



Montana State Water Plan

Executive Summary,
Including Major Findings
and Key Recommendations



MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

December 5, 2014

My Fellow Montanans,

Montana's economy and quality of life rely on water for everything from agriculture, livestock, fisheries, recreation, hydropower, industry and municipal uses. Montana enjoys the benefits of being a headwaters state where mountain snowpack delivers high quality water supplies into our valleys and plains. Balancing competing water demands with uncertain future water supplies is required. The State, working with citizens across Montana, must proactively plan and implement efforts to achieve a balance that ensures a strong economy and protects the magnificent environment we all enjoy and rely upon. It is with this recognition of the importance of water to the people of Montana that the Department of Natural Resources and Conservation (DNRC) is proud to adopt the 2015 State Water Plan.

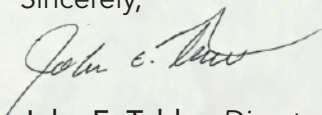
The 2015 Montana State Water Plan contains sixty-eight recommendations intended to guide state water policy and management over the near, intermediate and long-term bases. All recommendations contained in the State Water Plan are guided by the legal principles in the Montana Constitution, the prior appropriation doctrine and the Montana Water Use Act.

During the 18-month long planning process, DNRC worked with four regional Basin Advisory Councils (BACs) representing water users in the Clark Fork/Kootenai, Upper Missouri, Lower Missouri and the Yellowstone river basins. The 80 members of the four BACS represent the most diverse group of water users and interests ever brought together by the State of Montana. I want to thank all the members of the BACs for their hours of service in developing the basin plans that are the bases for the State Water Plan.

The planning process also benefited from the hundreds of Montanans who took the time to provide the BACs and the DNRC with comments on what they feel are the key water related issues facing Montana and how we, as a state, can address them together. As a result, the recommendations offered in the State Water Plan reflect the collective work and ideas of a broad range of water users from across the state.

I believe that implementation of the recommendations offered in the State Water Plan will provide the state and people of Montana with the information and tools necessary to meet the complex challenges of managing this vital resource to meet current uses and needs of future generations who will call Montana home.

Sincerely,



John E. Tubbs, *Director*



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The hundreds of individual Montanans that took the time to attend meetings, provide input, and comment on the Montana State Water Plan

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The Upper Missouri Basin

Advisory Council

Mark Aagenes, Cyndy Andrus, Vicki Baker, Jim Beck, Sarah Converse, Kitt Dale, Holly Franz, Michael Geary, Bob Hardin, Eloise Kendy, Lezlie Kinne, Alan Martinell, Earl Old Person, Walt Sales, Paul Siddoway, Dustin Stewart, Vernon Stokes, Joe Willauer, Craig Woolard, Gayla Wortman

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EXECUTIVE SUMMARY

Montana's economy and quality of life rely on water for everything from agriculture, livestock, industry, fisheries, and recreation, to municipal and domestic uses. It is with this recognition of our dependence on water that the Department of Natural Resources and Conservation (DNRC) is proud to present the 2015 State Water Plan to the Montana Legislature and the citizens of Montana.

The 2015 State Water Plan is a synthesis of the vision and efforts of regional Basin Advisory Councils (BACs) established in Montana's four main river basins: the Clark Fork/Kootenai, Upper Missouri, Lower Missouri, and the Yellowstone. The 80 members of the four BACs represent one of the most diverse groups of water users and interests ever brought together by the state of Montana. As part of the planning process, the BACs and DNRC were assisted by the hundreds of Montanans who took the time to provide the BACs and the DNRC with comments on what they feel are the key water related issues facing Montana and how we, as a state, can address them together.



As a result, the recommendations in the State Water Plan reflect the collective work and ideas of a broad range of water users from across the state. We believe that if the state and people of Montana carry out the recommendations offered in the State Water Plan, then Montana in the next 20 years will:

- Have finalized the adjudication of all water rights in the state of Montana – an effort that began in 1973;
- Be better prepared to manage water in real-time to adjust to seasonal changes in supply and demand as well as prepare for longer term climatic changes;
- Be better able to protect existing and senior water right holders while continuing to improve the state’s ability to allocate water to meet new demands;
- Be better prepared to endure droughts in watersheds across the state;
- Be better able to supply water to serve the needs of a growing population and thriving economy as well as the natural systems, habitats, and species that our state is renowned for; and
- Have a public that better understands the dynamics of our water supply and the water rights system they rely upon every day.

The Montana Legislature directed DNRC to update the State Water Plan and submit the results to the 2015 Legislative Session. The State Water Plan is to include:

- An inventory of consumptive and nonconsumptive uses associated with existing water rights;
- An estimate of the amount of surface and groundwater needed to satisfy new future demands;
- Analysis of the effects of frequent drought and new or increased depletions on the availability of future water supplies;
- Proposals for the best means, such as an evaluation of opportunities for storage of water by both private and public entities, to satisfy existing water rights and new water demands;
- Possible sources of water to meet the needs of the state; and
- Any legislation necessary to address water resource concerns.

