

Adaptation Strategies

Montana must go above and beyond near-term water management activities to reduce drought vulnerability and build long-term resilience. These adaptation strategies are organized around the following water use sectors: Agriculture; Conservation and Ecological Services; Energy and Industrial Use; Land Management and Fire; Municipal Water Supply; Recreation and Tourism; and Planning, Policy, and Community Governance. Where appropriate, existing resources are identified and examples from other states are included, so that Montana can benefit from lessons learned elsewhere. Additionally, the state can provide a foundation for building drought resiliency in all water-use sectors by developing measurable goals for state-wide water conservation and by providing additional coordination and support for monitoring, research and development, and public outreach, and through dedicated funding.

Agriculture

As Montana's largest water-use sector, agriculture is also one of the most impacted when it comes to drought. Though several federal programs exist to provide emergency relief in response to drought, they do little to encourage drought resiliency. Adaptation requires shifting from a reactive approach in which producers must first experience and document losses before they are eligible for relief, to proactively providing support for regenerative practices that can reduce drought vulnerability. Recommendations for adaptation center around: soil health and irrigation water management.

Montana has already initiated comprehensive investigations in both areas through the recent [soil management](#) and [irrigation efficiency](#) studies. These resources should be used to develop a comprehensive framework to reduce agricultural vulnerability to drought. Adaptation strategy implementation by producers will require partnerships and Montana should fund the organizations (e.g., [conservation districts](#)) that work to build and sustain these partnerships.

SOIL HEALTH

Soil health management is an integrated system of agricultural management practices that focuses on soil health as a way of optimizing nutrient, pesticide, and irrigation water applications. Healthy soil acts like a sponge, and loss of inputs through surface runoff and deep percolation is minimized. Over time, production costs are typically reduced for similar or increased crop yields and quality. However, building healthy soil requires upfront investments from producers as well as time, research, and even initial uncertainty. Support is available through federal partners, such as [NRCS](#), and at the local level through conservation districts, watershed groups, non-profit organizations, and land grant institutions (i.e., Montana State University, Aaniiih Nakoda College,

Blackfeet Community College, Chief Dull Knife College, Fort Peck Community College, Little Big Horn College, Salish Kootenai College, Stone Child College). However, without state-level coordination of soil health efforts, much of the burden to implement best practices is still shouldered by individual farmers and ranchers.

[Several states](#) have developed soil health initiatives and programs that can be used as examples to help Montana develop state policies that support soil health management. Many of these programs are summarized in the recent [soil management study](#) conducted as part of the Montana Soil Outreach effort, along with challenges, needs, and opportunities identified by Montana's producers and agricultural professionals. Additional summaries of state programs and policy development guidance are provided in the [State & Local Soil Health Strategies](#) report from the Izaak Walton League and [Soil Health Policy: Developing Community-Driven State Soil Health Policy and Programs](#) guidebook from Yale University. All of these reports highlight the Saving Tomorrow's Agriculture Resources (STAR) program, which was developed in Illinois and has been adopted in Iowa, Missouri, and Colorado. Colorado's [Soil Health Initiative](#) which uses the STAR framework to incentivize best practices through matching grants that can help leverage federal funds has been identified by Montana Departments of Agriculture and Livestock as a successful model that could be tailored to meet Montana's needs.

IRRIGATION WATER MANAGEMENT

While irrigation water management may be included under the umbrella of soil health management, it is useful to address separately because of the extent of irrigation water-use (68% of water consumed in Montana) and resources that exist to support irrigation improvements. At the state level, DNRC conducted an [economic analysis](#) (2008) and [conditions inventory](#) (2009) of Montana's irrigation infrastructure; though both reports are now over ten years old, they provide a good foundation for understanding irrigation infrastructure needs and assistance programs. More recently, the Montana Water Center Technical Working Group completed a study on [Evaluating Irrigation Efficiency: Toward a Sustainable Water Future for Montana](#) (2020), which provides a comprehensive summary of this complex subject, including overarching goals and supporting strategies, along with opportunities and constraints related to each goal. At the federal level, substantial funding for irrigation improvements has become available through recent legislation (i.e., ARPA, Bipartisan Infrastructure Law, Inflation Reduction Act). The economic analysis and conditions inventory should be revisited in the context of the more recent irrigation efficiency evaluation and new federal funding opportunities to develop adaptation strategies.

