Lodge, MT
Regional Director, USFWS, Denver, CO (HR)

Exhibit E

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF TABLES

EXHIBIT E

ENVIRONMENTAL RESOURCES

1.0 GENERAL DESCRIPTION OF LOCALE

Mystic Lake is located in the Beartooth Mountain Range of the Custer National Forest in Stillwater County, southcentral Montana. Absarokee, population 790, is located 30 miles northeast. Billings, Montana's largest city, is almost 90 miles northeast. Yellowstone National Park is less than 20 air miles southwest of the Project.

The Project setting is characterized by alpine turfs separated from timbered slopes or valley bottoms by steep rocky canyon walls.

There are 430 surface acres of water in Mystic Lake with six miles of shoreline. The Project boundary is the high water mark or elevation 7673.5. The lake is filled annually to the recreation level, elevation 7663.5 from July 1 through September 15.

The Project is surrounded on three sides by the Absarokee-Beartooth Wilderness. The Wilderness borders the lake on two sides and is 200 feet from shore on the third side. The Beartooth District of the Custer National Forest, United States Department of Interior, manages the majority of the area surrounding the Project.

The powerhouse is located approximately two miles below Mystic Lake. West Rosebud Lake, a regulating reservoir, is situated one mile downstream of the powerhouse. The stream gradient is ten percent between Mystic Lake and the powerhouse and three percent between the powerhouse and West Rosebud Lake.

The mean flow of West Rosebud Creek below the powerhouse is 129 cubic feet per second (USGS, 1984).

1.1 Mystic Lake Refill Study

1.12 Introduction

In the summer of 1982, The Montana Power Company's Power Operations Department prepared a study of potential power generation at the Mystic Lake project during the refill season. This study was performed to assess the impact on power generation of delaying the required date for attaining the recreation level (elevation 7663.5 feet) from July 1 to July 10. Following is a description of this study and its pertinent results.

1.13 Study Methodology

The study covered a 50-year period, beginning with 1931 and ending with 1980. During each of these years, Mystic Lake was assumed to be at its minimum elevation of 7612.0 feet on April 30 and was filled to its maximum elevation of 7673.5 feet by July 31. Two cases were run for each year, one in which the recreation level (7663.5 feet) was attained on or before July 1, and one in which the recreation level (7663.5 feet) was attained on or before July 10.

Inflows to Mystic Lake used in this study were based on inflows from The Montana Power Company's operating records. These recorded inflows have historically been computed as the sum of each day's outflow plus water stored in the reservoir during that day.

Because these computed inflows sometimes change erratically from one day to the next, an averaging scheme was used to smooth the inflow data . Daily inflows used for the study were calculated as the average of the recorded inflows for the day in question, the two previous days and the two following days.

The crest of the spillway at Mystic Lake is at elevation 7670.0 feet. In this study, if the reservoir was below the spillway crest the daily maximum discharge was limited by that day's inflow if the reservoir was empty, or by the hydraulic capacity of the power plant. It is necessary to reduce generation in order to maintain adequate pressure on the wood stave pipeline at low heads. This study accounted for that fact by limiting the plant's generation as follows:

Elevation	Maximum Generation (Mw)	Maximum Discharge (cfs)
7612' to 7613' -	6	86
7613' to 7615' -	7	100
7615' to 7623' -	8	115
7623' to 7630' -	9	129
7630' to 7637' -	10	143
7637' to 7640' -	11	157
7640' to 7670' -	11.5	164
7670' +	11.5	164 + Spill

A computer program was written by the Power Operations Department to perform the calculations. The program basically used a trial and error approach to regulate the discharge during the refill season. During the first trial, the program maintained the maximum possible discharge (described above) from May 1 through the required date for attaining the recreation level (either July 1 or July 10). If this resulted in the reservoir not reaching the recreation level

by the required date, each day's discharge was decreased by the equal amount necessary to reach the recreation level on the required date.

Beginning the day following the attainment of the recreation level, the program performed a trial maintaining the maximum possible discharge without spilling (164 cfs) through July 31. If this trial resulted in the reservoir being less than full through July 31, the discharge for each day beginning with the day after the required date for attaining the recreation level (either July 2 or July 11) was reduced by the required amount to allow the reservoir to fill at a uniform rate and reach its maximum elevation of 7673.5 feet on July 31.

If the trial maintaining maximum discharge without spilling resulted in the reservoir overfilling, a new trial was run with spill through one bay after the reservoir reached the spillway crest (elevation 7670.0 feet). If this trial resulted in overfilling, more trials were run, spilling through one additional bay each time, until a trial was completed without overfilling. Following this procedure, the reservoir was brought to its maximum elevation of 7673.5 on July 31, by filling at a uniform rate beginning with the day on which spill through all the open bays would have started drafting the reservoir. This uniform fill rate was achieved by reducing each day's discharge by the necessary amount.

Following the reservoir regulation described above, average power generation for each day was computed by multiplying that day's discharge less spill by 70 kW/cfs.

Study Results

The significant results of the Power Operations Department's study are summarized in Tables 1-5.

Table 1 contains information comparing potential power generation with the recreation level attained by July 1 and by July 10. The table shows that power generation could be increased in 19 of the 50 years studied if the required date for attaining the recreation level was changed to July 10. The total increase in generation for the 50 years studied was 38,414 megawatt hours. This is an average of 2,022 MWh/year during the 19 affected years, and 768 MWh/year over the entire 50-year study period.

Tables 2 and 3 contain information concerning reservoir refill levels and dates. These tables indicate that in 24 of the 50 years studied, the date for attaining the recreation level could be delayed beyond July 1. However, in five of these years, this delay would not result in increased power generation so the reservoir could be filled to the recreation level by July 1 without a negative impact on power production. This leaves 19 years in which the date the reservoir filled to the recreation level would be expected to be delayed beyond July 1. Table 2 shows that the date on which the recreation level was reached was delayed an average of

five days during the 19 affected years, and an average of two days over the 50 years studied. Table 3 shows that the reservoir was an average of 6.7 feet below the recreation level on July 1 during the 19 affected years, and an average of 2.5 feet below the recreation level on July 1 during the 50 years studied.

Tables 4 and 5 contain information about the possible reductions in peak discharge (spill plus water through the power plant) and spill which could be achieved by changing the required date for reaching the recreation level to July 10. The discharges and spills achieved in actual practice would not precisely match those in the study because the computer program assumed spill through the minimum number of bays necessary to avoid overfilling. Despite this assumption in the computer model, comparisons between the relative magnitudes of the peak discharges and spills are still illustrative. Tables 4 and 5 show that a reduction in the peak discharge and spill would be expected in 19 of the 50 years studied. In seven of these years, the peak discharge and spill could be reduced by 75 cfs or more.

MYSTIC LAKE REFILL STUDY

Table 1

May - July Generation (MWh)

Year	7,663.5' by July 1	7,663.5' by July 10	Generation Gain	Year	7,663.5' by July 1	7,663.5' by July 10	Generation Gain
1931	13,870	13,870		1956	20,598	20,598	
1932	20,546	20,546		1957	21,878	21,878	
1933	18,444	18,444		1958	21,897	21,897	
1934	18,004	18,004		1959	18,839	18,839	
1935	17,322	18,676	1,354	1960	14,868	14,868	
1936	20,919	20,919		1961	17,828	17,828	
1937	20,359	20,568	209	1962	19,714	19,714	
1938	19,587	19,587		1963	20,069	20,069	
1939	14,421	15,835	1,414	1964	16,763	19,051	2,288
1940	21,569	21,569		1965	19,412	19,412	
1941	18,330	19,434	1,104	1966	20,106	21,356	1,250
1942	15,437	19,572	4,135	1967	19,306	19,306	
1943	19,941	19,941		1968	17,332	18,374	1,042
1944	21,280	21,280		1969	21,315	21,628	313
1945	14,209	18,231	4,022	1970	19,933	19,933	
1946	16,381	19,923	3,542	1971	20,141	20,141	
1947	20,238	22,218	1,980	1972	20,339	20,339	
1948	20,652	20,652		1973	19,444	19,444	
1949	21,267	21,267		1974	19,785	19,785	
1950	16,497	18,194	1,697	1975	13,661	17,813	4,152
1951	13,651	17,031	3,380	1976	21,233	21,337	104
1952	22,260	22,260		1977	14,846	14,846	
1953	14,506	18,081	3,575	1978	19,629	19,629	
1954	18,142	20,086	1,944	1979	17,821	17,821	
1955	13,149	14,058	909	1980	22,333	22,333	

MYSTIC LAKE REFILL STUDY

Table 2

Date on Which Elevation 7,663.5' Attained

Year	7,663.5' by July 1	7,663.5' by July 10	Year	7,663.5' by July 1	7,663.5' by July 10
1931	July 1	July 3*	1956	June 12	June 12
1932	June 27	June 27	1957	June 14	June 14
1933	June 23	June 23	1958	June 8	June 8
1934	July 1	July 9*	1959	June 22	June 22
1935	July 1	July 5	1960	July 1	July 10*
1936	June 28	June 28	1961	June 24	June 24
1937	July 1	July 2	1962	July 1	July 1
1938	June 27	June 27	1963	June 26	June 26
1939	July 1	July 10	1964	July 1	July 5
1940	June 21	June 21	1965	June 25	June 25
1941	July 1	July 10	1966	July 1	July 4
1942	July 1	July 7	1967	June 23	June 23
1943	June 27	June 27	1968	July 1	July 6
1944	June 30	June 30	1969	July 1	July 3
1945	July 1	July 9	1970	June 24	June 24
1946	July 1	July 8	1971	June 23	June 23
1947	July 1	July 5	1972	June 18	June 18
1948	June 10	June 10	1973	June 30	June 30
1949	July 1	July 1	1974	June 19	June 19
1950	July 1	July 3	1975	July 1	July 5
1951	July 1	July 10	1976	July 1	July 2
1952	June 21	June 21	1977	July 1	July 10*
1953	July 1	July 8	1978	July 1	July 1
1954	July 1	July 5	1979	July 1	July 3*
1955	July 1	July 10	1980	June 29	June 29

*In these years, the reservoir could be filled to 7,663.5' by July 1 without causing later spill and lost generation.

MYSTIC LAKE REFILL STUDY

Table 3

Elevation on July 1

Year	7,663.5' by July 1	7,663.5' by July 10	Below 7,663.5'	Year	7,663.5' by July 1	7,663.5' by July 10	Below 7,663.5'
1931	7,663.7'	7,663.0'	0.5'*	1956	7,673.2'	7,673.2'	
1932	7,672.2'	7,672.2'		1957	7,673.0'	7,673.0'	
1933	7,671.1'	7,671.1'		1958	7,671.8'	7,671.8'	
1934	7,663.7'	7,660.9'	2.6'*	1959	7,673.4'	7,673.4'	
1935	7,663.5'	7,659.4'	4.1'	1960	7,663.6'	7,659.7'	3.8'*
1936	7,665.8'	7,665.8'		1961	7,668.2'	7,668.2'	
1937	7,663.8'	7,663.2'	0.3'	1962	7,664.6'	7,664.6'	
1938	7,670.6'	7,670.6'		1963	7,670.5'	7,670.5'	
1939	7,663.8'	7,654.4'	9.1'	1964	7,663.7'	7,656.7'	6.8'
1940	7,673.0'	7,673.0'		1965	7,671.6'	7,671.6'	
1941	7,663.7'	7,657.7'	5.8'	1966	7,663.5'	7,659.8'	3.7'
1942	7,663.5'	7,650.4'	13.1'	1967	7,672.7'	7,672.7'	
1943	7,673.2'	7,673.2'		1968	7,663.7'	7,660.6'	2.9'
1944	7,666.1'	7,666.1'		1969	7,663.8'	7,662.8'	0.7'
1945	7,663.6'	7,650.9'	12.6'	1970	7,673.4'	7,673.4'	
1946	7,663.8'	7,652.7'	10.8'	1971	7,673.4'	7,673.4'	
1947	7,663.7'	7,657.7'	5.8'	1972	7,672.5'	7,672.5'	
1948	7,673.0'	7,673.0'		1973	7,667.1'	7,667.1'	
1949	7,664.0'	7,664.0'		1974	7,673.5'	7,673.5'	
1950	7,663.6'	7,658.5'	5.0'	1975	7,663.7'	7,650.6'	12.9'
1951	7,663.7'	7,651.8'	11.7'	1976	7,663.7'	7,663.4'	0.1'
1952	7,671.1'	7,671.1'		1977	7,663.6'	7,657.9'	5.6'*
1953	7,663.7'	7,652.5'	11.0'	1978	7,664.4'	7,664.4'	
1954	7,663.6'	7,657.6'	5.9'	1979	7,663.6'	7,660.1'	3.4'*
1955	7,663.7'	7,659.3'	4.2'	1980	7,665.0'	7,665.0'	

*In these years, the reservoir could be filled to 7,663.5' by July 1 without causing later spill and lost generation.

MYSTIC LAKE REFILL STUDY

Table 4

Maximum Daily Discharge (cfs)

Year	7,663.5' by July 1	7,663.5' by July 10	Decrease	Year	7,663.5' by July 1	7,663.5' by July 10	Decrease
1931	164	138	26*	1956	433	433	
1932	431	431		1957	761	761	
1933	269	269		1958	542	542	
1934	164	147	17*	1959	590	590	
1935	348	330	18	1960	164	146	18*
1936	164	164		1961	164	164	
1937	339	327	12	1962	328	328	
1938	497	497		1963	447	447	
1939	265	164	101	1964	645	640	5
1940	387	387		1965	795	795	
1941	245	164	81	1966	355	316	39
1942	762	554	208	1967	860	860	
1943	877	877		1968	612	602	10
1944	606	606		1969	622	620	2
1945	653	634	19	1970	937	937	
1946	391	306	85	1971	559	559	
1947	705	630	75	1972	370	370	
1948	528	528		1973	408	408	
1949	347	347		1974	995	995	
1950	592	564	28	1975	717	348	369
1951	705	624	81	1976	377	373	4
1952	475	475		1977	164	136	28*
1953	498	458	40	1978	590	590	
1954	593	583	10	1979	164	164	
1955	363	337	26	1980	315	315	

*In these years, the reservoir could be filled to 7,663.5' by July 1 without causing later spill and lost generation. If the reservoir was filled to 7,663.5' by July 1, no reduction in peak discharge would occur.

MYSTIC LAKE REFILL STUDY

Table 5

Maximum Daily Spill (cfs)

Year	7,663.5' by July 1	7,663.5' by July 10	Decrease
1931	0	0	
1932	267	267	
1933	105	105	
1934	0	0	
1935	184	166	18
1936	0	0	
1937	175	163	12
1938	333	333	
1939	101	0	101
1940	223	223	
1941	81	0	81
1942	598	390	208
1943	713	713	
1944	442	442	
1945	489	470	19
1946	227	142	85
1947	541	466	75
1948	364	364	
1949	183	183	
1950	428	400	28
1951	541	460	81
1952	311	311	
1953	334	294	40
1954	429	419	10
1955	199	173	26
1956	269	269	
1957	597	597	
1958	378	378	
1959	426	426	
1960	0	0	
1961	0	0	
1962	164	164	
1963	283	283	
1964	481	476	5
1965	631	631	
1966	191	152	39
1967	696	696	
1968	448	438	10
1969	458	456	2
1970	773	773	
1971	395	395	
1972	206	206	
1973	204	204	
1974	831	831	
1975	553	184	369
1976	213	209	4
1977	0	0	
1978	426	426	
1979	0	0	
1980	151	151	

2.0 WATER USE AND QUALITY

The proposed amendment submitted by the Applicant will not affect water use or quality. The Applicant seeks only to change the refill date of Mystic Lake from July 1 to July 10, not change its current use of the water or quantity of water used.

3.0 FISH, WILDLIFE AND BOTANICAL RESOURCES

3.1 Trout Population

Mystic Lake supports a naturally abundant and self-sustaining rainbow trout population. The lake has not been stocked with trout since 1951. The fishery is composed of approximately 95 percent rainbow and 5 percent rainbow cutthroat hybrids (Schollenberger, 1984). Mystic Lake received an estimated 1,284 man-days fishing pressure during the 1982-1983 season (personal communication, McMullin). The trout population ranges in length to 14 inches with a mean of 10 inches (Schollenberger, 1984).

3.2 Spawning

Rainbow trout in Mystic Lake generally spawn from early June to early July. Three major spawning areas are located at the west end of the lake (Figure 3-1). Spawning activities are negligible in the remaining tributaries (Fish Creek and Creeks No. 7 and No. 8). The majority of spawning takes place in the West Rosebud Creek inlet. The balance of spawning activity is divided between the Creek No. 10 area and the Huckleberry-West Rosebud confluence area. The Creek No. 10 area is located in the stream above the mouth and the Huckleberry-West Rosebud area is located below the recreation

elevation at the confluence of the two streams (Schollenberger, 1984).

3.3 Food Habits

Food utilization depends upon the particular location and activity of the trout population. Aquatic and semi-aquatic insects are the preferred food items in June and July when fish are in the tributary streams selecting spawning sites. During this period, diptera larvae are the dominant food item. Adult zooplankton are the dominant food item in August when the fish are distributed in the lake (Schollenberger, 1984).

3.4 Impact Assessment

The fishery impacts due to the refill date delay (from July 1 to July 10) are presented in this section. The assessment of impacts is based primarily on a study of Mystic Lake and supplemented by a previous study done on West Rosebud Creek.

3.5 The Mystic Lake Rainbow Trout Study

3.5.1 Study Design and Methods

A study on the Mystic Lake fishery was conducted by the Montana Department of Fish, Wildlife and Parks in 1983 and 1984. The purpose was to determine the impacts of delaying the refill date on the lake fishery. The concerns of the Department were that the

refill delay could affect rainbow trout spawning movement into tributaries. The delay might also interfere with the life cycle of two large zooplankton species, Diaptomous shoshoni and Holopedium gibberum. These two species are thought to be an important food source for rainbow trout.

Due to the hydrological conditions that existed in 1983, the delayed refill date was tested in 1983. In 1984, the reservoir was refilled by July 1 date. The impact documentation and a comparison between the two years' refill operations is presented in the report: Impact on Rainbow Trout Reproduction Associated With the Attainment of the Recreational Pool Elevation at Mystic Lake. A copy of the report is attached as Attachment 3-I.

