

YELLOWSTONE RIVER
COMPACT COMMISSION

FORTY-FIRST ANNUAL REPORT

1992

YELLOWSTONE RIVER COMPACT COMMISSION
821 EAST INTERSTATE AVENUE
BISMARCK, NORTH DAKOTA 58501

Honorable Mike Sullivan
Governor of the State of Wyoming
Cheyenne, Wyoming 82001

Honorable Marc Racicot
Governor of the State of Montana
Helena, Montana 59620

Honorable Edward T. Schafer
Governor of the State of North Dakota
Bismarck, North Dakota 58501

Dear Sirs:

Pursuant to Article III of the Yellowstone River Compact (Compact) the Commission submits the following forty-first annual report of activities for the period ending September 30, 1992.

On February 10, 1992, the Yellowstone River Compact Commission convened a meeting via a conference call. In attendance were Mr. W.F. Horak, Jr., Chairman and Federal Representative; Mr. Gordon W. Fassett, Wyoming State Engineer; and Mr. Gary Fritz, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation. Also in attendance were Ms. Sue Lowry, Wyoming State Engineer's Office; Mr. Milo Vukelich, Wyoming Attorney General's Office; Mr. Joe A. Moreland, U.S. Geological Survey; and Mr. Matthew McKinney, Montana Department of Natural Resources and Conservation.

Mr. Horak called the meeting to order and stated that the Yellowstone River Compact Commission had received a request from the Wyoming Board of Control to review and approve a water-right adjudication for the Pennoyer Ditch under the Compact Rules for Adjudicating Water Rights for Interstate Ditches. The rules state that the Commission will determine the amount of the right, the location, and the priority date, and return the record to the Board of Control for final action.

Mr. Horak noted a typographical error in the legal description of the project. Mr. Fassett said the error would be corrected in the final record. With the understanding that the typographical error would be corrected, Mr. Fassett made a motion for the Commission to approve the adjudication as submitted. Mr. Fritz seconded the motion. Mr. Horak abstained from voting and the motion was approved.

Mr. Fassett asked if other members of the Commission had any questions or comments regarding a request for water rights for the McCarthy Ditch. He stated that the original request was for a point of diversion in Wyoming to irrigate lands in both Wyoming and Montana. The project now plans to use multiple alternate points of diversion in Montana to irrigate plots in both States.

Ms. Lowry stated that she had provided maps for Mr. Kerbel to review. She stated that the project would require a permit from Montana if points of diversion were located in that State.

Mr. Fritz stated that Montana had reviewed the project and concurred that points of diversion in Montana would be required to service the land included in the project. He stated that any diversion in Montana would, indeed, require a Montana permit.

Mr. Fassett commented that water used to irrigate lands in Wyoming would be a Wyoming allocation under the Compact regardless of the point of diversion.

Mr. Fritz asked when the alternative points of diversion would be used.

Ms. Lowry stated that she did not know at this time.

Mr. Fassett commented that the Wyoming process would require specificity on when and where diversions would occur. He added that the alternative points of diversion in Montana would logically require a permit from Montana. Wyoming would not issue a permit that would allow diversions from points in Montana.

Mr. Fritz suggested that the applicant contact the Montana Department of Natural Resources and Conservation to obtain an application for a permit. He stated that Montana would process the application as quickly as possible and would probably have the permit issued within 90 days.

Several questions were raised about which lands would be irrigated by the alternative points of diversion. The Commission decided that the application would need to be clarified but that it would eventually be submitted through the Compact Rules for Interstate Ditches for approval.

Mr. Fassett asked Mr. Horak for an update on the issue of the Federal Representative's voting status.

Mr. Horak stated that he will provide a copy of the Commission's annual report to Mr. Cohen and ask him to comment on the Commission's recent deliberations. He stated that Mr. Cohen probably would want to consider the Commission's proposed plan to resolve issues through a consensus-building process before responding.

Mr. Fritz asked if Mr. Cohen might allow the Federal Representative to vote on matters that already had been thoroughly examined by the State Representatives through a formalized process designed to eliminate frivolous questions or questions not ripe for decision--a process designed to develop consensus on an issue before bringing it to a vote of the Commission.

Mr. Horak stated that Mr. Cohen's position was clear on the issue of the voting status of the Federal Representative. He commented that Mr. Cohen might suggest that a neutral arbitrator be used to resolve issues that were unable to be resolved through the consensus process.

Mr. McKinney asked what role the U.S. Geological Survey would accept in the issue resolution process.

Mr. Horak stated that the U.S. Geological Survey would be willing to assist the Commission in reaching consensus by serving as a technical resource, but would not agree to arbitrate or formally endorse either State's point of view when differing positions on some issue were brought to the negotiating table.

Mr. McKinney asked Mr. Horak to comment on the potential for future changes in the USGS position on the issue. He noted that a change in the USGS position could result in a reversal in Commission rulings if the Federal Representative were allowed to cast a deciding vote after an arbitrator had resolved an issue.

Mr. Fassett observed that the consensus-building process developed by the Commission would have to include contingency plans to address potential changes in the USGS position.

Mr. Horak noted that the consensus process should include a binding clause that would preclude the Federal Representative from overriding or otherwise affecting decisions developed and endorsed by both States through the process. Mr. Horak suggested that a consensus-building process be drafted and submitted to the Chief Hydrologist for review and comment. He offered to inform the Chief Hydrologist now about the Commission's plan to develop a process designed to reach consensus on issues before bringing them to a vote of the Commission. A provision of that process, in the event of failure to reach consensus on an issue, might be to use an

arbitrator to resolve differences. The USGS representative would serve as a technical resource under the proposed consensus-building and arbitration process. Mr. Horak reaffirmed, however, that a USGS representative would not be allowed to cast deciding votes. If such authority is considered to be an essential requirement of the Federal Representative's role on the Commission, a non-USGS representative should be appointed to serve as chairperson.

Mr. Fassett stated that he was hopeful that the USGS would reconsider the voting issue if an acceptable consensus process were developed.

Mr. Horak suggested that in the event the consensus-building process fails to prevent or dissolve an impasse between Wyoming and Montana on some issue, a 30- to 90-day waiting period might be invoked to allow the USGS representative time to gather additional information, weigh the facts, and offer alternative solutions that might allow consensus to be reached. In that way, the USGS representative could make a contribution to the consensus-building process and assist in the resolution of disagreements between the States without having to cast a tie-breaking vote. If the States still could not agree on an issue, perhaps an outside arbitrator could be contracted to bring about resolution of the issue.

Mr. Fritz stated that the suggested waiting period would be acceptable. He reaffirmed the Montana position that the Federal Representative does not represent the USGS while serving as chairperson of the Commission.

The Yellowstone River Compact Commission held its annual meeting in Billings, Montana, on December 1, 1992. Mr. Gordon W. (Jeff) Fassett, Wyoming State Engineer, the designated representative for Wyoming; Mr. Gary Fritz, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation, the designated representative for Montana; and Mr. W.F. Horak, Jr., U.S. Geological Survey, the designated Federal Representative and Chairperson, were present.

Others present included:

Craig Cooper, Wyoming State Board of Control, Riverton, Wyoming;
Chuck Dalby, Montana Department of Natural Resources and Conservation,
Helena, Montana;
Don Englert, Wyoming State Engineer's Office, Byron, Wyoming;
Keith Kerbel, Montana Department of Natural Resources and Conservation,
Billings, Montana;
Sue Lowry, Wyoming State Engineer's Office, Cheyenne, Wyoming;
Glen McDonald, Montana Department of Natural Resources and Conservation,
Helena, Montana;
Matthew McKinney, Montana Department of Natural Resources and Conservation,
Helena, Montana;
Joe A. Moreland, U.S. Geological Survey, Helena, Montana;
Michael Whitaker, Wyoming State Board of Control, Sheridan, Wyoming.

Mr. Horak called the meeting to order at 9:40 a.m. and introduced members and representatives, outlined the agenda for the meeting, and welcomed attendees to the meeting.

The following items of business were discussed:

1. BUDGET:

Mr. Moreland reported that the budget for fiscal year 1992 was \$40,700, which covered the cost of operating four streamflow-gaging stations specified in the Yellowstone River Compact plus preparation of the annual report. He estimated that the cost of operation and reporting would be \$42,900 for fiscal year 1993, \$45,200 for fiscal year 1994, and \$47,200 for fiscal year 1995.

Mr. Moreland noted that channel migration during periods of low flow has caused difficulty in obtaining accurate streamflow records for the Tongue River at the current gaging station location. An alternative site located closer to the mouth of the Tongue River was inspected during the last period of low flow and was considered to be a more suitable location. The cost of relocating the gaging station

to the alternate site was estimated to be \$13,000, which included cost of replacing the mercury manometer with a pressure transducer system. If the cost were included in the Federal/State cooperative program, each State's share would be \$3,250. The U.S. Geological Survey would provide \$6,500 of the total cost. The relocation could be accomplished at a lesser cost if existing equipment were salvaged and utilized in constructing the new gaging station. Cost under that scenario would be about \$5,000 and each State's share would be about \$1,250. He asked the State Representatives if funding could be made available to move the gage during the 1993 fiscal year.

Mr. Fritz expressed regret that Montana is facing severe financial problems and could not provide the necessary funds.

Mr. Fassett stated that Wyoming budgets 2 years in advance for cost of conducting Yellowstone River Compact business and, because of State budgetary problems, also is unable to fund the project. He suggested that a budget request be submitted for inclusion in the 1996 fiscal year.

Mr. Fritz concurred with Mr. Fassett's recommendation.

2. STREAMFLOW AND RESERVOIR REPORT:

Mr. Moreland distributed tabular summaries and graphical charts of streamflow records and reservoir contents for the water year ending September 30, 1992. Annual streamflow was 102 percent of average for the Clarks Fork Yellowstone River, 82 percent of average for the Bighorn River, 71 percent of average for the Tongue River, and 59 percent of average for the Powder River. All tributaries except for the Clarks Fork of the Yellowstone River experienced smaller annual streamflow in 1992 than in 1991. Annual streamflow in the Clarks Fork of the Yellowstone River at Edgar, Montana, minus diversions to the Whitehorse Canal was 761,100 acre-feet for the 1992 water year. Annual streamflow in the Bighorn River at Bighorn, Montana, minus flow in the Little Bighorn River near Hardin, Montana, (adjusted for change in contents in Bighorn Lake) was 2,099,000 acre-feet for the 1992 water year. Annual streamflow in the Tongue River at Miles City, Montana, was 215,000 acre-feet for the 1992 water year. Annual streamflow in the Powder River near Locate, Montana, was 246,300 acre-feet for the 1992 water year.

