

YELLOWSTONE RIVER

COMPACT COMMISSION

FORTY-SIXTH ANNUAL REPORT

1997

**YELLOWSTONE RIVER COMPACT COMMISSION
DENVER FEDERAL CENTER, BUILDING 53, ROOM H-2102
LAKEWOOD, COLORADO 80225**

Honorable Jim Geringer
Governor of the State of Wyoming
Cheyenne, Wyoming 82002

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-sixth annual report of activities for the period ending September 30, 1997.

Members of the Yellowstone River Compact Commission convened their forty-sixth Annual Meeting on December 16, 1997 at 10:00 a.m. in Billings, Montana. In attendance were Mr. William F. Horak, Chairman and Federal Representative; Mr. Gordon W. Fassett, Wyoming State Engineer; and Mr. Jack Stults, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation. Also in attendance were Ms. Sue Lowry, Wyoming State Engineer's Office; Mr. Craig Cooper, Wyoming Board of Control, Water Division III; Mr. Mike Whitaker, Wyoming Board of Control, Water Division II; Mr. Keith Kerbel, Mr. Glen McDonald, and Ms. Ann Glubczynski, Montana Department of Natural Resources and Conservation; Mr. Orrin Ferris, MSE-HKM Associates; Mr. Larry Baccari, engineer, Sheridan, Wyoming; and Mr. James E. Kircher, Mr. Tom L. Quinn, and Mr. Robert E. Davis, U.S. Geological Survey.

Mr. Horak requested to continue to serve as Chairman for this meeting because a replacement Chairman had not yet been selected. All Commissioners approved the request.

Mr. Horak introduced Mr. Jack Stults as the new member of the Commission for Montana. Mr. Stults, who currently is the Administrator for the Water Resources Division of the Montana Department of Natural Resources and Conservation, replaces Mr. Gary Fritz on the Commission. Mr. Stults provided a summary of his professional experience. Mr. Horak, Mr. Fassett, and others welcomed Mr. Stults to the Commission.

Mr. Horak also introduced Mr. Jim Kircher. Mr. Kircher currently is the Associate Regional Hydrologist, Central Region, U.S. Geological Survey, Denver, Colorado. Mr. Horak requested that the Commissioners consider Mr. Kircher's appointment as the new Chairman of the Commission as part of this meeting. Mr. Kircher provided a summary of his professional experience.

All other attendees introduced themselves.

Mr. Horak asked if the agenda for the meeting was satisfactory. All Commissioners approved the agenda.

Mr. Davis presented information on budgets for current and future water years. The streamflow gaging program for the Yellowstone River Compact Commission for fiscal year 1997 cost \$51,100. The program is estimated to cost \$53,400 for fiscal year 1998, \$55,700 for fiscal year 1999, \$58,200 for fiscal year 2000, and \$60,500 for fiscal year 2001. Mr. Davis explained that one-fourth of the cost of the program is provided by the State of Wyoming, one-fourth is provided by the State of Montana, and one-half is provided by the U.S. Geological Survey through the Federal-State cooperative program. The Commission accepted the proposed budget for fiscal year 1998. Estimates for fiscal years 1999-2001, which represent annual increases of approximately 4 percent, met with general approval.

Mr. Davis reported that streamflow during water year 1997 was 156 percent of average for the Clarks Fork Yellowstone River, 145 percent of average for the Bighorn River, 135 percent of average for the Tongue River, and 133 percent of average for the Powder River. Annual flows in the Clarks Fork Yellowstone River and Bighorn River in water year 1997 were the highest for the period of record. Anchor Reservoir, Bighorn Lake, Bull Lake, Pilot Butte Reservoir, and Buffalo Bill Reservoir had more water in storage at the end of water year 1997 than at the end of water year 1996. Boysen Reservoir and Tongue River Reservoir had less water in storage. The total water in storage in the reservoirs increased 103,702 acre-feet during water year 1997. Mr. Fassett inquired about flows in the Yellowstone River. Mr. Davis reported that flow in the Yellowstone River reached record levels in water year 1997 at Livingston and Billings. Mr. Davis noted that the high streamflows statewide had resulted in considerable damage to numerous streamflow stations, although none of the stations operated for the Commission were damaged. However, if such damage were to occur in future years, additional funding might have to be requested from the Commission for station rehabilitation.

Mr. Quinn provided an overview of the Yellowstone River Basin National Water-Quality Assessment Program (NAWQA) study. The study was initiated in 1997 to describe the current water-quality conditions in the Yellowstone River basin, to describe how the water quality is changing over time, and to improve the understanding of the primary natural and human factors affecting water quality. The study will consist of 2 years of planning and data compilation, 3 years of high-intensity sampling at 20 surface-water sites, and 6 years of low-intensity sampling. Ground water also will be sampled at various sites in the basin. A liaison committee consisting of representatives from Federal, State, and local agencies, universities, the private sector, watershed organizations, and other entities will help define issues, identify sources of data, design study activities, and review reports. A USGS Fact Sheet describing the study was handed out.

Mr. Fassett recommended that the Yellowstone River Basin NAWQA study be a regular item on future agendas. Mr. Horak and Mr. Stults concurred.

Mr. Stults inquired about water-quality activities of the Commission. Mr. Horak reported the Compact focuses on water quantity, not quality, but added that quality has been addressed by the Commission in the past, as exemplified by a study of water quality in the Powder River (USGS Water-Resources Investigations Report 91-4029). Mr. Fassett explained that the study was conducted because of concerns about changes in water quantity and quality that could result from possible irrigation diversions in the Middle Fork. Mr. Stults expressed views on the importance and relation of water quality to beneficial use, which is part of the Compact. Ms. Lowry explained the process used for assessing total maximum daily loads (TMDL) in streams in Wyoming and recommended discussing TMDL programs at future Commission meetings.

Ms. Lowry reported that the Yellowstone River is planned to be nominated for inclusion in the American Heritage River Program. Mr. Stults reported that Senator Burns and Congressman Hill of Montana have expressed a general lack of support for the program. Mr. Fassett and others stated that a general lack of understanding of the program exists at present.

Mr. Fassett reported that discussions between Federal and State interests and the Shoshone and Arapahoe Tribes of the Wind River Indian Reservation are occurring monthly and are focusing on management and administration of existing reserved water rights. The Tribes are requesting that the State of Wyoming fund a 20,000 acre-foot enlargement of Ray Lake near Lander and rehabilitation of the major Bureau of Indian Affairs irrigation systems in the Reservation. Discussions also are focusing on the possible use of existing reserved water rights for purposes other than the projects and uses for which they were originally intended and the distribution of power revenues generated by Boysen Reservoir. The discussions are helping to resolve these issues but final resolutions are not anticipated in the near future. Mr. Horak inquired about current adjudications. Mr. Fassett reported that one of the main adjudication activities at present involves quantification of Walton Right claims by private individuals and the Tribes. Mr. Ferris inquired about plans by the Tribes to market water. Mr. Fassett reported that marketing of water by the Tribes outside of the Reservation was not allowed at present.

Mr. Fassett reported that instream-flow issues for the Little Bighorn River were resolved in September 1996. No new issues have arisen since then.

Mr. Kerbel reported that the Montana Statewide Adjudication efforts in the Yellowstone River basin are focused on the lower basin area near Miles City and the Clarks Fork Yellowstone River basin, including Rock Creek. Objections to decreed rights in the Clarks Fork Yellowstone River basin are being addressed primarily by mediation. A counter-objection process also is currently available and being used. Interstate rights are being identified in the system with an "X" prefix. They are being addressed as having primary responsibility residing with the State of Wyoming. Mr. Stults reported that the Montana Supreme Court has ruled that Montana can issue new water rights on Indian reservations only after the Tribal water rights have been quantified. The Montana legislature issued legislation clarifying parts of the ruling of the Supreme Court. Tribal interests are disputing the constitutionality of the ruling. The ruling is commonly referred to as the Pope or Ciotti case.

Mr. Kerbel reported that negotiations with the Crow Tribe are continuing. Evaluation of claims in the Pryor Creek basin was recently completed. Evaluation of claims in the Bighorn River basin is expected in the near future. Mr. Fassett inquired about the types of claims involved. Mr. Kerbel replied that claims by both tribal and non-tribal interests were being considered and that historically irrigated acreage was being identified and quantified. Mr. Fassett asked if potentially irrigable acreage was being considered as part of the evaluations. Mr. Kerbel stated that current evaluations considered only the historically irrigated areas. Mr. Ferris stated that a separate negotiation process is addressing the land base, including potentially irrigable acreage.

