

TWENTY-SIXTH ANNUAL REPORT

YELLOWSTONE RIVER

COMPACT COMMISSION

1977

YELLOWSTONE RIVER COMPACT COMMISSION

421 Federal Building
Helena, Montana

Honorable Ed Herschler
Governor of the State of Wyoming
Cheyenne, Wyoming

Honorable Thomas L. Judge
Governor of the State of Montana
Helena, Montana

Honorable Arthur A. Link
Governor of the State of North Dakota
Bismarck, North Dakota

Sirs:

Pursuant to Article III of the Yellowstone River Compact, the Commission submits the following twenty-sixth annual report of activities for the period ending September 30, 1977.

The Commission held a special meeting at Sheridan, Wyoming on April 18-19, 1977. Mr. George L. Christopoulos, Wyoming State Engineer, Mr. Orrin Ferris, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation, the designated representatives of their respective states, and Mr. Walter R. Scott, the designated Federal representative and chairman, were all present.

Others present were:

William Long, Deputy Wyoming State Engineer,
Cheyenne, Wyoming,
Clem Lord, Interstate Streams Engineer, State
Engineer's Office, Cheyenne, Wyoming,
Paul Kawulok, Wyoming Board of Control, Sheridan,
Wyoming,
Frank J. Trelease, Director, Water Planning
Program, State Engineer's Office, Cheyenne,
Wyoming,
Jack D. Palma, Assistant Attorney General,
State of Wyoming, Cheyenne, Wyoming,
Gary Fritz, Montana Department of Natural Resources
and Conservation, Helena, Montana,
George M. Pike, U. S. Geological Survey,
Helena, Montana,
LaRue A. Baker, U. S. Geological Survey, Compact
Stenographer, Bismarck, North Dakota

This special meeting was called to continue discussions of water-right procedures in Montana and Wyoming and definition of terms in the Compact. A Compact Administration Subcommittee, composed of two representatives each from Montana and Wyoming and the Commission chairman, was formed and given a charge to continue to resolve differences in definition of Compact terms and develop a conceptual design of a model of the Yellowstone River Basin, with special emphasis on the Tongue River at the beginning of the effort.

A special meeting of the Compact Administration Subcommittee was held at Sheridan, Wyoming on July 19, 1977. Those present were:

Walter R. Scott, Chairman, Federal representative and chairman, Yellowstone River Compact Commission,
Gary Fritz, Montana Department of Natural Resources and Conservation, Helena, Montana,
Rick Bondy, Montana Department of Natural Resources and Conservation, Helena, Montana,
Clem Lord, State Engineer's Office, Cheyenne, Wyoming,
Frank J. Trelease, State Engineer's Office, Cheyenne, Wyoming,
David A. Sprynczynatyk, North Dakota State Water Commission, Bismarck, North Dakota

The Commission held the annual meeting at Sheridan, Wyoming on November 9, 1977. Mr. George L. Christopoulos, Wyoming State Engineer, Mr. Orrin Ferris, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation, the designated representatives of their respective states, and Mr. Walter R. Scott, the designated Federal representative and chairman, were all present.

Others present were:

Jack D. Palma, Assistant Attorney General, State of Wyoming, Cheyenne, Wyoming,
Frank J. Trelease, Chief, Water Planning Program, State Engineer's Office, Cheyenne, Wyoming,
Clem Lord, Interstate Streams Engineer, State Engineer's Office, Cheyenne, Wyoming,
Paul Kawulok, Wyoming Board of Control, Sheridan, Wyoming,
William Long, Wyoming State Engineer's Office, Cheyenne, Wyoming,
Ted. J. Doney, Deputy Director/Chief Legal Counsel, Department of Natural Resources and Conservation, Helena, Montana,
Rick Bondy, Department of Natural Resources and Conservation, Helena, Montana,
David A. Sprynczynatyk, Director of Engineering, North Dakota State Water Commission, Bismarck, North Dakota,

Larry Merritt, U. S. Geological Survey, Billings,
Montana (representing George Pike),
William J. Kirven, Attorney, Buffalo, Wyoming,
Gary T. Cheatham, General Manager, Intake Water
Company, Houston, Texas,
John M. Robertson, Vice President, Intake Water
Company, Houston, Texas,
Jack L. Adams, Manager, Intake Water Company,
Houston, Texas,
Boyd L. Henderson, Attorney, Intake Water Company,
Houston, Texas,
Betty Dean, U. S. Geological Survey, Compact
Stenographer, Helena, Montana

There were no incidents during the year that required administration of the water in accordance with the provisions of the Compact. At the present level of water-resources development, the Commission feels that a program of intensive water-use regulations is not necessary. However, the attention of the Commission is continuing to focus on the need to define the detailed procedures for implementing Compact provisions previous to the time when development of water within the Yellowstone River Basin requires that these provisions be enforced.

The interest in Yellowstone River water for coal development and peripheral needs has continued to increase and it is evident that, at some yet undetermined time, it will be necessary to divide the waters of the Yellowstone River System as allocated by Article V of the Compact.

The documentation of pre-1950 water rights has been completed in Wyoming. The new 1973 Montana Water Use Act is assisting that state in its documentation, although it is still incomplete.

A problem that continues to be of major long-range concern to the Commission is the lack of proper quantification of all existing water rights. Of particular concern are the water rights of the Indian tribes and the implied federal reserved rights. The Commission believes that studies and action necessary to quantify these rights should be expedited.

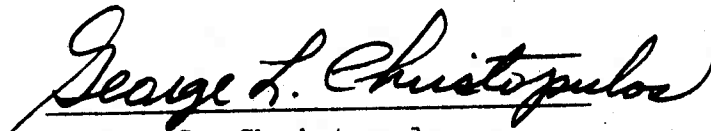
A suit filed by Intake Water Company against the Commission and its members in Federal District Court in Billings, Montana, on June 29, 1973, was discussed in the twenty-second annual report. Since then the Montana Department of Natural Resources and Conservation has brought suit in state court to invalidate any water right that the Intake Water Company purported to hold for Yellowstone River waters. This trial began on November 18, 1975, resulting in a ruling in favor of Intake Water Company. The state has appealed to the Montana Supreme Court. This also resulted in a ruling in favor of Intake Water Company. The suit against the Commission and its members in Federal District Court in Billings, Montana is still stayed as of this time.

Since that time Intake Water Company presented a petition to the Commission requesting permission to divert water out of the Yellowstone River Basin from the Powder River in Wyoming and the Yellowstone River near Intake, Montana. The Commission has asked for resolution of what is meant by "consent" of a signatory state from the legal representatives of each signatory state no later than April 1, 1978, as a necessary part of taking action on Intake Water Company's petition.

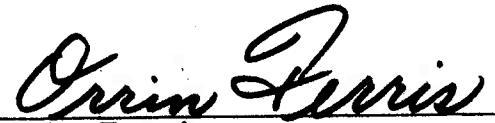
The Commission feels that due to the potential for large-scale use of water associated with coal development, joint allocation and development studies should be carried out in the near future. To this end, special meetings of the Commission and the Compact Administration Subcommittee, conducted as work sessions, will be scheduled to continue to document understandings and to develop procedures for implementation of Article V of the Compact.

The budgets for fiscal years 1977 through 1979 are discussed in the following general report. The amount of funds required for future Commission activities will depend largely on the outcome of water-development plans, inflation, and the degree of water administration required.


Respectfully submitted,



George L. Christopulos
Commissioner for Wyoming



Orrin Ferris
Commissioner for Montana



Walter R. Scott
Federal Representative

GENERAL REPORT

Cost:

The work funded by the Commission, which to date has been primarily concerned with the collection of required hydrologic data, has been financed through cooperative arrangements whereby Montana and Wyoming each bear one-fourth of the cost and the remaining one-half is borne by the United States. The salaries and necessary expenses of the State and Federal representatives, and hydrologic data made available by other agencies, are not evaluated or considered as expenses of the Commission.

The expense of the Commission during Fiscal Year 1977 was \$21,200, in accordance with the budget adopted for the year.

The budgets for Fiscal Years 1978 and 1979 were tentatively adopted subject to the availability of appropriations.

