

YELLOWSTONE RIVER COMPACT COMMISSION

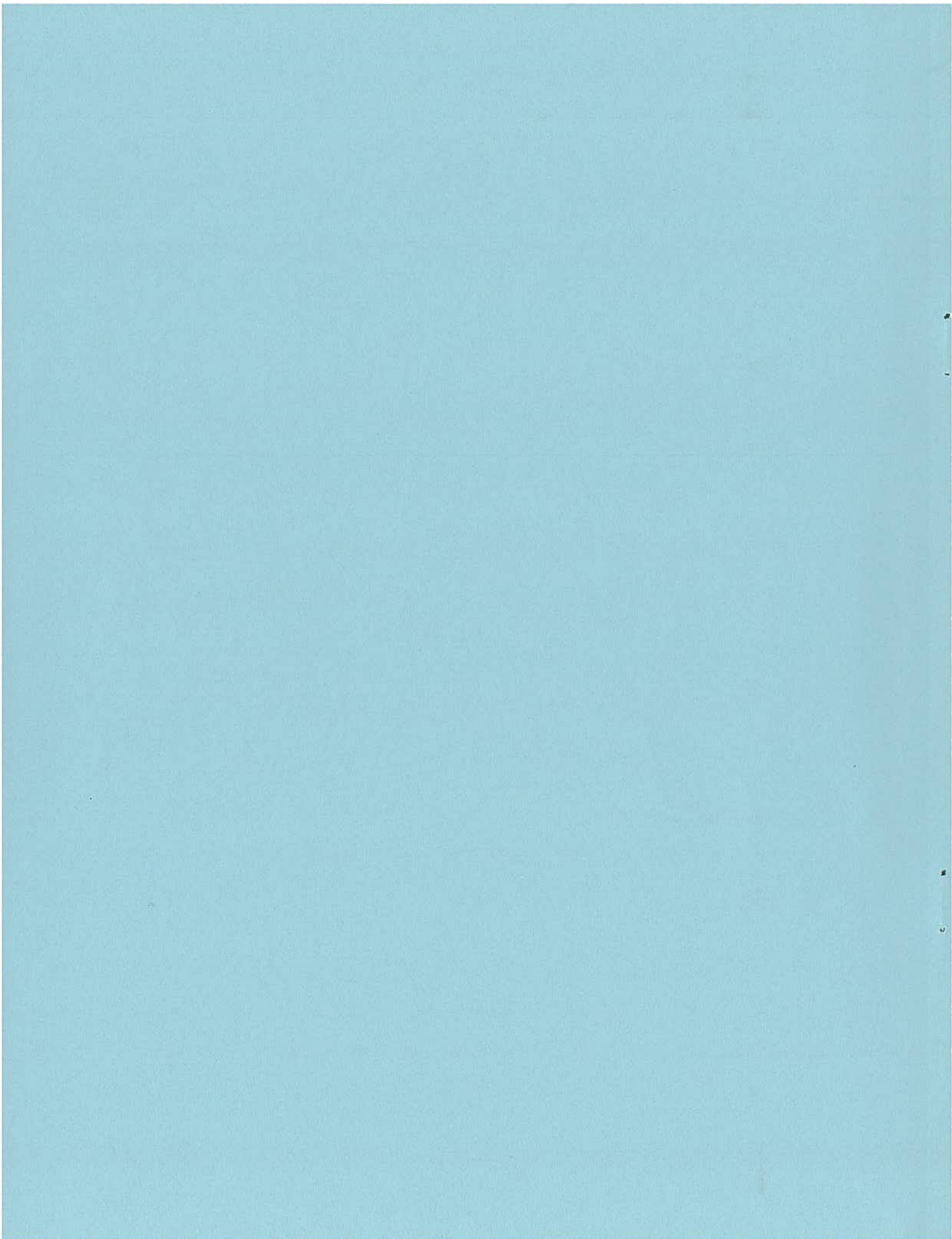
WYOMING

MONTANA

NORTH DAKOTA



FIFTY-EIGHTH ANNUAL REPORT
2009



Yellowstone River

Compact Commission

Fifty-Eighth Annual Report

2009

Contents

Minutes of December 1, 2009.....	vii
Minutes of Teleconference—September 17, 2010.....	xvi
Appendix A.....	xvii
General Report	1
Cost of Operation and Budget	1
Streamflow-Gaging Station Operation.....	1
Diversions.....	2
Reservoir Contents	2
Reservoirs Completed after January 1, 1950.....	2
Reservoirs Existing on January 1, 1950.....	2
Annual Contents of Reservoirs.....	2
Summary of Discharge for Yellowstone River Compact Streamflow-Gaging Stations.....	3
06208500 Clarks Fork Yellowstone River at Edgar, Mont.	3
06294000 Little Bighorn River near Hardin, Mont.	6
06294500 Bighorn River above Tullock Creek, near Bighorn, Mont.....	8
06308500 Tongue River at Miles City, Mont.....	11
06326500 Powder River near Locate, Mont.	14
Month-End Usable Contents for Yellowstone River Compact Reservoirs ¹ Completed after January 1, 1950.....	17
06258900 Boysen Reservoir, Wyo.....	17
06260300 Anchor Reservoir, Wyo.	18
06286400 Bighorn Lake near St. Xavier, Mont.	19
Month-End Useable Contents for Yellowstone River Compact Reservoirs ¹ Existing on January 1, 1950.....	20
Water-Year-End Useable Contents for Yellowstone River Compact Reservoirs ¹ or Lakes.....	21
Month-End Useable Contents for Yellowstone River Compact Reservoirs ¹ Existing on January 1, 1950.....	20
Water-Year-End Useable Contents for Yellowstone River Compact Reservoirs ¹ or Lakes.....	21
Rules and Regulations for Administration of the Yellowstone River Compact.....	23
Rules for the Resolution of Disputes over the Administration of the Yellowstone River Compact.....	27
Rules for Adjudicating Water Rights on Interstate Ditches.....	30
Claim Form for Interstate Ditches	35

¹ Wyoming disagrees with the term “Compact Reservoirs” as used throughout this annual report. Wyoming’s acceptance of this annual report should not be construed as Wyoming’s acceptance of the use of that term.

Figures

Map showing locations of Yellowstone River Compact streamflow-gaging and reservoir-content stations.....	in back
1–4. Graphs showing:	
1. Streamflow data for Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, water years 1922–2009. <i>A</i> , Statistical distribution of monthly and annual streamflow. <i>B</i> , Annual departure from the mean annual streamflow	5
2. Streamflow data for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), minus Little Bighorn River near Hardin, Mont. (06294000); adjusted for change in contents in Bighorn Lake, water years 1965–2009. <i>A</i> , Statistical distribution of monthly and annual streamflow. <i>B</i> , Annual departure from the mean annual streamflow	10
3. Streamflow data for Tongue River at Miles City, Mont. (06308500), water years 1939–2009. <i>A</i> , Statistical distribution of monthly and annual streamflow. <i>B</i> , Annual departure from the mean annual streamflow	13
4. Streamflow data for Powder River near Locate, Mont. (06326500), water years 1939–2009. <i>A</i> , Statistical distribution of monthly and annual streamflow. <i>B</i> , Annual departure from the mean annual streamflow	16

Tables

1. Daily mean discharge for Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, October 2008 through September 2009.....	3
2. Daily mean discharge for Little Bighorn River near Hardin, Mont. (06294000), October 2008 through September 2009.....	6
3. Daily mean discharge for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), October 2008 through September 2009.....	8
4. Daily mean discharge for Tongue River at Miles City, Mont. (06308500), October 2008 through September 2009.....	11
5. Daily mean discharge for Powder River near Locate, Mont. (06326500), October 2008 through September 2009.....	14
6. Month-end useable contents for Boysen Reservoir, Wyo.....	17
7. Month-end useable contents for Anchor Reservoir, Wyo.....	18
8. Month-end useable contents for Bighorn Lake, Mont.....	19
9. Month-end useable contents for Yellowstone River Compact reservoirs ¹ existing on January 1, 1950.....	20
10. Water-year-end usable contents for Yellowstone River Compact reservoirs ¹ or lakes	21

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Conversion Factors

Multiply	By	To obtain
Length		
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
Area		
acre	4,047	square meter (m ²)
acre	0.4047	hectare (ha) ¹
acre	0.4047	square hectometer (hm ²)
acre	0.004047	square kilometer (km ²)
square mile (mi ²)	2.590	square kilometer (km ²)
Volume		
acre-foot (acre-ft)	1,233	cubic meter (m ³)
acre-foot (acre-ft)	0.001233	cubic hectometer (hm ³)
acre-foot (acre-ft)	0.000001233	cubic kilometer (km ³)
barrel (bbl, for water, 50 gallons)	0.1892	cubic meter (m ³)
cubic foot per second per day [(ft ³ /s)/d]	2,447	cubic meter (m ³)
cubic foot per second per day [(ft ³ /s)/d]	0.0002447	cubic hectometer (hm ³)
cubic foot (ft ³)	0.02832	cubic meter (m ³)
million cubic feet (mcf)	0.02832	million cubic meters
Flow rate		
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year (m ³ /yr)
acre-foot per year (acre-ft/yr)	0.001233	cubic hectometer per year (hm ³ /yr)
acre-foot per year (acre-ft/yr)	0.000001233	cubic kilometer per year (km ³ /yr)
cubic foot per second (ft ³ /s)	28.32	liter per second (L/s)
cubic foot per second (ft ³ /s)	28.32	cubic decimeter per second (dm ³ /s)
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second (m ³ /s)
foot per year (ft/yr)	0.3048	meter per year (m/yr)
gallon per minute (gal/min)	0.06309	liter per second (L/s)

¹ The unit hectare is used with the International System of Units (SI), which is in common everyday use throughout the world. See: Taylor, B.E., and Thompson, Ambler, eds., 2008, The International System of Units (SI): U.S. Department of Commerce, NIST Special Publication 330, 92 p., available online at <http://physics.nist.gov/Pubs/SP330/sp330.pdf>.

YELLOWSTONE RIVER COMPACT COMMISSION
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Honorable Matt Mead
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Governor of the State of Montana
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Honorable Jack Dalrymple
Governor of the State of North Dakota
Bismarck, North Dakota 58501

Dear Governors:

Pursuant to Article III of the Yellowstone River Compact, the Commission submits the following fifty-eighth annual report of activities for the period ending September 30, 2009.

Minutes of December 1, 2009

Members of the Yellowstone River Compact Commission convened December 1 at 8:30 a.m. at the Park County Weed and Pest Building in Powell, Wyoming. In attendance were Mr. William Horak, U.S. Geological Survey (USGS), Chairman and Federal Representative; Ms. Mary Sexton, Director, Montana Department of Natural Resources and Conservation (DNRC) and Commissioner for Montana; and Mr. Patrick Tyrrell, Wyoming State Engineer and Commissioner for Wyoming. Also in attendance were Mr. Loren Smith, Mr. Carmine LoGuidice, and Ms. Jodee Pring, Wyoming State Engineer's Office (SEO); Mr. David Willms, Wyoming Attorney General's Office; Mr. Chuck Dalby, and Mr. Keith Kerbel, Montana DNRC; Ms. Jennifer Anders, Montana Attorney General's Office; Mr. Bob Bukantis, Montana Department of Environmental Quality (DEQ); Mr. Patrick Erger, Bureau of Reclamation; and Mr. Wayne Berkas, USGS.

Mr. Horak called the meeting to order and presented the agenda. He asked if anyone had any additions to the agenda. There were no additions and Mr. Horak asked the Commissioners to approve the agenda.

The two Commissioners approved the agenda.

Mr. Horak asked the USGS to discuss the annual budgets.

Mr. Berkas supplied a handout showing the operational cost for 2010 and the estimated budget for 2011, 2012, and 2013. The operational cost for 2010 is \$15,500 for each of the five streamgages and \$31,500 to produce the annual report. The budget for 2010, 2011, 2012, and 2013 will be \$109,000, \$128,000, \$134,000, and \$140,700,

respectively. Each State will be responsible for one-fourth of the budget and the USGS is responsible for one-half. Mr. Berkas stated that the budget will reflect one meeting per year in 2013, and the actual cost in 2013 may be less than the listed estimated cost.

Mr. Tyrell asked if the presented costs agree with what has been presented at past meetings, and why there is a large increase (\$19,000) between 2010 and 2011.

Mr. Berkas replied that the presented costs agree with what was previously presented at past meetings and published in previous annual reports, with the exception of 2013. The reason for the increase between 2010 and 2011 is that 2011 is when the USGS will begin charging for the extra effort for two meetings per year. Because both states function with biennium funding, the USGS could not significantly increase the presented budget until 3 years after two meetings per year began. 2011 is 3 years after the Commission began meeting twice per year. The cost will reflect two meetings per year until 3 years after the Commission changed back to annual meetings. That change will be reflected in 2013.

Mr. Horak asked the Commissioners to approve the budget.

The two Commissioners approved the budget.

Mr. Horak asked the USGS to update the Commission on water-quality monitoring efforts in the Tongue and Powder River drainages.

Mr. Berkas reported that the USGS Montana Water Science Center operates a monitoring network where data are collected from 12 sites on the Tongue and Powder Rivers. Continuous discharge and periodic water-quality data are collected from all of the sites and continuous specific conductance is collected at nine sites. The network is funded by Montana DNRC, Wyoming SEO, Montana Department of Environmental Quality (DEQ), Bureau of Land Management (BLM), Northern Cheyenne Tribe, and Fidelity Exploration and Development. Fidelity is committed to fund the gage on the Tongue River above T&Y Diversion, near Miles City until there is no more concern over coal-bed methane (CBM) development, or until they have completed CBM extraction.

Recently, the USGS received money from Montana's Resource Development Grant Program. There are two parts to the grant. In the first part, money is to be used to increase the number of water-quality samples and to again display real-time estimated sodium-adsorption ratio (SAR) on the USGS Web page. The second part of the grant is to fund a trend analysis of the data already collected.

The USGS Wyoming Water Science Center operates a monitoring network where data are collected from 31 sites on the Tongue and Powder Rivers. This year (2009 water year) three sites were discontinued: Ivy Creek at mouth near Arvada, Dry Fork Little Powder River at mouth, near Gillette, and Olmstead Creek at mouth, near Weston. One site was added: Tongue River below Youngs Creek, near Acme.

Ms. Sexton asked if BLM continues to be a partner. In light of Fidelity being committed to the monitoring, she is hoping that others will continue their support.