Reservoir contents at the end of the water year for reservoirs completed before 1950 were: Bull Lake, 51,510 acre-feet; Pilot Butte Reservoir, 12,520 acre-feet; Buffalo Bill Reservoir, 270,400 acre-feet; and Tongue River Reservoir, 27,840 acre-feet. Reservoir contents at the end of the water year for reservoirs completed after 1950 were: Boysen Reservoir, 525,500 acre-feet; Anchor Reservoir, 784 acre-feet; and Bighorn Lake, 1,026,000 acre-feet.

3. COMPACT ADMINISTRATION:

Mr. Horak commented that the question concerning voting status of the Federal Representative was still unresolved. He noted that Montana had offered to draft a plan for conflict resolution for the Commission's consideration. He asked if the plan was ready for review.

Mr. Fritz stated that Matt McKinney had prepared a plan but it was not ready for distribution. He stated that a copy would be made available for Commission review in July. He asked what effect the change in administration would have on the issue of the Federal Representative's voting status. The issue of conflict resolution might be moot if the new administration changed policy and allowed the Federal Representative to cast tie-breaking votes.

Mr. Horak commented that a change in policy is not likely, even under the new administration. He asked if Montana could briefly outline the conflict resolution plan for the Commission.

Mr. McKinney stated that he and Sue Lowry had prepared a draft plan that consisted of three levels of activity. At the first level, the States would work together to reach consensus. At that level, the Federal Representative could play an important role in the process by serving as a technical advisor. If the consensus

process is unsuccessful, a mediation process could be implemented. At that level of conflict resolution, a mediator would be hired by the States to assist them in reaching an agreement. The mediation level of the process could be constrained by a 30-day time limit to encourage early resolution. In the event that resolution is not achieved by the end of the allotted time, several options could be considered. The Commission could request binding arbitration from the mediator, an alternate Federal Representative could be selected to cast a deciding vote, or a new Federal representative with voting authority could be named as the Chairperson of the Commission to replace the U.S. Geological Survey member.

Mr. McKinney's presentation generated considerable discussion about the problems associated with the Chairperson's inability to cast votes on questions before the Commission. The State Representatives both expressed chagrin that the Yellowstone River Compact cannot be used to resolve issues without developing a process to circumvent the Federal Representative's inability to vote. A number of options to select a Federal Representative with voting status were explored. Mr. Fassett and Mr. Fritz agreed to compile a list of potential candidates who could replace the current Federal Representative and Chairperson. Both State Representatives also agreed that Mr. McKinney should continue refining the conflict resolution process and submit a draft copy of a plan for the Commission's consideration.

Mr. Horak noted that Mr. Fritz had asked that the Commission consider the issue of quantification of appropriated and unappropriated water and asked him to elaborate.

Mr. Fritz stated that the Montana Department of Natural Resources and Conservation is frustrated by the absence of a methodology to administer the Compact. He reported that his staff had compiled information on pre- and post-1950 water use in Wyoming. Based on that information, he had concluded that pre-1950 use impacts Montana and evidence suggests that post-1950 use also affects Montana's utilization of water in the basin. He noted that the impacts do not occur every year but that they do occur. He stated that he was skeptical that the Commission would proactively establish an administrative method and process and, after years of attempting to have such a system adopted by the Commission, would no longer pursue such an action. He suggested that it would be appropriate, however, for the Commission to begin a good faith effort to quantify the availability of water for future development in terms of post-1950 water use. Some specific topics that the Commission could consider include Indian water rights, supplemental water rights in Wyoming, water-quality problems, and unperfected pre-1950 water rights. He suggested that the Commission consider these potential problems before they become major and urgent issues. Until these issues are investigated and resolved, neither State can proceed with water development planning activities.

Mr. Cooper asked if Montana had prepared a paper on their investigation that Wyoming could review.

Mr. Dalby stated that he hoped to have a releasable document completed within 6 months. He commented that the framers of the Compact envisioned construction of mid-basin reservoirs that would facilitate water apportionment between the States. Without reservoirs, allocation of water requires use of predictive runoff models that are difficult to develop. He also noted that the Compact allocates all of the water between the States which is not practical in terms of contemporary water resources management considerations such as protection of instream flows. He noted that these issues would be more easily addressed in a consensus-building process than they would be after problems arose.

Mr. Horak asked if Montana could provide a compilation of the issues that concern them.

Mr. Fritz stated that a compilation could be prepared.

Mr. Fassett commented that he was not aware that the topic would be on the agenda of the meeting and, consequently, was not prepared to discuss it. He stated that he was worried about the issues that Montana raised. He asked if Montana could cite specific examples of injury. He stated that he saw little benefit from resolving issues in the abstract but agreed that real issues should be addressed.

After discussion concerning the issue of nonperfected, pre-1950 water rights and Montana's desire to quantify water use in the basin, Mr. Horak asked Mr. Fritz if he wanted to present the issue to the Commission.

Mr. Fritz stated that a proactive approach to resolving long-standing Compact issues seems prudent but the Commission has historically been unwilling to address issues other than in a crisis mode.

Mr. Fassett noted that some issues probably should be considered now and cited Montana's Federal Reserved Water Rights Compact Commission negotiations with the Crow Reservation as an example.

Mr. Fassett requested that Montana keep Wyoming apprised of negotiations with the Crow Tribe and give consideration to inviting Wyoming to participate in discussions.

4. WYOMING WATER DEVELOPMENT COMMISSION ACTIVITIES:

Mr. Fassett distributed a list of all projects that have been authorized by the Water Development Commission and noted that several of the projects are located in the Yellowstone River Basin and two are of interest to the Commission--Greybull Valley Dam and the Sheridan Area Water Supply Projects. The Greybull Valley Dam project involves construction of 25,000 acre-feet of off-stream storage. No new lands would be put into production. The sponsors of the project have requested authorization to fill the storage facility twice each year instead of once. This request raises new water rights questions in Wyoming that need to be resolved. The Sheridan Area Water Supply project will provide water for municipal supplies to satisfy U.S. Environmental Protection Agency requirements for replacement of raw water currently being supplied for domestic use. The project involves enlargement of the existing Twin Lakes Reservoirs from 3,500 to 5,000 acre-feet. The project has encountered problems in obtaining a 404 permit because of questions regarding protection of wetlands.

5. MISCELLANEOUS INFORMATION ITEMS:

Mr. Fassett provided a brief status report on coal bed methane activities in Wyoming. About 60 requests have been filed for permits to dewater coal beds but only about 20 projects are being pursued. One company has used water pumped from coal beds to produce a wetland to demonstrate beneficial use. Others have used water to supply stockwater to ranches.

Mr. Fassett reported that the Buffalo Bill Dam Rehabilitation project has been completed. The project involved enlargement of a U.S. Bureau of Reclamation project. Wyoming controls the marketing of the new storage.

Mr. Fassett reported that a 3 to 2 court decision on Wind River Indian Reservation litigation reversed a lower court decision and denies the tribal government permission to convert reserved water rights based on Practicably Irrigable Acres (PIA) to other uses. The tribes have decided not to appeal the decision. The decision provides a narrow answer to a narrow question concerning the conversion of unused water rights reserved for PIA's. A joint study involving the U.S. Bureau of Reclamation, U.S. Soil Conservation Service, U.S. Geological Survey, University of Wyoming, and the Bureau of Indian Affairs is being conducted to analyze water demands, irrigation efficiency, potential new reservoir sites, and feasibility of enlarging existing storage facilities. The joint study will hopefully help resolve water conflicts that will arise when the tribes begin exercising their reserved water rights.

Mr. Fassett noted that a State district court awarded treaty-based water rights (Walton Right) to non-Indian water users with an Indian Reserved Water Right priority date of 1868. The tribes are opposed to the concept of Walton Rights and will appeal the decision. The court ordered the State of Wyoming to cancel all overlapping individual State-issued water rights on the reservation when the court awarded the tribes an 1868 tribal water right.

Mr. Fassett reported that the Little Bighorn Pumped Hydro project is still attempting to obtain a FERC permit. Several environmental issues have arisen, including elk habitat and fishery spawning grounds. No contracts have been obtained for sale of electric power to be generated.

Mr. Fritz reported that Montana's Reserved Water Rights Compact Commission is negotiating with Native American tribes in the Milk River basin. He stated that the Commission is negotiating reserved water rights for Yellowstone National Park. The negotiated settlement will probably include a controlled ground water area to protect geothermal features of the Park. He noted that the Church Universal and Triumphant drilled a geothermal well near the Park boundary. The well produces less than 35 gallons per minute. Montana plans to issue a certificate that recognizes the Church's use of the water for a therapeutic pool and irrigation.

Mr. Fritz reported that Congress has authorized funding for the Tongue River Reservoir Rehabilitation project. Montana and Wyoming have agreed on operation of the enlarged reservoir. He noted that the negotiated compact with the Northern Cheyenne Reservation can be dissolved by the tribes through a referendum process. An objector to the compact has secured a sufficient number of signatures to require a vote on overturning the agreement. The tribal government has 60 days to hold a referendum vote. The tribal constitution requires a 30 percent voter turnout plus a majority vote for the referendum to succeed.

Mr. McDonald stated that Montana is currently preparing an Environmental Impact Statement for the rehabilitation project. Cultural surveys have been completed and public scoping meetings are scheduled. Final design work should be completed between late 1994 and mid-1995. Construction activities hopefully will begin in 1995.

Mr. Fassett observed that the agreement on the operational model is a demonstration that the States can resolve issues in a timely fashion when the issues are ripe.