The budgets for the three fiscal years are summarized as follows:

October 1, 1976 to September 30, 1977 (Fiscal Year 1977):

Continuation of existing stream-gaging program \$21,200

October 1, 1977 to September 30, 1978 (Fiscal Year 1978):

Continuation of existing stream-gaging program 23,120

October 1, 1978 to September 30, 1979 (Fiscal Year 1979):

Estimate for continuation of existing stream-gaging program 24,480

Gaging Stations:

Gaging stations at the measuring sites specified in the Compact were continued in operation and satisfactory discharge records collected at each. In addition, a station on Prairie Dog Creek near the Montana-Wyoming State line was operated for Compact administration purposes. Locations of gaging and reservoir stations are shown on a map of the Yellowstone River basin at the end of the report.

During the Water Year ending September 30, 1977, annual streamflow at the designated points of measurement in Montana was well below average in all tributaries of the Yellowstone River as shown in the following table:

| <u>Measurement Point</u> | <u>Percent of Average</u> |
|---|---------------------------|
| Clarks Fork Yellowstone River near Silesia, MT | 52 |
| Bighorn River at Bighorn minus Little Bighorn River near Hardin, MT Adjusted for change in contents in Bighorn Lake | 67 |
| Tongue River at Miles City, MT | 87 |
| Powder River near Locate, MT | 65 |

Details of streamflow for Water Year 1977 and bar graphs showing comparisons with average flows during selected base periods and with the preceding year are given in Appendix B.

Diversions:

There were no incidents during the year that required administration of the water in accordance with the provisions of the Compact. At the present level of water-resources development, the Commission feels that a program of intensive water-use regulations is not necessary.

Storage:

In reservoirs completed after January 1, 1950

Bighorn Lake, a U. S. Bureau of Reclamation project on the Bighorn River, and the largest storage project in the basin, contained 1,019,000 acre-feet at the beginning of the year and 931,100 acre-feet at the close. It fluctuated from a minimum of 845,700 acre-feet on April 4, 1977, to a maximum of 1,053,000 acre-feet on October 31, 1976. Boysen Reservoir, located on the Wind River and operated by the U. S. Bureau of Reclamation, began the year with 678,100 acre-feet in storage and ended with 413,100 acre-feet. Details regarding these reservoirs are given in Appendix C. The Commission is cognizant of other reservoirs in this general group and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

In reservoirs existing on January 1, 1950

As a matter of record and general information, month-end storage data are given in Appendix D for reservoirs in existence above the points of measurement on January 1, 1950. These data are pertinent to allocation under Article V, Section C, Item 5 of the Compact.

RULES AND REGULATIONS FOR ADMINISTRATION OF
THE YELLOWSTONE RIVER COMPACT

A compact, known as the Yellowstone River Compact, between the States of Wyoming, Montana and North Dakota, having become effective on October 30, 1951 upon approval of the Congress of the United States, which apportions the waters of certain interstate tributaries of the Yellowstone River which are available after the appropriative rights existing in the States of Wyoming and Montana on January 1, 1950 are supplied, and after appropriative rights to the use of necessary supplemental water are also supplied as specified in the Compact, the following rules and regulations are adopted subject to the provisions for amendment, revision or abrogation as provided herein.

Article I. Collection of Water Records

- A. It shall be the joint and equal responsibility of the members of the states of Wyoming and Montana to collect, cause to be collected or otherwise furnish records of tributary stream flow at the points of measurement specified in Article V (B) of the Compact, or as near thereto as is physically or economically feasible or justified.

1. Clarks Fork

The gaging station known as Clarks Fork near Silesia, Montana and located in NE 1/4 SE 1/4 sec.1, T.4 S., R.23 E., shall be the point of measurement for the Clarks Fork.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River at Bighorn, Montana and located in NE 1/4 NE 1/4 sec.33, T.5 N., R.34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana, and located in NE 1/4 NE 1/4 sec.19, T.1 S., R.34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana and located in SE 1/4, sec.23, T.7 N., R.47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River near Locate, Montana and located in SW 1/4 sec.14, T.8 N., R.51 E., shall temporarily be the designated point of measurement for that stream.

- B. Records of total annual diversion in acre-feet above the points of measurement designated in the Compact for irrigation, municipal and industrial uses developed after January 1, 1950, shall be furnished by the members of the Commission for their respective states, at such time as the Commission deems necessary for interstate administration as provided by the terms of the Compact. Providing that if it be acceptable to the Commission, reasonable estimates thereof may be substituted.
- C. Annual records of the net change in storage in all reservoirs, not excluded under Article V (E) of the Compact, above the point of measurement specified in the Compact and completed after January 1, 1950, and the annual net change in reservoirs existing prior to January 1, 1950, which is used for irrigation, municipal and industrial purposes developed after January 1, 1950, shall be the primary responsibility of the member of the Commission in whose state such works are located; providing such data is not furnished by federal agencies under the provisions of Article III (D) of the Compact, or collected by the Commission.

Article II. Office and Officers

- A. The office of the Commission shall be located, and be that of the United States Geological Survey, in Helena, Montana.
- B. The Chairman of the Commission shall be the federal representative as provided in the Compact.
- C. The Secretary of the Commission shall be as provided for in Article III of these rules.
- D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

- A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U.S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:
 - 1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.
 - 2. Assemble factual information on stream flow, diversion and reservoir storage for the preparation of an annual report to the Governors of the signatory states.
 - 3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.
- B. Act as Secretary to the Commission.

Article IV. Budget

- A. At the annual meeting of each even numbered year or prior thereto, the Commission shall adopt a budget for operation during the ensuing biennium beginning July first. Such budget shall set forth the total cost of construction, maintenance and operation of gaging stations, the cost of engineering and clerical aid, and other necessary expenses excepting the salaries and personal expenses of the Commissioners. On odd-numbered years revisions of the budget shall be considered.
- B. It shall be the obligation of the Commissioners of the states of Montana and Wyoming to endeavor to secure from the Legislature of their respective states sufficient funds with which to meet the obligations of this Compact, except insofar as provided by the federal government.

Article V. Meetings

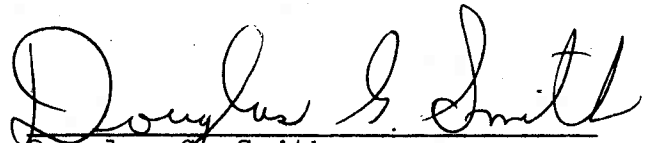
An annual meeting of the Commission shall be held each November at some mutually agreeable point in the Yellowstone River basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction of such other business consistent with its authority; provided that by unanimous consent of the Commission the


date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approval by the Commissioners for the States of Wyoming and Montana.


Article VI. Amendments, Revisions and Abrogations.

The Rules and Regulations of the Commission may be amended or revised by a unanimous vote at any meeting of the Commission.


Douglas G. Smith
Commissioner for Montana


Floyd A. Bishop
Commissioner for Wyoming

ATTESTED:


Robert C. Williams
Federal Representative

Adopted November 17, 1953
Amended November 9, 1970

Factors for converting English Units to International System
(SI) Units.

The following factors may be used to convert the English units published herein to the International System of Units (SI). Subsequent reports will contain both the English and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

| <u>Multiply English units</u> | <u>By</u> | <u>To obtain SI units</u> |
|--|------------|--|
| Length | | |
| feet (ft) | .3048 | meters (m) |
| miles (mi) | 1.609 | kilometers (km) |
| Area | | |
| acres | 4047 | square meters (m ²) |
| | .4047 | *hectares (ha) |
| | .4047 | square hectometer (hm ²) |
| | .004047 | square kilometers (km ²) |
| square miles (mi ²) | 2.590 | square kilometers (km ²) |
| Volume | | |
| cubic feet (ft ³) | 28.32 | cubic decimeters (dm ³) |
| | .02832 | cubic meters (m ³) |
| cfs-day (ft ³ /s-day) | 2447 | cubic meters (m ³) |
| | .002447 | cubic hectometers (hm ³) |
| acre-feet (acre-ft) | 1233 | cubic meters (m ³) |
| | .001233 | cubic hectometers (hm ³) |
| | .000001233 | cubic kilometers (km ³) |
| Flow | | |
| cubic feet per second (ft ³ /s) | 28.32 | liters per second (l/s) |
| | 28.32 | cubic decimeters per second (dm ³ /s) |
| | .02832 | cubic meters per second (m ³ /s) |

*The unit hectare is approved for use with the International System (SI) for a limited time. See NBS Special Bulletin 330, p. 15, 1972 edition.

