BIG SKY HEADWATERS PLAN

A STRATEGY FOR OPTIMIZING BIG SKY'S GREATEST ASSET

2024-2029 FIVE YEAR UPDATE

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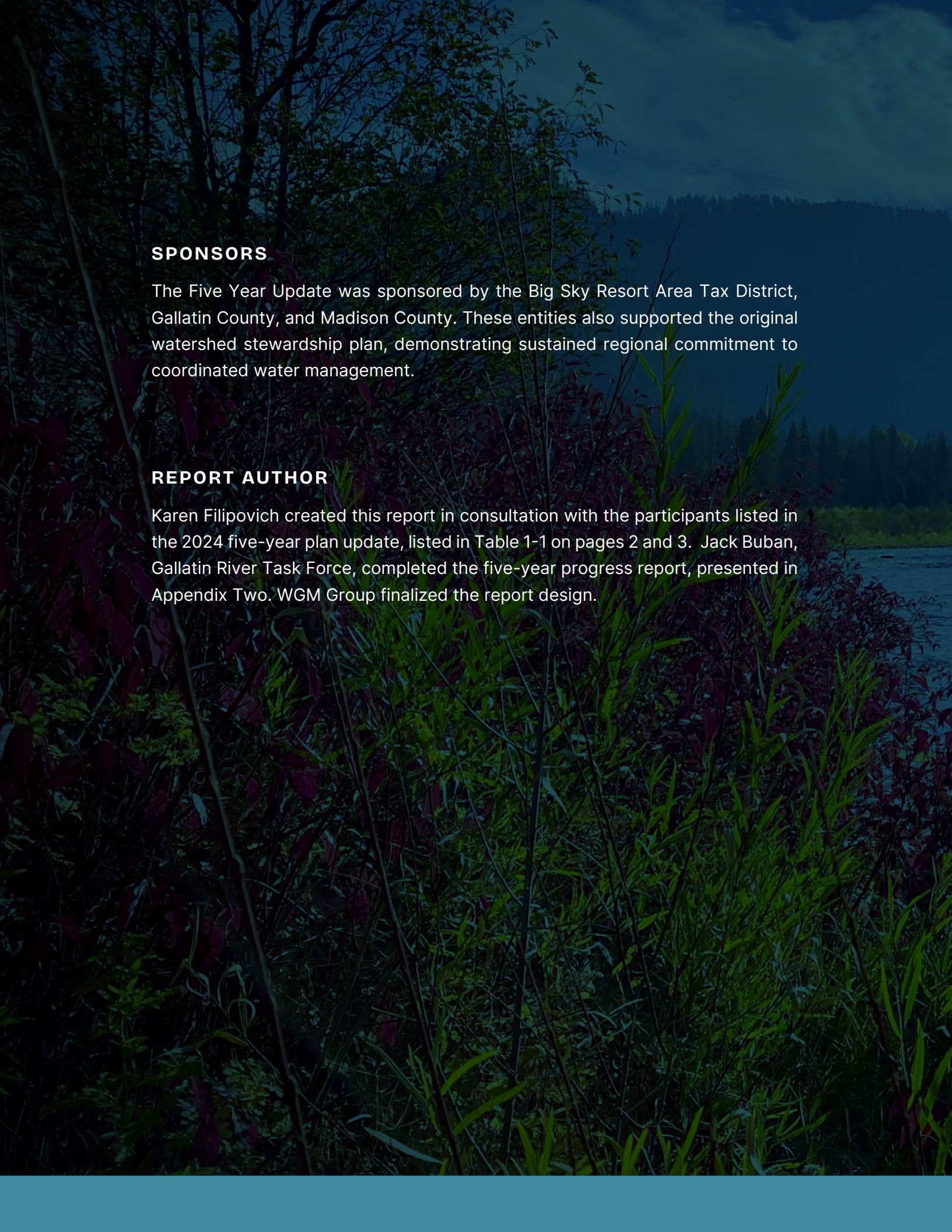
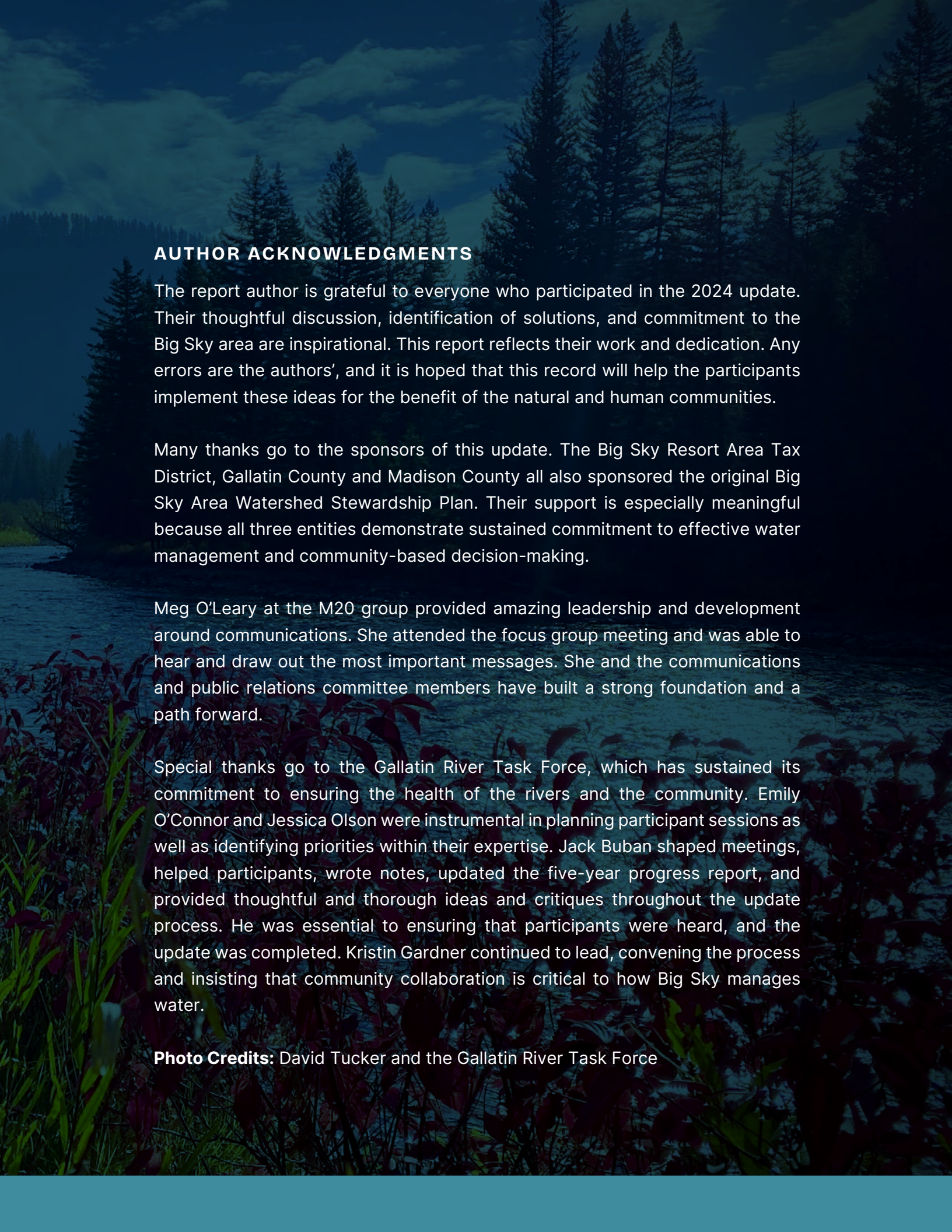


SPONSORS

The Five Year Update was sponsored by the Big Sky Resort Area Tax District, Gallatin County, and Madison County. These entities also supported the original watershed stewardship plan, demonstrating sustained regional commitment to coordinated water management.

REPORT AUTHOR

Karen Filipovich created this report in consultation with the participants listed in the 2024 five-year plan update, listed in Table 1-1 on pages 2 and 3. Jack Buban, Gallatin River Task Force, completed the five-year progress report, presented in Appendix Two. WGM Group finalized the report design.



AUTHOR ACKNOWLEDGMENTS

The report author is grateful to everyone who participated in the 2024 update. Their thoughtful discussion, identification of solutions, and commitment to the Big Sky area are inspirational. This report reflects their work and dedication. Any errors are the authors', and it is hoped that this record will help the participants implement these ideas for the benefit of the natural and human communities.

Many thanks go to the sponsors of this update. The Big Sky Resort Area Tax District, Gallatin County and Madison County all also sponsored the original Big Sky Area Watershed Stewardship Plan. Their support is especially meaningful because all three entities demonstrate sustained commitment to effective water management and community-based decision-making.

Meg O'Leary at the M20 group provided amazing leadership and development around communications. She attended the focus group meeting and was able to hear and draw out the most important messages. She and the communications and public relations committee members have built a strong foundation and a path forward.

Special thanks go to the Gallatin River Task Force, which has sustained its commitment to ensuring the health of the rivers and the community. Emily O'Connor and Jessica Olson were instrumental in planning participant sessions as well as identifying priorities within their expertise. Jack Buban shaped meetings, helped participants, wrote notes, updated the five-year progress report, and provided thoughtful and thorough ideas and critiques throughout the update process. He was essential to ensuring that participants were heard, and the update was completed. Kristin Gardner continued to lead, convening the process and insisting that community collaboration is critical to how Big Sky manages water.

Photo Credits: David Tucker and the Gallatin River Task Force

EXECUTIVE SUMMARY

Water defines Big Sky. It shapes the landscape, supports the community's economy, sustains fisheries and wildlife, and connects Big Sky to downstream communities across the Gallatin and Madison River systems.

As a headwaters community experiencing continued growth, Big Sky has both an opportunity and a responsibility to protect ecological health while meeting long-term community water needs.

The 2024–2029 Five Year Update to the Big Sky Area Watershed Stewardship Plan provides a coordinated, action-oriented framework for the next phase of water stewardship. Building on years of science, collaboration, infrastructure investment, conservation, and restoration, the Plan identifies priorities across three interconnected focus areas and provides a framework for moving high-value projects from planning to implementation.

A RENEWED NEED FOR ACTION

Since the 2018 Watershed Stewardship Plan, Big Sky has continued to grow and water management has become more complex. Development, recreation, drought variability, seasonal visitation, infrastructure needs, and increasing water demand place growing pressure on a limited and interconnected water system.

At the same time, Big Sky is better positioned to act. New science has improved understanding of how water moves through the landscape, and major investments in wastewater treatment, reuse, conservation, restoration, and monitoring have created a strong foundation for implementation.

PROGRESS & PATH FORWARD

Water stewardship efforts in Big Sky date back to approximately 2000, when water quality monitoring began under the Blue Water Task Force (later the Gallatin River Task Force).

The 2024–2029 update reflects progress achieved since 2018 and establishes priorities for the next five years. Between 2024 and 2029, focus group participants are expected to meet annually to review progress, address emerging challenges, and refine actions as needed.

COLLABORATION

The 2024 update was developed through a structured, collaborative process involving 37 individuals representing nonprofit organizations, private sector partners, local governments, state agencies, and community entities. Participants were invited and committed through a formal process, ensuring accountability and shared responsibility.