Mr. Berkas replied that all funding agreements are for 1-year period, but the USGS has confidence that BLM and others will continue their support into the future.

Mr. Horak asked the USGS to address streamflow conditions during the 2009 water year.

Mr. Berkas supplied a handout of annual flow statistics for the 2009 water year. Streamflow was above normal at one site and normal (within 80 and 120 percent of average) at three sites monitored by the Commission. Annual

streamflow at Clarks Fork Yellowstone River at Edgar was 118 percent of average, and ranked 58th lowest of 71 years. The annual streamflow at Bighorn River near Bighorn (adjusted for the flow of the Little Bighorn River and change of contents in Bighorn Lake) was 122 percent of average and ranked 25th lowest of 43 years. The annual streamflow at Tongue River at Miles City was 101 percent of average and ranked 35th lowest of 66 years. The annual streamflow at Powder River near Locate was 98 percent of average and ranked 37th lowest of 71 years. Total adjusted streamflow of the four rivers in water year 2009 was 4,342,200 acre-ft, compared to 4,445,400 acre-ft in water year 2008 and 2,723,000 acre-ft in water year 2007.

Reservoir storage in the reservoirs historically monitored and reported for the Commission increased in four reservoirs (Boysen Reservoir, Pilot Butte Reservoir, Buffalo Bill Reservoir, and Tongue River Reservoir) and decreased in three reservoirs (Bighorn Lake, Anchor Reservoir, and Bull Lake). The contents and the amounts of increase or decrease are listed in the annual report. The total usable contents of these reservoirs at the end of water year 2009 was 2,295,000 acre-ft, compared to 2,265,000 acre-ft in water year 2007 and 1,808,000 acre-ft in water year 2007. Storage in other reservoirs of interest to the Commission was 297,600 acre-ft at the end of water year 2009, which is a decrease of 17,200 acre-ft from the end of water year 2008. The usable contents of these reservoirs at the end of water year 2008 and 2009 are listed in Table 10 of the annual report.

Mr. Tyrrell asked if all of the reservoirs listed in table 10 are in Wyoming.

Mr. Berkas replied that all but one are entirely in Wyoming.

Mr. Berkas said that usually by the December meeting the annual report for the previous water year (2008) would have been published. He is still processing the minutes for the Technical Advisory Committee meeting and should complete that task shortly. After which, the report will enter the queue to be printed.

Mr. Horak said that Mr. Berkas had previously asked him if the Technical Advisory Committee meeting minutes should be incorporated into the Compact Commission annual report. From the beginning of the Technical Advisory Committee, the minutes of the meeting have been included in the Compact Commission annual report. The Technical Advisory Committee meeting minutes are posted on the Yellowstone River Compact Commission Web page (<http://yrcc.usgs.gov/>) and a summary of the meeting is included in the Compact Commission Meeting minutes. Mr. Horak asked the Commissioners if the Technical Advisory Committee meeting minutes should be included in the Compact Commission annual report.

Mr. Tyrrell replied that because the Technical Advisory Committee meeting minutes have always been in the report, then they probably should stay in the report. Ms Sexton agreed that the minutes should remain in the report.

Update – Mr. Berkas requested through a letter to the Commissioners that the Technical Advisory Committee minutes not be included in the Yellowstone River Compact Commission annual report. By e-mail, the Commissioners agreed not to include the Technical Advisory Committee minutes, but the agenda would be included. Mr. Berkas' letter is provided in Attachment A.

Mr. Horak asked Wyoming to address water administration highlights for 2009.

Mr. LoGuidice replied that in the Tongue and Powder River Basins, most of the regulation requests came in August. The Little Goose drainage is heavily irrigated and some calls occurred in the end of July, then the rain came and the need for water decreased. Calls in other basins occurred in late August.

The operators of the reservoirs in the mountains began dumping water late in the year because they could not store water through the winter. Lake DeSmet did not store any water in the 2009 water year due to a construction project on some gates.

Mr. Tyrrell added that the lack of rain in May and June, caused problems for dryland farmers and range land. Part of Johnson County (near Buffalo) requested Federal assistance for drought relief. That area also was hit hard by grasshoppers when the rain finally occurred in July.

Mr. Smith said the Bighorn River Basin had a warm dry May. The snowpack melted in early May, but streamflow did not increase as expected. Snow and rain in late May significantly increased streamflow. Inflows to Bull Lake were 109 percent of average, inflows to Boysen Reservoir were 121 percent of average, inflows to Buffalo Bill Reservoir were 132 percent of average, and inflows to Bighorn Lake were 116 percent of average.

There was not much regulation in the Bighorn River Basin in the 2009 water year due to timely rains and plenty of water in the rivers. Owl Creek and Greybull River nearly always go into regulation for delivery and exchange of reservoir water. Bennett and Little Rock Creeks (tributaries to the Clarks Fork Yellowstone River) usually go into regulation around May 1 until mountain runoff reaches the irrigation areas.

A significant issue occurred this year at the Greybull Valley Reservoir. The State field personnel observed some major sloughing, so the reservoir was ordered to be drained. Although it looks bad, the engineers feel the dam is sound and it can be rehabilitated. The reservoir is off-channel and was completed in 1998 and first filled in 2005.

All of the streamgages are installed and were running "live", transmitting to the satellite and available on the Wyoming SEO Web page.

Mr. Horak asked how many streamgages are operating.

Mr. Smith replied that there are 147 statewide. About 12 are in the Shoshone drainage area. Most of the streamgages are on the major diversions and canals used for administration purposes.

Mr. Tyrrell added that the Wyoming SEO instrumented established gages during this current biennium. The Wyoming Legislature appropriated about \$1.5 million to instrument about 250 gages. In light of tough economic times, the SEO hopes to instrument about 100 new stream, reservoir and canal gages in 2010. Many of the new gages will be put in areas where they are lacking coverage or where it takes many hours to travel to a site to read the gage. Transmitting the gage data should save many travel hours.

Mr. Horak asked Montana to address water administration highlights for 2009.

Ms. Sexton announced that Montana DNRC's Division Administrator (Mr. John Tubbs) left his position to become a Deputy for the Assistant Secretary of the Department of the Interior. Currently, DNRC is looking for a new Division Administrator. Mr. Rich Moy retired as the Water Management Bureau Chief and was replaced with Mr. Paul Azevedo.

Montana is implementing HB 40 that deals with permitting new appropriations and changes. Montana Bureau of Mines and Geology received some funding to do hydrologic assessments in various basins. They will start on the Gallatin River and move on to the Smith and Flathead Rivers. DNRC received some funding to update the State-Water Plan.

Mr. Kerbel said regarding administration, Montana had a cold winter, and in March, a major blizzard. Many ranchers lost a lot of calves during the blizzard in southeast Montana. But, the blizzard increased soil moisture in the spring. As a result, there was little irrigation along the Powder River.

Irrigation occurred along the Tongue River. Tongue River Reservoir filled and all the users received the water they needed.

This year DNRC did maintenance on Glacier Lake, removing rock from the inlet tunnel. Next year, maintenance will occur on the gate structure at Cooney Reservoir.

Mr. Erger stated that currently (December 1, 2009) the Bureau of Reclamation is releasing 2,775 ft³/s from Bighorn Lake, the largest flow for this date for the past 10 years. In November, the lake was full at 3,640 ft, and the current release from the dam is expected to continue through the winter. Bighorn Lake filled during the 2009 water year and water was delivered to all users in the basin. Currently, all of the releases from all of the Bureau of Reclamation facilities (Boysen and Buffalo Bill Reservoirs and Bighorn Lake) are the largest over the last 10 years.

Mr. Smith said that a flushing flow from Boysen Reservoir usually occurs near April 1. The flushing flow cleans the gravels in the river making them more suitable for spawning. The irrigators also like flushing flows to occur in July because high flows in the river at that time of the year remove aquatic vegetation from the streambed causing less problems with clogging diversion gates. Usually, after a July flushing flow, the irrigators do not need to run their moss catchers, saving them a lot of money.

Mr. Horak asked how long has the moss in the river channel been a problem, and what is the presumed source of the nutrients that cause the moss growth?

Mr. Smith replied that the moss buildup is mostly dependent on flows in the river. There usually is no problem when outflows from Boysen Reservoir are greater than 2,500 ft³/s, but when flows are less, moss buildup can be a problem. When flows are less than 1,500 ft³/s, moss growth becomes a huge problem. The presumed source of the nutrients is fertilizer.

Ms. Sexton asked who pays for the various flushing flows.

Mr. Smith replied that the Bureau of Reclamation supplies the water for the spring flushing flows under fish and wildlife use because the flush benefits spawning in the river. The irrigators request the July flushing flow and they use about 5,000 acre-ft of their water. The amount of money they save by not operating their moss catchers makes up for the lost power generation. The July flushing flow is short; releases ramp up to 5,000 ft³/s, held for about 1 hour, then brought back down to the original release.

Mr. Horak asked Montana and Wyoming to address the issue of determining what reservoirs should be published in the Compact Commission annual report.

Mr. Dalby said that at the spring Technical Advisory Committee meeting, the members decided to identify reservoirs of interest to the Yellowstone River Compact. He then presented a map and list of five reservoirs in Montana with storage capacities greater than 1,000 acre-ft. This volume was chosen because that size required some sort of management of reservoir operation. The five reservoirs are Willow Creek Reservoir, Cooney Reservoir, Glacier Lake, Bighorn Lake, and Tongue River Reservoir.

Mr. Tyrrell asked if there were uses assigned to the water in the reservoirs.

Mr. Dalby replied that uses assigned to the water and irrigation is the most common use. Cooney Reservoir and Glacier Lake do not thaw until late July, so releases from these facilities occur after August 1.

Ms. Pring presented a map and list of 42 reservoirs in Wyoming with storage capacities greater than 1,000 acre-ft.

Mr. Horak asked if the intent of the exercise of identifying reservoirs in both states was to modify table 10 in the Compact Commission annual report.

Mr. Berkas replied with the following excerpt from the minutes from the December 4, 2008, Yellowstone River Compact Commission meeting records:

Mr. Tyrrell made a motion that at the spring technical meeting, the Technical Committee should agree on a list of reservoirs within the Yellowstone River drainage with a storage capacity greater than 1,000 acre-ft that are permitted for consumptive uses. At that meeting, they would decide what reservoirs would be included in the 2009 annual report. The motion was seconded by Ms. Sexton.

Ms. Pring replied that at the spring 2009 Technical Advisory Committee meeting Mr. Kerbel made a motion that the Technical Advisory Committee postpone this discussion until the December Compact Commission meeting because Ms. Sexton was unable to attend the Technical Advisory Committee meeting. Table 10 only listed 1 reservoir in Montana and 29 reservoirs in Wyoming. Six reservoirs have usable capacities less than 1,000 acre-ft. The committee members knew there were more reservoirs that had usable capacities greater than 1,000 acre-ft that were not included in table 10. The committee members felt they should reconcile a list of reservoirs and present that list to the Commissioners, and the Commissioners would decide if table 10 should be amended. A requirement for a reservoir being on the list would be the ability to determine the end-of-year contents on September 30 of each year.

Ms. Pring suggested that the next step should be for each state to determine if they could obtain the reservoir contents on September 30. If contents could not be obtained, the reservoir would be removed from the list.

Considerable discussion ensued regarding what information should be recorded and how that information should be presented.

Mr. Tyrrell made a motion to have the Technical Advisory Committee change table 10 in the Compact Commission annual report to only list reservoirs with usable capacities greater than 1,000 acre-ft. In addition, they would create a table to be displayed on the Yellowstone River Compact Commission Web page that would include (1) priority date for each water right (and enlargement), (2) the source of the water, and (3) permitted uses (permit number) for each reservoir. The Technical Advisory Committee would report back to the Commissioners with finalized tables at the December 2011 Yellowstone River Compact Commission meeting.

Ms. Sexton seconded the motion.

Mr. Berkas said he would send the revised table 10 to each State to begin recording September 2010 contents, in preparation for table 10 being ready for the 2011 Yellowstone River Compact Commission annual report.

Mr. Horak asked Wyoming to update the Commissioners on CBM development in Wyoming.

Mr. Tyrrell commented that the CBM industry is experiencing a severe slowdown. So far in 2009, the monthly CBM well applications ranged from 0 to 185, while a few years ago well applications were in the range of several hundred each month. Some of the smaller companies are declaring bankruptcy due mostly to the reduction in the price of natural gas. When the price increases again, the number of applications probably will increase.

In 2009, the total number of approved reservoir permits for CBM decreased. The majority of the reservoir permits are in the Powder River drainages. The reduction is due in part to fewer well permit applications (reduced production of water) and cancellation or abandonment of existing reservoirs.

Ms. Sexton asked about the procedure for abandoning CBM reservoirs.

Mr. Tyrell replied that there are many ways. Early in the CBM development days, water was stored in existing stock ponds, and these ponds may or may not be permitted. Sometimes the retention ponds were permitted as stock ponds. Wyoming law states that all storage facilities need a permit, providing there is a beneficial use. Unfortunately, not all stock ponds in Wyoming were permitted. As the Wyoming SEO began investigating reservoir permits in 2004, they discovered that some CBM development companies were using unpermitted stock ponds. When these facilities were identified, the developer was asked to get a permit with a beneficial use of CBM development. When a developer requested a permit for CBM, a time limit would be applied to the permit. At the end of the time limit, the owner would either re-permit the reservoir or abandon the reservoir by breaching the reservoir so it cannot store water, or give it to the landowner (providing the reservoir is within the size of a stock reservoir).

Another type of reservoir is dug in the ground and is commonly called an oil and gas pit. These are traditionally used in the oil and gas industry but some are associated with the CBM industry. Generally, these do not have a beneficial use because cattle cannot get to these ponds. These ponds are permitted by the Wyoming Oil and Gas Conservation Commission.

Mr. Tyrell continued with the CBM discussion by providing a handout listing the total number of CBM reservoir permit filings in the Tongue River, Little Powder River, and Powder River drainages. Currently, in the Tongue River drainage, there are 22 filings for a total capacity of 290 acre-ft; in the Little Powder River drainage, there are 22 filings for a total capacity of 239 acre-ft; and in the Powder River drainage, there are 157 filings for a total capacity of 2,754 acre-ft. The average size of all the reservoirs is 14 acre-ft.

Mr. Horak asked Mr. Tyrell to describe the procedure to abandon CBM wells.