Conservation and Ecological Services

Natural ecosystems and associated biological resources support Montana's quality of life, as well as her recreation and tourism economy. The availability of water in the appropriate quantity, quality, timing, and duration is necessary to ensure ecosystem health. In order to build drought resiliency, Montana must pursue proactive policies and management practices that promote and protect the health of valuable aquatic and terrestrial systems. Areas to focus on for adaptation include: instream flow protection; invasive species reduction; integration of natural storage and artificial aquifer recharge into Montana's water use administration; and nature-based restoration, including those that build on Traditional Ecological Knowledge (TEK).

Maintaining enough water in streams to support ecosystem services can be achieved through use reductions, storage, and restoration practices. Voluntary water use reductions to restore/maintain instream flows would be more palatable to rightsholders if they were incentivized through the water rights or a water banking system. Practices such as floodplain restoration and stormwater management can not only help to maintain baseflow and recharge aquifers, but also reduce vulnerability to other hazards, such as flooding and water quality concerns. Therefore, opportunities for joint projects through DES' hazard mitigation and DEQ's nonpoint pollution programs should be investigated.

Developing groundwater storage through approaches like managed aquifer recharge (MAR) and aquifer storage and recovery (ASR) will require a comprehensive understanding of ground and surface water interactions, as well as water rights implications; however, given the shift in the timing of natural storage (i.e., snowpack), this should be a high priority. Successful programs in other states are the result of long-term investments; Montana should initiate the investigation into ASR recommended in the State Water Plan.

Finally, individual acts of restoration are being implemented throughout Montana and on the sovereign nations within her borders; Montana could extend these efforts through supporting tribes to export successful practices and through organizations such as the [Montana Watershed Coordination Council \(MWCC\)](#) and [Montana Conservation Corp \(MCC\)](#) to share information and help with implementation.

INSTREAM FLOW

The 2015 State Water Plan recommends coordinated efforts to provide sufficient protection for instream flows within the prior appropriation framework to maintain aquatic and riparian systems. Current mechanisms to protect or enhance instream flows include water rights (Murphy, recreational, temporary transfers), state water reservations, and flow leasing, as well as instream flow rights associated with tribal compacts and federal water reservations. Additional instream flow protections exist for lakes, rivers, and streams

that provide habitat to threatened and endangered species. The Montana Department of Fish, Wildlife and Parks (DFWP) holds or manages state instream flow rights, reservations, and leases/transfers on behalf of the public.

Because the instream flow rights/ reservations have a priority date of 1973 (i.e., relatively junior), and leases/ transfers are voluntary, cooperative efforts are required to maintain minimum flows. Sustaining fisheries and aquatic systems can be a great motivator for cooperation and even shared sacrifice among water users. The [Big Hole River Drought Management Plan](#) and [The Blackfoot Drought Response Plan](#) were both developed to help protect fisheries through voluntarily reducing water use during times of drought. Activation of such plans may reduce the need for fishing restrictions, which are triggered by high temperatures and/or low streamflow. Some challenges that have been identified are perceptions that voluntary use reductions could be interpreted as a water right abandonment and that the water rights transfer process takes a long time, making it an impractical drought response action. Additionally, a water banking system that offers market-based incentives for water use reductions could be a useful tool to help maintain instream flows, but it would require the development of a legal framework as described the Washington Department of Ecology's review of [Water Banking and Water Marketing in Select Western States](#).

INVASIVE SPECIES

Reducing invasive species that compete for limited resources can help native species be more resilient during drought conditions. Invasive species management is coordinated through the DNRC-led Montana Invasive Species Council (MISC), and includes programs led many of the [Governor's Drought and Water Supply Committee's](#) (DWSAC) member agencies. DFWP manages [Montana's Aquatic Invasive Species](#) (AIS) program, which includes watercraft inspections, early detection monitoring, response planning and public outreach. DNRC conducts the Forest Pest Management program and supports the AIS program through state-funded grants. The Montana Department of Agriculture's (DA) [Noxious Weeds Programs](#) provide resources and assistance to help landowners reduce the spread of weeds, pests, and disease, as well as pesticide impacts to human health or the environment through education, coordination, technical guidance, regulation, and financial assistance. DNRC also works with DA, Montana Department of Livestock (DL), and producers to control the spread of noxious weeds through their [Agriculture and Grazing Management Program](#). Continued support of these state programs that control invasive species, pests, and disease will help to build drought resiliency.

NATURAL STORAGE AND AQUIFER RECHARGE

Existing natural systems, such as riparian areas, floodplains and wetlands, act to slow runoff and promote groundwater recharge. Effectively, they store water during high flows and slowly release it back to the surface water system. Additional opportunities to store water when the physical supply exceeds downstream legal demands may be provided through artificial recharge of alluvial aquifers

and floodplains. Promoting practices that protect and restore natural systems and investigating opportunities for artificial recharge can support late season flows and help to mitigate drought impacts.