This model reflects the broader Big Sky Headwaters Partnership approach, which brings together 40 representatives to address water challenges across the Gallatin and Madison headwaters:

- AE2S
- Alpine Water
- American Rivers
- Association of Gallatin Agricultural Irrigators
- Big Sky Chamber of Commerce
- Big Sky Community Organization
- Big Sky Housing Trust
- Big Sky Owners Association
- Big Sky Resort
- Big Sky Resort Area District
- Big Sky Town Center
- Big Sky Trout
- Big Sky Vacation Rentals
- Big Sky Water and Sewer District
- Bucks T-4
- Canyon Water and Sewer District
- Gallatin City-County Health Department
- Gallatin County Commission
- Gallatin County Planning Department
- Gallatin Local Water Quality District
- Gallatin River Task Force
- Gallatin Watershed Council
- Gallatin Valley Land Trust
- Geyser Whitewater Expeditions
- Greater Yellowstone Coalition
- Lone Mountain Land Company
- M2O Group
- Madison Conservation District
- Madison County Commission
- Madison County Planning Department
- Montana Bureau of Mines and Geology
- Montana Department of Environmental Quality
- Montana Department of Natural Resources and
- Montana Land Alliance
- Montana Fish, Wildlife and Parks
- Trout Unlimited
- Upper Missouri Waterkeeper
- U.S. Forest Service
- WGM Group
- Yellowstone Club

Big Sky Water By The Numbers

43,000 ACRE FEET
Spring runoff leaving the West Fork annually

205M+ GALLONS
Water reused annually

$20M
Invested in reuse infrastructure

10,000 POUNDS
Nitrogen kept out of the Gallatin River annually

$60M
Invested in advanced wastewater treatment

PLAN STRUCTURE: THREE FOCUS AREAS

The 2024–2029 update is organized around three integrated focus areas:

1. ECOLOGICAL HEALTH OF THE RIVER SYSTEMS

Protecting and enhancing rivers, wetlands, riparian areas, and aquatic life through monitoring, restoration, conservation, and outreach.

2. WATER SUPPLY AND AVAILABILITY

Managing and balancing limited groundwater and surface water supplies to support fisheries, recreation, agriculture, and community needs.

3. WASTEWATER TREATMENT AND REUSE

Advancing higher treatment levels and expanding beneficial reuse for irrigation, snowmaking, and recharge to protect water quality and offset freshwater withdrawals.

Additional sections address stormwater, communications, governance considerations, funding, and the review process.

CROSS-CUTTING

These focus areas are supported by cross-cutting work in stormwater management, communications, governance, funding, and public engagement. Together, these elements form a practical framework for protecting Big Sky's headwaters while supporting long-term community needs. Progress in one area can create benefits across the others, making coordinated implementation essential.

STORMWATER MANAGEMENT

Stormwater projects can reduce sediment, improve water quality, support groundwater recharge, and help manage runoff from roads, development, and impervious surfaces. Projects such as rain gardens, treatment wetlands, and improved runoff management can help protect streams while supporting broader water resilience goals.

COMMUNICATIONS AND PUBLIC ENGAGEMENT

Many water management concepts are technical, but public understanding and support are essential. The Plan recommends continued investment in clear communications, public-facing materials, website content, poster boards, and outreach tools that explain why water stewardship matters and how projects benefit the community.

GOVERNANCE

Because Big Sky is unincorporated and spans multiple jurisdictions, clear governance and coordination are essential. The Partnership provides a structure for aligning priorities, clarifying roles, and helping partners move from planning to implementation.

FUNDING

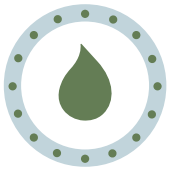
Long-term implementation will require sustained public and private investment. The Plan identifies the need for funding models that can support planning, design, construction, monitoring, maintenance, and communication over time. Public-private partnerships, district-based funding tools, grants, and local infrastructure investments will all play a role.

IMPACT & LIFT FRAMEWORK

A central feature of this update is the evaluation of each proposed action based on Impact and Lift:

- **Impact** reflects the anticipated ecological and community benefit.
- **Lift** reflects the level of effort, coordination, funding, or policy change required.

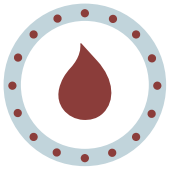
Actions are categorized to clarify which solutions are high-impact and achievable within the five-year window and which require greater effort or additional capacity. This framework supports strategic prioritization and transparent decision-making.



HIGH IMPACT LIGHTER LIFT

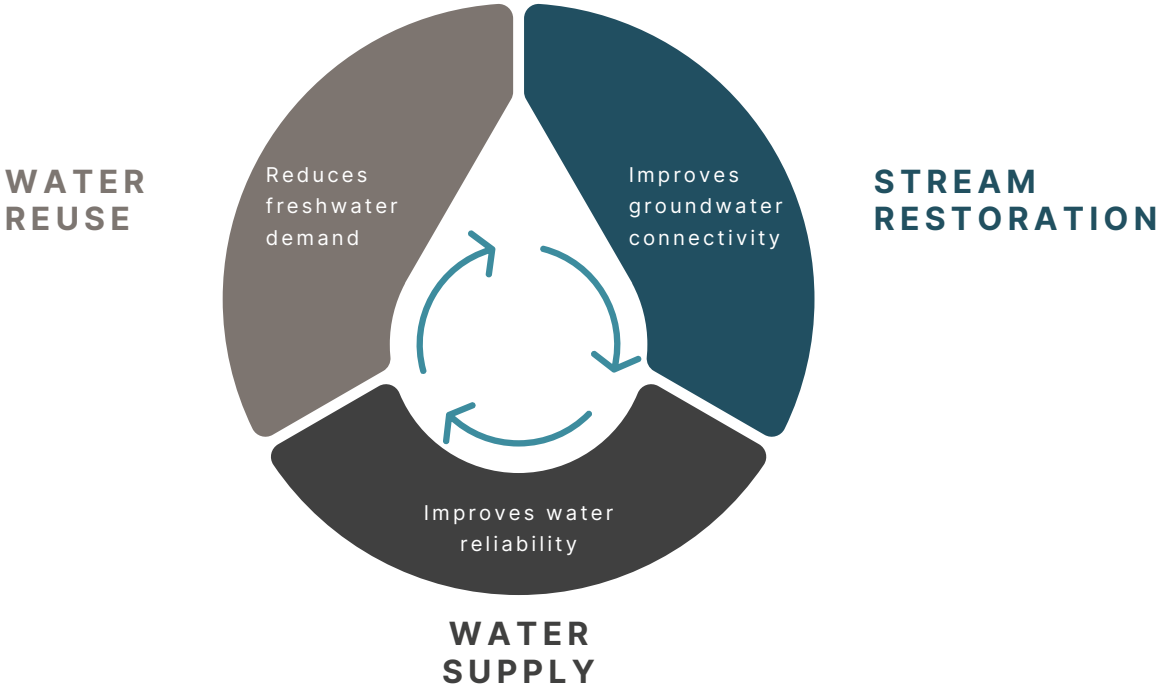
HIGH IMPACT HEAVIER LIFT

LOW IMPACT LIGHTER LIFT



LOW IMPACT HEAVIER LIFT

ONE WATER SYSTEM



FUNDING AND SPONSORSHIP

The Five Year Update was sponsored by the Big Sky Resort Area Tax District, Gallatin County, and Madison County. These entities also supported the original watershed stewardship plan, demonstrating sustained regional commitment to coordinated water management.

PRIORITIZE

Advance high-value projects with measurable ecological and community benefits

COORDINATE

Align partners, jurisdictions, funding, and capacity around shared priorities

TRACK & ADAPT

Track outcomes, adapt to new information, and communicate progress

BIG SKY HEADWATERS PARTNERSHIP

Ecological Health of the River Systems

Three Priorities for Healthier Rivers

Gallatin River Restoration Strategy

Provide designated river-access sites for everyone to enjoy.

Restore streamside vegetation to stabilize riverbanks, shade the water, and provide food and habitat for fish and other aquatic life.

West Fork Master Restoration Plan

Reconnect riverscapes. Restore habitat along the water's edge, benefiting fish and wildlife. Each mile of West Fork stream now supports about 4 acres of connected riverscape. Restoration could raise that to 8–11 acres per mile.

Slow the flow. Holding water on the landscape creates natural storage, so rivers keep running later into summer, when it's needed most.

Water Monitoring

Monitor water quality, water quantity, and stream life over the long term to build a clear picture of river health and guide restoration and water management actions.

This supports our shared goal of abundant, clean, cool water for the rivers and everyone who depends on them.

Protecting the headwaters of the Gallatin and Madison Rivers through smart water management, restoration, and reuse.

Steward the Source.

BIG SKY HEADWATERS PARTNERSHIP

Water Supply & Availability

Capture Spring. Sustain Summer.

Spring runoff is one of Big Sky's greatest water resources. By storing more of it — in our aquifers, natural systems, and reservoirs — and using less on summer landscapes, we can build a more resilient water supply for the future. This isn't about holding water back — it's about releasing it more gradually, which is better for Big Sky and for the communities downstream.

Opportunity #1

Managed Aquifer Recharge

One of Big Sky's best opportunities lies beneath it.

Directing spring runoff and stormwater into the ground to recharge our natural aquifers.

Opportunity #2

Natural Water Storage

Work with nature to store water.

Storing water naturally across the landscape improves stream health, habitat, and late-season water availability, often at a relatively low cost.

Opportunity #3

Reduced Summer Irrigation

Small changes add up to big savings.

Cutting back on summer irrigation is one of the biggest opportunities to stretch Big Sky's water supply — and it doesn't require any new infrastructure. The Alpenscapes program helps residents make that shift.

Numbers to know: 43,000 acre-feet of spring runoff leaves the West Fork each year, enough to fill 21,200 Olympic-sized swimming pools.

Protecting the headwaters of the Gallatin and Madison Rivers through smart water management, restoration, and reuse.

Steward the Source.

BIG SKY HEADWATERS PARTNERSHIP

Wastewater Treatment and Reuse

A State-of-the-Art Investment in Big Sky's Water Future

Big Sky's investment in water infrastructure isn't new — irrigation piping installed more than thirty years ago laid the groundwork for the systems now unlocking new opportunities to reuse water, strengthen resilience, and protect the rivers we all depend on.

Pilot Snowmaking

Operational in 2024

Piloted and launched innovative snowmaking, now operational to boost resilience.

~$20M

SCALE INVESTMENT

Committing to a $60M Plant

2020 Commitment to Lead the Way in Treatment & Reuse

Secured funding — through a 1% infrastructure ballot initiative — for a new water treatment plant to improve water treatment and expand reuse options and opportunities. Heavy front-end investment was needed to implement Big Sky's vision for holistic water solutions.

Reuse Infrastructure

Expanding piping for irrigation reuse

Big Sky has built and expanded systems that store, move, and reuse treated water across the community.

~$20M

SCALE INVESTMENT

Protecting the headwaters of the Gallatin and Madison Rivers through smart water management, restoration, and reuse.

Steward the Source.

SECTION ONE

INTRODUCTION & OVERVIEW

PURPOSE OF THIS UPDATE

In 2018, representatives from 35 nonprofit, private, local, and state entities interested in water management in the upper Gallatin watershed created the first watershed stewardship plan for the Big Sky area, geographically focused within the Big Sky Resort Area Tax District.

Over the past five years, progress toward many of the objectives in that initial plan has been accomplished, benefiting the Gallatin River, its contributing waters, surrounding land, and human and economic health.

