

YELLOWSTONE RIVER COMPACT COMMISSION



**SIXTIETH ANNUAL REPORT
2011**

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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.

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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)
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)
gallon per minute	0.06309	liter per second

¹ The unit hectare is used with the International System of Units (SI), which is in common 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://physic.nist.gov/Pubs/Sp330.pdf>

YELLOWSTONE RIVER COMPACT COMMISSION
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Honorable Matthew Mead
Governor of the State of Wyoming
Cheyenne, Wyoming 82002

Honorable Steve Bullock
Governor of the State of Montana
Helena, Montana 59620

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 sixtieth annual report of activities for the period ending September 30, 2011.

Minutes of December 8, 2011

Members of the Yellowstone River Compact Commission convened December 8, 2011, at 1:00 p.m. at the Hampton Inn in Buffalo, Wyo. 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; and Mr. Patrick Tyrrell, Wyoming State Engineer and Commissioner for Wyoming. Also in attendance were Ms. Sue Lowry, Ms. Jodee Pring, Mr. David Deutz, Mr. Loren Smith, and Mr. Carmine LoGuidice, Wyoming State Engineer's Office (SEO); Mr. Peter Michael, Wyoming Attorney General's Office; Mr. Bill DiRienzo, Wyoming Department of Environmental Quality (DEQ); Mr. Scott Quillinan, Wyoming State Geological Survey; Ms. Kim Overcast, DNRC; Ms. Jennifer Anders, Montana Attorney General's Office; Mr. Art Compton and Amy Steinmetz, Montana Department of Environmental Quality (DEQ); Mr. John Murdock (via telephone), Attorney, Office of the Solicitor, U.S. Department of the Interior, Washington, DC.; and Mr. John Kilpatrick, Mr. David Mott, and Mr. Wayne Berkas, USGS.

Mr. Anderson called the meeting to order and presented the agenda. He asked if anyone had any additions to the agenda.

Mr. Tyrrell made a motion to adopt the agenda, and Ms. Sexton seconded the motion. The motion passed.

Mr. Berkas distributed a handout showing the operational cost for fiscal year (FY) 2012 and the estimated budgets for FY2013 through FY2015. For FY2012, the cost to operate each of the five streamgages is \$16,000, and the cost to put together the annual report is \$48,000. The total cost is \$128,000 with Wyoming providing \$32,000, Montana providing \$32,000 and the USGS providing \$64,000. The estimated budget for FY2013, FY2014, and FY2015 is \$125,000, \$128,000, and \$133,000, respectively. There is a reduction in cost between FY 2012 and FY2013 due to the cost of moving from two meetings per year to one meeting per year. Also, the USGS anticipated a 3-percent increase each year for cost-of-living for FY2012 to FY2015. There is a possibility that the cost-of-living increases will be less than 3 percent each year; thus, the true cost for FY2013 may be less than estimated.

Mr. Tyrrell made a motion to accept the budget through 2014, and Ms. Sexton seconded the motion. The motion passed.

Mr. Anderson asked the USGS to discuss streamflow and reservoir conditions during the 2011 water year.

Mr. Berkas supplied a handout of annual flow statistics for the 2011 water year. Streamflow was above normal (normal is within 80 and 120 percent of average) at all four sites monitored by the Commission. Annual streamflow at Clarks Fork Yellowstone River at Edgar was 147 percent of average, and ranked 70th lowest of 73 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 169 percent of average and ranked 58th lowest of 58 years. The annual streamflow at Tongue River at Miles City was 240 percent of average and ranked 67th lowest of 68 years. The annual streamflow at Powder River near Locate was 229 percent of average and ranked 71st lowest of 73 years. Total adjusted streamflow of the four rivers in water year 2011 was 6,852,900 acre-ft, compared to 4,119,100 acre-ft in water year 2010 and 4,342,200 acre-ft in water year 2009.

Reservoir storage in the reservoirs historically monitored and reported for the Commission increased in five reservoirs (Bighorn Lake, Boysen Reservoir, Bull Lake, Anchor Reservoir, and Pilot Butte Reservoir) and decreased in two reservoirs (Buffalo Bill Reservoir and Tongue River Reservoir). The contents and the amounts of increase are listed in the annual report. The total usable contents of these reservoirs at the end of water year 2011 was 2,303,000 acre-ft, compared to 2,160,000 acre-ft in water year 2010 and 2,295,000 acre-ft in water year 2009. Storage in other reservoirs in the four river basins at the end of water year 2011 was 369,300 acre-ft.

Mr. Berkas handed out graphical displays of the daily discharges at the five streamflow-gaging stations monitored for the Yellowstone River Compact Commission (Clarks Fork Yellowstone River at Edgar, Little Bighorn River at Hardin, Bighorn River near Bighorn, Tongue River at Miles City, and Powder River near Locate) for the 2011 water year. The graphs showed the 2011 mean-daily flows compared to median-daily flows, and cumulative daily flows to maximum, median, and minimum accumulative-daily flows.

Mr. Anderson asked Mr. Tyrrell to discuss 2011 water-year administration highlights.

Mr. Tyrrell replied that 2011 was a good year for administration.

Mr. LoGuidice replied that the flows in the Tongue and Powder River drainages were much larger than average and administration occurred late in the summer, if at all. Little Goose Creek went into regulation on August 24 and again the first part of September. The Little Tongue River went into regulation on September 30, Piney Creek went into regulation on July 28, Clear Creek went into regulation on August 4, Rock Creek went into regulation on July 29, and French Creek went into regulation on July 28. No regulation occurred on the Big Goose Creek, Wolf Creek, Tongue River, and the Powder River.

In the Powder and Tongue River Basins, Wyoming SEO reservoir inspectors looked at a total 367 reservoirs. One hundred and forty-one reservoirs were checked for compliance, and 226 reservoirs were either endorsed or adjudicated. Safety inspections occurred on 90 dams, and 60 surface-water and 16 groundwater adjudications occurred in the two basins.

Mr. Smith replied that in the Bighorn River Basin, ungaged flows contributing to Bighorn Lake were 582 percent of average in 2011. The Bureau of Reclamation did a great job of holding water in Boysen and Buffalo Bill Reservoirs to allow the Bighorn River tributaries to drain, or there would have been high-flow problems on the Bighorn River. The tributaries on the east side of the Bighorn River Basin had higher than average peaks and the peaks occurred later in the year, in late June and early July.

Due to late runoff in the tributaries, early regulation occurred in April on Bennett Creek and the Greybull River. When runoff increased in June, regulation ceased, but began again on July 26 on the Greybull River. Regulation on Gooseberry Creek began the first of August, Owl Creek began on August 4, and the Middle Popo Agie in the Little Wind River drainage went into regulation on August 16 followed by South Beaver Creek in the Shell Creek drainage August 23.

Ms. Sexton replied that the headwaters of the Tongue River had high flows that were initially held by Tongue River Reservoir. In early May, outflow from Tongue River Dam were about 450 ft³/s, but by the end of May, flows were about 3,500 ft³/s. Outflows from the dam reached about 4,800 ft³/s in mid-June. Large flows also occurred in the Tongue River at Miles City and there were reports of damages due to high water in the area. Rain in May caused large flows in the Powder River. There was plenty of water available on the Tongue and Powder Rivers.

Mr. Anderson asked the Yellowstone River Technical Committee to address the list of reservoirs to be published in the annual report.

Mr. Berkas stated that the Yellowstone River Technical Committee decided on a list of reservoirs where the year-end contents would be published in the Yellowstone River Compact Commission report. Essentially all reservoirs that store 1,000 acre-ft

or more are included on the list. This is the second year that data have been collected from the reservoirs and that information will be published in table 10 of the annual report.

Mr. Anderson asked if there were any issues with the reservoir list.

Mr. Berkas replied that there might be an issue with Glacier Lake. The lake is so high in elevation that access to the lake is snowed in by October 1, thus it is very difficult to get a storage reading. It appears that the lake is drained each year and probably always will have year-end contents of 0.0 acre-ft. Is this reservoir important enough to be on the list?

Ms. Sexton replied that this question should be deferred to the Yellowstone River Technical Committee.

Mr. Smith agreed that the question of keeping Glacier Lake on the reservoir list should be addressed by the Yellowstone River Technical Committee. The reason for the list is to document the storage reservoirs that can store more than 1,000 acre-ft. After the committee better understands how the reservoir is operated, they can make a decision as to keeping or removing the reservoir from the list.

Mr. Anderson directed the Yellowstone River Technical Committee to take up the Glacier Lake issue at their next meeting. They would decide if estimates of year-end storage should be made or if Glacier Lake should remain on the list.

Ms. Lowry reminded the Commissioners that another issue with the reservoir list is whether they are considered Compact Reservoirs. At the last Yellowstone River Technical Committee meeting, it was decided, given the ongoing litigation, that footnote in table 10 remain in the report, that refers to Wyoming's objection to the use of the term "Compact Reservoirs" throughout the annual report.

Mr. Anderson replied that after the last Yellowstone River Compact Commission meeting on December 8, 2010, in Red Lodge, Mont., he did some investigation regarding this issue. The Yellowstone River Compact does not use the term "Compact Reservoirs". The Compact simply talks about reservoirs that existed prior to the Compact (1950) and the reservoirs that were constructed after the Compact. The term "Compact Reservoir" first occurred in the 1978 annual report when referring to the reservoirs existing on January 1, 1950. The table that we currently call table 10 first occurred in the 2004 annual report. There is no mention in the minutes about calling the reservoirs in the report "Compact Reservoirs". The term "Compact Reservoirs" probably was added as an editorial suggestion, not the result of a Commission decision.

Mr. Anderson asked Wyoming to address CBM development.

Mr. Tyrrell distributed handouts listing the number of coal-bed methane (CBM) reservoirs filed and permitted in the Yellowstone River drainage, a graph of the number of CBM reservoirs permitted from 2003 through 2011, and a graph showing the number of CBM well applications received from January 1997 through 2011 in the Wyoming SEO. This past year, there were 7 applications filed in the Tongue River drainage, 13 in the Little Powder drainage, and 134 in the Powder River drainage; for a total of 154 applications filed in the Yellowstone River drainage. There were 245 reservoirs permitted in the Tongue River drainage, 450 in the Little Powder River drainage, and 1,993 in the Powder River drainage; for a total of 2,688 permitted reservoirs in the Yellowstone River drainage. The permitted capacity of the reservoirs is about 3,246 acre-ft in the Tongue River drainage, about 3,853 acre-ft in the Little Powder River drainage, and about 29,685 acre-ft in the Powder River drainage, for a total permitted capacity of about 36,786 acre-ft in the Yellowstone River drainage.

The graph of CBM permitted reservoirs showed that the number of approved permits began decreasing in the Powder River drainage beginning in 2009, while the number of approved permits in the Little Powder River and Tongue River drainages remained constant or increased. The decrease in the Powder River drainage is due to the reservoirs no longer meeting the criteria as a CBM reservoir, thus, the reservoir was modified to not store water. In some cases, the reservoir never was built. Also, the reservoir could be reclassified for stock watering, but the capacity of the reservoir has to be reduced to 20 acre-ft or less.

The graph of CBM well applications show the number of applications received in 2011 is much less than in past years. Wyoming has issued a total of about 44,000 CBM well permits in the Powder River Basin, and there are about 11,300 currently active. In September 2011, CBM wells produced about 37,000,000 barrels of water, a little more than 3,000 barrels per well.

Ms. Sexton asked if the reservoirs converted to stock watering are permitted into perpetuity.

Mr. Tyrrell replied yes.

Ms. Sexton asked how many CBM reservoirs have been converted to stock watering.

Mr. LoGuidice replied that a rough guess would be 1 in 20 CBM reservoirs are modified and re-permitted as stock watering. Some of the CBM reservoirs originally were used for stock watering before the CBM play, so as the need for CBM reservoirs went away, the rancher re-permitted the reservoir to stock watering again. Also, stock reservoirs fill in through the years and the permits are cancelled. It is difficult to determine how much acre-ft of storage can be contributed to re-permitting CBM reservoirs to stock watering.

Ms. Sexton asked if some ranchers are keeping the CBM wells for stock watering.