The same methods were used to evaluate impacts in 1983 and 1984. Staff gauges, marked at one-foot intervals, were placed to measure changes in lake level in the spawning areas. Spawning areas were identified by the presence of paired and single fish, counted once a week throughout the spawning period. The conclusion of the spawning period was determined by noting a decrease in fish numbers associated with the spawning areas. Intergravel dissolved oxygen samples were collected in all spawning areas. Dissolved oxygen measurements were made at depths of zero, six and eight inches into the substrate. Egg incubation studies were conducted to evaluate hatching success in two spawning areas: West Rosebud Creek and Huckleberry-West Rosebud. Zooplankton samples were collected on a weekly basis to monitor the development sequence of Diaptomous

shoshoni and Holopedium gibberum. Gill nets were set to collect fish for food habits analyses.

3.5.2 Study Results and Conclusions

The recreation pool level was reached on July 3, 1983 and on June 29, 1984, resulting in a four-day difference in attaining the recreation pool elevation between 1983 and 1984. There is no significant difference impacts to the fishery resulting from the two refill dates tested in 1983 and 1984.

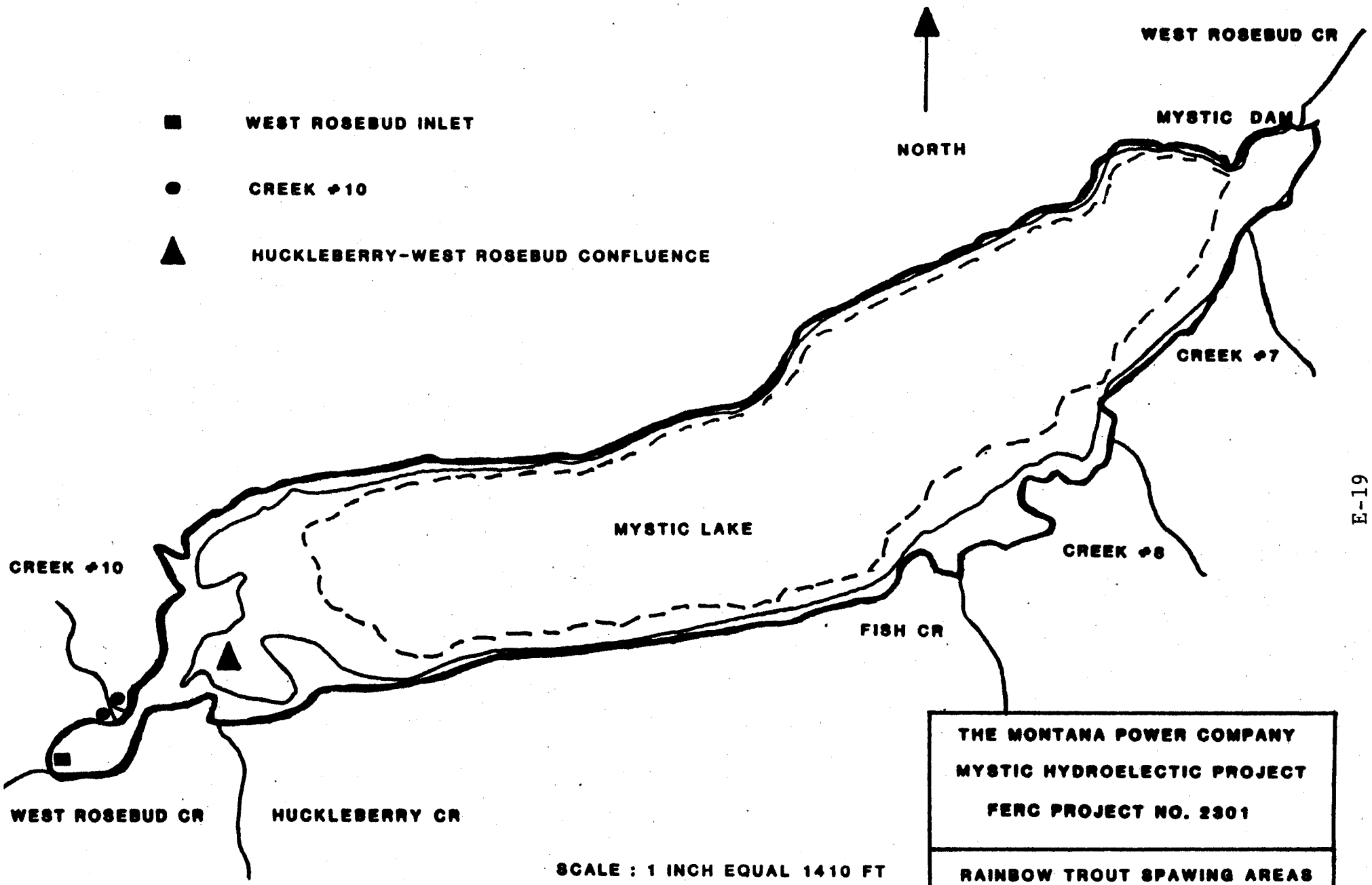
Low lake levels did not affect trout movement into the three major spawning areas in either year. Use of all three spawning areas was similar in both years. Intergravel dissolved oxygen was adequate for healthy egg development at all three spawning areas to a substrate depth of six inches for both years. Egg incubation and hatching success provided adequate recruitment to maintain the populations using all three spawning areas in both years.

The time of adult zooplankton appearance was not significantly different in 1984 than in 1983.

In conclusion, the study results indicate the Mystic Lake fishery will not be significantly affected by the extension of the refill date from July 1 to July 10.

3.6 West Rosebud Creek

A second concern has been the effect of the later fill date on the downstream fishery. A study of the West Rosebud Creek fishery was completed in 1979 and submitted to the Federal Energy Regulatory Commission on January 19, 1981. The findings of that report indicate that the later fill date will be beneficial to the downstream fishery. The employment of a later refill date will delay the spill date to a period with reduced discharge. As a result, the magnitude of the abrupt flow surge will be attenuated and the scouring effect on the stream bed will be lessened.



SCALE : 1 INCH EQUAL 1410 FT

SOURCE : SCHOLLENBERGER, 1984

THE MONTANA POWER COMPANY
MYSTIC HYDROELECTIC PROJECT
FERC PROJECT NO. 2301

RAINBOW TROUT SPAWING AREAS

FIGURE 3-1

IMPACT ON RAINBOW TROUT REPRODUCTION ASSOCIATED WITH THE ATTAINMENT OF THE RECREATIONAL POOL ELEVATION AT MYSTIC LAKE

Prepared by

Mark Schollenberger
Montana Department of Fish, Wildlife and Parks

Final Draft

November 1, 1984

TABLE OF CONTENTS

ABSTRACT

Mystic Lake is located in the West Rosebud Creek drainage in Stillwater County, Montana. In 1983, the Montana Power Company was granted a 1-year variance to their FERC license to delay filling Mystic Lake to the recreational pool elevation (7,663.5 ft.) from July 1 to July 10. The purpose of the delay was to generate additional power during the month of June. A study of the impact the delay of fill had on rainbow trout spawning activity and large zooplankton development was documented in 1983. In 1984, a comparable study was conducted when the recreational pool elevation deadline was July 1.

Spawning rainbow trout were confronted with similar low-pool conditions initially and subsequent rising water levels as the lake neared the recreational pool elevation in both years. Three major spawning areas were located in the west end of the lake: in the West Rosebud full-pool inlet, in Creek #10 above the full-pool elevation and in the low-pool confluence area of Huckleberry and West Rosebud creeks. Use of all three spawning areas was similar in both years. Attainment of the recreational pool elevation did not affect water levels in the West Rosebud full-pool inlet and in Creek #10 in both years.

The Huckleberry-West Rosebud confluence area was inundated with lake water prior to attaining the recreational pool elevation in 1983 and 1984. During the egg incubation period, this area was under 25.6 ft. of water in 1983 and 24.5 feet in 1984. Spawning activity ended once flooding of this area occurred. Twenty-three percent of the rainbow trout eggs in the incubation stations in this area hatched. Intergravel dissolved oxygen was adequate throughout the incubation period.

The zooplankton development period was similar in both years. Rainbow utilized this food source in late August after the spawning period when the fish returned to their lentic environment.

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Prior to 1926, Mystic Lake was a natural body of water occupying 342.5 acres. In 1926, Montana Power Company (MPC) built a dam, adding approximately 104.15 surface acres of additional water storage. MPC's FERC license (FPC No. 2301) requires the reservoir be filled to the recreation level (7,663.5 ft.) by July 1. In 1982, MPC filed a one-year variance to their FERC license to delay fill to the recreation level from July 1 to July 10, 1983. Under the existing refill date, power generation was lost in some years because reduced generation in June was necessary to refill the reservoir by July 1. MPC's application for the delay of fill states that extending the refill date to no later than July 10 approximately 3,900 megawatt hours of additional generation was expected during the refill period in 1983.

This study was initiated in response to Montana Department of Fish, Wildlife and Parks' (DFWP) concern that the delay of fill could affect rainbow trout (Salmo gairdneri) spawning movement into tributaries and interfere with the life cycle of two large zooplankton species (Diaptomous shoshoni) and (Holopedium gibberum) thought to be an important food source to rainbow trout (Marcuson, 1982).

Due to the particular hydrological conditions in 1983, DFWP, MPC and FERC agreed to delay filling the reservoir from July 1 to July 10, and the impact on the rainbow trout fishery was documented (Schollenberger 1983). In 1984, MPC complied with the July 1 refill date. A comparative study between the 2 years was conducted and is presented in this report. The MPC provided funding for this 2-year study.

OBJECTIVES

1. Locate major rainbow trout spawning areas and determine accessibility of those areas at various lake elevations.

2. Determine the duration of the spawning period.

3. Monitor the effects of increasing lake levels on low-pool spawning areas.

4. Document the development sequence of the two large zooplankton species.

STUDY AREA

Mystic Lake is located on West Rosebud Creek in Stillwater County approximately 90 miles southwest of Billings, Montana, and is surrounded by the Absaroka-Beartooth Wilderness on three sides (Figure 1). A three-mile hiking trail through non-wilderness U.S. Forest Service (USFS) lands provides access to the lake. Mystic is one of the most heavily used recreation areas in the Absaroka-Beartooth Mountains. A recreational study conducted by MPC in 1983 from July 1 to July 10 estimated 32 people per day visited the Mystic Lake area. Their main objective was to fish (MPC, 1983).

Mystic Lake is also the largest lake in the A-B Mountains. At full-pool elevation of 7,673.5 ft., the lake occupies 446.65 acres (Figures 2 and 3). Surface area of the lake can be reduced approximately one-third and depth of

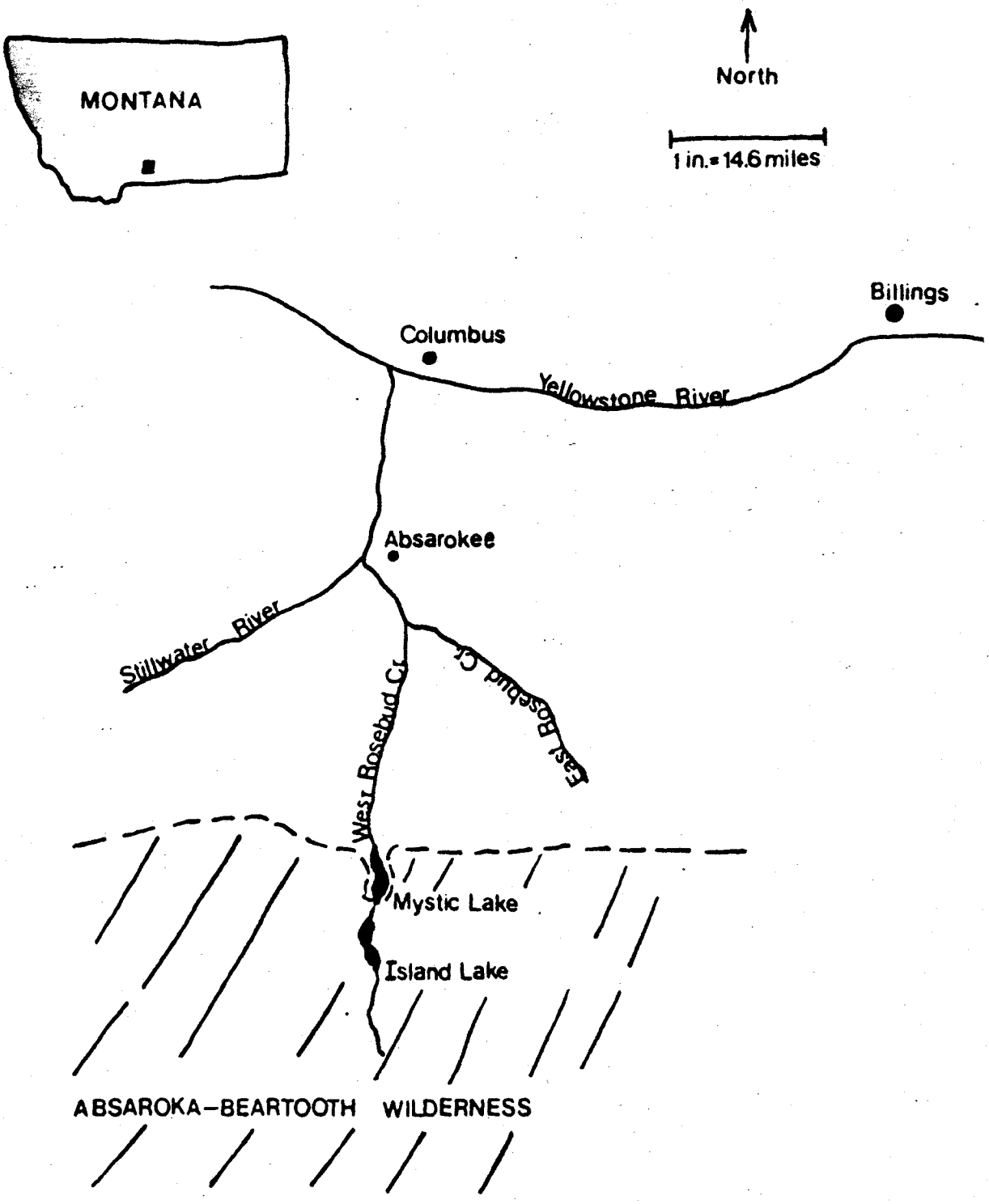


Figure 1. Map of West Rosebud drainage.

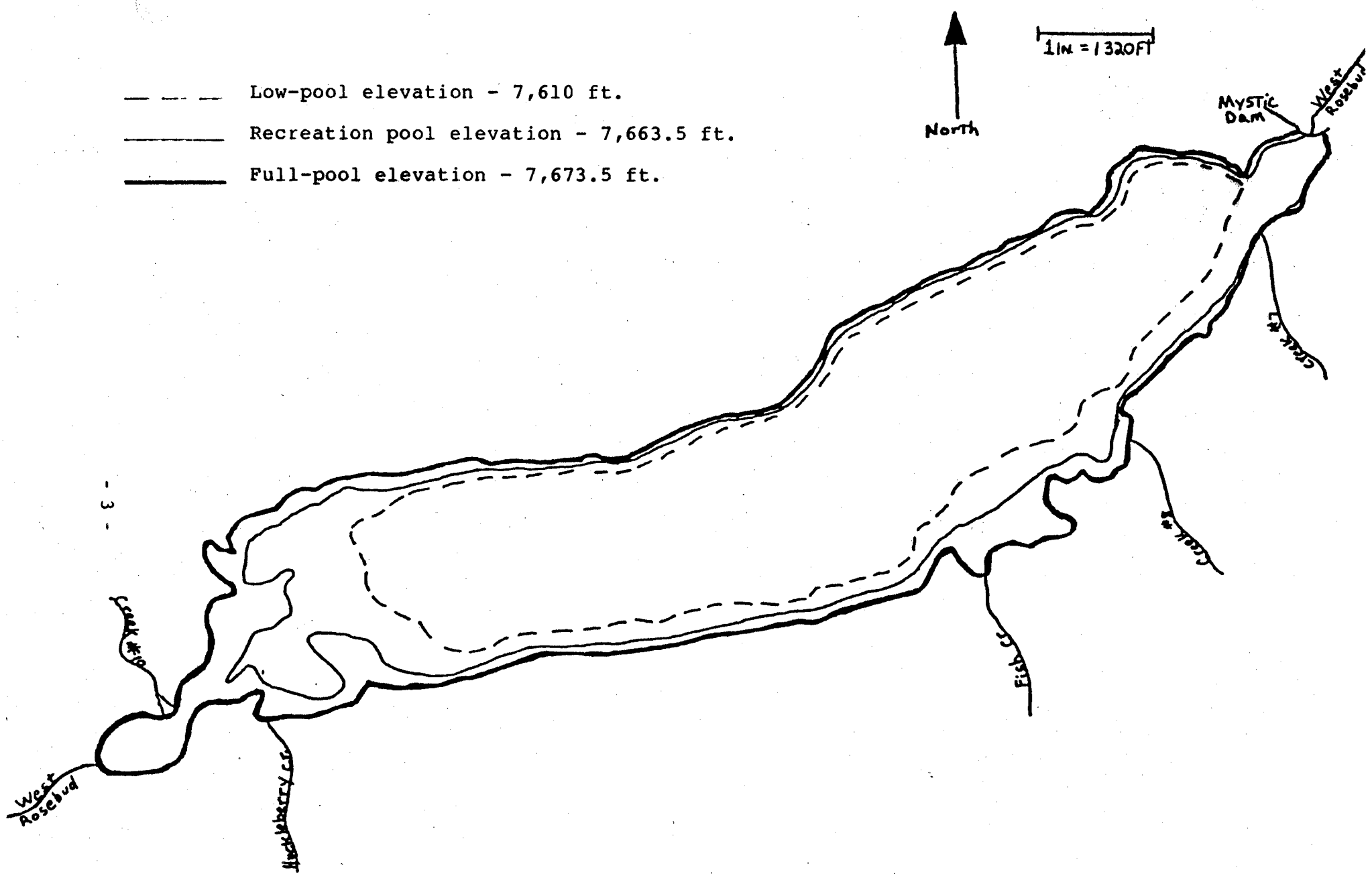


Figure 2. Map of the Study Area in Mystic Lake, 1983 and 1984.