MONTHLY SUMMARY OF DISCHARGE

06208800 CLARKS FORK YELLOWSTONE RIVER NEAR SILESIA, MT

LOCATION (revised).--Lat 45°30'48", long 108°49'42", in NW¼SE¼ sec.1, T.4 S., R.23 E., Carbon County, Hydrologic Unit 10070006, on left bank 0.5 mi (0.8 km) downstream from Whitehorse Canal intake, 1 mi (2 km) upstream from Rock Creek, 3 mi (5 km) south of Silesia, and at mile 19 (31 km).

DRAINAGE AREA.--2,093 mi² (5,421 km²).

PERIOD OF RECORD.--October 1969 to September 1977. Records for July 1921 to September 1969 (published as Clarks Fork Yellowstone River at Edgar) at site 5 mi (8.0 km) upstream not equivalent owing to diversion in Whitehorse Canal during irrigation season. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 3,410 ft (1,039 m), from topographic map.

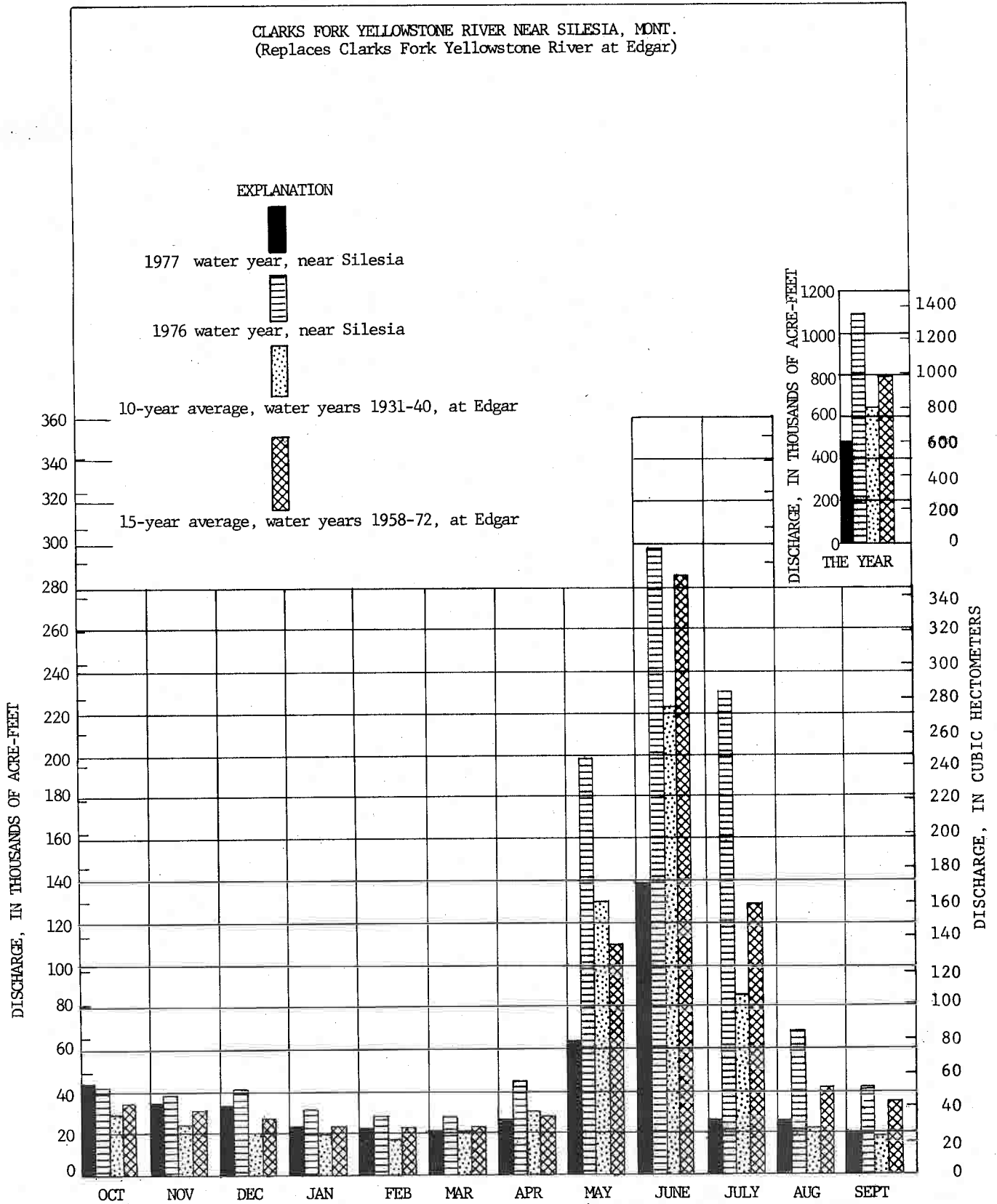
REMARKS.--Records good except those for winter period, which are poor. Diversion for irrigation of about 42,600 acres (172 km²) of which 1,100 acres (4.45 km²) lies below station. In addition, about 9,000 acres (36.4 km²) of land above station are irrigated by diversions from the adjoining Rock Creek basin.

AVERAGE DISCHARGE.--8 years (1970-77). 1,226 ft³/s (34.72 m³/s), 888,200 acre-ft/yr (1.10 km³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,800 ft³/s (334 m³/s) June 10, 1972, gage height, 7.51 ft (2.289 m); maximum gage height, 7.82 ft (2.384 m) July 6, 1975; minimum discharge, 88 ft³/s (2.36 m³/s) July 21, 1977, gage height, 0.72 ft (0.219 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,340 ft³/s (151 m³/s) June 9; gage height, 5.30 ft (1.615 m), only peak above base of 5,300 ft³/s (150 m³/s); minimum, 88 ft³/s (2.49 m³/s) July 21, gage height, 0.72 ft (0.219 m).

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|-------|---------|---------|----------------------|
| October 1976 | 22,592 | 729 | 818 | 655 | 44,810 |
| November | 17,727 | 591 | 662 | 483 | 35,160 |
| December | 16,831 | 543 | 669 | 381 | 33,380 |
| January 1977 | 11,684 | 377 | 470 | 260 | 23,180 |
| February | 11,290 | 403 | 450 | 354 | 22,390 |
| March | 10,341 | 334 | 370 | 278 | 20,510 |
| April | 13,342 | 445 | 662 | 223 | 26,460 |
| May | 31,966 | 1,031 | 1,750 | 354 | 63,400 |
| June | 69,977 | 2,333 | 4,850 | 489 | 138,800 |
| July | 13,099 | 423 | 1,010 | 97 | 25,980 |
| August | 12,876 | 421 | 975 | 219 | 25,360 |
| September 1977 | 9,715 | 324 | 501 | 193 | 19,270 |
| 1977 water year | 241,350 | 661 | 4,850 | 97 | 478,700 |



Comparison of discharge during 1977 water year with 1976 water year near Silesia and with average discharge for water years 1931-40 and 1958-72 at Edgar.

MONTHLY SUMMARY OF DISCHARGE

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT

LOCATION.--Lat 45°44'10", long 107°33'24", in NW¼SW¼NW¼ sec.20, T.1 S., R.34 E., Big Horn County, Hydrologic Unit 10080016, on right bank 15 ft (4.6 m) downstream from bridge on Sarpy Road, 0.2 mi (0.3 km) upstream from terminal wasteway of Agency Canal, 0.6 mi (1.0 km) upstream from mouth, and 2.3 mi (3.7 km) east of Hardin.

DRAINAGE AREA.--1,294 mi² (3,351 km²).

PERIOD OF RECORD.--June 1953 to September 1977. Records since June 1953 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,890 ft (881 m) from topographic map. Prior to Oct. 7, 1953, nonrecording gage at site 0.4 mi (0.6 km) downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mi (0.5 km) downstream. May 6, 1963, to Nov. 6, 1963, nonrecording gage at site 0.4 mi (0.6 km) downstream. All at different datums. Nov. 7, 1963, to Aug. 15, 1976, water-stage recorder at site 35 ft (11 m) downstream at present datum.

REMARKS.--Records good except those for winter periods, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity 23,000 acre-ft, 28.4 hm³). Diversions for irrigation of about 17,000 acres (68.8 km²) above station. Figures of discharge given herein include flow of terminal wasteway of Agency Canal.