Mr. Tyrell replied that wells are abandoned, or the permits go away for a couple of reasons. In Wyoming, the steps are to apply and receive a permit for a well. After completion of the well, you may get a certificate and then the water right has been adjudicated. Once the well has been adjudicated, in order to get rid of the water right, the well has to be abandoned. The abandonment process is either done voluntarily by the permit holder, or involuntarily through an adverse action. Typically, involuntary (adverse action) abandonment occurs when a neighbor wants to better his position in line by getting rid of a senior-water right. Abandonment usually occurs with surface-water rights, and occasionally with ground-water rights.

CBM wells are not adjudicated because they have a finite life, plus the Wyoming SEO would be adjudicating an additional 40,000 wells. CBM wells are abandoned by canceling the permit. The permit holder can contact the Wyoming SEO and report that the well is no longer producing (gas and water). Or the permit owner can report that they plugged the well. The permit stays in place until the permit owner reports the action to the Wyoming SEO.

Mr. LoGuidice said that part of the reason there is a decrease in the number of approved CBM permitted reservoirs between 2008 and 2009 is because the CBM reservoir inspectors discovered some permitted reservoirs were not constructed. Some developers discovered that gas and water production was not what they originally expected, and the reservoirs were not needed. When the inspectors discovered the reservoirs were not needed, the permits were removed.

Ms. Anders asked what happens to the water contained by CBM permitted reservoirs when that reservoir is abandoned.

Mr. Tyrell replied that in most cases there is no water remaining. The water has evaporated or seeped into the ground. Usually, a reservoir is used to store water because the CBM operator cannot get a permit to discharge development water. So, a reservoir is used to contain the water until it evaporates or seeps into the ground. If the reservoir continues to store water when the reservoir is reclaimed, the owner must get a permit to discharge or dispose of the water before the reservoir can be reclaimed. Early in the development of the Belle Fourche Basin, the discharge of development water was of such quality that owners were allowed to discharge directly into the creeks.

Mr. Kerbel asked if operators in the Powder River drainage were allowed to discharge into the creeks.

Mr. Tyrell replied that they were if the water met the discharge requirements.

Mr. Dalby asked if a CBM reservoir had a spillway, would the spillway and dam be removed during the reclamation process, or could the spillway be altered to allow the reservoir to become to a stock pond.

Mr. Tyrell replied that the dam could be removed. If the dam stays in place, the landowner needed to convert the reservoir to a stock-pond use. The Wyoming SEO does not want any water stored without a permit. If the CBM reservoir is 40 acre-ft, the landowner could knock down the spillway such that the reservoir contains 20 acre-ft and then he could convert it to a stock pond. The limit for stock ponds in Wyoming is 20 acre-ft. Some landowners have petitioned to retain larger reservoirs as stock ponds. We may allow this if there is a way to regulate that reservoir. In cases where there are many reservoirs on a property, we may ask why the reservoir is needed.

Mr. LoGuidice added that the Wyoming SEO, the BLM, Wyoming State Lands, Wyoming Department of Environmental Quality, and Wyoming Oil and Gas Commission met to discuss requirements for reclaiming abandoned reservoirs. On one extreme, BLM wanted the area restored to natural conditions, while the Wyoming SEO only wanted the reservoir to no longer store water. Presently, they have not agreed on a reclamation requirement.

Mr. Horak asked if the operator recorded the amount of water discharged from the well.

Mr. Tyrell replied that the amount of water (and gas) pumped out of each CBM well is reported to Wyoming Oil and Gas Conservation Commission, and that amount is posted on their Web page.

Mr. Horak asked Montana to update the Commissioners on CBM development in Montana.

Mr. Bukantis reported that there are two discharge permits for water from CBM production. Both permits discharge into the Tongue River and belong to Fidelity Exploration and Production. One is a direct discharge of untreated water of about 1,536 gal/min that occurs upstream of the Tongue River Reservoir. The other is a treated discharge of 864 gal/min that occurs downstream from the reservoir.

Ms. Sexton added that Montana DEQ permits discharges to the river. If the water were put to a beneficial use, Montana DNRC would permit that use. This is different from Wyoming where Wyoming permits each CBM well, while Montana does not.

Mr. Tyrell replied that Colorado used to not permit each CBM well until they lost a Supreme Court case. Now Colorado has to permit every CBM well. Something Montana may have to do in the future.

Mr. Horak asked Montana to address progress on statewide adjudication.

Ms. Sexton announced that DNRC had exceeded their bench mark of processing 31,000 claims by the end of 2010. By July 31, 2009, DNRC had processed 36,700 claims.

Preliminary decrees were issued for the Tongue River (42B and 42C) in February 2008.

DNRC is spending more and more time assisting the Water Court with District Court enforcement actions. DNRC expects to spend more time each year as the adjudication process matures.

DNRC is digitally updating the ownership of water rights by tying water-right ownership to the cadastral program with the Department of Revenue. They discovered that water-right ownership did not automatically transfer when the owner of a property changed. DNRC discovered that as much as one-third of the water rights had the wrong owner. By digitally tying the water-right ownership to the cadastral program, the water rights will automatically transfer with change of property ownership, unless water rights were specifically withheld.

Mr. Horak asked Wyoming to update the Commissioners on the Wyoming Board of Control and new adjudications.

Mr. Tyrrell reported that the only general adjudication remaining in Wyoming is in the Bighorn Basin, and that is about 98-percent complete. There are a few protests and final decisions are moving forward.

New water rights are adjudicated individually and independently of what is around the property. The Wyoming SEO can give an owner a certificate for a water right and the Board of Control adjudicates that water right.

Ms. Sexton asked when Wyoming regulates a water right.

Mr. Tyrrell replied that Wyoming regulates when there is a call. If there is no call, then they operate on run-of-the river and users can divert water and put that water to a beneficial use. When there is a call, the users are regulated to the water right amount, or a user may be cut off. Even unadjudicated users can use the water.

Mr. Dalby asked what is the motivation behind the general adjudication related to the Wind River Indian Reservation.

Mr. Smith replied that the courts recommended that the adjudication be broken into three phases. Phase one was the clarification of tribal-reserved rights. Phase two was the Federal – non-tribal rights, and reserved rights. And phase three is state rights and anything that was permitted prior to January 1, 1985. Everything after that date followed the Board of Control adjudication process. The Tribes of the Wind River Indian Reservation were awarded 209,000 acre-ft of water.

Mr. Smith said that they are working through about 110 and 120 permits outside of the General Adjudication in the Bighorn River Basin that will be brought to the Board of Control in February 2010. The current adjudication process (after the general adjudication in 1984) involves an application for a permit from the Wyoming SEO. The Wyoming SEO will inspect each facility to ensure that the facility meets the terms of the permit. The permit is advertised for public inspection and if there is an objection, a public hearing is scheduled to resolve the objection. If there were no objections, the Board of Control will adjudicate the water right. Permits are issued for all uses, including small domestic-water wells. Typically, the small domestic wells are not inspected and not adjudicated, but a permit is issued.

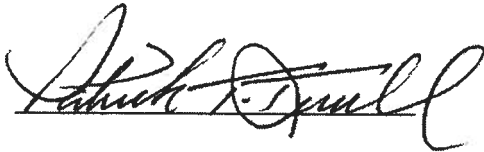
Mr. Horak asked Montana to update the Commission on the Montana – Crow Compact.

Ms. Sexton replied that the Montana – Crow Compact has been sent to the U.S. Congress. Montana is hopeful that the bill will go through the full Senate by the end of this year or early next year (2010).

Mr. Horak asked the group to decide on a date for the Yellowstone River Technical Advisory Committee meeting and the Yellowstone River Compact Commission meeting.

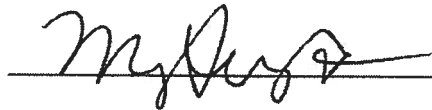
The Yellowstone River Technical Advisory Committee meeting will be on April 13, 2010, in Montana.

The Yellowstone River Compact Commission meeting will be on December 7, 2010, in Montana.



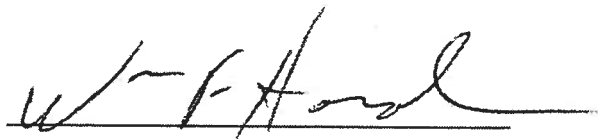
Patrick T. Tyrrell

Commissioner for Wyoming



Mary Sexton

Commissioner for Montana



William F. Horak, Jr.

Chairman and Federal Representative

Minutes of Teleconference—September 17, 2010

Members of the Yellowstone River Compact Commission convened via teleconference on September 17, 2010, to approve the Yellowstone River Compact Commission meeting minutes from December 1, 2009. Those in attendance were Mr. Mark Anderson, U.S. Geological Survey (USGS), Chairman and Federal Representative; Ms. Mary Sexton, Director, Montana Department of Natural Resources and Conservation (DNRC) and Commissioner for Montana; Mr. Patrick Tyrrell, Wyoming State Engineer and Commissioner for Wyoming; and Mr. Wayne Berkas, USGS, recording secretary.

Mr. Anderson called the meeting to order at 10:05 a.m. and asked that those participating in the meeting introduce themselves.

Mr. Tyrrell made a motion to approve the December 1, 2009 minutes and Ms. Sexton seconded the motion.

Mr. Anderson announced that the minutes were approved.

Mr. Anderson reminded those attending the teleconference that the Yellowstone River Compact Commission meeting is scheduled for December 8, 2010, in Red Lodge, Montana. Ms. Sexton added that Montana will send out an announcement identifying the location of the meeting and suggested motels.

Ms. Sexton motioned that the teleconference end, and Mr. Tyrrell seconded the motion. The teleconference ended at 10:20 a.m.

Appendix A



United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Montana Water Science Center

3162 Bozeman Avenue

Helena, Montana 59601

March 29, 2010

Dear Commissioners:

As per our standard publication procedures, the annual report of the Yellowstone Compact Commission is approved for publication by the USGS Montana Water Science Center Director (John Kilpatrick) after his review. During his review this year, John made several observations and raised several questions about the direction the report has taken over the past few years. Listed below are some of John's observations or questions:

1. The style and level of detail in the minutes of the Technical Committee's meeting is significantly different than that of the minutes of the Commission's annual meeting. The minutes of the Commission's annual meeting are more complete and accurate because they are based on a verbatim transcript. The Commission meeting minutes are put together by the USGS (usually the same person each year) and generally are consistent in style and formatting. The minutes of the Technical Committee meeting contain general summaries of what was said based on the notes of one of more attendees. The responsibility for preparing the minutes of the Technical Committee meeting rotates between the Montana Department of Natural Resources and the Wyoming State Engineer's Office. The note taker may not be the same person as the responsibility rotates between each agency and the level of detail in the notes varies from topic to topic and meeting to meeting.
2. The inclusion of the minutes of the Technical Committee's meeting in the Commission's annual report gives the appearance that both meetings are formal Commission meetings and that the minutes of both meetings are prepared to the same level of completeness and accuracy.
3. The Commission meeting minutes include a summary of the topics discussed during the Technical Committee meeting. Therefore, there is some duplication when both sets of minutes are included in the Commission's annual report.

4. The Technical Committee meeting minutes must be edited, revised, and supplemented by the Commission's Secretary, requiring significant effort, before they are detailed enough to be meaningful for more than a few years. The Technical Committee meeting minutes are currently provided online in a more raw form.
5. Are the informal presentations and discussions that occur at the Technical Committee meeting important enough to warrant inclusion in the Commission's annual report?
6. If they are important enough to be published in the annual report, should similar effort be expended to record minutes of equal quality for both the Commission annual meeting and the Technical Committee meeting?

Based on these observations and questions, I respectfully propose that the minutes of the Technical Committee not be included in the Commission's annual report. If the Commissioner's choose to retain the minutes of the Technical Committee in the annual report, I respectfully recommend that in future years the minutes be recorded and prepared in a similar manner to the Commission meeting minutes. Bear in mind that increasing the quality and completeness of the minutes of the Technical Committee meeting will increase the overall cost of preparing the annual report and this cost will by necessity need to be borne, in part, by the States of Montana and Wyoming.

I will postpone printing the 2008 Yellowstone River Compact Commission report until I receive additional direction from the Commission.

Respectfully submitted,

Wayne R. Berkas /signed/

YRCC Secretary
and
Data Section Chief,
USGS Montana Water Science Center

General Report

Cost of Operation and Budget

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

The expenses of the Commission during Federal fiscal year 2009 were \$89,000, in accordance with the budget adopted for the year.

Estimated budgets for Federal fiscal years 2010, 2011, 2012, and 2013 were tentatively adopted subject to the availability of appropriations. The 17.4-percent increase from 2009–10 is based on increasing the number of meetings and an increase in publication costs for the annual report. The increase from 2011 to 2012 is based on an approximate 5-percent increase. The budgets for the four fiscal years are summarized as follows:

October 1, 2009, to September 30, 2010 (fiscal year 2010):

Estimate for continuation of existing streamflow-gaging programs \$109,000

October 1, 2010, to September 30, 2011 (fiscal year 2011):

Estimate for continuation of existing streamflow-gaging programs \$128,000

October 1, 2011, to September 30, 2012 (fiscal year 2012):

Estimate for continuation of existing streamflow-gaging programs \$134,000

October 1, 2012, to September 30, 2013 (fiscal year 2013):

Estimate for continuation of existing streamflow-gaging programs \$140,700

Streamflow-Gaging Station Operation

Operation of five streamflow-gaging stations at the measuring sites specified in the Yellowstone River Compact continued in water year 2009 with satisfactory records collected at each station. Locations of streamflow-gaging stations, along with reservoir-content stations, are shown on a map of the Yellowstone River Basin at the end of this report.

For gage sites, horizontal coordinate information (latitude and longitude) is referenced to the North American Datum of 1927 (NAD 27). The gage datums and elevations listed in this report are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

During water year 2009, annual streamflow was normal² at three streamflow-gaging stations and above normal at one streamflow-gaging station. The rank of the annual streamflow, with the lowest annual streamflow having a rank of 1, is displayed in the following table:

Station number	Streamflow-gaging station	Percent of average streamflow for water year 2009 ¹	Rank of annual streamflow		Year of lowest annual streamflow (rank equals 1)	Number of years of annual record
			2009 water year	2008 water year		
06208500	Clarks Fork Yellowstone River at Edgar, Mont., minus diversions to White Horse Canal	118	58	60	2001	71
06294500	Bighorn River above Tullock Creek, near Bighorn, Mont., minus Little Bighorn River near Hardin, Mont., adjusted for change in contents in Bighorn Lake	122	25	17	2002	43
06308500	Tongue River at Miles City, Mont.	101	35	47	1961	66
06326500	Powder River near Locate, Mont.	98	37	55	2004	71

¹ Average is based on period of record at station.