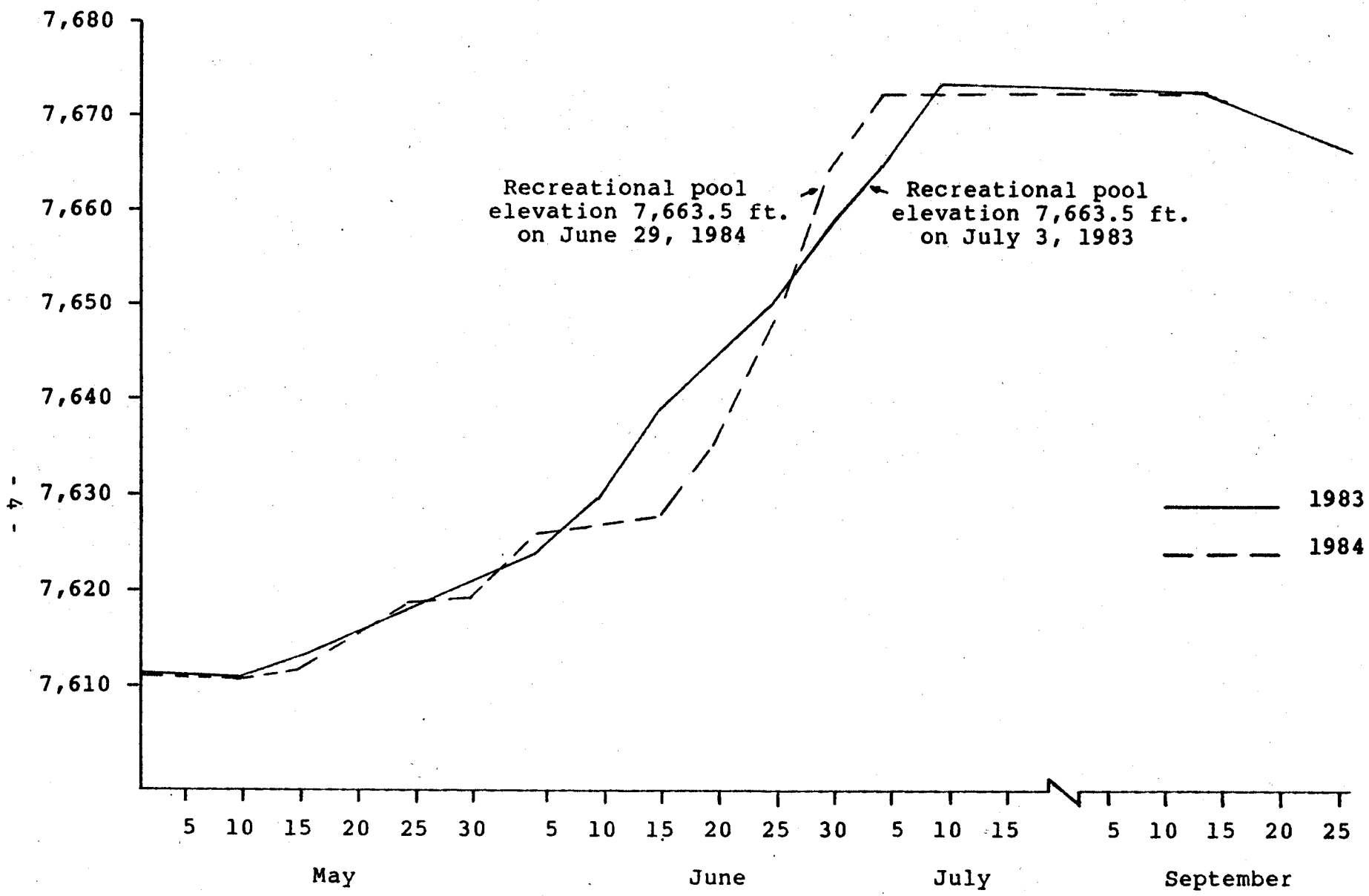


Figure 3. Daily Lake elevations in Mystic Lake from May 1 to September 25, 1983 and 1984.

63.5 ft. depth (pers. comm., Mystic dam operator). Low pool normally occurs in April at 297.85 surface acres (elevation 7,610 ft.) and remains at this level until spring runoff begins filling the lake in May. Recreational pool elevation occurs at 7,663.5 ft., and is the minimum lake elevation required by MPC's FERC license between July 1 and September 15. Lake elevation during this time period may fluctuate 10 ft. between recreational pool and full pool. Full pool generally occurs in late July. For purposes of this study, low pool refers to lake elevation prior to attainment of the recreational pool.

Tributaries draining into Mystic Lake include West Rosebud, Fish, Huckleberry and three unnamed creeks. (Marcuson 1976) assigned identification numbers 7, 8 and 10 to the three unnamed creeks in the study area. The study area includes Mystic Lake and its tributaries between low- and full-pool elevations.

METHODS

The same methods were used in 1983 and 1984 to evaluate impacts on the rainbow trout fishery associated with the attainment of the recreational pool. Daily lake elevations, supplied by Mystic dam operators, along with extensive photographs of the lake and tributary inlets were also used to document lake elevations during the spawning period. A staff guage marked at 1-foot intervals was placed in the West Rosebud full-pool inlet to document changes in lake elevation in this spawning area.

Rainbow Trout Spawning

In most streams, redds are easy to observe and count due to their cleaned appearance. The relatively sediment-free substrate of the tributaries in the study area prohibited actual redd counts in this area. To assess the use of a spawning area, fish numbers were visually counted once a week in tributaries and their inlets throughout the spawning period. Percent use of a spawning area was computed, based on the total number of spawners observed in all spawning areas. This method was successful in determining access into spawning areas. However, fish numbers observed (once a week) represent the minimum number of spawners using a spawning area. Weekly kick-sampling in the gravel with a net throughout the incubation period eventually revealed "eyed eggs" which were helpful in back-calculating when eggs were deposited and the initiation of the spawning period. The end of the spawning period was determined by noting a decrease in fish numbers observed in spawning areas.

Fish were sampled either by hook and line or gill nets. All fish sampled were weighed and measured, and sex ratio between males and females determined. Scale samples were obtained to determine the age structure of the population.

Spawning Area Micro-habitat

Intergravel dissolved oxygen (D.O.) samples were obtained in all spawning areas, using the method developed by DFWP fisheries biolgists on Flathead Lake, Montana (Decker-Hess and Graham, 1982). Intergravel samples were collected, using a hand-operated rotary pump which was connected to an 18-in. long probe of 1/8-in. galvanized pipe by 1/4-in. ID plastic tubing (Figure 4). The probe was passed through a 5-in.^{2} foam rubber-backed steel plate before it was driven into the gravel to prevent contamination of the sample by lake

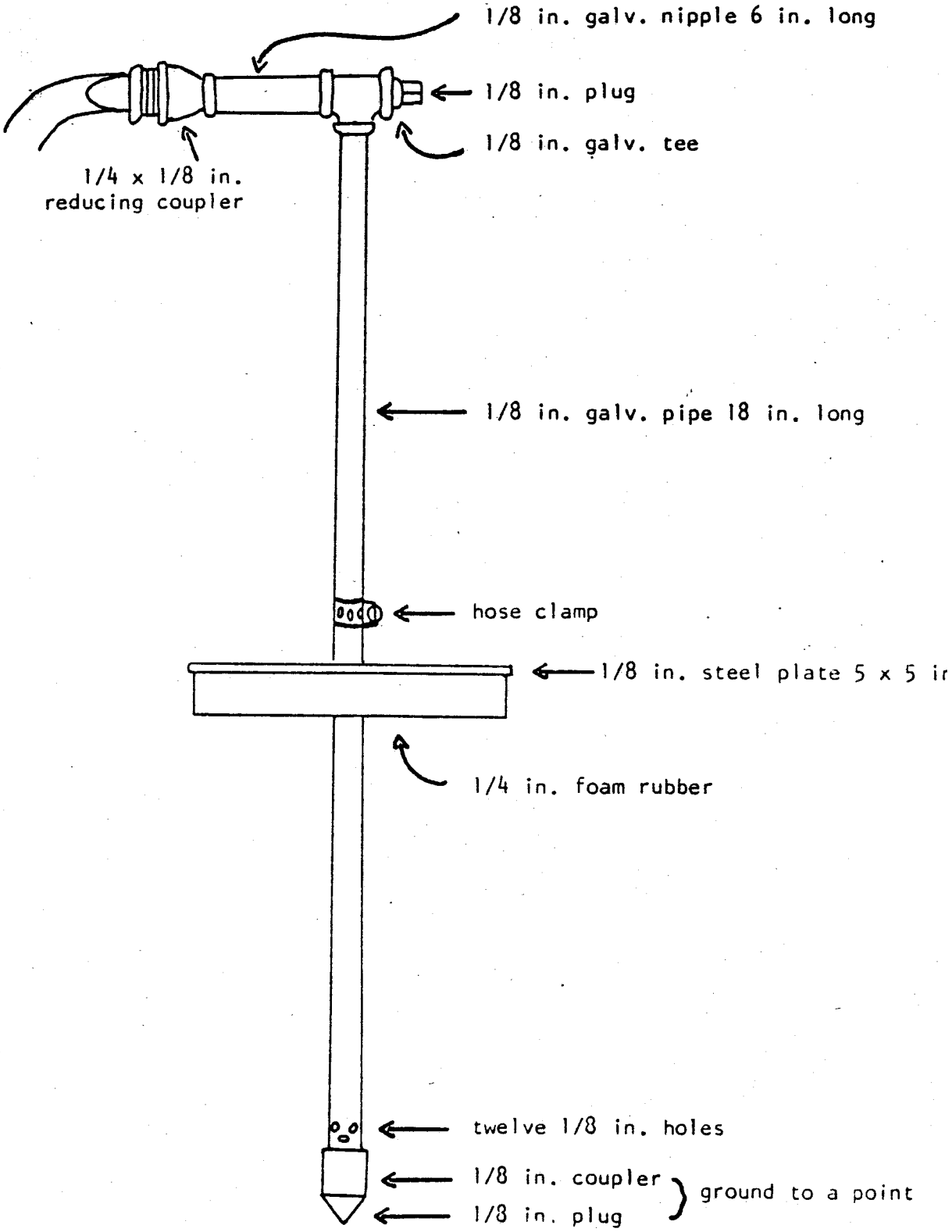


Figure 4. Dimensions of the probe used for collecting intergravel water samples in rainbow trout spawning areas (from Decker-Hess and Graham, 1982).

water. All samples were pumped into 325 ml. B.O.D. bottles. When necessary, the probe was inserted into the gravel by a SCUBA diver, while a second person operated the pump and performed the D.O. test from the boat. The modified Winkler method was used to analyze samples in the field (EPA, 1974).

D.O. in intergravel water tends to decrease with depth in the substrate (Chambers, et al., 1955; Meekin, 1967; Sheridan, 1962 and Decker-Hess, 1982). Intergravel D.O. samples were collected at the gravel surface and at 6 in. into the gravel. The intent of the sampling was to determine the depths at which dissolved oxygen became insufficient in the egg depositional area.

Rainbow Trout Egg Development

In addition to duplicating the 1983 methods, egg incubation stations were established in 1984 to determine the length of the incubation period and evaluate the hatching success in two spawning areas: West Rosebud full-pool inlet and the confluence area of Huckleberry and West Rosebud creeks. Establishment of egg incubation stations was prompted by sufficient D.O. concentrations found in the Huckleberry-West Rosebud spawning area in 1983 when the area was under 25 ft. of lake water during the incubation period. Lake elevation records show rising lake water floods the Huckleberry-West Rosebud confluence during the spawning period every year. In 1983, 20.5% of the observed spawning fish constructed redds in the area, but it was not known if egg development continued once the area was flooded. It was felt that results from the egg incubation stations established in 1984 would indicate the relative hatching success of past and future years.

Rainbow trout were captured on June 20, 1984 and artificially spawned. The fertilized eggs were placed in nylon screen bags. Each screen bag contained 30 eggs, mixed with gravel, and were buried 2-4 in. in the substrate. Three egg incubation stations were established in both the West Rosebud full-pool inlet, to be used as a control, and in the Huckleberry-West Rosebud confluence area. At each station there were two screen bags of 60 eggs. At two of the stations, the screens were sealed shut so hatching fry couldn't escape. Screen bags at the third station were not sealed, so fry could escape when they reached the button-up stage of development. Fry traps were placed over the open screen bags to capture emerging fry. The fry traps were constructed from 25-gallon barrels with a screened lid on one end and open on the opposite end. A screen fyke inside the barrel funneled the emerging fry into the compartment formed by the screen lid and funnel (Figure 5). The open end of the barrel was placed over the unsealed screen bag. Intergravel D.O. samples were obtained at each station once a week prior to planting the egg bags. Once the eggs were planted in the substrate, weekly D.O. testing continued throughout the egg development and button-up period to note any change in the D.O. associated with rising lake elevations. Water temperature was recorded at the substrate surface when intergravel D.O. samples were obtained. Water temperatures were also recorded in all tributaries in 1983 and 1984, approximately every third day to monitor the effect of temperature on rainbow selection of and movement into tributaries to spawn.

Zookplankton Development

Vertical zooplankton samples were collected on a weekly basis to follow the development sequence of the larger species: D. shoshoni, a copepod, and

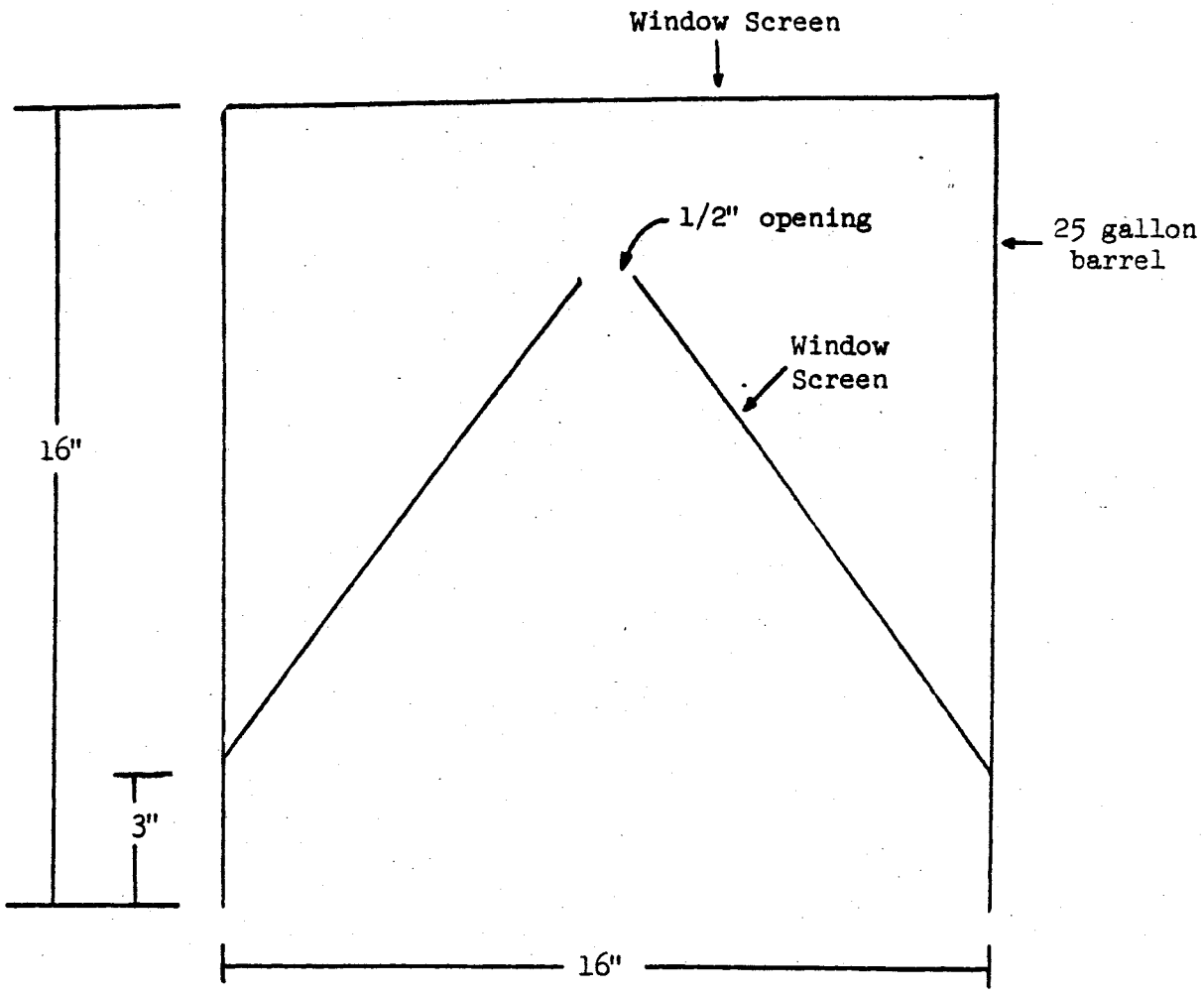


Figure 5. Dimensions of deep water fry emergence traps.

H. gibberum, a cladoceran. Quantitative sampling was not done for two reasons: 1) the early developmental stages of copepods (termed nauplii of which there are several stages) and juvenile cladocerans are extremely difficult to identify and 2) the relative abundance and specific timing of maximum and minimum populations vary considerably within a species in the same lake from one year to the next (Pennak, 1978). Because of this, quantitative differences in zooplankton development between 1983 and 1984 could not necessarily be related to lake level changes. The adult forms of the two species were relatively easy to identify, due to their large size - 2.0-2.6 mm. When adult forms first appeared in the samples, the end of the development cycle was calculated based on the date of the sample.

Rainbow Trout Diets

All stomach samples were obtained from fish captured in gill nets. During the 1983 and 1984 study period, a gill net was set overnight in the area of the West Rosebud low-pool inlet (Figure 6). Nets were set in late June, during the spawning period, in mid-July after the recreation and full-pool elevations were achieved and in late August, one month after the fish returned to their lentic environment.

