

August 1, 2020
Water Policy Interim Committee
Jason Mohr

CLIMATE AND WATER RIGHTS



STUDY OF CLIMATE AND WATER RIGHTS

A COMMITTEE SELECTION

As part of its 2019-20 work plan, the Water Policy Interim Committee is studying climate and water rights during the 16-month interim period. A major reason for conducting this inquiry is the committee's desire to protect senior water rights, which may become at risk as climate changes. This paper is a summary of the research considered by the committee, as well as committee findings and an appendix of public comments.

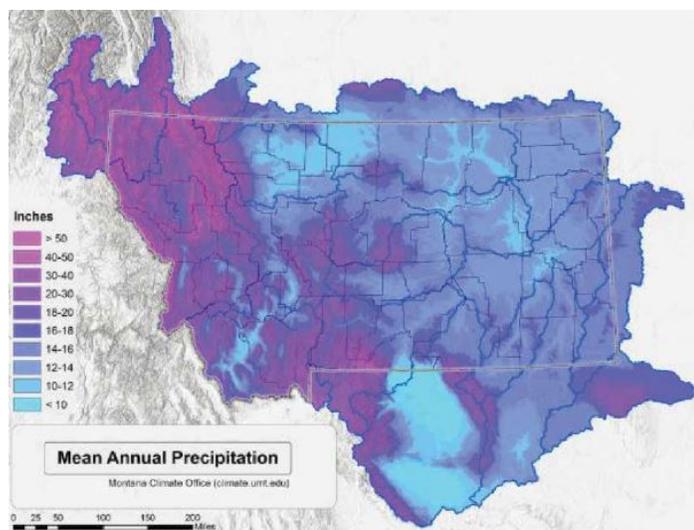
MONTANA CLIMATE ASSESSMENT

The Montana Institute on Ecosystems' Montana Climate Assessment¹ represents the first major attempt to quantify the effects of climate change specifically for Montana. Various university faculty, students, state and federal agency researchers, nonprofit organizations, resource managers, and citizens researched and wrote the assessment over a two-year period.²

The assessment analyzed recent climate trends and projected future climate conditions. The assessment is divided into three impact areas—impacts to Montana's water, forests, and agriculture. It also identifies major knowledge gaps and areas for future research. Although all issue areas are certainly related, the committee focused on the impacts to Montana's water.

OBSERVED CLIMATE TRENDS

Montana's unique geography makes it the headwaters for three major river basins—Missouri, Snake/Columbia, and



Saskatchewan. The Continental Divide "splits the state into climatically distinct western wet and eastern dry regions" and is subject to "diverse weather systems that originate from the Pacific Ocean, the Arctic, and sometimes subtropical regions."³

Energy from the sun—or more specifically how solar radiation is reflected, absorbed, transformed, and reradiated—drives the climate in Montana and elsewhere. Historical weather records since 1950 show a rise in temperatures across the state's seven climate divisions, exhibiting an increase of annual average temperatures of 2-3 degrees.⁴ Average annual precipitation has not changed since 1950, although average winter precipitation has generally decreased and spring precipitation has increased.

¹ The Institute on Ecosystems is based at Montana State University and the University of Montana.

² Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *2017 Montana Climate Assessment*.

³ Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *Executive Summary, 2017 Montana Climate Assessment*, 7.

⁴ Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *Executive Summary, 2017 Montana Climate Assessment*, 8.

PROJECTIONS FOR MONTANA'S WATER

The observed trends in temperatures and precipitation are expected to continue through the end of this century, and the effects of these trends will "likely result in additional stress on Montana's water supply,"⁵ including:

- A continued decline in mountain snowpack
- Reduced snowpack at mid and low elevations
- Earlier snowmelt and an earlier peak in spring runoff
- Reduced late-summer water availability in snowmelt-dominated watersheds
- Increased demand for groundwater

As a result, years-long droughts will continue to be a natural feature of Montana's climate, and the frequency and duration of late summer and early fall droughts will likely increase.⁶

These effects are not consistent across the state. For example, while snowpack today is approximately 80 percent of its observed 1930s value, the impacts will be more pronounced west of the Continental Divide, especially below 6,000 feet in altitude. And groundwater in Montana's irrigated valleys may be protected by seepage from ditches and canals, which recharge these valley aquifers and make those less susceptible to drought.⁷