Mr. LoGuidice replied that CBM wells are usually abandoned by the industry because they do not produce gas and little water. The wells are rarely kept for stock watering but there is a procedure for doing so.

Mr. Anderson asked Montana to address CBM development.

Mr. Compton replied that three significant occurrences happened in Montana after the last Commission meeting in 2010. The Environmental Protection Agency (EPA) asked Montana to update the electrical conductivity (EC) and sodium-adsorption ratio (SAR) standards. Montana made the update and submitted those to EPA for approval. A Montana Supreme Court decision required that all CBM discharges be treated, and now the untreated CBM discharge belonging to Fidelity Exploration is treated.

EPA announced that they are setting dates for compliance with the Federal Promulgation of Effluent Limit Guidelines. The date for CBM-derived gas is in 2013 and the date for conventional natural gas is in 2014. The EPA guidelines are technology based guidelines, while Montana's guidelines are water-quality based. In Montana, the more stringent guideline will apply. In reality, it won't matter because all effluent discharges must be treated.

About a year ago, a Wyoming CBM workgroup looked into an agricultural policy that made sense to everyone. The first 20 permits based on this policy were recently issued.

Mr. DiRienzo (Wyoming DEQ) replied that Wyoming is issuing the permits by watershed because the permits should be applied on a watershed scale.

Ms. Sexton asked Mr. Anderson if the Commission could direct the Yellowstone River Technical Committee to look into fracking. She said there is no fracking in CBM wells in Montana and asked if there was fracking in Wyoming.

Mr. Tyrrell replied that there was no fracking for the CBM wells in the Powder River Basin in Wyoming, but there was fracking in other areas of Wyoming primarily related to oil production.

Mr. Anderson said that the technical committee should be prepared to discuss fracking in the Yellowstone River Basin.

Mr. Anderson asked Ms. Sexton to address adjudication progress in Montana.

Ms. Sexton distributed a map showing the adjudication status in the major drainage basins in Montana and replied that the statewide adjudication began in 1972 with the Water Use Act. Adjudication was active in the 1980s and slowed down in the 1990s. The adjudication process began again in earnest after Legislation in 2005. The goal of the Legislation was to achieve at least enforceable decrees by 2020. The benchmark for the end of 2012 is to process 44,000 claims. Currently (December 1, 2011), Montana DNRC has processed 49,000 claims.

There is a final decree on the Powder River drainage and preliminary decree on the Tongue River drainage. The Little Bighorn River drainage has a preliminary decree the remaining part of the Bighorn River drainage is currently being examined. Temporary preliminary decrees occur on the Clarks Fork of the Yellowstone River drainage.

Mr. LoGuidice asked if the final decree was in a volume or a flow rate.

Ms. Sexton replied that the water right is reported as an instantaneous flow rate (cubic feet per second).

Mr. Anderson asked Mr. Tyrrell to address adjudication in Wyoming.

Mr. Tyrrell replied that the water rights are adjudicated through the Board of Control. The board meets quarterly and is comprised of the State Engineer and the four Division Superintendents. The Board adjudicates the water right by Board action upon the recommendation of the Superintendent and if there are objections, the Board is the arbitrator and court. The State adjudicates about 400 to 500 rights each year. In the late 1970s, the Bighorn, and Clarks Fork Yellowstone River drainages were adjudicated under a “General Adjudication”. That process is nearly completed.

Mr. Anderson asked if Wyoming forces abandonment on non-use of a water right.

Mr. Tyrrell replied that State law allows the State Engineer to pursue an abandonment but the process is complicated. Most abandonments are neighbor against neighbor, as an involuntary abandonment by another party that has a concern of injury if the water right is reactivated or who can prove a benefit if the water right is not reactivated.

Mr. Anderson asked if a user can adjudicate and be issued a new permit.

Mr. Tyrrell replied that adjudication means to finalize an existing permit. The permit has met the measure of beneficial use and there is proof that the user is irrigating acres. In Wyoming, all irrigation water rights are based on one cubic foot per second (ft³/s) to 70 acres at the point of diversion, regardless of soil type and the distance the field is from the source (river). When the river is not in regulation, a user can take additional water providing the water is not wasted.

Mr. Smith added that there were 227 permits adjudicated this year (2011) in the Bighorn River drainage. Of the 227 permits, 159 were for irrigation and 43 were for stock reservoirs that were recorded as built within the terms of the permit but not adjudicated.

Mr. Anderson announced that it was time for Mr. Quillinan with the Wyoming State Geological Survey to present a study on: “Geochemical analysis of the Tongue River and associated drainages in the Powder River Basin: Analyzing the influence of natural processes and Coalbed Natural Gas (CBNG)”.

Mr. DiRienzo interjected that the Montana DEQ noticed that the electrical conductance (EC) in the Tongue River at State line, near Decker, Mont., tends to peak in late March and April each year. Montana asked if the high EC values were due to CBNG production. The Wyoming DEQ is doubtful that CBNG production contributed to the EC increase because there are no direct discharges of CBNG production water to the Tongue River or tributaries. The Wyoming DEQ asked the Wyoming State Geological Survey and the University of Wyoming to do a study to determine if CBNG production contributed to the high EC values in the Tongue River.

Mr. Quillinan provided handouts of his slide presentation. The highlights of the presentation are presented herein: The intent of the study was to determine if the high total-dissolved solids (TDS) concentrations measured in the Tongue River at the Wyoming/Montana State line each spring were due to CBNG produced water or natural phenomena. Water-quality samples were collected from the Tongue River, Goose Creek, Prairie Dog Creek and Dutch Creek, and from CBNG wells and outfalls in the fall of 2008 and spring of 2009. The water-quality samples were analyzed for chemical constituents (ions) and carbon isotopes. There is a distinct difference between the ionic composition of the surface and groundwater (calcium, magnesium, sulfate water) and the CBNG produced water (sodium carbonate water). Sampling in the fall and spring indicates Dutch Creek is the source of the high TDS concentrations at the State line. There is a distinctly different isotopic carbon signature between the surface waters and the CBNG produced waters. The study concluded that the high TDS concentrations measured at the State line is a natural phenomenon originating from the intra-basinal Prairie Dog Creek drainage (Dutch Creek is a tributary to Prairie Dog Creek), and there was no influence of CBNG produced water on the TDS concentrations at the State line.

The anticipated publishing date of the report from the study is in 2012.

Mr. Anderson said that Mr. Mott wanted to share some CBM information with the Commission.

Mr. Mott announced the USGS recently published a report called, “Assessment of Potential Effects of Water Produced from Coalbed Natural Gas Development on Macroinvertebrate and Algal Communities in the Powder River and Tongue River, Wyoming and Montana, 2010,” by David A. Peterson, Eric G. Hargett, and David L. Feldman. This report is available on line at the USGS publications Web page.

Mr. Mott also said that the Wyoming and Montana USGS Water Science Centers are working on water-quality trends reports for the Powder River structural basin. The Wyoming report is scheduled to be completed in the spring of 2012. The Montana report is scheduled to be completed later in 2012.

Mr. Anderson asked Ms. Sexton to update the Commission on the Montana/Crow Compact.

Ms. Sexton announced that the Federal government, Montana and the Crow Tribe ratified the Crow Compact in March 2011. The Crow Tribe is preparing a petition to the Water Court to issue the Compact settlement as a Preliminary Decree in the Montana General Adjudication. Montana's portion of the Compact settlement is \$15 million, and that money is in an escrow account. The interest from the account is given to the Crow Tribe, and when the Final Decree is settled, the tribe will receive the principal.

Mr. Anderson asked the States if they wanted to discuss the recent Supreme Court decision.

Ms. Anders replied that Montana brought suit to enforce the Yellowstone River Compact as part of the complaint of the alleged four violations of the Compact. The Supreme Court heard arguments on one of four claims—the claim that there is increased consumption on acreage in Wyoming that was irrigated prior to 1950. The Special Master agreed with Wyoming that this claim was not valid. Montana appealed to the Supreme Court to review that decision, and in May, the Supreme Court upheld that decision. Montana will proceed on the other three alleged violations.

Mr. Anderson asked what the three remaining allegations were.

Mr. Michael replied (1) ground-water pumping, (2) new irrigated acreage, and (3) reservoir storage.

Mr. Anderson reminded the Commissioners that at the last Commission meeting in December 2010, both Commissioners requested that the chairman address the issue of the Federal Representative voting. Mr. Anderson continued saying that he investigated this issue with only two motives: (1) pure intellectual curiosity as to why the U.S. Geological Survey was named in the Compact as the Federal Representative, and (2) provide insight and understanding so he could better fulfill his role as the Federal Representative.

The Compact states (Article III, Section F), "In the 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."

When the Yellowstone River Compact was crafted, the creators used the Snake River Compact as a guide. In the Snake River Compact, a third member was appointed specifically to vote when there were disagreements between States. In the Yellowstone River Compact, the third member (Federal Representative) was someone appointed by the Director of the USGS. Correspondence during the formation of the Compact clearly indicated that the State representatives were concerned about inordinate Federal control. Clearly the framework referred to methods of negotiation rather than adjudication in interstate disputes. The USGS probably was named as the Federal Representative because the USGS was accepted as the agency that measured streamflow. Also, the Bureau of Reclamation asked to be excluded for consideration as the Federal Representative because of the potential conflict of interest because the Bureau of Reclamation would be the agency that would construct dams and do water projects in the watershed.

Mr. R.J. Newell from the Bureau of Reclamation was appointed by Harry S. Truman, the President of the United States, to represent the United States in negotiations of a Compact between the States of Montana, North Dakota, and Wyoming. The first meeting was on November 29, 1949, and Mr. Newell was nominated and chosen as the Chairman of the Compact Commission. After the Compact was ratified, the first Yellowstone River Compact Commission meeting occurred on December 24, 1952. The Director of the USGS appointed Mr. Frank Stermitz, the USGS Montana District Chief, to be the Federal Representative and act as Chairman of the Commission. From the first meeting to date, the Federal Representative has been an employee of the USGS.

The records show that the Federal Representative has never voted to break a tie. In 1985, there was an issue about constructing a reservoir on the Middle Fork Powder River. The issue was about the amount of storage in the reservoir and if this storage should be considered under Article V of the Compact (the Article that divides water realized after 1950). The Chairman was

pressed to vote and break the tie, and for a lot of reasons, the Chairman did not vote. As a result, a document was accepted and ratified by the Commissioners on June 22, 1996, entitled, "Rules for the Resolution of Disputes over the Administration of the Yellowstone River Compact".

Mr. Anderson concluded by saying that the Compact clearly allows the Federal Representative to vote, but minutes of the discussions while forming the Compact clearly indicated that the States did not want Federal interference.

Ms. Sexton asked if States ever entered into conflict resolution.

Ms. Lowry said that one might argue that the States are now following conflict dispute procedures.

Mr. Anderson said the next agenda item is the status of official Yellowstone River Compact Commission files. He announced that he had all of the documents in his possession scanned and converted into digital files. The next step is to review those files to determine what should be available to the public. All of the annual reports have been scanned and posted on the Yellowstone River Compact Commission Web page.

Mr. Anderson said that he is a little frustrated on three issues related to the Commission meetings, and these issues are (1) advance notice of the agenda for the Commission meeting, (2) completion of the meeting minutes, and (3) completion of the annual report. He asked the other two Commissioners if they had concerns.

Mr. Tyrrell replied that he thought there were some guidelines on producing the agenda, the minutes, and the report. He has not had any comments from the Wyoming Governor asking about the annual report. His concern is that the agenda be presented early enough so that he and Ms. Sexton are not surprised and so both Commissioners can be adequately prepared for the meeting. A couple of weeks before the meeting would be acceptable. While the minutes may be later than planned, he is more concerned that the minutes are accurate and correct.

Mr. Berkas said he would do a better job of preparing the minutes for the Commissioners review and a better job of finalizing the annual report.

Mr. Tyrrell pointed out that Article III, C of the Compact states that the Commission, "shall compile a report for each year ending September 30 and transmit it to the Governors of the signatory States on or before December 31 of each year."

Mr. Anderson asked who should be receiving notice of the meeting and the agenda.