PROGRESS AND CHALLENGES SINCE 2018

Over this timeframe, new water challenges have been identified. Participants in the 2024 update came together to focus attention on actions that will address these challenges and build on past successes and new opportunities.

- Significant progress toward improving wastewater treatment levels through the new Water Resource Recovery Facility (WRRF) plant designed and built by the Big Sky Water and Sewer District (BSWSD) and plant expansions within the Yellowstone Club and Moonlight Basin treatment facilities.
- Formation of the Gallatin Canyon Water and Sewer District, with a potential option to connect individual septic systems in Gallatin Canyon to the BSWSD WRRF to improve wastewater treatment.
- First reuse water snowmaking permit in Montana completed and in use at the Yellowstone Club.
- Restoration projects completed on the West Fork, Middle Fork, and Gallatin rivers, along with additional restoration planning.
- Increased water conservation efforts through improved metering within the BSWSD, water conservation incentives, and community education focused on efficiency and water wise landscaping efforts.
- Significant data collection and analyses completed on water supply, groundwater, and surface water quality and quantity, and algae to improve understanding and develop effective solutions.

New Challenges

Overall, the challenges that participants identified in 2018 continue. Additionally, a handful of further challenges have emerged, including:

- Algal blooms in the upper Gallatin River system.
- Residential and visitor growth outpaced even the highest projections.
- Increased recognition of flood potential as part of water variability.
- Lawsuits that are taking valuable time and money away from developing and implementing water solutions.

FIVE YEAR WATER SOLUTIONS UPDATE PARTICIPANTS

Participants agreed to work to identify feasible solutions and provide solutions to Big Sky's water management challenges. Participants were invited and accepted via a letter of commitment.

Table 1. Water Solutions Update Participants

PARTICIPANT	REPRESENTING
GINNETTE ABDO	Montana Bureau of Mines and Geology
GUY ALSENTZER	Upper Missouri Waterkeeper
SCOTT BOSSE*	American Rivers
PAT BYORTH	Trout Unlimited
JACK BUBAN	Gallatin River Task Force
RICH CHANDLER*	Lone Mountain Land Company
JEFF DUNN	WGM Group
RON EDWARDS	Big Sky Water and Sewer District
AMY FONTE	Big Sky Resort
LOREN FRANKLIN	Lone Mountain Land Company
KRISTIN GARDNER*	Gallatin River Task Force
SIERRA HARRIS	Greater Yellowstone Coalition
HOLLY HILL	Gallatin Watershed Council
STEVE JOHNSON	Big Sky Resort Area District
RICH MCELDOWNEY	Gallatin River Task Force
MACE MANGOLD	WGM Group/Canyon Water and Sewer District
PETER MANKA	Alpine Water/Big Sky Water and Sewer District
TAYLOR MIDDLETON	Big Sky Resort
WHITNEY MONTGOMERY	Big Sky Community Organization
TROY NEDVED	Big Sky Resort
LESLIE NOGARET	Gallatin River Task Force
DAVID O'CONNOR	Big Sky Housing Trust
EMILY O'CONNOR	Gallatin River Task Force
JOHNNY O'CONNOR*	Big Sky Water and Sewer District
JESS OLSON	Gallatin River Task Force
JON OLSEN	Lone Mountain Land Company/Canyon Water and Sewer District

PARTICIPANT	REPRESENTING
CONNOR PARISH	Trout Unlimited
MIKE RICHTER	Montana Bureau of Mines and Geology
WALT SALES	Association of Gallatin Agricultural Irrigators/Montana Legislature
TODD SHAW	Gallatin River Task Force
ALLISON STRINGER	US Forest Service
COLIN THRELKELD	Madison Conservation District
ADAM RUTZ	Big Sky Water and Sewer District
KEITH WELLSTONE	MT Fish, Wildlife and Parks
ASHLEY WILSON	Big Sky Community Organization
CHET WORK	Gallatin Valley Land Trust

**Steering Committee member*

In addition to community participants, several technical experts participated to provide information to help update this plan. These included Bill Todd, Madison County Commissioner; Jennifer Boyer, Gallatin County Commissioner; Danika Holmes, Department of Natural Resources and Conservation; Scott Buecker, AE2S; Andy Ulven, Department of Environmental Quality, and Nick Banish, Gallatin Local Water Quality District.

Communications

A communications and public relations committee led by Meg O'Leary of M20 Group and developed an overall communications plan.

Table 2. Water Solutions Update Communications Committee

PARTICIPANT	REPRESENTING
RICH ADDICKS	BIG SKY RESIDENT
TAMMY ESTENSEN	Big Sky Resort Area District
MARNE HAYES	Gallatin River Task Force
ANNA JOHNSON	Lone Mountain Land Company
STACIE MESUDA	Big Sky Resort
MEG O'LEARY	M20 Group
DAVID TUCKER	Journalist

SOLUTIONS

The solutions presented in this report have been identified as areas that are feasible to progress over the next five years, have a partner or partners that can work in this area, and are expected to have a positive impact. Several solutions will require significant additional funding and/or substantial effort to make progress. Below are descriptions of the column headers in each solutions table.

SOLUTION TOOLS

Several types of tools were identified in 2018. These help identify the skills and approaches needed for each of the solutions. They are identified in the "Solutions Tools" column and are:

Technical: These solutions employ monitoring, evaluation, and other analytical techniques or employ specific scientific and engineering methods.

Policy, Planning, and Regulatory: These solutions require a change in a policy, rule, ordinance, law, circular, or require a change in how an entity such as a homeowners association (HOA) chooses to operate.

Community/Collaborative: These solutions involve community and partner coordination or partnerships aligned across two or more organizations or entities.

Communications/Public Relations: These solutions include the development and dissemination of messages that help inform and support individual and community action around water and actions.

LEAD AND SUPPORTING PARTNERS

The identified partners are those who can commit to a leading or supporting role in implementing that solution. Other partners may be added as a project progresses or as new entities enter Big Sky. There are a handful of solutions that are important but may not have fully identified partners. Part of the lift required in these areas is identifying the partners to execute projects in these areas. Lead and supporting partners are outlined in the "Primary Partners" and "Additional Partners" columns. Appendix One spells out all acronyms used for partners and throughout this report.

IMPACT AND LIFT

Participants evaluated the impact and lift of each solution, and these are noted in the far-right column of each table. High impact solutions are a priority, though those with a heavy lift will be more difficult to achieve. The lift/impact scale is as follows:

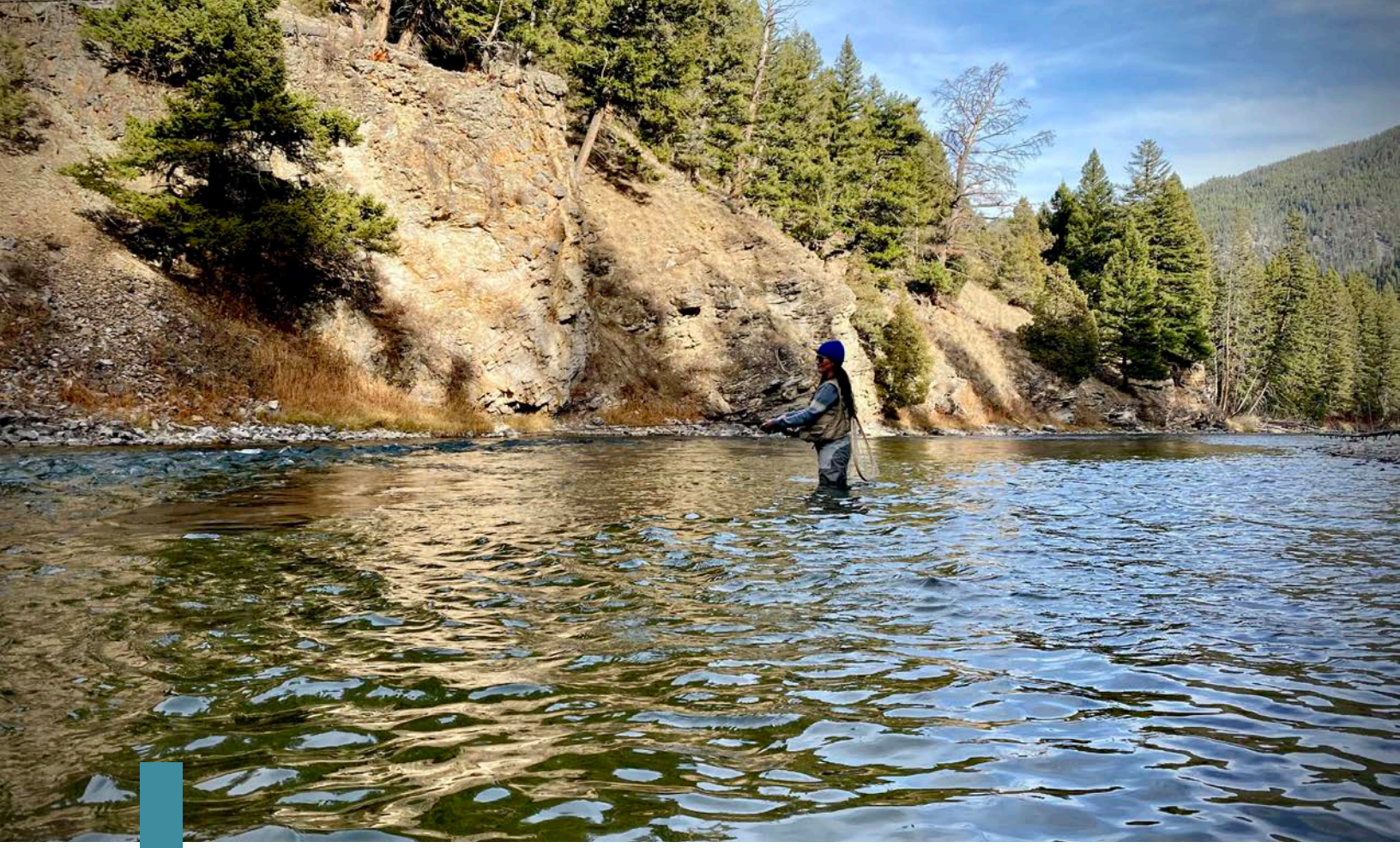
Actions likely to be completed within the five-year timeframe.

Areas where progress is likely in the next five years, and they may be difficult to complete within that timeframe.

Will be completed as there is time and capacity.

It is not expected that much progress will occur unless some type of change in the lift occurs to make it easier and/or the impact is found to be higher.

Additionally, there are some activities where the impact or lift is not well-characterized. A few activities do not have an initial impact and/or lift assessment. These are all coded with grey boxes, and the uncertainties notes with question marks. It is expected that these will be moved to an active assessment



SECTION TWO

ECOLOGICAL HEALTH OF THE RIVERS SYSTEMS

The Ecological Health of Our Rivers Systems section focuses on improving and protecting the health of the rivers, streams, riparian areas, wetlands, and aquatic life.

Challenges in the Ecological Health of the Rivers Systems focus area include:

Limited water supply and a growing community.

Data gap and community knowledge gap.

Stream health, including sediment, pollutants, habitat, and lwarm late-season temperatures.

Development outpacing conservation.

FOCUS AREA SOLUTIONS

The following identified actions will help Big Sky progress toward the enhancement of high-quality river systems and aquatic life.

