



FIVE YEARS OF



MONITORING
MONTANA WATERS



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MONTANA WATERS



FLATHEAD LAKE
BIO STATION
UNIVERSITY OF MONTANA



For five years, the Monitoring Montana Waters (MMW) program has been a force for promoting clean waters, ensuring environmental health and promoting volunteer-led science in Montana. Since its initiation in 2020, this program at the Flathead Lake Biological Station has aided 19 community water monitoring programs across Montana, providing technical assistance, lab support and funding to ensure these programs collect rigorous, scientifically sound data that support their goals and are used for management of our waters. In its first five years, MMW has funded the analysis of over 8,000 samples from some of the most valuable and sensitive rivers and lakes in Montana, including the Big Hole River and Flathead Lake. This retrospective looks back on the successes and impact of MMW over the first five years, highlighting the program's goals, evolution, and future direction through the lens of five community monitoring groups who utilize MMW's resources to support their water monitoring and environmental protection efforts.



The origins of the Monitoring Montana Waters lie in a 2020 charitable donation to the Flathead Lake Biological Station. This funding from PlusFish Philanthropy made it possible for the FLBS to launch a new program dedicated to providing Montanans with the resources needed to conduct monitoring efforts that could make a difference. Assistant Research Professor Rachel Malison (then a post-doctoral researcher at the FLBS), took on the task of turning the short description the donor and FLBS Associate Director Tom Bansak created into a functional program to support water quality monitoring efforts around the state. “I’m an organizer at heart ... that’s just in who I am,” Malison said. She said that the challenge of developing the program did not intimidate her, although building new relationships with other institutions, state government and community groups was a bit more challenging to get started. After a year of planning, Malison and her team of FLBS staff and Big Sky Watershed Corps members launched the program in 2021, which initially involved seven community water data collection efforts. Although MMW has expanded in the types of sampling involved and in the geographic scope of groups involved, MMW’s basic mission and the ways that groups interface with its staff has remained consistent.

“[MMW] has given staff more confidence in advocating for this place. The more we know about the valley, the more passionately, clearly and uninhibitedly we can talk about the valley.”

Anthony South, Yaak Valley Forest Council



Standing by the banks of the Kootenai River in Troy, Montana, Anthony South looks out over the clear water and watches his dog Abbey chase a frisbee into the stream. South is the Headwaters Director for the Yaak Valley Forest Council (YVFC), a nonprofit organization based in Troy that, among other efforts, works on stream restoration and maintaining high water quality in the Yaak Valley's rivers. The support of Monitoring Montana Waters has made many of the group's water monitoring efforts possible, South explained.

Monitoring the health of waters in the Yaak Valley has been core to the YVFC's work since its inception, South said. Over the years, these efforts included testing the amount of sediment in streams to support decommissioning roads that cross them, surveys for fish barriers and sampling for aquatic invasive species like rainbow trout or zebra mussels. YVFC has also done extensive work on riverbank restoration in the area, using low-tech restoration methods and manual labor to restore degraded riverbanks on private land.

The Monitoring Montana Waters program "plugged in perfectly" into the Forest Council's ongoing efforts, South said, filling a "big gap" in the group's data by helping them test key water quality characteristics like the amount of nitrogen and

phosphorus in the water or how much oxygen is available for fish and other aquatic organisms. MMW's close alignment with their goal drove the Forest Council to become one of the inaugural groups in the program when it launched in 2021.

MMW also helps the group test selenium levels in the Kootenai River, South said. High levels of selenium can damage fishes' ability to reproduce, potentially causing the widespread collapse of fish populations with sufficient contamination. South said that selenium is a major concern in the area due to the high amounts of selenium laced runoff coming from open pit coal mines in the Elk River Valley area of British Columbia, Canada. This runoff flows into the headwaters of Kootenai River and makes its way into Montana.

South said that the technical assistance and support the program offers makes sophisticated water monitoring achievable for groups without extensive technical skills. "Almost anybody and everybody can go out and do it."

Each year of MMW monitoring begins with groups submitting a sampling analysis plan and a set of standard operating procedures to MMW staff for review. These documents outline the goals for a group's sampling effort, what characteristics they



will sample and where their sampling sites will be, as well outlining the details of their sampling procedures. MMW's 2024/2025 Big Sky Watershed Corps Member Brianna Elizondo said that MMW tends to start work with new groups through Zoom calls where they help walk them through the templates for the sampling analysis plan and standard operating procedures, and answer questions. Once the group starts drafting these documents, staff keep meeting with them and commenting on the drafts to help refine them, Elizondo said.

MMW also helps groups determine what water characteristics they might need to sample to understand the issues they are seeing. "Lots of groups when they come to us don't really know what nutrients are behind the issues they're seeing," Elizondo said. She said that MMW staff typically guide groups to start with testing levels of nutrients like nitrogen or phosphorus along with testing total suspended solids if they are concerned about sediments or various metals if mining waste is an issue.