Ms. Lowry replied that past lists of people to be notified were bigger. She said that Ms. Pring was updating the list for Wyoming, and would pass it along to Mr. Anderson.

Mr. Anderson replied said that updating the list would be an action item.

Mr. Anderson asked if there were timelines identified for presenting the agenda, completing the minutes, and publishing the report.

Mr. Berkas said that guidelines were discussed in a past set of minutes.

Mr. Berkas found the following motion regarding the distribution of the agenda in the minutes from the April 25, 2007 meeting:

Mr. Horak made a motion to amend the procedures put in place more than a year ago:

The first draft of the agenda will be e-mailed to the Commissioners more than 6 weeks prior to the meeting.

The final agenda will be distributed more than 2 weeks prior to the meeting.

Only mutually agreed upon changes to the agenda will be accepted to the agenda less than 2 weeks prior to the meeting.

The motion was seconded and passed.

Mr. Berkas found the following discussion about proposed timelines for distributing the meeting minutes in the December 6, 2006 meeting minutes.

“Mr. Berkas replied that Soteria Scoping (Ms. Patterson) has been hired to record the meeting and provide an electronic document transcript of the meeting. He would paraphrase the statements made at the meeting, using the transcript, to cover the main topics discussed at the meeting. Within 45 days from the meeting, a draft copy of the minutes will be distributed to the two Commissioners and they will have an opportunity to make editorial changes to better clarify their points and statements. Changes are to be returned to Mr. Berkas within 30 days. After both Commissioners are satisfied with the minutes, the minutes are approved. After the minutes from this meeting are approved, they will be incorporated into the annual report. The report will be mailed to the State Governors (Montana, North Dakota, and Wyoming) and the President’s Office, and displayed on the Yellowstone River Compact Commission Web page.

Mr. Horak stated that the Compact says that the Commission will produce an annual report that will be delivered to Governors of the signatory States by the end of the calendar year (December 31). The Commission recognized that in the meeting structure for last few years, including the annual meeting in early December, that it is not feasible for the Commission to meet the December 31 deadline. The Commission has declared that if the Commission accomplishes the distribution of the final report between February and mid-March, then the Commission will have discharged their obligations for formal reporting of Commission proceedings.”

Mr. Anderson asked if there were any public comments.

Ms. Sexton said that this will be Art Crompton’s last Commission meeting, and she wanted to thank him for the many years of service updating the Commissioners on water-quality issues in the Yellowstone River Basin.

Mr. Anderson asked the Commissioners to pick a date for the next meeting.

The Commissioners set a tentative date for December 4, 2012 (Tuesday) at a location in Montana.

Mr. Anderson adjourned the meeting at 5:00 p.m.



Patrick T. Tyrrell

Commissioner for Wyoming



Mary Sexton

Commissioner for Montana



Mark T. Anderson

Chairman and Federal Representative

General Report

Cost of Operation and Budget

Work funded by the Yellowstone River Compact Commission consists of collecting the required hydrologic data, reporting the meeting minutes, and compiling the annual report; and is 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 2011 were \$128,000, in accordance with the budget adopted for the year. Estimated budgets for Federal fiscal years 2012, 2013, 2014, and 2015 were tentatively adopted subject to the availability of appropriations. The listed cost for 2012 is based on two meetings per year that occurred from 2004 through 2008. Because Montana and Wyoming operate on biennium budgets that are offset from each other, the cost for two meetings per year could not be realized until three years notice to the two States. The cost for the additional meetings began in 2010 and will continue through 2012. The reduction in cost in 2013 reflects one meeting per year. The budgets for the four fiscal years are summarized as follows:

<u>October 1, 2011, to September 30, 2012 (fiscal year 2012):</u>	
Estimate for continuation of existing streamflow-gaging programs	\$128,000
<u>October 1, 2012, to September 30, 2013 (fiscal year 2013):</u>	
Estimate for continuation of existing streamflow-gaging programs	\$125,000
<u>October 1, 2013, to September 30, 2014 (fiscal year 2014):</u>	
Estimate for continuation of existing streamflow-gaging programs	\$128,000
<u>October 1, 2014, to September 30, 2015 (fiscal year 2015):</u>	
Estimate for continuation of existing streamflow-gaging programs	\$133,000

Streamflow-Gaging Station Operation

Operation of five streamflow-gaging stations at the measuring sites specified in the Yellowstone River Compact continued in water year 2011 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.

The Commission is primarily interested in the flow near the mouths of the Clarks Fork Yellowstone River, Bighorn River, Tongue River, and Powder River. Even though the Little Bighorn River is not covered by the Yellowstone River Compact, the compact covers the water in the Bighorn River minus the Little Bighorn River. Thus, the flow from the Little Bighorn River is subtracted from the flow of the Bighorn River. In addition, the Bighorn River flow is adjusted monthly with change in storage of Bighorn Lake. Bighorn Lake began filling in 1965. During water year 2011, annual streamflow was above normal² at all streamflow-gaging stations. 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 2011 ¹	Rank of annual streamflow		Year of lowest annual streamflow (rank equals 1)	Number of years of annual record
			2011 water year	2010 water year		
06208500	Clarks Fork Yellowstone River at Edgar, Mont., minus diversions to White Horse Canal	147	70	16	2001	73
06294500	Bighorn River above Tullock Creek, near Bighorn, Mont., minus Little Bighorn River near Hardin, Mont., (06294000) adjusted for change in contents in Bighorn Lake	169	58	32	2002	58
06308500	Tongue River at Miles City, Mont.	240	67	44	1961	68
06326500	Powder River near Locate, Mont.	229	71	51	2004	73

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 2011 (tables 1–5) and graphical comparisons of statistical distribution of monthly and annual streamflow, and annual departures from mean annual streamflow (figures 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 2011.

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 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 599,100 acre-ft in usable contents and ended the water year with 651,500 acre-ft. Anchor Reservoir, located on South Fork Owl Creek and operated by the Bureau of Reclamation, began the water year with 350 acre-ft in usable contents and ended the water year with 396 acre-ft. Bighorn Lake, a Bureau of Reclamation storage project on the Bighorn River that is the largest in the Yellowstone River Basin, contained 944,900 acre-ft of usable contents at the beginning of the water year and 1,009,000 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 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 (2011) and previous water years for the 7 reservoirs listed above plus 38 additional reservoirs that have usable contents greater than 1,000 acre-ft was compiled at the request of the Commission. The information is provided in table 10 in the section “Water-Year-End 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 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 2010 through September 2011.

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

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	278	577	e500	e280	e320	e360	348	375	1,810	10,300	2,150	739
2	282	552	e490	e260	e350	e350	369	364	2,280	9,770	2,300	683
3	277	547	e490	e320	e380	e390	401	344	2,790	8,780	2,210	624
4	284	557	e480	e390	e400	e400	423	358	2,680	8,980	2,040	582
5	265	552	e470	e430	e440	e390	397	410	2,780	9,670	1,890	547
6	258	549	e460	e450	e460	e370	370	414	3,950	10,300	1,800	478
7	271	548	e480	e450	e460	e360	375	480	5,540	10,200	1,770	426
8	271	567	e480	e460	e420	e350	391	563	5,860	9,540	1,690	394
9	320	638	e480	e440	e370	e360	396	914	5,900	8,980	1,530	358
10	371	604	e480	e390	e400	e370	380	1,310	5,430	8,300	1,440	344
11	382	578	e480	e360	e430	e420	372	1,480	4,670	7,260	1,320	331
12	404	561	e470	e340	e450	e450	365	934	4,530	7,160	1,220	294
13	426	525	e490	e410	e450	457	372	1,040	4,400	7,910	1,160	328
14	440	565	e490	e470	e420	448	382	1,570	5,000	7,370	1,090	371
15	436	570	e490	e490	e440	434	382	1,740	5,670	6,750	1,040	398
16	447	566	e460	e470	e460	429	381	1,670	5,950	6,210	991	378
17	454	563	e420	e450	e440	422	368	1,880	5,460	5,830	979	358
18	464	556	e370	e450	e410	406	378	1,850	4,340	5,580	894	376
19	483	576	e350	e450	e350	373	437	1,760	3,770	5,630	824	401
20	474	586	e380	e420	e320	366	427	2,040	3,890	5,740	791	385
21	471	e400	e420	e400	e300	364	398	4,550	3,960	5,290	791	394
22	493	e320	e450	e390	e320	390	383	2,420	5,010	4,430	776	395
23	488	e280	e480	e400	e350	394	380	2,440	6,630	3,870	723	390
24	490	e250	e480	e410	e320	380	370	3,340	8,000	3,560	689	377
25	494	e300	e480	e420	e300	375	362	5,540	8,790	3,310	674	367
26	516	e350	e480	e430	e330	369	378	4,280	8,460	3,160	669	358
27	555	e430	e480	e430	e350	381	403	3,540	7,190	3,120	692	363
28	542	e500	e470	e430	e370	371	376	2,900	6,590	2,980	677	351
29	532	e520	e460	e410	---	361	362	2,430	7,500	2,660	737	333
30	535	e510	e380	e370	---	355	376	2,300	9,080	2,380	907	350
31	556	---	e320	e330	---	346	---	2,020	---	2,230	793	---
Total	12,959	15,197	14,110	12,600	10,810	11,991	11,502	57,256	157,910	197,350	37,257	12,473
Mean	418	507	455	406	386	387	383	1,847	5,264	6,366	1,202	416
Max	556	638	500	490	460	457	437	5,540	9,080	10,300	2,300	739
Min	258	250	320	260	300	346	348	344	1,810	2,230	669	294
Ac-ft	25,700	30,140	27,990	24,990	21,440	23,780	22,810	113,600	313,200	391,400	73,900	24,740

Table 1. Daily mean discharge for the Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, October 2010 through September 2011.—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921–2011, BY WATER YEAR (WY)*												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	536	503	406	352	350	364	549	2,097	4,046	2,050	596	462
Max	1,010	777	593	512	584	554	1,398	5,578	7,256	6,366	1,541	1,395
(WY)	(1942)	(1928)	(1996)	(1997)	(1963)	(1943)	(1943)	(1928)	(1996)	(2011)	(1951)	(1941)
Min	298	310	217	200	180	220	123	710	1,768	290	49.5	156
(WY)	(1956)	(1936)	(1937)	(1922)	(1922)	(1924)	(1961)	(2010)	(1987)	(1988)	(1988)	(1988)

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

SUMMARY STATISTICS						
	Calendar Year 2010		Water Year 2011		Water Years 1921–2011*	
Annual total	303,690		551,415			
Annual mean	832		1,511		1,027	
Highest annual mean					1,623 1997	
Lowest annual mean					644 2001	
Highest daily mean	7,150	Jun 6	10,300	Jul 1	10,600	Jun 2, 1936
Lowest daily mean	141	Aug 26	250	Nov 24	37	May 11, 1961
Annual seven-day minimum	157	Aug 23	273	Oct 2	43	Apr 18, 1961
Maximum peak flow			10,700	Jul 6	11,100	Jun 12, 1997
Maximum peak stage			9.27	Jul 6	9.30	Jun 12, 1997
Instantaneous low flow					36	Apr 22, 1961
Annual runoff (ac-ft)	602,400		1,094,000		744,100	
10 percent exceeds	1,830		5,350		2,820	
50 percent exceeds	390		464		465	
90 percent exceeds	283		350		273	