AVERAGE DISCHARGE.--24 years, 313 ft³/s (8.86 m³/s), 226,800 acre-ft/yr (280 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft³/s (128 m³/s) Apr. 2, 1965; maximum gage height, 11.78 ft (3.591 m) Mar. 20, 1960, site and datum then in use (backwater from ice); discharge observed, 0.20 ft³/s (0.006 m³/s) Aug. 7, 1961, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft³/s (28.3 m³/s) and maximum (*):

| Date | Time | Discharge | | Gage height | |
|--------|------|----------------------|---------------------|-------------|-------|
| | | (ft ³ /s) | (m ³ /s) | (ft) | (m) |
| Apr. 9 | 0500 | *2,110 | 59.8 | *4.53 | 1.381 |
| May 12 | 1200 | 1,280 | 36.2 | 3.85 | 1.173 |

Minimum discharge, 64 ft³/s (1.81 m³/s) July 23; gage height, 1.11 ft (0.338 m).

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|------|---------|---------|----------------------|
| October 1976 | 6,774 | 219 | 258 | 199 | 13,440 |
| November | 5,045 | 168 | 200 | 78 | 10,010 |
| December | 6,794 | 219 | 300 | 180 | 13,480 |
| January 1977 | 5,660 | 183 | 300 | 100 | 11,230 |
| February | 7,832 | 280 | 590 | 160 | 15,530 |
| March | 9,232 | 298 | 399 | 240 | 18,310 |
| April | 22,062 | 735 | 1,960 | 261 | 43,760 |
| May | 23,298 | 752 | 1,200 | 531 | 46,210 |
| June | 17,801 | 593 | 866 | 228 | 35,310 |
| July | 4,109 | 133 | 220 | 86 | 8,150 |
| August | 3,986 | 129 | 161 | 106 | 7,910 |
| September 1977 | 4,025 | 134 | 151 | 101 | 7,980 |
| 1977 water year | 116,618 | 320 | 1,960 | 78 | 231,300 |

MONTHLY SUMMARY OF DISCHARGE

06294700 BIGHORN RIVER AT BIGHORN, MT

LOCATION.--Lat 46°08'50", long 107°28'00", in NE¼NE¼ sec.33, T.5 N., R.34 E., Treasure County, Hydrologic Unit 10080015, on right bank just downstream from bridge on old U.S. Highway 10, 0.3 mi (0.5 km) downstream from bridge on Interstate Highway 94, 0.7 mi (1.1 km) upstream from mouth, 1.3 mi (2.1 km) southwest of Bighorn, and 4.4 mi (7.1 km) east of Custer.

DRAINAGE AREA.--22,885 mi² (59,272 km²). Area at site used prior to Oct. 7, 1955, 22,410 mi² (58,042 km²).

PERIOD OF RECORD.--May 1945 to September 1977. Published as "near Custer", 1945-55. Records since January 1950 available in annual reports of the Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,690 ft (820 m), by barometer. May 11 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder, at site 4 mi (6.4 km) upstream at different datum.

REMARKS.--Records good except those for period of backwater from Yellowstone River, which are fair. Stage-discharge relation affected by backwater from Yellowstone River (June 6-22). Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft, 1.67 km³). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft (1.73 km³), see appendixes C and D. Diversions for irrigation of about 465,000 acres (1,880 km²) above station.

AVERAGE DISCHARGE.--32 years, 3,934 ft³/s (111.4 m³/s) 2,850,000 acre-ft/yr (3.51 km³/yr), unadjusted.

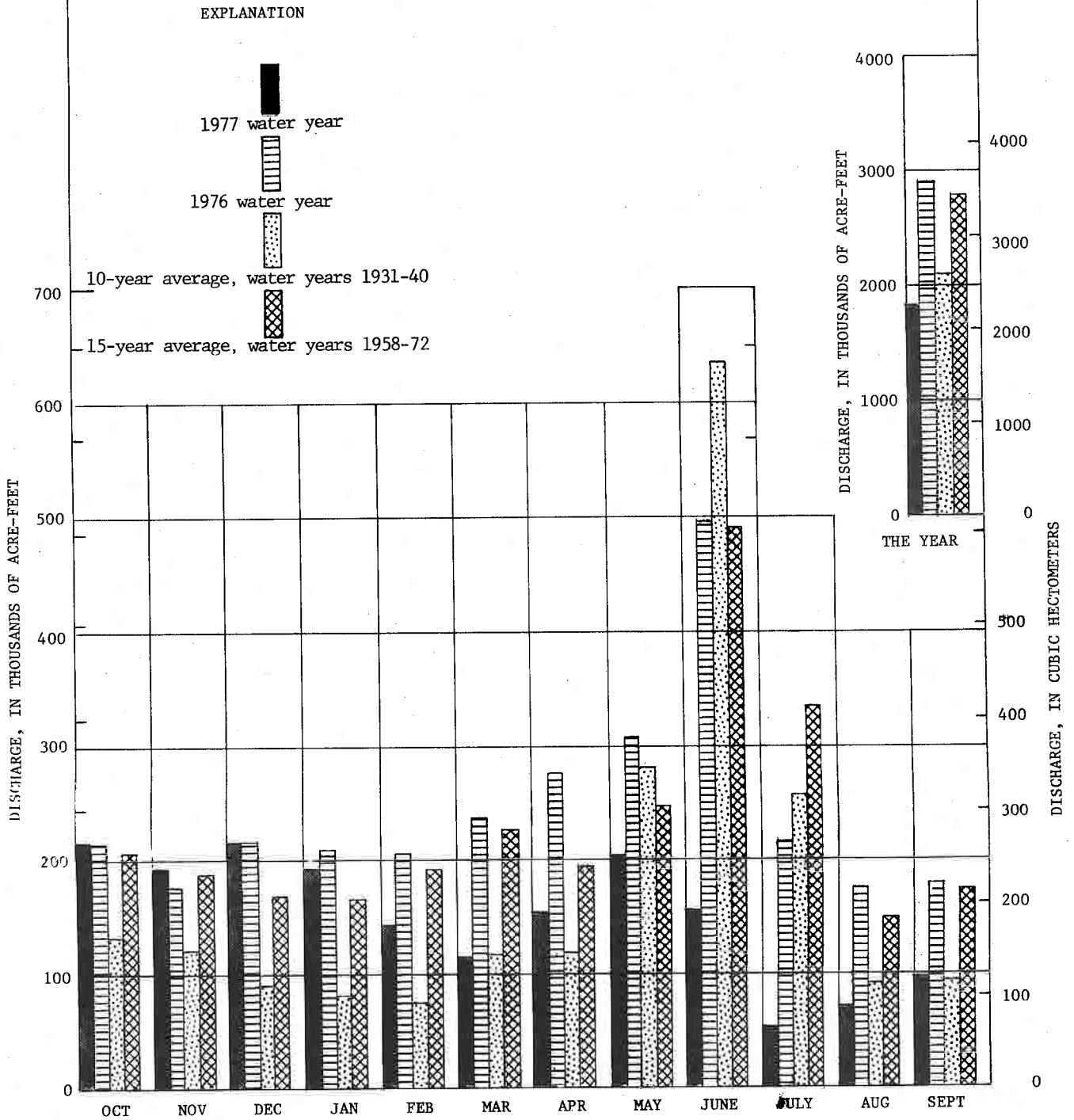
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,200 ft³/s (742 m³/s) June 24, 1947, gage height, 8.79 ft (2.679 m), site and datum then in use, from rating curve extended above 12,500 ft³/s (354 m³/s); maximum gage height recorded, 14.21 ft (4.331 m) Apr. 2, 1965 (ice jam); minimum discharge, about 275 ft³/s (7.79 m³/s) Nov. 15, 1959, result of freezeup; minimum daily, 400 ft³/s (11.3 m³/s) Apr. 4, 1967.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,280 ft³/s (150 m³/s) Apr. 8, gage height, 3.47 ft (1.058 m); maximum gage height, 3.77 ft (1.149 m) June 10 (backwater from Yellowstone River); minimum daily discharge, 738 ft³/s (20.9 m³/s) Oct. 31.