WATERSHED STATUS, TRENDS, AND MONITORING

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Use multispectral drone imagery for detecting and identifying algae.			
Replace four GRTF stream gauges with the bubbler system.			
Increase Common understanding of trends through monitoring, data analysis, and reporting.			
Develop a technical advisory committee for the upper Gallatin watershed.			
Identify and address barriers to conducting an updated creel survey and annual stock assessment for wild trout populations.			
Engage river users in citizen science.			
Increase data collection of streamflow on small tributaries to determine the water holding capacity of those drainages.			
Develop “targets” or “triggers” based on environmental indicators based on science to inform action.			
Update fish management plan.			

LAND CONSERVATION

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Include opportunities to analyze water retention valuation as a potential benefit to landowners and the resource.			

WATERSHED RESTORATION

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Develop restoration plans for areas on public lands.			
Continue to support the USFS NEPA analyses for restoration projects by utilizing outside contractors when applicable.			
Advocate through MDT optimization planning process for sediment reduction practices on Hwy 191 from traction sand.			
Execute restoration plans addressing constituents of concern (Upper Gallatin Nutrient Assessment and Reduction Plan, West Fork Masterplan, Gallatin River Access Restoration Strategy, Middle Fork Restoration Plan).			
Improve horse manure management on private and public lands close to waterways.			
Expand identification and execute high value wetland restoration projects.			
Execute projects within the Gallatin River Access Restoration Strategy.			
Increase landscape scale water retention through micro scale dimpling projects in suitable areas across Big Sky.			
Increase activities to retain and reuse snow.			
Explore restoration opportunities for native westslope cutthroat trout in tributary streams.			
Replace inadequate culverts on Highways 64 and 191 to facilitate fish passage in areas where it does not interfere with westslope cutthroat trout genetic isolation.			
Enhance riparian buffers on unpaved road			

WATERSHED RESTORATION (CONT'D)

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Communicate on existing river and stream spill protocols.			
Explore management and mechanisms to reduce water runoff from bridges.			

WATERSHED OUTREACH

Outreach to increase community and visitors' understanding of conditions and actions that are important for further work.

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Engage with guests, tourists, and landowners on the importance of healthy riparian areas and slow the flow restoration.			
Direct recreators to lower impact river access sites.			
Produce a video focused on the benefits of restoration.			
Build a culture in the community that prioritizes restoration projects and promotes healthy riparian areas on private land.			
Utilize landowner ambassadors who have successfully executed restoration projects and can promote the value of restoration and partnership.			
Increase landowner and public awareness of the importance of wetlands & riparian areas.			

ECOLOGICAL HEALTH OF OUR RIVER SYSTEMS SOLUTIONS: EXPECTED BENEFITS

The expected benefits of progress on the actions in this section over the next five years include:

Improved understanding of existing conditions and water quality trends will enable successful management of activities that affect the health of river systems, riparian areas, and wetlands.

Preservation of existing high-quality stream, riparian, and wetland resources.

Restoration of streams, riparian and wetland areas that have been degraded.

Preservation and enhancement of native and wild trout fisheries and aquatic life.

Preserved and enhanced river recreation and amenity-based economy.

SECTION THREE

WATER SUPPLY AND AVAILABILITY

Big Sky's water supply is physically and legally limited, relying solely on groundwater as its drinking water source. Complex geography makes locating new water-supply wells challenging, and many wells produce less water than desired. Water rights are limited and mostly junior or subordinate to senior water rights downstream, necessitating solutions that make the most of scarce water.

Challenges in the Water Supply and Availability focus area include:

Limited water supply and a growing community.

Shallow, limited-volume aquifers that are vulnerable to contamination.

Variability in snowpack and late-season flows.

Groundwater withdrawals from individual wells can significantly impact the availability of freshwater supplies and stream flows.

Fragmented ownership boundaries have resulted in 20+ community water providers, leading to a lack of cohesive community-wide water management and use restrictions.

FOCUS AREA SOLUTIONS

Partners identified the following actions they can make progress on in the next five years. These are organized by the primary objective each action will fulfill.

OPTIMIZING WATER SUPPLY

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Optimize flows from Lake Levinsky.			
Investigate the feasibility and creation of snow mounds from reuse water.			
Explore and increase the use of greywater systems.			
Demonstrate the potential of Net zero water development projects.			
Engineer alpine lakes to regulate flow.			
Establish BSWSD capacity based on water supply instead of the currently used wastewater capacity.			
Investigate and analyze water use carrying capacity and tradeoffs.			
Explore and implement options for managed aquifer recharge to store spring runoff and augment late season flows.			
Monitor other regional cloud seeding efforts.			
Investigate snowmaking as a wetline for wildfire mitigation.			

Cross-cutting Solutions

In addition to these solutions that are primarily focused on water supply, there are several cross-cutting solutions that will address variable water supply but are implemented under the other focus areas:

Ecological Health of the River System:

- Microstorage projects and all process-based storage techniques (water bars, landscape dimpling).
- Wetland restoration.

Wastewater Treatment and Reuse:

- Increase snowmaking reuse and capturing its runoff.
- Snowmaking in the meadow.
- Targeted reclaimed snowmaking for recharge.
- Engineered wetland nutrient polishing and aquifer recharge.
- Explore indirect potable reuse.

GROUND AND SURFACE WATER MODELING AND ASSESSMENT

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Upgrade groundwater monitoring to include temperature and specific conductance along with water level.			
Use adaptive management and develop forecasts for groundwater supplies.			
Incorporate improved water supply regulations in subdivision reviews.			
Test the effects of water withdrawals and/or snow levels on ground and surface water levels within the Model Variable Augmentation (MVA) model.			
Increase data collection for flow on small tributaries to determine water holding capacity of those drainages.			
Examine potential of alluvial mountain wells for further water supply.			
Examine the potential and tradeoffs of Madison limestone for further water supply.			
Evaluate policies such as exempt well regulations, stream depletion zones, and controlled groundwater areas to address groundwater withdrawals from individual and community systems.			
Develop forecasts for groundwater supplies.			
Develop standards for indirect potable reuse for Montana.			

WATER CONSERVATION

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Increase water provider leak detection and repair efforts.			
Expand the use of water metering across the community.			
Expand rebates for more efficient indoor/ outdoor water use, document water savings, and continue the Big Sky Water Conservation Program.			
Complete Gallatin Drought and Deluge Adaptive Management Plan.			
Develop water conservation partnerships to align goals, messaging, and scale Big Sky Water Conservation Program impact.			
Coordinated outreach on the benefits of native landscaping through Alpenscapes.			
Increase messaging on the importance of water conservation.			
Support policies and rules that decrease fresh, potable water use through county and HOA regulation.			
Encourage policy changes to requirements for hot tub water cleaning policies between renters.			
Implement a seasonal drought surcharge for water rates.			
Develop firm caps on water use per house or per SFE in instances where tiered water pricing is proving ineffective			

WATER RIGHTS MITIGATION

Montana is a first in time, first in line state for water rights. All projects incorporate this legal reality, and it is especially important as part of mitigation projects.

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Evaluate existing streamflow relative to FWP instream flow reservations, Murphy Rights, and the relationship between groundwater and surface water interactions.			
Create and expand the water exchange program.			

FLOOD MANAGEMENT

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Monitor flood recovery efforts from Yellowstone River floods to inform future action plans to mitigate floods.			
Limit infrastructure that occurs in the floodplain (Water Course Commons).			

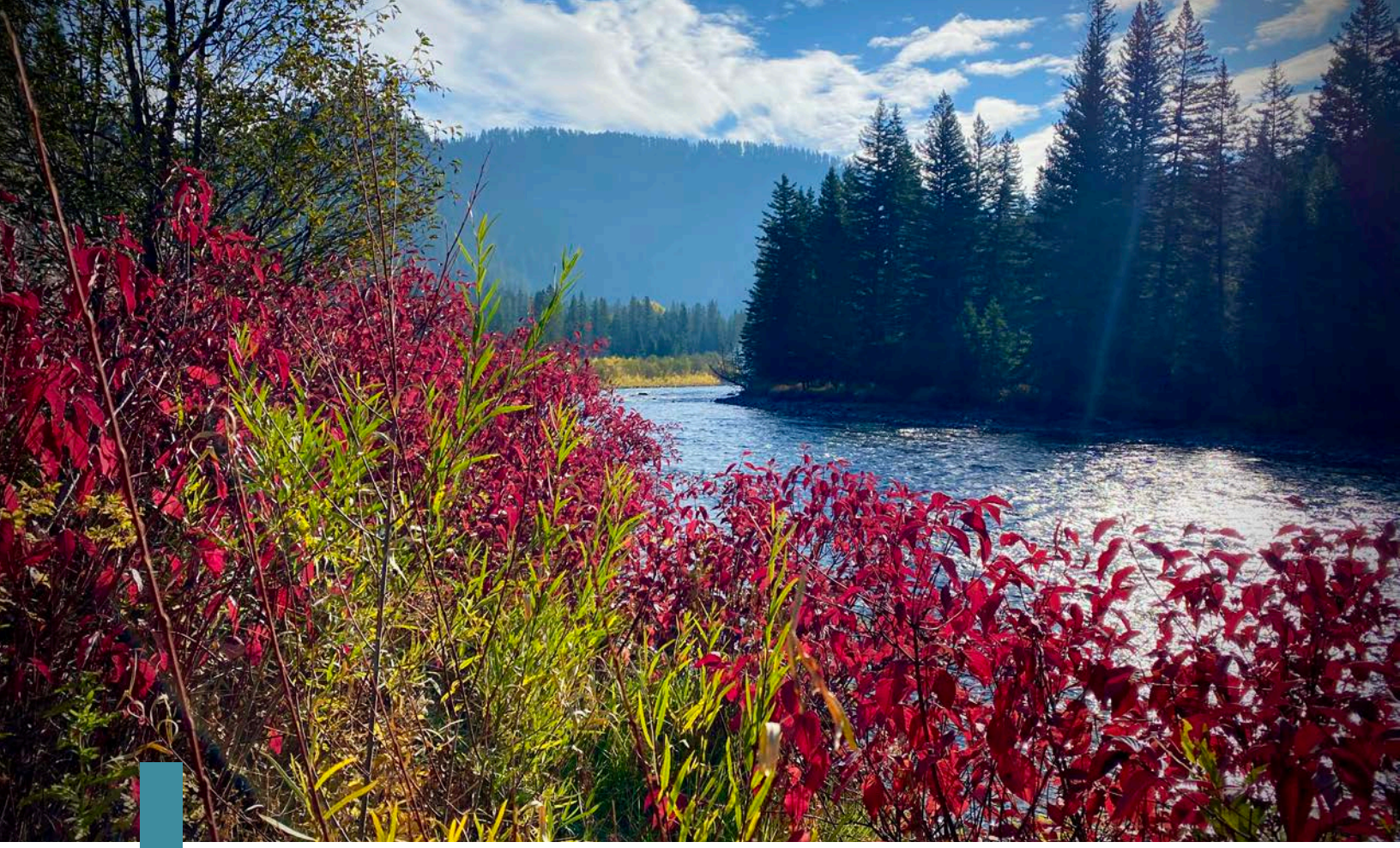
WATER SUPPLY AND AVAILABILITY: EXPECTED BENEFITS

The expected beneficial changes by making progress on these actions will contribute to:

Improved ability to maximize thoughtful use of limited groundwater and surface water supplies.

“Slowing the flow” of water through the system enhances delivery of clean water at critical times for fish and other aquatic life.