Once the sampling analysis plan and the standard operating procedures drafted and being edited, groups are eligible to apply for funding to pay for the analysis of the samples they collect in the lab. The costs of sample collection, like time and driving, are covered by the water sampling group. Groups may

apply for grants from MMW to cover purchasing sampling gear every three years to help cover costs of things like water quality meters. Most of the sample processing and analysis is done at the FLBS Freshwater Research Lab, Elizondo said, although certain tests, like for selenium and other metals, are processed by the Brooks Applied Laboratory in Seattle.

Once the sampling season starts, the YVFC team coordinates heavily with the "amazing" MMW staff, South said, arranging shipping of the coolers and bottles that store water samples to the council and managing of the logistics of shipping the samples back to the lab so that they arrive within a week of collection.

The YVFC takes samples twice a year at 23 sites along the Yaak and Kootenai rivers and their tributaries. Samples are taken in the spring during high waters and in the late summer or fall when water in the river is at its lowest, South said, capturing the river's variations. Three to four YVFC staff typically take the samples, he said, although they were joined in the spring of 2025 by a volunteer from Glacier National Park as well. Sampling starts at the northern sites near the Canadian border and works south.

Once the samples are collected and the processed, results are

sent back to YVFC. South said that he goes over these results and compares them to Montana Department of Environmental Quality standards to detect sites and (characteristics) that may be abnormal. He also enters them into the DEQ MT-eWQX database that tracks water quality throughout Montana and into a recently launched stream data dashboard on the Forest Council website. Results are then also available in the national water quality portal.

The data gathered with MMW has “given staff more confidence in advocating for this place,” South said. “The more we know about the valley, the more passionately, clearly and uninhibitedly we can talk about the valley.” The data has helped open discussions with the public and community partners about selenium and other water quality issues, South said, in addition to being integrated into updated restoration plans for the area.

“Our work is kind of just the foundation, the cornerstone for what’s to come,” South said. The valley is changing rapidly, with warming temperatures, a growing population and increasing threats, both from contaminants like selenium and invasive species. South said that he hopes the data that YVFC collects using MMW can be part of the solution, providing a basis for ongoing advocacy and protection of the unique sub-boreal inland rainforest environments in the valley.

Driving along a backcountry Yaak Valley road in his 1993 pickup, South points out the North Fork of the Yaak River, which he said is the most heavily impacted of the Yaak’s four forks by agriculture in Canada. Although the fork has a lot of beaver activity, South said that phosphorus levels are high and the fish population is small. Understanding these issues is part of what drives the YVFC’s testing work South said. “That was part of our rationale or justification for testing was to try to have an undeniable finger pointed at something.”





Establishing baselines is one of the key purposes of data collection by groups participating in the MMW program. Our world and environment are rapidly changing, whether by warming temperatures or local influences like the growing populations and development occurring through much of Montana. Since our actions on land influence water quality, many of these changes have the potential to impact our rivers and lakes and the animals that live in them. High summer temperatures can stress populations of cutthroat trout and other fish valued by anglers and conservationists while the nitrogen and phosphorus contained in wastewater and fertilizer can cause harmful algal blooms. However, understanding these changes and risks to our waters requires having rigorous baseline data to understand conditions. MMW helps communities build those extensive baseline datasets, helping interested groups determine what characteristics they should monitor and helping them implement monitoring using scientifically credible methods. This effort provides communities with the data they need to understand environmental changes and human land-use impacts as they happen and prepare community groups, local and state governments to effectively respond to them.

“Without access to that kind of financial support, we wouldn’t even be able to begin to do what we’ve done.”

Jeff DiBenedetto, Rock Creek Watershed Group



Change is coming in the Rock Creek Valley, Jeff DiBenedetto explains. Rock Creek flows out of the Absaroka Beartooth Wilderness north of Yellowstone National Park, winding northward for 55 miles through a mix of small towns, subdivisions and agricultural lands until it empties into the Clarks Fork of the Yellowstone River about 30 miles east of Billings. The area is seeing growing development, and the potential for increased oil drilling in the Beartooth Front, DiBenedetto said. The area has also seen new environmental challenges, he said, such as large-scale flooding from Rock Creek through the valley's largest town of Red Lodge in 2022.

DiBenedetto's group, the Rock Creek Watershed Group, is working to prepare the valley for these changes by building strong baseline data on water quality in Rock Creek. In 2021, DiBenedetto said that members of group concerned about the impacts of development on the the creek and the connected aquifer began looking for water quality data about Rock Creek. They found that the Montana Department of Environmental Quality, which regulates the permitting of septic systems and other water related systems, had no data on water quality in Rock Creek. Without data, DiBenedetto said, it's impossible to tell how conditions in the creek may be changing or what impacts increased development, more septic systems or other stressors may be

having. Long term planning, such as work on grow policy by the Carbon County government, is also difficult without baseline data, he said.

Seeing this gap, the watershed group decided to launch its own water quality monitoring effort focused on Rock Creek in 2022, DiBenedetto said. This effort was supported and facilitated by Monitoring Montana Waters, which provides technical support, funding and volunteer training for the watershed group and its parent organization, the Carbon County Resource Council. The project involves sampling of 11 sites on Rock Creek and its tributaries, including locations in the national forest, near subdivisions and in regions with heavy agricultural activity. Between April and October, eight volunteers from the group take samples every month, testing nitrogen and phosphorus levels, pH, water temperature and other characteristics. Most of the sampling group members are retired and live in the area, DiBenedetto said, although they were recently joined by a younger volunteer connected to the local Trout Unlimited chapter.