The 2015 State Water Plan recognized that there are possible implications for water rights associated with integrating natural storage into Montana's water use administration, and it recommended that DNRC explore these, as well as feasibility and cost effectiveness, through stakeholder-driven watershed-scale pilot projects that enhance the natural storage capacity of wetlands, riparian areas, and/or floodplains. [DEQ's Nonpoint Source Program](#) provides resources that can help identify and support projects to enhance natural storage (which typically also have significant water quality benefits) through watershed restoration planning and 319 project funding. DL, Montana State University (MSU) Extension, tribal colleges, and [conservation districts](#) can also be resources to help producers restore streambanks and improve the function of riparian areas by developing alternative water supplies and drought resilient grazing strategies.

Approaches such as MAR and ASR are more complicated; and would require hydrogeologic studies and an enhanced groundwater management framework. The State Water Plan recommended that DNCR partner with MBMG and stakeholders to investigate ASR - the geologic conditions required, potential adverse effects to surface water flows, financial feasibility, and water right implications. This investigation should include a comprehensive review of programs and projects implemented in other states so that Montana can learn from their challenges and build upon their successes. The National Groundwater Association issued a [Special Issue on Managed Aquifer Recharge](#) for September/October 2022 that provides overviews on planning, regulation, and economics, as well as case studies from CA, TX, ID, FL, MA, as well as Mexico and Kuwait. Although MAR-ASR technology is now used in many western states, Montana should also look to the east for guidance, specifically to [South Florida Water Management District](#), home to one of the first regional scale ASR projects. Another useful model is the [Arizona Water Banking Authority](#) (summarized in this [review article](#)), which was established in 1996 to make full use of Arizona's Colorado River entitlement and is a key component supporting Arizona's implementation of its Colorado Basin drought contingency plan. Some additional considerations include: water quality requirements for injection wells as specified by [US EPA](#); engineering design standards developed by [ASCE](#); and the potential legal obstacles outlined by San Diego Law Review in, "[The Fragile Future of Aquifer Storage and Recovery](#)."

RESTORATION AND TRADITIONAL ECOLOGICAL KNOWLEDGE

Watershed restoration practices that can help to retain water include those previously discussed in the context of soil health and natural storage, and they are also presented here in the context of Traditional Ecological Knowledge (TEK) to highlight how cultural connections can help bolster restoration efforts and build long term resiliency. Many of Montana's tribal nations have drawn on TEK to develop innovative approaches to drought management that incorporate wholistic nature-based solutions.

The Confederated Salish & Kootenai Tribes (CSKT) developed a [Climate Change Strategic Plan](#) in 2013 (updated in 2016; 3rd update anticipated in 2023). This plan preceded Montana's statewide climate assessment and includes projected impacts to forestry, land, fish, wildlife, water, air, infrastructure, people, and culture. Goals and specific action items were identified, including the development of a drought management plan. CSKT collaborated with DNRC on the Forest Action Plan and is currently incorporating the Climate Change Strategic Plan recommendations in their forest management practices, including the use of TEK in using managed fire to reduce fuel hazards and encourage regrowth of culturally significant plants.

The Blackfeet Nation developed a [Climate Change Adaptation Plan](#) in 2018 that identifies and prioritizes adaptation goals, strategies, and actions for the following sectors: agriculture, cultural resources and traditions, fish, forestry, human health, land and range, water, and wildlife. As a result of this plan, several departments in the Blackfeet Nation and Blackfeet Tribal College have embarked on joint projects to restore riparian areas by building [beaver dam analogues](#), initiate [regenerative grazing practices](#) that mimic benefits of buffalo on the landscape, build [snow fences to increase water storage](#) and restore wetland systems, and promote biocultural stewardship and food sovereignty. A core component of all these efforts is building capacity through education and outreach; and the Blackfeet Nation envisions building coalitions that can help other communities in the state develop these practices.

The Fort Belknap Indian Community entered into a five-year partnership in 2019 with BLM and the Society for Ecological Restoration to implement the [Native Seed and Grassland Restoration Program](#). The program focuses on the role of TEK of native plant communities in ecological restoration.