Mr. McDonald reported on the status of the Tongue River Dam rehabilitation. Construction began in August 1996 and is expected to continue through June 1999. The rehabilitation includes reconstructing the spillway, adding new principal and auxiliary outlet works, and adding protection to the center spillway using roller-compacted concrete. The rehabilitation will increase the storage stage by 4 feet and increase the storage volume from 66,000 acre-feet to 80,000 acre-feet. Rights to the additional storage volume of 14,000 acre-feet will belong to the Northern Cheyenne Tribe. As part of the water-allocation process, the direct-flow right of 12,500 acre-feet of the Tribe was subordinated. In addition, the Tribe received rights to market 7,500 acre-feet of water and the Tongue River Water Users Association received rights to market 32,500 acre-feet. The area of marketing is from Tongue River Dam to Miles City. The total cost of the rehabilitation is estimated to be \$45-50 million, funded on a 65/35 Federal/State cost-share basis. Mr. McDonald presented slides and descriptions of various phases of the rehabilitation to date.

Mr. Fassett recommended consideration of a field tour of important sites in the Yellowstone River basin. The other Commissioners and other attendees concurred.

Mr. Fassett presented a review of the enlargement of Twin Lakes for the Sheridan area water supply. Plans include construction of a dam to provide an increase in storage capacity of about 1,300 acre-feet. Total storage will be about 3,400 acre-feet. The water will be used to augment the water supply for Sheridan and for other purposes. Water will be conveyed to Sheridan in Big Goose Creek. Construction is expected to be completed during the summer of 1998.

Mr. Fassett provided an update on the Tie Hack Municipal Reservoir project in the Bighorn Mountains. The project involves construction of a 100-foot high dam on a tributary of Clear Creek that will provide 2,435 acre-feet of storage capacity and allow for hydropower generation. The project is completed and the water is being used for water supply for Buffalo. Revenue from hydropower generation is being used to help offset the costs of construction.

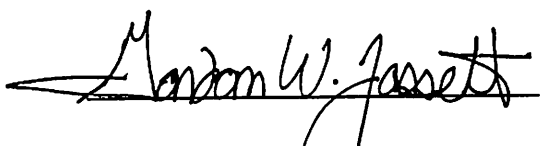
Mr. Fassett reported on the proposed Greybull Valley Reservoir project. The project involves construction of an offstream storage facility for about 20,000 acre-feet of water to be diverted from the Greybull River between Meeteetse and Greybull. The project is still in the permitting stage, but much of the funding has been arranged. Construction could possibly begin in 1998. The water will be used for agricultural purposes in the lower end of the basin. Crops grown in the area are primarily sugar beets and similar crops. Mr. Cooper reported that the basin has 60,000 acre-feet of storage upstream from the project and water supplying the Greybull Valley Reservoir will be diverted re-regulation water from the upstream facilities and will help modify stage fluctuations in the Greybull River.

Mr. Horak requested that the Commission consider a new Chairman and Federal Representative. Mr. Horak recommended that consideration be given to Mr. Kircher, a member of the USGS regional staff in Denver, rather than the USGS District Chief for North Dakota, as has been the custom in the past, for logistical and operational reasons. Mr. Fassett asked if the new chairman would vote on disputed issues. Mr. Horak stated that disputes probably would be resolved through the recently developed rules for the resolution of disputes. Mr. Fassett expressed the importance of the chairman being technically informed about Compact issues. Mr. Stults agreed. After some discussion, Mr. Fassett and Mr. Stults both agreed that Mr. Kircher was a qualified and appropriate candidate for Chairman and Federal Representative and agreed to send a joint letter to the USGS Director, through the Regional Hydrologist, Central Region, and the Chief Hydrologist, recommending Mr. Kircher for that position. Ms. Lowry recommended that the letter include a request for clarification of the role of the Chairman and Federal Representative in resolving disputes. Mr. Stults agreed, but also expressed support for the existing rules for resolution of disputes.

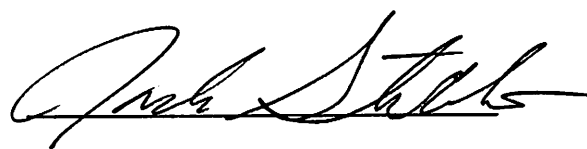
Mr. Horak asked about the need for a mid-year meeting. Mr. Fassett and Mr. Stults expressed their willingness to meet in mid-year in order to expand their knowledge of the area, even though no critical needs or issues were identified that would require a meeting. Mr. Fassett stated that visits to the various development projects and discussions about Indian water-right negotiations might be appropriate for the meeting, which could be based in Sheridan. Mr. Stults agreed. Mr. Fassett also recommended that the new Chairman and Federal Representative be responsible for organizing the meeting.

The next annual meeting was tentatively scheduled for November 1998.

The meeting was adjourned at 1:20 p.m.



Gordon W. Fassett
Commissioner for Wyoming



Jack Stults
Commissioner for Montana



William F. Horak
Chairman and Federal Representative

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GENERAL REPORT

Cost of operation and budget

The work funded by the Yellowstone River Compact 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 1997 was \$51,100, in accordance with the budget adopted for the year.

The budgets for fiscal years 1998, 1999, 2000, and 2001 were tentatively adopted subject to the availability of appropriations.

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

<u>October 1, 1996, to September 30, 1997 (fiscal year 1997):</u>	
Estimate of continuation of existing streamflow-gaging programs	\$51,100
<u>October 1, 1997, to September 30, 1998 (fiscal year 1998):</u>	
Estimate of continuation of existing streamflow-gaging programs	\$53,400
<u>October 1, 1998, to September 30, 1999 (fiscal year 1999):</u>	
Estimate of continuation of existing streamflow-gaging programs	\$55,700
<u>October 1, 1999, to September 30, 2000 (fiscal year 2000):</u>	
Estimate of continuation of existing streamflow-gaging programs	\$58,200
<u>October 1, 2000, to September 30, 2001 (fiscal year 2001):</u>	
Estimate of continuation of existing streamflow-gaging programs	\$60,500

Streamflow-gaging station operation

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

During water year 1997, annual streamflow was greater than normal¹ in all tributaries of the Yellowstone River as given in the following table:

<u>Station number</u>	<u>Measurement site</u>	<u>Percent of average²</u>
06208500	Clarks Fork Yellowstone River at Edgar, Mont., minus diversions to White Horse Canal	156
06294500	Bighorn River above Tullock Creek, near Bighorn, Mont., minus Little Bighorn River near Hardin, Mont. Adjusted for change in contents in Bighorn Lake	145 ³
06308500	Tongue River at Miles City, Mont.	135
06326500	Powder River near Locate, Mont.	133

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

²Average is based on period of record at station.

³Average is based on period since completion of Yellowtail Dam in 1967.

Tabulation of streamflow data for water year 1997 and graphical comparisons with average flows for the preceding year and for selected base periods are given in the section "Summary of discharge for Compact streamflow-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 Bureau of Reclamation project on the Bighorn River, and the largest storage project in the basin, contained 978,100 acre-feet at the beginning of the year and 1,032,000 acre-feet at the end of the year. Daily contents ranged from 691,800 acre-feet on May 8, 1997 to 1,224,000 acre-feet on July 14, 1997. Boysen Reservoir, located on the Wind River and operated by the Bureau of Reclamation, began the year with 650,600 acre-feet in storage and ended the year with 616,600 acre-feet. Monthend and year-end 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 contents 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.

SUMMARY OF DISCHARGE FOR COMPACT STREAMFLOW-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 sea level, from topographic map. Prior to Aug. 31, 1953, nonrecording gage at same site and datum.