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet | Adjusted runoff, in acre-feet* |
|-----------------|------------------|-------|---------|---------|----------------------|--------------------------------|
| Oct. 1976 | 98,678 | 3,183 | 3,900 | 738 | 195,700 | 229,700 |
| Nov. | 139,660 | 4,655 | 5,130 | 3,310 | 277,000 | 201,600 |
| Dec. | 130,540 | 4,211 | 4,420 | 3,600 | 258,900 | 229,200 |
| Jan. 1977 | 124,700 | 4,023 | 4,900 | 3,000 | 247,300 | 205,000 |
| Feb. | 97,510 | 3,483 | 3,900 | 3,080 | 193,400 | 157,700 |
| Mar. | 78,530 | 2,533 | 3,080 | 2,290 | 155,800 | 133,900 |
| Apr. | 79,360 | 2,645 | 5,010 | 1,740 | 157,400 | 197,800 |
| May | 78,150 | 2,521 | 3,800 | 1,830 | 155,000 | 249,500 |
| June | 77,780 | 2,593 | 4,420 | 1,580 | 154,300 | 191,400 |
| July | 59,920 | 1,933 | 2,710 | 1,660 | 118,900 | 60,700 |
| Aug. | 54,680 | 1,764 | 1,980 | 1,550 | 108,500 | 80,200 |
| Sept. 1977 | 54,500 | 1,817 | 1,880 | 1,760 | 108,100 | 105,700 |
| 1977 water year | 1,074,008 | 2,942 | 5,130 | 738 | 2,130,000 | 1,811,000 |

* Adjusted for change in contents in Bighorn Lake.

BIGHORN RIVER AT BIGHORN, MONT.
 (Adjusted for change in contents in Bighorn Lake
 minus
 Little Bighorn River near Hardin, Mont.)



Comparison of discharge during 1977 water year with 1976 water year and with average discharge for water years 1931-40 and 1958-72.

MONTHLY SUMMARY OF DISCHARGE

06306250 PRAIRIE DOG CREEK NEAR ACME, WY

LOCATION.--Lat 44°59'02", long 106°50'21", in NE¼SW¼SW¼ sec.23, T.58 N., R.83 W., Sheridan County, Hydrologic Unit 10090101, on right bank, 600 ft (183 m) upstream from county bridge, 0.9 mi (1.5 km) upstream from mouth, 2.8 mi (4.5 km) downstream from Coutant Creek, and 7.6 mi (12.2 km) northeast of Acme.

DRAINAGE AREA.--358 mi² (927 km²).

PERIOD OF RECORD.--October 1970 to September 1977. Records for May 1965 to September 1970 in files of Office of Wyoming State Engineer. Records since October 1970 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 3,450 ft (1,052 m), from topographic map.

REMARKS.--Records good except those for winter period, which are poor. Diversions above station for irrigation of about 13,600 acres (55.0 km²) of which about 60 acres (243,000 m²) lies below station. Flow supplemented by 3 transbasin diversions from North Piney Creek and South Piney Creek via Prairie Dog ditch, Piney and Cruse ditch and Mead-Coffeen ditch.

AVERAGE DISCHARGE.--7 years, 42.8 ft³/s (1.212 m³/s), 31,010 acre-ft/yr (38.2 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 738 ft³/s (20.9 m³/s) Mar. 5, 1975, gage height, 6.01 ft (1.832 m), from rating curve extended above 190 ft³/s (5.38 m³/s) on basis of step-backwater computation; minimum daily, 6.3 ft³/s (0.18 m³/s) June 4, 5, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 222 ft³/s (6.29 m³/s) Apr. 11, gage height, 3.35 ft (1.021 m); minimum, 6.9 ft³/s (0.195 m³/s) July 20, gage height, 0.79 ft (0.241 m).

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1976 | 1,504 | 48.5 | 88 | 27 | 2,980 |
| November | 762 | 25.4 | 33 | 13 | 1,510 |
| December | 689 | 22.2 | 35 | 17 | 1,370 |
| January 1977 | 437 | 14.1 | 19 | 10 | 867 |
| February | 857 | 30.6 | 70 | 15 | 1,700 |
| March | 1,130 | 36.5 | 55 | 19 | 2,240 |
| April | 2,770 | 92.3 | 215 | 20 | 5,490 |
| May | 1,322 | 42.6 | 80 | 16 | 2,620 |
| June | 1,328 | 44.3 | 110 | 19 | 2,630 |
| July | 509.3 | 16.4 | 37 | 8.6 | 1,010 |
| August | 853 | 27.5 | 48 | 12 | 1,690 |
| September 1977 | 1,360 | 45.3 | 62 | 33 | 2,700 |
| 1977 water year | 13,521.3 | 37.0 | 215 | 8.6 | 26,820 |

MONTHLY SUMMARY OF DISCHARGE

06308500 TONGUE RIVER AT MILES CITY, MT

LOCATION.--Lat 46°21'30", long 105°48'24", in SE¼ sec.23, T.7 N., R.47 E., Custer County, Hydrologic Unit 10090102, on right bank 4 mi (6 km) south of Miles City and 8 mi (13 km) upstream from mouth.

DRAINAGE AREA.--5,379 mi² (13,923 km²).

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to September 1977. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharge only for some periods, published in WSP 1309. Records since January 1950 available in annual report of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,370 ft (722 m), by barometer. April 1938 to April 1942, nonrecording gage at site 8 mi (13 km) upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft (0.30 m) higher.

REMARKS.--Records good except those for winter period, which are poor. Flow regulated by Tongue River Reservoir (appendix D) and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft, 18.5 hm³). Diversions for irrigation of about 90,000 acres (364 km²) above station.

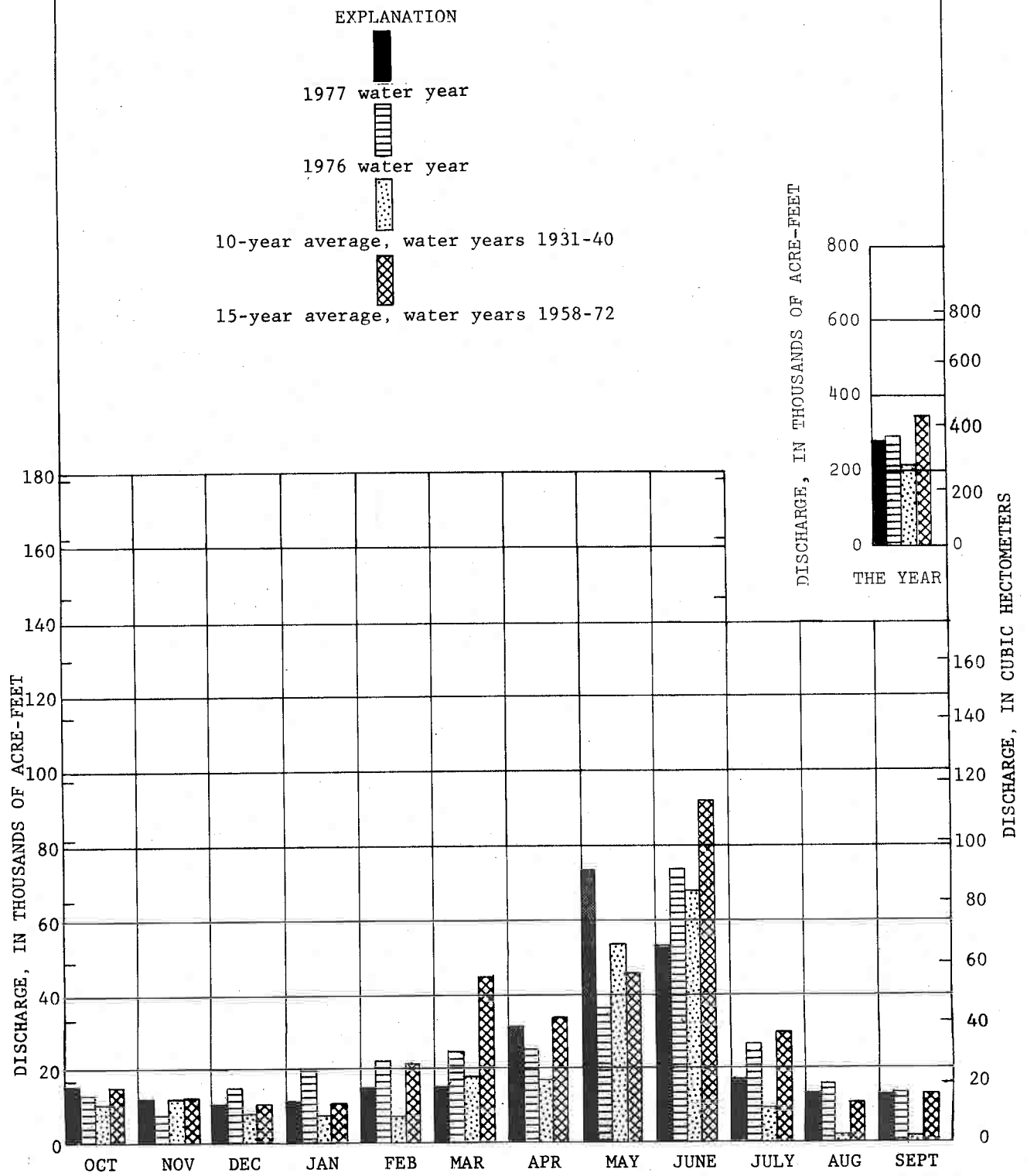
AVERAGE DISCHARGE.--34 years (1938-41, 1946-77), 440 ft³/s (12.45 m³/s), 318,800 acre-ft/yr (393 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,300 ft³/s (377 m³/s) June 15, 1962, gage height, 12.33 ft (3.758 m), present datum, from rating curve extended above 5,200 ft³/s (147 m³/s) on basis of float measurement; maximum gage height, 13.27 ft (4.045 m), present datum, Mar. 19, 1960, Feb. 15, 1971 (ice jam); no flow July 9-19, Aug. 13, 14, Sept. 28, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,910 ft³/s (54.1 m³/s) May 19, gage height, 4.54 ft (1.384 m); minimum daily, 110 ft³/s (3.12 m³/s) Nov. 13-16.