In 1983, stomach contents were enumerated and percent occurrence of the dominant food item in each stomach was calculated. The food item with the highest percent occurrence was considered to be the dominant food item. A more accurate method of analyzing stomach contents, the index of relative importance (IRI), was used in 1984. The IRI is the arithmetic mean (expressed as percentages) of the number, frequency of occurrence and volume of food item in the diet (George and Hadley, 1979; Leathe and Graham, 1982). The IRI ranges from zero to 100 with the latter value indicating exclusive use of a food item. Stomach contents from 1983 were reevaluated, using the IRI in order to compare the 1983 and 1984 results. Aquatic insects found in stomachs were keyed to their taxanomic order. Zooplankton developmental stages were identified as copepod nauplii or juvenile cladocerans. The two larger zooplankton species were identified, depending on their digestive state, and grouped together as adult zooplankton.

RESULTS

Rainbow Spawning

The annual study periods began on June 15, 1983 and June 8, 1984 when the lake elevations were 7,639.89 ft. and 7,626.08 ft., respectively. During the rainbow trout spawning period, lake elevations increased 23.61 ft. in 1983 and 36.05 ft. in 1984 before reaching the recreation pool level of 7,663.5 ft. In 1983, the recreation pool occurred on July 3, 7 days before the July 10 refill date. The recreation pool in 1984 occurred on June 29, 2 days prior to the July 1 refill date. There was a 4-day difference in attaining the recreation pool elevation between 1983 and 1984.

Spawning rainbow trout were confronted with the same low-pool water conditions during both spawning periods. Before achieving the recreational pool elevation, all tributaries were carving their channels through the exposed lake bed before entering the lake. Fish were observed spawning in some of these creek channels while the lake was filling. Major spawning areas

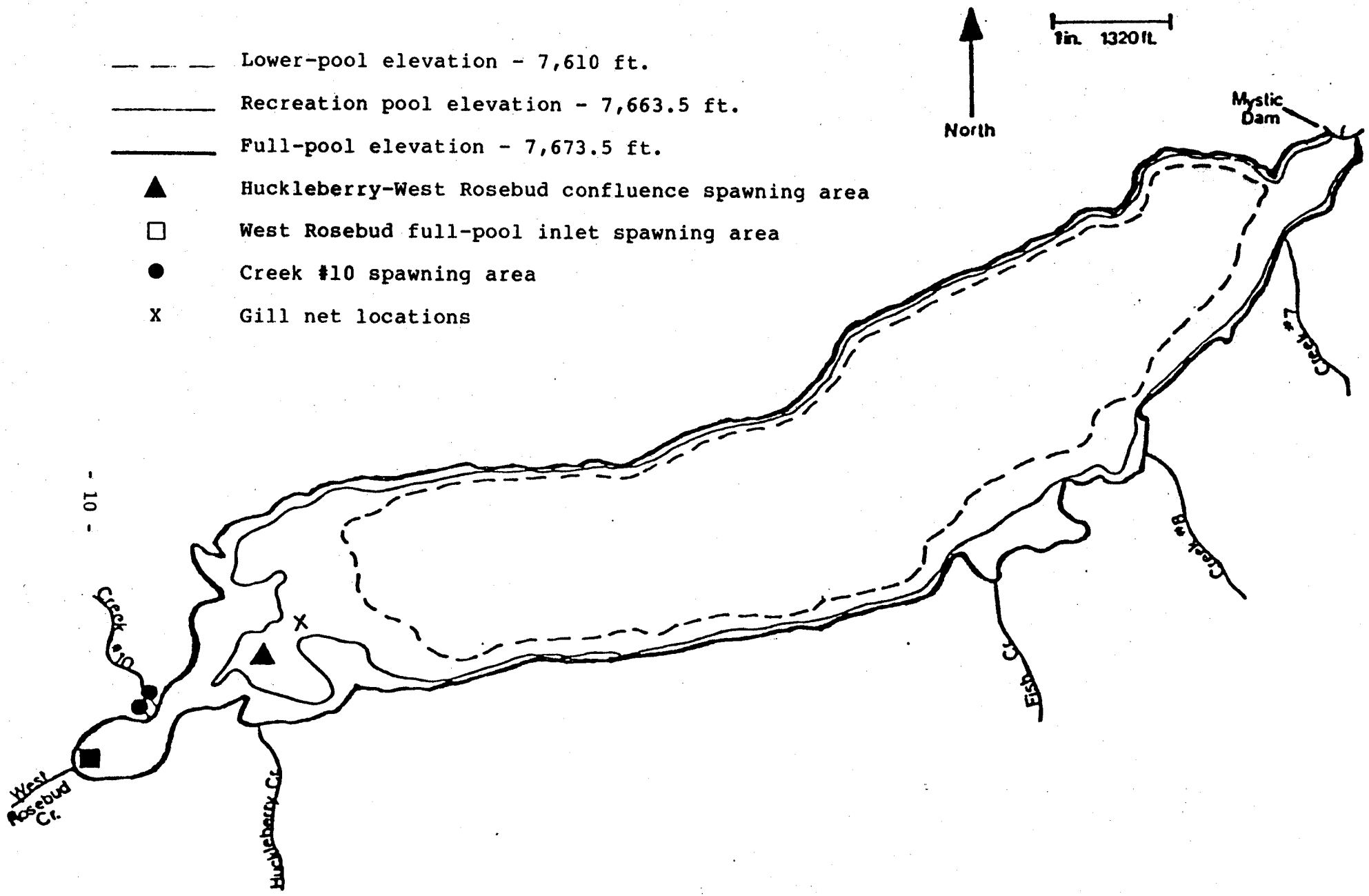


Figure 6. Location of spawning areas and gill net sets in Mystic Lake in 1983 and 1984.

were at the west end of the lake in the West Rosebud full-pool inlet, in Creek #10 above the full-pool elevation, and in the low-pool confluence area of Huckleberry and West Rosebud creeks (Figure 6).

Spawning activity in Creeks #7, #8 and Fish Creek was negligible during both the 1983-1984 spawning period. At low-pool elevations between 7,639.89 ft. and 7,648.22 ft. (June 15-June 23, 1983) and 7,626.08 ft. and 7,648.34 ft. (June 8-June 25, 1984), the inlets of these tributaries tumbled down steep, exposed shoal areas, making fish movement into them difficult. After June 23, 1983 and June 25, 1984, access improved and suitable spawning substrate existed in the exposed lake bed, but no fish were observed in these low-pool creek channels. Spawning habitat above the full-pool elevation was scarce. Cold water temperatures may have discouraged spawniing activity in these tributaries (Table 1). The optimum water temperature needed to induce rainbow to spawn lies between 50 and 55° F (Piper et al. 1982). The average monthly water temperature in all tributaries was similar in 1983 and 1984. In both study periods, Creeks #7, #8 and Fish Creek averaged approximately 10 and 5° F cooler than West Rosebud and Creek #10, respectively, due to their glacial origin and shaded north exposure. The influence of Island Lake and the eastern exposure of West Rosebud Creek account for the optimum spawning water temperatures found there.

Table 1. Average monthly water temperatures in Mystic Lake tributaries, 1983 and 1984.

Location	Avg. Water Temp. (° F) 1983		Avg. Water Temp. (° F) 1984	
	June	July	June	July
Creek #7	39	41	40	41
Creek #8	39	42	40	41
Fish Creek	40	42	40	42
Huckleberry Cr.	44	49	43	47
Creek #10	44	47	43	45
W. Rosebud Cr.	50	52	49	53

Percent use of spawning areas and the duration of the spawning period was similar in 1983 and 1984. Weekly counts of individual and paired fish observed are summarized in Tables 2 and 3. Fifty-five percent of the total observed spawners utilized West Rosebud full-pool inlet in 1983 compared to 61% in 1984. Twenty-four and 21% of the spawners were observed in Creek #10 in 1983 and 1984, respectively. Spawning fish were observed in early to mid-

Table 2. Visual observation of fish during weekly fish counts in three rainbow trout spawning areas at Mystic Lake during 1983.

Date	Paired Spawners	No. of Fish	No. of Unpaired Fish	Total No. of Fish
		West Rosebud Creek Full-pool Inlet		
6/15	66	132	53	185
6/24	62	124	56	180
7/1	71	142	48	190
7/7	59	118	42	160
7/14*	-	-	-	-
7/21	7	14	21	35
Total	265	530	220	750
		Creek #10		
6/16**	-	-	-	-
6/24	35	70	45	115
7/1	41	82	39	~~105~~ 121
7/7	11	22	24	46
7/14	4	8	19	27
7/21***	___	___	21	21
Total	91	182	148	~~320~~ 330
		Huckleberry-West Rosebud Creek Confluence		
6/16	13	26	21	47
6/23	61	122	16	~~150~~ 138
6/24	31	62	13	75
6/28***	-	-	-	-
Total	105	210	50	~~280~~ 260

corrections by FJP

*Turbid water made it difficult to accurately count fish.

**Fish were not counted until June 24.

***Spawning area inundated with lake water.

Table 3. Visual observation of fish during weekly fish counts in three rainbow trout spawning areas at Mystic Lake during 1984.

Date	Paired Spawners	No. of Fish	No. of Unpaired Fish	Total No. of Fish
		West Rosebud Full-pool Inlet		
	66	132	50	182
6/15	51	102	42	144
6/22	44	88	59	147
7/1	46	92	35	127
7/9	18	36	28	64
7/21	0	0	38	38
Total	225	450	252	702
		Creek #10		
6/8	6	12	12	24
6/15	16	32	19	51
6/22	21	42	30	72
7/1	13	26	20	46
7/9	7	14	18	32
7/21	1	2	14	16
Total	64	128	113	241
		Huckleberry-West Rosebud Creek Confluence		
6/8	15	30	28	58
6/15	26	52	30	82
6/22	20	40	28	68
6/26*	-	-	-	-
Total	61	122	86	208

*Spawning area inundated with lake water.

June during both spawning periods in the West Rosebud full-pool inlet and in Creek #10. Fish numbers declined in early July when spring runoff had increased in 1983 and 1984.

The confluence of Huckleberry and West Rosebud creeks was approximately 15 ft. below the recreation pool elevation in 1983 and 1984 prior to initial flooding. In 1983, 20.5% of the spawners used this area to construct redds and 18% spawned there in 1984. Spawning fish were not observed after June 26 when the area was flooded with an additional 2.78 ft. of water in 1983 (total water depth 4.03 ft.) and 1.87 ft. in 1984 (total water depth 3.12 ft.). Initial flooding of this area occurred on June 25 in both years regardless of the July 1 or July 10 recreational pool deadline.

A total of 217 fish were sampled by gill nets and hook and line during 1983 and 1984; 96.3% were rainbow trout and 3.7% appeared to be rainbow-cutthroat hybrids. The average size was 9.9 in. in 1983 and 10.5 in. in 1984. The combined average was 10.2 in. There were 1.7 females to every male.

The age structure of all fish sampled in both years is summarized in Table 4. Sample size ranged from 6.0 inches (Age II) to 14.2 inches (Age IV+). Gill nets were inefficient at capturing smaller Age I fish. Age II fish ranged from 6.0 to 8.5 inches, averaging 7.0 inches. Size range of Age III fish was from 7.9 to 10.1 inches and averaged 9.4 inches. Age IV and IV+ fish lengths ranged from 9.0-11.3 inches and 10.6-13.6 inches, averaging 10.3 and 12.0 inches, respectively.

Table 4. Rainbow trout age structure in Mystic Lake.

Age Class	Size Ranges (inches)	Avg. Length (inches)	Avg. Weight (lb.)
I	-	-	-
II	6.0- 8.5	7.0	.14
III	7.9-10.1	9.4	.23
IV	9.0-11.3	10.3	.35
IV+	10.6-13.6	12.2	.50

Spawning Area Microhabitat

Attainment of the recreational pool elevation on July 3, 1983 and June 28, 1984 did not affect the water level in the West Rosebud full-pool inlet (Table 5). This area was flooded with 1.8 ft. of rising lake water on July 9, 1983 and July 3, 1984 with 1 foot of water. Maximum elevation occurred on July 21 in both years.

Table 5. Water depths (in ft.) in the West Rosebud full-pool inlet spawning area during the spawning and incubation period in 1983 and 1984.

Date	West Rosebud Full-pool Inlet 1983	1984
6/8	-	0.8
6/15	1.0	1.0
6/24	1.0	1.0
6/25	1.0	1.0
6/26	1.0	1.0
6/28	1.0	1.0
7/1	1.0	1.0
7/2	1.0	1.0
7/3	1.0	2.0
7/4	1.0	2.0
7/9	2.8	2.5
7.13	2.5	-
7/21	3.5	2.7
8/3	3.0	2.5
8/27	2.5	2.5
8/29	2.0	-

Spawning sites in the Huckleberry-West Rosebud confluence were flooded with rising lake water before the recreation pool was achieved in 1983 and 1984. Initial flooding in this area occurred on June 25 in both years, raising the water depth .81 ft. in 1983 and .22 ft. in 1984. However, the rate of flooding differed in both study years between June 25 and attainment of the recreational pool elevation (Table 6). Once this area began flooding, it took 9 days to reach the recreation pool in 1983, averaging 1.62 ft./day, and 5 days in 1984, averaging 3.14 ft./day. Maximum water depth over this area was 25.6 ft. on July 10, 1983 and 24.78 feet on July 23, 1984.

Results of intergravel D.O. samples are summarized in Tables 7 and 8. Rainbow trout eggs require a mimimum of 5 mg/l or greater of D.O. to develop. Without sufficient oxygen, eggs develop abnormalities, and their hatching may be delayed or premature (Piper et al. 1982). Intergravel D.O. samples collected at the three stations in West Rosebud full-pool inlet and in the confluence area of Huckleberry and West Rosebud creeks satisfied the 5 mg/l minimum required for healthy egg development at the substrate surface and 6 in. beneath the substrate. The D.O. at 10 in. into the substrate in both spawning areas was insufficient for egg development.

In the West Rosebud full-pool inlet, dissolved oxygen samples from the substrate surface ranged from 8.2 to 8.8 mg/l on June 13, 1984 (water temperature 50° F) and later decreased to 7.6 mg/l (59° F) by August 8. The D.O. 6 in. beneath the substrate initially ranged from 6.4-7.6 mg/l and decreased to 4.0-4.6 mg/l.

Table 6. Daily water depth (in feet) in the Huckleberry-West Rosebud Confluence spawning area between June 25 and attainment of the recreational pool elevation in 1983 and 1984.

Date	Water Depth in the Huckleberry-West Rosebud Confluence 1983	1984
6/24	1.25*	1.25*
6/25	2.06	1.47
6/26	4.03	3.12
6/27	5.98	6.32
6/28	7.99	10.27
6/29	9.60	13.82**
6/30	10.87	16.83
7/1	12.12	20.15
7/2	13.2	22.85
7/3	15.43**	23.84
7/4	16.48	23.96
7/5	17.29	24.04
7/6	18.15	24.11
7/7	20.03	24.17
7/8	20.57	24.48
7/9	24.63	24.40
7/10	25.60	24.18

*Water depth prior to flooding.

**Date recreation pool achieved.

Table 7. Intergravel dissolved oxygen concentrations (mg/l) at three stations in the West Rosebud full-pool inlet, 1984.

Date	Water Temperature (° F) at Substrate Surface	Probe Depth (in.)	Dissolved Oxygen Concentration (mg/l) Upper Station	Middle Station	Lower Station
6/8	49	-	-	-	-
6/13	50	0	8.2	8.6	8.8
		6	7.6	6.4	7.2
		8	6.0	6.0	6.4
6/21	49	0	8.2	9.2	8.8
		6	7.4	7.4	7.0
		8	5.2	6.6	6.0
6/28	50	0	7.4	8.0	7.8
		6	7.0	7.0	6.6
		8	5.6	6.0	5.8
7/9	43	0	8.2	7.6	7.8
		6	7.4	7.0	6.8
		8	6.8	6.0	6.0
7/20	58	0	7.6	8.6	7.6
		6	6.2	7.0	6.0
		8	-	-	-
7/24	58	0	9.2	8.8	8.8
		6	5.6	5.6	6.0
		8	4.2	4.8	5.6
8/3	58	0	7.6	7.6	8.0
		6	5.6	5.0	5.6
		8	3.8	3.8	3.6
8/8	59	0	7.6	7.6	7.6
		6	4.6	4.0	4.1
		8	3.6	3.9	3.7
8/13	60	0	6.6	6.6	6.6
		6	2.6	3.0	2.6
		8	2.0	1.4	2.2

Table 8. Intergravel dissolved oxygen concentrations (mg/l) at three stations in the Huckleberry-West Rosebud confluence area, 1984.

Date	Water Temperature (°F) at Substrate Surface	Probe Depth (in.)	Dissolved Oxygen Concentration (mg/l) Upper Station	Middle Station	Lower Station
6/8	47	-	-	-	-
6/13	50	0	8.7	8.6	8.7
		6	8.8	8.0	8.2
		8	6.8	7.0	6.9
6/21	47	0	8.8	8.8	8.8
		6	8.6	7.6	8.2
		8	6.9	7.2	7.0
6/8	-	0	-	-	-
		6	-	-	-
		8	-	-	-
7/9	40	0	7.0	7.0	7.0
		6	6.6	6.7	6.4
		8	6.0	6.1	6.0
7/20	54	0	6.6	7.2	7.2
		6	6.2	6.2	6.1
		8	6.0	6.0	5.9
7/24	49	0	7.2	7.0	7.1
		6	6.0	6.3	5.9
		8	5.2	5.1	4.6
8/3	56	0	7.2	7.2	7.2
		6	6.6	6.4	4.8
		8	5.1	5.0	4.5
8/8	56	0	7.2	7.2	7.2
		6	5.1	5.0	5.0
		8	4.2	4.2	4.0
8/13	56	0	7.2	7.2	8.8
		6	3.6	4.5	2.4
		8	3.2	4.2	2.0

During the same sampling period, the D.O. at the substrate surface in the Huckleberry-West Rosebud confluence was 8.7 mg/l, decreasing to 7.2 mg/l when the area was under 24.5 ft. of water. Samples collected 6 in. into the substrate ranged from 8.0-8.8 mg/l initially, and decreased to 5.0 mg/l. Water temperature at the substrate surface during the sampling period increased from 40 to 56° F.