Increased resiliency from drought, climate variability, and wildfire.



SECTION FOUR

WASTEWATER TREATMENT AND REUSE

In the next five years, many action items in the Wastewater Treatment and Reuse area will capitalize on the higher wastewater treatment levels beginning in 2024, including the new Big Sky Water and Sewer District Water Resource Recovery Facility (BSWSD WRRF) in the Big Sky Meadow and the formation and initial expansion of the Gallatin Canyon Water and Sewer District. Expanding the options for treated water reuse is key to protecting human health and our river systems and offsetting surface and groundwater withdrawals.

Challenges in the Water Supply and Availability focus area include:

- High quality treatment.
- Reclaimed water.
- Low, warm late season streamflow.

FOCUS AREA SOLUTIONS

The following actions are organized by the primary objective each action will fulfill.

HIGHLY TREATED WASTEWATER

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Expand engineered wetland treatment systems and enhanced riparian areas to further treat reclaimed water and stormwater within a 100+ foot corridor on streams and rivers.			
Model treatment options, including natural treatment options.			
Conduct a salinity reduction pilot project.			
Evaluate a potential salinity control program and/or ordinance.			
Increase community education on the proper use of water softeners and the disposal of fats, oils, and grease (FOG).			
Share progress and innovations in wastewater treatment and reuse with other communities and the public.			

ADDRESSING SEPTIC AND SMALL COMMUNITY SYSTEMS

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Continue advocacy at the county and state levels to address septic systems.			
Improve wastewater provisions and review process in the Gallatin and Madison Counties subdivision requirements.			
Coordinate with counties to prioritize areas for septic upgrades vs. areas for centralized hookups.			
Evaluate the feasibility of a Septic Maintenance District pilot or program.			
Evaluate the feasibility of a septic maintenance rebate program.			
Expand the Gallatin Canyon Water and Sewer District.			
Ensure the feasibility of the Gallatin Canyon Water and Sewer District expansion.			
Prioritize hooking up existing septic system drain fields impacting the Meadow Village Aquifer to the BSWSD WRRF.			
Connect Firelight to the BSWSD WRRF.			

EXPAND BENEFICIAL REUSE

SOLUTION	CHALLENGE ADDRESSED	SOLUTION TOOL	IMPACT/ LIFT
Continue to evaluate reuse storage water balance and use portfolio.			
Evaluate reuse timing, shallow groundwater recharge project, and implement if potential exists as part of the Reuse Management Plan.			
Increase snowmaking reuse and runoff capture.			
Evaluate late season snowmaking.			
Partner with reuse snowmaking crews on training on increasing late season snow storage.			
Improve public understanding of human health safeguards in regard to treated water reuse.			
Improve public knowledge about zero direct discharge.			
Evaluate nutrient trading options.			
Advocate for an update to DEQ Circular 2 relative to reclaimed water infrastructure and to improve the chain of custody process for residential users.			
Continue to identify and expand reuse of reclaimed water for irrigation into new areas with purple pipe.			
Assess "fully consumptive" reuse modeling and its impacts on available downstream water.			
Investigate opportunities for indirect potable reuse.			
Explore snowmaking reuse opportunities in the meadow.			

Cross-cutting Solutions

Water Supply and Availability:

Water Supply and Availability: Many of the beneficial reuse solutions have direct benefits to water supply. Similarly, water supply has some solutions around snowmounds and maintaining a fire line that can include beneficial reuse. In Big Sky, a portfolio approach to water supply that directly includes reused water is a high priority.

WASTEWATER TREATMENT AND REUSE SOLUTIONS: EXPECTED BENEFITS

Improved water quality by addressing existing impairments.

Prevents future impacts to river systems from wastewater reuse by improving treatment levels and developing reuse alternatives that provide ecological benefits.

“Slowing the flow” of water through the system enhances clean water delivery at critical times for fish and other aquatic life.

Conserve valuable fresh water supply through increased beneficial reuse and recharge options.

SECTION FIVE

ADDITIONAL COMMITTEES AND NEEDED RESOURCES

STORMWATER FOCUS AREA

An initial stormwater/runoff modeling effort has been completed in the last five years. Participants have noted that stormwater capture and infiltration can improve water quality and slow the flow of water across the landscape.

Participants identified an initial set of solution ideas but did not have enough information to make determinations to prioritize and evaluate impacts.

Instead, a fourth focus group should be formed to evaluate and support partner implementation of this cross-cutting issue. Stormwater has water quality and water quantify implications for surface and groundwater. Identified areas with stormwater solutions are:

- Maximizing water supply.
- Watershed restoration and conservation.
- Watershed status and trends dashboard.
- Stormwater management.

The expected benefits of prioritizing and implementing further work in this area include improved water quality, groundwater infiltration and recharge, and further protection from overland flows during storm events.

COMMUNICATIONS AND PUBLIC RELATIONS COMMITTEE

Water management is important to everyday life, and the technical nature of activities and terms can cause confusion, creating a gap between the necessary work, the relevance to water resources, and ways that the community can engage and take action.

A communications and public relations committee has been established to provide a better understanding, with clear, coherent messaging about community-based solutions, progress, and specific actions. This committee is focused on the development of messaging in the following areas:

- Brand identity of the overall, high-level community-based effort.
- Specific messaging on the importance of community water and community-wide water management efforts.
- Consultation with other focus groups on communications around specific topics and best practices.
- Promote Big Sky as a one-water model for other western mountain towns to follow.

CROSS-CUTTING SOLUTIONS

The three focus area groups identified many solutions that require communications and public relations tools. The communications and public relations committee will be consulted as needed, and their overall guidance will be used to develop and implement all such solutions.

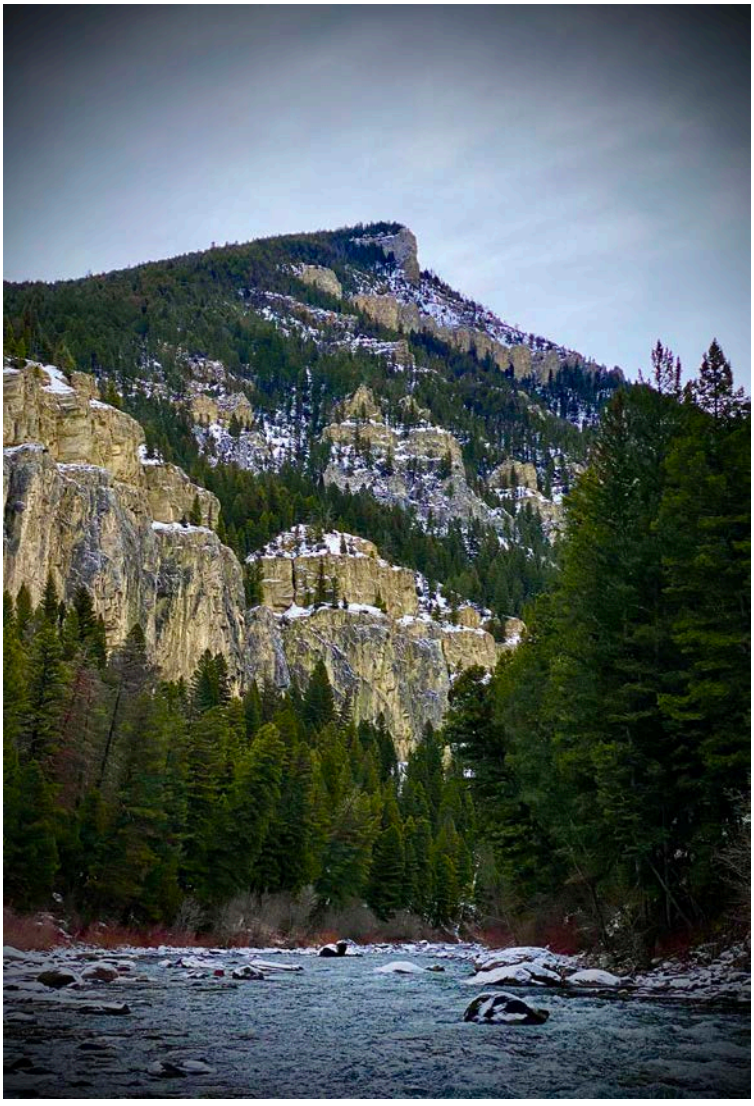
GOVERNANCE

In 2016, stakeholders identified management and government oversight as barriers to coordinated work. Progress has been made since 2018, but water management is still split between many entities and

two counties. Other efforts to evaluate options, such as municipal incorporation or larger centralized water and sewer district boundaries or other types of governance, are also opportunities to integrate and coordinate water management. Since the Big Sky Resort Tax is investigating governance in detail in 2025, this topic will be revisited after its final report to the Big Sky community.

FUNDING

Almost all the solutions outlined in this report require some form of funding. Some are already incorporated into a governmental or private budget, but most will require some form of additional funding. The 2018 plan required extensive additional funding from sources like the 1% for infrastructure vote through BSRAD, ARPA, and other COVID era stimulus funding and county, state, and federal funds to accomplish. This need will continue, especially for many of the larger projects and heavier lift solutions or those beneficial to individual users.