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

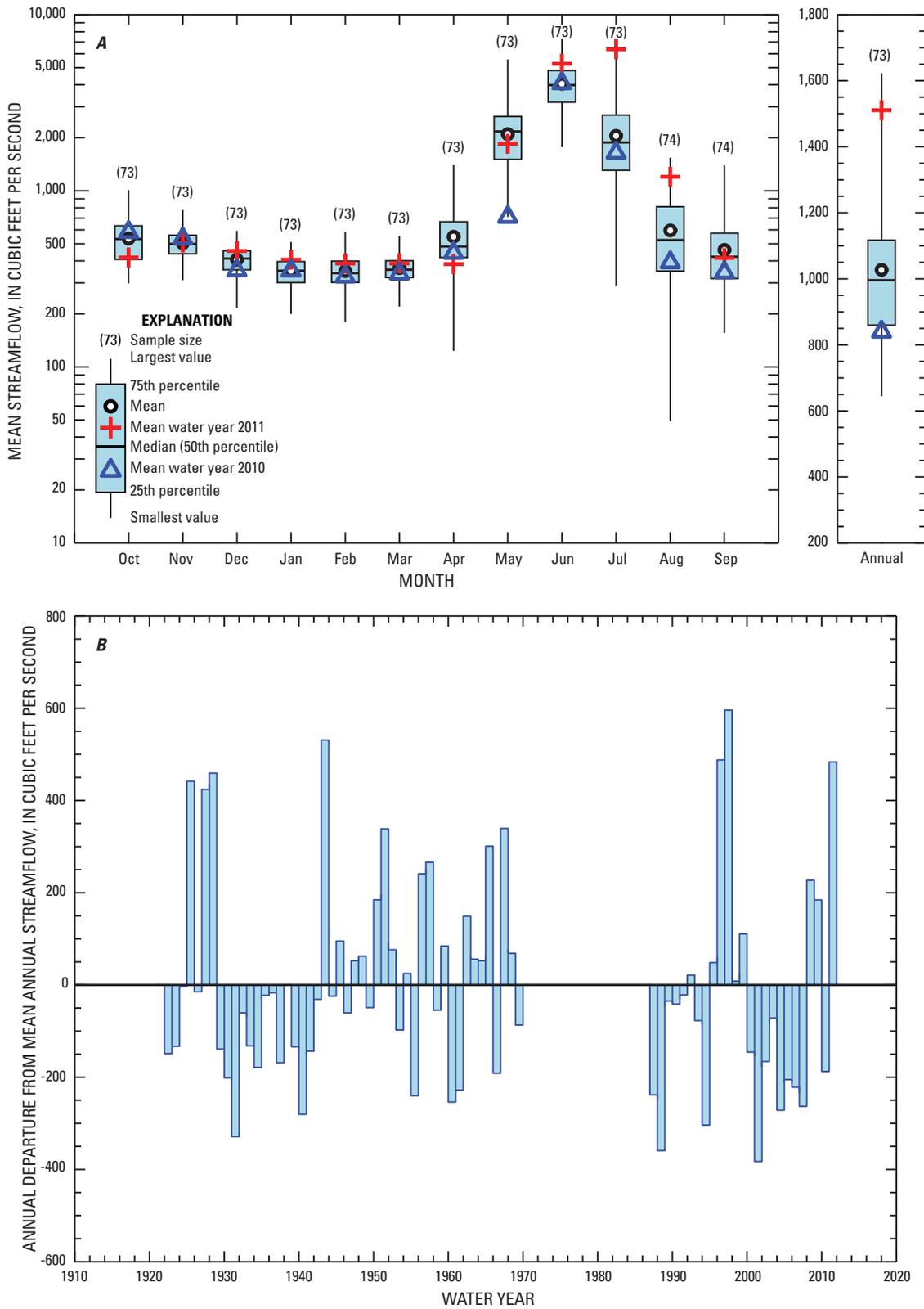


Figure 1. Streamflow data for Clarks Fork Yellowstone River at Edgar, Mont. (06208500), minus diversions to White Horse Canal, water years 1922–2011. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

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 2010 through September 2011.

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

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	134	154	e140	e110	e60	e110	213	300	3,250	2,120	325	200
2	133	149	e140	e100	e50	e100	284	301	2,550	2,350	314	208
3	136	150	e140	e90	e40	e110	301	310	1,940	2,330	262	212
4	134	149	e140	e80	e45	e110	270	287	1,850	2,060	251	218
5	130	149	e130	e100	e70	e100	245	257	1,800	1,850	240	210
6	129	148	e130	e110	e120	e100	216	240	1,700	1,760	238	202
7	131	151	e130	e110	e110	e100	214	227	1,730	1,660	240	198
8	132	152	e130	e110	e100	e100	216	223	1,910	1,560	258	192
9	135	154	e140	e100	e90	e100	225	239	2,170	1,460	261	186
10	136	153	e130	e100	e80	e200	243	335	2,320	1,380	263	185
11	143	156	e120	e80	e70	e500	229	1,060	2,400	1,280	269	185
12	151	155	e120	e70	e80	e900	215	1,830	2,220	1,160	264	194
13	147	149	e120	e60	e100	e600	205	952	2,030	1,050	270	195
14	146	146	e120	e80	e120	e500	197	618	1,950	1,060	262	206
15	145	154	e110	e110	e170	e450	197	512	1,920	968	246	219
16	144	158	e110	e110	e240	e400	203	464	1,990	869	239	219
17	144	175	e110	e100	e220	e350	192	436	2,110	786	229	223
18	142	178	e110	e100	e200	e300	189	448	2,230	723	223	220
19	144	168	e100	e100	e180	e270	211	456	2,250	669	218	220
20	148	166	e90	e100	e170	253	258	557	2,000	629	204	217
21	149	124	e80	e100	e150	226	273	2,980	1,920	576	202	205
22	152	e110	e90	e100	e130	212	240	5,730	1,880	542	197	176
23	152	e100	e100	e100	e130	210	235	13,500	1,840	520	184	178
24	152	e90	e100	e100	e110	210	248	7,370	1,900	502	164	182
25	155	e90	e110	e100	e100	207	249	5,330	2,030	481	169	187
26	155	e80	e120	e100	e90	199	236	4,550	2,300	447	212	190
27	160	e80	e120	e100	e80	192	238	4,180	2,440	417	221	192
28	158	e90	e120	e100	e100	194	356	3,450	2,390	388	205	175
29	159	e110	e110	e100	---	200	370	2,820	2,270	372	200	168
30	156	e130	e110	e100	---	198	325	2,560	2,100	360	197	169
31	157	---	e110	e90	---	197	---	2,990	---	344	201	---
Total	4,489	4,118	3,630	3,010	3,205	7,898	7,293	65,512	63,390	32,673	7,228	5,931
Mean	145	137	117	97.1	114	255	243	2,113	2,113	1,054	233	198
Max	160	178	140	110	240	900	370	13,500	3,250	2,350	325	223
Min	129	80	80	60	40	100	189	223	1,700	344	164	168
Ac-ft	8,900	8,170	7,200	5,970	6,360	15,670	14,470	129,900	125,700	64,810	14,340	11,760

Table 2. Daily mean discharge for Little Bighorn River near Hardin, Mont. (06294000), October 2010 through September 2011.—
Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954–2011, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	151	149	131	135	189	296	298	620	842	271	118	127
Max	276	248	223	366	610	987	748	2,852	2,113	1,333	382	267
(WY)	(1979)	(1979)	(1979)	(1975)	(1971)	(1972)	(1965)	(1978)	(2011)	(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 2010		Water Year 2011		Water Years 1954–2011	
Annual total	95,250		208,377			
Annual mean	261		571		277	
Highest annual mean					676 1975	
Lowest annual mean					70.4 1961	
Highest daily mean	1,650	Jun 13	13,500	May 23	15,800	May 20, 1978
Lowest daily mean	70	Jan 7	40	Feb 3	0.30	Aug 5, 1961
Annual seven-day minimum	81	Feb 8	65	Jan 30	0.40	Aug 3, 1961
Maximum peak flow			^a 17,300	May 23	^b 22,600	May 19, 1978
Maximum peak stage			12.32	May 23	12.32	Mar 23, 2011
Instantaneous low flow					^c 0.20	Aug 7, 1961
Annual runoff (ac-ft)	188,900		413,300		200,600	
10 percent exceeds	650		1,920		600	
50 percent exceeds	151		197		160	
90 percent exceeds	90		100		74	

^a Includes Agency Canal.

^b Gage height, 11.20 ft.

^c 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 2010 through September 2011.

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

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	3,180	2,990	2,450	e2,600	e2,500	e2,700	3,320	7,490	16,300	13,600	10,400	4,370
2	3,130	2,900	2,460	e2,600	e2,600	e2,600	3,350	7,370	16,200	12,900	10,300	4,410
3	3,150	2,770	2,500	e2,600	e2,700	e2,600	3,440	7,380	16,200	12,100	10,300	4,440
4	3,140	2,770	2,520	2,600	e2,600	e2,600	3,380	7,360	16,600	11,300	9,620	4,410
5	3,130	2,680	2,540	2,570	2,580	e2,600	3,320	6,940	17,100	10,900	9,140	4,380
6	3,090	2,660	2,530	2,570	2,700	e2,600	3,290	6,670	17,200	10,700	9,210	4,320
7	3,190	2,690	2,520	2,580	2,730	e2,600	3,360	6,620	17,400	10,600	9,130	4,270
8	3,320	2,730	2,520	2,610	e2,700	e2,600	3,580	6,620	17,400	10,500	9,100	4,230
9	3,340	2,760	2,590	2,640	e2,600	e2,600	3,970	6,800	17,700	10,500	8,470	4,160
10	3,380	2,750	2,720	e2,600	e2,600	2,750	4,190	7,640	18,100	10,300	8,040	4,160
11	3,340	2,680	2,740	e2,600	e2,600	4,890	4,090	10,500	18,100	10,100	8,000	4,180
12	3,330	2,590	2,750	e2,600	2,590	5,180	4,060	11,600	18,300	11,000	7,780	4,180
13	3,320	2,620	2,770	e2,600	3,010	4,040	4,010	9,410	18,200	11,300	7,510	4,170
14	3,060	2,630	2,790	e2,600	3,780	3,560	4,520	8,390	18,100	11,700	7,450	4,070
15	3,110	2,680	2,820	2,540	3,340	3,430	5,030	8,230	18,000	12,300	7,350	3,980
16	3,100	2,730	2,810	2,580	3,360	3,360	5,150	8,150	18,000	12,100	6,960	3,820
17	2,860	2,760	2,740	2,680	3,310	3,360	5,820	8,480	18,300	11,900	6,650	3,640
18	2,800	2,760	2,720	2,710	3,010	3,390	5,990	8,570	18,300	11,900	6,570	3,600
19	2,850	2,700	2,670	2,650	2,940	3,300	6,760	8,890	18,200	11,800	6,160	3,560
20	2,900	2,670	2,670	2,660	e2,400	3,190	6,970	9,570	17,900	12,000	5,780	3,690
21	2,950	2,610	e2,700	2,660	e1,900	3,110	7,050	13,800	17,600	12,400	5,730	3,790
22	2,870	2,590	e2,600	2,640	e2,700	3,080	7,110	21,900	17,400	12,700	5,660	3,750
23	2,780	e2,600	e2,600	2,620	e2,600	3,080	6,940	31,200	17,400	12,600	5,320	3,730
24	2,790	e2,600	2,550	2,630	e2,200	3,050	6,880	24,400	16,900	12,600	4,990	3,730
25	2,830	e2,500	2,570	2,610	e2,000	3,060	6,940	17,700	16,200	12,600	4,960	3,730
26	2,810	2,490	2,580	2,620	e1,900	3,050	6,970	16,700	16,500	12,500	4,690	3,730
27	2,810	2,530	2,580	2,710	e2,400	3,020	7,130	13,400	16,700	12,500	4,450	3,750
28	2,810	2,580	2,580	2,810	e2,900	3,020	7,460	13,800	16,600	12,400	4,420	3,610
29	2,830	2,640	2,600	2,890	---	3,140	7,800	13,800	16,100	10,900	4,410	3,600
30	2,880	2,510	2,640	2,810	---	3,250	7,640	12,500	15,100	10,400	4,390	3,600
31	2,930	---	e2,600	e2,600	---	3,290	---	15,500	---	10,400	4,360	---
Total	94,010	80,170	81,430	81,790	75,250	98,100	159,520	357,380	518,100	361,500	217,300	119,060
Mean	3,033	2,972	2,627	2,638	2,688	3,165	5,317	11,530	17,270	11,660	7,010	3,969
Max	3,380	2,990	2,820	2,890	3,780	5,180	7,800	31,200	18,300	13,600	10,400	4,440
Min	2,780	2,490	2,450	2,540	1,900	2,600	3,290	6,620	15,100	10,100	4,360	3,560
Ac-ft	186,500	159,000	161,500	162,200	149,300	194,600	316,400	708,900	1,028,000	717,000	431,000	236,200