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in Acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1976 | 7,657 | 247 | 310 | 176 | 15,190 |
| November | 6,080 | 203 | 300 | 110 | 12,060 |
| December | 5,320 | 172 | 190 | 160 | 10,550 |
| January 1977 | 5,710 | 184 | 200 | 170 | 11,330 |
| February | 7,470 | 267 | 350 | 200 | 14,820 |
| March | 7,106 | 229 | 359 | 134 | 14,090 |
| April | 15,719 | 524 | 716 | 374 | 31,180 |
| May | 37,042 | 1,195 | 1,890 | 496 | 73,470 |
| June | 26,794 | 893 | 1,390 | 121 | 53,150 |
| July | 8,466 | 273 | 492 | 189 | 16,790 |
| August | 6,520 | 210 | 268 | 141 | 12,930 |
| September | 6,317 | 211 | 274 | 115 | 12,530 |
| 1977 water year | 140,201 | 384 | 1,890 | 110 | 278,100 |

TONGUE RIVER AT MILES CITY, MONT.



Comparison of discharge during 1977 water year with 1976 water year and with average discharge for water years 1931-40 and 1958-72.

MONTHLY SUMMARY OF DISCHARGE

06326500 POWDER RIVER NEAR LOCATE, MT

LOCATION.--Lat 46°26'56", long 105°18'44", in NW¼SW¼ sec.14, T.8 N., R.51 E., Custer County, Hydrologic Unit 10090209, on left bank 1.5 mi (2.4 km) downstream from bridge on U.S. Highway 12 at present site of Locate (5 mi, 8 km, west of former site of Locate), 1.5 mi (2.4 km) upstream from Locate Creek, and 25 mi (40 km) east of Miles City.

DRAINAGE AREA.--13,194 mi² (34,172 km²). Area at site used prior to Oct. 1, 1965, 13,189 mi² (34,160 km²).

PERIOD OF RECORD.--March 1938 to September 1977. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,390 ft (728 m), by barometer. Prior to July 11, 1947, nonrecording gage at bridge 1.5 mi (2.4 km) upstream and July 11, 1947, to Sept. 30, 1965, water-stage recorder at site near bridge at different datum. Oct. 1, 1965, to Oct. 4, 1966, nonrecording gage, and Oct. 5, 1966, to Apr. 15, 1969, water-stage recorder at site 200 ft (61 m) upstream at present datum.

REMARKS.--Records fair except those for winter period, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft (45.4 hm³). Diversions for irrigation of about 74,500 acres (302 km²), revised.

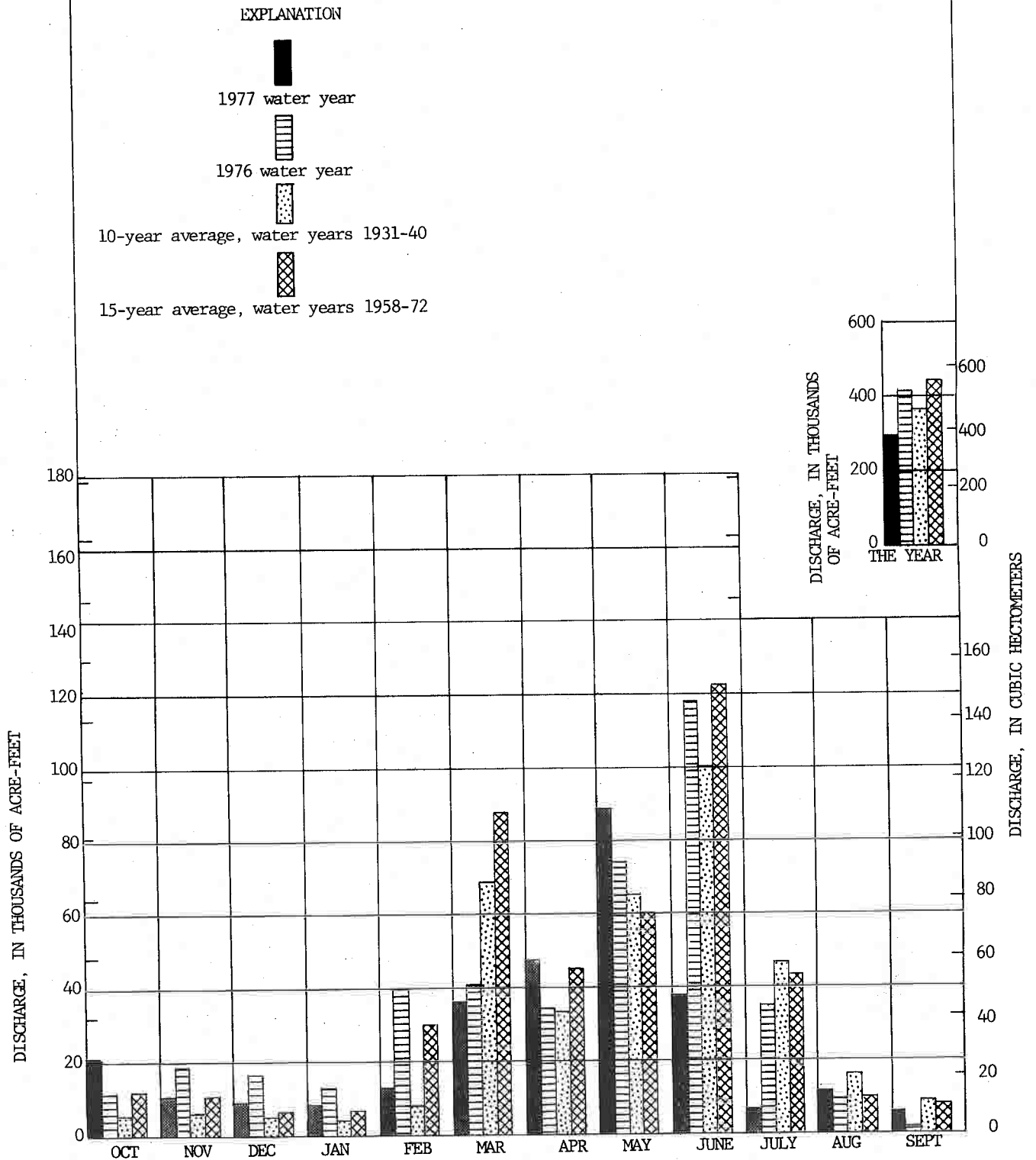
AVERAGE DISCHARGE.--39 years, 615 ft³/s (17.42 m³/s), 445,600 acre-ft/yr (549 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 31,000 ft³/s (878 m³/s) Feb. 19, 1943, gage height, 11.23 ft (3.423 m), site and datum then in use, from rating curve extended above 17,000 ft³/s (481 m³/s); no flow Jan. 16 to Feb. 12, Feb. 22-24, 1950, July 27, Sept. 21-27, Oct. 1, 1960, Sept. 4-8, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,420 ft³/s (96.9 m³/s) May 19, gage height, 5.41 ft (1.649 m); minimum daily, 13 ft³/s (0.37 m³/s) July 26.