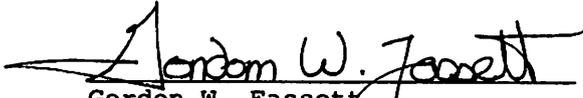
Ms. Lowry reported that the McCarthy Ditch issue remains unresolved. A Wyoming irrigator with land in Wyoming and Montana has requested a permit to divert water from the Tongue River in Wyoming with alternate points of diversion in Montana. Mr. Dalby, Mr. Kerbel, Mr. Whitaker, and Mr. Baccari visited the lands in question and agreed that the irrigator could irrigate lands in Montana and Wyoming using several points of diversion in both States. Mr. Fritz stated that any diversion in Montana would require a Montana permit. Mr. Fassett noted that the situation creates a potential for illegal diversion of water to irrigate new land in Montana using a Wyoming water right. The Commission ruled that the irrigator must modify his application to Wyoming by eliminating the proposed alternative points of diversion in Montana and submit a permit application to Montana for the alternate diversion points.

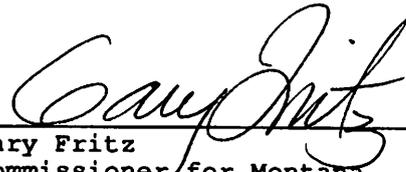
Mr. Fassett asked if Montana planned to respond to his request to participate in negotiations with the Crow Reservation on their reserved water rights. He noted that water rights issues related to the Crow Reservation are more critical to Wyoming than the issues related to the Northern Cheyenne Reservation.

Mr. Fassett reported that a group in Wyoming was exploring opportunities to market excess water from Lake DeSmet to Montana water users. He asked if Montana had considered how it would differentiate natural streamflow from the releases from Lake DeSmet to protect the buyers rights. Mr. Whitaker noted that the sellers hoped to market 10,000 acre-feet of water. Mr. Dalby stated that the most likely buyer is the first water user on the Powder River in Montana, although one potential purchaser is located several miles downstream.

Mr. Fassett asked Mr. Fritz to provide names of candidates to replace the current chairperson. Mr. Horak suggested that Montana and Wyoming provide their list of candidates to the Director of the U.S. Geological Survey for his consideration. Mr. Fassett observed that they may want to postpone their request for a replacement until the new administration has reappointed the incumbent Director or named a new Director.

Having no other business, the Commission adjourned the meeting at 2:15 p.m.


Gordon W. Fassett
Commissioner for Wyoming


Gary Fritz
Commissioner for Montana


William F. Horak
Federal Representative

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GENERAL REPORT

Cost of operation and budget

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 U.S. Geological Survey representatives, and the cost to other agencies of collecting hydrologic data, are not considered as expenses of the Commission.

The expense of the Commission during fiscal year 1992 was \$40,700, in accordance with the budget adopted for the year.

The budgets for fiscal years 1993, 1994, and 1995 were tentatively adopted subject to the availability of appropriations.

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

October 1, 1991, to September 30, 1992 (fiscal year 1992):

Continuation of existing stream-gaging programs \$40,700

October 1, 1992, to September 30, 1993 (fiscal year 1993):

Continuation of existing stream-gaging programs \$42,900

October 1, 1993, to September 30, 1994 (fiscal year 1994):

Estimate of continuation of existing stream-gaging programs \$45,200

October 1, 1994, to September 30, 1995 (fiscal year 1995):

Estimate of continuation of existing stream-gaging programs \$47,500

Stream-gaging-station operation

Gaging stations at the measuring sites specified in the Compact were continued in operation and satisfactory discharge records were collected at each station. Locations of gaging and reservoir stations are shown on a map of the Yellowstone River Basin at the end of the report.

During water year 1992, annual streamflow was less than normal¹ in two of the four tributaries of the Yellowstone River as given in the following table:

| <u>Station number</u> | <u>Measurement site</u> | <u>Percent of average</u> |
|-----------------------|--|---------------------------|
| 06208500 | Clarks Fork Yellowstone River at Edgar, Mont., minus diversions to Whitehorse Canal | 102 |
| 06294500 | Bighorn River at Bighorn, Mont., minus Little Bighorn River near Hardin, Mont. Adjusted for change in contents in Bighorn Lake | 82 |
| 06308500 | Tongue River at Miles City, Mont. | 71 |
| 06326500 | Powder River near Locate, Mont. | 59 |

Tabulation of streamflow data for water year 1992 and graphical comparisons with average flows for the preceding year and for selected base periods are given in the section "Monthly summary of discharge for Compact stream-gaging stations."

Diversions

No diversions were regulated by the Commission during the year. The Commissioners considered the need to develop procedures to administer water in accordance with the provisions of the Compact.

Storage in reservoirs

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 1,046,000 acre-feet at the beginning of the year and 1,026,000 acre-feet at the close. It fluctuated from 803,500 acre-feet on May 6, 1952, to 1,079,000 acre-feet on July 27, 1952. Boysen Reservoir, located on the Wind River and operated by the U.S. Bureau of Reclamation, began the year with 646,900 acre-feet in storage and ended with 525,500 acre-feet. Monthend and yearend contents and a description of these reservoirs are given in the section "Monthly summary of contents for Compact reservoirs completed after January 1, 1950." The Commission is cognizant of other reservoirs in the Yellowstone River basin and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

Reservoirs existing on January 1, 1950

As a matter of record and general information, monthend storage data are given later in the report for reservoirs in existence upstream from the points of measurement on January 1, 1950. These data are pertinent to allocation under Article V, Section C, Item 3 of the Compact.

¹The "normal" range is 80 to 120 percent of average.

SUMMARY OF DISCHARGE FOR COMPACT STREAM-GAGING STATIONS

06208500 Clarks Fork Yellowstone River at Edgar, Mont.

LOCATION.--Lat 45°27'58", long 108°50'35", in SE1/4SE1/4SE1/4 sec.23, T.4 S., R.23 E., Carbon County, Hydrologic Unit 10070006, on right bank 400 ft downstream from county bridge, 0.5 mi east of Edgar, 6 mi upstream from Rock Creek, and at river mile 22.1.

DRAINAGE AREA.--2,032 mi².

PERIOD OF RECORD.--July 1921 to September 1969, October 1986 to current year.

REVISED RECORDS.--WSP 1509: 1924, 1932(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,460 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Aug. 31, 1953, recording gage at same site and datum.

REMARKS.--Estimated daily discharges: Oct. 27 to Nov. 7, Nov. 28 to Dec. 4, Jan. 14-31. Records good except those for the estimated daily discharges, which are poor. Diversions for irrigation of about 41,500 acres, of which about 840 acres lies downstream from the station. In addition, about 6,300 acres of land upstream from the station are irrigated by diversions from the adjoining Rock Creek basin. Several observations of water temperature and specific conductance were made during the year. Figures of discharge given herein have the flow of White Horse Canal subtracted.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|-------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|-------|
| 1 | 585 | 430 | e380 | 424 | 385 | 344 | 405 | 2140 | 2890 | 3820 | 797 | 292 |
| 2 | 581 | e380 | e400 | 415 | 365 | 354 | 432 | 2010 | 2760 | 3310 | 743 | 270 |
| 3 | 572 | e430 | e500 | 449 | 358 | 366 | 459 | 1800 | 3010 | 2860 | 771 | 264 |
| 4 | 564 | e480 | e620 | 443 | 356 | 377 | 530 | 1830 | 3180 | 2620 | 763 | 257 |
| 5 | 563 | e540 | 617 | 463 | 339 | 365 | 666 | 2000 | 3100 | 2850 | 686 | 288 |
| 6 | 552 | e640 | 597 | 475 | 338 | 392 | 640 | 2330 | 3130 | 2710 | 626 | 365 |
| 7 | 538 | e640 | 666 | 468 | 335 | 414 | 552 | 2730 | 2740 | 2540 | 567 | 495 |
| 8 | 518 | 635 | 578 | 433 | 337 | 396 | 491 | 3250 | 2420 | 2350 | 512 | 572 |
| 9 | 505 | 629 | 533 | 403 | 346 | 380 | 474 | 3630 | 2360 | 2100 | 521 | 582 |
| 10 | 503 | 629 | 527 | 420 | 354 | 369 | 476 | 3360 | 2510 | 1890 | 466 | 522 |
| 11 | 499 | 619 | 543 | 462 | 354 | 353 | 512 | 2470 | 2910 | 1760 | 361 | 532 |
| 12 | 491 | 597 | 517 | 462 | 373 | 349 | 544 | 1970 | 3210 | 1760 | 275 | 524 |
| 13 | 466 | 582 | 496 | 447 | 350 | 358 | 513 | 1640 | 3360 | 1910 | 237 | 522 |
| 14 | 463 | 607 | 527 | e360 | 344 | 377 | 681 | 1380 | 3370 | 1760 | 221 | 535 |
| 15 | 458 | 604 | 527 | e300 | 339 | 404 | 814 | 1340 | 3840 | 1630 | 209 | 536 |
| 16 | 446 | 552 | 562 | e320 | 335 | 428 | 885 | 1780 | 6290 | 1510 | 220 | 490 |
| 17 | 440 | 519 | 562 | e300 | 336 | 455 | 930 | 2060 | 4990 | 1400 | 228 | 465 |
| 18 | 484 | 544 | 548 | e330 | 328 | 450 | 1100 | 2100 | 4290 | 1300 | 227 | 471 |
| 19 | 448 | 568 | 489 | e370 | 325 | 438 | 1000 | 2840 | 4030 | 1220 | 234 | 513 |
| 20 | 434 | 547 | 503 | e400 | 327 | 412 | 877 | 3560 | 4010 | 1350 | 204 | 525 |
| 21 | 443 | 542 | 496 | e400 | 333 | 398 | 726 | 4040 | 3900 | 1580 | 252 | 526 |
| 22 | 426 | 547 | 488 | e420 | 335 | 390 | 701 | 3930 | 3790 | 2150 | 312 | 524 |
| 23 | 453 | 506 | 434 | e400 | 337 | 376 | 741 | 3400 | 3840 | 1950 | 408 | 484 |
| 24 | 494 | 472 | 449 | e420 | 335 | 368 | 731 | 3660 | 3850 | 1770 | 491 | 466 |
| 25 | 493 | 490 | 457 | e410 | 331 | 379 | 587 | 4100 | 3910 | 1550 | 541 | 459 |
| 26 | 498 | 562 | 489 | e430 | 326 | 371 | 572 | 4310 | 3800 | 1400 | 493 | 490 |
| 27 | 493 | 558 | 472 | e430 | 331 | 370 | 586 | 4560 | 3440 | 1260 | 469 | 523 |
| 28 | 473 | e500 | 459 | e440 | 334 | 378 | 919 | 4710 | 3290 | 1110 | 416 | 545 |
| 29 | 452 | e420 | 445 | e450 | 340 | 391 | 1290 | 3940 | 3190 | 1020 | 366 | 552 |
| 30 | 434 | e350 | 449 | e490 | --- | 384 | 1720 | 3480 | 3710 | 948 | 341 | 499 |
| 31 | 468 | --- | 426 | e410 | --- | 382 | --- | 3210 | --- | 897 | 325 | --- |
| TOTAL | 15237 | 16119 | 15756 | 12844 | 9926 | 11968 | 21554 | 89560 | 105120 | 58285 | 13282 | 14088 |
| MEAN | 492 | 537 | 508 | 414 | 342 | 386 | 718 | 2889 | 3504 | 1880 | 428 | 470 |
| MAX | 585 | 640 | 666 | 490 | 385 | 455 | 1720 | 4710 | 6290 | 3820 | 797 | 582 |
| MIN | 426 | 350 | 380 | 300 | 325 | 344 | 405 | 1340 | 2360 | 897 | 204 | 257 |
| AC-FT | 30220 | 31970 | 31250 | 25480 | 19690 | 23740 | 42750 | 177600 | 208500 | 115600 | 26340 | 27940 |
| e Estimated | | | | | | | | | | | | |