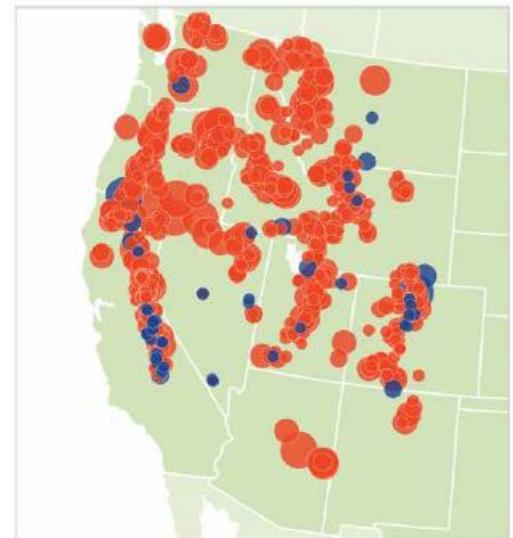
Examination of irrigation canals may help water users balance the efficiency of a project (which may be improved by lining a canal) with the benefits of leakage (which may recharge the aquifer). Frequent monitoring of flow data at strategic locations such as turnouts over several years can identify operational changes that further improve canal efficiency, as well as aid response to changes in precipitation and climate.

A 2017-19 study of Farmer's Canal off the West Gallatin River identified reaches of the canal that gained or lost water as it traveled on its 10-mile diversion, which serves 14,000 acres.⁸ This information may allow irrigators—and policymakers—to affect and benefit water users far beyond its irrigated acres.

POLICY INQUIRIES

The Montana Climate Assessment predicts the state will continue to face years- or decades-long drought. This "persistent drought" is expected to challenge water policymakers—and perhaps force changes. As the assessment states:

In the past, Montana often addressed drought and flooding as temporary emergencies, with reactionary responses to an immediate crisis. Over the past decade, western water planners have learned that the best time to prepare for the impacts of drought or flooding is before those events occur.⁹



Percent change:
Trends in April snowpack in western U.S. (Mote and Sharp (2016))

⁵ Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *Executive Summary, 2017 Montana Climate Assessment*, 14.

⁶ Ibid. More analysis and discussion specific to water issues begins on page 71 of the *2017 Montana Climate Assessment*.

⁷ Testimony of Wyatt F. Cross to WPIC, Sept. 10, 2019.

⁸ Presentation of John Metesh, Montana Bureau of Mines and Geology, to WPIC, Jan. 7, 2020.

⁹ Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *2017 Montana Climate Assessment*, 125.

The Montana State Water Plan includes some of this "drought resilience" planning, specifically related to increasing water storage.

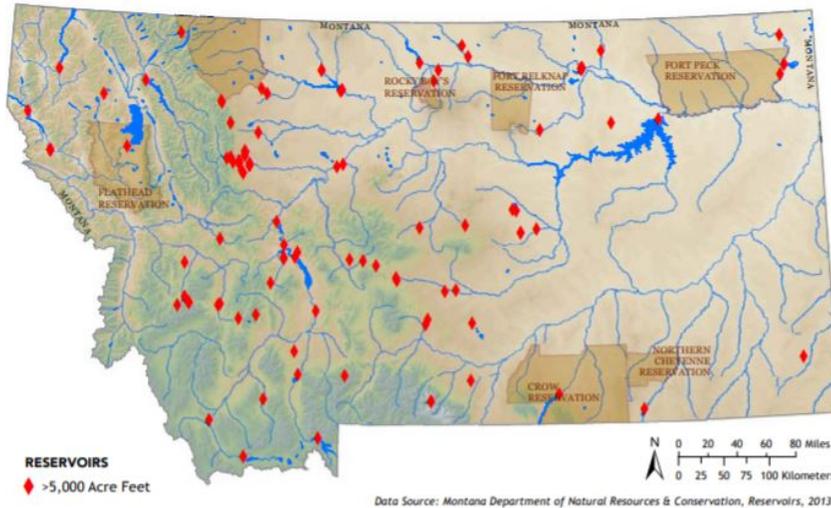
But not only will Montanans' reliance on the state's natural systems be challenged: The very basis of the state's legal construct for the distribution of water—the prior appropriation doctrine—could also come under pressure.

INCREASED STORAGE?