REMARKS.--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 1996 TO SEPTEMBER 1997 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	790	664	e420	e900	e500	430	559	1200	6420	4370	2200	726
2	765	657	e440	e1000	e500	415	580	1260	7850	4110	1970	668
3	785	675	e410	e950	e480	450	539	1030	7150	3680	1890	643
4	778	677	e390	e900	e450	440	542	869	7100	3450	1680	614
5	765	656	e450	e800	e400	425	e500	927	8270	3200	1550	628
6	753	646	e500	e700	e350	415	e430	1070	9380	3230	1610	614
7	742	608	e600	e700	e350	430	e450	1460	9500	3320	1480	646
8	736	601	725	e740	e350	454	e450	1750	9160	3440	1400	679
9	740	599	740	e700	e360	438	e440	1650	9410	3550	1430	617
10	727	623	759	e600	e360	425	e430	1890	9970	3570	1420	574
11	709	612	692	e400	e380	467	e420	2310	10500	3600	1380	579
12	696	607	635	e250	e400	491	e410	2580	10200	3620	1230	666
13	679	592	603	e200	e420	444	e400	2760	9430	3430	1210	769
14	665	610	595	e250	e440	429	e450	2970	7670	2870	1100	863
15	668	620	e550	e350	e470	427	e500	3460	7060	2530	1210	853
16	693	600	e500	e350	e500	482	600	4160	7130	2560	1610	806
17	683	e500	e450	e330	e550	553	597	4770	7310	2750	1830	808
18	694	e540	e400	e400	e550	589	640	5240	7800	2790	1770	749
19	676	e580	e420	e500	e500	598	725	4910	9190	2790	1640	720
20	689	e500	e450	e600	e450	641	930	4530	8350	2780	1460	721
21	689	e450	e420	e550	e450	677	1190	4530	6430	2500	1350	728
22	671	e430	e360	e500	e430	732	1180	4800	5490	2280	1240	745
23	666	e400	e300	e450	e420	699	987	5020	5790	2220	1150	818
24	675	e370	e300	e350	e400	691	915	5000	5450	2160	1110	876
25	668	e400	e300	e300	e450	656	900	5800	4460	2220	1040	837
26	730	e390	e270	e280	475	569	877	5180	3920	2280	954	803
27	669	e410	e300	e250	476	594	833	4150	4000	2230	895	791
28	658	e430	e400	e270	456	682	1020	3580	4330	2150	893	836
29	677	e450	e450	e350	---	625	1290	3560	4330	2250	824	860
30	708	e400	e600	e450	---	560	1150	4020	4280	2460	789	819
31	685	---	e800	e500	---	539	---	4610	---	2470	763	---
TOTAL	21929	16297	15229	15870	12317	16467	20934	101046	217330	90860	42078	22056
MEAN	707	543	491	512	440	531	698	3260	7244	2931	1357	735
MAX	790	677	800	1000	550	732	1290	5800	10500	4370	2200	876
MIN	658	370	270	200	350	415	400	869	3920	2150	763	574
AC-FT	43500	32330	30210	31480	24430	32660	41520	200400	431100	180200	83460	43750

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1997, BY WATER YEAR (WY)*

	MEAN	500	408	350	349	367	565	2123	4119	2061	629	488
MAX	1010	777	593	512	584	554	1398	5578	7256	4771	1541	1395
(WY)	1942	1928	1996	1997	1963	1943	1943	1928	1996	1943	1951	1941
MIN	298	311	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 1996 CALENDAR YEAR FOR 1997 WATER YEAR WATER YEARS 1921 - 1997*

	FOR 1996 CALENDAR YEAR		FOR 1997 WATER YEAR		WATER YEARS 1921 - 1997*	
ANNUAL TOTAL	554039		592413		1042	
ANNUAL MEAN	1514		1623		1623	
HIGHEST ANNUAL MEAN					668	
HIGHEST ANNUAL MEAN					10600	
HIGHEST DAILY MEAN	10400	Jun 15	10500	Jun 11		Jun 2 1936
LOWEST DAILY MEAN	200	Feb 26	200	Jan 13		May 11 1961
ANNUAL SEVEN-DAY MINIMUM	291	Jan 27	304	Jan 11		Apr 18 1961
INSTANTANEOUS PEAK FLOW			11100			Jun 12 1997
INSTANTANEOUS PEAK FLOW			9.30			Jun 12 1997
INSTANTANEOUS LOW STAGE						Apr 22 1961
ANNUAL RUNOFF (AC-FT)	1099000		1175000		755200	
10 PERCENT EXCEEDS	4800		4410		2870	
50 PERCENT EXCEEDS	666		696		470	
90 PERCENT EXCEEDS	350		400		275	

*--During period of operation (water years 1921-69, 1987 to current year).

e--Estimated.

06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MONT.
 (Minus diversions to White Horse Canal)

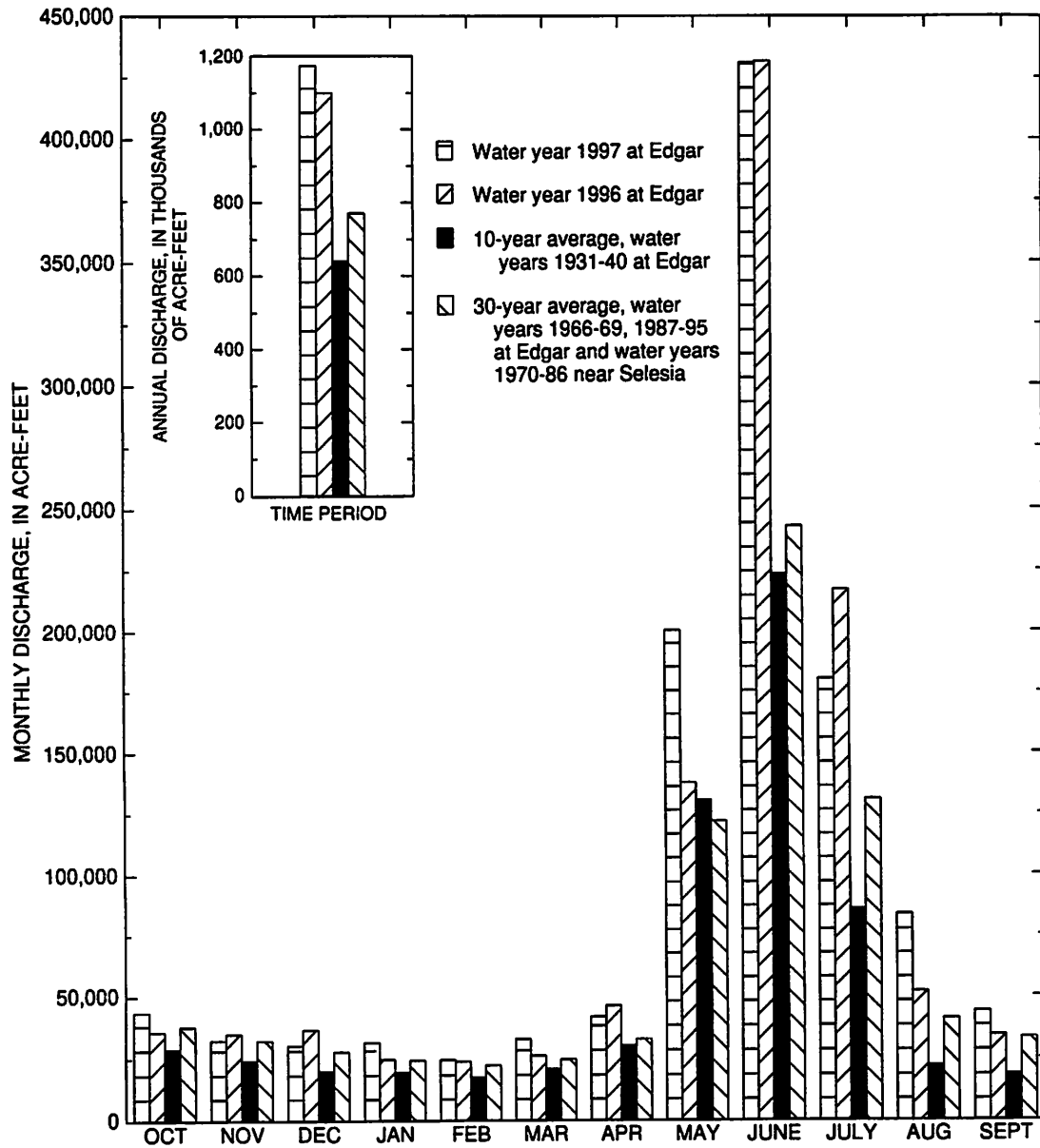


Figure 1. Comparison of discharge of the Clarks Fork Yellowstone River during water year 1997 with discharge during water year 1996 and with 10-year and 30-year average discharges.

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, 3.6 mi southwest of Bighorn, 4.5 mi southeast of Custer, and at river mile 3.0.