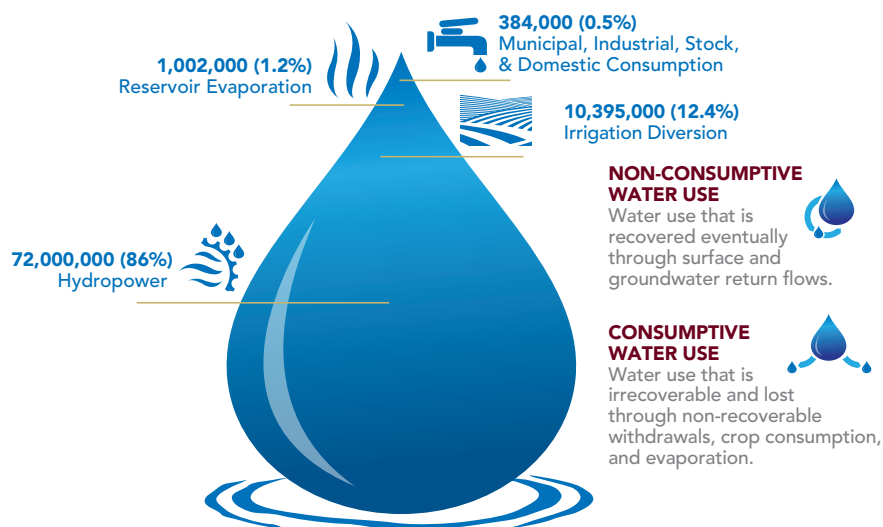
The guiding legal principles for the State Water Plan include: the Montana Constitution with its recognition of pre-1973 water rights and the fundamental principles of the prior appropriation doctrine (“first in time is first in right”); and, the Montana Water Use Act that, amongst other things, governs the adjudication of existing pre-1973 water rights, new appropriations of water, changes to existing water rights, water rights compacts, water reservations, and water planning.

During the 18-month long planning process, DNRC worked with the BACs on developing basin specific responses to each of the subject areas listed above. Results of this effort in each planning basin, along with supporting data, are contained in four individual basin planning reports. Each of the four basin plans serves as a standalone document for guiding the development and management of the basin's water resources. These basin plans will continue to evolve to meet the planning needs of their respective basins.

In contrast to the detail rich basin plans, the State Water Plan provides a high-level overview of the state's water resources and lays out a path for managing those resources over the next twenty years. Although the State Water Plan represents the outgrowth of these regional plans, only the State Water Plan has been formally adopted by DNRC. In the event that guidance in one of the basin plans is at odds with the State Water Plan, the direction offered in the State Water Plan takes precedence. Similarly, the policy recommendations offered in the basin plans represent the collective work of the individual BACs and should not be interpreted as carrying the authority of official state policy. The basin plans are all available for review at www.dnrc.mt.gov/mwsi.

Water use in Montana totals approximately 84 million acre-feet annually. Hydroelectric power generation accounts for 72 million acre-feet or 86% of the water used on a state-wide basis. Approximately 3.6 million acre-feet are consumed state-wide. Agriculture diverts approximately 10.4 million acre feet and consumes approximately 2.4 million acre-feet, reservoir evaporation consumes 1 million acre-feet, and municipal, industrial, domestic, and livestock watering consume approximately 200,000 acre-feet combined.

WATER USE IN MONTANA ANNUAL ACRE FEET



Demand for water is a function of many factors that are inherently uncertain. Population may grow or decline and agriculture and industry may demand more water or make do with less through greater efficiency. Changing and variable climatic conditions compound this uncertainty.

To forecast the potential effects of climate trends on future water supplies in Montana, DNRC modeled a range of climate scenarios following general procedures similar to those described in the U.S. Bureau of Reclamation (2011) West-Wide Climate Risk Assessments. Virtually all model simulations project warmer temperatures and most project modest precipitation increases. Although annual stream flow volumes are expected to stay the same or increase, Montanans are likely to see a shift in the timing of runoff due to earlier snowmelt and an increase in rain as a percentage of precipitation during late winter and early spring.

The availability of water for new appropriations varies across the state and is subject to both physical water availability and existing legal demands. Many of the basins located in the western third of the state are generally closed to new surface water appropriations. Opportunities for new appropriations for surface water or

hydraulically connected groundwater also may be limited outside of closed basins because of existing legal demands including irrigation claims, hydroelectric rights, or instream water rights for fisheries, wildlife, and recreational use.

Given the scarcity of legally available surface water, the reallocation of existing water rights to new uses will play a key role in meeting future demands. As part of that reallocation, water users must receive an authorization from DNRC before they change or lease their water right in order to ensure that they will not adversely affect other water rights.

In areas of Montana, the ability to put water to a beneficial use is limited as much by water quality as physical availability. Water quantity and water quality are closely intertwined and the Montana Water Use Act recognizes this relationship (§85-2-311 MCA). However, this document offers limited guidance regarding water quality issues because DNRC has no authority to regulate water quality and the state water planning statute does not explicitly address water quality. The Department of Environmental Quality has primary authority over the regulation of water quality in Montana. For more information on water quality regulation in Montana, please reference DEQ’s Montana Nonpoint Source Management Plan at <http://deq.mt.gov/wqinfo/nonpoint/NonpointSourceProgram.mcp>. Another good source of information is the Clean Water Act Information Center <http://deq.mt.gov/wqinfo/CWAIC/default.mcp>. These sites provide information, strategies and goals and reports that address water quality issues generally as well as water quality as it is affected by water quantity.