Dozens—or even hundreds—of dams store or impound water in Montana to help supply water to users during peak summer demand. Montana is home to some of the largest water impoundment projects in the country. Among these are Fort Peck

Lake—Montana's largest water body and the fifth-largest reservoir in the United States—and Hungry Horse Reservoir, the 22nd largest.¹⁰ The Bureau of Reclamation also stores more than 1 trillion gallons of water at 13 major reservoirs, which feed 400,000 acres, or 625 square miles.¹¹ The Department of Natural Resources and Conservation operates 31 impoundments, marketing billions of gallons for thousands of acres.¹²

Increasing storage through impoundments remains an option for meeting future water demands. State water planners see opportunities on major river systems with small existing storage capacities compared to the total flow, including the Gallatin, Big Hole, Upper Clark Fork, Bitterroot, and Blackfoot



Montana reservoirs holding more than 5,000 acre feet of water (1.6 billion gallons).
(Montana State Water Plan)

Rivers.¹³ Although more limited, some eastern streams could provide reservoir opportunity, such as Horse Creek, Flatwillow Creek, Judith River, and the streams from the Little Rocky and Bears Paw mountain ranges.¹⁴

Congress and the Legislature would have to approve major new projects, which would have a high price tag and face some regulatory requirements that many existing projects did not, including environmental, recreational, and location issues.

¹⁰ <https://www.nwo.usace.army.mil/>

¹¹ Testimony of Chris Gomer, Bureau of Reclamation, to WPIC, Jan. 7, 2020.

¹² <http://dnrc.mt.gov/divisions/water/projects>

¹³ Department of Natural Resources and Conservation, *Montana State Water Plan (2015)*, 60-61.

¹⁴ *Ibid.*

Recent policy action allows for rehabilitation and enlargement of facilities. The Reclamation Safety of Dams Act will eventually rehabilitate and increase the capacity of Fresno Reservoir in north-central Montana by raising the dam height by 5 feet.¹⁵ The DNRC is considering a similar course of action at Ruby, Painted Rocks, and East Fork reservoirs.¹⁶

Another approach may be to increase natural storage and artificial aquifer recharge. According to the State Water Plan:

Existing natural systems, such as riparian areas, floodplains and wetlands act to slow runoff and promote groundwater recharge; effectively storing water and releasing it slowly back to the surface water system. In this way, these natural systems fill a role similar to traditional reservoirs. The hydrologic characteristics of these natural systems also improve water quality.¹⁷

Some are already bringing "natural storage" to the landscape. The Big Hole Watershed Committee has led projects reconstructing stream channels, removing placer mine tailings, removing conifers, and planting willows on Oregon Creek and French Gulch. The projects are expected to saturate wetlands and floodplains, providing fish habitat, riparian vegetation, and increased natural storage.¹⁸

Another technique for enhancing natural storage is "beaver mimicry," which entails building small dams of sticks and mud in degraded streams. Also known as "beaver dam analogs," this may increase the retention of water and sediment, help maintain late season flows, and improve stream and streamside habitat quality. Beaver mimicry projects have been constructed on Lolo Creek and the Big Hole, Blackfoot, and Clark Fork rivers, as well as on eastern Montana waterways.¹⁹



WPIC members walk along Oregon Creek (LEPO)

FLEXIBLE PERIOD OF USE?

One observed climate trend is that in some drainages, spring runoff is occurring before the start of a water right holder's period of use. The 2017 Montana Climate Assessment states:

Historical observations show a shift toward earlier snowmelt and an earlier peak in spring runoff in the Mountain West (including Montana). Projections suggest these patterns are very likely to continue into the future as temperatures increase.²⁰

The effect of this "will reduce late-summer water availability in snowmelt-dominated watersheds."²¹ This effect may negatively affect irrigation rights.

¹⁵ Testimony of Chris Gomer, Bureau of Reclamation, to WPIC, Jan. 7, 2020.

¹⁶ Testimony of Jan Langel, DNRC, to WPIC, Jan. 7, 2020.

¹⁷ Department of Natural Resources and Conservation, *Montana State Water Plan (2015)*, 69.

¹⁸ Montana Watershed Coordination Council, *Missouri Headwaters Watershed Tour brochure (2019)*.

¹⁹ Email from Lisa Eby, professor of aquatic ecology, University of Montana, July 22, 2020.

²⁰ Cathy Whitlock, Wyatt F. Cross, Bruce Maxwell, Nick Silverman, Alisa A. Wade, Institute on Ecosystems, *2017 Montana Climate Assessment*, 72.

²¹ *Ibid.*

An element of a water right is its "period of use." Montana statute does not refer specifically to a "period of use,"²² but the term does appear in administrative rule,²³ which the DNRC uses to set a date range for a new irrigation right based on a climatic designation.