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|-------|---------|---------|----------------------|
| October 1976 | 10,594 | 342 | 929 | 75 | 21,010 |
| November | 5,363 | 179 | 336 | 70 | 10,640 |
| December | 4,485 | 145 | 180 | 75 | 8,900 |
| January 1977 | 4,010 | 129 | 140 | 110 | 7,950 |
| February | 6,520 | 233 | 380 | 110 | 12,930 |
| March | 18,280 | 590 | 779 | 310 | 36,260 |
| April | 23,835 | 795 | 1,160 | 544 | 47,280 |
| May | 45,058 | 1,440 | 3,110 | 478 | 89,370 |
| June | 18,983 | 633 | 1,660 | 246 | 37,650 |
| July | 3,404 | 110 | 347 | 13 | 6,750 |
| August | 5,625 | 181 | 465 | 65 | 11,160 |
| September | 2,874 | 95.8 | 336 | 32 | 5,700 |
| 1977 water year | 149,031 | 407 | 3,110 | 13 | 295,700 |

POWDER RIVER NEAR LOCATE, MONT.



Comparison of discharge for 1977 water year with 1976 water year and with average discharge for water years 1931-40 and 1958-72.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

06258900 BOYSEN RESERVOIR, WY

LOCATION.--Lat 43°25'00", long 108°10'37", in NW¼NW¼ sec.16, T.5 N., R.6 E., Fremont County, at dam on Wind River, 13 mi (21 km) north of Shoshoni, Wyoming.

DRAINAGE AREA.--7,700 mi² (19,943 km²).

PERIOD OF RECORD.--October 1951 to September 1977 (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is mean sea level, datum of 1933 (levels by Bureau of Reclamation).

REMARKS.--Reservoir is formed by rock-fill dam completed in October 1951. Storage began Oct. 11, 1951. Usable capacity, 742,100 acre-ft (915 hm³) between elevation 4,657.00 ft (1,419.454 m), invert of penstock pipe, and 4,725.00 ft (1,440.180 m), top of spillway gate. Dead storage, 59,880 acre-ft (73.8 hm³) below elevation 4,657.00 ft (1,419.454 m). Prior to Jan. 1, 1966, usable capacity was 757,800 acre-ft (934 hm³) and dead storage was 62,000 acre-ft (76.4 hm³), at same elevations. Crest of dam is at elevation 4,758 ft (1,450 m). Figures given herein represent usable contents. Water used for irrigation, flood control, and power development.

COOPERATION.--Records furnished by Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 862,500 acre-ft (1,060 hm³) July 6, 7, 1967, elevation, 4,730.83 ft (1,441.957 m); minimum daily (since normal) use of water started, 189,800 acre-ft (234 hm³) Mar. 18, 19, 1956, elevation, 4,684.18 ft (1,427.738 m), capacity table then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 686,600 acre-ft (847 hm³) Oct. 12, elevation, 4,722.09 ft (1,439.293 m); minimum daily, 413,100 acre-ft (509 hm³) Sept. 30, elevation, 4,704.98 ft (1,434.078 m).

| Month | Water-surface elevation, in feet | Contents*, in acre-feet | Change in contents, in acre-feet |
|------------------------------|--|----------------------------|-------------------------------------|
| September 30, 1976 | 4,721.63 | 678,100 | - |
| October 31 | 4,721.38 | 673,500 | -4,600 |
| November 30 | 4,719.82 | 645,300 | -28,200 |
| December 31 | 4,716.04 | 579,900 | -65,400 |
| January 31, 1977 | 4,711.39 | 505,800 | -74,100 |
| February 28 | 4,710.18 | 487,600 | -18,200 |
| March 31 | 4,710.98 | 499,600 | +12,000 |
| April 30 | 4,713.00 | 530,700 | +31,100 |
| May 31 | 4,712.64 | 525,100 | -5,600 |
| June 30 | 4,710.40 | 490,900 | -34,200 |
| July 31 | 4,708.62 | 464,500 | -26,400 |
| August 31 | 4,706.70 | 437,000 | -27,500 |
| September 30, 1977 | 4,704.98 | 413,100 | -23,900 |
| 1977 water year | | | -265,000 |

* Does not include dead storage of 59,880 acre-feet (73.8 hm³).

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

06260300 ANCHOR RESERVOIR, WY

LOCATION.--Lat 43°39'50", long 108°49'27", in sec.26, T.43 N., R.100 W., Hot Springs County, at dam on South Fork Owl Creek, 2 mi (3 km) downstream from Middle Fork, 3 mi (5 km) southeast of Anchor, and 32 mi (51 km) west of Thermopolis.

DRAINAGE AREA.--125 mi² (324 km²), approximately.

PERIOD OF RECORD.--November 1960 to September 1977 (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (Bureau of Reclamation datum).

REMARKS.--Reservoir is formed by concrete arch dam completed in 1960. Usable capacity, 17,170 acre-ft (21.2 hm³) between elevation 6,343.75 ft (1,933.575 m), invert of river outlet, and 6,441.00 ft (1,963.217 m), spillway crest, not including 68 acre-ft (83,800 m³) below elevation 6,343.75 ft (1,933.575 m). Prior to Oct. 1, 1971, usable capacity was 17,280 acre-ft (21.3 hm³) not including 149 acre-ft (184,000 m³) below the invert. Figures given herein represent usable contents. Water is used for irrigation of lands in Owl Creek basin.

COOPERATION.--Records furnished by Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 9,250 acre-ft (11.4 hm³) July 4, 1967 (elevation, 6,418.52 ft or 1,956.365 m); no storage on many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 545 acre-ft (672,000 m³) May 12, (elevation, 6,364.20 ft or 1,939.808 m); no storage on many days.

| <u>Month</u> | <u>Water-surface elevation, in feet</u> | <u>Contents*, in acre-feet</u> | <u>Change in contents, in acre-feet</u> |
|------------------------------|---|------------------------------------|---|
| September 30, 1976 | - | 0 | 0 |
| October 30 | - | 0 | 0 |
| November 30 | - | 0 | 0 |
| December 31 | - | 0 | 0 |
| January 31, 1977 | - | 0 | 0 |
| February 28 | - | 0 | 0 |
| March 31 | - | 0 | 0 |
| April 30 | 6,355.02 | 195 | +195 |
| May 31 | - | 0 | -195 |
| June 30 | - | 0 | 0 |
| July 31 | - | 0 | 0 |
| August 31 | - | 0 | 0 |
| September 30 | - | 0 | 0 |
| 1977 water year | | | 0 |

* Does not include dead storage of 68 acre-feet (83,800 m³).

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

06286400 BIGHORN LAKE NEAR ST. XAVIER, MT

LOCATION.--Lat 45°18'27", long 107°57'26", in SW¼SE¼ sec.18, T.6 S., R.31 E., Big Horn County, Hydrologic Unit 10080010, in block 13 of Yellowtail Dam on Bighorn River, 1.3 mi (2.1 km) upstream from Grapevine Creek, 15.5 mi (24.9 km) south-east of St. Xavier, and at mile 81.0 (130.3 km)

DRAINAGE AREA.--19,626 mi² (50,831 km²).

PERIOD OF RECORD.--November 1965 to September 1977 (monthend contents only). Prior to October 1969, published as "Yellowtail Reservoir."

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is mean sea level (levels by Bureau of Reclamation).

REMARKS.--Reservoir is formed by thin concrete-arch dam; construction began in 1961; completed in 1967. Storage began Nov. 3, 1965. Usable capacity, 1,356,000 acre-ft (1.67 km³) between elevation 3,296.50 ft (1,004.773 m), river outlet invert, and 3,657.00 ft (1,114.654 m), top of flood control. Elevation of spillway crest, 3,593.00 ft (1,095.146 m). Normal maximum operating level, 1,097,000 acre-ft (1.35 km³), elevation, 3,640.00 ft (1,109.472 m). Minimum operating level, 483,400 acre-ft (596 hm³), elevation 3,547.00 ft (1,081.126 m). Dead storage, 18,970 acre-ft (23.4 hm³) below elevation 3,296.50 ft (1,004.773 m). Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

COOPERATION.--Elevations and capacity table furnished by Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,346,000 acre-ft (1.66 km³) July 6, 1967, elevation, 3,656.43 ft (1,114.480 m); minimum since first filling, 660,700 acre-ft (815 hm³) Mar. 11, 1970, elevation, 3,584.45 ft (1,092.540 m).