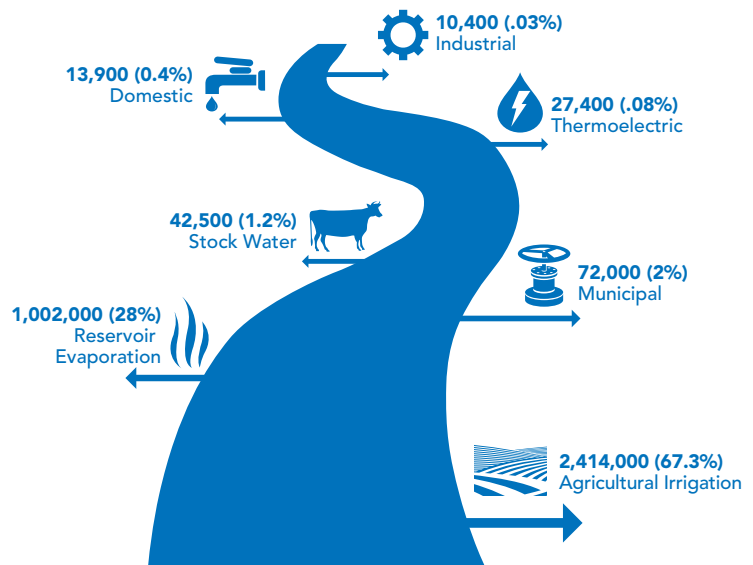
Water storage is an important tool for meeting future demands and responding to a changing climate. The prospect of constructing storage projects in Montana is limited by the availability of suitable locations, cost, public support, the need

to mitigate environmental impacts, and limited legal and physical availability of water to store. The development of new storage projects is limited to basins where the volume of annual runoff exceeds downstream legal demands.

There are also opportunities to retain high spring flows through the use of natural systems such as riparian areas, floodplains and wetlands which act to slow runoff and promote groundwater recharge effectively storing water and releasing it slowly back to the surface water system. In this way, these natural systems fill a role similar to traditional reservoirs. Artificial recharge of alluvial aquifers may also provide additional opportunities to store water when the physical supply exceeds downstream legal demands.

The major findings and recommendations of the State Water Plan are found in the pages that follow. All recommendations contained in the State Water Plan are subject to the existing institutional and legal framework for water use in Montana as provided by the Montana Constitution, prior appropriation doctrine, and Montana Water Use Act. Full implementation of some recommendations may require the Legislature to amend the Water Use Act.

**WATER CONSUMED IN MONTANA
ANNUAL ACRE FEET**





MAJOR FINDINGS AND KEY RECOMMENDATIONS

The complete recommendations for the Montana State Water Plan are set forth below. These recommendations were developed from input provided by four regional watershed basin councils, private individuals, and local, state, tribal, and federal resource managers. These recommendations are intended to guide Montana water policy and management over the near, intermediate, and long term bases. Where appropriate, DNRC has identified the agencies with primary responsibility for plan implementation. If unidentified, the recommendation is intended to offer guidance to the many private, local, state, federal, and tribal entities involved in water management in Montana.

All recommendations contained in the State Water Plan are subject to the existing institutional and legal framework for water use in Montana as provided for by the Montana Constitution, prior appropriation doctrine, and Montana Water Use Act. Full implementation of some recommendations may require the Legislature to amend the Montana Water Use Act.



WATER SUPPLY AND DEMAND

Water supply across Montana is controlled by the variability in seasonal temperature and precipitation. While the demand for water continues to grow, water availability varies from year to year and often changes dramatically within a given year. As a result, coping with supply and demand imbalances is a constant feature of water management in Montana. Ensuring an adequate supply of water to meet current beneficial uses and future demands is a theme echoed by the four Basin Advisory Councils throughout the planning process.

Steps to address these issues include:

Support Water Use Efficiency and Water Conservation

As the demand for water increases, water conservation and water use efficiency to reduce the consumption of water will play a larger role in meeting the state's future needs. Looking ahead, we must focus on innovative strategies to stretch supplies and promote water conservation while protecting against adverse effects to existing water users.

There is a general misunderstanding that when irrigators, municipalities, or other water users improve the efficiency of their water systems so that they divert or discharge less water that they are actually "saving" or reducing water consumption. In reality, irrigation upgrades, for example, may actually increase water consumption through higher crop yields and reduced return flows relied on by other water users. Additional adverse effects may include decreased recharge of shallow groundwater. The Montana Water Use Act prohibits changes in water use that result in adverse effects to other water users on the source. Site-specific investigations, long-term monitoring and development of tools and strategies for mitigating the adverse effects from increasing efficiencies are needed to facilitate informed decisions on new permitting and water right change authorizations.

Free flowing wells are found throughout Montana and are a valuable asset, especially for stock water in remote areas, but left uncontrolled they can waste water and contribute to the decline of groundwater levels. Records from the Montana Groundwater Information Center (GWIC) indicate that there are more than 4,400 wells reported as "flowing" at the time of construction. With an average flow rate (of measured stock wells) of 20 gallons per minute, equipping a single well with a flow control valve can save approximately 32 acre feet per year. Monitoring by Montana Bureau of Mines and Geology indicate that water levels in the Lower Hell Creek – Fox Hills aquifer along the Yellowstone River corridor from Miles City to North Dakota have declined as much as 100 feet over the past 30 to 40 years partly due to uncontrolled flowing wells.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Support both site-specific investigations and long-term monitoring studies to quantify the effects associated with changes in irrigation methodologies and improvements to water distribution systems. These investigations will help to inform the development of water efficiency and conservation strategies that use water more effectively.
- Support state and federal programs that assist landowners with controlling discharge from uncontrolled flowing wells.