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1992, BY WATER YEAR (WY)

| | 534 | 501 | 406 | 356 | 354 | 362 | 557 | 2084 | 4043 | 2046 | 628 | 499 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| MEAN | 534 | 501 | 406 | 356 | 354 | 362 | 557 | 2084 | 4043 | 2046 | 628 | 499 |
| MAX | 1010 | 777 | 583 | 779 | 616 | 554 | 1398 | 5578 | 6843 | 4771 | 1541 | 1395 |
| (WY) | 1942 | 1928 | 1951 | 1970 | 1970 | 1943 | 1943 | 1928 | 1927 | 1943 | 1951 | 1941 |
| MIN | 298 | 310 | 217 | 200 | 180 | 220 | 123 | 757 | 1768 | 290 | 49.5 | 156 |
| (WY) | 1956 | 1936 | 1937 | 1922 | 1922 | 1924 | 1961 | 1968 | 1987 | 1988 | 1988 | 1988 |

SUMMARY STATISTICS

| | FOR 1991 CALENDAR YEAR | FOR 1992 WATER YEAR | WATER YEARS 1921 - 1992* |
|--------------------------|------------------------|---------------------|--------------------------|
| ANNUAL TOTAL | 370264 | 383739 | |
| ANNUAL MEAN | 1014 | 1048 | 1030 |
| HIGHEST ANNUAL MEAN | | | 1558 |
| LOWEST ANNUAL MEAN | | | 668 |
| HIGHEST DAILY MEAN | 8020 | 6290 | 10600 |
| LOWEST DAILY MEAN | 131 | 204 | 37 |
| ANNUAL SEVEN-DAY MINIMUM | 157 | 220 | 43 |
| INSTANTANEOUS PEAK FLOW | | 7190 | 10900a |
| INSTANTANEOUS PEAK STAGE | | 7.60 | 8.66 |
| INSTANTANEOUS LOW FLOW | | 189 | 36 |
| ANNUAL RUNOFF (AC-FT) | 734400 | 761100 | 746500 |
| 10 PERCENT EXCEEDS | 2930 | 3180 | 2820 |
| 50 PERCENT EXCEEDS | 495 | 509 | 470 |
| 90 PERCENT EXCEEDS | 230 | 338 | 274 |

*--During period of operation.
a--Gage height, 8.62 ft.

CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MONT.
 (Minus diversions to Whitehorse Canal)

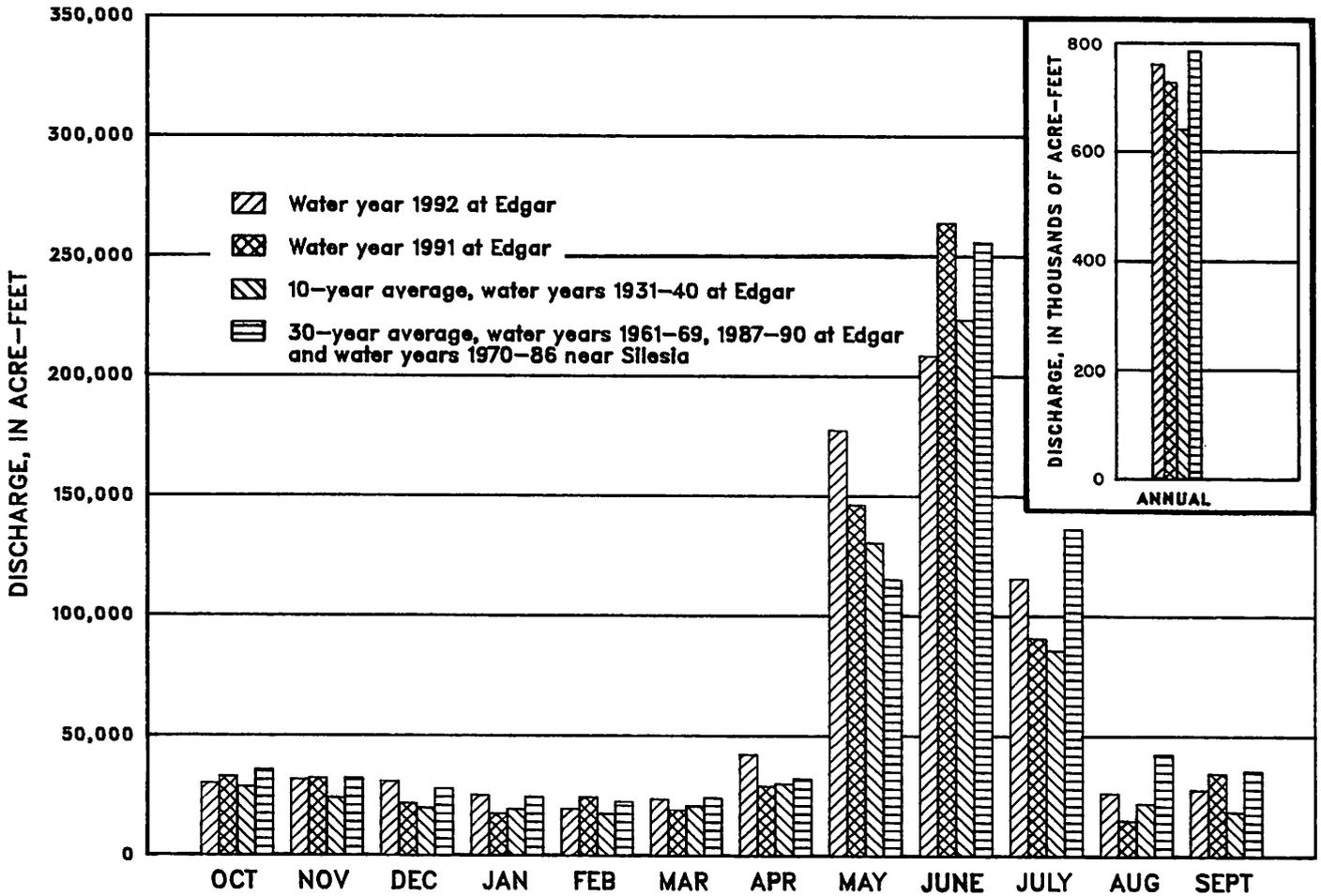


Figure 1.--Comparison of discharge of the Clarks Fork Yellowstone River during water year 1992 with discharge during water year 1991 and with 10-year and 30-year average discharges.

06294500 Bighorn River above Tullock Creek, near Bighorn, Mont.

LOCATION.--Lat 46°07'29", long 107°28'06", in SE1/4SE1/4NE1/4 sec.3, T.4 N., R.34 E., Treasure County, Hydrologic Unit 10080015, on right bank, 1.9 mi upstream from Tullock Creek, 3.0 mi upstream from mouth, 3.6 mi southwest of Bighorn, and 4.5 mi southeast of Custer.

DRAINAGE AREA.--22,414 mi². Area at site used Oct. 7, 1955, to Sept. 30, 1981, 22,885 mi².

PERIOD OF RECORD.--October 1981 to current year. Previously published as "06294700 Bighorn River at Bighorn, MT" 1956-81, and as "near Custer" 1945-55. Flows are equivalent at all sites.