² The "normal" range defined in this report is 80 to 120 percent of average.

Tabulation of streamflow records for water year 2009 (tables 1–5) and graphical comparisons of statistical distribution of monthly and annual streamflow, and annual departures from mean annual streamflow (figs. 1–4) are provided in the section “Summary of Discharge for Yellowstone River Compact Streamflow-Gaging Stations.” The tabulated streamflow records do not account for depletions for irrigation and other uses unless otherwise noted.

Diversions

No diversions were regulated by the Commission during water year 2009.

Reservoir Contents

Reservoirs Completed after January 1, 1950

As a matter of record and general information, month-end usable contents data (tables 6–8) and descriptions of these reservoirs are given in the section “Month-End Usable Contents for Yellowstone River Compact Reservoirs Completed after January 1, 1950.” Boysen Reservoir, located on the Wind River and operated by the Bureau of Reclamation, began the water year with 588,800 acre-ft in usable contents and ended the water year with 619,500 acre-ft. Anchor Reservoir, located on South Fork Owl Creek and operated by the Bureau of Reclamation, began the water year with 346 acre-ft in usable contents and ended the water year with 325 acre-ft. Bighorn Lake, a Bureau of Reclamation storage project on the Bighorn River that is the largest in the Yellowstone River Basin, contained 1,052,000 acre-ft of usable contents at the beginning of the water year and 1,045,000 acre-ft at the end of the water year.

Reservoirs Existing on January 1, 1950

As a matter of record and general information, month-end usable contents data for the four reservoirs in existence on January 1, 1950, upstream from the points of measurement, are given in table 9 in the section “Month-End Usable Contents for Yellowstone River Compact Reservoirs Existing on January 1, 1950.” The reservoirs are Bull Lake, operated by the Bureau of Reclamation; Pilot Butte Reservoir, operated by the Bureau of Reclamation; Buffalo Bill Reservoir, operated by the Bureau of Reclamation; and Tongue River Reservoir, operated under the supervision of the Water Resources Division of the Montana Department of Natural Resources and Conservation. These data are pertinent to allocation under Article V, Section C, Item 3 of the Compact.

Annual Contents of Reservoirs

Information on reservoir contents at the end of the current (2009) and previous water years for the 7 reservoirs listed above plus 23 additional reservoirs was compiled at the request of the Commission. The information is provided in table 10 in the section “Water-Year-End Usable Contents for Yellowstone River Compact Reservoirs or Lakes.”

Summary of Discharge for Yellowstone River Compact Streamflow-Gaging Stations

06208500 Clarks Fork Yellowstone River at Edgar, Mont.

LOCATION.--Lat 45°27'58", long 108°50'35" referenced to North American Datum of 1927, in SE ¼ SE ¼ SE ¼ 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.--2,022 mi².

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

REVISED RECORDS. -- Water Supply Paper (WSP) 1509: 1924; 1932, maximum discharge. WSP 1729: Drainage area. Water Data Report MT-04-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,460 ft, referenced to the National Geodetic Vertical Datum of 1929. Prior to August 31, 1953, nonrecording gage located at same site and elevation.

REMARKS.--Records are good except for the estimated daily discharges, which are poor. Diversions for irrigation include about 41,500 acres, of which about 840 acres lie 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. U.S. Geological Survey satellite telemeter is located at the station. Several unpublished observations of water temperature and specific conductance were made during the year. **Discharge values and summary statistics given herein have the diversions to White Horse Canal subtracted.**

Table 1. Daily mean discharge for Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, October 2008 through September 2009.

[Discharge is in cubic feet per second; --, no data. Abbreviations: Ac-ft, acre-ft; e, estimated; Max, maximum; Min, minimum; WY, water year]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	480	569	435	e400	e400	430	344	617	7,640	4,400	827	331
2	467	543	441	e400	e430	368	344	571	7,340	4,580	725	368
3	454	539	432	e400	e440	398	354	582	6,020	4,540	673	358
4	473	531	e370	e350	e460	426	373	569	5,160	4,430	631	329
5	524	539	e320	e370	e460	418	352	601	5,240	4,080	666	307
6	536	526	e360	e400	e430	387	332	634	5,870	3,640	662	307
7	548	511	391	e430	e430	352	331	744	6,060	3,280	918	306
8	569	490	417	e450	e430	346	335	793	5,230	2,930	1,350	289
9	596	513	385	e470	e430	318	363	809	4,340	2,660	1,260	299
10	664	519	402	e450	e430	234	409	753	3,860	2,320	1,080	269
11	718	502	348	e450	e430	297	391	785	3,460	2,050	875	266
12	735	504	388	e450	419	398	400	862	3,220	1,880	724	267
13	688	494	343	e470	383	488	424	1,060	3,290	1,930	660	270
14	742	494	168	e430	371	472	475	857	3,900	2,200	664	279
15	770	529	e120	e440	416	403	534	805	4,790	2,020	678	272
16	813	476	e150	e460	370	373	487	815	5,320	1,780	689	253
17	794	485	e180	e480	363	388	436	998	5,860	1,540	675	256
18	798	491	e170	e500	364	379	404	1,800	6,310	1,420	577	248
19	809	476	e150	e480	358	356	402	3,550	6,310	1,350	518	246
20	788	468	e150	e480	360	349	481	5,770	6,230	1,410	460	255
21	743	466	e170	e470	346	355	543	6,140	6,580	1,400	417	257
22	716	453	e190	e420	347	369	669	5,420	6,700	1,240	393	273
23	699	436	e250	e300	357	405	957	5,480	5,780	1,070	378	277
24	669	419	e300	e140	368	417	1,190	6,110	5,090	930	371	286
25	670	420	e350	e140	395	390	1,080	6,210	5,080	861	372	276
26	656	407	e350	e160	395	376	821	6,370	5,370	849	386	283
27	639	421	e300	e180	334	351	796	6,220	5,350	874	365	288
28	628	424	e330	e200	430	325	711	6,300	4,950	1,070	351	283
29	611	426	e380	e300	---	344	657	6,700	4,670	1,080	336	298
30	594	423	e400	e400	---	363	651	7,280	4,610	1,040	327	329
31	587	---	e400	e440	---	341	---	7,730	---	927	305	---
Total	20,178	14,494	9,540	11,910	11,146	11,616	16,046	93,935	159,630	65,781	19,313	8,625
Mean	651	483	308	384	398	375	535	3,030	5,321	2,122	623	288
Max	813	569	441	500	460	488	1,190	7,730	7,640	4,580	1,350	368
Min	454	407	120	140	334	234	331	569	3,220	849	305	246
Ac-ft	40,020	28,750	18,920	23,620	22,110	23,040	31,830	186,300	316,600	130,500	38,310	17,110

Table 1. Daily mean discharge for the Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, October 2008 through September 2009—Continued.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921–2009, BY WATER YEAR (WY)*												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	537	503	406	351	350	364	553	2,121	4,028	1,995	590	464
Max	1,010	777	593	512	584	554	1,398	5,578	7,256	4,771	1,541	1,395
(WY)	(1942)	(1928)	(1996)	(1997)	(1963)	(1943)	(1943)	(1928)	(1996)	(1943)	(1951)	(1941)
Min	298	310	217	200	180	220	123	757	1,768	290	49.5	156
(WY)	(1956)	(1936)	(1937)	(1922)	(1922)	(1924)	(1961)	(1968)	(1987)	(1988)	(1988)	(1988)

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

SUMMARY STATISTICS							
	Calendar Year 2008		Water Year 2009		Water Years 1921–2009*		
Annual total	454,371		442,214				
Annual mean	1,241		1,212		1,023		
Highest annual mean					1,623		
Lowest annual mean					644		
Highest daily mean	7,910	Jun 26	7,730	May 31	10,600	Jun 2, 1936	
Lowest daily mean	120	Dec 15	120	Dec 15	37	May 11, 1961	
Annual seven-day minimum	155	Dec 14	155	Dec 14	43	Apr 18, 1961	
Maximum peak flow			8,120	May 31	11,100	Jun 12, 1997	
Maximum peak stage			8.03	May 31	9.30	Jun 12, 1997	
Instantaneous low flow					36	Apr 22, 1961	
Annual runoff (ac-ft)	901,200		877,100		741,100		
10 percent exceeds	4,070		4,590		2,820		
50 percent exceeds	474		468		466		
90 percent exceeds	302		294		270		

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

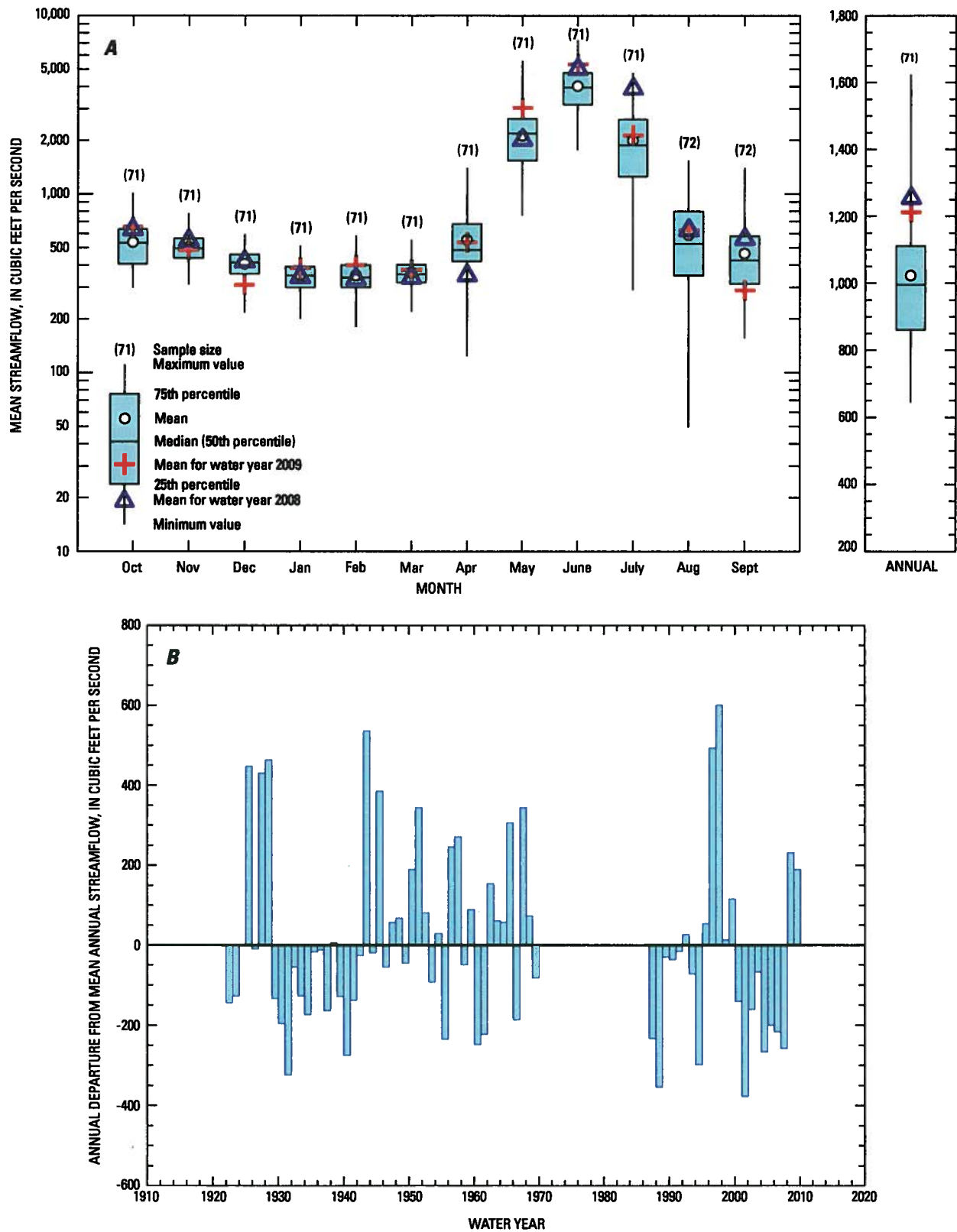


Figure 1. Streamflow data for Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, water years 1922–2009. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

06294000 Little Bighorn River near Hardin, Mont.

LOCATION.--Lat 45°44'09", long 107°33'24" referenced to North American Datum of 1927, in SE ¼ NE ¼ NE ¼ sec.19, T.1 S., R.34 E., Big Horn County, Hydrologic Unit 10080016, on left bank 50 ft downstream from bridge on Sarpy Road, 0.2 mi upstream from terminal wasteway of Agency Canal, 0.6 mi upstream from mouth, and 2.3 mi east of Hardin.

DRAINAGE AREA.--1,294 mi².

PERIOD OF RECORD.--June 1953 to present.

REVISED RECORDS.--Water Data Report MT-86-1: 1978.

GAGE.--Water-stage recorder. Elevation of gage is 2,882.29 ft, referenced to the National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to October 7, 1953, nonrecording gage located at site 0.4 mi downstream. October 7, 1953, to May 6, 1963, water-stage recorder located at site 0.3 mi downstream. May 6, 1963, to November 6, 1963, nonrecording gage located at site 0.4 mi downstream. All locations had different elevations. November 7, 1963, to August 15, 1976, water-stage recorder located at site 35 ft downstream at present elevation. August 15, 1976, to September 30, 1979, water-stage recorders were located on each bank downstream from Sarpy Road Bridge and were used depending on control conditions.

REMARKS.--Records are good except for estimated daily discharges, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity 23,000 acre-ft). Diversions for irrigation include 20,980 acres upstream from station. **Discharge values and summary statistics given herein include the flow of terminal wasteway of Agency Canal.** U.S. Geological Survey satellite telemeter is located at the station. Several unpublished observations of water temperature and specific conductance were made during the year.

Table 2. Daily mean discharge for Little Bighorn River near Hardin, Mont. (06294000), October 2008 through September 2009.