INTERMEDIATE TERM RECOMMENDATIONS (4-8 YEARS)

- Support the efforts of state agencies, universities and others to identify and pursue research on innovative water management and conservation strategies that are tailored to local needs and conditions.
- DNRC will analyze the water right implications and lessons learned from the land application of treated municipal wastewater.

LONG TERM RECOMMENDATIONS (6-10 YEARS)

- Support the implementation of water conservation incentives and measures that are adaptable to the needs of local conditions, individual watersheds and municipalities.
- The state of Montana should offer incentives that encourage the development of community wells as an alternative to individual wells for domestic water supplies.

Improve and Expand Efforts to Quantify Surface Water Supplies and Availability

The importance of ensuring an adequate supply of water to meet current beneficial uses and future demands is a theme echoed by the four Basin Advisory Councils throughout the planning process. Water supply across Montana is controlled by variability in seasonal temperature and precipitation as well as long-term climatic trends. While the demand for water continues

to grow, physical water availability varies from year-to-year and can often change dramatically between seasons in any given year. As a result, coping with supply and demand imbalances is a constant feature of water management in Montana. While we cannot eliminate all supply and demand imbalances, Montana can improve and expand efforts to gather the best scientific information available to quantify water supplies and availability.

SHORT TERM RECOMMENDATION (0-2 YEARS)

- DNRC will work with local water users and other government agencies to conduct a basin-wide physical water availability and water management assessment in the Upper Missouri Basin. The study will assess and analyze how the basin's existing water and power operations and infrastructure will perform under different water supply scenarios. The study will also analyze the effectiveness of adaptation and mitigation strategies for meeting the challenges of supplying adequate water in the future.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Build upon the lessons learned from the Upper Missouri Basin water availability and water management assessment to conduct similar studies in other basins.
- Invest in the capacity to identify and evaluate the opportunities and challenges posed by large scale forces that will influence water supply and demand over the next twenty years. Examples of large scale forces include but are not limited to: energy development, demographic shifts, climate variability, the operation of federal dams and reservoirs within Montana and downstream states, treaties and compacts with neighboring states and Canada, and federal actions related to threatened and endangered species. Review and revise the assessment every 5 years.

Increase Flexibility to Manage Available Water Supplies Through Storage and Rehabilitation of Existing Infrastructure

Water storage is an important part of any integrated water resource management strategy. Water storage creates greater flexibility in managing available supplies to meet the multiple demands of agriculture, municipalities, industry, hydropower, fisheries, recreation and water quality.

The Basin Advisory Councils and the public indicated continued support for Montana's policy to actively pursue water storage projects if water storage is found to be the best solution for meeting growing needs and resolving water management challenges (85-1-703, MCA). However, traditional large-scale storage projects are expensive to plan, construct, operate and maintain. The prospect of constructing new large storage projects in Montana is limited by the availability of suitable locations, cost, public support, the need to mitigate environmental impacts, as well as the limited legal and physical availability of water. Smaller storage projects can improve water availability within the year, but lacking significant carry-over storage, may not be effective tools for mitigating water-supply shortages during an extended drought. Other options to explore include retrofitting current storage infrastructure to increase the amount of water stored and modernizing outlet works to enable more efficient operation.

Another important tool for stored water management is the modification of policies and purposes governing project operations that define how and when water is stored or released, and for what purpose (e.g. irrigation, hydropower, instream flow, recreation).

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Work with state and federal reservoir operators to evaluate policies and purposes that consider multiple benefits and provide additional water to meet other beneficial uses if water is legally available and without jeopardizing the original authorized use of the reservoir.

- Explore opportunities to increase the storage capacity of existing state and federal reservoirs where feasible and modify infrastructure to enable more efficient operations.
- Explore the opportunities and challenges of securing contract water from federal projects such as Hungry Horse, Canyon Ferry, Tiber, Clark Canyon and Yellowtail Reservoirs to provide water for mitigating the effects of new appropriations.
- Work with the Legislature to make funding available to share in the cost of upgrading and rehabilitating existing water conveyance infrastructure. The state will work with willing stakeholders to develop public-private partnerships and innovative funding strategies for projects that cannot be completed within the state's current funding programs.
- Work with willing stakeholders to identify basins where high spring flows are physically and legally available for storage.

LONG TERM RECOMMENDATION (6-10 YEARS)

- Work with the Legislature to make funding available to share in the cost of developing additional water storage infrastructure. The state will work with willing stakeholders to develop public-private partnerships and innovative funding strategies for projects that cannot be completed within the state's current funding programs.