GAGE.--Water-stage recorder. Elevation of gage is 2,700 ft above National Geodetic Vertical Datum of 1929, from topographic map. May 11, 1945 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder 1.7 mi upstream at different datum. Oct. 7, 1955, to Sept. 30, 1981, at site 2.3 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Jan. 15, 16. Records good. Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft). 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. Diversion for irrigation of about 445,200 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | 4510 | 3470 | 4180 | 3630 | 3520 | 2580 | 2540 | 2600 | 2490 | 3050 | 3490 | 2450 |
| 2 | 4550 | 3490 | 4280 | 3630 | 3510 | 2580 | 2560 | 2600 | 2400 | 3060 | 3530 | 2360 |
| 3 | 4500 | 3510 | 4300 | 3640 | 3500 | 2580 | 2580 | 2660 | 2440 | 2990 | 3500 | 2320 |
| 4 | 4510 | 3530 | 4350 | 3600 | 3470 | 2540 | 2590 | 2630 | 2380 | 3230 | 3440 | 2350 |
| 5 | 4470 | 3620 | 4390 | 3600 | 3480 | 2530 | 2560 | 2570 | 2360 | 3080 | 3500 | 2370 |
| 6 | 4500 | 3740 | 4450 | 3620 | 3470 | 2600 | 2560 | 2610 | 2370 | 2940 | 3520 | 2320 |
| 7 | 4520 | 3750 | 4490 | 3620 | 3460 | 2580 | 2540 | 2690 | 2450 | 2780 | 3520 | 2350 |
| 8 | 4540 | 3800 | 4280 | 3610 | 3450 | 2630 | 2530 | 2810 | 2510 | 2740 | 3550 | 2370 |
| 9 | 4540 | 3930 | 4270 | 3590 | 3430 | 2670 | 2530 | 2860 | 2450 | 2770 | 3570 | 2320 |
| 10 | 4530 | 4080 | 4280 | 3590 | 3440 | 2670 | 2560 | 2970 | 2440 | 2850 | 3640 | 2360 |
| 11 | 3760 | 4130 | 4170 | 3600 | 3430 | 2640 | 2540 | 3030 | 2480 | 2870 | 3660 | 2360 |
| 12 | 3310 | 4120 | 4110 | 3590 | 3400 | 2620 | 2540 | 2870 | 2510 | 2910 | 3550 | 2360 |
| 13 | 3180 | 4120 | 4170 | 3580 | 3120 | 2600 | 2540 | 2670 | 2520 | 2950 | 3270 | 2320 |
| 14 | 3120 | 4160 | 4130 | 3580 | 2860 | 2600 | 2520 | 2610 | 2550 | 2980 | 3090 | 2280 |
| 15 | 3120 | 4250 | 4050 | e3600 | 2610 | 2580 | 2500 | 2510 | 2990 | 2940 | 3110 | 2230 |
| 16 | 3140 | 4110 | 4050 | e3600 | 2600 | 2590 | 2410 | 2500 | 3260 | 2850 | 3150 | 2190 |
| 17 | 3140 | 3990 | 4070 | 3510 | 2610 | 2680 | 2480 | 2550 | 3570 | 2770 | 3100 | 2140 |
| 18 | 3180 | 4000 | 4090 | 3500 | 2610 | 2640 | 2570 | 2560 | 3800 | 2710 | 2990 | 2160 |
| 19 | 3160 | 3960 | 4110 | 3510 | 2600 | 2680 | 2590 | 2480 | 3680 | 2700 | 2990 | 2150 |
| 20 | 3170 | 4030 | 4090 | 3510 | 2610 | 2680 | 2620 | 2350 | 3240 | 2700 | 2970 | 2420 |
| 21 | 3200 | 4080 | 3740 | 3510 | 2590 | 2660 | 2660 | 2390 | 3110 | 2710 | 3000 | 2420 |
| 22 | 3230 | 4090 | 3730 | 3520 | 2600 | 2650 | 2650 | 2660 | 3100 | 3090 | 2810 | 2390 |
| 23 | 3390 | 4040 | 3700 | 3500 | 2610 | 2650 | 2670 | 2760 | 3090 | 3550 | 2630 | 2380 |
| 24 | 3350 | 4010 | 3700 | 3520 | 2570 | 2610 | 2740 | 2800 | 3090 | 3950 | 2670 | 2340 |
| 25 | 3350 | 4050 | 3720 | 3530 | 2610 | 2560 | 2730 | 2710 | 3080 | 3870 | 2690 | 2290 |
| 26 | 3380 | 4240 | 3700 | 3530 | 2610 | 2550 | 2760 | 2670 | 2770 | 3810 | 2720 | 2260 |
| 27 | 3410 | 4280 | 3700 | 3520 | 2620 | 2560 | 2650 | 2570 | 2490 | 3720 | 2700 | 2220 |
| 28 | 3500 | 4310 | 3650 | 3520 | 2580 | 2580 | 2670 | 2500 | 2500 | 3480 | 2620 | 2190 |
| 29 | 3470 | 4270 | 3640 | 3530 | 2600 | 2570 | 2640 | 2440 | 2510 | 3420 | 2540 | 2160 |
| 30 | 3420 | 4230 | 3630 | 3510 | --- | 2540 | 2620 | 2500 | 2670 | 3430 | 2490 | 2140 |
| 31 | 3410 | --- | 3630 | 3520 | --- | 2540 | --- | 2510 | --- | 3430 | 2480 | --- |
| TOTAL | 114560 | 119390 | 124850 | 110420 | 86570 | 80740 | 77650 | 81640 | 83300 | 96330 | 96490 | 68970 |
| MEAN | 3695 | 3980 | 4027 | 3562 | 2985 | 2605 | 2588 | 2634 | 2777 | 3107 | 3113 | 2299 |
| MAX | 4550 | 4310 | 4490 | 3640 | 3520 | 2680 | 2760 | 3030 | 3800 | 3950 | 3660 | 2450 |
| MIN | 3120 | 3470 | 3630 | 3500 | 2570 | 2530 | 2410 | 2350 | 2360 | 2700 | 2480 | 2140 |
| AC-FT | 227200 | 236800 | 247600 | 219000 | 171700 | 160100 | 154000 | 161900 | 165200 | 191100 | 191400 | 136800 |
| e Estimated | | | | | | | | | | | | |

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1946 - 1992, BY WATER YEAR (WY)

| | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | |
|------|------|------|------|------|------|------|------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|--|
| MEAN | 3248 | 3369 | 3193 | 3049 | 3225 | 3757 | 3496 | 4409 | 7106 | 5292 | 2758 | 2806 | | | | | | | | | | |
| MAX | 5546 | 5599 | 4907 | 5478 | 5314 | 6580 | 7203 | 9102 | 15180 | 19090 | 6567 | 4952 | | | | | | | | | | |
| (WY) | 1972 | 1974 | 1968 | 1968 | 1971 | 1972 | 1972 | 1947 | 1948 | 1967 | 1978 | 1973 | | | | | | | | | | |
| MIN | 1391 | 1223 | 1280 | 1382 | 1843 | 908 | 1063 | 1304 | 1050 | 707 | 868 | 1009 | | | | | | | | | | |
| (WY) | 1990 | 1978 | 1961 | 1961 | 1966 | 1966 | 1966 | 1966 | 1966 | 1960 | 1961 | 1966 | | | | | | | | | | |

SUMMARY STATISTICS

| | FOR 1991 CALENDAR YEAR | FOR 1992 WATER YEAR | FOR WATER YEARS 1946 - 1992 |
|--------------------------|------------------------|---------------------|-----------------------------|
| ANNUAL TOTAL | 1546410 | 1140910 | |
| ANNUAL MEAN | 4237 | 3117 | 3809 |
| HIGHEST ANNUAL MEAN | | | 5501 |
| LOWEST ANNUAL MEAN | | | 1623 |
| HIGHEST DAILY MEAN | 15200 | Jun 22 | 50000 |
| LOWEST DAILY MEAN | 2130 | Aug 28 | 400 |
| ANNUAL SEVEN-DAY MINIMUM | 2180 | Aug 25 | 528 |
| INSTANTANEOUS PEAK FLOW | | | 59200a |
| INSTANTANEOUS PEAK STAGE | | | 14.21b |
| INSTANTANEOUS LOW FLOW | | | 275c |
| ANNUAL RUNOFF (AC-FT) | 3067000 | 2263000 | 2760000 |
| 10 PERCENT EXCEEDS | 6350 | 4100 | 6220 |
| 50 PERCENT EXCEEDS | 3460 | 2980 | 3200 |
| 90 PERCENT EXCEEDS | 2390 | 2430 | 1800 |

a--Gage height, 14.15 ft.

b--Ice jam.

c--About, result of freezeup.

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

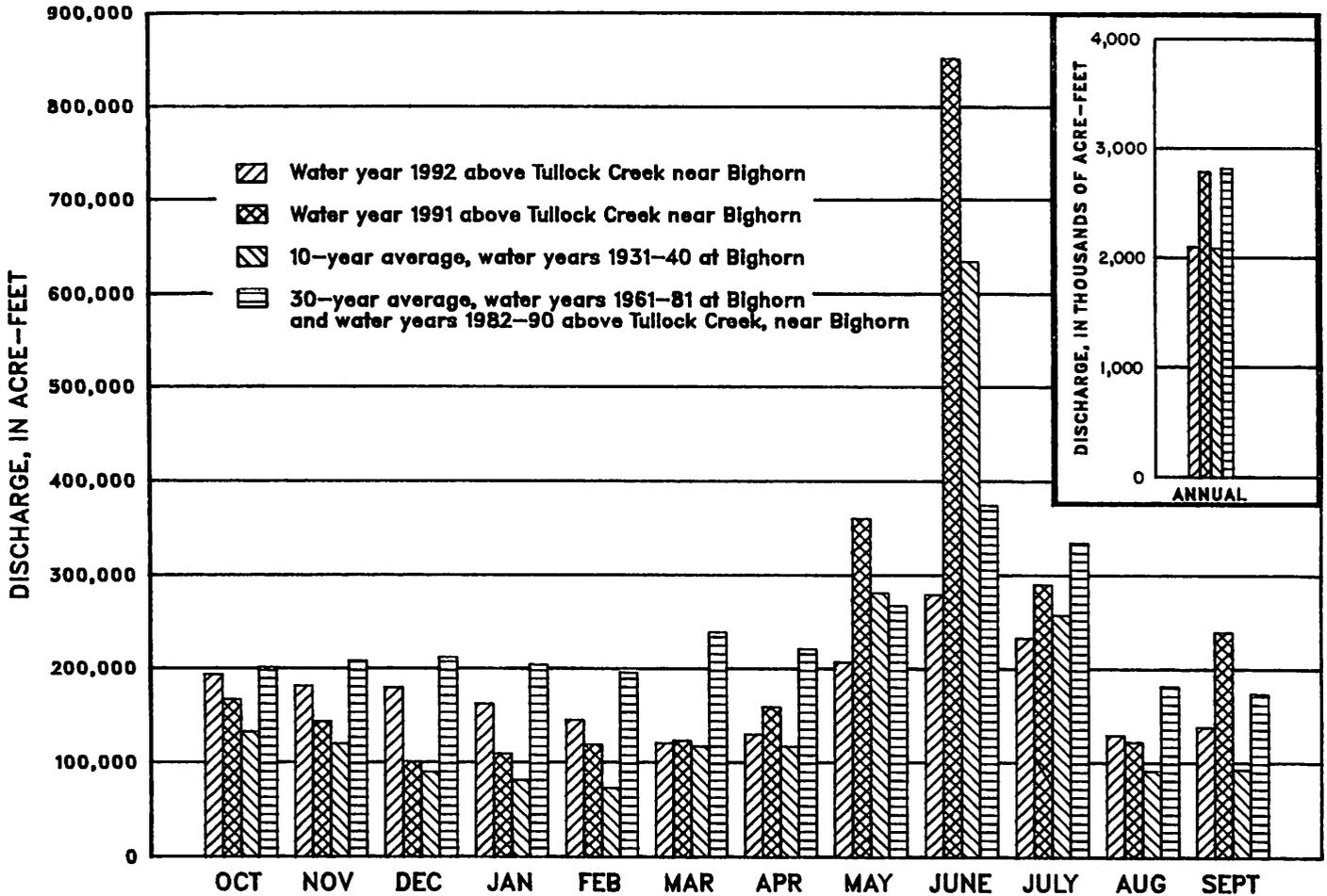


Figure 2.--Comparison of discharge of the Bighorn River during water year 1992 with discharge during water year 1991 and with 10-year and 30-year average discharges.