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 sea level, 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.--Records good except those for estimated daily discharges, which are poor. 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. Several observations of water temperature and specific conductance were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2870	3390	3450	e3700	6880	5090	6730	6870	7100	7190	7660	7250
2	2880	3470	3500	e3700	6380	5100	6920	6680	7750	7540	7520	7290
3	2840	3500	3500	e3700	5860	5160	7040	7190	8330	6650	7490	7060
4	2870	3570	3530	e3700	4550	5090	7170	7110	8430	5150	7440	6560
5	2880	3650	3600	e3700	4580	5080	7410	6720	8310	4850	7320	6030
6	2900	3690	3600	e3700	4510	5080	7280	6290	8200	4720	7220	5440
7	2900	3510	3540	e3700	4390	5120	7210	5960	8310	4590	7100	5130
8	2890	3130	3410	e3700	4500	5220	7410	5870	8590	4450	6980	5110
9	2900	3140	3430	e3700	4650	5220	7550	5740	9130	4340	6910	4810
10	2920	3160	3440	e3500	4630	5230	7740	5270	9940	4200	6880	4200
11	2920	3150	3510	e3000	4620	5250	7870	4980	10300	4320	6840	3800
12	2950	3200	3520	e2400	4640	5270	7830	4940	10400	4850	6910	3750
13	2970	3220	3510	e3000	4660	5180	7830	4940	12600	6340	7030	3730
14	2960	3260	3580	e3300	4660	5330	8020	4860	14500	7260	6980	3700
15	2980	3320	3520	e3500	4770	5490	8530	4820	14700	7820	6970	3670
16	2820	3310	3520	e3600	5120	5560	9100	4580	14400	7870	6940	3660
17	1640	3260	e3500	e3600	5730	5810	9310	4350	14500	7740	7010	3650
18	3020	3250	e3350	e3600	5740	5980	9220	4350	14700	7700	7000	3630
19	3090	3310	e3300	e3600	5730	6440	9030	4460	15000	7820	6810	3630
20	3130	3340	e3400	e3600	5820	7050	8800	4600	15000	8400	6660	3630
21	3200	3350	e3500	e3600	5510	6860	8600	4300	14900	9560	6830	3620
22	3310	3360	e3500	e3600	5320	6640	8400	4170	14600	8960	6730	3720
23	3150	3450	e3500	e3600	5170	6330	8160	4140	14300	8230	6680	3710
24	3030	3470	e3400	e3600	5150	6100	7840	4230	14200	7840	6700	3920
25	3100	3540	e3000	3700	5140	5950	7750	4380	13300	7600	6660	4230
26	3350	3470	e2500	3630	5160	6060	7740	4480	11900	7540	6570	4270
27	3290	3270	e2700	3620	5140	6280	7710	4740	10500	7530	6560	4260
28	3260	3380	e2900	4180	5140	6500	7710	4950	9370	7450	6520	4290
29	3300	3440	e3000	5210	---	6730	7420	5660	8090	7340	6730	4290
30	3330	3440	e3500	5820	---	6690	7100	6060	7110	7310	7230	4490
31	3360	---	e3500	6310	---	6610	---	6520	---	7620	7260	---
TOTAL	93010	101000	104710	116870	144150	179500	236430	164210	338460	210780	216140	136530
MEAN	3000	3367	3378	3770	5148	5790	7881	5297	11280	6799	6972	4551
MAX	3360	3690	3600	6310	6880	7050	9310	7190	15000	9560	7660	7290
MIN	1640	3130	2500	2400	4390	5080	6730	4140	7100	4200	6520	3620
AC-FT	184500	200300	207700	231800	285900	356000	469000	325700	671300	418100	428700	270800

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1997, BY WATER YEAR (WY)

MEAN	3248	3357	3198	3056	3226	3763	3584	4451	7246	5502	2850	2870
MAX	5546	5599	4907	5478	5314	6580	7881	9102	15180	19090	6972	4952
(WY)	1972	1974	1968	1968	1971	1972	1997	1947	1948	1967	1997	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	FOR WATER YEARS 1945 - 1997
ANNUAL TOTAL	1651700	2041790	
ANNUAL MEAN	4513	5594	3844
HIGHEST ANNUAL MEAN			5594
LOWEST ANNUAL MEAN			1623
HIGHEST DAILY MEAN	8630	15000	50000
LOWEST DAILY MEAN	1640	1640	400
ANNUAL SEVEN-DAY MINIMUM	2280	2750	528
INSTANTANEOUS PEAK FLOW		a15100	c59200
INSTANTANEOUS PEAK STAGE		b9.58	d14.21
INSTANTANEOUS LOW FLOW		1640	f275
ANNUAL RUNOFF (AC-FT)	3276000	4050000	2785000
10 PERCENT EXCEEDS	7990	8260	6500
50 PERCENT EXCEEDS	3500	5090	3230
90 PERCENT EXCEEDS	2750	3200	1820

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

SUMMARY STATISTICS	WATER YEARS 1946 - 1961*		WATER YEARS 1967 - 1997**	
ANNUAL MEAN	3358		3965	
HIGHEST ANNUAL MEAN	5501	1947	5594	1997
LOWEST ANNUAL MEAN	1623	1961	1999	1989
HIGHEST DAILY MEAN	25700	Jun 23 1947	50000	May 20 1978
LOWEST DAILY MEAN	462	May 12 1961	400	Apr 4 1967
ANNUAL SEVEN-DAY MINIMUM	528	May 6 1961	843	Nov 18 1977
INSTANTANEOUS PEAK FLOW	g26200	Jun 24 1947	59200	May 20 1978
INSTANTANEOUS PEAK STAGE	d10.65	Mar 20 1947	14.15	May 20 1978
INSTANTANEOUS LOW FLOW	f275	Nov 15 1959		
ANNUAL RUNOFF (AC-FT)	2578000		2872000	
10 PERCENT EXCEEDS	6200		6390	
50 PERCENT EXCEEDS	2810		3500	
90 PERCENT EXCEEDS	1500		2000	

*--Prior to construction of Yellowtail Dam.

**--After completion of Yellowtail Dam.

a--Gage height, 6.81 ft.

b--Backwater from ice. Stage may have been higher during period of no gage-height record.

c--Gage height 14.15 ft, at different site and datum.

d--Backwater from ice.

e--Estimated.

f--About, result of freezeup.

g--Gage height, 8.79 ft, at different site and datum.

06294500 BIGHORN RIVER ABOVE TULLOCK CREEK, NEAR BIGHORN, MONT.
 (Adjusted for change in contents in Bighorn Lake
 minus
 Little Bighorn River near Hardin, Mont.)