Integrate Natural Storage to Benefit Water Supplies and Ecosystems

Existing natural systems, such as riparian areas, floodplains and wetlands act to slow runoff and promote groundwater recharge; effectively storing water and releasing it slowly back to the surface water system. In this way, these natural systems fill a role similar to traditional reservoirs. The hydrologic characteristics of these natural systems also improve water quality. Artificial recharge of alluvial aquifers and floodplains may also provide additional opportunities to store water when the physical supply exceeds downstream legal

demands. Integrating existing natural systems and promoting the protection and restoration of natural systems into Montana’s water management practices will support late season flows, help to mitigate the impact of drought cycles, and provide environmental benefits.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- DNRC will explore the water right implications of integrating natural storage and artificial aquifer recharge into Montana’s water use administration.
- DNRC will work with stakeholders to identify and develop at least one pilot project to quantify the capacity and explore the water right implications of using natural storage to enhance water supplies in smaller watersheds.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- DNRC will work with stakeholders to investigate the feasibility, cost effectiveness, and water right implications of using the natural storage capacity of wetlands, riparian areas, or floodplains to enhance water management in a smaller watershed.
- DNRC will work with stakeholders and the Montana Bureau of Mines and Geology to investigate the feasibility and potential for using aquifer storage and recovery tools to meet local water needs. The investigation will include the geologic conditions required for aquifer storage and recovery, potential adverse effects to surface water flows, financial feasibility, and water right implications.

Support and Expand Existing Drought Preparedness and Planning Efforts

Drought is part of Montana’s natural hydrologic regime. Almost any part of the state can experience drought conditions in any given year. Climatologists can now forecast climate anomalies, such as El Niño, six to nine months in advance of onset. El Niño events have a consistent record of bringing warmer temperatures and below normal precipitation to Montana over the winter months resulting in below average water content of the

mountain snowpack, an early spring runoff, and surface water shortages. Accurate forecasting of El Niño and other weather related events can provide up to a year of lead time to assist planning and to develop mitigation strategies.

Drought preparedness requires a collaborative approach within small- to medium-sized watersheds. Working together, water users and water management agencies can develop adaptive management strategies that can yield benefits to water supply, fisheries, and water quality. Adaptive management also requires effective coordination between state and federal agencies responsible for managing water supply, water quality, fisheries, and drought and water supply forecasting. Successful adaptive management is facilitated by ready access to information about stream flow, water rights, water quality and aquatic habitat.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Support the development of drought management plans in small to medium size watersheds.
- Assess potential threats to the state’s water supply and economy resulting from extended periods of drought and increased climate variability by partnering with appropriate state and federal agencies to conduct one climate risk assessment pilot study in one of the four planning basins.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Support University and college programs, including the Montana Climate Office, involvement in drought monitoring and forecasting in order to increase the lead-time for Montana water users and managers to prepare for times of water scarcity.
- Build upon the lessons learned from the climate risk assessment pilot study identified above and conduct similar studies in the remaining basins.

WATER USE ADMINISTRATION

Historic beneficial use is the basis, measure and limit of a water right. An accurate understanding of water use is critical to Montana's ability to protect existing water rights while meeting new demands through the water right change process or new appropriations of surface water and groundwater.

The existence of unused and overstated claims in the DNRC water rights database may hinder new development in some basins by making water legally unavailable for use. In some cases a water right may remain unused for a period of time due to economic forces. In other cases an appropriator may have filed a water right, but later abandoned their plans to put the water to a beneficial use. Water right administration needs to reflect actual demands and supply on specific sources.

The role of exempt wells in water allocation has created a level of uncertainty for senior water right holders, the development community and DNRC. Exempt wells are excepted from the water right permitting process and allow for the beneficial use of water without an analysis of adverse effect. DNRC has had two very different definitions of "combined appropriation" related to exempt wells. The role of exempt wells in meeting Montana's water needs will remain unclear until the courts or the legislature provide guidance on the intent of the term "combined appropriation". Enforcement against water use without a water right or permit, water use that exceeds the limits of a water right or permit, or water use outside of priority date is also critical to the orderly management of Montana's water resources.

Steps to address these issues include:

Complete an Accurate and Enforceable Water Rights Adjudication

Adjudication of pre-1973 water rights is critical to Montana's ability to develop strategies for meeting future demands while protecting existing water rights. The water rights adjudication process must be completed as accurately as possible to establish the priority of pre-1973 water rights.

SHORT TERM RECOMMENDATION (0-2 YEARS)

- Continue funding of both the Water Court and the DNRC efforts to complete the current adjudication process at the necessary level of staffing to meet legislatively established benchmarks.

INTERMEDIATE TERM RECOMMENDATION (2-6 YEARS)

- The DNRC and the Water Court should work with stakeholders to evaluate and develop processes to ensure water rights are accurately and consistently defined across Montana.

LONG TERM RECOMMENDATION (6 - 10 YEARS)

- Create a plan for transitioning the state, including the DNRC, the Water Court, and the District Courts, to post adjudication water distribution, management and enforcement roles.

Enforce Against Illegal Water Use

Montana Water users want a more efficient, less expensive, and more administrative approach to water right enforcement. There is growing public sentiment in support of DNRC playing a more active enforcement role against illegal water use.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Examine and recommend changes to improve the current administrative process for bringing enforcement action against illegal water use.
- DNRC and the Water Court should create and the Legislature should actively fund a water rights dispute mediation unit to provide an administrative alternative to traditional water rights litigation. Training in dispute resolution and mediation should be available to all water commissioners.
- Review the procedures for establishing water distribution projects based upon Water Court decrees to improve the efficiency of that process.
- Promote consistent legal and professional measurement and distribution of water under decree by requiring water commissioners to complete the DNRC training (MCA 85-5-111) and create a certification process with annual renewals.