The Anishinaabe and Ne-I-Yah-Wahk people on the Rocky Boy Reservation are working to restore culturally important plants such as sweetgrass, yarrow, and buffalo berries whose wetland habitats are threatened by extended drought and climate change. Through a combination of scientific research and TEK, species of sweetgrass unique to the Rocky Boy Reservation were identified. Tribal natural resource leaders are [developing new wetland assessment tools that consider medicinal and cultural value of native plants](#) and are working to migrate threatened species to headwater systems that are less sensitive to drought and climate change impacts.

Energy and Industrial Use

Several of DWSAC's member agencies participate in the development of state, federal, and private reservoir annual operating plans, including DNRC, DEQ, and DFWP. [Forecast Informed Reservoir Operations](#) (FIRO) has been recognized by the [National Integrated Drought Information System](#) (NIDIS) as a promising strategy to address drought-related water shortages by integrating additional flexibility in operation policies and rules with enhanced monitoring and improved weather and water forecasts. FIRO is currently being developed and tested other states such as [Texas](#) and [California](#).

DEQ's Energy Division is currently updating the [2016 Montana Energy Assurance Plan](#), which describes the actions and measures to be taken in phased responses to address energy shortages, including a shortage of hydro-electricity related to drought. DEQ also operates permitting programs that regulate industrial wastewater and hydrologic and water quality impacts of mining operations. The potential for drought to exacerbate water quality impacts and measures that can be taken to reduce the risk of these impacts should be considered as part of the permitting process.

Land and Fire Management

The [Montana Forest Action Plan](#) identifies goals and objectives to increase the resiliency and sustainability of Montana's forests through cross-boundary, landscape scale forest restoration and management. Healthy landscapes and fire-adapted communities are more resilient to drought impacts, and accomplishing the recommendations identified through the Forest Action Plan, and accompanying [Statewide Assessment of Forest Conditions](#) and [Priority Areas for Focused Attention](#), will have the added benefit of supporting drought resiliency. The Forest Action Plan highlights TEK-based forest management practices by CKST, including the deliberate, purposeful, and careful application of fire to create and maintain open canopy lowland forests and revitalize important medicinal and food plants, such as camas and huckleberry.

DNRC's Forestry Division supports drought adaptation through ongoing activities and programs, such as: private landowner engagement through the [Forest Stewardship](#) program, in partnership with MSU Extension Services and NRCS, to promote responsible private forest management, including practices that increase drought resiliency (e.g., planting native species and reducing overstocked trees); the [Urban and Community Forestry](#) program, funded through USDA grants, to provide to expertise to rural and underserved communities and engage with planning departments to develop planting plans that help meet other resiliency goals; riparian area protection in streamside management zones from adverse logging practices; maintenance of the [Conservation Seedling Nursery](#), which provides seedlings for restoration projects and general forest replanting for conservation purposes. Additionally, DNRC State Lands Division cooperates with DA to provide guidance to citizens on how to prepare for pests during times of drought, and DNRC's State Entomologist provides expertise on how to address drought-related insect and disease outbreaks.

The Montana Forest Action Plan provides a roadmap for accomplishing drought resiliency related to land and fire management and the overarching recommendation is to accomplish objectives laid out in the plan. DNRC is also currently leading efforts to update county community wildfire protection plans, which can help to identify and build partnerships to accomplish fuels reduction in the wildland-urban interface (WUI). Support for public/ private partnerships as well as for organizations like MCC may be helpful in getting these projects accomplished. Additionally, state Wildlife Management Areas (WMAs) may be opened to grazing during drought

emergencies depending on their condition; guidance that outlines these conditions and the current state of these lands and timelines for emergency grazing access would be helpful to producers and potentially reduce conflict.

Municipal Water Supply

Although the percentage of consumptive use of water for domestic (0.4%) and municipal use (2%) in Montana is relatively small, Montana's population is growing rapidly, and it will be important for communities to consider water conservation measures that can help reduce their vulnerability to drought impacts as they plan for growth and future water supply needs. Many other western states with limited water resources have experienced rapid population growth and have implemented policies and practices to help ensure adequate public water supply and reduce potential conflicts with other water uses. Guidance can be taken from these efforts, as well as more local planning effort, such as the [City of Bozeman Drought Management Plan](#), to develop state-wide municipal water conservation strategies that reduce outdoor water use, improve water use efficiency, and encourage smart growth.