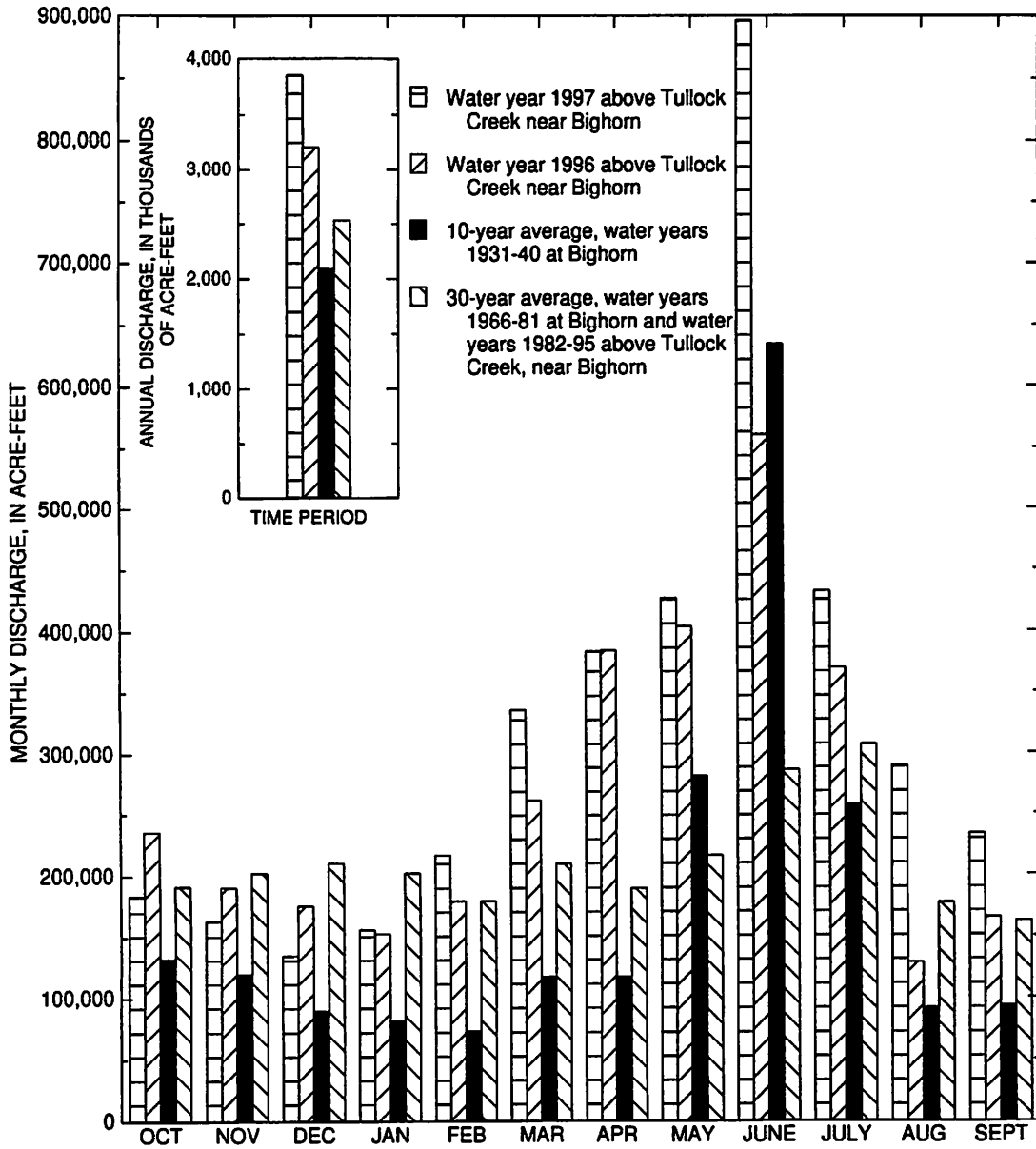


Figure 2. Comparison of discharge of the Bighorn River during water year 1997 with discharge during water year 1996 and with 10-year and 30-year average discharges.

06308500 Tongue River at Miles City, Mont.

LOCATION.--Lat 46°23'05", long 105°50'41", in SE 1/4 SE 1/4 SE 1/4 sec. 4, T.7 N., R.47 E., Custer County, Hydrologic Unit 10090102, on right bank 1.5 mi south of Miles City and at river mile 2.3.

DRAINAGE AREA.--5,397 mi². Area at site used prior to Oct. 4, 1995, 5,379 mi².

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to current year. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. April 1946 to Oct. 4, 1995, at site 2.5 mi upstream. Flows at present site are equivalent with site operated from 1946. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,360 ft above sea level, from topographic map. April 1938 to April 1942, nonrecording gage at site 8 mi upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft higher. Oct. 4, 1995, gage was moved 2.5 miles downstream.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulation by Tongue River Reservoir (station 06307000), and many small reservoirs in Wyoming (combined capacity about 15,000 acre-ft). Diversions for irrigation of about 100,800 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

**DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES**

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	329	e120	e200	e300	523	613	654	1500	e900	566	451
2	97	317	e120	e200	e300	548	613	652	1200	e800	550	420
3	184	304	e120	e170	e250	604	610	588	1200	e800	546	374
4	207	298	e120	e150	e240	529	623	473	1080	e800	540	387
5	206	296	e140	e130	e230	520	723	585	998	e770	522	385
6	205	295	e130	e130	e230	484	764	505	906	e770	478	391
7	204	296	e130	e150	e230	527	729	549	1180	e770	521	387
8	208	301	e130	e150	e230	789	700	566	1410	e800	451	364
9	210	294	e130	e120	e220	931	693	565	1720	e750	432	335
10	214	290	e130	e80	e220	869	693	567	1940	e650	447	332
11	217	290	e140	e65	e200	911	685	557	1900	e600	459	338
12	215	275	e120	e65	e190	1050	637	562	1950	596	447	333
13	216	230	e110	e70	e230	911	571	563	1980	616	424	329
14	219	198	e100	e75	e300	639	606	492	1990	615	410	330
15	215	e180	e95	e80	e500	517	706	429	2060	566	411	344
16	217	e150	e90	e75	e800	546	625	430	2040	489	446	386
17	215	e135	e85	e90	e1400	855	583	407	2000	481	488	380
18	265	e120	e80	e120	e2100	895	550	420	2030	477	504	329
19	323	e110	e85	e150	e3000	998	544	429	2780	475	475	284
20	347	e100	e100	e200	2240	844	609	499	2790	468	447	279
21	396	e90	e100	e200	1980	946	681	886	2430	542	484	291
22	428	e80	e90	e170	1620	896	746	943	2410	556	535	301
23	337	e75	e80	e160	886	757	742	991	2270	611	545	315
24	297	e70	e70	e120	657	664	715	1020	2090	927	549	385
25	291	e80	e60	e90	599	599	698	1110	1780	1070	564	377
26	341	e90	e60	e70	732	574	698	1330	1620	1050	452	459
27	415	e110	e70	e55	660	594	694	1570	1430	855	459	397
28	317	e130	e90	e80	630	591	688	1770	1360	685	456	431
29	264	e140	e100	e150	---	605	676	1790	1330	599	437	457
30	317	e130	e120	e250	---	629	671	1840	1000	585	449	435
31	277	---	e160	e310	---	628	---	1850	---	583	454	---
TOTAL	7952	5803	3275	4125	21174	21973	19886	25592	52374	21256	14948	11006
MEAN	257	193	106	133	756	709	663	826	1746	686	482	367
MAX	428	329	160	310	3000	1050	764	1850	2790	1070	566	459
MIN	88	70	60	55	190	484	544	407	906	468	410	279
AC-FT	15770	11510	6500	8180	42000	43580	39440	50760	103900	42160	29650	21830

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1997, BY WATER YEAR (WY) *

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972		
MEAN	245	259	194	194	288	559	459	733	1319	488	187	203	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599	
MAX	694	585	423	502	1794	1783	1693	2983	3825	2207	700	599	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	
(WY)	1972	1942	1950	1975	1971	1971	1965	1978	1978	1975	1975	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	1968	
MIN	10.3	60.9	68.0	78.6	102	79.8	12.5	29.2	48.6	12.6	6.08	2.40	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	
(WY)	1961	1989	1990	1961	1961	1961	1961	1961	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	FOR 1996 WATER YEAR	FOR 1997 WATER YEAR	WATER YEARS 1938 - 1997*
ANNUAL TOTAL	157476	209364	209364	209364	
ANNUAL MEAN	430	574	574	574	424
HIGHEST ANNUAL MEAN					986
LOWEST ANNUAL MEAN					57.2
HIGHEST DAILY MEAN	2470	3000	3000	3000	9290
LOWEST DAILY MEAN	60	55	55	55	.00
ANNUAL SEVEN-DAY MINIMUM	74	73	73	73	.00
INSTANTANEOUS PEAK FLOW		a3080	a3080	a3080	c13300
INSTANTANEOUS PEAK STAGE		b8.66	b8.66	b8.66	13.27
INSTANTANEOUS LOW FLOW		55	55	55	.00
ANNUAL RUNOFF (AC-FT)	312400	415300	415300	415300	307300
10 PERCENT EXCEEDS	949	1200	1200	1200	991
50 PERCENT EXCEEDS	212	454	454	454	230
90 PERCENT EXCEEDS	90	100	100	100	71

*--During period of operation (April 1938 to April 1942, April 1946 to current year).
 a--Gage height, 7.00 ft.
 b--Backwater from ice.
 c--At previous site and datum.
 e--Estimated.