TONGUE RIVER AT MILES CITY, MONT.

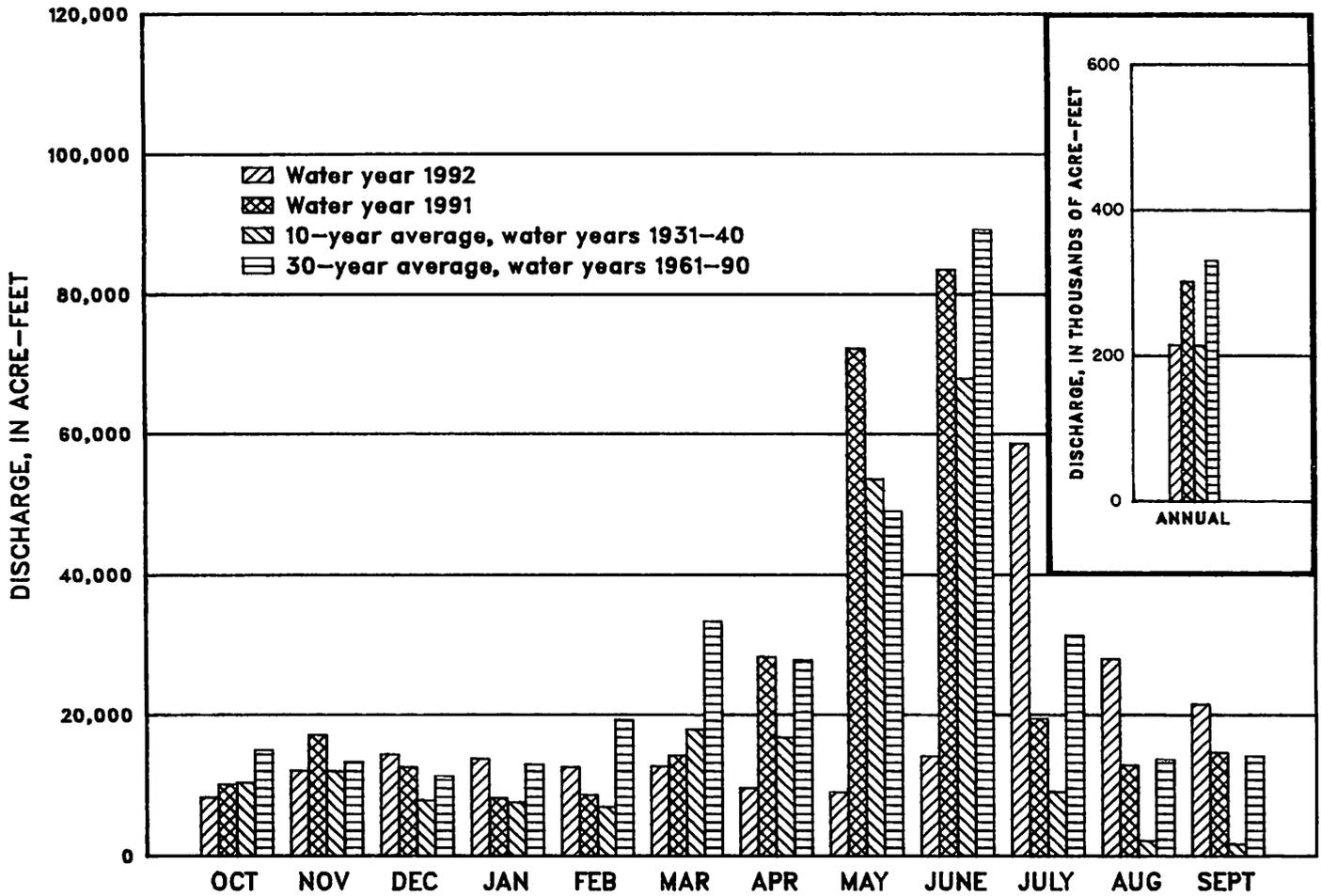


Figure 3.--Comparison of discharge of the Tongue River during water year 1992 with discharge during water year 1991 and with 10-year and 30-year average discharges.

POWDER RIVER NEAR LOCATE, MONT.

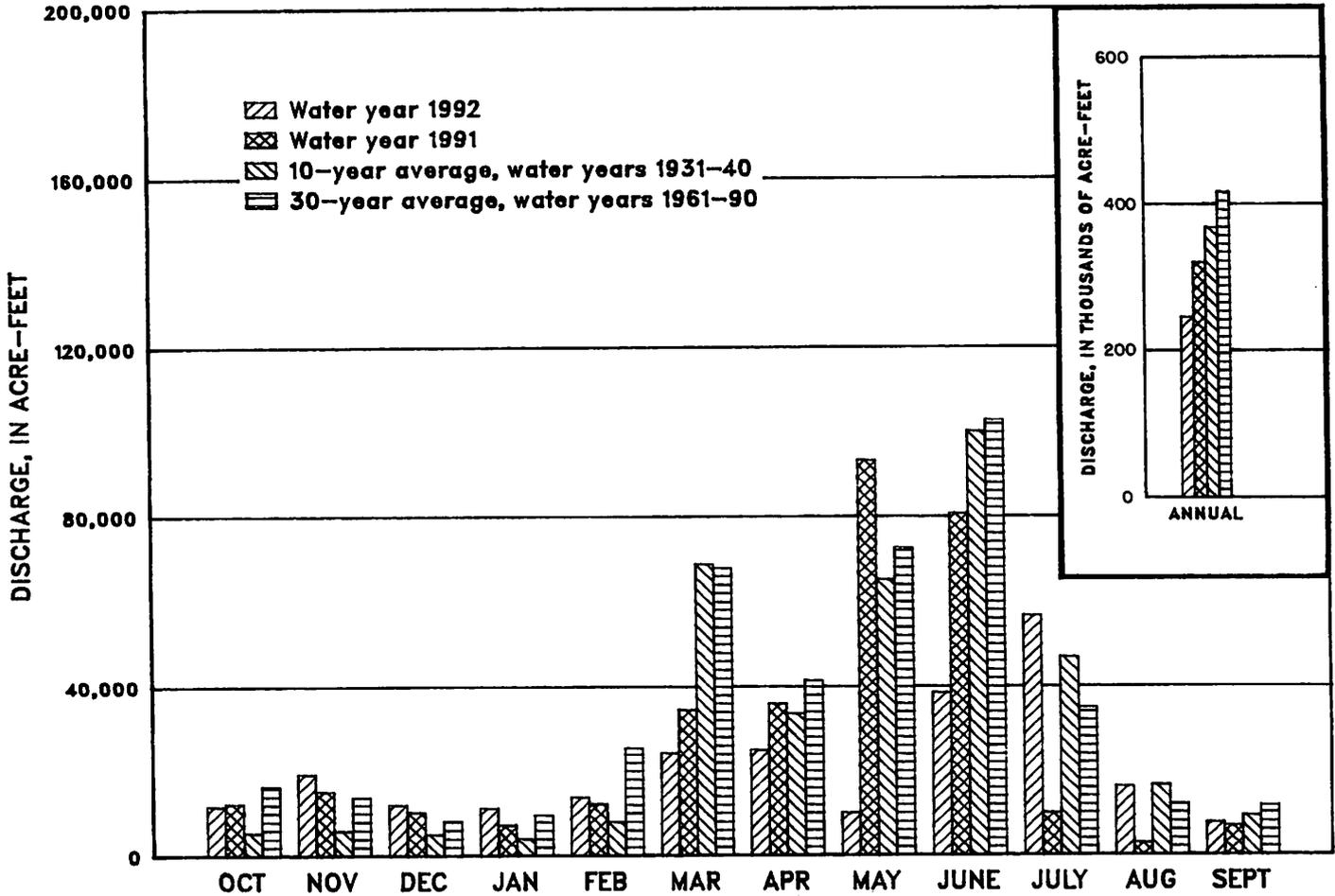


Figure 4.--Comparison of discharge of the Powder River during water year 1992 with discharge during water year 1991 and with 10-year and 30-year average discharges.

MONTHLY SUMMARY OF CONTENTS FOR COMPACT RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

06258900 Boysen Reservoir, Wyo.

LOCATION.--Lat 43°25'00", long 108°10'37", in NW1/4 NW1/4 sec. 16, T. 5 N., R. 6 E., Fremont County, Hydrologic Unit 10080005, at dam on Wind River and 13 mi north of Shoshoni, Wyoming.

DRAINAGE AREA.--7,700 mi².

PERIOD OF RECORD.--October 1951 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. 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 between elevation 4,657.00 ft, invert of penstock pipe, and 4,725.00 ft, top of spillway gate. Dead storage, 59,880 acre-ft below elevation 4,657.00 ft. Prior to Jan. 1, 1966, usable capacity was 757,800 acre-ft and dead storage was 62,000 acre-ft at same elevations. Crest of dam is at elevation 4,758.00 ft. Figures given herein represent usable contents. Water used for irrigation, flood control, and power development.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum usable daily contents, 862,500 acre-ft, July 6, 7, 1967, elevation, 4,730.83 ft; minimum usable daily since normal use of water started, 191,900 acre-ft, Mar. 18, 19, 1956, elevation, 4,684.18 ft, capacity table then in use.

