Natural Water Storage

Why Natural Storage?

One million acre-feet of water per year in Montana is lost to evaporation from reservoirs. Traditional large-scale storage projects are expensive to plan, construct, operate and maintain. Construction of 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 legal and physical availability of water.

Natural Storage and the State Water Plan

The Montana State Water Plan outlines several strategies to meet current and future water supply needs, including: **Explore the use of natural storage and retention to benefit water supplies and ecosystems.**

> **"Existing natural systems such as riparian areas**, **floodplains** and **wetlands** slow runoff and promote groundwater recharge; effectively storing water and releasing it slowly back to the surface water system.
>
> **Artificial recharge of alluvial aquifers** may also provide additional opportunities to store water when the physical supply exceeds downstream legal demands. Integrating existing natural systems into Montana's water management practices will support late season flows, mitigate the impact of drought cycles, and provide environmental benefits." **– 2015 State Water Plan**

Natural Storage Project Types and Examples

1) **FLOODPLAIN RESTORATION** – Natural water storage and retention can be enhanced by restoring side channels, limiting the encroachment of urban development and impervious surfaces, reconnecting rivers to floodplains, minimizing stream incision and channelization, and preventing erosion through good forest and range management practices.

   Project Example (Yellowstone River): A channel migration easement (CME) program on the Yellowstone River compensates landowners for allowing natural lateral migration of the Yellowstone River, which, in turn enhances water storage. Montana Aquatic Resources Services (MARS) completed the first CME near Sidney in 2014 and a second in 2016 near Forsyth.

   Potential Project Example (Ruby River, Upper Missouri River Basin): Sections of the Upper Ruby River are deeply incised, limiting access to the floodplain and accelerating bank erosion. Reconnecting the floodplain would slow spring flows and reduce sediment input into the Ruby Reservoir which is experiencing reduced capacity due to sediment contributions.

2) **IRRIGATION INFRASTRUCTURE** – Recharge from irrigation canals and flood irrigation practices have significantly changed the groundwater flow systems in nearly all watersheds of western Montana and the large watersheds of eastern Montana. Significant volumes of water from irrigation conveyance and application practices percolate into alluvial aquifers and slowly release to support late season streamflow. Existing irrigation infrastructure provides ready means for augmenting the recharge of shallow groundwater systems. In some areas it may be feasible to run water through these systems

outside of the normal irrigation season (but within the period of diversion) for the purpose of recharging shallow groundwater aquifers. This activity would require a **change authorization from DNRC** to ensure other water users are not adversely affected. Currently, **water users cannot change their period of diversion** as part of the water right change process.

Project Example (Missouri River Basin): The East Bench Canal (Dillon, MT) delivers irrigation water to 49,800 acres. A groundwater study by MBMG identified that the "leaky" system (~2.2 cfs/mile) contributes approximately 27,600-acre feet to the local alluvial aquifer which in turn elevates groundwater that supplies many domestic wells in the area. Several large irrigation districts, such as the Bitterroot Irrigation District, experience similar scenarios.

3) **WETLANDS AND INFILTRATION GALLERIES -** There may be opportunities to take advantage of the natural storage potential of shallow aquifers by diverting unallocated flows into constructed wetlands or retention basins. Wetlands and beaver dam complexes are important contributors to natural water storage and many beaver dam analog projects are occurring across Montana to mimic these systems.

Project Example (Ninemile Creek, Clark Fork River Basin): Beaver mimicry is an emerging tool in floodplain and wetland restoration, especially in higher-elevation tributaries, as practitioners recognize the ecological value of beaver dams for enhancing water storage. Trout Unlimited, Clark Fork Coalition and other partners used this method to help restore Ninemile Creek where it had been straightened and incised due to mining, increasing late summer flow from 6 cfs to 7 cfs.

Water that is slowed down and spread out can help recharge the aquifer, and in turn, may enhance downstream water supply (Wood Creek near Augusta)

Feasibility of and Constraints on Natural Storage

The feasibility of any storage or recharge project will depend on a number of factors including, but not limited to, site specific geologic and hydrologic conditions (distance to aquifer, type, transmissivity), distance to desired recharge (stream) and management objectives, and the physical and legal availability of surface water to divert and store. Pilot projects should also consider collaboration potential, quality assurance, monitoring, data analysis, reporting and target audience.