06308500 TONGUE RIVER AT MILES CITY, MONT.

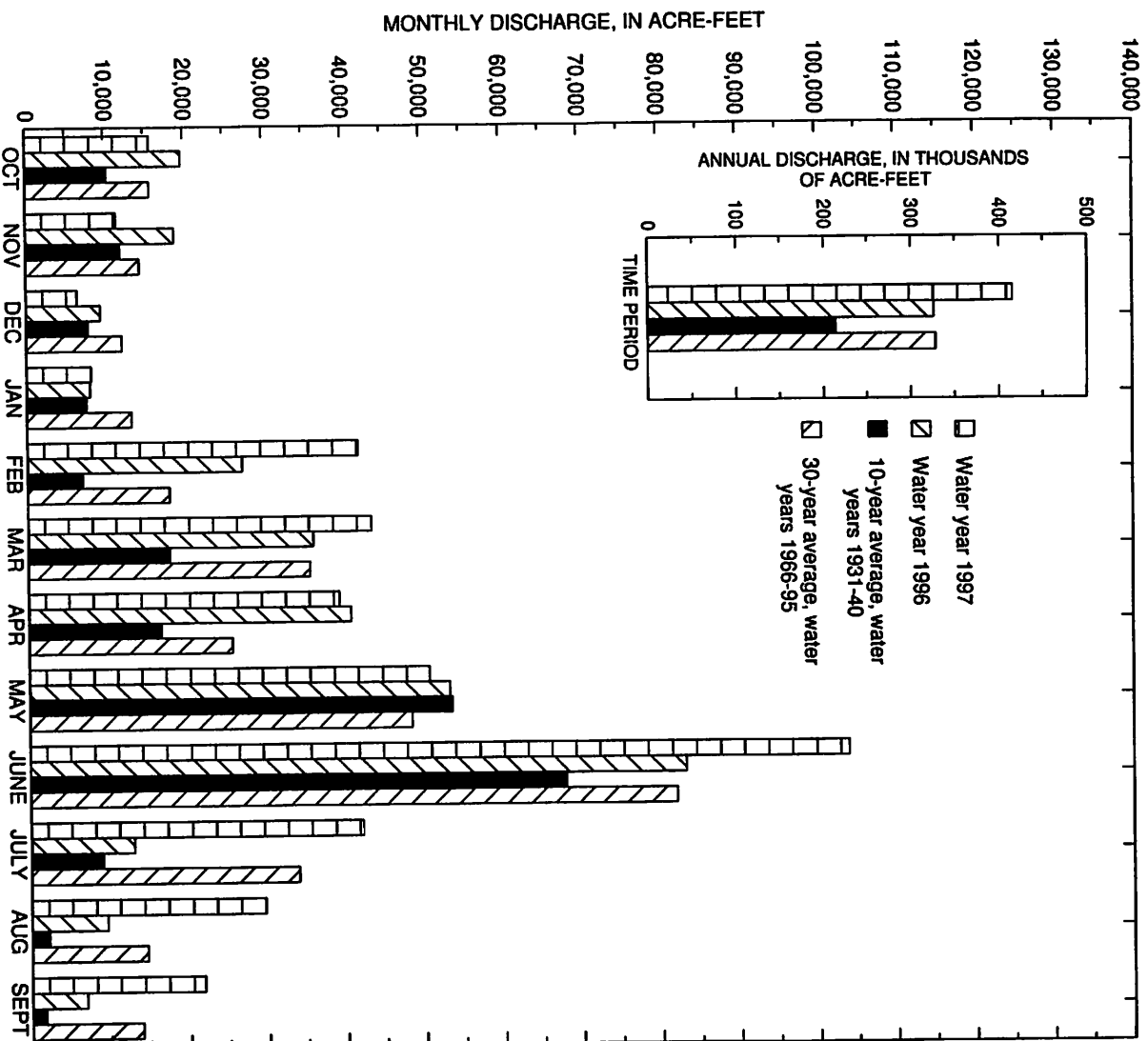


Figure 3. Comparison of discharge of the Tongue River during water year 1997 with discharge during water year 1996 and with 10-year and 30-year average discharges.

06326500 POWDER RIVER NEAR LOCATE, MONT.

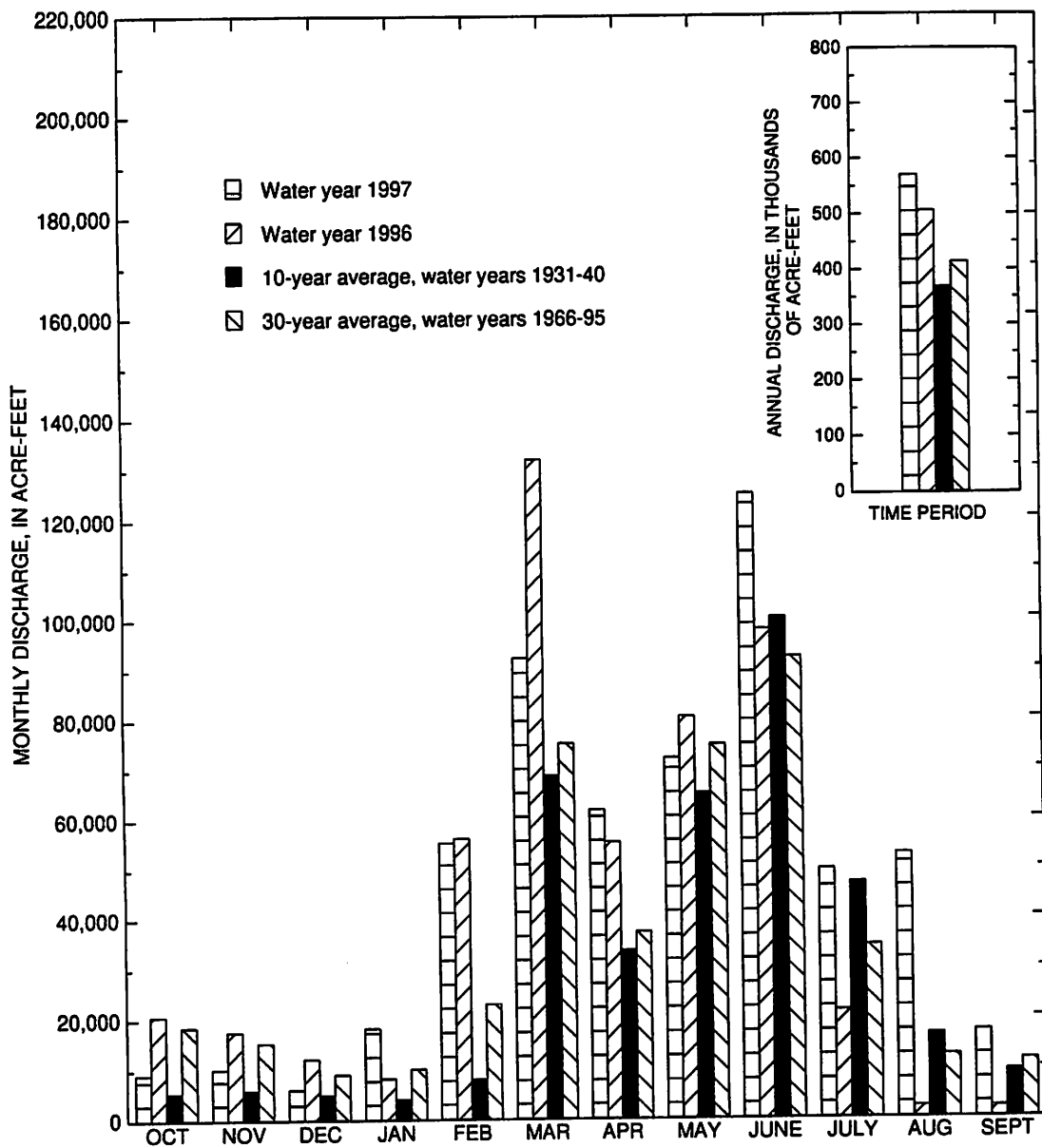


Figure 4. Comparison of discharge of the Powder River during water year 1997 with discharge during water year 1996 and with 10-year and 30-year average discharges.

**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 feet above sea level (levels by Bureau of Reclamation).

REMARKS (REVISED).--Reservoir is formed by rock-fill dam completed in October 1951. Storage began Oct. 11, 1951. Usable capacity, 701,500 acre-ft between elevation 4,657.00 ft, invert of penstock pipe, and 4,725.00 ft, top of spillway gate. Dead storage, 40,080 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. Between January 1966 and October 1996, usable capacity was 742,100 acre-ft and dead storage was 59,880 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 Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 862,500 acre-ft, July 6, 7, 1967, elevation, 4,730.83 ft; minimum daily contents 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 daily contents, 748,200 acre-ft, June 27, elevation, 4,727.33 ft; minimum daily contents, 390,600 acre-ft, May 12, elevation, 4,705.28 ft.