Table 3. Daily mean discharge for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), October 2010 through September 2011.—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945–2011, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	3,099	3,160	3,034	2,933	3,070	3,506	3,425	4,353	6,963	5,263	2,841	2,798
Max	5,546	5,599	4,907	5,478	5,314	6,580	7,881	11,530	17,270	19,090	7,010	4,952
(WY)	(1972)	(1974)	(1968)	(1968)	(1971)	(1972)	(1997)	(2011)	(2011)	(1967)	(2011)	(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 2010		Water Year 2011		Water Years 1945–2011		
Annual total		1,458,700		2,243,610			
Annual mean		3,996		6,147		3,689	
Highest annual mean						6,147	2011
Lowest annual mean						1,474	2003
Highest daily mean		11,800	Jun 19	31,200	May 23	50,000	May 20, 1978
Lowest daily mean		2,040	Apr 6	1,900	Feb 21	400	Apr 4, 1967
Annual seven-day minimum		2,060	Apr 1	2,240	Feb 20	528	May 6, 1961
Maximum peak flow				33,200	May 23	^a 59,200	May 20, 1978
Maximum peak stage				10.86	May 23	^b 14.21	Apr 2, 1965
Instantaneous low flow						^c 275	Nov 15, 1959
Annual runoff (ac-ft)		2,893,000		4,450,000		2,672,000	
10 percent exceeds		10,200		14,300		6,270	
50 percent exceeds		2,930		3,430		3,050	
90 percent exceeds		2,200		2,600		1,630	

	Water Years 1946–1961*		Water Years 1967–2011**	
Annual mean		3,358		3,699
Highest annual mean		5,501	1947	6,147
Lowest annual mean		1,623	1961	1,474
Highest daily mean		25,700	Jun 23, 1947	50,000
Lowest daily mean		462	May 12, 1962	400
Annual seven-day minimum		528	May 6, 1961	843
Maximum peak flow		^d 26,200	Jun 24, 1947	59,200
Maximum peak stage		10.65	May 24, 1947	14.15
Instantaneous low flow		^c 275	Nov 15, 1959	
Annual runoff (ac-ft)		2,578,000		2,632,000
10 percent exceeds		6,200		6,060
90 percent exceeds		1,500		1,700

* Prior to construction of Yellowtail Dam.

** After completion of Yellowtail Dam.

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

^b Ice jam, at different site and datum.

^c About, result of freezeup.

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

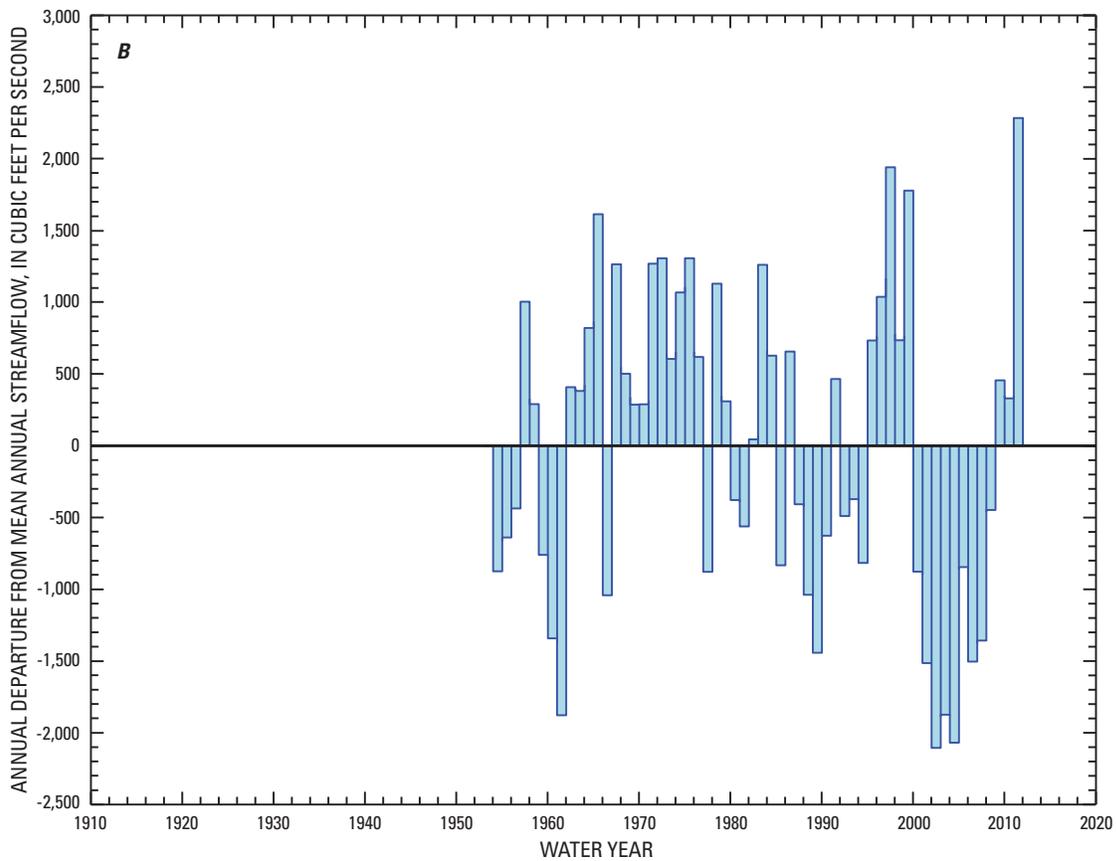
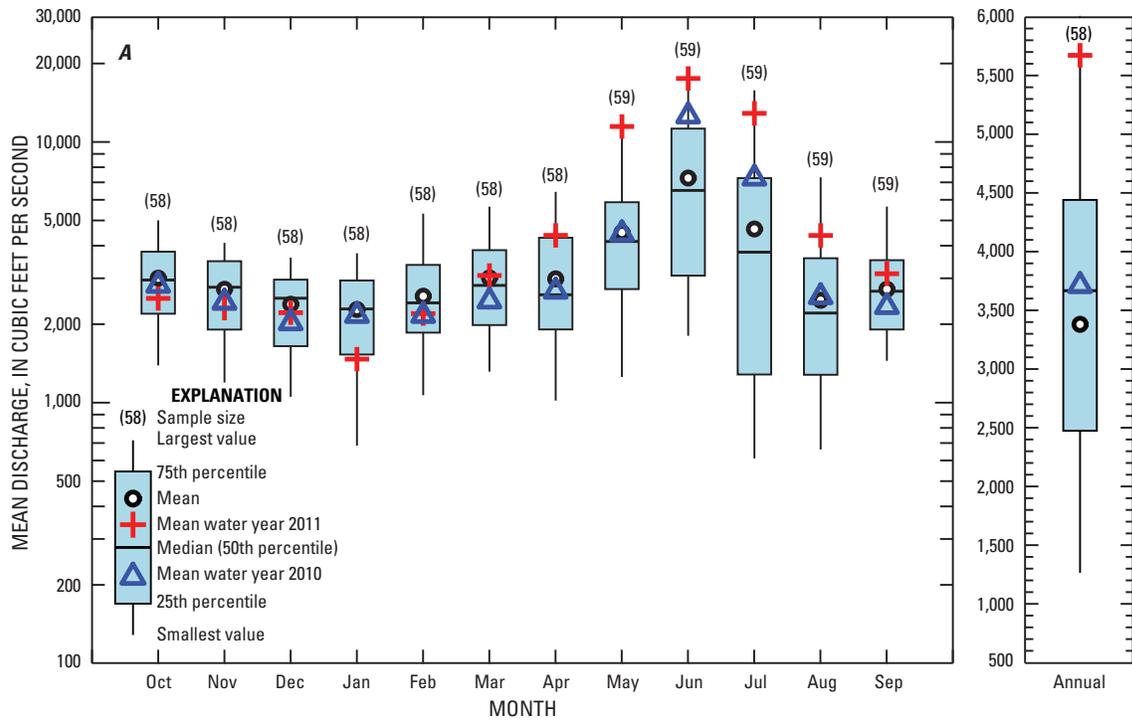


Figure 2. Streamflow data for Bighorn River above Tullock Creek, near Bighorn, Mont. (06294500), minus Little Bighorn River near Hardin, Mont. (06294000); adjusted for change in contents in Bighorn Lake, water years 1965–2011. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual 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 2010 through September 2011.

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

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	108	208	e170	e130	e180	e220	425	607	e5,700	3,990	433	254
2	114	208	e170	e140	e170	e210	438	571	e4,600	3,760	420	255
3	123	207	e180	e140	e170	e220	425	543	e4,000	3,610	406	198
4	127	206	e170	e130	e160	e250	413	535	e4,000	3,660	388	208
5	126	206	e170	e140	e160	e240	402	522	e3,700	3,700	343	210
6	127	207	e160	e150	e200	e240	406	517	e3,400	3,450	349	207
7	128	208	e170	e160	e240	e230	409	509	3,100	3,080	350	216
8	128	208	e160	e160	e220	e230	423	508	3,010	2,830	334	212
9	134	208	e160	e160	e210	e230	428	573	3,010	2,600	316	214
10	139	208	e160	e150	e200	e240	443	3,350	3,280	2,460	276	211
11	144	208	e150	e140	e190	e700	442	8,480	3,610	2,340	277	216
12	149	208	e150	e130	e180	e3,500	449	2,650	3,890	2,270	278	195
13	150	210	e160	e140	e220	3,120	450	1,110	4,170	2,240	291	194
14	148	212	e160	e140	e450	1,810	459	824	4,630	2,250	287	208
15	150	218	e170	e130	e550	1,620	471	742	4,610	2,230	282	214
16	153	226	e160	e140	e500	1,560	486	689	4,340	2,150	280	215
17	158	246	e150	e150	e450	1,540	491	684	4,370	2,060	288	229
18	159	235	e150	e160	e400	1,170	504	733	4,970	1,980	282	211
19	144	227	e140	e150	e360	1,060	526	947	4,600	1,800	256	200
20	149	161	e140	e150	e320	889	534	3,620	4,520	1,590	247	226
21	151	e130	e140	e160	e300	718	552	12,000	4,460	1,380	262	234
22	153	e130	e140	e170	e280	607	639	11,500	4,340	1,190	252	235
23	154	e150	e150	e170	e270	567	1,500	7,520	4,080	1,060	238	222
24	155	e170	e150	e170	e260	508	1,460	3,740	3,920	891	221	211
25	160	e160	e140	e170	e250	477	883	3,140	3,690	763	218	205
26	166	e200	e140	e180	e240	456	667	3,130	3,590	624	221	152
27	168	e190	e150	e190	e240	439	614	3,110	3,730	649	228	136
28	173	e180	e140	e200	e230	424	589	3,020	3,860	567	226	138
29	181	e180	e140	e210	---	417	552	3,080	4,000	531	215	141
30	209	e180	e130	e200	---	412	544	4,910	4,090	468	216	141
31	209	---	e120	e190	---	418	---	6,370	---	453	224	---
Total	4,637	5,895	4,740	4,900	7,600	24,722	17,024	90,234	121,270	62,626	8,904	6,114
Mean	150	196	153	158	271	797	567	2,911	4,042	2,020	287	204
Max	209	246	180	210	550	3,500	1,500	12,000	5,700	3,990	433	255
Min	108	130	120	130	160	210	402	508	3,010	453	215	136
Ac-ft	9,200	11,690	9,400	9,720	15,070	49,040	33,770	179,000	240,500	124,200	17,660	12,130