Rainbow Trout Egg Development

Hatching of rainbow trout eggs placed in screen bags occurred in both the West Rosebud full-pool inlet and the confluence of Huckleberry and West Rosebud creeks. Fry traps, however, were inefficient at capturing emerging fry in both spawning areas.

Rainbow trout eggs hatch in 48 days when water temperature is 45° F, 31 days at 50° and 24 days at 55° F (Piper, et al., 1982). The incubation period in the West Rosebud full-pool inlet was approximately 34 days. Water temperature fluctuated from 47 to 58° F, averaging 52° F. Egg bags were pulled from each of the three stations in both spawning areas on July 24. Sac fry were present only in the West Rosebud full-pool inlet. Sixty percent of the eggs from the combined lower and middle stations in the West Rosebud full-pool inlet either hatched or were well developed in the "eyed stage" (hatching was imminent). Twenty percent of the eggs hatched in the upper station. Low hatching success at the upper station may have resulted from a disturbance at this site in late June (one of the egg bags and the stake marking its location was found along the shoreline).

After hatching, sac fry remain in the substrate until their yolk sac is absorbed or "buttoned up" before emerging. Four fry out of 180 eggs were observed in traps 15 days after hatching in the West Rosebud full-pool inlet. Sixty-six dead eggs remained and 110 eggs were missing, indicating these eggs hatched and the fry eluded the traps. Traps were not placed in Creek #10 because redds were located above the full-pool inlet and were not affected by rising lake water. However, the incubation period was delayed slightly, due to the cooler water found there. Fry were observed at the inlet of Creek #10 in late August.

Rainbow eggs in the confluence area of Huckleberry and West Rosebud creeks required a longer incubation period. On July 24, only one egg bag was pulled from each station. There was 100% egg mortality at the lower station. Twenty percent of the eggs from the middle and upper stations were at the eyed stage. The remaining egg bags were pulled 10 days later, and 23% of the combined eggs in the middle and upper stations hatched. There was 100% mortality at the lower station. The incubation period was approximately 44 days, 10 days longer than in the West Rosebud full-pool inlet. Water temperature fluctuated from 47 to 54° F, averaging 49° F. Only 1 fry out of 120 eggs was captured in the fry traps. There were 79 dead eggs at both middle and upper stations and 41 eggs were missing.

Zooplankton Development

Timing of the large zooplankton development in Mystic Lake differed in 1983 and 1984. Copepod nauplii and juvenile cladocerans were observed in 1983 from late June to mid-July. By mid-July, adult forms of D. gibberum appeared

in vertical plankton tows. Nauplii and juveniles were not present in late July samples.

In 1984, D. shoshoni and H. gibberum were first observed in late June approximately 2 weeks earlier than in 1983. Early developmental stages of both copepods and cladocerans were also present. In mid-July, the adult forms of both species predominated the sample.

Rainbow Trout Diets

A total of 137 stomach samples were examined, 90 in 1983 and 47 in 1984. Their contents are summarized in Appendix A tables 1-6.

Aquatic and semi-aquatic insects were the preferred food item in June of both years when fish were in tributary streams selecting spawning sites. Diptera larvae were the dominant food item in 1983 and 1984 (Figures 7 and 8). Other food groups in order of importance in 1983 were Trichoptera larvae, Coleoptera adults, Hymenoptera adults, Plecoptera nymphs, copepod nauplii and juvenile cladocerans, Diptera pupae and Ephemeraptera nymphs. Food groups in order of importance in 1984 were Hymenoptera adults, Coleoptera adults, Diptera pupae, Ephemeraptera numphs, Trichoptera nymphs and Diptera adults.

In mid-July, Diptera larvae and pupae were the dominant food item. Copepod nauplii and juvenile cladocerans along with adult forms were observed in 1983. In 1984, only adult zooplankton were present in mid-July. By late August when rainbow were distributed throughout the lake, adult zooplankton was the dominant food item.

DISCUSSION AND CONCLUSIONS

Three major rainbow trout spawning areas were located at the west end of Mystic Lake: in the West Rosebud full-pool inlet, in Creek #10 above the full-pool elevation and in the low-pool confluence area of Huckleberry and West Rosebud creeks. Trout movement into these spawning areas was not affected by the refill of Mystic Lake in 1983. Spawning rainbow were confronted with equal low-pool water conditions and subsequent rising water levels as the lake approached the recreational pool elevation in 1983 and 1984. Use of all three spawning areas was similar in both years. Attainment of the recreation pool did not affect water levels in the West Rosebud full-pool inlet and in Creek #10 spawning areas. Access into these areas was adequate in both years. The Huckleberry-West Rosebud confluence area was inundated with lake water before the recreational pool was attained in 1983 and 1984. Despite flooding in this area, 23% of the rainbow trout eggs in the egg incubation stations hatched. Observed spawners imprinting on this spawning area implies that rainbow trout eggs deposited there in the past have developed and hatched.

At present, the rainbow population in Mystic Lake is abundant and self-sustaining, indicating past operation of the Mystic Power Plant has not threatened the fishery. A reservoir regulation study by MPC (based on 50 years of record) found the proposed July 10 refill deadline would have affected the lake level on July 1 in 19 years out of the 50 years of study (randomly distributed), and there would have been no effect on the lake level on July 1 in 31 of the 50 years of study (pers. comm. Frank Pickett, MPC,

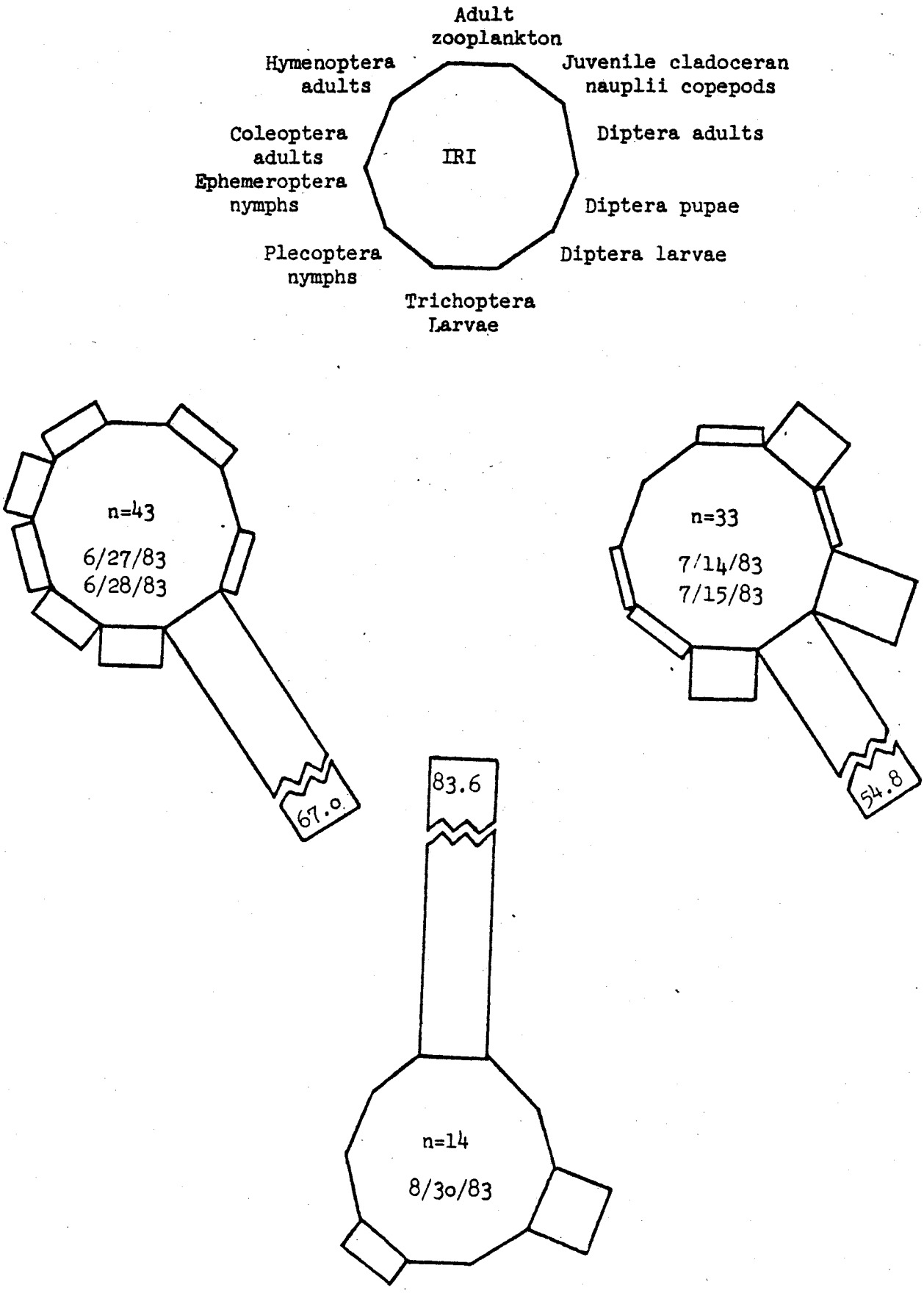


Figure 7. Index of relative importance (IRI) of food items found in rainbow trout stomachs in Mystic Lake in 1983.

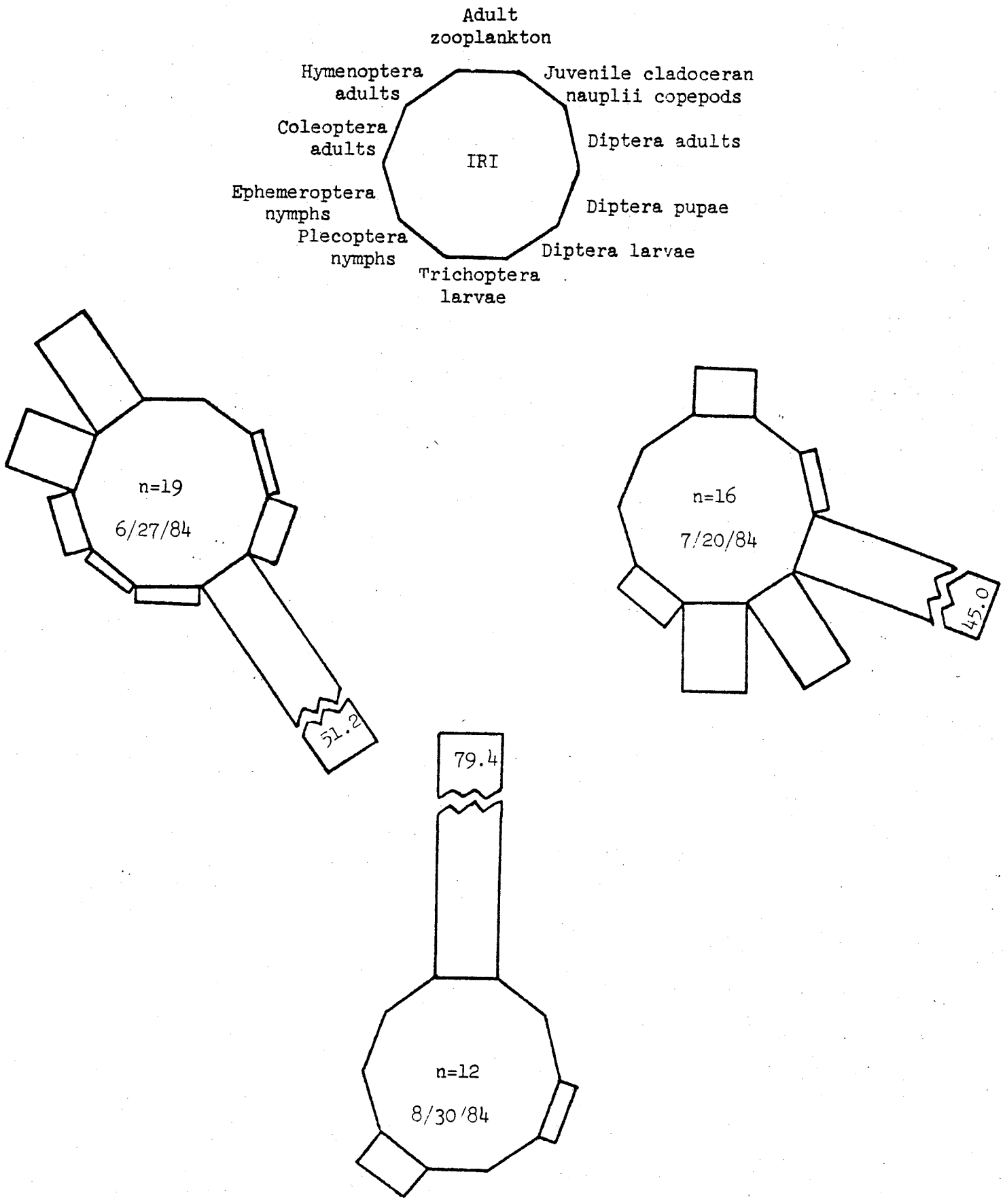


Figure 8. Index of relative importance (IRI) of food items found in rainbow trout stomachs in Mystic Lake in 1984.

1983). The average refill date would have occurred on July 6 during the affected years. Refill would have been delayed the maximum 10 days to July 10 in four out of the 50 years of study. The MPC reservoir regulation study and the fisheries data presented in this report indicates the extension of MPC's FERC license from July 1 to July 10 would not have a significant impact on the rainbow trout fishery in Mystic Lake.

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Appendix A

Rainbow Trout Diet Information

Table 1. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 43 rainbow trout stomachs collected on June 27 and 28, 1983.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Diptera (pupae)	14	(1.4)	.1	(1.2)	3	(5.9)	2.8
Diptera (larvae)	789	(81.1)	5.1	(59.0)	31	(61.0)	67.0
Trichoptera (larvae)	66	(6.8)	.6	(7.0)	5	(9.8)	7.8
Plecoptera (nymphs)	29	(3.0)	.2	(.23)	5	(9.8)	4.3
Ephemereptera (nymphs)	10	(1.0)	.1	(1.2)	3	(5.9)	2.7
Copepod nauplii and juvenile cladocerans	52	(5.3)	>.1	(>1.2)	2	(3.8)	3.4
Hymenoptera (adults)	6	(.62)	.1	(11.5)	1	(1.9)	4.6
Coleoptera (adults)	7	(.72)	1.5	(17.2)	1	(1.9)	6.54
Total	937		8.7		51		
Insect parts*			1.5		38		
Debris*			2.0		5		

*Not included in total.

Table 2. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 33 rainbow trout stomachs collected on July 14 and 15, 1983.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Diptera (adults)	2	(.2)	>.1	(1.8)	1	(1.9)	1.3
Dipters (pupae)	69	(8.4)	.4	(7.4)	17	(32.7)	16.2
Diptera (larvae)	466	(57.0)	3.5	(65.0)	22	(42.3)	54.8
Trichoptera (larvae)	79	(9.6)	.8	(14.8)	3	(5.8)	10.1
Plecoptera (nymphs)	8	(.9)	.1	(1.8)	3	(5.8)	2.8
Ephemeroptera (nymphs)	22	(2.7)	.2	(3.7)	1	(1.9)	2.8
Copepad nauplii and juvenile cladoceran	170	(20.8)	.2	(3.7)	3	(5.8)	10.1
Adult zooplankton	3	(.4)	>.1	(1.8)	2	(3.8)	2.0
Total	819		5.4		52		
Insect parts*			4.0		19		
Debris*			2.0		4		

*Not included in total.

Table 3. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 14 rainbow trout stomachs collected on August 30, 1983.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Zooplankton (adult)	1,566	(98.3)	1.0	(83.3)	9	(69.2)	83.6
Diptera (pupae)	20	(1.3)	.1	(8.3)	3	(23.1)	10.9
Plecoptera (adult)	7	(.40)	.1	(8.3)	1	(7.7)	5.5
Total	1,593		1.2		13		
Insect parts*			>.1		2		
Debris*			.1		1		

*Not included in total.

Table 4. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 19 rainbow trout stomachs collected on June 27, 1984.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Diptera (adults)	2	(.2)	>.1	(>.73)	1	(2.2)	1.04
Diptera (pupae)	15	(1.8)	.10	(.73)	7	(16.0)	6.2
Diptera (larvae)	676	(82.0)	4.50	(33.1)	17	(39.0)	51.2
Trichoptera (larvae)	3	(.4)	>.1	(>.73)	3	(7.0)	2.71
Plecoptera (nymphs)	2	(.2)	>.1	(>.73)	2	(5.0)	2.0
Epheneroptera (nymphs)	12	(1.4)	.20	(1.5)	5	(11.4)	4.8
Hymenoptera (adults)	63	(7.6)	5.50	(40.4)	4	(9.0)	19.0
Coleoptera (adults)	55	(6.6)	3.0	(22.1)	5	(11.4)	13.6
Total	888		13.6		44		
Insect parts			5.0		14		
Debris			1.5		11		
					25		

Table 5. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 16 rainbow trout stomachs collected on July 20, 1984.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Diptera (adults)	1	(.4)	.10	(4.7)	1	(3.3)	2.8
Diptera (pupae)	131	(54.1)	1.0	(47.6)	10	(33.3)	45.0
Diptera (larvae)	47	(19.4)	.25	(11.8)	9	(30.0)	20.4
Trichoptera (larvae)	34	(14.0)	.40	(19.0)	6	(30.0)	17.6
Plecoptera (nymphs)	2	(.8)	.20	(9.5)	2	(6.6)	5.6
Zooplankton (adult)	27	(11.1)	.20	(9.5)	2	(6.6)	9.0
Total	242		2.1		30		
Insect parts*			5.5		14		
Debris*			.20		7		

*Not included in total.

Table 6. Composition by number, volume, frequency of occurrence and calculated index of relative importance (IRI) for major food items in 12 rainbow trout stomachs collected on August 27, 1984.