[Discharge is in cubic feet per second; ---, no data. Abbreviations: Ac-ft, acre-ft; e, estimated; Max, maximum; Min, minimum; WY, water year]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	140	161	158	e130	e150	e160	228	377	1,020	474	206	113
2	142	160	153	e120	e150	e170	246	318	1,010	433	191	105
3	138	161	e140	e100	e160	e170	274	286	1,040	417	184	102
4	139	161	129	e100	e160	e180	288	267	999	415	172	94
5	149	166	132	e110	e170	e190	314	255	934	413	164	86
6	149	163	154	e130	e170	e190	278	251	878	401	164	92
7	163	164	178	e150	e170	e180	254	251	991	365	171	101
8	161	160	178	e140	e170	e170	258	269	1,130	336	183	101
9	154	160	151	e140	e170	e170	348	304	1,120	299	192	99
10	159	163	172	e130	e170	e140	522	307	984	282	186	90
11	177	164	175	e130	e170	e110	471	285	893	273	171	87
12	200	164	159	e130	e170	e120	433	272	833	262	162	86
13	204	174	e140	e130	e170	e130	509	272	763	253	154	94
14	194	175	e110	e130	e160	e140	534	278	720	244	144	104
15	192	193	e80	e130	e170	e170	417	280	730	257	146	107
16	197	181	e70	e130	e170	e200	361	279	749	252	154	102
17	196	169	e90	e130	e170	e250	336	291	789	247	160	95
18	194	167	e120	e130	e170	e330	298	287	803	238	167	93
19	186	163	e110	e130	e170	318	268	306	823	231	165	98
20	178	160	e100	e130	e170	250	255	376	838	226	155	97
21	172	160	e100	e130	e160	235	243	546	799	210	151	91
22	167	157	e110	e130	e170	222	236	701	794	190	144	92
23	166	158	e110	e120	e170	217	251	742	822	171	136	109
24	163	159	e110	e80	e170	231	285	723	776	158	136	128
25	164	162	e110	e90	e170	238	328	788	707	174	112	119
26	164	159	e110	e90	e160	229	329	852	654	176	109	105
27	161	159	e110	e90	e150	233	303	912	615	174	110	99
28	159	162	e120	e110	e150	218	282	888	613	163	106	97
29	157	169	e130	e140	---	202	338	872	574	179	105	88
30	162	163	e120	e150	---	236	357	888	521	215	105	91
31	161	---	e120	e150	---	258	---	976	---	211	113	---
Total	5,208	4,937	3,949	3,830	4,630	6,257	9,844	14,699	24,922	8,339	4,718	2,965
Mean	168	165	127	124	165	202	328	474	831	269	152	98.8
Max	204	193	178	150	170	330	534	976	1,130	474	206	128
Min	138	157	70	80	150	110	228	251	521	158	105	86
Ac-ft	10,330	9,790	7,830	7,600	9,180	12,410	19,530	29,160	49,430	16,540	9,360	5,880

Table 2. Daily mean discharge for Little Bighorn River near Hardin, Mont. (06294000), October 2008 through September 2009—Continued.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954–2009, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	151	149	132	136	192	299	302	596	814	256	115	125
Max	276	248	223	366	610	987	748	2,852	1,981	1,333	382	267
(WY)	(1979)	(1979)	(1979)	(1975)	(1971)	(1972)	(1965)	(1978)	(1968)	(1975)	(1975)	(1978)
Min	60.7	82.6	65.6	50.5	68.5	71.1	54.8	71.9	117	8.50	2.46	19.1
(WY)	(2002)	(2002)	(2002)	(2005)	(2005)	(2002)	(1961)	(1961)	(1961)	(1961)	(1961)	(1960)
SUMMARY STATISTICS												
	Calendar Year 2008				Water Year 2009				Water Years 1954–2009			
Annual total	111,020				94,298							
Annual mean	303				258				272			
Highest annual mean									676 1975			
Lowest annual mean									70.4 1961			
Highest daily mean	2,270 May 26				1,130 Jun 8				15,800 May 20, 1978			
Lowest daily mean	70 Dec 16				70 Dec 16				0.30 Aug 5, 1961			
Annual seven-day minimum	96 Dec 15				94 Sep 5				0.40 Aug 3, 1961			
Maximum peak flow					*1,180 Jun 9				*22,600 May 19, 1978			
Maximum peak stage					*5.80 Dec 3				*11.78 Mar 20, 1960			
Instantaneous low flow					*61 Sep 29				*0.20 Aug 7, 1961			
Annual runoff (ac-ft)	220,200				187,000				197,200			
10 percent exceeds	904				631				592			
50 percent exceeds	166				170				160			
90 percent exceeds	124				105				71			

^a Includes Agency Canal.

^b Backwater from ice.

^c Gage height, 1.95 ft.

^d Gage height, 11.20 ft.

^e Site and datum then in use.

^f Result of discharge measurement.

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

LOCATION.--Lat 46°07'29", long 107°28'06" referenced to North American Datum of 1927, in SE ¼ SE ¼ NE ¼ 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 October 7, 1955, to September 30, 1981, 22,885 mi².

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

GAGE.--Water-stage recorder. Elevation of gage is 2,700 ft, referenced to the National Geodetic Vertical Datum of 1929. May 11, 1945, to December 6, 1945, nonrecording gage, and December 7, 1945, to October 6, 1955, water-stage recorder located 1.7 mi upstream at different elevation. October 7, 1955, to September 30, 1981, located at site 2.3 mi downstream at different elevation.

REMARKS.--Records are good except for estimated daily discharges, which are poor. After November 1965, flow has been regulated by Bighorn Lake (usable contents, 1,312,000 acre-ft). Major regulation prior to November 1965 occurred from 14 reservoirs in Wyoming and 1 in Montana with combined usable contents of about 1,400,000 acre-ft. Diversion for irrigation of about 445,200 acres occurs upstream from the station. U.S. Geological Survey satellite telemeter is located at the station. Several unpublished observations of water temperature and specific conductance were made during the year.

Table 3. Daily mean discharge for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), October 2008 through September 2009.

[Discharge is in cubic feet per second; ---, no data. Abbreviations: Ac-ft, acre-ft; e, estimated; Max, maximum; Min, minimum; WY, water year]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2,940	2,740	3,120	e3,000	2,640	e2,600	2,740	4,250	5,330	12,500	3,550	2,910
2	2,920	2,700	3,070	e3,000	2,630	2,660	2,800	4,200	5,350	12,300	3,510	3,000
3	2,900	2,730	2,900	e2,900	2,630	2,770	2,890	4,100	5,280	12,500	3,470	3,120
4	2,930	2,740	2,850	e2,800	2,650	2,890	2,950	4,060	5,390	12,500	3,360	3,200
5	3,010	2,790	2,850	e2,900	2,680	2,990	2,970	4,020	5,390	12,600	3,310	3,280
6	2,960	2,830	2,910	e3,000	2,700	3,060	2,890	3,860	5,520	12,600	3,310	3,270
7	2,990	2,890	3,000	e2,900	2,740	2,920	2,840	3,970	5,060	12,500	3,240	3,250
8	2,980	2,930	3,040	2,950	2,740	2,840	2,820	3,870	7,270	12,400	3,150	3,220
9	2,970	2,960	3,000	3,070	2,730	2,790	3,090	4,160	8,000	12,300	3,080	3,200
10	3,100	3,010	3,050	3,150	2,740	e2,700	3,610	4,220	8,450	11,900	3,010	3,140
11	3,170	3,060	3,140	3,150	2,730	e2,500	3,830	4,180	8,500	11,300	2,900	3,150
12	3,230	3,100	2,990	3,240	2,700	e2,600	3,730	4,170	8,460	11,400	3,000	3,150
13	3,230	3,120	2,900	2,930	2,670	e2,600	3,720	4,180	8,400	11,400	3,130	3,120
14	3,230	2,970	e2,800	2,880	2,650	2,610	3,780	4,320	8,430	9,920	3,110	3,130
15	3,290	3,000	e2,700	2,790	2,630	2,700	3,760	4,610	8,450	7,660	3,180	3,120
16	3,420	3,050	e2,800	2,740	2,610	2,820	3,640	4,630	9,110	7,360	3,110	3,130
17	3,480	3,030	e2,900	2,760	2,610	2,960	3,640	4,660	9,690	7,350	3,020	3,120
18	3,440	3,060	e3,000	2,750	2,620	3,020	3,560	4,640	9,740	6,870	3,110	3,110
19	3,440	3,010	e2,900	2,760	2,630	3,010	3,480	4,650	10,400	5,450	3,190	3,090
20	3,410	2,900	e2,900	2,770	2,650	2,920	3,440	4,770	10,900	4,690	2,980	3,100
21	3,380	2,920	e2,900	2,780	2,630	2,780	3,460	4,850	11,200	4,520	3,050	3,100
22	3,370	2,950	e2,900	2,790	2,630	2,690	3,590	5,040	12,500	4,360	3,050	3,100
23	3,380	2,980	e2,900	2,770	2,630	2,670	3,910	5,060	13,100	4,210	3,020	3,130
24	3,200	3,000	e2,900	e2,700	2,660	2,680	4,100	5,020	13,400	4,000	2,950	3,160
25	2,930	2,990	e2,900	e2,700	2,710	2,700	4,150	5,040	13,400	4,030	2,820	3,170
26	2,950	2,960	e2,900	e2,600	2,750	2,720	4,200	4,970	13,200	4,130	2,870	3,180
27	2,980	2,980	e2,900	e2,600	e2,600	2,700	4,160	5,120	12,900	4,170	2,990	3,150
28	3,000	3,000	e2,900	e2,600	e2,500	2,700	4,020	5,290	12,800	4,030	2,940	3,170
29	2,940	3,050	e2,950	e2,600	---	2,700	4,260	5,200	12,900	4,060	2,930	3,200
30	2,830	3,110	e3,000	2,610	---	2,760	4,320	5,180	12,700	4,080	2,890	3,270
31	2,860	---	e3,000	2,610	---	2,730	---	5,220	---	3,810	2,870	---
Total	96,860	88,560	90,970	87,800	74,490	85,790	106,350	141,510	282,220	252,900	96,100	94,440
Mean	3,125	2,952	2,835	2,832	2,660	2,767	3,545	4,565	9,407	8,158	3,100	3,148
Max	3,480	3,120	3,140	3,240	2,750	3,060	4,320	5,290	13,400	12,600	3,550	3,280
Min	2,830	2,700	2,700	2,600	2,500	2,500	2,740	3,860	5,280	3,810	2,820	2,910
Ac-ft	192,100	175,700	180,400	174,200	147,800	170,200	210,900	280,700	559,800	501,600	190,600	187,300

Table 3. Daily mean discharge for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), October 2008 through September 2009—Continued.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945–2009, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	3,094	3,168	3,040	2,938	3,082	3,531	3,414	4,211	6,747	5,149	2,773	2,774
Max	5,546	5,599	4,907	5,478	5,314	6,580	7,881	9,102	15,180	19,090	6,972	4,952
(WY)	(1972)	(1974)	(1968)	(1968)	(1971)	(1972)	(1997)	(1947)	(1948)	(1967)	(1997)	(1973)
Min	1,103	1,223	1,280	1,382	1,544	908	1,063	1,304	1,050	707	868	1,009
(WY)	(2003)	(1978)	(1961)	(1961)	(2003)	(1966)	(1966)	(1966)	(1966)	(1960)	(1961)	(1966)

SUMMARY STATISTICS												
	Calendar Year 2008				Water Year 2009				Water Years 1945–2009			
Annual total	1,220,590				1,497,990							
Annual mean	3,335				4,104				3,644			
Highest annual mean									5,594			
Lowest annual mean									1,474			
Highest daily mean	10,800 Jun 20				13,400 Jun 24				50,000 May 20, 1978			
Lowest daily mean	1,800 May 9				2,500 Feb 28				400 Apr 4, 1967			
Annual seven-day minimum	1,910 May 8				2,610 Jan 26				528 May 6, 1961			
Maximum peak flow					13,600 Jun 24				59,200 May 20, 1978			
Maximum peak stage					9.86 Jan 5				14.21 Apr 2, 1965			
Instantaneous low flow									275 Nov 15, 1959			
Annual runoff (ac-ft)	2,421,000				2,971,000				2,640,000			
10 percent exceeds	6,800				7,800				6,150			
50 percent exceeds	2,800				3,060				3,040			
90 percent exceeds	2,080				2,700				1,610			

	Water Years 1946–1961*				Water Years 1967–2009**			
Annual mean	3,358				3,633			
Highest annual mean	5,501 1947				5,594 1997			
Lowest annual mean	1,623 1961				1,474 2003			
Highest daily mean	25,700 Jun 23, 1947				50,000 May 20, 1978			
Lowest daily mean	462 May 12, 1962				400 Apr 4, 1967			
Annual seven-day minimum	528 May 6, 1961				843 Nov 18, 1977			
Maximum peak flow	26,200 Jun 24, 1947				59,200 May 20, 1978			
Maximum peak stage	10.65 May 24, 1947				14.15 May 20, 1978			
Instantaneous low flow	275 Nov 15, 1959							
Annual runoff (ac-ft)	2,578,000				2,632,000			
10 percent exceeds	6,200				6,060			
50 percent exceeds	2,810				3,150			
90 percent exceeds	1,500				1,690			

* Prior to construction of Yellowtail Dam.

** After completion of Yellowtail Dam.

^a Gage height, 6.99 ft.

^b Result of ice jam.

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

^d Ice jam, at different site and datum.

^e About, result of freezeup.

^f Gage height, 8.79 ft, at different site and datum.