Table 4. Daily mean discharge for Tongue River at Miles City, Mont. (06308500), October 2010 through September 2011.—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938–2011, BY WATER YEAR (WY)*												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	233	246	185	187	263	507	428	721	1,319	481	177	193
Max	694	585	423	529	1,794	1,783	1,693	2,983	4,042	2,207	700	599
(WY)	(1972)	(1942)	(1950)	(1999)	(1971)	(1971)	(1965)	(1978)	(2011)	(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 2010		Water Year 2011		Water Years 1938–2011*	
Annual total	164,827		358,666			
Annual mean	452		983		409	
Highest annual mean					986	
Lowest annual mean					57.2	
Highest daily mean	4,010	May 25	12,000	May 21	12,000	May 21, 2011
Lowest daily mean	96	Aug 27	108	Oct 1	0.00	Jul 9, 1940
Annual seven-day minimum	108	Aug 22	122	Oct 1	0.00	Jul 9, 1940
Maximum peak flow			15,300		15,300	
Maximum peak stage			13.99		13.99	
Annual runoff (ac-ft)	326,900		711,400		296,300	
10 percent exceeds	1,450		3,610		918	
50 percent exceeds	170		240		218	
90 percent exceeds	129		143		67	

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

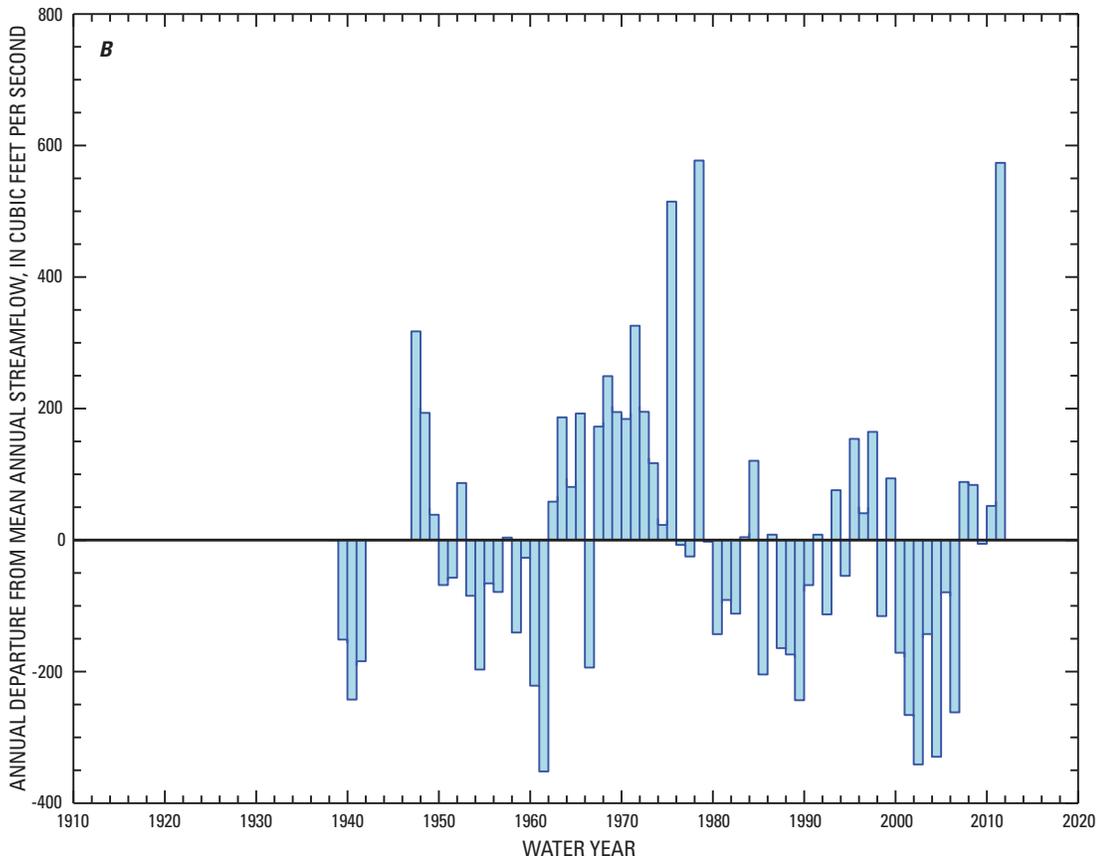
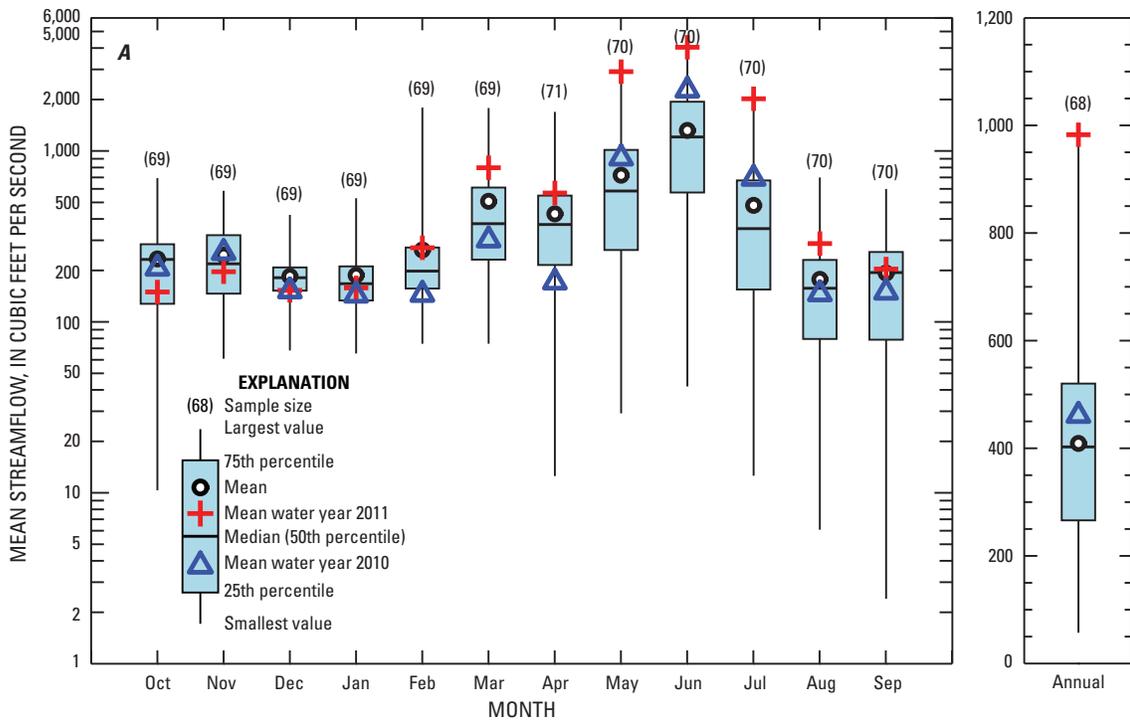


Figure 3. Streamflow data for Tongue River at Miles City, Mont. (06308500), water years 1939–2011. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

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 2010 through September 2011.

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

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	92	201	e210	e160	e160	e210	770	879	7,750	2,570	482	139
2	95	204	e210	e170	e180	e200	845	788	7,000	2,600	446	137
3	100	214	e210	e170	e220	e210	858	688	7,220	2,800	404	129
4	103	229	e200	e170	e240	e220	838	625	6,020	2,620	378	167
5	98	233	e190	e190	e250	e230	818	593	5,530	2,460	347	166
6	100	236	e200	e210	e240	e240	782	541	5,110	2,330	327	151
7	99	236	e210	e200	e220	e260	691	525	4,770	2,180	308	146
8	97	225	e220	e200	e190	e280	661	500	4,540	1,960	287	141
9	105	219	e220	e190	e200	e380	635	668	4,410	1,920	285	137
10	113	239	e210	e170	e220	e600	587	12,100	4,560	1,880	272	134
11	109	241	e190	e150	e250	e1,000	591	13,300	4,650	1,780	261	132
12	108	239	e200	e150	e260	e3,000	559	4,320	5,070	1,600	242	125
13	110	233	e210	e180	e260	e5,000	562	2,070	5,400	1,510	238	123
14	111	245	e220	e180	e280	5,840	568	1,350	5,410	1,540	238	124
15	108	245	e220	e170	e300	5,720	556	1,360	4,880	1,560	257	118
16	114	244	e210	e190	e290	6,150	530	1,150	4,360	1,450	260	118
17	126	268	e200	e200	e260	5,610	523	1,070	4,310	1,440	252	117
18	144	269	e190	e200	e230	3,980	521	1,190	4,460	1,380	233	115
19	148	264	e190	e200	e220	3,680	551	1,410	4,360	1,310	222	114
20	155	267	e200	e200	e210	2,560	570	7,480	4,130	1,220	214	114
21	162	e250	e190	e210	e190	2,080	651	20,500	3,760	1,100	207	129
22	167	e210	e200	e230	e200	1,730	1,110	19,400	3,530	1,050	204	129
23	163	e190	e200	e240	e210	1,420	1,780	13,700	3,220	1,010	191	128
24	175	e170	e210	e240	e200	1,200	1,140	10,300	3,110	933	185	141
25	171	e200	e210	e250	e180	1,050	892	7,980	3,140	870	180	153
26	165	e220	e220	e250	e170	941	768	7,180	3,050	812	171	153
27	180	e210	e220	e260	e190	875	800	6,800	3,270	838	169	165
28	197	e210	e210	e260	e210	823	771	6,950	3,190	776	161	165
29	193	e200	e200	e240	---	780	742	6,660	3,020	673	161	173
30	195	e180	e180	e210	---	738	848	9,760	2,810	591	147	173
31	198	---	e170	e180	---	732	---	10,100	---	523	144	---
Total	4,201	6,791	6,320	6,220	6,230	57,739	22,518	171,937	136,040	47,286	7,873	4,156
Mean	136	226	204	201	222	1,863	751	5,546	4,535	1,525	254	139
Max	198	269	220	260	300	6,150	1,780	20,500	7,750	2,800	482	173
Min	92	170	170	150	160	200	521	500	2,810	523	144	114
Ac-ft	8,330	13,470	12,540	12,340	12,360	114,500	44,660	341,000	269,800	93,790	15,620	8,240

Table 5. Daily mean discharge for Powder River near Locate, Mont. (06326500), October 2010 through September 2011.—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939–2011, BY WATER YEAR (WY)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	242	218	149	143	404	1,180	728	1,212	1,629	568	206	160
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 2010		Water Year 2011		Water Years 1939–2011	
Annual total	238,854		477,311			
Annual mean	654		1,308		570	
Highest annual mean					1,622	
Lowest annual mean					79.1	
Highest daily mean	7,010	May 25	20,500	May 21	26,000	Feb 19, 1943
Lowest daily mean	61	Sep 8	92	Oct 1	0.00	Jan 16, 1950
Annual seven-day minimum	67	Sep 4	98	Oct 1	0.00	Jan 16, 1950
Maximum peak flow			24,100	May 21	^b 31,000	Feb 19, 1943
Maximum peak stage			11.70	May 21	^c 12.20	Mar 16, 1978
Instantaneous low flow			^a 82	Oct 1	0.00	Many days ^d
Annual runoff (ac-ft)	473,800		946,700		412,900	
10 percent exceeds	2,140		4,360		1,330	
50 percent exceeds	233		241		230	
90 percent exceeds	92		141		41	

^a Gage height, 1.19 ft.

^b Gage height, 11.23 ft, observed.

^c Backwater from ice.

^d On many days in 1950, 1960-61, 1998, and 2006.