Food Item	No.	(%)	Vol. (ml)	(%)	Freq. of Occur.	(%)	IRI
Zooplankton (adult)	3,462	(99.8)	2	(65.0)	11	(73.3)	79.4
Diptera (pupae)	1	(.02)	>.1	(3.0)	1	(6.6)	3.2
Plecoptera (adult)	3	(.09)	.5	(16.0)	1	(6.6)	7.6
Total	3,466		3.1		15		
Insect parts*			.1		2		

*Not included in total.

[4]

4.0 HISTORICAL AND ARCHEOLOGICAL RESOURCES

The proposed amendment submitted by the Applicant will not affect historical or archeological resources in the area.

5.0 RECREATION RESOURCES

5.1 Recreation Facilities

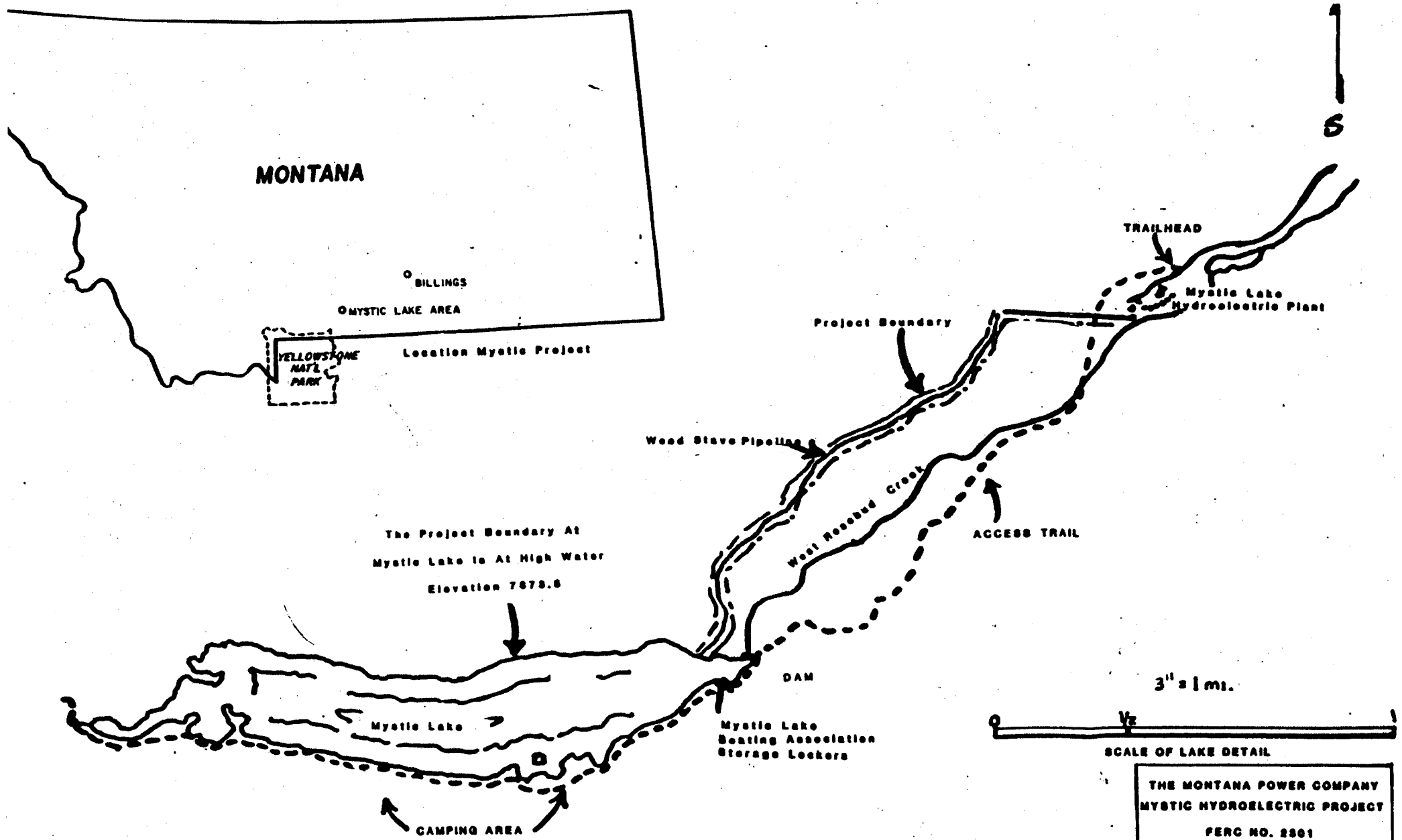
Access to Mystic lake is via the West Rosebud Trail, a three mile long foot trail from the powerhouse to the dam on nonwilderness National Forest land (Figure 5-1). Trailhead facilities including restrooms, garbage facilities, information and trail register are provided. The Forest Service maintains the trail and the recreation facilities.

There is no public recreation facilities at the lake. "No trace" camping is encouraged and concentrated on the south shore. A Forest Service Wilderness Guard periodically patrols the area (LeClair 1982).

The Forest Service issued a special use permit to the Mystic Lake Boating Association to keep motor boat storage lockers adjacent the Project boundary on the southeast shore. Approximately ten boats and lockers are stored at the site. A copy of the permit is included as Attachment 5-I.

5.2 Historic Recreation Use

The Custer National Forest conducted a recreation use survey on the West Rosebud Trail from 1978-1982. The survey instrument was a trailhead electronic eye counter with two actual counts to determine accuracy. Results of the survey are on Table 5-1. The Forest Service data indicates total visitation in the range of 3,400-4,600 per year. Between 41-48 persons per day were estimated during the month of July for those years (Alt 1983).



THE MONTANA POWER COMPANY
MYSTIC HYDROELECTRIC PROJECT
FERC NO. 2301

RECREATION MAP

Table 5-1
West Rosebud Trail Use
1978-1982

Year	Study Period	Total Visitation	Visitors Per Day for July
1978	June 1 - Aug. 31	3,431	41
1979	June 15 - Sept. 30	3,846	41
1980	May 1 - Sept. 30	4,574	41
1981	June 1 - Aug. 31	3,883	-
1982	June 1 - Sept. 31	4,000 (Estimate)	-

The results of the actual counts show 5.1 percent error frequency.

Average Duration of Stay:	Day Use	1980 - 5.5 hours 1981 - 4.9 hours
	Overnight	1980 - 5.1 RVD's 1981 - 4.0 RVD's
Average Group Size:		1980 - 3.5 persons 1981 - 4.2 persons

Source: USDA Custer National Forest (1982)

5.3 Recreation Use During Test Period

A recreation use study was completed at the Project (The Montana Power Company, 1983) for the time period from July 1 through July 10 in 1983 as was a second study for the same period in 1984 (Highland Technical Services 1984). In 1983, the Applicant was granted a one-year variance to delay the fill date from July 1 to July 10. In 1984, the July 1 fill date was reinstated. The comparative results of these two studies are included as Attachment 5-II. A brief summary of study results follows:

An average of 35.4 persons per day visited the Mystic Lake study area during the study period. It is assumed the discrepancy between the Forest Service data and the Applicant's data for average persons per day in July is due to the Applicant's study period being in early July when fewer people visit the site because of inclement weather, while the Forest Service survey covered the entire month.

The studies show that the majority of Mystic Lake use is day use. Overnight use is generally concentrated on weekends or holidays. The main purpose for visitation to the site is either "catching fish" or "enjoying with family or friends." The primary activities engaged in at Mystic are fishing, hiking and camping.

The trail to Mystic is a primary access route to the Absarokee-Beartooth Wilderness and Granite Peak, the highest point in Montana.

Almost 40 percent of the respondents in 1984 indicated they visit Mystic in order to access those sites.

Most respondents, 93 percent in 1984 and 72 percent in 1983, rated their visit to Mystic as "good" or better. Weather and fishing success are the two factors that primarily influence the quality of recreation experiences. The responses that were less than "good" were generally indicative of poor weather or poor fishing success.

5.4 Impact Assessment

Delaying the recreation level fill date from July 1 to July 10 will result in minor and short-term positive and negative impacts to Mystic Lake recreational use.

The results of the reservoir regulation analysis for the 50 years on record from 1930-1980 were noted previously. The findings indicate that the delay in attainment date from July 1 to July 10 would not affect the lake level in 64 percent of all years. During the affected years, the average number of days to reach elevation 7663.5 would be five days or fill by July 6.

In the 36 percent of all years expected to be affected, the mean elevation difference would be 6.3 feet. The range of elevation difference would be between .1-foot and 13 feet.

The majority of the shoreline is comprised of moderate to steep slope, roughly 38 percent of the shore has less than five percent gradient or gentle slope.

The exposed shoreline would result in an adverse aesthetic impact by exposing mudflats. On the other hand, the lower water level would increase access to the water body where the shore is too steep for access when the water level is high. Additionally, survey respondents frequently reported they had more success fishing when the water level was down which would be a beneficial impact to the recreation experience even if only perceived as such (MPC 1983).

The delay of the date of attainment will not significantly impact the rainbow trout fishery at the Project (Schollenberger 1984).

It is expected with increased access to the water and perceived improved fishing success, the adverse aesthetic impact will have minimal effect on the quality of the recreation experience at Mystic.

ATTACHMENT 5-I

SPECIAL USE PERMIT

Current Permit

United States Department of Agriculture
Forest Service

a. Record no. (1-2)	b. Region (3-4)	c. Forest (5-6)
70	01	08
d. District (7-8)	e. User number (9-12)	f. Kind of use (13-15)
02	5062	111
g. State (16-17)	h. County (18-20)	i. Cord no. (21)
30	095	1

SPECIAL USE PERMIT
Act of October 21, 1976

This permit is revocable and nontransferable
(Ref. FSM 2710)

P.L. 94-579

Permission is hereby granted to MYSTIC LAKE BOATING ASSOCIATION

of 1311 Meadow Circle, Laurel, MT 59044
hereinafter called the permittee, to use subject to the conditions set out below, the following described lands or improvements:

An area of land approximately 23 feet long and 10 feet wide in unsurveyed NW¼ Section 9, Township 7 South, Range 16 East, PMM, Stillwater County, Montana, more particularly described as the south shore at mouth of Mystic Lake as shown on attached map by D. Harris, 4/25/62, and hereto made a part of this permit.

This permit covers .1 acres and/or _____ miles and is issued for the purpose of:

Maintain a wooden structure containing 10 boat motor storage lockers (and chaining small boats to the structure for boat security.).

1. Construction ... is complete. ... This use shall be actually exercised at least 30 days each year, unless otherwise authorized in writing. 1981 fees paid.

2. In consideration for this use, the permittee shall pay to the Forest Service, U.S. Department of Agriculture, the sum of Twenty-five and no/100 Dollars ($ 25.00) for the period from January 1, 1982, to December 31, 1982, and thereafter annually on January 1, Twenty-five and no/100 Dollars ($ 25.00): *Provided, however,* Charges for this use may be made or readjusted whenever necessary to place the charges on a basis commensurate with the value of use authorized by this permit.

3. This permit is accepted subject to the conditions set forth herein, and to conditions 18 to 21 attached hereto and made a part of this permit.

	NAME OF PERMITTEE	SIGNATURE OF AUTHORIZED OFFICER / TITLE	DATE
PERMITTEE	Mystic Lake Boating Assoc.	Howard E. Brown	11-19-81
	NAME AND SIGNATURE	**TITLE**	**DATE**
ISSUING OFFICER	JAMES F. MANN	Forest Supervisor	NOV 30 1981

(CONTINUED ON REVERSE)

2700-4 (7/71)

4. Development plans; layout plans; construction, reconstruction, or alteration of improvements; or extension of layout or construction plans for this area must be approved in advance and in writing by the forest supervisor. Trees or shrubbery on the permitted area may be removed or destroyed only after the forest officer in charge has approved, and has marked or otherwise designated that which may be removed or destroyed. Timber cut or destroyed will be paid for by the permittee as follows: Merchantable timber at appraised value; young-growth timber below merchantable size at current damage appraisal value; *provided* that the Forest Service reserves the right to dispose of the merchantable timber to others than the permittee at no stumpage cost to the permittee. Trees, shrubs, and other plants may be planted in such manner and in such places about the premises as may be approved by the forest officer in charge.

5. The permittee shall maintain the improvements and premises to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the forest officer in charge.

6. This permit is subject to all valid claims.

7. The permittee, in exercising the privileges granted by this permit, shall comply with the regulations of the Department of Agriculture and all Federal, State, county, and municipal laws, ordinances, or regulations which are applicable to the area or operations covered by this permit.

8. The permittee shall take all reasonable precautions to prevent and suppress forest fires. No material shall be disposed of by burning in open fires during the closed season established by law or regulation without a written permit from the forest officer in charge or his authorized agent.

9. The permittee shall exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this permit, and shall pay the United States for any damage resulting from negligence or from the violation of the terms of this permit or of any law or regulation applicable to the National Forests by the permittee, or by any agents or employees of the permittee acting within the scope of their agency or employment.

10. The permittee shall fully repair all damage, other than ordinary wear and tear, to national forest roads and trails caused by the permittee in the exercise of the privilege granted by this permit.

11. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit that may arise herefrom unless it is made with a corporation for its general benefit.

12. Upon abandonment, termination, revocation, or cancellation of this permit, the permittee shall remove within a reasonable time all structures and improvements except those owned by the United States, and shall restore the site, unless otherwise agreed upon in writing or in this permit. If the permittee fails to remove all such structures or improvements within a reasonable period, they shall become the property of the United States, but that will not relieve the permittee of liability for the cost of their removal and restoration of the site.

13. This permit is not transferable. If the permittee through voluntary sale or transfer, or through enforcement of contract, foreclosure, tax sale, or other valid legal proceeding shall cease to be the owner of the physical improvements other than those owned by the United States situated on the land described in this permit and is unable to furnish adequate proof of ability to redeem or otherwise reestablish title to said improvements, this permit shall be subject to cancellation. But if the person to whom title to said improvements shall have been transferred in either manner provided is qualified as a permittee and is willing that his future occupancy of the premises shall be subject to such new conditions and stipulations as existing or prospective circumstances may warrant, his continued occupancy of the premises may be authorized by permit to him if, in the opinion of the issuing officer or his successor, issuance of a permit is desirable and in the public interest.

14. In case of change of address, the permittee shall immediately notify the forest supervisor.

15. The temporary use and occupancy of the premises and improvements herein described may be sublet by the permittee to third parties only with the prior written approval of the forest supervisor but the permittee shall continue to be responsible for compliance with all conditions of this permit by persons to whom such premises may be sublet.

16. This permit may be terminated upon breach of any of the conditions herein or at the discretion of the ~~Regional Forester, the Chief Forest Service~~ Authorized Officer.

17. In the event of any conflict between any of the preceding printed clauses or any provisions thereof and any of the following clauses or any provisions thereof, the following clauses will control

GPO 914-673

18. The permittee shall indemnify the United States against any liability for e to life or property arising from the occupancy or use of National Forest lands r this permit, provided this shall not be construed to indemnify the United States gainst its own negligence.

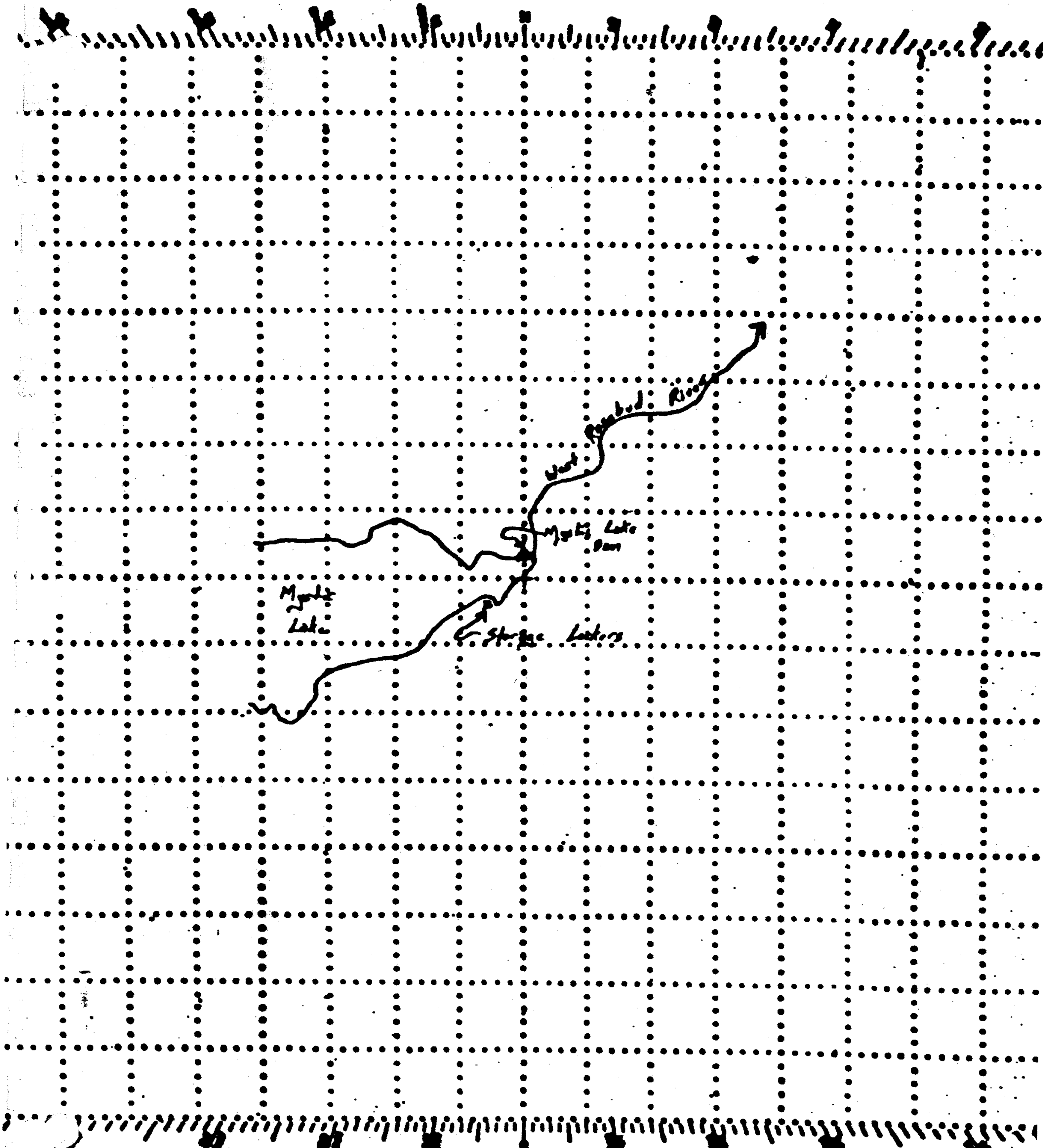
19. A late payment charge in addition to the regular fees shall be made for ailure to meet the fee payment due date or any of the dates specified for submission of statements required for fee calculation. The late payment charge shall be $15.00, or an amount calculated by applying the current rate prescribed by Treasury Fiscal equirements Manual Bulletins to the overdue amount for each 30-day period, or fraction hereof, that the payment is overdue, whichever is greater. If the due date falls on a nonworkday, the late payment charge will not apply until the next workday.