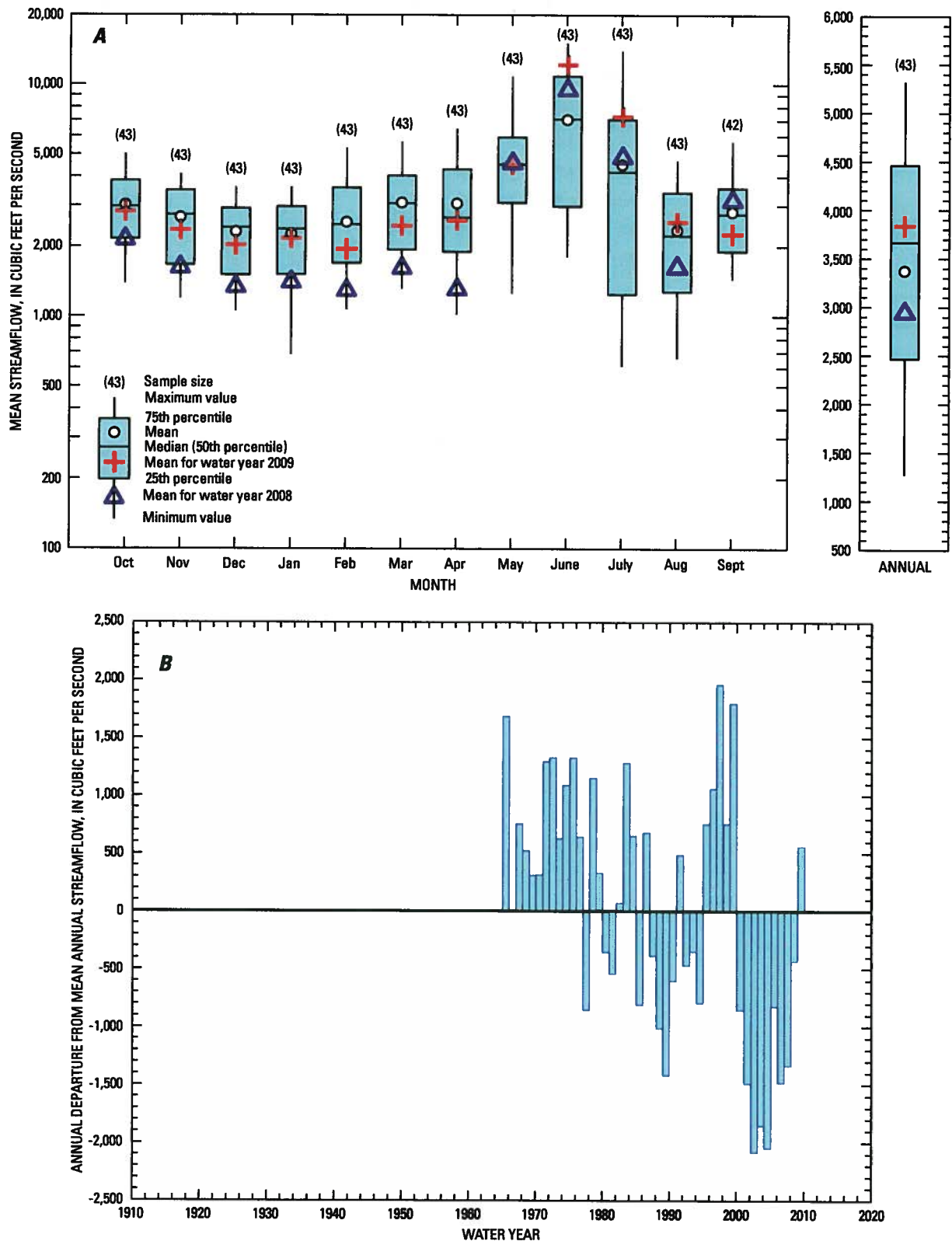


Figure 2. Streamflow data for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), minus Little Bighorn River near Hardin, Mont. (06294000); adjusted for change in contents in Bighorn Lake, water years 1965–2009. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

06308500 Tongue River at Miles City, Mont.

LOCATION.--Lat 46°23'05", long 105°50'41" referenced to North American Datum of 1927, in SE ¼ SE ¼ SE ¼ 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 October 4, 1995, 5,379 mi².

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to present. 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 October 4, 1995, at site 2.5 mi upstream from present site. Flows at present site are equivalent with flows at site operated from 1946. Monthly discharge only for some periods, published in Water Supply Paper (WSP) 1309.

REVISED RECORDS. -- WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,360 ft, referenced to the National Geodetic Vertical Datum of 1929. April 1938 to April 1942, nonrecording gage located at site 8 mi upstream from present site at different elevation. April 1946 to September 30, 1963, located at elevation 1.00 ft higher than present site. October 4, 1995, gage was moved 2.5 mi downstream.

REMARKS.--Records are good except for estimated daily discharges, which are poor. Flow is regulated by Tongue River Reservoir (station 06307000) with usable contents of 79,070 acre-ft, and many small reservoirs in Wyoming with combined capacity about 15,000 acre-ft. Diversions for irrigation include about 100,800 acres upstream from station. U.S. Geological Survey satellite telemeter is located at the station.

Table 4. Daily mean discharge for Tongue River at Miles City, Mont. (06308500), October 2008 through September 2009.

[Discharge is in cubic feet per second; ---, no data. Abbreviations: Ac-ft, acre-ft; e, estimated; Max, maximum; Min, minimum; WY, water year]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	132	175	e400	e130	e150	e220	482	814	310	917	222	185
2	104	175	e400	e130	e150	e260	529	778	315	847	220	217
3	103	177	e370	e120	e150	e300	560	769	304	794	218	227
4	101	178	e340	e110	e160	e340	556	806	308	922	218	209
5	113	e260	e230	e120	e160	e370	543	903	346	809	216	213
6	132	e320	e230	e130	e160	e350	568	849	417	733	219	210
7	e150	e330	e240	e130	e160	e300	582	791	480	719	299	221
8	e160	e330	e240	e130	e160	e300	605	780	528	691	418	217
9	154	e330	e190	e130	e150	e300	620	777	629	653	432	226
10	168	e330	e130	e130	e150	e300	653	776	1,130	598	418	230
11	226	335	e130	e130	e150	e340	657	772	1,370	544	347	224
12	274	340	e120	e130	e160	e400	659	773	1,380	493	327	233
13	288	378	e110	e130	e150	e500	653	803	1,360	472	310	234
14	340	449	e100	e120	e160	e600	657	808	1,390	480	282	229
15	366	392	e110	e120	e160	e700	662	792	1,380	455	333	195
16	280	374	e120	e130	e170	669	692	769	1,620	418	302	202
17	214	391	e130	e130	e170	664	701	766	1,550	386	280	193
18	194	396	e130	e130	e170	603	705	760	1,350	365	279	195
19	186	397	e130	e130	e170	542	724	755	1,370	363	303	207
20	181	397	e130	e130	e170	586	744	750	1,400	348	313	214
21	179	e400	e130	e130	e170	550	746	706	1,440	342	289	233
22	177	e400	e130	e130	e180	476	748	577	1,530	344	268	227
23	172	402	e130	e120	e200	418	747	453	1,530	321	266	217
24	170	399	e130	e110	e220	411	759	451	1,470	338	273	197
25	169	402	e130	e120	e220	409	766	451	1,430	335	259	189
26	166	400	e130	e120	e220	433	765	448	1,370	327	231	186
27	162	397	e130	e130	e220	426	766	424	1,240	310	220	184
28	165	402	e130	e130	e220	429	762	387	1,140	286	195	191
29	172	e400	e130	e140	---	433	797	348	1,050	268	180	192
30	174	e400	e130	e150	---	468	832	328	1,010	252	181	198
31	176	---	e130	e150	---	479	---	317	---	249	189	---
Total	5,748	10,456	5,410	3,970	4,830	13,576	20,240	20,681	32,147	15,379	8,507	6,295
Mean	185	349	175	128	172	438	675	667	1,072	496	274	210
Max	366	449	400	150	220	700	832	903	1,620	922	432	234
Min	101	175	100	110	150	220	482	317	304	249	180	184
Ac-ft	11,400	20,740	10,730	7,870	9,580	26,930	40,150	41,020	63,760	30,500	16,870	12,490

Table 4. Daily mean discharge for Tongue River at Miles City, Mont. (06308500), October 2008 through September 2009—Continued.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938–2009, BY WATER YEAR (WY)*												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	235	246	186	189	265	506	430	686	1,265	455	176	194
Max	694	585	423	529	1,794	1,783	1,693	2,983	3,825	2,207	700	599
(WY)	(1972)	(1942)	(1950)	(1999)	(1971)	(1971)	(1965)	(1978)	(1978)	(1975)	(1975)	(1968)
Min	10.3	60.9	68.0	65.3	74.5	74.5	12.5	29.2	41.9	12.6	6.08	2.40
(WY)	(1961)	(1989)	(1990)	(2005)	(2003)	(2002)	(1961)	(1961)	(2002)	(1960)	(1949)	(1938)

SUMMARY STATISTICS												
	Calendar Year 2008				Water Year 2009				Water Years 1938–2009*			
Annual total	184, 827				147,239							
Annual mean	505				403				400			
Highest annual mean									986 1978			
Lowest annual mean									57.2 1961			
Highest daily mean	3,010		Jun 27		1,620		Jun 16		9,290		Jun 15, 1962	
Lowest daily mean	100		Dec 14		100		Dec 14		0.00		Jul 9, 1940	
Annual seven-day minimum	117		Dec 10		117		Dec 10		0.00		Jul 9, 1940	
Maximum peak flow					*1,900		Jun 16		*13,300		Jun 15, 1962	
Maximum peak stage					*10.20		Mar 4		*13.27		Mar 19, 1960	
Annual runoff (ac-ft)	366,600				292,000				289,500			
10 percent exceeds	1,790				784				900			
50 percent exceeds	225				302				218			
90 percent exceeds	136				130				65			

* During periods of operation (April 1938 to April 1942, April 1946 to current year).

* Gage height 5.57 ft.

* Backwater from ice.

* Gage height, 11.33 ft, at previous site and datum.

* Ice jam, at previous site and datum used from 1963 to 1995.

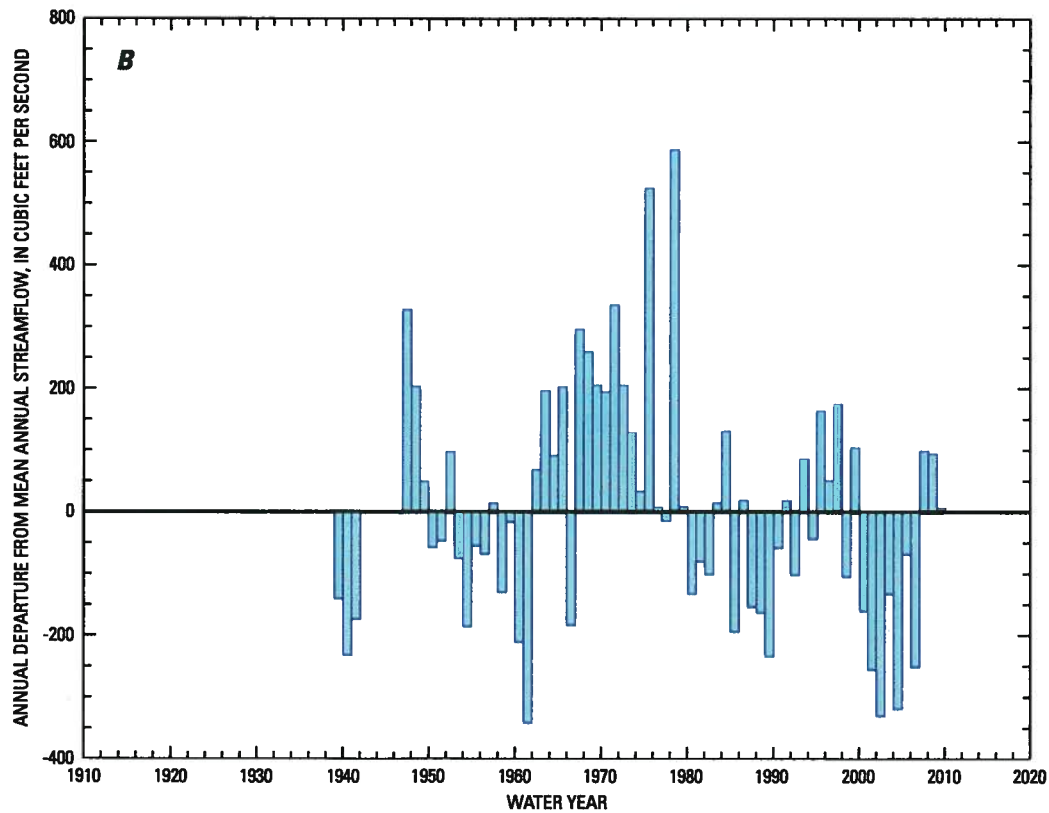
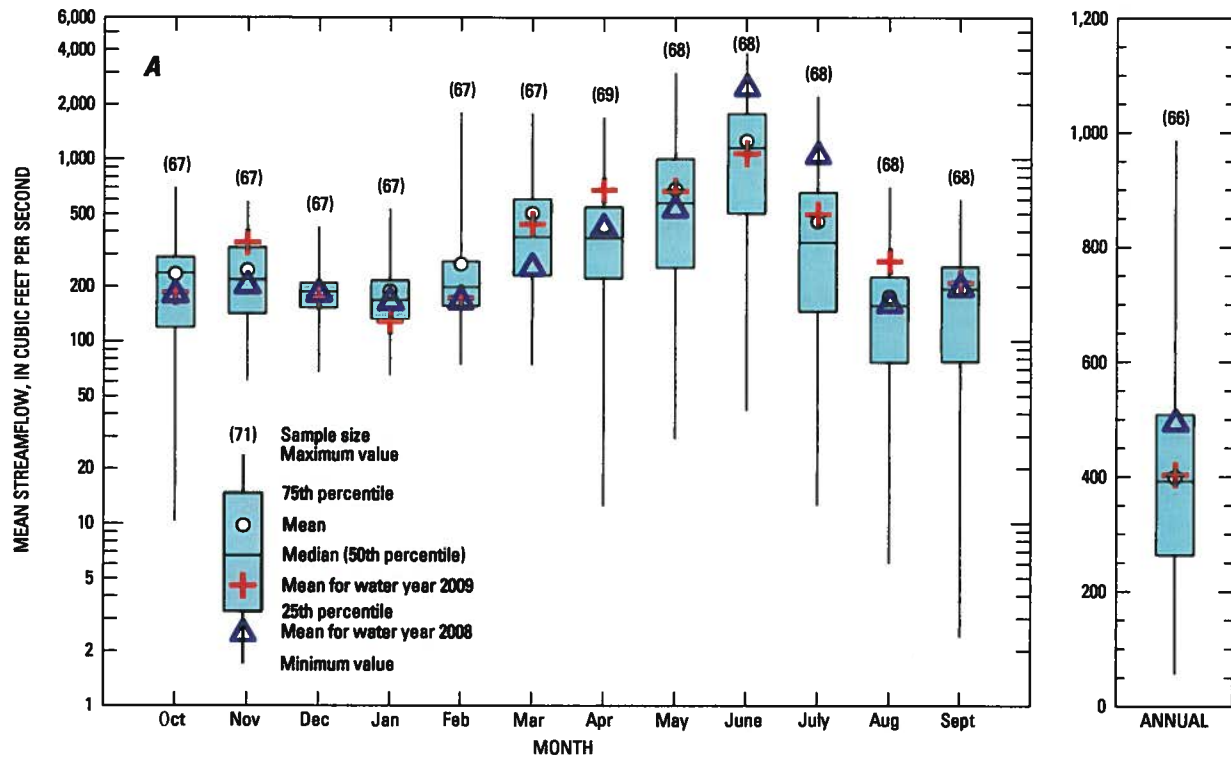


Figure 3. Streamflow data for Tongue River at Miles City, Mont. (06308500), water years 1939–2009. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

06326500 Powder River near Locate, Mont.

LOCATION.—Lat 46°25'48", long 105°18'34" referenced to North American Datum of 1927, in SW ¼ SW ¼ SE ¼ sec.23, T.8 N., R.51 E., Custer County, Hydrologic Unit 10090209, on left bank at downstream side of bridge on U.S. Highway 12, 0.1 mi west of Locate, and 25 mi east of Miles City, and at river mile 29.4.