Month	Water-surface elevation, in feet	Usable contents, in acre-feet*	Change in usable contents, in acre-feet
September 30, 1996	4,720.12	650,600	---
October 31	4,719.28	595,700	-54,900
November 30	4,719.07	592,000	-3,700
December 31	4,718.16	576,500	-15,500
January 31, 1997	4,717.33	562,700	-13,800
February 28	4,716.16	543,800	-18,900
March 31	4,711.66	476,000	-67,800
April 30	4,706.11	401,100	-74,900
May 31	4,709.13	440,700	+39,600
June 30	4,727.17	744,900	+304,200
July 31	4,724.63	694,300	-50,600
August 31	4,723.09	664,800	-29,500
September 30, 1997	4,720.47	616,600	-48,200
1997 water year			-34,000

*--Capacity table revised effective October 1, 1996.

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 feet above sea level (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, including 68 acre-ft below elevation 6,343.75 ft. Prior to Oct. 1, 1971, usable capacity was 17,280 acre-ft, 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 Bureau of Reclamation.

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

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 7,650 acre-ft, June 29, 30, elevation, 6,413.10 ft; minimum daily contents, 212 acre-ft, Oct. 1, 2, elevation, 6,353.00 ft.

Month	Water-surface elevation, in feet	Usable contents, in acre-feet	Change in usable contents, in acre-feet
September 30, 1996	6,353.00	212	---
October 31	6,356.10	286	+74
November 30	6,354.00	233	-53
December 31	6,356.00	283	+50
January 31, 1997	6,354.50	244	-39
February 28	6,355.30	263	+19
March 31	6,363.30	548	+285
April 30	6,364.60	609	+61
May 31	6,360.50	433	-176
June 30	6,413.10	7,650	+7,217
July 31	6,397.00	3,940	-3,710
August 31	6,383.10	2,040	-1,900
September 30, 1997	6,360.00	414	-1,626
1997 water year			+202

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 feet above 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, 1,312,000 acre-ft, revised, 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 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 daily contents since first filling, 641,900 acre-ft, Apr. 14, 1989, elevation, 3,583.30 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 1,224,000 acre-ft, July 14, elevation, 3,651.71 ft; minimum daily contents, 691,800 acre-ft, May 8, elevation, 3,593.15 ft.

Month	Water-surface elevation, in feet	Usable contents, in acre-feet	Change in usable contents, in acre-feet
September 30, 1996	3,633.43	978,100	---
October 31	3,634.29	987,300	+9,200
November 30	3,631.60	959,200	-28,100
December 31	3,624.55	894,300	-64,900
January 31, 1997	3,615.81	826,400	-67,900
February 28	3,605.94	762,400	-64,000
March 31	3,605.70	761,000	-1,400
April 30	3,594.86	700,800	-60,200
May 31	3,618.52	846,300	+145,500
June 30	3,646.90	1,149,000	+302,700
July 31	3,649.37	1,187,000	+38,000
August 31	3,640.53	1,061,000	-126,000
September 30, 1997	3,638.21	1,032,000	-29,000
1997 water year			+53,900

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 usable 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 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 water level data.

Month	Usable contents, in acre-feet			
	06224500 Bull Lake	Pilot Butte Reservoir*	06281500 Buffalo Bill Reservoir	06307000 Tongue River Reservoir
September 30, 1996.....	77,810	15,110	526,600	17,700
October 31	76,400	26,040	511,800	9,920
November 30	77,420	25,840	516,300	12,100
December 31	78,780	25,700	512,100	14,440
January 31, 1997	80,540	25,620	513,500	15,900
February 28	81,070	25,560	485,600	23,130
March 31	81,450	25,520	424,000	25,340
April 30	80,260	25,840	294,800	18,440
May 31.....	95,160	23,710	335,900	34,180
June 30.....	146,800	24,860	618,000	49,990
July 31	147,700	25,300	641,500	38,970
August 31	147,000	26,650	622,800	21,590
September 30, 1997.....	120,700	26,970	566,500	6,650
 Change in contents during water year.....	 +42,890	 +11,860	 +39,900	 -11,050

*--From revised capacity table effective October 1, 1996.

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, 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 THE RESOLUTION OF DISPUTES
OVER THE ADMINISTRATION OF THE
YELLOWSTONE RIVER COMPACT**

December 19, 1995

Section I. General Framework

According to Article III(F) of the Yellowstone River Compact.

"In case of the failure of the representatives of Wyoming and Montana to unanimously agree on any matter necessary to the proper administration of this compact, then the member selected by the director of the United States Geological Survey shall have the right to vote upon the matters in disagreement and such points of disagreement shall then be decided by a majority vote of the representatives of the states of Wyoming and Montana and said member selected by the director of the United States geological survey, each being entitled to one vote."

Section II. Purpose and Goal

- A. The purpose of these rules is to clarify and more fully develop the dispute resolution process outlined in Section I.
- B. The goal of the dispute resolution process outlined in these rules is to encourage joint problem solving and consensus building. It consists of three phases -- unassisted negotiation, facilitation, and voting.
- C. Any agreement reached through this process is binding on Montana, Wyoming, and the United States Geological Survey (USGS).
- D. Either state can initiate the dispute resolution process defined in Sections IV, V, and VI, and the other state is obligated to participate in good faith. The states agree that the issues pursued under this dispute resolution process shall be both substantive and require timely resolution.

Section III. Consensus

- A. In the process of administering the Yellowstone River Compact, the representatives from Montana and Wyoming agree to seek consensus.
- B. For purposes of this rule, consensus is defined as an agreement that is reached by identifying the interests of Montana and Wyoming and then building an integrative solution that maximizes the satisfaction of as many of the interests as possible. The process of seeking consensus does not involve voting, but a synthesis and blending of alternative solutions.

Section IV. Unassisted Negotiation

- A. In all situations, the representatives from Montana and Wyoming shall first attempt to seek consensus through unassisted negotiation. The federal representative will not serve as chairperson in the unassisted negotiation process.
- B. During a negotiation process, the representatives from Montana and Wyoming shall identify issues about which they differ, educate each other about their needs and interests, generate possible resolution options, and collaboratively seek a mutually acceptable solution.
- C. To help facilitate negotiations, the representatives from Montana and Wyoming in cooperation with the USGS agree to share technical information and develop joint data bases. Other data sources may also be used.
- D. The USGS shall serve as technical advisor in the two-state negotiations.

Section V. Facilitation

- A. If the representatives from Montana and Wyoming are not able to reach consensus through unassisted negotiation, they shall each identify, articulate, and exchange, in writing, the unresolved issues.
- B. The representatives from Montana and Wyoming shall then jointly appoint a facilitator to assist in resolving the outstanding dispute. If the representatives from Montana and Wyoming cannot identify a mutually acceptable facilitator, the representative appointed by the USGS shall appoint a facilitator.
- C. A facilitator, for purposes of this rule, is defined as a neutral third party that shall help the representatives from Montana and Wyoming communicate, negotiate, and reach agreements voluntarily. The facilitator is not empowered to vote or render a decision.
- D. The facilitator shall assist the representatives from Montana and Wyoming in developing appropriate ground rules for each facilitated session including establishing a deadline for completion of the facilitation process, setting an appropriate agenda, identifying issues, collecting and analyzing technical information, developing options, packaging agreements, and preparing a written agreement. The facilitator reserves the right to meet privately with each representative during the facilitation process.

Section VI. Voting

- A. If, and only if, the representatives from Montana and Wyoming are unable to reach consensus with the assistance of a facilitator, then a dispute may be settled by voting.
- B. The representatives from Montana and Wyoming, along with the representative appointed by the director of the USGS, are each entitled to one vote.
- C. If the USGS representative does not vote in accordance with Article III, then the director of the USGS will select, with concurrence from Wyoming and Montana, a neutral third party to vote.

- D. If the representative appointed by the director of the USGS is not involved in the steps outlined in Sections IV and V, each state shall have the opportunity to present appropriate information to that representative. This information may be presented through both oral presentations and written documents. All information will be shared with the other state.

The representative of the USGS may also consult the facilitator referenced in Section V in an attempt to resolve any disputes.

- E. The USGS shall pay the expenses of the representative appointed by the director of the USGS.
- F. Points of disagreement shall be resolved by a majority vote.