20. Unless sooner terminated or revoked by the Authorized Officer, in accordance with the provisions of the permit, this permit shall expire and become void on December 31, 1991, but a new permit to occupy and use the same National Forest land may be granted provided the permittee will comply with the then-existing laws and regulations governing the occupancy and use of National Forest lands and shall have notified the Regional Forester not less than six (6) months prior to said date that such new permit is desired.

21. This permit supersedes and cancels a permit for the same use dated June 20, 1962, issued by Craig W. Silvernale, Acting Forest Supervisor.

... Lake Ranking Association — FIELD MAP SHEET — Unsurveyed T. 15 — R. 16 E — Sec. 9

1- -62 — Unit Custer - Stillwater — Mag. Dec. ______ Area ______



Field work by ______ Date 4-25-62 Plotted by R. Harrison

Remarks ... EDW-9-118 9-9-57

June 18, 1962 Craig W. Siebenaler

ATTACHMENT 5-II

RECREATION USE STUDY

MYSTIC LAKE HYDROELECTRIC PROJECT

FERC PROJECT NO. 2301

1983-1984 RECREATION USE STUDY

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This summarizes recreation use studies conducted at Mystic Lake during the summers of 1983 and 1984. The Montana Power Company (the Company) operates the Mystic Hydroelectric Project (the Project). The studies evaluated the potential impact the delay of fill would have on recreation at Mystic Lake. The results of the studies are analyzed and compared in this report.

In 1983, FERC granted the Company a one-year variance in its license to delay the recreation fill date. In 1984, the fill date of July 1 was met. Table 1 shows the water level elevations for both years.

1.1 Study Area

The study area is shown on Figure 1. It includes Mystic Lake and the area immediately surrounding it. The lake is located in the Beartooth mountain range of the Custer National Forest in Stillwater County, southcentral Montana. The Project boundary at Mystic Lake is the high water mark (elevation 7673.5). Beyond that, most of the land in the area is managed by the United States Department of Agriculture, Custer National Forest. The border of the Absarokee-Beartooth Wilderness lies approximately 200 feet from the project boundary on the south side of the lake and adjacent the project on the north side.

MYSTIC LAKE STUDY AREA

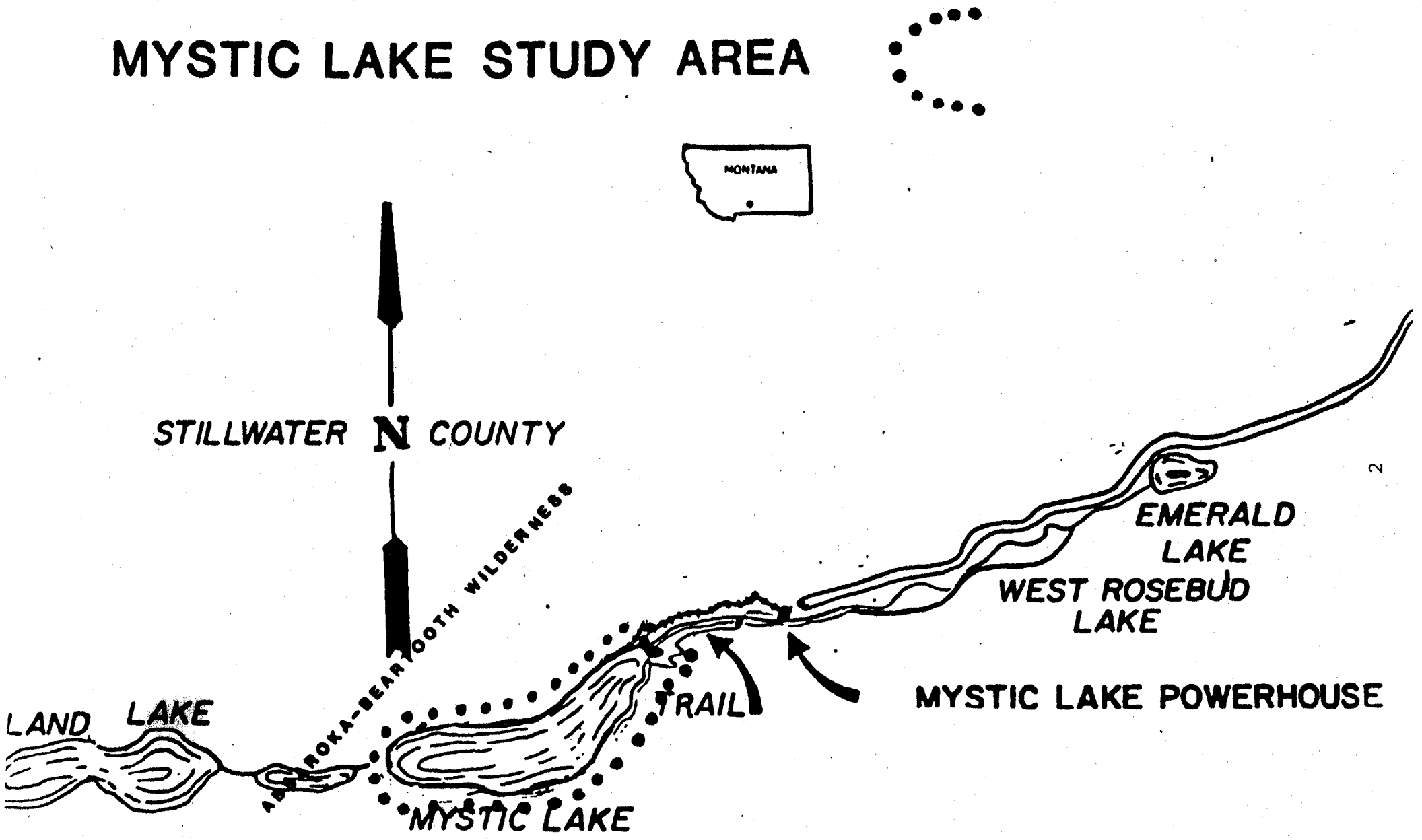


FIGURE 1

Access to the lake is primarily from the east via a steep three-mile hiking trail on nonwilderness Forest Service land. The trail is one of the major access routes to the Absarokee-Beartooth Wilderness and to Granite Peak, the often-climbed, highest mountain in Montana.

Recreation development at the lake is limited to directional signs and a boat equipment storage facility on the southeast shore owned by the Mystic Lake Boating Association.

"No trace" camping is concentrated on the south side of the lake and while the site receives significant use, there is in fact little visible impact on the natural setting from recreation use.

Recreation in the area is managed by the Beartooth Ranger District of the Custer National Forest. A Forest Service Wilderness Guard periodically visits the study area.

1.2 Population of Interest

The population of interest included all individuals visiting the study area for recreational purposes from July 1 to July 10, 1983 and 1984.

2.0 METHODOLOGY

On-site interviews were conducted to complete the study. A copy of the interview forms are included in Appendix A. In 1983, the survey was administered by The Montana Power Company. In 1984, the interviews were conducted by Highland Technical Services, a consulting firm contracted by The Montana Power Company. The 1983 questionnaire was reviewed by the Custer National Forest and the Montana Department of Fish, Wildlife and Parks. Modifications proposed by these two agencies were incorporated into the 1984 survey.

Interviews were conducted as groups of visitors were leaving the study area. Each group was approached, informed of the purpose of the study and a member interviewed on a voluntary basis. Group members under sixteen were avoided. Eighty-three interviews were conducted in 1983 and 113 in 1984. An estimated ten parties were not interviewed each year, usually due to odd departure times. Interviews required three to five minutes to complete.

3.0 RESULTS

3.1 Visitation to the Mystic Lake Area

A total of 639 individuals in 196 groups were observed leaving the study area during the study periods (285 in 83 groups in 1983, 354 in 113 groups in 1984). The average size was 3.8 persons in 1983

and 3.1 in 1984. The total use was increased to 708 visitors or an average of 35.4 persons per day to accommodate the estimated ten unobserved groups each year. Table 2 shows the number of parties and the average group size by date. The highest visitation occurred on weekends. The Fourth of July holiday received high use in both years.

3.2 Type of Use

Just over 50 percent of all groups interviewed in 1983 stayed overnight. In 1984, only 35 percent of the groups spent one or more nights. Overnight use occurred primarily on weekends. Because visitors were interviewed as they left the area, low overnight use was usually recorded on Fridays and Saturdays. Table 3 shows overnight and day use per day. Respondents' length of stay ranged from less than one hour to one week.

3.3 Previous Experience in the Study Area

Fifty-four percent of total visitors interviewed in 1983 and 53 percent in 1984 had previously visited the study area. Overnight visitors had much more experience in the area than day users. Table 4 summarizes respondents previous experience at Mystic. The high rate of repeat visitation suggests a fairly high level of satisfaction with the recreation opportunities in the study area.

3.4 Purpose of Visits and Primary Activities Engaged In

The main purpose for visiting the study area was asked of each respondent as well as the primary recreation activities engaged in to determine if expectations were being realized when visiting Mystic. It appears they were as in 1983, "catching fish" was the main purpose for visiting Mystic Lake. The second primary reason selected was "enjoying with family or friends." These two purposes were reversed in 1984. In that same year "relaxing" replaced "getting away from it all" as the third most frequent reason for visitation. Table 5 contains the main purpose of user visits to Mystic Lake by use type.

In both 1983 and 1984, fishing, hiking and camping were the primary activities engaged in by respondents (Table 6). Of the primary activities listed on the questionnaire, "nature study" was the least selected activity in both years.

3.5 Experience Rating

The majority of visitors to the study area rated the quality of their visit as good, very good or excellent (Table 7). Ninety-two percent of 1984 visitors fell in that range with only two percent of visitors rating their experience as poor. In 1983, poor ratings made up 18 percent of the responses while the positive experience ratings made up 72 percent.

Ratings were comparable for overnight and day users in 1984. In 1983, day users enjoyed their visits slightly more than overnight visitors; 78 percent of day users rated their experience as good or better while 68 percent of overnight visitors rated their experience as such.

Of the 16 total poor ratings in 1983, 13 were expressed the first four days of the study when the lake level had not reached elevation 7663.5, the recreation level (Table 1). In that same period, however, of the 42 total respondents, 60 percent or 25 respondents rated their experience as good or better.

Further analysis of the management comments of respondents with poor experience ratings and weather conditions in 1983 indicates that though the lower lake level did reduce the aesthetic appeal of the area for some respondents, weather conditions (Appendix B) seemed to affect the quality of the recreation experience more than anything else. Other comments which are assumed to elicit a poor rating included Forest Service regulations, lack of or location of facilities and fishing success.

Figure 2 shows the correlation between poor ratings and weather conditions. On days the weather was inclement, responses were markedly lower than on nice days.

The 1984 survey included an additional question which queried the reasons for choosing specific management experience ratings (Table 8). Sixty-nine percent of these reasons focused upon

fishing success, weather or scenery. The only poor ratings other than an individual whose dog had gotten caught on a fishing hook were reported on July 7 or 8, the only poor weather days in the 1984 study.

3.6 Socio/demographic Characteristics

The majority of visitors to Mystic are Montana residents. Only 12 percent of the visitors interviewed in 1983 were from out-of-state, dropping to eight percent in 1984 (Table 9). Of Montana residents, well over half were from Yellowstone County (primarily Billings). Stillwater, Custer, Carbon and Dawson counties, and other neighboring counties were the next most common residences. Table 10 shows in which Montana counties visitors reside.

When family groups or organizational groups were approached, usually a parent or group leader assumed the interviewee role. There was a tendency for respondents to be male and more experienced in the area. The male dominance exists both in overnight and day use, although more so among overnight groups. Table 11 shows the sex of respondents by use type.

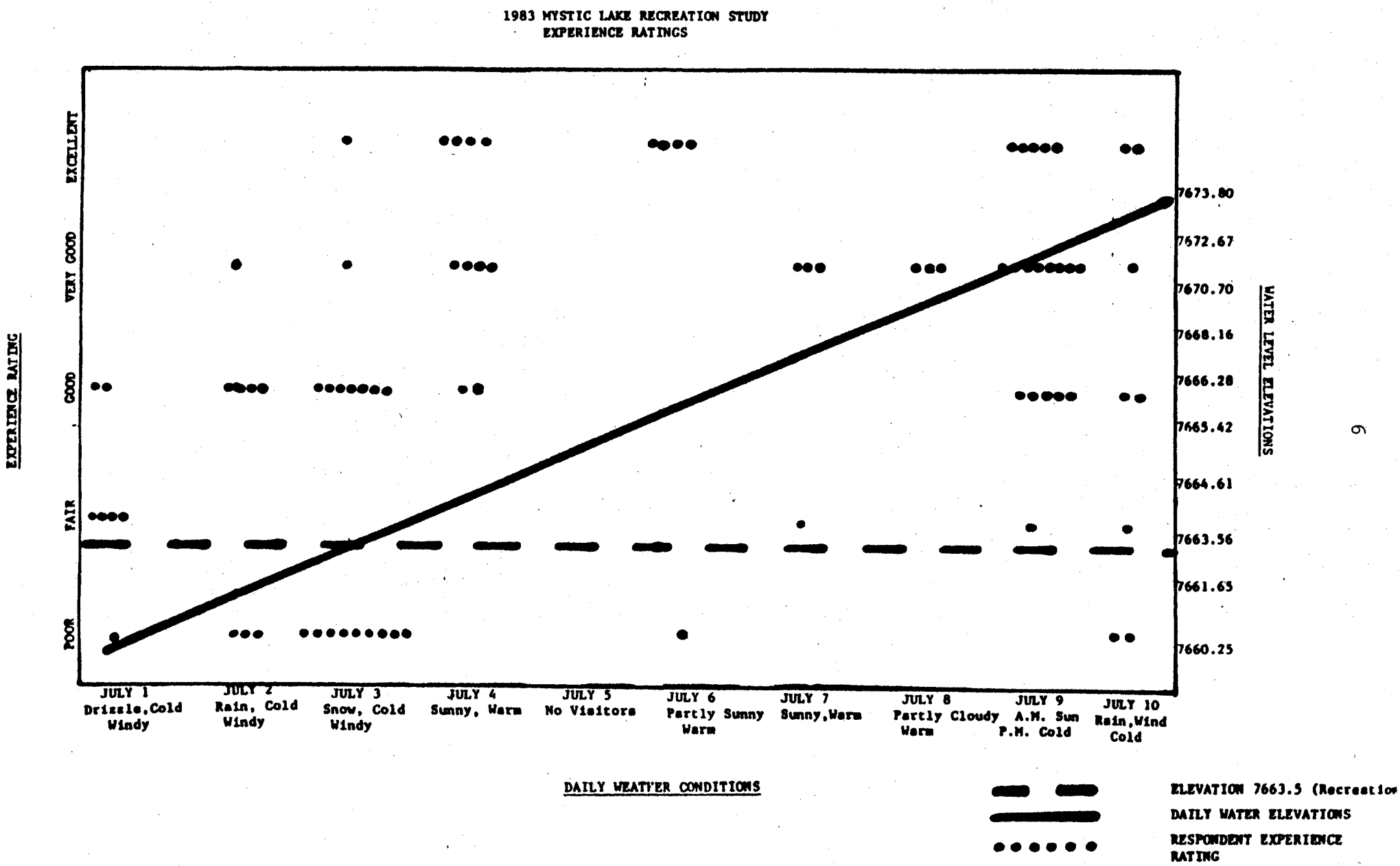

1983 MYSTIC LAKE RECREATION STUDY
EXPERIENCE RATINGS
EXPERIENCE RATING
EXCELLENT
VERY GOOD
GOOD
FAIR
POOR
WATER LEVEL ELEVATIONS
7673.80
7672.67
7670.70
7668.16
7666.28
7665.42
7664.61
7663.56
7661.65
7660.25
JULY 1 Drizzle,Cold Windy
JULY 2 Rain, Cold Windy
JULY 3 Snow, Cold Windy
JULY 4 Sunny, Warm
JULY 5 No Visitors
JULY 6 Partly Sunny Warm
JULY 7 Sunny,Warm
JULY 8 Partly Cloudy Warm
JULY 9 A.M. Sun P.M. Cold
JULY 10 Rain,Wind Cold
DAILY WEATHER CONDITIONS
ELEVATION 7663.5 (Recreation
DAILY WATER ELEVATIONS
RESPONDENT EXPERIENCE RATING

FIGURE 2

In 1983, the average ages of day users and overnight users were found to be 32 and 28, respectively. In 1984 the averages were 32 and 31.

Only one respondent indicated an education level below the ninth grade. Overall, day users had a slightly higher education level than overnight visitors. Table 12 shows the education level of respondents by use type.

3.7 Management Comments

In 1983 about half the visitors to the lake volunteered comments on the management of the area. This number rose to about 90 percent in 1984. Of the 51 management comments in 1983, 11 (22 percent) referred to the water level and four referred to the quality of the fishing. In 1984, 23 of the 101 management comments (23 percent) related to the water level or its effect on the fisheries. Table 13 includes respondents comments for both years.

4.0 CONCLUSIONS

The delay of fill appears to have some impact on the recreational experience of Mystic Lake visitors. However, recreationists were almost equally divided on the question of whether the impact was positive or negative. In 1983, five visitors expressed their dissatisfaction for the low water levels while six either preferred the water low or were indifferent about water levels. In 1984,

11 recreationists expressed a preference for high water, while 11 others preferred low water or were indifferent about water levels.