SECTION SIX

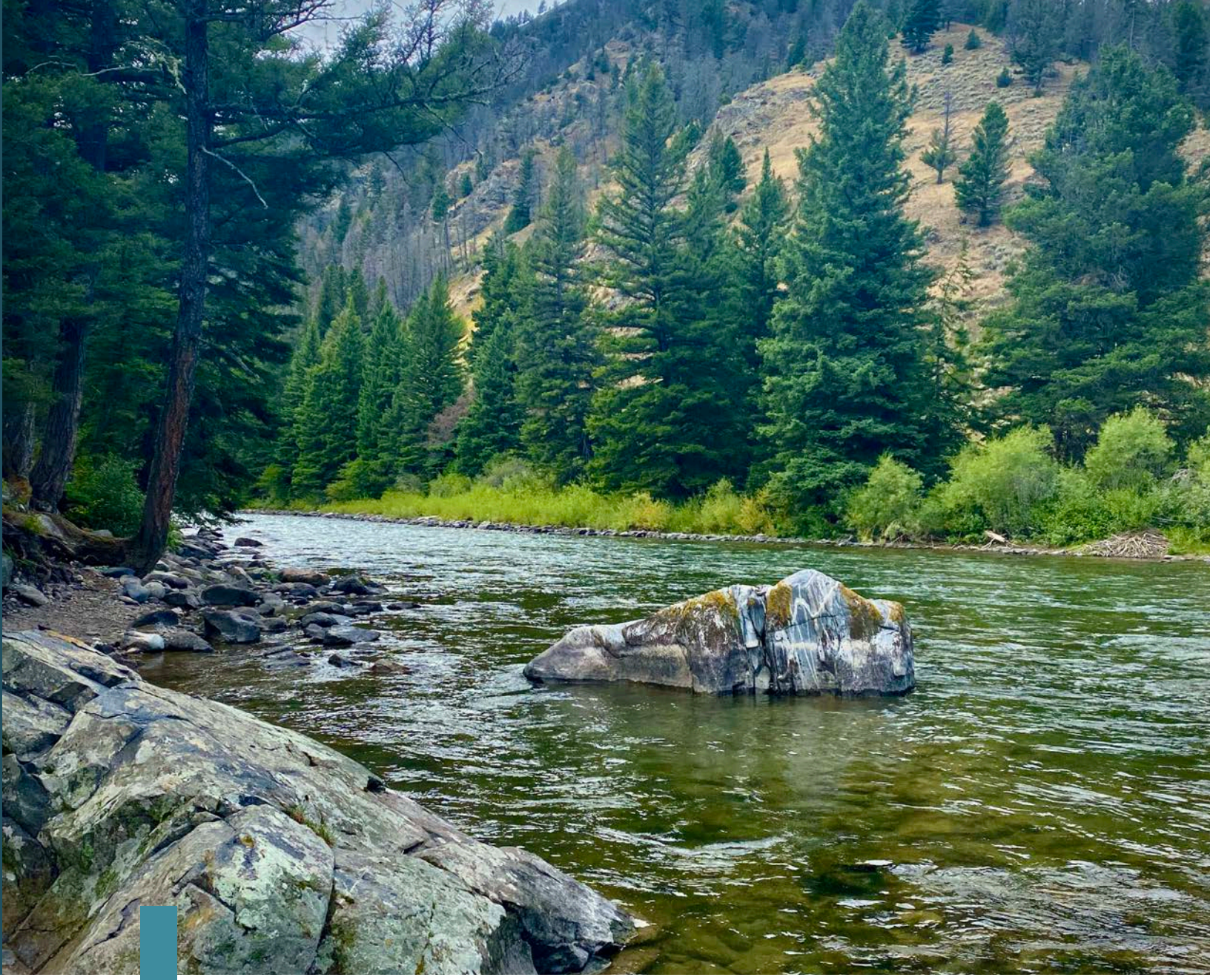
REVIEW PROCESS

Several technical analyses will be completed in the next five years, including water supply updates and the TMDL for the middle segment of the mainstem Gallatin River (Yellowstone National Park to the Spanish Creek confluence). Participants also continue to learn and adapt management practices to changing circumstances, taking advantage of further funding and improved technologies.

Between 2024-2029, focus group participants are expected to meet annually and discuss:

- Progress in the last year.
- New opportunities and challenges.
- Needed modifications or additions for progress.
- Identify and invite additional partners to work on specific actions.

Any changes will be incorporated as part of an annual review. Progress to date, solutions, and adaptations will be shared with the community through partner messaging and media outreach.



APPENDIX ONE

ACRONYM LIST

4CF	Four Corners Foundation
AGAI	Association of Gallatin Agricultural Irrigators
BSFD	Big Sky Fire Department
BSR	Big Sky Resort
BSWSD	Big Sky Water & Sewer District
BSRAD	Big Sky Resort Area District
CLLC	Center for Large Landscape Conservation
GCWSD	Canyon Water & Sewer District
GNFAC	Gallatin National Forest Avalanche Center
GYC	Greater Yellowstone Coalition
GWT	Gallatin Water Trust
COE	Army Corps of Engineers
DEQ	Department of Environmental Quality
DNRC	Department of Natural Resources and Conservation
FLUM	Future Land Use Mapping
FWP	Montana Fish, Wildlife, and Parks
HOA	Home Owners Association
GCWSD	Gallatin Canyon Water and Sewer District
GLWQD	Gallatin Local Water Quality District
GPHD	Gallatin Public Health Department
GRTF	Gallatin River task Force
GVLT	Gallatin Valley Land Trust
GW	Grow Wild
GWC	Gallatin Watershed Council
LPHS	Lone Peak High School

LMLC	Lone Mountain Land Company
MBMG	Montana Bureau of Mines and Geology
MCD	Madison Conservation District
MDT	Montana Department of Transportation
MLR	Montana Land Reliance
MOGA	Montana Outfitters and Guide Association
MTNHSP	Monatna Natural Heritage State Program
SNO	Big Sky Sustainable Network Organization
MSU	Montana State University
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TU	Trout Unlimited
UMWK	Upper Missouri Waterkeeper
USFS	United States Forest Service
WGM	WGM Group, Inc.
WRRF	Water Resource Reuse Facility
YC	Yellowstone Club

APPENDIX TWO

STATUS OF THE 2018 BIG SKY SUSTAINABLE WATERSHED STEWARDSHIP ACTION ITEMS REPORT CARD

The following dashboard is designed to easily illustrate the status action items outlined in the 2018 Big Sky Sustainable Watershed Stewardship Plan. They are grouped by the focus areas of the plan. Status is as of January 2024. Timelines for action items are defined as **quick start (2018), short term (2019-2023), mid-term (2024-2028), and long term (2029+).** The status of projects is color coded according to the color guidelines below.

GREEN: Complete/Continuously Ongoing.
YELLOW: In Progress.
RED: Not started.

ECOLOGICAL HEALTH OF OUR RIVER SYSTEMS

GOAL: ***A HEALTHY AND RESILIENT RIVER SYSTEM SUSTAINED THROUGH A PRINCIPLED APPROACH TO WATERSHED STEWARDSHIP THAT INCLUDES HUMAN ACTIVITIES AND NATURAL PROCESSES THAT MAINTAIN AND ENHANCE STREAM, RIPARIAN AND WETLAND CONDITIONS AND CONNECTIONS, ENSURING WATER REMAINS CLEAN AND COLD.***

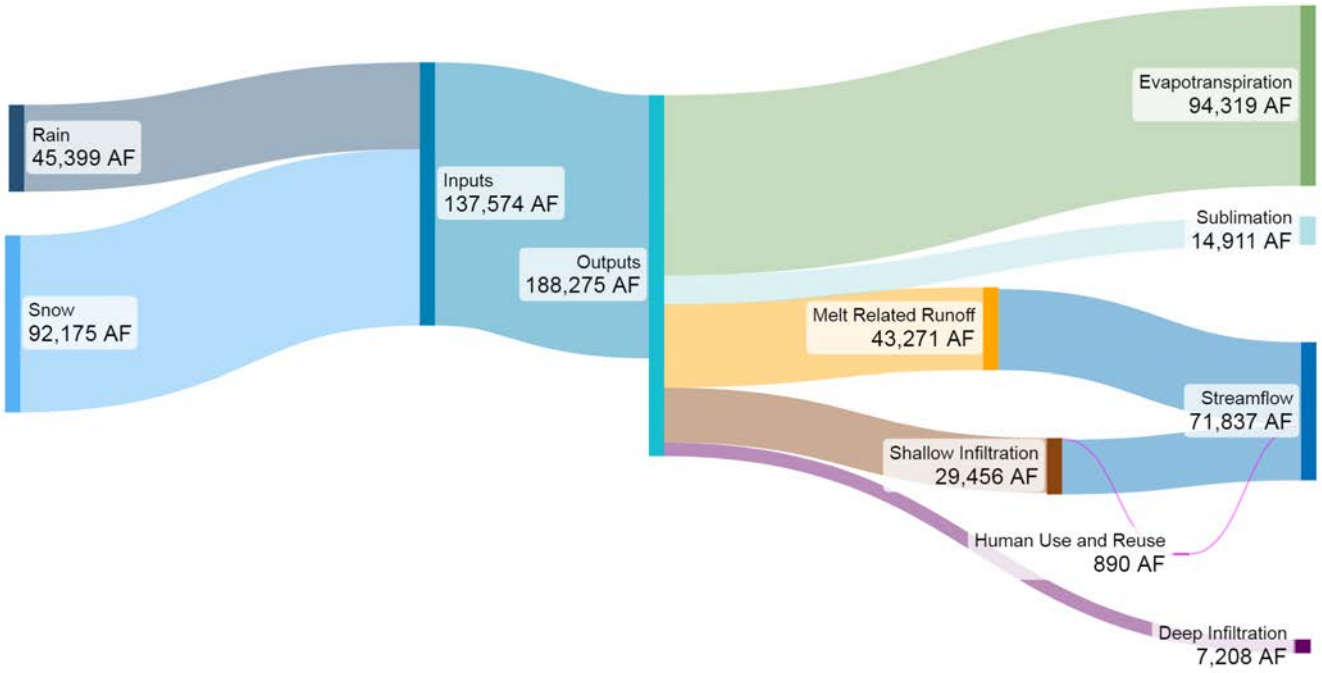
WHAT	STATUS	WHO	TIME-LINE	NOTES
Watershed Status and Trends Monitoring				
Develop expanded monitoring program		GRTF DEQ FWP	Quick start	
Develop technical advisory committee			Quick start	
Develop SAP/QAPP for expanded monitoring programs for trends monitoring, filling data gaps, future permitting, and identifying areas for restoration and conservation		GRTF	Quick start	
Initiate expanded monitoring program		GRTF DEQ FWP	Quick start	• Developed expanded algae/nutrient monitoring focus after 2018 bloom. • West Fork and Gallatin fish counts
Monitor data analysis and reporting		GRTF DEQ FWP	Quick start	• Annual algae/nutrient data analysis, reporting performed. • West Fork and Upper Gallatin fish counts performed in 2021 and 2024 • Reporting not completed
Establish funding plan for Years 1-3		GRTF DEQ FWP	Quick start	Funding plan for algae monitoring
Continue expanded monitoring program, adapt as needed to track water quality trends, fill identified data gaps, provide baseline information for permitting actions, and identify areas for restoration and conservation activities		GRTF DEQ FWP	Short term	• Algae/nutrient focus • Fish counts performed in 2021 and 2024
Establish and maintain long-term funding mechanism		GRTF DEQ FWP	Short & Long	
Continue expanded monitoring program, adapt as needed		GRTF DEQ FWP	Mid-to-long	

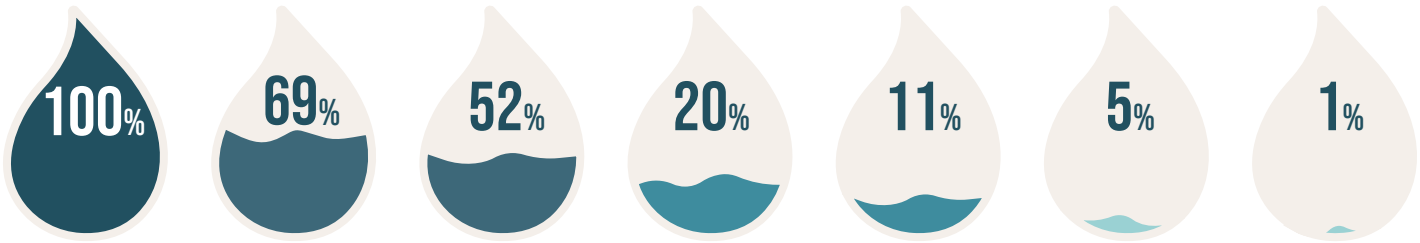
WHAT	STATUS	WHO	TIME-LINE	NOTES
Update SAP/QAPP as needed		GRTF DEQ FWP	Mid-to-long	
Monitoring data analysis and reporting			Mid-to-long	
Utilize data to document ecological improvements and guide future restoration and conservation activities			Mid-to-long	
Watershed Status and Trends Dashboard				
Establish environmental indicators and monitoring programs		GRTF DEQ FWP		
Develop dashboard based on environmental indicators, including online and in-town; update dashboard with monitoring data		GRTF		Drought dashboard completed
Develop communication and outreach plan		GRTF	Short term	Annual water quality report card and outreach via Task Force media channels and Explore Big Sky. Story map created but not published.
Engage water resources managers on utilization of trend data for decision making		GRTF	Short term	
Develop "targets" or "triggers" based on established environmental indicators		GRTF DEQ FWP	Short term	
Continue to update dashboard with monitoring data, provide analysis and explain implications		GRTF	Mid-to-long	
Use dashboard for adaptive management of water resources		GRTF	Mid-to-long	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Use "targets" or "triggers" for established environmental indicators to document ecological improvements resulting from restoration, conservation and management actions		GRTF	Mid-to-long	
Watershed Restoration and Conservation				
Identify projects to prioritize from existing plans		GRTF	Quick start	
Identify partners to pursue implementation of specific projects		GRTF	Quick start	
Update Upper Gallatin River Watershed Restoration plan for impaired streams		GRTF	Quick start	Completed Upper Gallatin Nitrogen Assessment Reduction Plan. In progress West Fork Master Restoration Plan
Document restoration and conservation actions already taken		GRTF GVLT MLR TNC	Quick start	
Identify projects to prioritize from existing plans and newly collected data, implement restoration and conservation projects		GRTF	Short term	Middle Fork #3 Upper Deer Creek
Continue to seek funding sources for project implementation		GRTF	Short & Long	
Engage private landowners in conservation activities		GRTF GVLT MLR TNC CLLC	Short term	
Continue to implement restoration and conservation projects; utilize monitoring data to prioritize future projects		GRTF GVLT MLR TNC CLLC	Mid-to-long	