Montana currently lacks statewide guidance to encourage municipal and domestic water use conservation. Many western states have recently enacted outdoor water use restrictions, turf removal programs, new development requirements, and/ or incentive programs to improve municipal water use efficiency. While Montana may not have the same level of water scarcity that has driven many other states to enact these initiatives, it is experiencing a precursor – rapid growth. It would behoove Montana to get these types of “low hanging fruit” solutions in place before growing populations set up water use conflicts with other sectors. The state does provide support for community planning, such as the grant programs administered through the Montana Department of Commerce (Commerce), technical support from the Montana Department of Environmental Quality (DEQ), and resources developed by DNRC. Consolidating resource support through organizations like [Montana Association of Planners](#) (MAP) and MWCC may be helpful for linking current resources to new federal funding opportunities. Additionally, Montana should help growing communities get water infrastructure in place that would allow them to [reuse municipal water](#) (e.g., reclaimed water for landscape irrigation).

REDUCE OUTDOOR WATER USE

Several strategies are currently being implemented throughout the western U.S. to reduce outdoor water use, such as: watering restrictions, separate outdoor metering, supply/ time variable water rates, turf removal, and the use of reclaimed/ recycled water for outdoor irrigation. While Montana does not currently have any state-wide policies related to outdoor irrigation, several communities have embraced one or more of these strategies. Bozeman is leading the way, having already enacted [permanent outdoor watering restrictions](#) (in addition to drought-emergency restrictions), developed a [water smart planning guide](#) and [rebate program](#), and

currently is in the process of revising [landscape and irrigation standards for new development](#) projects that will reduce outdoor water use and support sustainable growth. Other communities, including Belgrade, Billings, Butte, Dillon, Helena, and Kalispell, have also implemented outdoor water use restrictions during drought emergencies. These types of use restrictions and programs often occur at the local-level, although some states are beginning to enact statewide policies, such as [California's outdoor water use restrictions](#), Utah's [prohibition on preventing property owners from installing water wise landscaping](#), and [Colorado's statewide turf-replacement program](#). Additionally, [water reuse infrastructure funding programs](#) can help communities in Montana recycle treated wastewater for outdoor irrigation, a practice that has been used for decades in the southwest [and pioneered by Southern Nevada Water Authority \(SNWA\)](#).

IMPROVE WATER USE EFFICIENCY

Water use efficiency is used here in terms of both system level improvements, such as replacing aging water infrastructure, and at the individual level, such as installing water efficient fixtures in homes and businesses. The MWCC created a table listing [2021 Bipartisan Infrastructure Law funding opportunities](#) that, when combined with the previously listed funding programs, can help communities and water providers address aging infrastructure needs; notably, these can include those that address not only efficiency improvements but also water quality concerns, such as replacing lead pipes. For water use efficiency improvements at the individual level, the City of Bozeman provides indoor [residential](#) and [commercial](#) rebates to help citizens improve water use efficiency in homes and businesses by upgrading plumbing fixtures and appliances. In Nevada, SNWA offers several [business incentives and programs](#) that Montana water providers can use as a model to help residents assess and reduce their consumptive use. The [EPA's WaterSense program](#) is another resource that can help Montanans find water-efficient products and programs that meet EPA's criteria for efficiency and performance.

PREPARE FOR GROWTH

DWSAC member agencies that support municipal and domestic water supply management and planning include DNRC, Commerce, and DEQ. DNRC's 2021 [Integrated Water Resources Planning and Management Guide for Montana Municipalities](#) was developed to guide public water providers through the integrated water resource planning process, including water supply and demand assessments, as well as water efficiency, conservation, drought management, and source water protection planning. The guide provides examples of drought response actions and water efficiency best management practices (BMPs) that communities can integrate into local-level planning. Commerce leads the Montana Ready Communities Initiative and developed the [Montana's Resilience Framework for Communities](#), which provides helpful tools to assist communities as they work to ensure that long-term

planning, projects and priorities position them to thrive in all conditions, including drought. Commerce also administers several programs (e.g., [Community Development Block Grants](#), [Community Technical Assistance Program](#)) that aid communities in developing best practices for water/ sewer/ WUI/ subdivision regulations, growth policies, and water supply planning. Drought resiliency criteria can be incorporated into the grant review process to encourage sustainable development. DEQ's Engineering Infrastructure & Subdivisions program can support drought resiliency by developing design standards that encourage water conservation, such as reductions of turf irrigation or use of recycled water, and DEQ's Drinking Water Program provides several resources for public water supply systems and source water protection to develop drought resiliency.