DRAINAGE AREA.—13,068 mi².

PERIOD OF RECORD.—March 1938 to present.

REVISED RECORDS.— Water Supply Paper (WSP) 926: 1939. WSP 1309: 1938-39, maximum discharge. WSP 1729: Drainage area. Water Data Report MT-04-1: Drainage area.

GAGE.—Water-stage recorder. Elevation of gage is 2,384.79 ft, referenced to the National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to July 11, 1947, nonrecording gage located at bridge 1.5 mi upstream, and July 11, 1947, to September 30, 1965, water-stage recorder located at site near upstream bridge at different elevation. October 1, 1965, to October 4, 1966, nonrecording gage, and October 5, 1966, to March 21, 1978, water-stage recorder located at present site and elevation. March 22, 1978, to April 23, 1981, water-stage recorder located 1.5 mi upstream at different elevation, April 24 to August 20, 1981, water-stage recorder located at present site and elevation, and August 21, 1981, to September 30, 1981, water-stage recorder located 1.5 mi upstream at different elevation. October 1, 1981, to April 5, 1995, water-stage recorder located at site 1.5 mi downstream at different elevation. April 7, 1995, to present, water-stage recorders located on each bank and used depending on control conditions.

REMARKS.—Records are fair except for estimated daily discharges, which are poor. Some regulation occurs by three reservoirs in Wyoming with combined usable contents of 36,800 acre-ft. Diversions for irrigation include about 101,800 acres upstream from station. U.S. Geological Survey satellite telemeter is located at the station.

Table 5. Daily mean discharge for Powder River near Locate, Mont. (06326500), October 2008 through September 2009.

[Discharge is in cubic feet per second; ---, no data. Abbreviations: Ac-ft, acre-ft; e, estimated; Max, maximum; Min, minimum; WY, water year]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	162	308	317	e150	e320	e420	777	1,090	915	1,050	98	235
2	165	306	323	e150	e320	e550	860	1,010	823	980	97	216
3	166	308	323	e130	e350	e700	912	968	793	909	119	158
4	161	315	117	e100	e400	e800	899	944	800	946	176	153
5	152	307	e270	e120	e410	e900	998	942	843	869	297	144
6	149	313	e340	e120	e410	e850	990	887	868	844	362	132
7	156	319	e320	e140	e410	e800	969	895	877	838	492	121
8	147	317	e310	e160	e410	e750	990	870	879	906	630	119
9	156	319	e290	e170	e410	e700	1,000	876	816	921	492	120
10	169	314	e290	e170	e410	e640	1,030	848	931	831	350	115
11	197	309	e290	e170	e410	e600	1,190	875	952	789	313	108
12	228	320	e290	e170	e410	e570	1,480	945	917	714	268	107
13	270	325	e270	e190	e440	e570	2,230	976	921	686	236	105
14	307	345	e200	e210	e400	e600	3,070	991	901	585	223	103
15	337	360	e160	e190	e440	e790	2,410	989	903	479	312	94
16	312	353	e180	e190	e470	e1,100	2,190	976	1,120	417	327	91
17	308	357	e200	e210	e470	e1,400	1,910	926	1,120	372	227	90
18	306	359	e210	e240	e470	e1,700	1,700	840	1,040	340	375	86
19	306	361	e210	e300	e470	e1,900	1,440	895	1,140	314	380	83
20	324	373	e180	e350	e440	1,810	1,310	925	1,080	352	295	75
21	321	359	e160	e390	e440	1,280	1,220	900	1,130	307	259	74
22	328	369	e160	e410	e480	1,220	1,130	884	1,240	270	258	80
23	329	387	e170	e430	e520	1,100	1,020	918	1,230	232	282	81
24	331	368	e160	e390	e440	1,050	944	1,120	1,140	193	379	81
25	333	364	e160	e310	e420	943	896	1,390	1,240	176	337	80
26	332	361	e170	e240	e420	883	849	1,250	1,300	152	279	77
27	336	332	e160	e200	e380	851	836	1,120	1,220	138	240	73
28	322	323	e160	e250	e380	733	927	1,050	1,160	128	243	81
29	317	352	e160	e250	---	713	1,140	1,000	1,100	119	224	81
30	311	335	e160	e290	---	738	1,200	934	1,070	118	204	79
31	313	---	e150	e320	---	742	---	887	---	105	187	---
Total	8,051	10,138	6,860	7,110	11,750	28,403	38,517	30,121	30,469	16,080	8,961	3,242
Mean	260	338	221	229	420	916	1,284	972	1,016	519	289	108
Max	337	387	340	430	520	1,900	3,070	1,390	1,300	1,050	630	235
Min	147	306	117	100	320	420	777	840	793	105	97	73
Ac-ft	15,970	20,110	13,610	14,100	23,310	56,340	76,400	59,740	60,440	31,890	17,770	6,430

Table 5. Daily mean discharge for Powder River near Locate, Mont. (06326500), October 2008 through September 2009—Continued.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939–2009, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	243	216	148	142	408	1,173	729	1,143	1,577	552	206	161
Max	921	790	417	476	3,850	4,627	3,062	5,970	8,045	2,015	1,096	898
(WY)	(1941)	(1999)	(1942)	(1981)	(1943)	(1972)	(1965)	(1978)	(1944)	(1993)	(1941)	(1941)
Min	1.77	12.5	12.5	4.53	2.82	80.2	109	51.2	25.9	9.34	1.30	0.19
(WY)	(1961)	(1961)	(1961)	(1950)	(1950)	(1950)	(1961)	(2004)	(2004)	(2004)	(1988)	(1960)
SUMMARY STATISTICS												
	Calendar Year 2008				Water Year 2009				Water Years 1939–2009			
Annual total	282,596				199,702							
Annual mean	772				547				558			
Highest annual mean									1,622			
Lowest annual mean									79.1			
Highest daily mean	8,030				May 30				26,000			
Lowest daily mean	30				Jan 20				0.00			
Annual seven-day minimum	36				Jan 18				0.00			
Maximum peak flow					3,070				Apr 14			
Maximum peak stage					7.74				Mar 5			
Instantaneous low flow					65				Sep 26			
Annual runoff (ac-ft)	560,500				396,100				404,300			
10 percent exceeds	2,160				1,100				1,300			
50 percent exceeds	322				360				229			
90 percent exceeds	90				131				40			

^a Gage height, 4.78 ft.

^b Backwater from ice.

^c Gage height, 1.04 ft.

^d Gage height, 11.23 ft, observed.

^e On many days in 1950, 1960–61, 1998, and 2006.

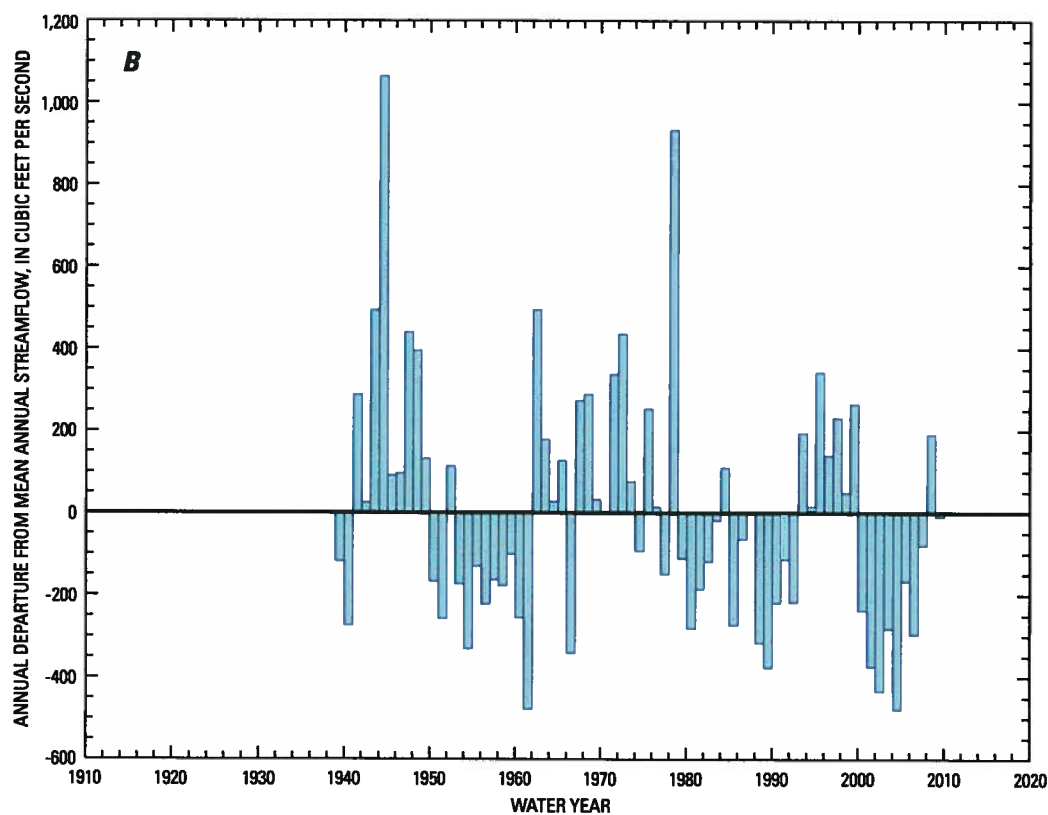
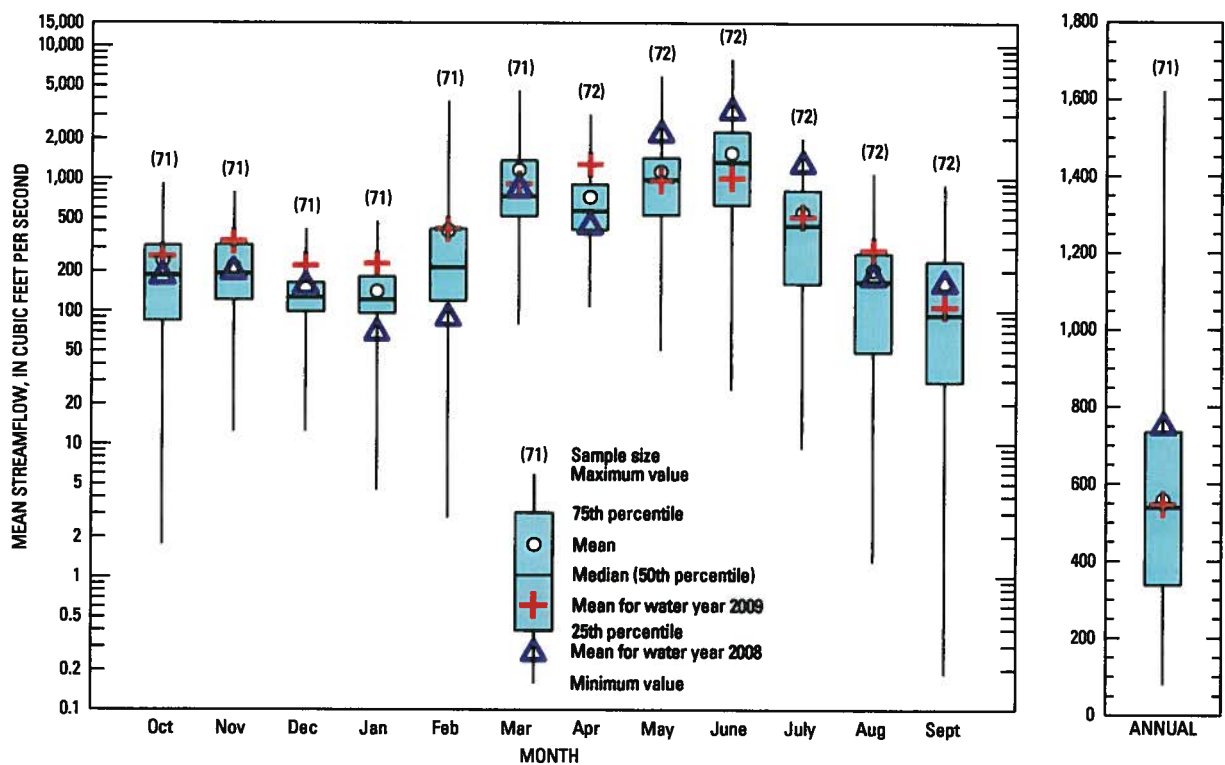


Figure 4. Streamflow data for Powder River near Locate, Mont. (06326500), water years 1939–2009. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

Month-End Usable Contents for Yellowstone River Compact Reservoirs¹ Completed after January 1, 1950

06258900 Boysen Reservoir, Wyo.

LOCATION.--Lat 43°25'00", long 108°10'37" referenced to North American Datum of 1927, in NW1/4NW1/4 sec. 16, T.5 N., R.6 E., Fremont County, Hydrologic Unit 10080005, at dam on Wind River and 13 mi north of Shoshoni, Wyo.

DRAINAGE AREA.--7,700 mi².

PERIOD OF RECORD.--October 1951 to present (month-end contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to the National Geodetic Vertical Datum of 1929 (levels by Bureau of Reclamation).

REMARKS.--Reservoir is formed by rock-fill dam completed in October 1951. Storage began October 11, 1951. Usable contents are 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 is 40,080 acre-ft below elevation 4,657.00 ft. Prior to January 1, 1966, usable contents were 757,900 acre-ft and dead storage was 62,000 acre-ft at same elevations. Between January 1966 and October 1996, usable contents were 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. Water used for irrigation, flood control, and power generation.

COOPERATION.--Elevations and contents 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, March 18, 19, 1956, elevation, 4,684.18 ft, capacity table then in use.

EXTREMES FOR WATER YEAR 2009.--Maximum daily contents, 738,200 acre-ft, July 6, elevation, 4,726.84 ft; minimum daily contents, 533,700 acre-ft, May 19, 20, elevation, 4,715.52 ft.

Table 6. Month-end useable contents for Boysen Reservoir, Wyo.

[Symbol: --, no data.]