GOAL: *MANAGE AND BALANCE SURFACE AND GROUNDWATER SUPPLIES FOR A VIBRANT COMMUNITY SUSTAINING A BROAD SPECTRUM OF USES AND VALUES INCLUDING FISHERIES, WILDLIFE, RECREATION, AGRICULTURE, MUNICIPAL AND DOMESTIC NEEDS.*

West Fork Water Budget Summary





Precipitation | **Evapo-transpiration** | **Streamflow** | **Shallow Infiltration** | **Sublimation** | **Deep Infiltration** | **Human Use and Reuse**

WHAT	STATUS	WHO	TIME-LINE	NOTES
Groundwater Monitoring and Modeling				
Identify additional streamflow monitoring sites/gauging stations and groundwater monitoring sites; incorporate into Watershed Status and Trends Monitoring Program SAP/QAPP		GRTF GLWQD MBMG BSWSD USGS	Quick start	• Gallatin USGS gauge above Deer Creek • Middle Fork gauge • Meadow Aquifer Study
Apply to MBMG GWIP for funding Lower Basin ("Canyon") aquifer study		GRTF	Quick start	
Review results of MBMG GWIP Meadow Village aquifer study		BSWSD GRTF		
Establish funding for years 1-3		GRTF GLWQD MBMG	Quick start	
Implement expanded groundwater and surface water monitoring; provide data in real-time and as updates to the Watershed Status and Trends Dashboard		GRTF GLWQD MBMG BSWSD USGS	Short term	No dashboard
Conduct Lower Basin ("Canyon") aquifer study		MBMG	Short term	Reports in internal review
Adapt management decisions for Big Sky Golf Course and institute protective measures based on results of Meadow Village aquifer study; add real-time tracking of groundwater elevations and obtain additional soils data		BSR MBMG BSWSD	Short term	
Establish and maintain long-term funding mechanism			Short term	

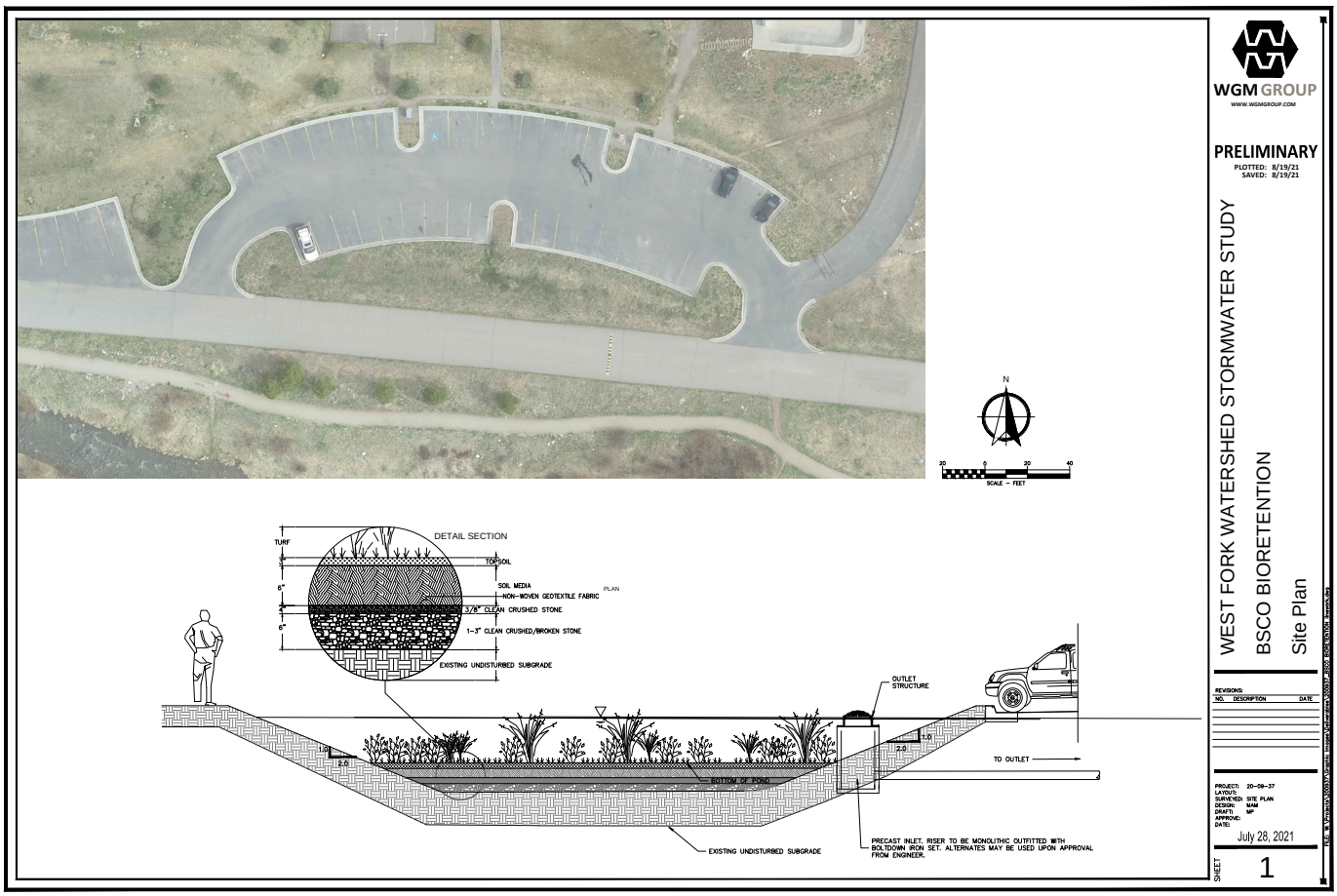
WHAT	STATUS	WHO	TIME-LINE	NOTES
Refine water yield estimates and develop water balance for West Fork watershed; develop water yield and water balance for Jack Creek watershed; use information to manage water use and reuse and to develop "targets" or "triggers" for management actions		GRTF	Short term	West Fork in progress
Evaluate exempt well regulations, stream depletion zones, and controlled groundwater areas as potential tools for addressing groundwater withdrawals from individual wells and community systems			Short term	
Continue groundwater and surface water monitoring; expand as needed; provide data in real-time and as updates to Watershed Status and Trends Dashboard		GRTF GLWQD MBMG BSWSD USGS	Mid & Long	
Adapt management decisions based on results of Lower Basin ("Canyon") aquifer study; update Canyon Area Wastewater Treatment and Disposal study; identify future groundwater priority areas for assessment		GCWSD	Mid-term	Canyon study updated.
Adapt management decisions for Big Sky Golf Course based on data; develop seasonal forecasts for groundwater supplies			Mid-term	
Conduct additional studies in groundwater priority areas			Long term	
Continue to adapt management decisions based on data; develop seasonal forecasts for groundwater supplies			Long term	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Strategies for Water Conservation				
Outreach to HOAs and community on conservation practices		GRTF	Quick start	Working with SNO on Sustainable HOA Program
Outreach on the Task Forces' Big Sky Water Conservation rebate program		GRTF	Quick start, short, mid, long	Ongoing marketing campaign. Water Conservation Toolkit in the works.
Develop landscape design and irrigation ordinance for BSCWSD that outlines new water efficient specifications		BSCWSD	Quick start	Irrigation ordinance in place. No landscape ordinance.
Investigate potential changes to existing covenants, regulations, and zoning		HOAS GRTF	Quick start	
Identify short and long-term funding sources			Quick start	
Continue the Task Forces' Big Sky Water Conservation rebate program		GRTF	Short term	Program established in 2016.
Utilize regulations to enforce conservation (zoning, building codes, architectural review, subdivision review, landscaping requirements, controlled groundwater area)			Short term	Several HOA's have updated their landscaping requirements.
Document expanded irrigation reuse through purple pipe hook ups		GRTF Town Center	Short term	BSCO purple pipe project
Document water savings from residential participants of Big Sky Water Conservation rebate program		GRTF	Short term	11,000,000+ gallons saved since 2016.
Expand Water Conservation Program to include incentive options for commercial/ municipal water users		GRTF	Short term	Commercial incentives offered in 2022.

WHAT	STATUS	WHO	TIME-LINE	NOTES
Develop xeriscaping demonstration projects to showcase waterwise landscape design options		GRTF Grow Wild Alpen-scapes	Short term	Crail Gardens. Alpenscapes.com in the works.
Moonlight Basin: expand water metering		LMLC	Short term	60-70% done
Identify and implement opportunities for gray water reuse projects			Short & Long	
Reduce water supply demands by retirement of existing development rights			Short term	
Utilize regulations to enforce conservation (zoning, building codes, architectural review, subdivision review, landscape requirements, controlled groundwater area)			Mid-to-long	
Continue to document water savings from residential participants of Big Sky Water Conservation rebate program			Mid-to-long	
Continue to expand Big Sky Water Conservation Program			Mid-to-long	
Stormwater Management				
Initiate inventory of existing stormwater outfalls and identify areas where needed			Quick start	
Outreach to developers and HOAs on instituting BMPs; spot check construction sites for compliance with BMPs			Quick start	
Establish funding sources for stormwater management			Quick start	
Complete inventory of existing stormwater outfalls, model stormwater flows, and identify areas where infrastructure improvements are needed			Short term	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Continue outreach to developers and HOAs on instituting BMPs; spot check construction sites for compliance with BMPs			Short term	
Maintain funding sources for stormwater management			Short term	
Investigate MS4 designation and/or develop stormwater management plan			Short term	
Identify linkages between stormwater and sediment TMDLs			Short term	
Implement stormwater infrastructure improvements			Mid-to-long	
Continue outreach to developers and HOAs on instituting BMPs; spot check construction sites for compliance with BMPs			Mid-to-long	
Implement stormwater management plan; adapt as needed			Mid-to-long	
Address sediment TMDLs by improving stormwater infrastructure			Mid-to-long	
Mitigation of Water Rights				
Evaluate "physical availability" vs " legal availability" in mitigation of water rights			Short-to-long	
Evaluate implications to senior rights holders			Short-to-long	
Evaluate existing streamflows relative to FWP instream flow reservations and the relationship between groundwater and surface water interactions			Short-to-long	