DEQ's Drinking Water program determines which public water supplies are most susceptible to impairment, and systems that are susceptible to drought are assessed to determine their ability to withstand drought conditions. Assessments include information about alternate water sources for the system, the possibility of implementing water use restrictions, and potential health impacts of water shortages. Communities with a history of municipal water problems, such as inadequate water supply systems or wastewater treatment facilities, can obtain assistance with monitoring, planning, and in procuring alternative sources of funding to make appropriate changes or necessary upgrades. DEQ also provides technical assistance to utilities and local health departments on water shortage response planning and implementation, as well as training seminars for municipal water systems operators to manage systems during drought. DEQ offers guidance for developing legislation that incentivizes water conservation (e.g., municipal water rates should not provide "quantity discounts" that encourage higher use, rates that increase with volume of use reduce waste, low flush toilets should be required by state building codes, etc.).

Recreational and Tourism

According to a [recent assessment by the U.S. Bureau of Economic Analysis](#), Montana is second only to Hawaii in both the percentage of state revenue generated from outdoor recreation and the rate at which this economic sector is growing. From snowpack to streamflow to fish and wildlife, drought can negatively impact the natural resources that draw many of Montana's visitors and help to sustain the quality of life that Montanans rely on. Many of the previous listed strategies that address conservation and ecological services and other water-use sectors, can also serve to mitigate drought impacts to recreation and tourism; however, additional strategies may be needed to help maintain and support this economic sector.

Commerce's Montana Tourism Promotion Division currently helps Montana's visitors navigate drought conditions through the [visitMT.com](#) website, which provides information concerning the extent of drought impacts, such as forest closures due to fires or river use and fishing restrictions due to low streamflow. Commerce also addresses visitor concerns, helps to revise travel plans, and

develops materials and resources to shape visitor perceptions/ expectations and while encouraging responsible recreation. Support is also provided for tourism-related businesses through guidelines and incentive programs that encourage water conservation and/or recognize sustainable practices. Additionally, Commerce recognizes that both the agriculture and outdoor recreation/ tourism industries are especially susceptible to drought impacts and has several programs aimed at diversifying the state's economy to reduce our economic vulnerability, including: Made in Montana (and sell to outside markets); expansion of broadband to allow for growth in tech; MT Mainstreet Program, which invests in downtowns and walkable communities; and Historic Preservation Grant Programs.

Montana's recreational and tourism sectors depend on maintaining instream flows and aquatic habitats, so adaptation should include the strategies developed to support conservation and ecological services. DFWP has also expressed that recreational use often shifts during times of drought because of restrictions placed on impacted water resources, so solutions like permitting, may need to be explored. Additionally, guides and outfitters have little recourse to recover drought related losses. Small business loans may be available during drought emergencies, but these may not become available until after staff have been reduced and seasons have ended.

Planning, Policy, and Community Governance

Local, stakeholder-driven drought management planning can be highly effective and provide a conduit for accessing the federal funding required to build resiliency. However, these efforts can be hindered by lack of capacity and policies that provide incentives for water conservation. Further, many drought adaptation strategies, particularly those related to municipal and domestic use, are often accomplished through the adoption of local ordinances and/or investments initiated by community governance. Support from the state for local-level planning, policies, and community governance can help local jurisdictions plan for and achieve drought resiliency.

Baseline support for planning is needed to help Montana be more competitive in federal drought resiliency grant programs. Several western states have water resource planning programs that lead to the state water plan, river basin plans, and watershed plans. Montana has a similar model, but DNRC's planning division does not have the resources to accomplish this level of comprehensive planning, nor do most watershed groups. States that are the most successful in accessing federal funds to implement drought resiliency projects often build upon a foundation of planning decades in the making (e.g., CO's 2006 legislature established a [Water Supply Reserve Account](#) which funds their [Basin Implementation Plans](#)).

Legislative action will be needed to accomplish many of the adaptation strategies recommended by this plan. Current water rights administration has inherent barriers to the drought preparedness and adaptation. Comprehensive solutions, such as a soil health

program, water banking system, and developing natural storage through both restoration practices and MAR-ASR, will require long-term commitments from the State. Support for water conservation planning and policy guidance can help Montana's communities grow in a sustainable way and reduce conflicts between municipal and other water use sectors ([Statutes Making Conservation a California Way of Life](#) provides some example of policies and a roadmap for achieving them).

Bozeman provides a good example of integrating Montana-based planning resources, such as DNRC/s IWR Planning Guide, with strategies from other states to develop tailored municipal water supply policies, including ordinances and incentive programs. Like many communities in the West, limited water resources combined with a growing population spurred Bozeman's investment in resiliency. Montana can help to extend some of these policies to lesser-resourced communities by working with Bozeman and organizations, such as MAP, to develop versions for statewide adoption.