LONG TERM RECOMMENDATION (6-10 YEARS)

- Clarify how decrees within subbasins of major adjudicated basins will be administered when a water rights dispute arises between water users in adjacent subbasins.

Provide Sufficient Information, and Legal and Administrative Capacity to Minimize Adverse Effects during Times of Water Scarcity

Climate variation and shifting weather patterns affect average temperatures, the amount, and distribution of precipitation, and whether that precipitation occurs as rain or snow. As a result, seasonal streamflows are likely to change both in volume and timing. Climate variation may lead to an extended growing season and/or higher water use by crops and vegetation. Looking ahead, our water management strategies must adapt to address the highly variable water supply.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Drought planning efforts must include legal and administrative mechanisms that enable water users to reduce water use without the risk of abandonment and allow for the water savings to be protected.
- Assess the water right implications and potential adverse effects of allowing a water right holder to change their period of use to adapt to changing runoff and growing seasons.

Analyze Additional Opportunities and Challenges for Using Water Marketing, Mitigation, and Banking as Tools for Meeting New Demands

Compared to many western states, Montana appears to have relatively abundant water supplies, however most of this water may already be appropriated, and many parts of the state are fully allocated and closed to new appropriations. Meeting new water demands requires innovative approaches to address local water deficits within individual sub-basins. Understanding the potential positive and negative impacts of these measures

is the first step towards taking advantage of new approaches. The potential for water marketing (the sale of water or the water right by the owner) is high in Montana, especially in closed basins where the value of water increases with new water demands. Mitigation for new uses will require the reallocation of surface water or groundwater through a water right change. There are questions about the scope of water banking and its role in facilitating the reallocation of water, and the potential adverse effects of change authorizations. These issues and opportunities for mitigation, water marketing and water banking require more research, innovation, and application in the next decade.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Assess the opportunities, challenges, water right implications, and potential adverse effects of using water marketing, mitigation, and banking as tools for meeting new demands
- Create well-managed systems that offer economic development opportunities to market, transfer and lease water and build public awareness of water marketing opportunities.

Complete all Outstanding Tribal and Federal Compacts and Work Closely with Federal Partners to Better Manage Federal Water Projects

In contrast to many states that resorted to litigation as a method to quantify federal reserved water rights, in 1979, the Montana Legislature chose to establish the Montana Reserved Water Rights Compact Commission. To date the Commission has successfully negotiated, and the Montana Legislature has approved, seventeen compacts: eleven federal (non-tribal) compacts and six tribal compacts. A negotiated compact with the Confederated Salish and Kootenai Tribes (CSKT) is awaiting approval by the Montana Legislature.

Montana's water rights adjudication process will not be complete until all federal and tribal compacts have been decreed by the Water Court.

To reach a final decree, all compacts must be ratified by the Montana Legislature, approved by appropriate federal authorities, and in the case of tribal compacts approved by tribes.

All four Basin Advisory Councils agreed that it is in the interest of the state, federal government, and the tribes to complete this important work.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Continue to support and implement all adopted compacts. The state and the state's Congressional delegation must continue working with the tribes and the Departments of Justice and Interior to complete all the federal and tribal water compacts still in process.
- Montana must remain actively engaged in an ongoing dialogue with adjacent states and Canada to protect Montana's interest through the implementation of treaties and compacts that affect Montana's water resources.

WATER INFORMATION

Water resource issues are multi-faceted and often highly localized. Understanding and resolving them requires ready access to up-to-date information. Multiple local, state, federal, and tribal agencies generate and use water information in carrying out their responsibilities related to the protection or allocation of Montana's water resources. Better integration of this information will support planning, policy development and decision making at local, state and federal levels. Integration of information will also support planning and decision making by individual water users. Better access to hydrologic and climatic information at the appropriate geographic scale will result in more accurate assessments of water availability. Improved measurement and monitoring of water use will support the state's ability to determine when water is physically and legally available to meet new demands, while protecting existing water rights. Improved access to integrated water information will also support the work of water managers to distribute water by priority.

Steps for increasing access to information on Montana's water resources include:

Support Improvements to the Montana Water Information System

The Montana State Library's Water Information System (WIS) is the starting point for finding water resource information in Montana. The WIS makes high quality data on surface water, ground-water, water quality, riparian areas, water rights, climate data and more available to the public from one common starting place. Improving the WIS through the development of new data sets, interactive applications, and maps will support informed decision-making and integrated water resource management.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Provide the state library with additional staff resources dedicated to the development of new water resource related data sets, interactive applications, and maps.
- DNRC will work with the state library to develop a systematic workflow for revising the Montana Spatial Data Infrastructure (MSDI) Hydrography Framework based on the US Geological Survey National Hydrography Dataset (NHD).
- Develop a process for transmitting water data generated by local, state and federal agencies, and watershed groups to the state library for inclusion in the WIS in a consistent and timely fashion.
- Continue working with the U.S. Geological Survey on the development of StreamStats—an interactive Web-based map application for providing streamflow statistics on streams and rivers with limited hydrologic information.

INTERMEDIATE TERM RECOMMENDATION (2-6 YEARS)

- Improve the spatial representation of points of diversion (PODs) and places of use (POUs) associated with water rights, and make this improved representation available through the WIS.