GOAL: *DEVELOP AND IMPLEMENT HOLISTIC WASTEWATER AND STORMWATER MANAGEMENT, UTILIZING BEST AVAILABLE TECHNOLOGIES AND PRACTICES, TO MEET BIG SKY'S LONG-TERM COMMUNITY NEEDS AND PROTECT AND IMPROVE THE ECOLOGICAL HEALTH OF THE RIVER SYSTEMS.*



WHAT	STATUS	WHO	TIME-LINE	NOTES
High Treatment Levels for Treated Wastewater				
Identify potential treatment levels attainable with BSCWSD wastewater treatment plant upgrades		BSWSD	Quick start	
Educate community on treatment levels for the various types of systems currently in use		BSWSD GRTF Resort Tax GCWSD	Quick start	
Identify necessary treatment levels for priority reuse alternatives (irrigation, snowmaking, shallow groundwater recharge)		BSWSD LMLC	Quick start	
Upgrade treatment plant infrastructure to improve level of treatment		BSWSD GCWSD LMLC	Short-to-long	
Continue to educate the community on treatment levels for the various types of systems currently in use		BSWSD GRTF GCWSD LMLC	Short-to-long	
Continue to identify necessary treatment levels for priority reuse alternatives (irrigation, snowmaking, shallow groundwater recharge); incorporate cost information as available		BSWSD GRTF GCWSD LMLC	Short-to-long	
Identify potential for the use of treatment wetlands		BSWSD LMLC GCWSD	Short-to-long	
Upgrade treatment levels as opportunities arise across all infrastructure		BSWSD LMLC GCWSD	Short-to-long	
Engage septic system and small community system owners in Gallatin Canyon and outlying areas		GCWSD	Quick start, short, mid, long	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Education and outreach on septic maintenance		GRTF	Quick-to-long	
Apply to MBMG for funding Lower Basin ("Canyon") aquifer study, including nutrient loading and assessment		GRTF	Quick start	
Evaluate groundwater data in Gallatin Canyon and surface water data for the Gallatin River; expand monitoring data to document nutrient inputs from septic systems		GRTF	Quick start	
Conduct Lower Basin ("Canyon") aquifer study, including nutrient loading assessment		MBMG	Short term	
Develop and implement a plan with BSCWSD to accept more septage and reduce the need to truck to Gallatin Valley		BSWSD	Short term	
Implement strategy to improve septic systems in areas that are unlikely to be placed on a centralized system		GCWSD Firelight	Short & Long	
Coordinate with Gallatin County on areas for septic system upgrades compared to areas likely to be places on centralized system			Short term	
Continue to engage septic system and small community system owners in the Gallatin Canyon and outlying areas			Mid-to-long	
Continue groundwater and surface water monitoring along the Gallatin River to document nutrient inputs from septic systems			Mid-to-long	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Implement strategy to improve septic systems in areas that are unlikely to be placed on a centralized system			Mid-to-long	
Develop and implement a strategy for centralizing portion of the existing septic systems, either by expanding existing BSCWSD or establishing a new district, if indicated as Lower Basin ("Canyon") residential decision on most feasible strategy			Mid-to-long	Gallatin Canyon Water and Sewer District
Expand Water Reuse for Irrigation				
Develop partnerships and coordinating mechanisms for modernizing greenspace management with irrigation reuse		BSWSD LMLC BSCO GRTF Chapel	Quick start	
Develop a plan with BSCWSD for additional monitoring in irrigated areas to ensure full consumption of land applied effluent		BSWSD GLWQD GRTF MBMG	Quick start	
Start identifying areas for irrigation expansion using purple pipes		LMLC BSCO	Quick start	
Establish modernized greenspace management			Short-term	
Implement monitoring of irrigated areas to ensure full consumption of land applied effluent; communicate progress to community		BSWSD GLWQD GRTF MBMG	Short & Long	
Expand irrigation into new areas using purple pipes; continue identifying areas for additional irrigation expansion		GRTF BSWSD LMLC BSCO	Short-term	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Develop plan for expanded storage and seasonal considerations for reuse between irrigation and snowmaking		GRTF LMLC BSR BSWSD	Short-term	
Map existing drain tiles under Big Sky Golf Course and develop a plan to address potential transport of land applied water to the river through the drain tiles		BSR BSWSD	Short-term	
Identify relationship between irrigation and groundwater recharge		BSR BSWSD	Short-term	
Continue to expand irrigation into new areas using purple pipes; continue identifying areas for additional irrigation expansion			Mid-to-long	
Implement a plan for expanded storage and seasonal considerations for reuse between irrigation and snowmaking			Mid-to-long	
Implement a plan to address potential transport of land applied wastewater to the river through drain tiles on the Big Sky Golf Course			Mid-to-long	
Develop Water Reuse for Snowmaking				
Initiate process with DEQ to develop a regulatory framework for making snow with treated effluent		LMLC	Quick start	
Determine monitoring parameters required for permitting snowmaking with treated effluent and develop monitoring network and SAP; begin monitoring		LMLC	Quick start	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Examine other areas where treated effluent is being used for snowmaking to help identify engineering and regulatory requirements		LMLC	Quick start	
Identify necessary infrastructure improvements (pipes, ponds, etc.) required to begin snowmaking with treated effluent by November 2020		LMLC	Quick start	
Finalize regulatory framework; obtain approval from the Board of Environmental Review		LMLC	Short-term	
Develop effective coordinating mechanism between BSCWSD and ski resorts		LMLC BSWSD	Short-term	
Continue monitoring network aimed at permitting snowmaking with treated effluent and tracking water quality during implementation		LMLC GRTF	Short-term	
Construct necessary infrastructure improvements (pipes, ponds, etc.) required to begin snowmaking with treated effluent by November 2020; expand acreage through additional infrastructure		LMLC	Short-term	
Identify necessary treatment levels to ensure no negative environmental impacts		LMLC	Short-term	
Develop and implement plans for expanded storage and seasonal considerations for reuse between irrigation and snowmaking		BSWSD LMLC BSR GRTF	Short & Long	
Continue monitoring network to track water quality during implementation		LMLC GRTF	Mid-to-long	

WHAT	STATUS	WHO	TIME-LINE	NOTES
Expand snowmaking and infrastructure		LMLC	Mid-to-long	BSR/Spanish Peaks
Investigate Shallow Groundwater Recharge				
Review results of MBMG Meadow Village aquifer study and identify opportunities for recharging the Meadow Village aquifer		GRTF	Quick start	
Identify and implement additional groundwater monitoring sites		GRTF BSWSD GLWQD MBMG GCWSD	Quick & Short	
Examine regulatory process for shallow groundwater recharge		GCWSD	Quick start	
Assess "fully consumptive" irrigation requirements and potentially modify to "maximize consumption as necessary"			Short-term	
Identify areas for future study		GCWSD	Mid-to-long	
Implement shallow groundwater recharge project if potential exists			Mid-to-long	

SUSTAINING FUNDING AND COMMUNITY ENGAGEMENT

WHAT	STATUS	WHO	TIME-LINE	NOTES
Sustaining Funding				
Establish a funding committee and coordinator; identify funding sources			Quick start	
Develop a fundraising plan			Quick start	
Explore funding to support currently unpaid expertise for specific implementation actions			Quick start	
Explore Water Fund mechanisms and determine the most feasible approaches		GRTF TNC	Quick start	
Continue with funding committee and coordinator			Short & long	
Implement fundraising plan			Short & long	
Establish community Water Fund or alternate measure of long-term sustainable funding			Short & long	
Share progress and promote community payment for water resources services			Short & long	
Explore tax and bond options as opportunities arise			Short & long	
Community Engagement				
Develop a community engagement plan		GRTF	Short & long	
Develop a "Trout Friendly" certification program		GRTF	Short & long	Rebranded as Alpenscapes
Implement conservation award			Short & long	

APPENDIX THREE

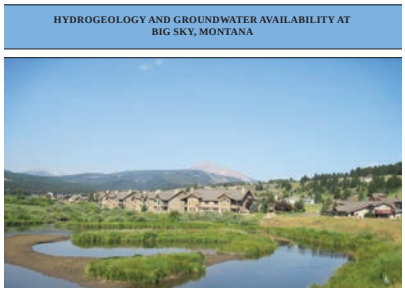
PROGRESS AND PROJECTS

WATER SUPPLY AND AVAILABILITY

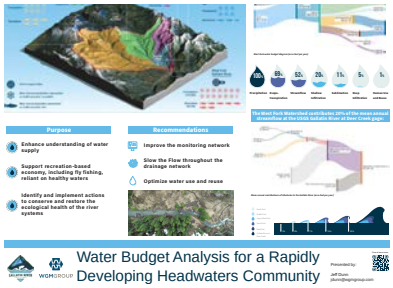
GROUNDWATER MONITORING AND MODELING

Completed:

1 new streamflow gage on MFWF



MBMG Meadow Aquifer Study



2024 Water Budget Report

In progress:

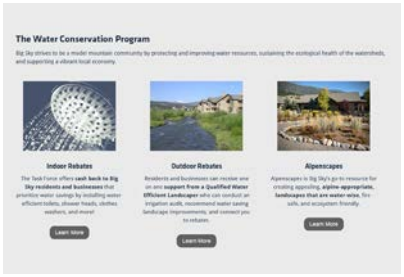
MBMG Canyon Aquifer Study

WATER SUPPLY AND AVAILABILITY

STRATEGIES FOR CONSERVATION

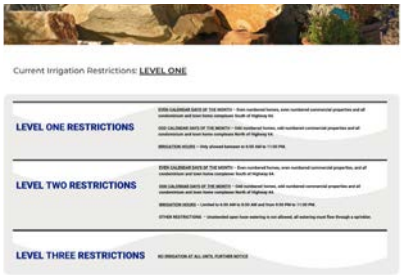
Completed:

Alpenscapes - Native and sustainable landscape planning resources and guidelines



GRTF water conservation programs:

- Replacing water fixtures
- Smart irrigation systems
- Outdoor audits



BSWSD water restrictions

WASTEWATER TREATMENT AND REUSE

HIGHLY TREATED WASTEWATER

Completed:

Identified potential treatment levels attainable with BSCWSD wastewater treatment plant upgrades

Upgraded 3 systems along Gallatin

EXPAND BENEFICIAL REUSE

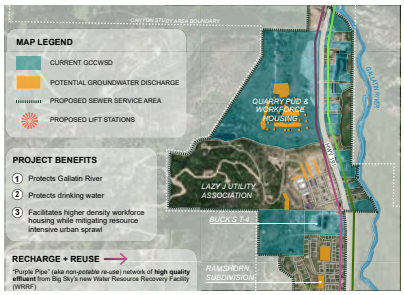
Completed:

Reused wastewater for snowmaking at Yellowstone Club

WASTEWATER TREATMENT AND REUSE

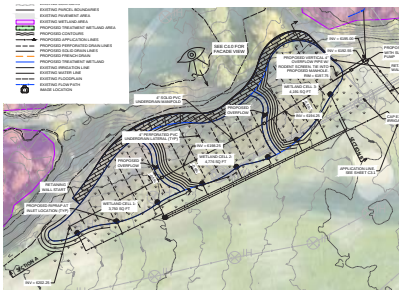
ADDRESSING SEPTIC AND SMALL COMMUNITY SYSTEMS

Completed:



Gallatin Canyon Sewer

In progress:



West Fork Gallatin Wetland Establishment