An analysis of the correlation of low experience ratings to the variables of lake level and weather in 1983 indicates that inclement weather, even when the lake was high, lowered experience levels. Fishing success seems to have a similar, though less dramatic, impact. Because the weather was very poor during the low water period of the study in 1983, it is theorized that the low experience ratings on these days were primarily due to weather.

Fishing is the most frequently engaged in activity at Mystic Lake. Survey respondents generally indicated that fishing was better when the water was lower. This is probably the major reason that lower lake levels do not seem to significantly effect experience ratings. While lower lake level has an adverse impact on aesthetics, it seems to have a positive impact on fishing success. It should be noted, however, that some fishermen, while stating their preference for lower lake levels, qualified this preference with the concern that if these drawdowns detrimentally impact fisheries, then they would be opposed to them.

The 1983 survey included informal discussion of the reason for the survey rather than a standard background statement related to the MPC amendment to FERC and its possible effects upon lake levels during the period of July 1 through July 10. That year, 11 of the 51 management comments concerned lake levels. In 1984 a formal

explanation of the amendment and its possible impacts was read to every person that was surveyed. Management comments related to the lake level, however, were still low, only 23 out of 101, almost equal to the 1983 percentage. This could be attributed to the fact that, though not standard, the interviewer did discuss the project in 1983 or because in 1984 the lake level was high so comments were not made.

A periodic delay in reaching the recreation fill level at Mystic Lake will not have a significant impact upon the recreational experience of visitors. Any negative impacts that occur will, for the most part, be offset by increased fishing success and increased access to the water body where terrain now restricts fishing activities.

TABLE 1

MYSTIC ELEVATIONS

Date	1983	1984
July 1	7660.25	7668.28
July 2	7661.65	7670.98
July 3	7663.56	7671.97
July 4	7664.61	7672.09
July 5	7665.42	7672.17
July 6	7666.28	7672.40
July 7	7668.16	7672.30
July 8	7670.70	7672.61
July 9	7672.67	7672.53
July 10	7673.80	7672.31
July 11	7672.76	7672.12

Source: The Montana Power Company, 1984.

TABLE 2

NUMBER OF INTERVIEWED PARTIES AND
AVERAGE GROUP SIZE BY DATE

1983

Date	No. of Groups Interviewed	Average Group Size
Friday - July 1, 1983	7.0	2.8
Saturday - July 2, 1983	8.0	2.8
Sunday - July 3, 1983	18.0	3.1
Monday - July 4, 1983	10.0	3.8
Tuesday - July 5, 1983	0	0
Wednesday - July 6, 1983	5.0	6.0
Thursday - July 7, 1983	3.0	6.7
Friday - July 8, 1983	4.0	2.5
Saturday - July 9, 1983	20.0	3.4
Sunday - July 10, 1983	8.0	3.0
Total Number of Parties	83.0	Overall Average Group Size 3.8

1984

Date	No. of Groups Interviewed	Average Group Size
Sunday - July 1, 1984	29.0	2.4
Monday - July 2, 1984	10.0	3.0
Tuesday - July 3, 1984	11.0	3.3
Wednesday - July 4, 1984	18.0	3.8
Thursday - July 5, 1984	3.0	5.3
Friday - July 6, 1984	6.0	2.2
Saturday - July 7, 1984	11.0	3.9
Sunday - July 8, 1984	20.0	2.7
Monday - July 9, 1984	4.0	5.5
Tuesday - July 10, 1984	1.0	2.0
Total Number of Parties	113.0	Overall Average Group Size 3.1

TABLE 3

USE TYPE

IN PERCENT OF GROUPS PER DAY

1983

Date	No. of Groups Interviewed	Percent Overnight	Percent Day Use
Friday - July 1, 1983	7.0	57.1	42.9
Saturday - July 2, 1983	8.0	25.0	75.0
Sunday - July 3, 1983	18.0	72.2	27.8
Monday - July 4, 1983	10.0	30.0	70.0
Tuesday - July 5, 1983	0	0	0
Wednesday - July 6, 1983	5.0	20.0	80.0
Thursday - July 7, 1983	3.0	33.3	66.7
Friday - July 8, 1983	4.0	50.0	50.0
Saturday - July 9, 1983	20.0	25.0	75.0
Sunday - July 10, 1983	8.0	100.0	0

1984

Date	No. of Groups Interviewed	Percent Overnight	Percent Day Use
Sunday - July 1, 1984	29.0	52.0	48.0
Monday - July 2, 1984	10.0	10.0	90.0
Tuesday - July 3, 1984	11.0	27.0	73.0
Wednesday - July 4, 1984	18.0	11.0	89.0
Thursday - July 5, 1984	3.0	34.0	66.0
Friday - July 6, 1984	6.0	17.0	83.0
Saturday - July 7, 1984	11.0	9.0	91.0
Sunday - July 8, 1984	20.0	65.0	35.0
Monday - July 9, 1984	4.0	50.0	50.0
Tuesday - July 10, 1984	1.0	100.0	0

TABLE 4

PREVIOUS EXPERIENCE

BY USE TYPE IN PERCENT OF TOTAL GROUPS

1983

Use Type	Had Not Previously Visited Mystic Lake	Had Previously Visited Mystic Lake
Overnight	19.3	28.9
Day Use	26.5	25.3

1984

Use Type	Had Not Previously Visited Mystic Lake	Had Previously Visited Mystic Lake
Overnight	12	23
Day Use	35	30

TABLE 5

RESPONDENTS MAIN PURPOSE(S) OF VISIT(S) BY USE TYPE*

1983

Main Purpose(s)	Overnight	Day Use
Catch Fish	22	22
Relax	6	5
Enjoy With Family or Friends	8	13
Solitude	2	3
Get Away From It All	13	16
Access Wilderness	6	0
Enjoy Scenery	1	1
Get Exercise	0	1

1984

Main Purpose(s)	Overnight	Day Use
Catch Fish	36	37
Relax	22	44
Enjoy with Family or Friends	20	54
Solitude	21	27
Get Away from it All	16	27
Access Wilderness	18	25
Study Lake	0	1
Climbing	1	0
See MPC Facilities	0	1

* These results are not additive as some respondents indicated more than one main purpose.

TABLE 6

PRIMARY ACTIVITIES ENGAGED IN BY RESPONDENT BY USE TYPE

1983

Activity	Overnight	Day Use
Fishing	15	24
Picnicking	0	3
Hiking	13	22
Camping	21	0
Photography	4	1

1984

Activity	Overnight	Day Use
Fishing	31	36
Boating	1	0
Picnicking	0	5
Hiking	15	46
Camping	12	0
Nature Study	2	5
Photography	0	1

* These results are not additive as some users indicated more than one primary activity.

TABLE 7

TRIP EXPERIENCE RATING IN PERCENT BY USE TYPE

1983

Use Type	Excellent	Very Good	Good	Fair	Poor
Day Use %	35	25	18	10	12
Overnight %	11	25	32	7	25

1984

Use Type	Excellent	Very Good	Good	Fair	Poor
Day Use %	44	23	25	4	4
Overnight %	31	38	23	8	0

TABLE 8

REASONS FOR SELECTING EXPERIENCE RATINGS IN 1984

BY RESPONDENT

Reason	Number of Respondents
Poor fishing	14
Fishing good	15
Weather bad	14
Weather good	20
Nice scenery	39
Solitude	7
Clean	7
Good trails	5
Bad trails	2
Clean abundant water	2
Lots of green vegetation	2
Do not like seeing dam	1
Nice flowers	1
Just a nice place	2
Observed wildlife	3
Dog was hooked while fishing	1
Good time	7
Fresh air	2
Natural area	1
Because we're here!	1
High water	1
Flies	1

TABLE 9

MONTANA STATE RESIDENT STATUS BY DATE

IN PERCENT OF GROUPS PER DAY

1983

Date	Montana Resident	Nonresident
Friday - July 1, 1983	85.7	14.3
Saturday - July 2, 1983	100.0	0
Sunday - July 3, 1983	100.0	0
Monday - July 4, 1983	100.0	0
Tuesday - July 5, 1983		
Wednesday - July 6, 1983	80.0	20.0
Thursday - July 7, 1983	66.7	33.3
Friday - July 8, 1983	80.0	20.0
Saturday - July 9, 1983	85.7	14.3
Sunday - July 10, 1983	75.0	25.0

1984

Date	Montana Resident	Nonresident
Sunday - July 1, 1984	93.0	7.0
Monday - July 2, 1984	70.0	30.0
Tuesday - July 3, 1984	100.0	0
Wednesday - July 4, 1984	94.0	6.0
Thursday - July 5, 1984	66.0	34.0
Friday - July 6, 1984	83.0	17.0
Saturday - July 7, 1984	100.0	0
Sunday - July 8, 1984	100.0	0
Monday - July 9, 1984	75.0	25.0
Tuesday - July 10, 1984	100.0	0

TABLE 10

MONTANA RESIDENTS' COUNTIES

IN PERCENT OF TOTAL GROUPS

1983

County	Percent
Beaverhead	1.4
Carbon	4.1
Custer	2.7
Dawson	4.1
Fergus	1.4
Flathead	1.4
Gallatin	2.7
Missoula	1.4
Musselshell	1.4
Rosebud	1.4
Silver Bow	1.4
Stillwater	4.1
Yellowstone	72.5

1984

County	Percent
Carbon	1.0
Custer	3.0
Dawson	1.0
Fallon	1.0
Gallatin	1.0
Missoula	1.0
Rosebud	1.0
Sheridan	2.0
Stillwater	6.0
Treasure	1.0
Yellowstone	82.0

TABLE 11

SEX OF RESPONDENTS BY USE TYPE

IN PERCENT

1983

Use Type	Male	Female
Overnight	80.5	19.5
Day Use	66.7	33.3

1984

Use Type	Male	Female
Overnight	85	15
Day Use	79	21

TABLE 12

RESPONDENT EDUCATION LEVEL BY USE TYPE

IN PERCENT

1983

Use Type	Eighth Grade or Less	Grades 9-11	High School Graduate	Some College	College Graduate
Overnight	0	2.6	46.1	20.5	30.8
Day Use	0	2.5	30.0	25.0	42.5

1984

Use Type	Eighth Grade or Less	Grades 9-11	High School Graduate	Some College	College Graduate
Overnight	0	5	35	23	37
Day Use	2	6	32	18	42

TABLE 13

RESPONDENT MANAGEMENT COMMENTS BY NUMBER OF COMMENTS*

1983

Management Comment	Number
Like low water level	4
Like high water level	3
Water level aesthetically better high	2
Fishing poor this year	1
Fishing better this year	3
Lake level makes no difference	2
Well for drinking water needed	1
Trail maintenance needed	2
Area is clean	6
Creek crossing improvement needed	3
Likes trail	4
Wants less development	1
Wants trail to go around lake	1
Likes campsites	1
Appreciates rangers	2
Bad experience with rangers	1
Too much litter	1
Signing improvement needed	2
Likes MPC's minimal impact	1
Pleased with management in general	4
Likes "No Trace" camping idea	1
A women can feel safe	1
Dislikes lower trail location	1
Does not like Forest Service regulations	2
Do not blast near wilderness	1

TABLE 13
(Cont.)

1984

Management Comment	Number
Like high water level better	10
Fishing better when lake is high	1
Like low water level, fishing is better	6
Lake level doesn't matter	5
Don't fill lake so fast	1
Area seems well managed	16
Clean, looks good	22
Improve access to Island Lake	5
Should have outhouse	1
Do not allow boats on lakes	1
Reclaim graveled areas near lake	2
Remove boats and clean area around them	4
Clean up around powerhouse	4
Trail needs improvement	4
Good trails	4
Need trail maps at trailhead	1
Would rather not see dam structure	1
Like the beach area	1
Flies are bad	3
Make boats accessible to the public	
Put electric lines around MPC house underground	1
Need larger fish	1
Should be some interpretation related to the hydro project	1
No more development	1
Keep dogs out	1
"No tract" camping is good	2

* Some respondents made more than one management comment.

180362

LITERATURE CITED

Highland Technical Services. 1984. Mystic Lake Hydro - Project Recreational Use Study. Unpub. rpt. MPC.

Montana Power Company. 1983. Mystic Lake Hydro-Project Recreational Use Study. Unpub. rpt. MPC 14 pp.

APPENDIX A

MYSTIC LAKE RECREATION STUDY VISITOR INTERVIEW FORMS

#_____

MILLTOWN LAKE RECREATION STUDY
VISITOR INTERVIEW FORM

DATE: _____ OBSERVER: _____

TIME: _____

WEATHER: _____

PARTY SIZE: _____

SPECIAL CONSIDERATIONS:

1. Residence: _____ _____
   City State
2. Was this your first visit?
   _____ Yes
   _____ No (Go to 3)
3. Number of previous visits: _____
4. Average duration of previous visit: _____
5. Expected duration of this visit: _____
6. Main purpose of visit(s):

_____	Catching Fish	_____	Solitude
_____	Relax	_____	Get away from it all
_____	Enjoy with family or friends	_____	Other Specify _____
		_____	Access Wilderness

7. Primary activity this visit:

_____	Fishing	_____	Hiking
_____	Boating	_____	Camping
_____	Picnicking	_____	Nature Study

8. Primary activity on previous visits:

_____	Fishing	_____	Hiking
_____	Boating	_____	Camping
_____	Picnicking	_____	Nature Study

9. Experience rating:

_____	Excellent	_____	Fair
_____	Very Good	_____	Poor
_____	Good		

10. Age:
11. Sex:
12. Education:
13. Occupation:
14. Management Comments:

1984
MYSTIC LAKE RECREATION STUDY
VISITOR INTERVIEW FORM

DATE: _____ OBSERVER: _____

TIME: _____

WEATHER: _____

PARTY SIZE: _____

SPECIAL CONSIDERATIONS:

INTRODUCTION

The Montana Power Company owns and operates the dam which forms the impoundment of Mystic Lake. The Company is seeking permission from the Federal Energy Regulatory Commission to delay the fill date for the lake from July 1 to July 10 for the purpose of generating additional power during that period. This could keep water levels lower for one or even ten of the days depending on runoff and rainfall. The purpose of this survey is to measure the impact that this delay of fill may have on your recreational experience at Mystic Lake. The study was carried out last year at this time with the lake at a lower level. Those results will be compared with this year's study when the lake is at full recreational capacity.

1. Residence: _____ (City) _____ (State)
2. Was this your first visit?
   _____ Yes
   _____ No (Go to 3)
3. Number of previous visits: _____
4. Average duration of previous visit: _____
5. Expected duration of this visit: _____
6. Main purpose of visit(s):

_____	Catching Fish	_____	Solitude
_____	Relax	_____	Get away from it all
_____	Enjoy with family or friends	_____	Other Specify _____
		_____	Access Wilderness

7. Primary activity this visit:

_____	Fishing	_____	Hiking
_____	Boating	_____	Camping
_____	Picnicking	_____	Nature Study

8. Primary activity on previous visits:

_____	Fishing	_____	Hiking
_____	Boating	_____	Camping
_____	Picnicking	_____	Nature Study

9. Experience rating:

_____	Excellent	_____	Fair
_____	Very Good	_____	Poor
_____	Good		

10. Age:
11. Sex:
12. Education:
13. Occupation:
14. Management Comments:

APPENDIX B

SUMMARY OF GENERAL WEATHER CONDITIONS DURING STUDY PERIOD

SUMMARY OF GENERAL WEATHER CONDITIONS DURING STUDY PERIOD

1983

Friday - July 1, 1983	Drizzle, cold, windy
Saturday - July 2, 1983	Rain, cold, windy
Sunday - July 3, 1983	Snow, cold, windy
Monday - July 4, 1983	Sunny, warm, light breeze
Tuesday - July 5, 1983	
Wednesday - July 6, 1983	Partly sunny with occasional shower
Thursday - July 7, 1983	Sunny, warm, still
Friday - July 8, 1983	Partly cloudy, warm, windy
Saturday - July 9, 1983	Morning sun deteriorating to rain, cold, wind
Sunday, July 10, 1983	Rain, wind, cold

1984

Sunday - July 1, 1984	Partly cloudy
Monday - July 2, 1984	Clear, warm
Tuesday - July 3, 1984	Partly cloudy, warm
Wednesday - July 4, 1984	Clear, warm
Thursday - July 5, 1984	Clear, warm
Friday - July 6, 1984	Cloudy
Saturday - July 7, 1984	Cloudy, cool
Sunday - July 8, 1984	Rain, cool
Monday - July 9, 1984	Clear, warm
Tuesday - July 10, 1984	Clear, warm

[6]

6.0 LAND MANAGEMENT AND AESTHETICS

The proposed amendment submitted by the Applicant will not affect land management.

7.0 LIST OF LITERATURE FOR RECREATION ANALYSIS

Citations

Alt, Tom, Custer National Forest, Wilderness Manager, personal communication with Polly Jones, MPC, June 16, 1983.

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LeClair, Christine, Custer National Forest, Wilderness Ranger, personal communication November 1, 1982, Mary Gail Sullivan, MPC.

Schollenberger, Mark, 1984, Impact on Rainbow Trout Reproduction Associated with Attainment of the Recreational Pool Elevation at Mystic Lake, Montana, Department of Fish, Wildlife and Parks.

The Montana Power Company, 1983 Mystic Lake Reservoir Regulation Study for 1931-1980.

USDA, Custer National Forest, 1982 Trailhead Register data.

7.1 LIST OF LITERATURE FOR FISH, WILDLIFE, AND BOTANICAL ANALYSIS

Citations

McMullin, Steve, Montana Department Fish, Wildlife and Parks. Personal Communication with Frank Pickett, The Montana Power Company, November 20, 1984.

Montana Power Company, 1979, West Rosebud Creek Minimum Flow Study. Unpublished report. 53 pages plus Appendices.

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Schollenberger, Mark, 1984, Impact on Rainbow Trout Reproduction Associated With the Attainment of the Recreational Pool Elevation at Mystic Lake, Montana, Department of Fish, Wildlife and Parks.

United States Geological Survey, 1984, Water Resources Data, Montana, Water Year 1983, Volume 1.