Inventory of Consumptive and Non-Consumptive Uses

An accurate inventory of Montana's water use, both consumptive and non-consumptive, is critical to the state's ability to quantify current use and determine the amount of water legally and physically available to meet new demands. Accurate information on historic water use is required to evaluate potential adverse effects of changes in use.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Invest in the resources necessary to acquire the best information available on current consumptive and non-consumptive water use in Montana. This includes accurate information on the extent and distribution of irrigated lands, crop types, and irrigation system types.
- Develop the capability to use Geographic Information System (GIS) technology and specialized agricultural engineering software to calculate the amount of water consumed by plants (evapotranspiration) using available information generated from NASA's Landsat Program.
- Explore the development of standard practices for evaluating consumptive use from analysis of Landsat imagery.
- Provide technical assistance and incentives to water users to measure water at or near the point of diversion from a ditch, stream, or wellhead.

Monitor Water Supply and Distribution

Effective water management and distribution depend on accurate real-time measurements of streamflow, snowpack and soil moisture. Improving Montana's water supply and distribution monitoring network will improve the ability of water managers and water users to adjust to seasonal supply and demand imbalances as well as plan for longer term imbalances associated with climate variability.

DNRC currently provides funds to operate and maintain forty-four (44) real-time stream gages

in Montana through the U.S. Geological Survey's (USGS) Cooperative Water Program (Co-Op Program). These gages provide real-time flow information on the state's main rivers and larger tributaries. Other critical water supply monitoring systems include both SNOTEL (SNOW TELemetry), a system operated by the Natural Resource Conservation Service (NRCS) that measures mountain precipitation and other atmospheric conditions, and SCAN (Soil Climate Analysis Network), a system operated by NRCS that measures soil moisture. All of this information is available to water users via the Montana Drought and Water Supply website (drought.mt.gov). Montana must work to ensure the continued operation of these water supply monitoring networks.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Expand the funding base for the USGS Co-Op Program beyond traditional state and federal agency partners by educating local organizations and private entities on the purpose and need for stream gages.
- Begin to develop a network of 100 state operated permanent, year-round stream gages to gather and distribute real-time streamflow information on smaller streams and tributaries not monitored through the USGS Co-Op Program.
- Encourage support of all existing sites and further expansion of the NRCS's SNOTEL and SCAN systems to provide actionable and long term water supply and soil moisture condition data.

Improve and Expand Efforts to Quantify Groundwater Supplies and Availability

Montanans are increasingly looking to the state's groundwater to meet future needs. Groundwater information including aquifer characteristics and water monitoring data collected under the Montana Bureau of Mines and Geology Groundwater Water Assessment Program is needed statewide to identify sources of groundwater potentially available for development.

SHORT TERM RECOMMENDATION (0-2 YEARS)

- The Montana Bureau of Mines and Geology's (MBMG's) Groundwater Steering Committee should re-assess the criteria used in selecting studies conducted under both the Groundwater Assessment and Groundwater Investigation Programs to better reflect critical needs and statewide priorities.

INTERMEDIATE TERM RECOMMENDATION (2-6 YEARS)

- Provide additional funding to MBMG's Groundwater Characterization Program (GWCP) for the purpose of completing reconnaissance level inventories of groundwater resources in the remaining GWCP characterization areas.
- Provide necessary funding to expand MBMG's Groundwater Monitoring Program for the purpose of adding dedicated monitoring wells to characterize trends in groundwater levels.

Improve Conjunctive Management of Surface Water and Groundwater

Montana recognizes the link between surface water and groundwater and manages them as a single resource. Additional site-specific investigations to determine aquifer properties are necessary: to evaluate interactions between groundwater and surface water, develop strategies for mitigating impacts of groundwater use on surface water users, and to facilitate decisions on new permitting and water right change authorizations.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Support continued funding for the MBMG's Groundwater Investigation Program to ensure that aquifer information and modeling tools necessary to implement conjunctive management are available.
- Identify options for mitigation or aquifer recharge plans to offset impacts of groundwater use on surface water.
- Investigate the availability and the potential for the diversion of high spring surface water flows for aquifer recharge.
- Investigate the design of aquifer storage and recovery projects to optimize water use while protecting existing water users.

ECOLOGICAL HEALTH AND ENVIRONMENT

Montana's aquatic systems, lakes and rivers, and associated biological resources, support our quality of life, provide clean drinking water, and support Montana's recreation and tourism economy. The availability of water in the appropriate quantity, quality, timing and duration is necessary to ensure the health of our water-dependent ecosystems. The state should pursue proactive policies and management practices to meet the needs of aquatic ecosystems within the prior appropriation system in order to sustain the health of these valuable natural systems as Montana's economy grows.

Steps to address these issues include:

Provide Sufficient Protection for Instream Flows Within the Prior Appropriation Framework to Maintain Aquatic and Riparian Systems

Coordinated efforts are needed to develop and implement strategies and tools for providing minimum instream flow regimes within the prior appropriation framework.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Ensure that the change of use process for instream flow/fishery water rights is consistent with the change process for all other beneficial uses. Steps would include a requirement that the applicant show they will not adversely affect other water right holders, the allowance of both temporary and permanent changes, and a broader recognition that instream flow rights should be enforced in priority.
- Recognize and document the importance of connectivity within stream and riparian systems. Efforts should be made to restore connectivity and habitat where needed within the prior appropriation doctrine.
- Support research to determine the frequency, magnitude, timing and duration of high flows and low flows needed to maintain the natural ecological functions of rivers, streams and habitats across the state.