"Without access to that kind of financial support, we wouldn't even be able to begin to do what we've done," DiBenedetto said, referring to grants MMW provides for sample analysis and gear.



The technical support and field training that MMW staff provide has also been “really good” for the watershed council, he said, helping them refine their sampling techniques and understand their data. This multifaceted support “helps local groups like ours get off the ground and get something going,” DiBenedetto said.

With three years of baseline data collected, the group is moving towards an “educational phase,” DiBenedetto said, even as they continue to gather more data. This educational phase includes efforts to engage both the public and local government officials about the importance of water quality and to teach them about the current water quality conditions in Rock Creek. DiBenedetto said that the baseline information is critical for this effort, as it “gives us factual information if we’re talking to the county planning board” or other similar organizations. He said that the county commissioners have developed a greater interest in water issues in recent years, including concerns about future water supply and how increased groundwater consumption may reduce local aquifers.

One recent success in this effort was a water quality forum

the group and the Carbon Country Resource Council held in February, 2025. The event featured multiple speakers, including MMW Program Leader Rachel Malison, who spoke on how MMW supports volunteers to monitor water quality. The event “kind of surprised us because we packed the room,” DiBenedetto said. About 70 people came to the “standing room only” event and more were turned away due to lack of space, he said.

Successful events like this are a sign that water quality is “maybe getting a bit more headway” to DiBenedetto. He said that the group plans to continue its educational work and sample collection in the future and is working on being included in future water planning efforts both by DEQ and local governments. He hopes that these plans will help facilitate further stream restoration efforts in the area and increased water quality standards for the area where measures to mitigate water quality impacts are based on best practices and data. The baseline water quality data the group has collected will be central in moving forward these advocacy efforts forward and forming a base for this work, DiBenedetto said. “There’s no point in collecting the data unless you’re going to make use of it.”





The data that MMW helps community groups collect is often funneled into efforts to educate and inform the public about local water quality issues and the health of their watersheds. After samples are analyzed in a lab, groups plot and analyze their data to show and think about how to communicate their findings to interested people and leaders in their communities. MMW helps groups interpret what the levels of compounds found in the water mean and what threat they might pose to the environment and the organisms in the water. MMW also consults with groups to help them craft strategies to translate their findings into an accessible, impactful form. Ideas and options for outreach efforts were highlighted during a portion of the annual training event held at FLBS in May 2025. However, outreach and education are ultimately driven by the community groups that MMW supports. Their passionate advocacy and deep connections within their communities are key to translating the data they collect with MMW support from valuable scientific information to community engagement, expanded knowledge and local, regional and state-level action to protect Montana streams and rivers.

“Our problem is how many people love this place and our solution is how many people love this place.”

Geoffrey Gill, Flathead Rivers Alliance



Most rivers monitored with MMW support are struggling in some way, impacted by significant water quality threats or other degradation. “We’re part of the MMW program for a very different set of concerns,” said Flathead Rivers Alliance (FRA) Volunteer Coordinator Geoffrey Gill. The group monitors the water on the North, Middle and South forks of the Flathead River. The North Fork runs southward on along the western edge of Glacier National Park while the middle and south forks run northwards from the Great Bear Wilderness and into the Flathead National Forest before eventually joining the North Fork. RA tests a total of 11 sites across the forks, including four sites on the North Fork, 6 sites on the Middle Fork and one on the South Fork.

The forks of the Flathead River are notably pristine, witnessed by their inclusion in the National Wild and Scenic Rivers system. Although the water is currently clean and clear, Gill said that the goal of the monitoring project is to keep it that way. “We are doing well with water quality ... and we need to be out here so we can know early and act early.”

The sampling program is on its third year, Gill said, and is working to expand volunteer participation. In 2023 and 2024 the sampling was primarily done by FRA staff, with a cadre of

volunteers taking over the work in 2025. Gill said that his goal in the future is that this cadre of volunteers will be able to take more lead of the program and help train new volunteers. The current volunteer group is deeply engaged with the details and nuances of water quality and conservation on the Flathead, Gill said. This group includes board members of local conservation organizations, people involved with the West Glacier Community Preservation Association and a member of the North Valley Search and Rescue. As the program grows, Gill said that he hopes to draw in a wider variety of people and make the program a “good entry point to river conservation.”

Beyond monitoring the river’s health, Gill said that the monitoring project helps the FRA with another of its projects, ensuring that visitors responsibly use the river. Glacier National Park sees 3 million visitors a year, Gill said, and the West Glacier boat ramp, which is one of the most accessible starting points for rafting the Flathead, serves between 9,000 and 10,000 people a day during the summer. “That is a staggering amount of folks,” Gill said.

FRA operates a volunteer river ambassador program, which places liaisons at popular river put ins and take outs. These liaisons provide information to boaters, remind them about