Section VII. Funding

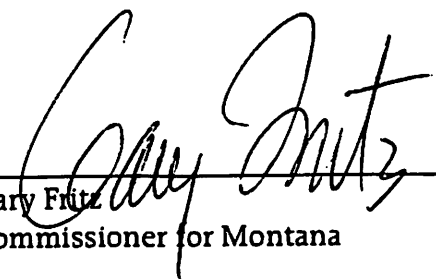
- A. The USGS will pay one-half and the states of Montana and Wyoming shall each pay one-quarter of the expenses of the facilitator, which shall not exceed \$10,000, unless agreed to by both states and the USGS.

Section VIII. Amendments

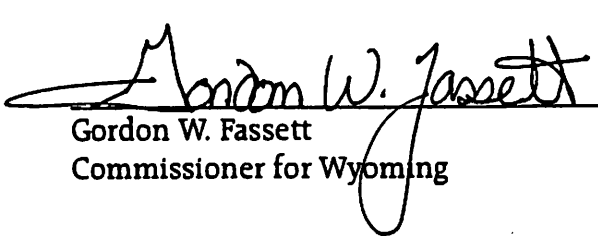
- A. These rules may be amended or revised by a unanimous vote of the Commission.

Section IX. Execution


These rules for the resolution of disputes over the administration of the Yellowstone River Compact are hereby executed on the date indicated below.



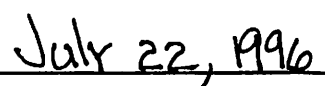
Gary Fritz
Commissioner for Montana



Gordon W. Fassett
Commissioner for Wyoming



William F. Horak
Federal Representative



Date

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.) _____

(b) Describe water measuring device: _____

(c) If the point of diversion is in Montana:

1. What flow rate has been claimed?
 _____ cubic feet per second
 gallons per minute
 miner's inches

2. What volume of water has been claimed?
 _____ acre-feet

7. Dimensions of ditch at headgate: Width at top (at waterline) _____ feet; width at bottom _____ feet; side slopes (vertical:horizontal) _____:_____; depth of water _____ feet; grade _____ feet per mile.

8. Place of use and acres irrigated: County _____ State _____
 Give legal subdivisions of land owned by you on which water is being used (acres claimed): An example field is shown in the first line.

T. R.	SEC.	NE $\frac{1}{4}$		NW $\frac{1}{4}$		SW $\frac{1}{4}$		SE $\frac{1}{4}$		TOTAL				
		NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	NE $\frac{1}{4}$	NW $\frac{1}{4}$	SW $\frac{1}{4}$	SE $\frac{1}{4}$	
58N	95W	18		25.1									10.2	35.3

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: _____

16. Describe ordinary annual period of use: _____ to _____
(mo/day) (mo/day)

_____.

17. Attach copies of aerial photographs, U. S. Geological Survey maps or other such documents showing the ditch and lands irrigated that give evidence to this claim and may be useful to the Commission.

* * * * *

State of _____)
) SS
State of _____)

I, _____, having been duly sworn, depose and say that I, being of legal age and being the claimant of this claim for a water right, and the person whose name is signed to it as the claimant, know the contents of this claim and the matters and things stated there are correct.

Subscribed and sworn before me, this ____ day of _____, 19__.

Notary Public

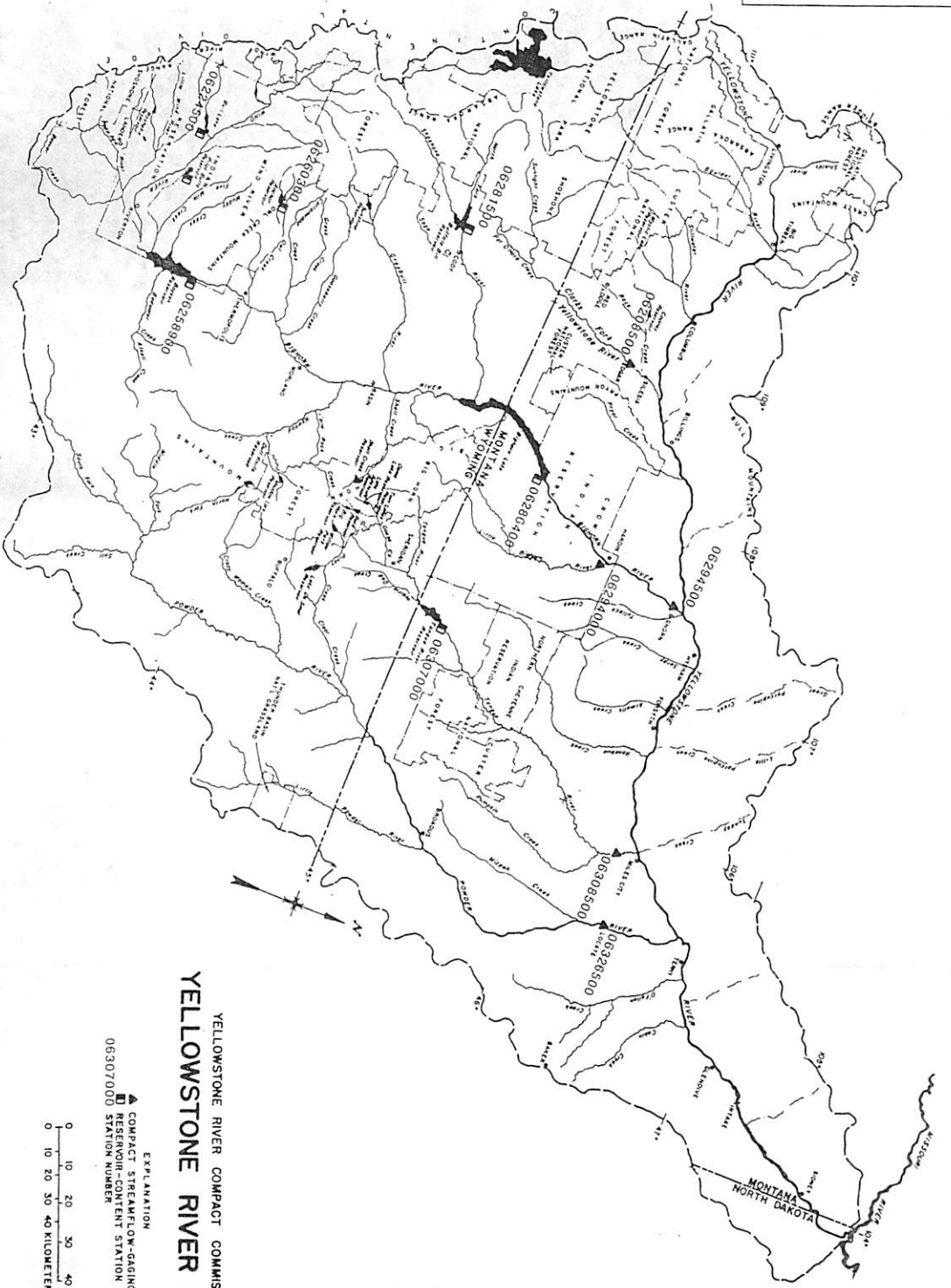
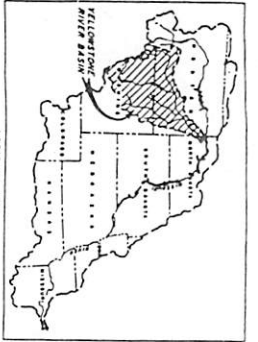
Residing at: _____

My commission expires: _____

CONVERSION TABLE

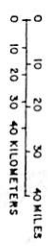
<u>Multiply inch-pound units</u>	<u>By</u>	<u>To obtain SI units</u>
<i>Length</i>		
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)
<i>Area</i>		
acres	4,047	square meters (m ²)
	0.4047	*hectares (ha)
	0.4047	square hectometer (hm ²)
	0.004047	square kilometers (km ²)
square miles (mi ²)	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.



YELLOWSTONE RIVER COMPACT COMMISSION
YELLOWSTONE RIVER BASIN

EXPLANATION
 ▲ COMPACT STREAMFLOW-GAGING STATION
 ◻ RESERVOIR-CONTENT STATION
 06307000 STATION NUMBER



MAP SHOWING LOCATIONS OF COMPACT STREAMFLOW-GAGING AND RESERVOIR-CONTENT STATIONS