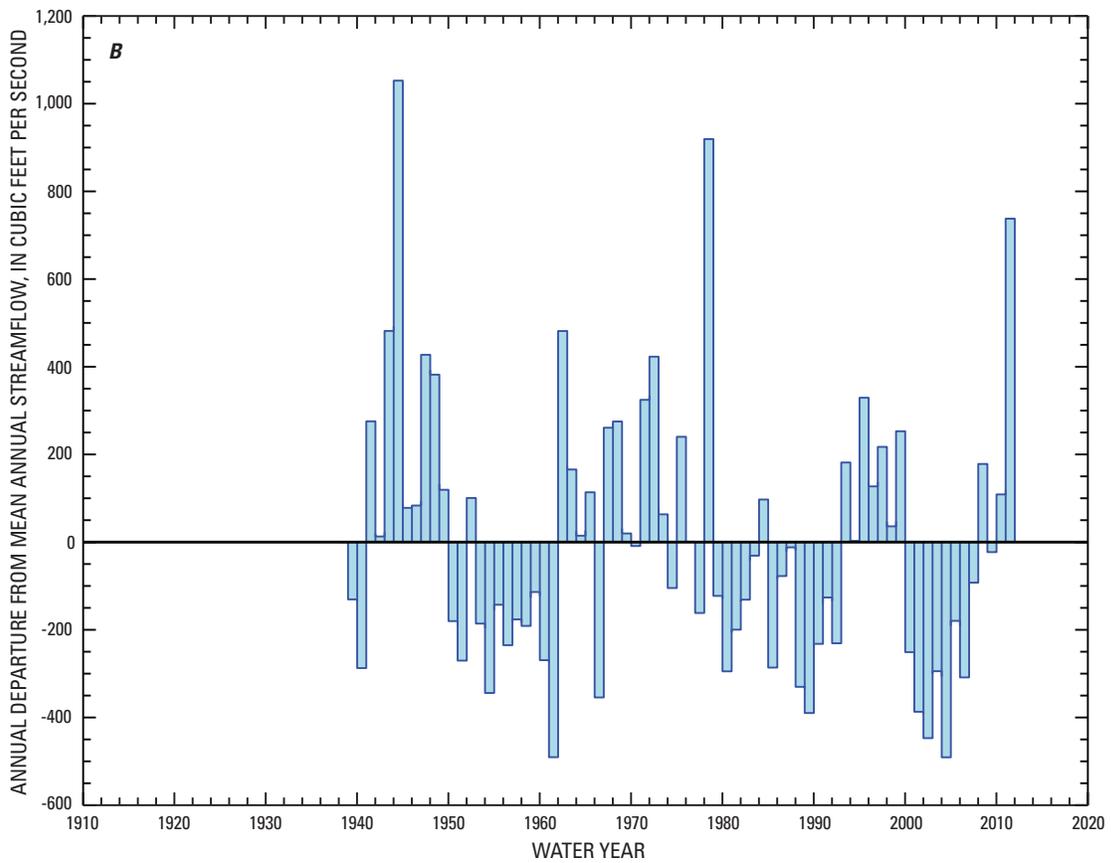
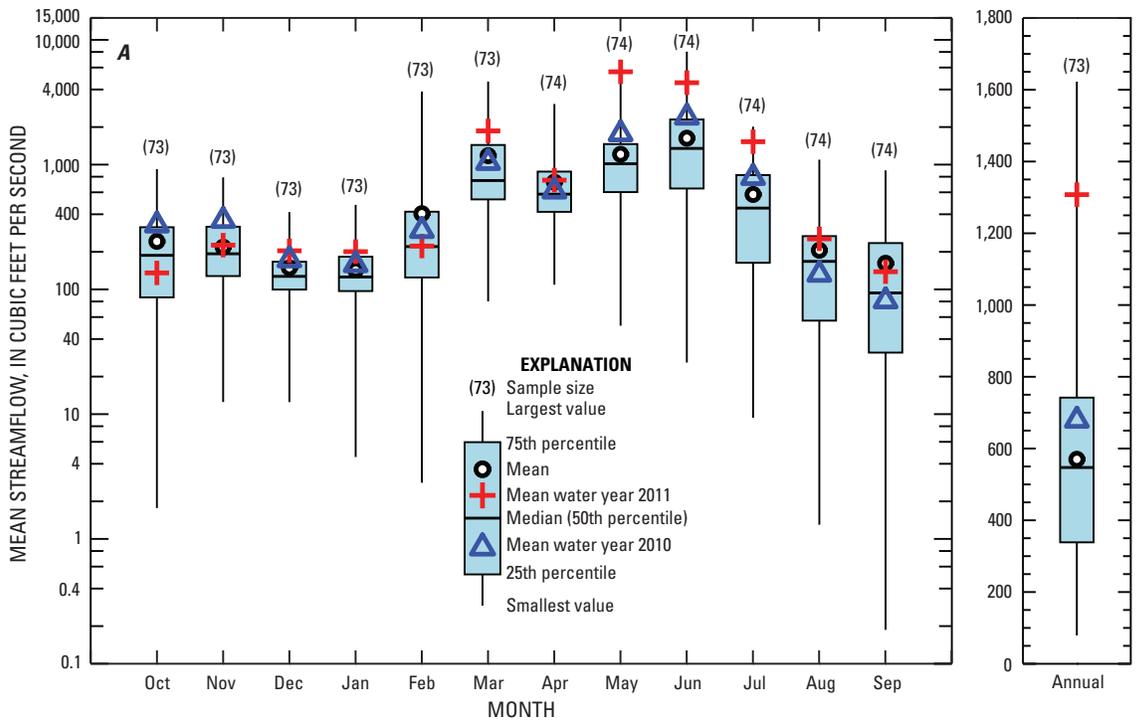


Figure 4. Streamflow data for Powder River near Locate, Mont. (06326500), water years 1939–2011. *A*, Statistical distribution of monthly and annual streamflow. *B*, Annual departure from the mean annual streamflow.

Month-End 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 NW¼NW¼ 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 2011.--Maximum daily contents, 758,500 acre-ft, July 16, elevation, 4,727.83 ft; minimum daily contents, 390,800 acre-ft, June 7, elevation, 4,705.29 ft.

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

[Symbol: --, no data]

Date	Water-surface elevation, in feet	Usable contents, in acre-feet	Change in usable contents, in acre-feet
September 30, 2010	4,719.48	599,100	--
October 31	4,718.78	587,000	-12,100
November 30	4,718.47	581,800	-5,200
December 31	4,718.28	578,500	-3,300
January 31, 2011	4,717.70	568,800	-9,700
February 28	4,717.03	557,800	-11,000
March 31	4,716.88	555,300	-2,500
April 30	4,714.02	510,700	-44,600
May 31	4,707.82	423,200	-87,500
June 30	4,714.38	516,100	92,900
July 31	4,725.81	717,500	201,400
August 31	4,723.16	666,100	-51,400
September 30, 2011	4,722.38	651,500	-14,600
2011 water year			52,400

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.

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 2011.--Maximum daily contents, 7,010 acre-ft, July 15, elevation, 6,411.45 ft; minimum daily content, 168 acre-ft, May 12, elevation, 6,350.91 ft.

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

[Abbreviation: e, estimated Symbol: --, no data]

Date	Water-surface elevation, in feet	Usable contents, in acre-feet	Change in usable contents, in acre-feet
September 30, 2010	6,358.31	350e	--
October 31	6,357.40	326	-24
November 30	6,357.50	330	4
December 31	6,359.00	379	49
January 31, 2011	6,357.00	314	-65
February 28	6,357.50	330	16
March 31	6,364.00	580	250
April 30	6,356.29	292	-288
May 31	6,357.43	327	35
June 30	6,399.12	4,310	3,983
July 31	6,407.94	6,040	1,730
August 31	6,361.25	462	-5,578
September 30, 2011	6,359.50	396	-66
2011 water year			46

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. Values 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 2011.--Maximum contents, 1,129,000 acre-ft, July 24, elevation, 3,655.03 ft; minimum, 728,600 acre-ft, May 19, elevation, 3,606.55 ft.

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

[Symbol: --, no data]

Date	Water-surface elevation, in feet	Usable contents, in acre-feet	Change in usable contents, in acre-feet
September 30, 2010	3,630.14	944,900	--
October 31	3,627.72	922,200	-22,700
November 30	3,626.24	908,900	-13,300
December 31	3,624.17	891,100	-17,800
January 31, 2011	3,621.64	825,500	-65,600
February 28	3,619.46	809,300	-16,200
March 31	3,620.91	820,000	10,700
April 30	3,615.17	779,700	-40,300
May 31	3,631.31	907,600	127,900
June 30	3,643.48	1,051,000	143,400
July 31	3,652.86	1,193,000	142,000
August 31	3,643.20	1,047,000	-146,000
September 30, 2011	3,640.35	1,009,000	-38,000
2011 water year			64,100

Month-End 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 usable 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 storage 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 table. The usable contents of Tongue River Reservoir increased from 68,000 acre-ft to 79,070 acre-ft in 1999.

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

Date	Usable contents, in acre-feet ²			
	06224500 Bull Lake	Pilot Butte Reservoir	06281500 Buffalo Bill Reservoir	06307000 Tongue River Reservoir
September 30, 2010	65,120	14,300	485,500	51,100
October 31	67,860	24,930	457,600	50,460
November 30	68,900	24,660	455,600	49,930
December 31	70,260	24,560	452,300	50,270
January 31, 2011	70,650	24,440	446,100	50,980
February 28	70,530	24,420	438,100	53,380
March 31	70,190	24,270	433,300	56,880
April 30	67,240	21,380	335,000	51,680
May 31	63,420	20,210	313,900	80,920
June 30	123,000	25,300	472,100	81,700
July 31	143,700	26,740	620,200	61,530
August 31	127,500	21,070	571,500	51,860
September 30, 2011	92,240	20,400	482,700	46,650
Change in contents during water year	27,120	6,100	-2,800	-4,450

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 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 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. 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 8,160 acre-ft.

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

[Contents are in acre-feet. Reservoirs or lakes are listed in alphabetical order by drainage basin. Abbreviation: e, estimated. Symbol: --, no data or not available]

Reservoir or lake name	Pre-compact 1950 water right	Post-compact 1950 water right	Usable capacity	Usable contents on Sept. 30, 2011	Usable contents on Sept. 30, 2010	Change in usable contents ²
Clarks Fork Yellowstone River Basin						
Cooney Reservoir ³	28,230	0	28,230	18,080	17,900	180
Glacier Lake ³	4,200	0	4,200	--	--	
Bighorn River Basin						
(Lake) Adelaide Reservoir ⁴	1,450	3,320	4,770	2,280	980	1,300
Anchor Reservoir ⁵	--	9,250	17,410	396	350 ^e	46
Bighorn Lake ⁵	--	1,312,000	1,312,000	1,009,000	944,900	64,100
Boysen Reservoir ⁵	757,900	--	757,900	651,500	599,100	52,400
Buffalo Bill Reservoir ⁵	456,600	187,900	644,500	482,700	485,500	-2,800
Bull Lake ⁵	77,040	--	77,040	92,240	65,120	27,120
Greybull Valley Reservoir ⁴	--	33,170	33,170	9,390	4,160	5,230
Pilot Butte Reservoir ⁵	34,600	--	34,600	20,400	14,300	6,100
Sunshine Reservoir ⁴	52,990	--	52,990	51,180	52,340	-1,160
Lower Sunshine Reservoir ⁴	--	58,750	58,750	28,570	25,060	3,230
Christina Reservoir ⁴	3,860	--	3,860	3,800	3,500	300
Corral Reservoir ⁴	--	1,030	1,030	640	576	64
Diamond Creek Dike Reservoir ⁴	--	18,380	18,380	473	445	26
Enterprise Reservoir ⁴	1,490	204	1,700	40	42	-2
Fairview Extension Reservoir ⁴	791	620	1,410	1,400	1,400	0
Harrington Reservoir ⁴	315	887	1,200	800	600	200
Lake Cameahwait Reservoir ⁴	--	6,680	6,680	6,680	6,680	0
Lake Creek Reservoir ⁴	1,370	--	1,370	1,370	1,370	0
Newton Lakes ⁴	4,520	--	4,520	250	2,000	-1,750
Perkins and Kinney Reservoir ⁴	1,200	--	1,200	1,040	1,150	-110
Sage Creek Reservoir ⁴	440	2,340	2,780	2,580	2,680	-100
Shell Reservoir ⁴	1,950	--	1,950	75	75	0
Shoshone Lake Reservoir ⁴	9,740	--	9,740	70	140	-70
Teapot Reservoir ⁴	1,580	--	1,580	0	0	0
Tensleep Reservoir ⁴	3,510	--	3,510	1,720	3,220	-1,500
Wiley Reservoir ⁴	689	331	1,020	632	1,020	-388
Worthen Meadow Reservoir ⁴	--	1,500	1,500	1,500	398	1,102
Powder River Basin						
Cloud Peak Reservoir ⁴	3,400	172	3,570	3,570	3,570	0
Dull Knife Reservoir ⁴	--	4,320	4,350	1,330	1,170	150
Healy Reservoir ⁴	--	5,140	5,140	3,460	3,970	-510
Kearney Reservoir ⁴	1,850	4,470	6,320	2,000	2,190	-190
Lake DeSmet ⁴	37,520	197,500	235,000	204,100	203,600	500
Muddy Guard Reservoir ⁴	--	2,340	2,340	1,010	840	170
Tie Hack Reservoir ⁴	1,650	788	2,440	2,440	2,440	0
Willow Park Reservoir ⁴	4,460	--	4,460	386	337	45
Posy No. 1 Reservoir ⁴	--	1,540	1,540	1,540	1,540	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.