PLANNING

All the DWSAC member agencies participate in water and/or resource management planning efforts, many of which directly or indirectly address drought. Examples of these planning efforts include river basin plans (DNRC), watershed restoration plans (DEQ, FWP), community development plans (Commerce), community wildfire protection plans (DNRC), and hazard mitigation plans (DES). Because drought touches all these planning areas, they all provide opportunities to address drought through both comprehensive and local planning. Linking these efforts more directly to drought management by including adaptation strategies identified in this plan can provide a mechanism for developing drought resiliency in the long term.

Organizations like conservation districts, irrigation districts, forest collaboratives, and watershed groups build coalitions around shared resource concerns and often lead or instigate multi-jurisdictional drought management planning. Successful watershed-scale drought resiliency planning have already occurred or are currently underway in the: [Beaverhead](#), [Big Hole](#), [Blackfoot](#), [Jefferson](#), and [Upper Yellowstone](#) watersheds. Support from the state for sharing successes and lessons learned through organizations such as [MWCC](#), [Montana Association of Conservation Districts \(MACD\)](#), and [Montana Forest Collaboration Network \(MFCN\)](#) could help to extend drought planning to lesser resourced areas and achieve state-wide participation.

While federal funding programs are available to support drought resiliency planning and project implementation (e.g., [USBR's WaterSmart](#), FEMA's [BRIC](#) and [HMGP](#), [EPA's CWSRF](#)), the grant programs are competitive, and the application process alone requires a significant investment of time and resources. Many jurisdictions don't have the capacity to compete for and access federal funding. Baseline funding to staff organizations, such as watershed groups that support local-level and multi-jurisdictional drought planning, could help Montana leverage federal assistance grants. Montana can look to other western states that currently provide or are

investigating baseline funding for water conservation and drought planning ([CA](#), [CO](#), and [OR](#)). Additionally, planning templates can help groups, communities, and water providers navigate the planning process, as well as ensure that plans are consistent with statewide objectives and that identified projects will qualify for grant funding.

Additionally, this planning process identified additional state agencies/ entities with key roles in drought monitoring, including the Montana Climate Office (MCO) and Montana State Library (MSL), and drought response, including Montana Departments of Transportation (DOT) and Public Health and Human Services (DPHHS), that should be considered for DWSAC membership. Stakeholders have voiced concerns about drought impacts to human health (e.g., air quality from smoke and dust; extreme heat; water quality; and mental health), and beyond the inclusion of DPHHS in DWSAC, the State should support DPHHS in conducting planning and resource development to address these concerns.

POLICY

Developing policy objectives and incentives that support water conservation will allow for more effective drought planning and increase cooperation among competing uses. For example, many constituents are under the impression that their water rights are subject to abandonment if they do not consistently use their full allocation. This is counterproductive to the cooperative agreements that are being successfully implemented through many watershed-scale drought management plans. Further, DNRC has the authority to expedite water rights transfers during a drought emergency, however, the timelines and lack of conservation incentives confound this process. Water rights policy could be updated to incentivize rights holders to not take their full allocation during times of drought or implement restoration projects that help to maintain or restore instream flows, as well as to ensure that timelines can accommodate emergency transfers during drought emergencies. Additionally, many of the adaption strategies identified for the different water use sectors will require policy support and/or allocated funding to be implemented statewide, such as: water banking, MAR-ASR, FIRO, outdoor municipal use restrictions, and local level planning; policy recommendations should be developed specific to each sector.

COMMUNITY GOVERNANCE

Water conservation and land use practices are often determined at the local level, through community governance. Local communities that provide water and resources to their citizens have the responsibility to plan for long-term sustainability, as well as the power to enact ordinances governing how their resources are used and maintained. Municipal water use, and in particular outdoor water use and growth, can be managed effectively through local ordinances. More resourced communities, such as Bozeman, are making headway through ordinances and initiatives developed through community governance to support their drought management plan. However, these are the culmination of a multi-year planning process, that began with an [Integrated Water Resources Plan](#), which led

to the development of the [Drought Management Plan](#), and was followed up with coordinated outreach efforts that allowed for the passage of ordinances and funding commitments to provide resources to their citizens to achieve plan objectives. For less-resourced communities, it may be necessary to reduce the burden required to get solutions in place. Montana can provide support to these communities by providing example ordinances that support state-wide drought resiliency goals and incentives for implementation.

All Sectors

Many of the previously identified, sector-specific adaptation strategies can serve to reduce drought vulnerability in multiple water use sectors, and linking these strategies through comprehensive planning can help to build state-wide resiliency. Montana can also provide a foundation for drought resiliency in all water-use sectors by developing measurable water conservation goals and by providing additional coordination of and support for monitoring, research and development, and public outreach. Additionally, dedicated funding will be required to not only respond to drought but to build a foundation for resiliency.