Date	Water-surface elevation, in feet	Usable contents, in acre-ft	Change in usable contents, in acre-ft
September 30, 2008	4,718.88	588,800	--
October 31	4,718.51	582,400	-6,400
November 30	4,718.72	586,000	3,600
December 31	4,717.94	572,800	-13,200
January 31, 2009	4,717.38	563,500	-9,300
February 28	4,717.01	557,400	-6,100
March 31	4,716.63	551,300	-6,100
April 30	4,717.26	561,500	10,200
May 31	4,718.23	577,700	16,200
June 30	4,726.36	728,500	150,800
July 31	4,723.55	673,500	-55,000
August 31	4,721.96	643,700	-29,800
September 30, 2009	4,720.63	619,500	-24,200
2009 water year			30,700

¹Wyoming disagrees with the term "Compact Reservoirs" as used throughout this annual report. Wyoming's acceptance of this annual report should not be construed as Wyoming's acceptance of the use of that term.

06260300 Anchor Reservoir, Wyo.

LOCATION.--Lat 43°39'50", long 108°49'27" referenced to North American Datum of 1927, 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, Wyo.

DRAINAGE AREA.--131 mi².

PERIOD OF RECORD.--November 1960 to present (month-end contents only).

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

REMARKS.--Reservoir is formed by concrete-arch dam completed in 1960. Usable contents are 17,410 acre-ft (revised) 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 October 1, 1971, usable contents were 17,280 acre-ft, including 149 acre-ft below the invert. Water is used for irrigation of land in Owl Creek basin.

COOPERATION.--Elevations and contents table 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 contents on many days some years.

EXTREMES FOR WATER YEAR 2009.--Maximum daily contents, 7,240 acre-ft, May 7, elevation, 6,411.81 ft; minimum daily contents, 310 acre-ft, many days, elevation, 6,356.88 ft.

Table 7. Month-end useable contents for Anchor Reservoir, Wyo.

[Symbol: --, no data.]

Date	Water-surface elevation, in feet	Usable contents, in acre-ft	Change in usable contents, in acre-ft
September 30, 2008	6,358.04	346	--
October 31	6,358.21	352	6
November 30	6,358.10	348	-4
December 31	6,356.91	311	-37
January 31, 2009	6,361.17	459	148
February 28	6,362.33	506	47
March 31	6,364.00	580	74
April 30	6,372.29	1,070	490
May 31	6,393.31	3,360	2,290
June 30	6,409.13	6,300	2,940
July 31	6,398.37	4,180	-2,120
August 31	6,373.29	1,150	-3,030
September 30, 2009	6,357.34	325	-825
2009 water year			-21

06286400 Bighorn Lake near St. Xavier, Mont.

LOCATION.--Lat 45°18'27", long 107°57'26" referenced to North American Datum of 1927, in SW ¼ SE ¼ sec.18, T.6 S., R.30 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 southwest of St. Xavier, and at river mile 86.6.

DRAINAGE AREA.--19,626 mi².

PERIOD OF RECORD.--November 1965 to present (month-end contents only). Prior to October 1969, published as "Yellowtail Reservoir." Records of daily elevations and contents on file at the U.S. Geological Survey, Montana Water Science Center in Helena, Mont.

GAGE.--Water-stage recorder located in powerhouse control room. Elevation of gage is 3,296.5 ft, referenced to the National Geodetic Vertical Datum of 1929 (levels by Bureau of Reclamation).

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

REMARKS.--Reservoir is formed by thin concrete-arch dam; construction began in 1961 and was completed in 1967. Storage began November 3, 1965. Usable contents are 1,312,000 acre-ft, between elevation 3,296.50 ft, river outlet invert, and 3,657.00 ft, top of flood control. Elevation of spillway crest is 3,593.00 ft. Normal maximum operating level is 1,097,000 acre-ft, between elevations, 3,640.00 ft and 3,657.00 ft. Minimum operating level is 483,400 acre-ft, elevation, 3,547.00 ft. Dead storage is 16,010 acre-ft, below elevation 3,296.50 ft. All elevations are referenced to the National Geodetic Vertical Datum of 1929. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,346,000 acre-ft, July 6, 1967, elevation, 3,656.43 ft; minimum since first filling, 519,400 acre-ft, March 11, 2003, elevation 3,572.81 ft.

EXTREMES FOR WATER YEAR 2009.--Maximum contents, 1,165,000 acre-ft, July 6, elevation, 3,647.92 ft; minimum, 853,700 acre-ft, May 20, elevation, 3,619.50 ft.

Table 8. Month-end useable contents for Bighorn Lake, Mont.

[Symbol: --, no data.]

Date	Water-surface elevation, in feet	Usable contents, in acre-ft	Change in usable contents, in acre-ft
September 30, 2008	3,639.82	1,052,000	--
October 31	3,639.22	1,044,000	-8,000
November 30	3,637.45	1,023,000	-21,000
December 31	3,633.15	975,200	-47,800
January 31, 2009	3,629.82	941,800	-33,400
February 28	3,627.87	923,500	-18,300
March 31	3,627.15	917,000	-6,500
April 30	3,623.47	885,300	-31,700
May 31	3,626.10	907,700	22,400
June 30	3,646.79	1,148,000	240,300
July 31	3,644.23	1,111,000	-37,000
August 31	3,642.49	1,087,000	-24,000
September 30, 2009	3,639.26	1,045,000	-42,000
2009 water year			-7,000

Month-End Useable Contents for Yellowstone River Compact Reservoirs¹ Existing on January 1, 1950

The extent, if any, to which the use of reservoirs in this section may be subject to Compact allocations was not determined. As a matter of hydrologic interest, the month-end useable contents, in acre-ft, of four reservoirs are given in table 9. Three of the reservoirs (Bull Lake, Pilot Butte Reservoir, and Buffalo Bill Reservoir) are in the Bighorn River Basin, Wyoming, and data on contents were furnished by the Bureau of Reclamation. The usable capacity of Buffalo Bill Reservoir was increased in 1992 from 456,600 acre-ft to 644,540 acre-ft (listed as 646,565 acre-ft by 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, who furnished the water-level data and the reservoir-contents data. The usable contents of Tongue River Reservoir increased from 68,000 acre-ft to 79,070 acre-ft in 1999.

Table 9. Month-end useable contents for Yellowstone River Compact reservoirs¹ existing on January 1, 1950.

Date	Usable contents, in acre-ft ²			
	06224500 Bull Lake	Pilot Butte Reservoir	06281500 Buffalo Bill Reservoir	06307000 Tongue River Reservoir
September 30, 2008	83,800	8,430	484,400	47,670
October 31	87,200	25,500	461,300	54,140
November 30	88,900	25,200	459,100	47,670
December 31	89,200	25,100	452,800	48,190
January 31, 2009	89,600	25,000	443,700	56,270
February 28	89,900	24,800	436,700	59,310
March 31	90,100	24,700	432,900	61,440
April 30	88,000	28,200	436,100	54,440
May 31	114,800	27,800	536,000	66,730
June 30	142,600	29,000	597,000	80,690
July 31	143,600	27,800	622,100	69,880
August 31	124,900	17,200	560,500	59,310
September 30, 2009	79,040	16,000	486,000	48,710
Change in contents during water year	-4,760	7,570	1,600	1,040

¹ Wyoming disagrees with the term "Compact Reservoirs" as used throughout this annual report. Wyoming's acceptance of this annual report should not be construed as Wyoming's acceptance of the use of that term.

² Pre-Compact water rights and post-Compact water rights for these reservoirs are presented in the table, "Water-year-end useable contents for Yellowstone River Compact reservoirs or lakes."

¹ Wyoming disagrees with the term "Compact Reservoirs" as used throughout this annual report. Wyoming's acceptance of this annual report should not be construed as Wyoming's acceptance of the use of that term.

Water-Year-End Useable Contents for Yellowstone River Compact Reservoirs¹ or Lakes

Month-end usable contents for additional reservoirs of interest to the Yellowstone River Compact are listed in table 10. The listed water rights or usable contents in this report have changed from the 2008 annual report for three reservoirs. In 2008, the annual report listed that the post-Compact 1950 water right for Adelaide Reservoir was 4,760 acre-ft. The correct post-Compact 1950 water right is 3,320 and the correct usable capacity is 4,770 acre-ft. Anchor Reservoir was built to hold 17,410 acre-ft, but sinkholes within the area contained by the dam prevent filling the reservoir to the designed volume, and at present, only 9,250 acre-ft has been adjudicated, with an extension to December 31, 2013, for the remaining 8,150 acre-ft. In 2008, the annual report listed that the pre- and post-Compact 1950 water rights for the Lower Sunshine Reservoir were 42,640 and 42,300 acre-ft respectively. The correct pre- and post-Compact 1950 water rights are 0 and 58,750 acre-ft, respectively.

Table 10. Water-year-end usable contents for Yellowstone River Compact reservoirs¹ or lakes.

[Contents are in acre-ft. Reservoirs or lakes are listed in alphabetical order by drainage basin.]

Reservoir or lake name	Pre-Compact 1950 water right	Post-Compact 1950 water right	Usable contents	Usable contents on Sept. 30, 2009	Usable contents on Sept. 30, 2008	Change in usable contents ²
Bighorn River Basin						
(Lake) Adelaide Reservoir ³	1,450	3,320	4,770	2,270	6,010	-3,740
Anchor Reservoir ^{4,5}	0	9,250	17,410	325	346	-21
Bighorn Lake ⁴	0	1,312,000	1,312,000	1,045,000	1,052,000	-7,000
Boysen Reservoir ⁴	757,900	0	701,500	619,500	588,800	30,700
Buffalo Bill Reservoir ⁴	456,600	187,900	644,500	486,000	484,400	1,600
Bull Lake ⁴	77,040	0	77,040	79,040	83,800	-4,760
Greybull Valley Reservoir ³	0	33,170	33,170	1,280	7,940	-6,660
Pilot Butte Reservoir ⁴	34,600	0	34,600	16,000	8,430	7,570
Sunshine Reservoir ³	52,990	0	52,990	47,760	45,560	2,200
Lower Sunshine Reservoir ³	0	58,750	58,750	35,570	33,920	1,650
Powder River Basin						
Cloud Peak Reservoir ³	3,400	172	3,570	3,570	3,380	190
Dull Knife Reservoir ³	0	4,320	4,320	1,520	1,420	100
Healy Reservoir ³	0	5,140	5,140	4,340	3,540	800
Kearney Reservoir ³	1,850	4,470	6,320	2,500	2,550	-50
Lake DeSmet ³	37,520	197,500	235,000	184,500	195,900	-11,400
Muddy Guard Reservoir ³	0	2,340	2,340	1,380	1,260	120
Tie Hack Reservoir ³	1,650	2,440	2,440	2,440	2,440	0
Willow Park Reservoir ³	4,460	0	4,460	0	516	-516
Tongue River Basin						
Bighorn Reservoir ³	2,750	1,880	4,630	956	1,290	-334
Cross Creek Reservoir ³	0	798	798	253	109	144
Dome Reservoir ^{3,6}	1,840	188	2,030	1,760	1,450	310
Granger Reservoir ³	146	0	146	0	0	0
Last Chance Reservoir ³	90	0	90	0	0	0
Martin Reservoir ³	561	0	561	0	0	0
Park Reservoir ³	7,350	3,020	10,360	4,160	4,110	50
Sawmill Lakes Reservoir ³	0	1,280	1,280	989	842	147
Tongue River Reservoir ⁷	79,070	0	79,070	48,710	47,670	1,040
Twin Lakes Reservoir ^{3,8}	1,180	2,220	3,400	2,350	2,540	-190
Weston Reservoir ³	370	0	370	0	0	0
Willits Reservoir ³	79	0	79	0	0	0

¹ Wyoming disagrees with the term "Compact Reservoirs" as used throughout this annual report. Wyoming's acceptance of this annual report should not be construed as Wyoming's acceptance of the use of that term.

² Change in usable contents is derived from subtracting the 2009 usable contents from the 2008 usable contents.

³ Private reservoir permitted and accounted for by the State of Wyoming.

⁴ Reservoirs managed by Bureau of Reclamation.

⁵ Anchor Reservoir was designed to store 17,400 acre-ft, but sinkholes within the area contained by the dam prevent filling to the design capacity.

⁶ Data are combined contents of Dome Lake and Dome Lake Reservoir.

⁷ Reservoir managed by the State of Montana.

⁸ Data are combined contents of Twin Lakes Number 1 and Twin Lakes Number 2.

¹ Wyoming disagrees with the term "Compact Reservoirs" as used throughout this annual report. Wyoming's acceptance of this annual report should not be construed as Wyoming's acceptance of the use of that term.

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.

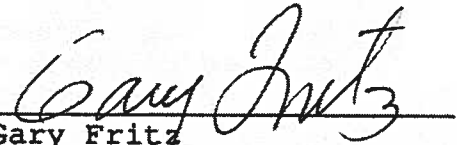
Article V. Meetings

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.

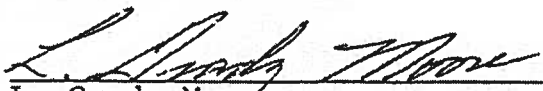
Article VI. Amendments, Revisions and Abrogations.

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

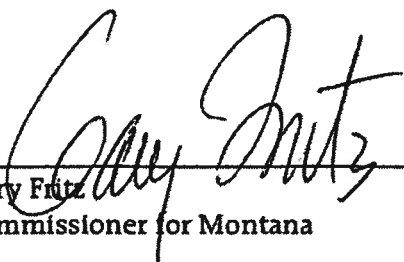
- A. The USGS will pay one-half and the states of Montana and Wyoming shall each pay one-quarter of the expenses of the facilitator, which shall not exceed \$10,000, unless agreed to by both states and the USGS.

Section VIII. Amendments

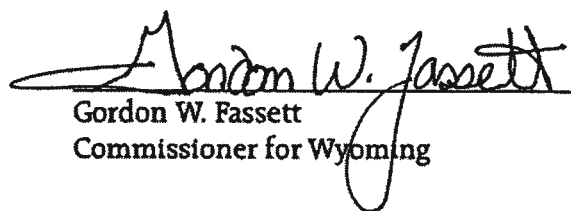
- A. These rules may be amended or revised by a unanimous vote of the Commission.

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.



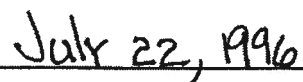
Gary Fritz
Commissioner for Montana



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) 7777354

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.) _____

1. What flow rate has been claimed?

□ gallons per minute

2. What volume of water has been claimed?

feet; grade _____ feet per mile.

the first line.

36

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 _____)
State of _____) SS

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: _____