EXTREMES FOR CURRENT YEAR.--Maximum usable contents, 646,000 acre-ft, Oct. 1, elevation, 4,719.86 ft; minimum usable, 475,300 acre-ft, May 25, elevation, 4,709.35 ft.

| Month | Water-surface elevation, in feet | Usable contents, in acre-feet | Change in usable contents, in acre-feet |
|-----------------------------|----------------------------------|-------------------------------|---|
| September 30, 1991. | 4,719.91 | 646,900 | --- |
| October 31. | 4,718.50 | 621,900 | -25,000 |
| November 30 | 4,717.96 | 612,500 | -9,400 |
| December 31 | 4,715.23 | 566,500 | -46,000 |
| January 31, 1992. | 4,711.64 | 508,000 | -58,500 |
| February 29 | 4,710.39 | 490,700 | -17,300 |
| March 31. | 4,711.28 | 504,100 | +13,400 |
| April 30. | 4,710.79 | 496,700 | -7,400 |
| May 31. | 4,709.87 | 483,000 | -13,700 |
| June 30 | 4,712.76 | 526,900 | +43,900 |
| July 31 | 4,714.98 | 562,300 | +35,400 |
| August 31 | 4,713.49 | 538,400 | -23,900 |
| September 30, 1992. | 4,712.67 | 525,500 | <u>-12,900</u> |
| 1992 water year | | | -121,400 |

06260300 Anchor Reservoir, Wyo.

LOCATION.--Lat 43°39'50", long 108°49'27", in sec. 26, T. 43 N., R. 100 W., Hot Springs County, Hydrologic Unit 10080007, at dam on South Fork Owl Creek, 2 mi downstream from Middle Fork, 3 mi southeast of Anchor, and 32 mi west of Thermopolis.

DRAINAGE AREA.--131 mi².

PERIOD OF RECORD.--November 1960 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (U.S. Bureau of Reclamation benchmark).

REMARKS.--Reservoir is formed by concrete arch dam completed in 1960. Usable capacity, 17,160 acre-ft between elevation 6,343.75 ft, invert of river outlet, and 6,441.00 ft, spillway crest, not including 68 acre-ft below elevation 6,343.75 ft. Prior to Oct. 1, 1971, usable capacity was 17,280 acre-ft not including 149 acre-ft below the invert. Figures given herein represent usable contents. Water is used for irrigation of land in Owl Creek basin.

COOPERATION.--Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum usable daily contents, 9,250 acre-ft, July 4, 1967, elevation, 6,418.52 ft; no storage on many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 7,830 acre-ft, July 23, elevation, 6,413.80 ft; minimum, 106 acre-ft, Feb. 21 to Mar. 1, elevation, 6,347.00 ft.

| <u>Month</u> | <u>Water-surface elevation, in feet</u> | <u>Usable contents, in acre-feet</u> | <u>Change in usable contents, in acre-feet</u> |
|-----------------------------|---|--------------------------------------|--|
| September 30, 1991. | 6,364.60 | 610 | --- |
| October 31. | 6,360.00 | 414 | -196 |
| November 30 | 6,362.00 | 492 | +78 |
| December 31 | 6,351.00 | 170 | -322 |
| January 31, 1992. | 6,347.80 | 117 | -53 |
| February 29 | 6,347.00 | 106 | -11 |
| March 31. | 6,350.00 | 148 | +42 |
| April 30. | 6,359.60 | 400 | +252 |
| May 31. | 6,366.40 | 701 | +301 |
| June 30 | 6,405.00 | 5,420 | +4,719 |
| July 31 | 6,411.80 | 7,240 | +1,820 |
| August 31 | 6,392.70 | 3,270 | -3,970 |
| September 30, 1992. | 6,367.90 | 784 | <u>-2,486</u> |
| 1992 water year | | | +174 |

06286400 Bighorn Lake near St. Xavier, Mont.

LOCATION.--Lat 45°18'27", long 107°57'26", in SW1/4 SE1/4 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 upstream from Grapevine Creek, 15.5 mi southeast of St. Xavier, and at river mile 86.6.

DRAINAGE AREA.--19,626 mi².

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

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. 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 between elevation 3,296.50 ft, river outlet invert, and 3,657.00 ft, top of flood control. Elevation of spill-way crest, 3,593.00 ft. Normal maximum operating level, 1,097,000 acre-ft, elevation, 3,640.00 ft. Minimum operating level, 483,400 acre-ft, elevation 3,547.00 ft. Dead storage, 16,010 acre-ft below elevation 3,296.50 ft. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 1,346,000 acre-ft, July 6, 1967, elevation, 3,656.43 ft; minimum since first filling, 641,900 acre-ft, Apr. 14, 1989, elevation, 3,583.30 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 1,079,000 acre-ft, July 27, elevation, 3,641.92 ft; minimum, 803,500 acre-ft, May 6, elevation, 3,612.51 ft.

| Month | Water-surface elevation, in feet | Usable contents, in acre-feet | Change in usable contents, in acre-feet |
|------------------------------|----------------------------------|-------------------------------|---|
| September 30, 1991 | 3,639.36 | 1,046,000 | --- |
| October 31 | 3,637.31 | 1,021,000 | -25,000 |
| November 30. | 3,633.07 | 974,300 | -46,700 |
| December 31. | 3,627.00 | 915,600 | -58,700 |
| January 31, 1992 | 3,621.39 | 868,400 | -47,200 |
| February 29. | 3,619.25 | 851,800 | -16,600 |
| March 31 | 3,614.98 | 820,500 | -31,300 |
| April 30 | 3,612.68 | 804,700 | -15,800 |
| May 31 | 3,621.48 | 869,200 | +64,500 |
| June 30. | 3,636.00 | 1,006,000 | +136,800 |
| July 31. | 3,641.28 | 1,070,000 | +64,000 |
| August 31. | 3,636.82 | 1,016,000 | -54,000 |
| September 30, 1992 | 3,637.74 | 1,026,000 | +10,000 |
| 1992 water year | | | -20,000 |

MONTHLY SUMMARY OF CONTENTS FOR COMPACT RESERVOIRS EXISTING ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this section 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. The 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 furnished the operating data.

Contents, in acre-feet

| Month | 06224500 a/Bull Lake | b/Pilot Butte Reservoir | 06281500 c/Buffalo Bill Reservoir | 06307000 d/Tongue River Reservoir |
|--|-------------------------|-------------------------------|--|--|
| September 30, 1991. . . | 84,940 | 13,230 | 275,000 | 20,080 |
| October 31. | 81,830 | 19,100 | 252,200 | 20,080 |
| November 30 | 84,140 | 21,120 | 252,700 | 23,350 |
| December 31 | 85,320 | 21,050 | 248,800 | 19,940 |
| January 31, 1992. . . . | 85,600 | 20,980 | 244,700 | 18,380 |
| February 29 | 85,400 | 20,980 | 249,700 | 15,440 |
| March 31. | 85,680 | 28,080 | 265,000 | 18,020 |
| April 30. | 84,140 | 26,720 | 255,000 | 27,400 |
| May 31. | 80,990 | 23,990 | 300,900 | 48,710 |
| June 30 | 110,400 | 29,640 | 410,200 | 70,200 |
| July 31 | 125,800 | 24,460 | 410,700 | 63,630 |
| August 31 | 92,110 | 15,830 | 331,100 | 41,150 |
| September 30, 1992. . . | 51,510 | 12,520 | 270,400 | 27,840 |
| Change in contents during water year. . . | -33,430 | -710 | -4,600 | +7,760 |

a/ Usable contents, from revised capacity table effective October 1, 1965. Dead storage is 722 acre-ft.

b/ Usable contents. Dead storage is 5,360 acre-ft.

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

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

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 appropriate rights existing in the States of Wyoming and Montana on January 1, 1950 are supplied, and after appropriate rights to the use of necessary supplemental water are also supplied as specified in the Compact, is administered under the following rules and regulations 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 streamflow 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 NW1/4 SE1/4 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 above Tullock Creek, near Bighorn, Montana, and located in SE1/4 SE1/4 NE1/4 sec. 3, T. 4 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 SE1/4 NE1/4 NE1/4 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 NE1/4 NE1/4 SE1/4 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 NW1/4 SW1/4 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 are 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 at the office of the Chairman of the Commission.
- 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. The Geological Survey shall 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.



Gary Fritz
Commissioner for Montana



George L. Christopoulos
Commissioner for Wyoming

ATTESTED:



L. Grady Moore
Federal Representative

Adopted November 17, 1953
Amended December 16, 1986

RULES FOR ADJUDICATING WATER RIGHTS ON INTERSTATE DITCHES

Article I. Purpose

The purpose of this rule is to determine and adjudicate, in accordance with the laws of Montana and Wyoming, those pre-Compact (January 1, 1950) water rights diverting from the Powder, Tongue, Bighorn and Clarks Fork Rivers and their tributaries where the point of diversion is in one State and the place of use is in the other State which have not yet been adjudicated.

Article II. Authority

In accordance with the Yellowstone River Compact, the State of Montana and the State of Wyoming, being moved by consideration of interstate comity, desire to remove all causes of present and future controversy between the States and between persons in one State and persons in another State with respect to these interstate ditches. Article III (E) of the Compact provides the Yellowstone River Compact Commission with the authority "...to formulate rules and regulations and to perform any act which they may find necessary to carry out the provisions of this Compact...."

Article III. Definitions

The terms defined in the Yellowstone River Compact apply as well as the following definitions:

1. "Acre-feet" means the volume of water that would cover 1 acre of land to a depth of 1 foot.
2. "Cfs" means a flow of water equivalent to a volume of 1 cubic foot that passes a point in 1 second of time and is equal to 40 miners inches in Montana.
3. "Interstate Ditches" shall include ditches and canals which convey waters of the Bighorn, Tongue, Powder, and Clarks Fork Rivers and their tributaries across the Wyoming-Montana State line where the water is diverted in one State and the place of use is in the other State.
4. "Department of Natural Resources and Conservation," hereafter called the "Department," means the administrative agency and Department of the Executive Branch of the Government of Montana created under Title II, Chapter 15, MCA which has the responsibility for water administration in that State.