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

[Contents are in acre-feet. Reservoirs or lakes are listed in alphabetical order by drainage basin. Symbol: --, no data or not available]

Reservoir or lake name	Pre-compact 1950 water right	Post-compact 1950 water right	Usable capacity	Usable contents on Sept. 30, 2011	Usable contents on Sept. 30, 2010	Change in usable contents ²
Tongue River Basin						
Bighorn Reservoir ⁴	2,750	1,880	4,630	1,170	357	813
Dome Reservoir ^{4,6}	1,840	188	2,030	1,020	993	27
Park Reservoir ⁴	7,350	3,020	10,360	4,350	3,790	560
Sawmill Lakes Reservoir ⁴	--	1,280	1,280	866	690	176
Tongue River Reservoir ³	79,070	--	79,070	46,650	51,100	-4,450
Twin Lakes Reservoir ^{4,7}	1,180	2,220	3,400	2,130	2,200	-70
Willow Creek Reservoir ³	--	22,900	22,900	7,400	7,220	180

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 2011 usable contents from the 2010 usable contents.

³ Reservoir managed by the State of Montana.

⁴ Private reservoirs permitted and accounted by the State of Wyoming.

⁵ Reservoirs managed by Bureau of Reclamation.

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

⁷ Data are combined contents of Twin Lakes Number 1 and Twin Lakes Number 2.

RULES AND REGULATIONS FOR ADMINISTRATION OF THE YELLOWSTONE RIVER COMPACT

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

Article I. Collection of Water Records

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

1. Clarks Fork

The gaging station known as Clarks Fork near Silesia, Montana and located in NW1/4 SE1/4 sec. 1, T. 4 S., R. 23 E., shall be the point of measurement for the Clarks Fork.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River above Tullock Creek, near Bighorn, Montana, and located in SE1/4 SE1/4 NE1/4 sec. 3, T. 4 N., R. 34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana, and located in SE1/4 NE1/4 NE1/4 sec. 19, T. 1 S., R. 34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana, and located in NE1/4 NE1/4 SE1/4 sec. 23, T. 7 N., R. 47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River near Locate, Montana, and located in NW1/4 SW1/4 sec. 14, T. 8 N., R. 51 E., shall temporarily be the designated point of measurement for that stream.

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

Article II. Office and Officers

- A. The office of the Commission shall be located at the office of the Chairman of the Commission.
- B. The Chairman of the Commission shall be the Federal representative as provided in the Compact.
- C. The Secretary of the Commission shall be as provided for in Article III of these rules.
- D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

- A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U.S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:

1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.
 2. Assemble factual information on stream flow, diversion, and reservoir storage for the preparation of an annual report to the Governors of the signatory States.
 3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.
- B. The Geological Survey shall act as Secretary to the Commission.

Article IV. Budget

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

Article V. Meetings

An annual meeting of the Commission shall be held each November at some mutually agreeable point in the Yellowstone River Basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction of such other business consistent with its authority; provided that by unanimous consent of the Commission the date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

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

Article VI. Amendments, Revisions and Abrogations.

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



Gary Fritz
Commissioner for Montana



George L. Christopoulos
Commissioner for Wyoming

ATTESTED:



L. Grady Moore
Federal Representative

Adopted November 17, 1953
Amended December 16, 1986

**RULES FOR THE RESOLUTION OF DISPUTES
OVER THE ADMINISTRATION OF THE
YELLOWSTONE RIVER COMPACT**

December 19, 1995

Section I. General Framework

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

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

Section II. Purpose and Goal

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

Section III. Consensus

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

Section IV. Unassisted Negotiation

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

Section V. Facilitation

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

Section VI. Voting

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

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

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

E. The USGS shall pay the expenses of the representative appointed by the director of the USGS.

F. Points of disagreement shall be resolved by a majority vote.

Section VII. Funding

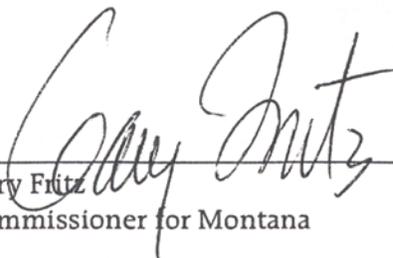
A. The USGS will pay one-half and the states of Montana and Wyoming shall each pay one-quarter of the expenses of the facilitator, which shall not exceed \$10,000, unless agreed to by both states and the USGS.

Section VIII. Amendments

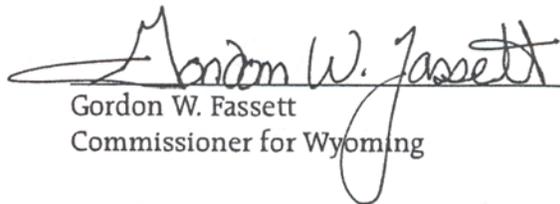
A. These rules may be amended or revised by a unanimous vote of the Commission.

Section IX. Execution

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



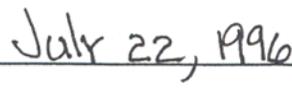
Gary Fritz
Commissioner for Montana



Gordon W. Fassett
Commissioner for Wyoming



William F. Horak
Federal Representative



Date

RULES FOR ADJUDICATING WATER RIGHTS ON INTERSTATE DITCHES

Article I. Purpose

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

Article II. Authority

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

Article III. Definitions

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

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

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

Article IV. Procedures

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

A. Wyoming Procedure

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

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

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

B. Montana Procedure

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

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

Article V. Exclusions

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

Article VI. Claim Form Submission Period

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

YELLOWSTONE RIVER COMPACT COMMISSION

WYOMING

GORDON W. FASSETT
STATE ENGINEER
HERSCHLER BUILDING
4TH FLOOR EAST
CHEYENNE, WYOMING 82002
(307) 777-354

UNITED STATES

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

MONTANA

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

YELLOWSTONE RIVER COMPACT COMMISSION

CLAIM FORM FOR INTERSTATE DITCHES

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

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

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

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

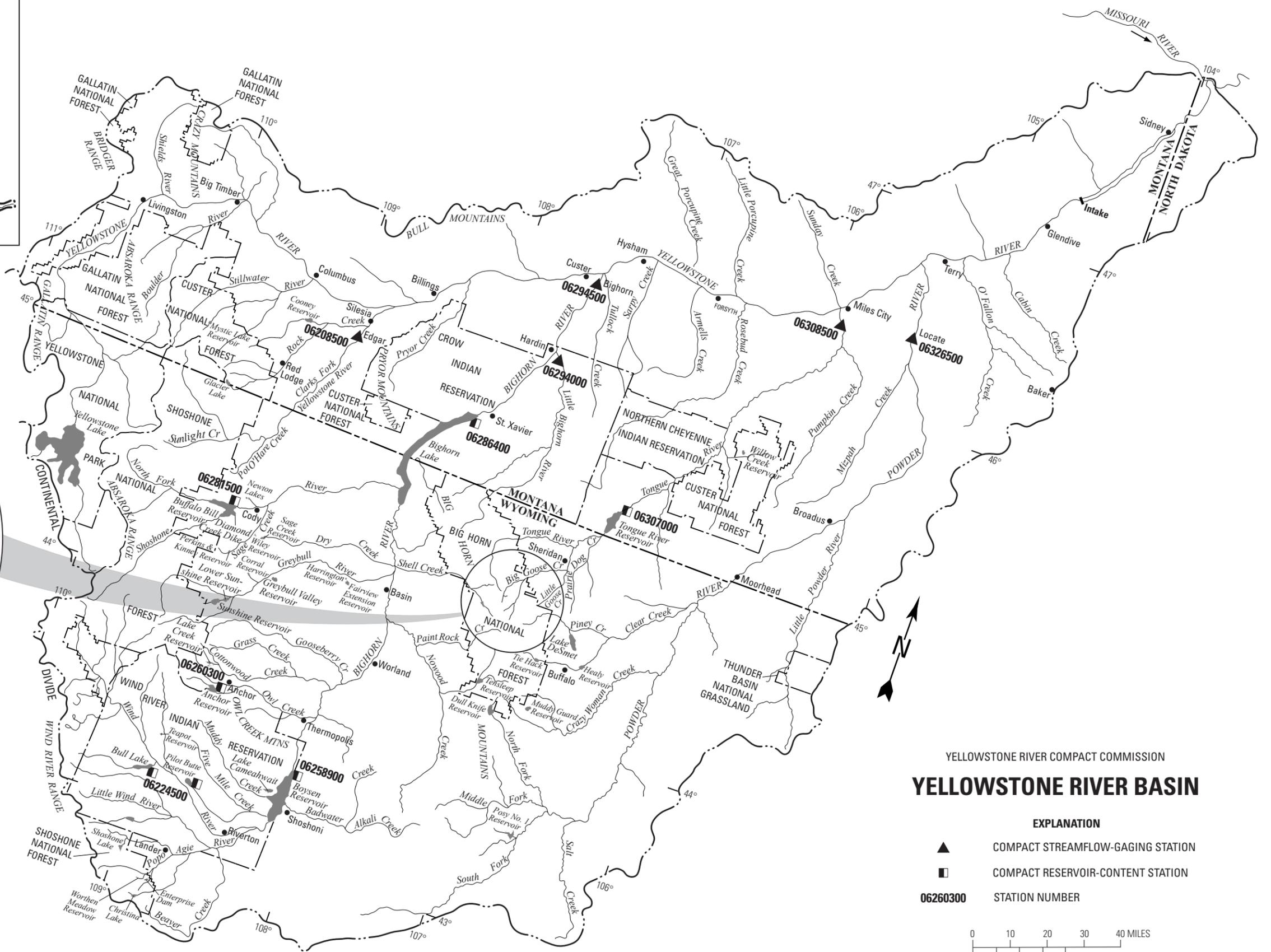
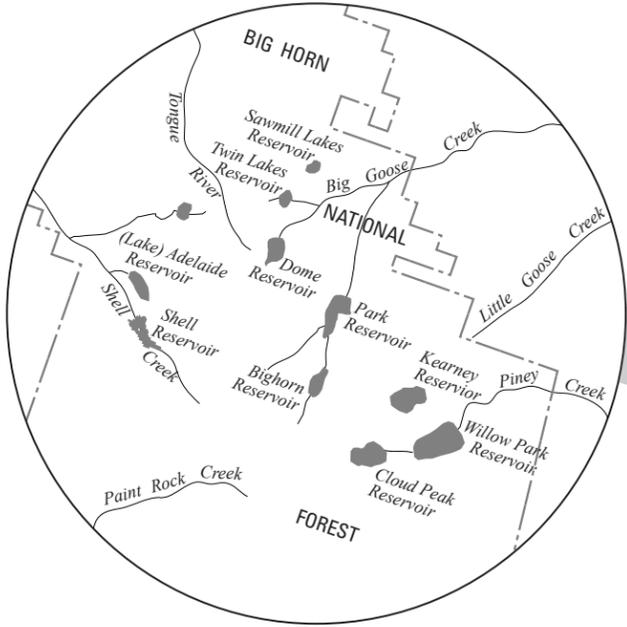
12. Attach documentary evidence or affidavits showing your ownership or control of the above lands, as well as the historic use of water on these lands. _____

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

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



LOCATION MAP



YELLOWSTONE RIVER COMPACT COMMISSION
YELLOWSTONE RIVER BASIN

- EXPLANATION**
- ▲ COMPACT STREAMFLOW-GAGING STATION
 - COMPACT RESERVOIR-CONTENT STATION
 - 06260300 STATION NUMBER