MEASURABLE GOALS

Large-scale drought resiliency goals with measurable targets aimed at reducing consumptive water use (i.e., water that is used and not replaced) can help ensure that Montana's water supply can keep up with future demands. Setting targets to work towards provides a mechanism to measure success and could take the form of either a percent reduction or an amount (in acre-feet) of water saved, or a combination of the two. For example, in 2015 the California state water board established mandatory statewide reductions in water use by 25 percent, and followed up in 2022 with "[California's Water Supply Strategy. Adapting to a Hotter, Drier Future](#)," which outlines strategies to achieve the following specific numeric targets: create storage space for up to 4 million acre-feet of water, recycle and reuse at least 800,000 acre-feet of water per year by 2030, and free up 500,000 acre-feet of water through more efficient water use and conservation. While the Montana's goals will differ from California's, we can apply their model of defining measurable goals and supporting objectives. Montana's 2015 State Water Plan summarizes water use within the state, including consumptive use, by sector and by river basin. Measurable targets to support drought resiliency based on this foundation could be defined through the next State Water Plan update.

MONITORING

Drought monitoring is led by DWSAC's monitoring subcommittee and relies on data collected by several state and federal agencies. This information is essential to not only assess drought conditions and make timely decisions, but also to guide and measure progress

toward adaptation. The MCO maintains the drought indicator dashboard and continually advances the state's capabilities to measure and assess drought through research and resource coordination. For example, MCO recently secured federal funding to expand the Mesonet system to many underrepresented areas that have historically had very limited coverage of streamflow, precipitation, snowpack, and soil moisture data. This will not only help to improve Montana's ability to assess drought conditions, it will also help communities better quantify impacts and benefit from federal relief programs. However, MCO lacks dedicated funding, which creates uncertainty and precludes their ability to develop new prediction methods, such as forecast modeling. The development of baseline monitoring objectives and corresponding funding support for MCO would ensure the continued advancement of drought monitoring in Montana.

RESEARCH AND DEVELOPMENT

A comprehensive understanding of river basin hydrology will be needed to implement drought adaptation strategies that can lead to long-term resiliency (e.g., ASR, FIRO, and water banking), as well as quantify progress toward reaching statewide goals. With state support, Montana University System can help state agencies conduct the scientific studies that can provide a foundation for resilience.

Additionally, Montana's research community can help to develop and communicate the best practices that will be required to develop drought resiliency, particularly in the agricultural sector. DA and DL currently coordinate with Montana's Land Grant Institutions to research drought and pest-tolerant crop varieties and practices. Much of the support for this research is provided through Montana Wheat & Barley Committee and conducted in partnership with MSU Extension and Tribal Colleges. DA and DL have noted that additional research into resilient varieties of hay crops, as well as new crops related to climate change, would be helpful, especially with a feedback loop between researchers and practitioners. Producers would also benefit from guidance on what impacts they will need to prepare for during periods of drought (e.g., disease and water quality) and measures they can take to help minimize impacts before conditions become dire.

PUBLIC OUTREACH

Public support is essential for developing drought resilience. While Montanans deeply value her natural, including water, resources, they may not be aware of how to connect those values to behaviors. Additionally, Montana has one of the fastest grow rates in the nation, welcoming citizens from different climates that may not have experience with drought and/or water scarcity. A public information campaign should be considered to help citizens better understand their water resources and develop a culture of water conservation in Montana. Effective public outreach can empower local champions, increase capacity of watershed groups, and educate elected officials about grant funding opportunities and ordinance options. Most state agencies conduct education and outreach

related to drought and/or water conservation aimed at specific stakeholder groups; however, these may not be as effective in reaching the public at large. A coordinated, targeted, public outreach campaign could ultimately empower Montana's citizens to make choices that support drought adaptation, especially for adaptation strategies that may require a change or perceived sacrifice.

FUNDING

The state does not currently have dedicated drought response funding. Except for SBA drought disaster assistance loans, federal response funding resources are mostly focused on agriculture. All of these are tied to a Secretarial Disaster Designation and/or documented losses. Some state funding resources exist, such as the Environmental Contingency Program (at the discretion of the governor) and DNRC Emergency Grants and Loans but have not historically been used for drought-related purposes. Further, drought adaptation in all sectors will require some level of financial commitment. Montana has great ideas – most of the solutions identified here have been previously identified through other state planning efforts – what is lacking is dedicated funding to achieve them.