Support Proactive, Coordinated Efforts to Reduce Invasive Species and Protect Endangered Species in Montana

Both aquatic and terrestrial invasive species can impact water supplies and distribution. Zebra mussels, Eurasian watermilfoil and Tamarisk (saltcedar), colonize quickly, out-compete native species, wreak havoc on water delivery infrastructure, threaten native aquatic ecosystems and/or consume large amounts of water. The presence of threatened and endangered species requires careful management decisions and cross agency coordination to minimize negative impacts to critical habitat and to water users. Coordinated efforts are needed to implement actions that protect Montana’s land and water resources.

SHORT TERM RECOMMENDATIONS (0-2 YEARS)

- Promote the use of voluntary programs that preserve the flexibility of landowners to manage their operations as the preferred method for handling Endangered Species Act protection and recovery programs.
- Support local and agency coordination efforts to implement invasive species protection programs.



COLLABORATIVE WATER PLANNING AND COORDINATION

Water management in Montana occurs at a variety of scales: watershed, sub-basin, basin, statewide and regional. Many local, state, federal, and tribal agencies and organizations are involved in the distribution, protection, and/or measurement of Montana’s water. Coordination increases communication, improves efficiencies, and leverages technical and financial resources. Effective collaboration helps to inform, engage, and connect stakeholders and supports efforts to improve water management across all watersheds. It is important to coordinate efforts and involve water managers, users, and stakeholders at the watershed, basin, and statewide scale to develop sustainable management solutions.

Expand Support for Basin and Community Based Watershed Planning

Community-based watershed groups, conservation districts, and other organizations provide the structure and a forum to bring together stakeholders, build partnerships, and work collaboratively to develop local water management plans. It will be increasingly important to provide such groups with planning support, technical assistance, and access to information to develop, implement, and monitor water use plans as demand for water grows and the administration of Montana’s water becomes more complex.

SHORT TERM RECOMMENDATION (0-2 YEARS)

- Provide funding to periodically convene the Basin Advisory Councils to evaluate, update and implement the recommendations adopted in the State Water Plan.

INTERMEDIATE TERM RECOMMENDATIONS (2-6 YEARS)

- Create a dedicated and sustainable source of funds to support technical, organizational and operational capacity of local watersheds to assist in water management and drought planning, education and outreach, and the coordination of local efforts to implement state and basin plan recommendations.

- Build on the work of the statewide organizations such as the Montana Association of Conservation Districts and the Montana Watershed Coordination Council to provide financial, technical and educational assistance to increase the organizational capacities of community based watershed groups and Conservation Districts.

Encourage Collaboration, Coordination, and Communication across Local, State, and Federal Agencies and Tribal Governments

Many state and federal agencies and tribes share responsibilities for land and water management. The policies and actions of one often directly impact another. Close coordination between local, state, federal and tribal water managers is critical for achieving outcomes that serve both economic and environmental interests. Local, state and federal agencies and tribes in Montana must work closely to:

SHORT TERM RECOMMENDATION (0-2 YEARS)

- Address watershed, sub-basin and basin wide water management issues through increased interaction and communication between water users, watershed groups, technical specialists, and policy makers at all levels of government.

INTERMEDIATE TERM RECOMMENDATION (2-6 YEARS)

- Encourage land management agencies to include potential impacts to water supplies in their management decisions. This could include forest vegetation management and the restoration of natural features such as riparian areas and wetlands that act to slow runoff and promote groundwater recharge.

Develop a Plan to Deliver Water Related Training, Education and Outreach

Water management is complicated, not only because of water's finite and variable nature, but also because of the complicated nature of the water right laws and rules used to administer it. Water education and outreach activities are necessary to provide a foundation for the informed management of Montana's water resources now and into the future.

SHORT TERM RECOMMENDATION (0-2 YEARS)

- DNRC will expand on current efforts to create and deliver public awareness and training programs, working through the Montana Watercourse, Conservation Districts, Water Quality Districts, municipalities and community-based watershed groups that provide information on
 - Water efficiency and hydrology related topics:
 - Benefits and consequences of sprinkler and flood irrigation system conversions,
 - Municipal water conservation measures,
 - Consumptive and non-consumptive use,
 - Groundwater/ surface water interactions.
 - Water Rights Administration:
 - Water right basics,
 - The process to obtain water for new or expanded uses,
 - DNRC's improved/simplified change process,
 - The process for filing an objection to an application for a new, expanded, or changed use of water,
 - Water reservations, legal status and availability for development as a beneficial use.
 - Adjudication and tribal and federal compacts progress and outcomes
 - How to access water data through the Water Information System
 - Technical trainings, assistance and incentives to support voluntary water measurement programs
 - Educate local organizations and private entities on the value, purpose, and need for stream gages, as well as how and where to access the data.

INTERMEDIATE TERM RECOMMENDATION (2-6 YEARS)

- Develop an easily navigable webpage or portal that provides public information on water contracting/leasing opportunities and for identifying all the elements of a water right including: ownership, beneficial use, point of diversion, place and period of use.



Montana Department of Natural Resources and Conservation

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