Although not addressed in state law, department policy does not allow a user to change a period of use outside the originally defined water right. A water user would need to apply for a new water right with the earlier period of diversion or use or file a change application to add storage to the existing water right. This stored water could potentially be used before the next year's period of diversion.²⁴

Agencies in at least 5 Western states must approve a change in a "period of use." Idaho, Colorado, Utah, Wyoming, and Washington use slightly different terminology,²⁵ but essentially a change in "period of use" triggers those states' change of use process.²⁶ In Montana, a "change in appropriation right" is defined as a change in the place of diversion, place of use, purpose of use, or place of storage. These uses may need further clarification in Montana statute.

FINDINGS AND RECOMMENDATIONS

1. Because water rights are a vital property right in Montana, the WPIC and the Legislature should continue to monitor climate change to determine the effects on water rights.
2. The Montana Legislature created the Surface Water Assessment and Monitoring Program at the Montana Bureau of Mines and Geology in 2017 to collect and compile surface water information. State law directs the bureau to gather data, compile existing information, conduct field studies, and prepare a detailed hydrogeologic assessment report. The committee recommends that the Legislature should help the program to meet this policy direction by providing adequate funding.
3. The Montana Legislature clarified the Renewable Resource Grant and Loan Program through House Bill 424 in 2017 to allow for the funding of source watershed projects.²⁷ The maintenance and repair of source watersheds are intended to improve water source reliability, which may mitigate negative impacts from anticipated changes in climate.

²² Statute uses various phrases such as "times of use" (section 85-2-224, MCA), "inclusive dates during which the water is used each year" (section 85-2-234, MCA), "length of time" (section 85-2-316, MCA), and "starting and ending date of the proposed use of water" (section 85-2-410, MCA).

²³ Admin. R. Mont. 36.12.112.

²⁴ Email from James Ferch, DNRC, to WPIC staff.

²⁵ Colorado refers to a change in "time of use," Washington includes season of use within "purpose of use," and for Wyoming a "change use" limits a new use to the same period of time. Water Policy Interim Committee memo, "Comparison of Change of Water Right Processes in 6 States," July 2018.

²⁶ Legislative Environmental Policy Office memo to WPIC, "Flexible Periods of Use," Dec. 16, 2019.

²⁷ Since passage of the bill, the program has awarded \$755,540 to several stream restoration, source water protection, and water storage projects that benefit watershed health. Major projects include the removal of Rattlesnake Dam in Missoula, and restoration of Krause and Trumbull creeks in the Flathead Conservation District. Memo from Autumn Coleman, resource development bureau chief (DNRC), July 27, 2020.

From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Friday, August 28, 2020 4:34:20 PM

Comments for WPIC

Date: 28th August 2020 16:34

Full Name:

Joshua Dale Elliott

Email Address:

elliojos@gmail.com

Subject Line:

Public Comments on Climate and Water Rights Whitepaper

Your Comment:

Mr. Mohr and Montana WPIC Members: I have a few comments regarding the Climate and Water Rights whitepaper dated August 1, 2020. At the beginning of the paper, you state that “[a] major reason for conducting this inquiry is the committee's desire to protect senior water rights, which may become at risk as climate changes.” While senior water rights are clearly important in Montana under the prior appropriation system, the severity of looming threats associated with climate change may require that we take one step further back so that we can evaluate the importance of senior water rights in the context of the greater public interest. It may well be that we can devise a way to protect senior water rights and continue to satisfy public needs, but we should not use the assumed supremacy of senior water rights as a starting point as we strategize a response to climate change. An effective response may require that we truly think outside the box and not constrain our options to those that fit neatly within our current system. Regarding the proposed means of increasing water storage, I strongly encourage you to rule out construction of new dams. The damage this would cause to fish, wildlife, and ecosystems is unacceptable, especially considering the alternative options available. In comparison, the environmental harm resulting from increasing the dam height at existing reservoirs is relatively small. Beaver mimicry and other forms of wetland restoration are clearly the most preferable forms of increasing water storage in a way that not only protects but restores ecological systems vital to Montana’s way of life. This latter option should be prioritized and pursued aggressively. Regarding the period of use for existing water rights holders, has the committee entertained the idea of a program to not only allow but incentivize existing rights holders to withdraw more water during peak spring flows and store surplus water for use later in the summer? Program subsidies could be used to facilitate construction of the necessary private storage infrastructure, with the stipulation that rights holders discharge a certain percentage of the stored water during low flow periods directly back into the water course. I thank you all for your public service and taking these comments into consideration.