5. "Water Court" means a Montana District Court presided over by a water judge, as provided for in Title III, Chapter 7, MCA.
6. "State Engineer" shall be the current holder of the position created by the Wyoming Constitution as Chief Water Administration Official for the State of Wyoming.
7. "Board of Control," hereinafter called the "Board," is defined as the constitutionally created water management agency in Wyoming composed of the four Water Division Superintendents and the State Engineer.
8. "Superintendent" is the member of the Board who is the water administration official for the Water Division where the interstate ditch is located. (The two Water Divisions in the Yellowstone River drainage are Water Division Numbers Two and Three.)
9. "Date of Priority" shall mean the earliest date of actual beneficial use of water, unless evidence and circumstances pertaining to a particular claim establish an earlier date.
10. "Point of Diversion" is defined to be the legal land description by legal subdivision, section, township, and range of the location of the diversion structure for an interstate ditch from a natural stream channel.
11. "Place of Use" is defined to be the legal land description (legal subdivision, section, township, and range) of the lands irrigated by an interstate ditch.
12. "Person" is defined as an individual, a partnership, a corporation, a municipality or any other legal entity, public or private.
13. "Claimant" is defined as any person claiming the use of water from an interstate ditch as herein defined.

Article IV. Procedures

The procedures for determining and adjudicating water rights associated with interstate ditches shall be categorized as follows: (A) Where the point of diversion is in Wyoming and place of use in Montana, and (B) Where the point of diversion is in Montana and place of use in Wyoming.

A. Wyoming Procedure

1. The Yellowstone River Compact Commission will provide a claim form to be completed by the claimant that will describe the location and point of diversion and land being irrigated, the priority date claimed, method of irrigation and such other information required to describe the claim. (A sample form for this purpose is attached.)
2. The Yellowstone River Compact Commission will send the claim form to water users on the interstate ditches.
3. Water users will complete the claim form and file it with the Yellowstone Compact Commission, which, when found to be correct and complete, will be forwarded to the Board for verification.
4. Upon receipt of the form, the Board shall forward it to the appropriate Superintendent, who, in cooperation with the Department, will validate the information including the use that has been made of the water, the number of acres and location of lands being irrigated, the priority date, and all other relevant information. The Superintendent and the Department will utilize aerial photography and other information to have prepared a reproducible map showing the location of the ditch system, lands irrigated, point of diversion, etc., of the claim.
5. After the validation procedure, the Superintendent will hold a hearing, after appropriate notice and advertisement, at which time the claimant shall describe, in detail, the use that has been made of the water and the lands that are being irrigated, establish a priority date, etc. Costs incurred in advertising shall be paid by the claimant. If a single hearing is held to consider several claims, the costs of advertising shall be shared equally among the claimants. Anyone who opposes the claim shall appear and state the reasons, if any, for opposition to the claim. If there is no opposition to the claim, cost incurred in holding the hearing shall be paid by the claimant. If protestants do appear and oppose the claim, hearing costs will be paid 50 percent by the claimant and 50 percent by the protestant, or if there is more than one protestant, the remaining 50 percent shall be shared equally among the protestants.
6. At the conclusion of the hearing, the Superintendent shall forward the record to the Yellowstone River Compact Commission with his findings and recommendations. The Yellowstone River Compact Commission will make the

determination of the amount of the right, the location, and the priority date, and then send the record to the Board.

7. The Board shall review the record and integrate it into its water rights system. Upon entry of the record by the Board, the information shall be forwarded to the Department and the Chairman of the Yellowstone River Compact Commission.
8. Upon the entry of the right into the Board's records, it will have the following attributes:
 - a. The right will be a Wyoming water right with a priority date as established by this procedure.
 - b. The amount of the right will be determined as provided by Wyoming law.

B. Montana Procedure

1. The Yellowstone River Compact Commission will provide a claim form to be completed by the claimant that will describe the location and point of diversion and land being irrigated, the priority date claimed, method of irrigation and such other information required to describe the claim.
2. The Commission will send the claim form to water users on the interstate ditches.
3. Water users will complete the claim form and file it with the Yellowstone River Compact Commission, which, when found to be correct and complete, will be forwarded to the Department for verification.
4. Upon receipt of the form, the Department, in cooperation with the Wyoming State Engineer's Office, will validate the information, including the use that has been made of the water, the number of acres and location of lands being irrigated, the priority date, and all other relevant information. The appropriate Superintendent and the Department will utilize aerial photographs and other information to have prepared a reproducible map showing the location of the ditch system, land irrigated, point of diversion, etc., of the claim.

5. The Department will then forward the record to the Yellowstone River Compact Commission with its findings and recommendations. Upon approval by the Commission, the record shall be submitted to the Montana Water Court for adjudication. A duplicate record will be forwarded to the Wyoming State Engineer's Office, the Board, and the Chairman of the Yellowstone River Compact Commission upon adjudication.
6. Upon adjudication of the right by the Montana Water Court, it will have the following attributes:
 - a) The right will be a Montana water right with a priority date as established by this procedure.
 - b) The amount of the right will be determined as provided by Montana law.

Article V. Exclusions

- A. These rules recognize the limitation in Article VI of the Yellowstone River Compact regarding Indian water rights.
- B. These rules shall not be construed to determine or interpret the rights of the States of Wyoming and Montana to the waters of the Little Bighorn River.

Article VI. Claim Form Submission Period

All claims must be submitted to the Yellowstone River Compact Commission, c/o District Chief, United States Geological Survey, 821 E. Interstate, Bismarck, ND 58501, within 90 calendar days after the claimant has received the claim form from the Commission. The blank claim form will be sent certified mail to the water user and the submission period of 90 calendar days will begin with the next day following receipt of the form, as evidenced by the certified mail receipt card. For good cause shown in writing, an extension of time beyond the 90 days for submittal may be obtained from the Commission.

YELLOWSTONE RIVER COMPACT COMMISSION

WYOMING

GORDON W. FASSETT
STATE ENGINEER
HERSCHLER BUILDING
4TH FLOOR EAST
CHEYENNE, WYOMING 82002
(307) 777-7354

UNITED STATES

WILLIAM F. HORAK
CHAIRMAN
U.S. GEOLOGICAL SURVEY
821 E. INTERSTATE AVENUE
BISMARCK, NORTH DAKOTA 58501
(701) 250-4601

MONTANA

GARY FRITZ
ADMINISTRATOR, WATER RESOURCES DIVISION
DEPT. OF NATURAL RESOURCES & CONSERVATION
1520 EAST SIXTH AVENUE
HELENA, MONTANA 59620
(406) 444-6603

YELLOWSTONE RIVER COMPACT COMMISSION

CLAIM FORM FOR INTERSTATE DITCHES

1. Name of ditch or canal: _____
2. Source of water supply: _____
Tributary of _____
3. Name of claimant: _____
Address _____
City _____ State _____ Zip Code _____
Home Phone No. _____ Business Phone No. _____
4. Person completing form: _____
Address _____
City _____ State _____ Zip Code _____
Home Phone No. _____ Business Phone No. _____
5. Method of irrigation: _____
6. Point of diversion: County _____ State _____
Headgate located in the $\frac{1}{4}$ $\frac{1}{4}$, Section _____, T. _____ R. _____

(a) Description of headgate: (Briefly describe the materials and general features, date constructed or last known work, general condition.) _____

9. Describe any additional uses of water claimed from the ditch:

10. Date of first beneficial use of water (priority date) on lands described above for _____ Ditch is _____
(mo/day/yr)
and shall be the same for all lands claimed on this form.
11. Has irrigation water been diverted onto all lands shown in the above tabulation each year since completion of works?___
If not, state exceptions and reasons therefore: _____

12. Attach documentary evidence or affidavits showing your ownership or control of the above lands, as well as the historic use of water on these lands. _____

13. What permit or claim numbers have been assigned to known records filed with either the Wyoming State Engineer's Office or the Montana Department (DNRC) for irrigating the above lands? _____

14. Have personnel in the Wyoming State Engineer's Office or the Montana Department (DNRC) been contacted to obtain the information given in No. 13? () Yes () No
15. Describe any flumes or pipelines in the ditch conveyance system: _____

CONVERSION TABLE

| <u>Multiply inch-pound units</u> | <u>By</u> | <u>To obtain SI units</u> |
|---|-------------|--|
| <i>Length</i> | | |
| feet (ft) | 0.3048 | meters (m) |
| miles (mi) | 1.609 | kilometers (km) |
| <i>Area</i> | | |
| acres | 4,047 | square meters (m ²) |
| | 0.4047 | *hectares (ha) |
| | 0.4047 | square hectometer (hm ²) |
| | 0.004047 | square kilometers (km ²) |
| square miles (mi ²) | 2.590 | square kilometers (km ²) |
| <i>Volume</i> | | |
| cfs-day or second-foot day (ft ³ /s-day) | 2,447 | cubic meters (m ³) |
| | 0.002447 | cubic hectometers (hm ³) |
| cubic feet | 0.02832 | cubic meters |
| acre-feet (acre-ft) | 1,233 | cubic meters (m ³) |
| | 0.001233 | cubic hectometers (hm ³) |
| | 0.000001233 | cubic kilometers (km ³) |
| <i>Flow</i> | | |
| cubic feet per second (ft ³ /s) | 28.32 | liters per second (L/s) |
| | 28.32 | cubic decimeters per second (dm ³ /s) |
| | 0.02832 | cubic meters per second (m ³ /s) |
| acre-feet per year (acre-ft/yr) | 1,233 | cubic meters per year (m ³ /yr) |
| | 0.001233 | cubic hectometers per year (hm ³ /yr) |
| | 0.000001233 | cubic kilometers per year (km ³ /yr) |

*The unit hectare is approved for use with the International System (SI) for a limited time. See National Bureau of Standards Special Bulletin 330, p. 12, 1977 edition.