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 1,053,000 acre-ft (1.30 km³) Oct. 31, elevation, 3,636.37 ft (1,108.366 m); minimum daily, 845,700 acre-ft (11.04 km³) Apr. 4, elevation, 3,613.83 ft (1,101.495 m).

| <u>Month</u> | <u>Water-surface elevation, in feet</u> | <u>Contents*, in acre-feet</u> | <u>Change in contents, in acre-feet</u> |
|------------------------------|---|------------------------------------|---|
| September 30, 1976 | 3,633.28 | 1,019,000 | -- |
| October 31 | 3,636.37 | 1,053,000 | +34,000 |
| November 30 | 3,629.27 | 977,600 | -75,400 |
| December 31 | 3,626.09 | 947,900 | -29,700 |
| January 31, 1977 | 3,621.19 | 905,600 | -42,300 |
| February 28 | 3,616.53 | 869,900 | -35,700 |
| March 31 | 3,614.10 | 848,000 | -21,900 |
| April 30 | 3,618.96 | 888,400 | +40,400 |
| May 31 | 3,629.81 | 982,900 | +94,500 |
| June 30 | 3,633.45 | 1,020,000 | +37,100 |
| July 31 | 3,627.61 | 961,800 | -58,200 |
| August 31 | 3,624.47 | 933,500 | -28,300 |
| September 30, 1977 | 3,624.20 | 931,100 | -2,400 |
| 1977 water year | | | -87,900 |

* Does not include dead storage of 18,970 acre-feet (23.4 hm³).

RESERVOIRS IN EXISTENCE ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this category which may be subject to Compact allocations was not determined. As a matter of hydrologic interest the monthend contents in acre-feet of four reservoirs are given. The first three reservoirs are in the Bighorn River basin, Wyoming and data on contents were furnished by the U.S. Bureau of Reclamation. Tongue River Reservoir in Montana is operated under the supervision of the Water Resources Division of the Montana Department of Natural Resources and Conservation, which agency furnished operating data.

| Month | Contents, in acre-feet | | | |
|---|---------------------------------|---------------------------------|--|--|
| | 06224500 <u>a/ Bull Lake</u> | <u>b/ Pilot Butte Reservoir</u> | 06281500 <u>c/ Buffalo Bill Reservoir</u> | 06307000 <u>d/ Tongue River Reservoir</u> |
| September 30, 1976 | 55,760 | 8,880 | 318,800 | 25,540 |
| October 31 | 59,160 | 8,700 | 284,300 | 29,460 |
| November 30 | 56,580 | 8,480 | 269,300 | 32,800 |
| December 31 | 55,310 | 8,320 | 244,600 | 36,000 |
| January 31, 1977 | 53,990 | 8,150 | 218,200 | 35,000 |
| February 28 | 53,550 | 8,100 | 219,500 | 39,560 |
| March 31 | 53,990 | 15,120 | 223,400 | 45,150 |
| April 30 | 55,760 | 31,010 | 239,900 | 51,200 |
| May 31 | 58,780 | 24,940 | 234,800 | 63,000 |
| June 30 | 79,460 | 14,220 | 307,600 | 64,950 |
| July 31 | 72,070 | 23,340 | 250,000 | 43,400 |
| August 31 | 79,040 | 16,680 | 215,700 | 25,700 |
| September 30, 1977 | 71,760 | 6,550 | 185,200 | 20,080 |
| Change in contents during water year | +16,000 | -2,330 | -133,600 | -5,460 |

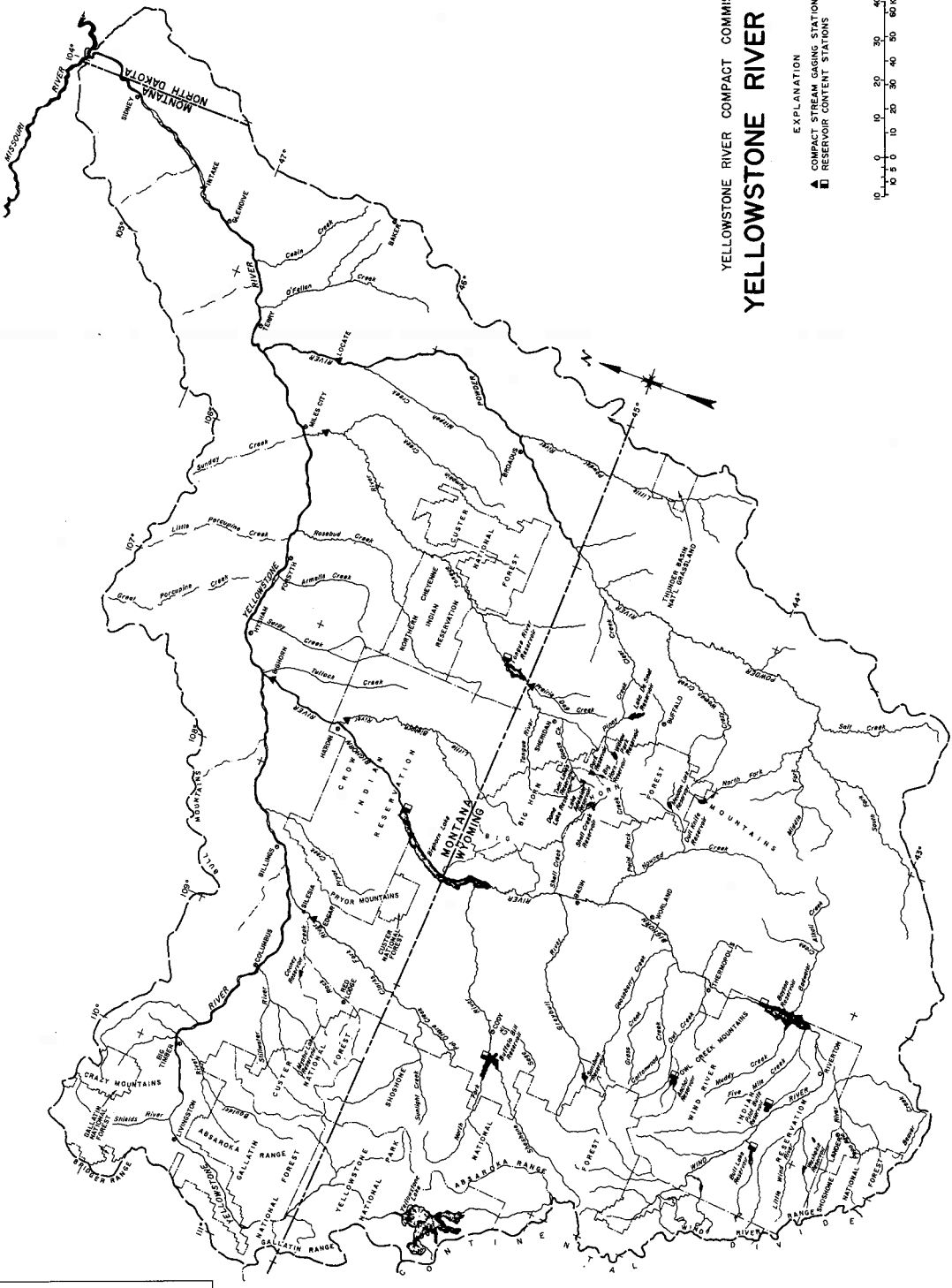
a/ Usable contents, from revised capacity table effective Oct. 1, 1965. Dead storage is 722 acre-feet (890,000 m³).

b/ Usable contents. Dead storage is 5,360 acre-ft (6.61 hm³).

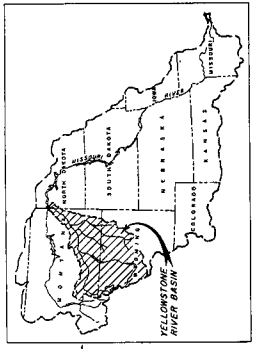
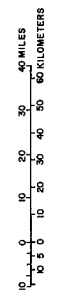
c/ Usable contents, from revised capacity table based on survey of 1959. Contents prior to October 1960 based on survey of 1941. Dead storage is negligible.

d/ Usable contents. Dead storage is 1,400 acre-ft (1.73 hm³). Contents based upon sedimentation surveys of October 1948.

YELLOWSTONE RIVER COMPACT COMMISSION YELLOWSTONE RIVER BASIN



EXPLANATION
 ▲ COMPACT STREAM GAGING STATIONS
 ■ RESERVOIR CONTENT STATIONS



LOCATION MAP