Sent via www.leg.mt.gov/committees/interim/2019wpic/meeting-info/

From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Sunday, August 30, 2020 10:13:21 PM

Comments for WPIC

Date: 30th August 2020 22:13

Full Name:
Maeve Holman

Email Address:
maeve.holman@umt.edu

Subject Line:
Natural Storage Opportunity

Your Comment:

In regards to the white paper on "climate and water rights": I am really intrigued by the possibility for more natural water storage sites. Ecologic restoration coupled with improved water quality and groundwater recharge sounds like a win- win to me, and I believe we should be investing in these more natural solutions while we still have the chance. I'm sure the outcomes of these methods wouldn't show themselves immediately so it would be better for the projects be completed before a severe water crisis occurs. I recognize the language in the report seems to hint that the results of the projects are unknown/lack standing as of yet- but the worst case scenario of trying these natural water storage methods are healthier and happier floodplains and wetlands.

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From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Tuesday, September 01, 2020 12:02:43 PM

Comments for WPIC

Date: 1st September 2020 12:02

Full Name:

Jacob Lamb

Email Address:

jacobl.lamb@umontana.umt.edu

Subject Line:

A white Paper on "Climate and Water Rights"

Your Comment:

To Montana WPIC Members: I feel strongly inclined to suggest that you refrain from the implementation of a "Flexible period of use" clause into Montana water Law. While it is true that the hydrological cycle is in shifting due to a trend of warming temperatures, water rights should not be granted the freedom to move with the hydrological cycle. By allowing senior water rights to change, this will only prevent junior water right holders from a having a fair and equal chance to move up the priority list. In regard to a plan aimed at increased water retention across the landscape, I am very appreciative that you have mentioned and looked into the use of ecological restoration. Both river restoration efforts and beaver mimicry devices are showing tremendous success and with continued effort, I believe will be sufficient in keeping up the water demand on the landscape. Artificially altering natural river and stream systems with damns will only cause more irreversible damage to the local water ecosystems that so many species are dependent on. I am appreciative for your educated and open approach to this complicated issue, and willingness to accept public input.

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From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Tuesday, September 01, 2020 11:42:18 AM

Comments for WPIC

Date: 1st September 2020 11:42

Full Name:
Atlas McKinley

Email Address:
mckinleyatlas@gmail.com

Subject Line:
Source Watersheds

Your Comment:
I agree with and support the third recommendation in the report. The potential for source watershed restoration to increase natural water storage seems to provide a win for both water users, fish and riparian wildlife.

Sent via www.leg.mt.gov/committees/interim/2019wpic/meeting-info/

From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Tuesday, September 01, 2020 11:07:03 AM

Comments for WPIC

Date: 1st September 2020 11:07

Full Name:
Ashley Miller

Email Address:
a.miller1416@gmail.com

Subject Line:
Climate and Water Rights

Your Comment:

To whom it may concern, It is interesting to read how annual rainfall has not changed since 1950, but how winter precipitation has decreased significantly. How has this decrease in snowpack changed how we manage Montana water? The option to impound Montana rivers to increase water storage is very frustrating to read. In my opinion, that would be detrimental to the aquatic environment, and the fisheries. Knowing that steps are being taken to enhance natural storage to benefit aquatic habitat is very pleasing.

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From: webmaster@localhost.legmt.gov
To: [Mohr, Jason](#)
Subject: Public Comment Submission for WPIC
Date: Monday, August 31, 2020 4:59:45 PM

Comments for WPIC

Date: 31st August 2020 16:59

Full Name:
Jaret Retterath

Email Address:
jaret.retterath@umontana.edu

Subject Line:
Climate and Water Rights

Your Comment:

First off, I discourage the idea of constructing new impoundments on new waterways to increase water storage as history has proven the damage that can be done to aquatic ecosystems. Even if the the technology enhancements have been improved to mitigate aquatic habitat degradation, I still strongly disagree. The second approach of artificially constructing natural storage I highly encourage. I agree with removing mine tailing, artificially constructing beaver dams, planting cotton woods and willows, and improving fish habitats to bring back the natural habitat that existed here before settlers unknowingly damaged. That would increase the amount of water being cycled through groundwater systems which would then produce cleaner water for beneficial use and will also benefit dry land ecological habitats in the process of entering groundwater systems. I prefer that type of groundwater storage more than just leaving water sitting in reservoirs and evaporating away with the warmer temperature we will see in the future. I suggest you start performing these projects ASAP to prepare for droughts and floods like you stated in the draft. I also highly encourage for you guys to push irrigators to use the most advanced technologies to date to irrigate their land. I know that funding is probably a big issue concerning that fact, but you could give some kind of tax break to alleviate the expense.

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