



FEMA



**Dam  
Safety  
Program**

Montana Water Resources Division

# Dams in Montana

DECEMBER 2018



Tongue River Dam



# Dams in Montana

**MONTANA HAS OVER  
64,000 RESERVOIRS <sup>1</sup>**

<sup>1</sup> According to a database of storage water rights.

## GENERAL CATEGORIES OF DAMS ACCORDING TO SIZE



### LARGE

Generally, these dams are the US Bureau of Reclamation (USBR) and US Corp of Engineers (USACE) owned and operated dams (e.g., Canyon Ferry, Libby Dam). These dams can be several hundred feet tall and are often constructed with concrete.



### MEDIUM

Typically, these dams are between 30 and 150 feet tall and are usually of earthen construction. (e.g., Bearpaw Dam, Painted Rocks Dam)



### SMALL

Generally, these dams are less than 30 feet tall and are commonly referred to as pond dams. Most of the dams in the state are in this category.

# Dams in Montana

## CATEGORIES OF DAMS ACCORDING TO RESERVOIR CAPACITY

There are 3259 dams that meet National Dam Inventory (NID) Criteria. Dams are included in the NID if they store at least 50 acre feet of water or are at least 25 feet high. Note that dams less than 6 feet high are excluded regardless of storage capacity. Similarly, dams that store less than 15 acre feet of water are excluded, regardless of height.

*In the water world, water is commonly measured in acre-feet. One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land, about the size of a football field, one foot deep. So, an area of 1 acre about 50 feet deep would be 50 acre-feet.*

### WHAT IS THE BASIS FOR NATIONAL DAM INVENTORY CRITERIA?

Reservoirs that store greater than 50 acre feet or dams that are 25 feet tall or more can pose a threat to downstream life and property. The exclusions are large reservoirs with small dams (common to wildlife refuges) or tall dams with low storage potential (often found on narrow coulees).

Note the inventory is based on Maximum Storage Capacity.

### A QUICK WAY TO ESTIMATE RESERVOIR STORAGE:

Surface area in acres x height of water in reservoir (toe of dam to spillway) x 0.4

This Judith Basin County Reservoir has approximately 2 surface acres (think of 2 football fields) and has 22.1 feet of water up to the principal spillway:

$$2 \text{ acres} \times 22.1 \text{ feet} \times 0.4 = 17.5 \text{ acre feet}$$

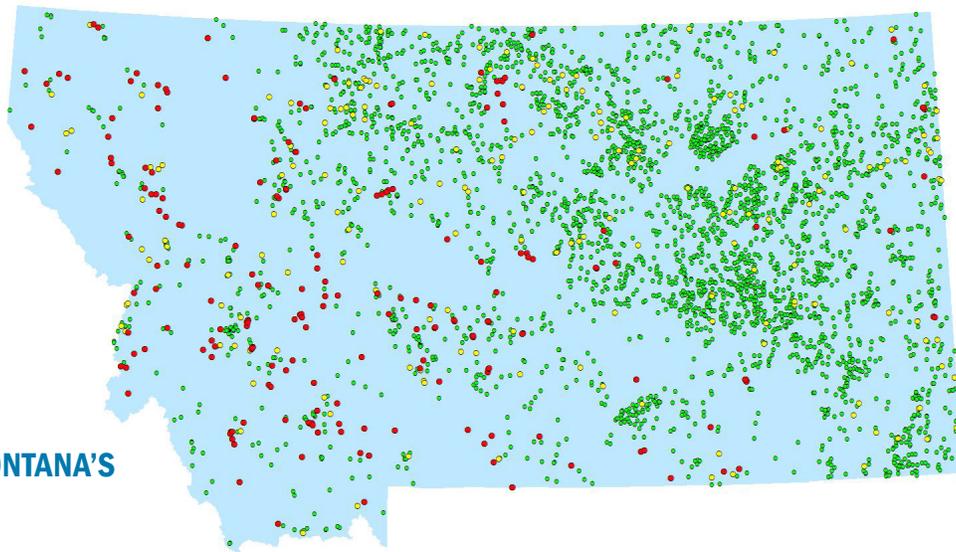


Fork Peck is the largest capacity reservoir in Montana with a normal storage of 1.54 million acre feet.



# Dams in Montana

## CATEGORIES OF DAMS ACCORDING TO HAZARD TO DOWNSTREAM POPULATION, PROPERTY AND INFRASTRUCTURE



### SNAPSHOT OF MONTANA'S DAM INVENTORY:

- HIGH HAZARD DAMS (197)**  
Failure may cause loss of human life
- SIGNIFICANT HAZARD DAMS (201)**  
Failure may cause significant property damage, but loss of life is not expected.
- LOW HAZARD DAM (2861)**  
Failure causes minimal property damage, usually limited to property owned by dam owner.

When defining the Hazard Classification of dams, the condition or integrity of the dam is not considered, only the potential for damage and loss of life should the dam fail. In other words, it doesn't matter if the dam is in excellent or poor shape.

*Note: Dams on ponds that do not meet National Dam Inventory Criteria generally do not have a hazard classification assigned.*

## LIABILITY OF DAM OWNERSHIP

In Montana, regardless of classification, the dam owner — and in some cases the land owner (if different) — are responsible.

Responsible dam ownership includes attention to maintenance, repair, careful operation, periodic inspection as well as compliance with all applicable laws.

For more information on the Liability of Dam Ownership in Montana refer to:

<http://dnrc.mt.gov/divisions/water/operations/dam-safety/LegalLiabilityDamOwnership.pdf>



# Dams in Montana

## MONTANA REQUIREMENTS FOR DAMS ACCORDING TO HAZARD CLASSIFICATION

### HIGH-HAZARD DAMS

*Dams with potential for loss of life if they fail*

- Inspections by licensed engineer
- Stringent regulatory oversight
- New construction and repairs must be overseen by licensed engineer
- Compliance with design and construction standards
- Emergency Action Plan to evacuate downstream residents required
- Operation and maintenance plans required

*Montana dams with a large population at risk downstream must be designed to withstand extreme floods and severe earthquakes.*

### SIGNIFICANT-HAZARD DAMS

*Dams with potential for property damage if they fail*

- Less frequent Inspections (depending on Regulatory Agency)
- Emergency Action Plan optional

### LOW-HAZARD DAMS

*Dams with low damage potential if they fail*

- Often not Inspected (depending on Regulatory Agency)
- Rarely have an Emergency Action Plan

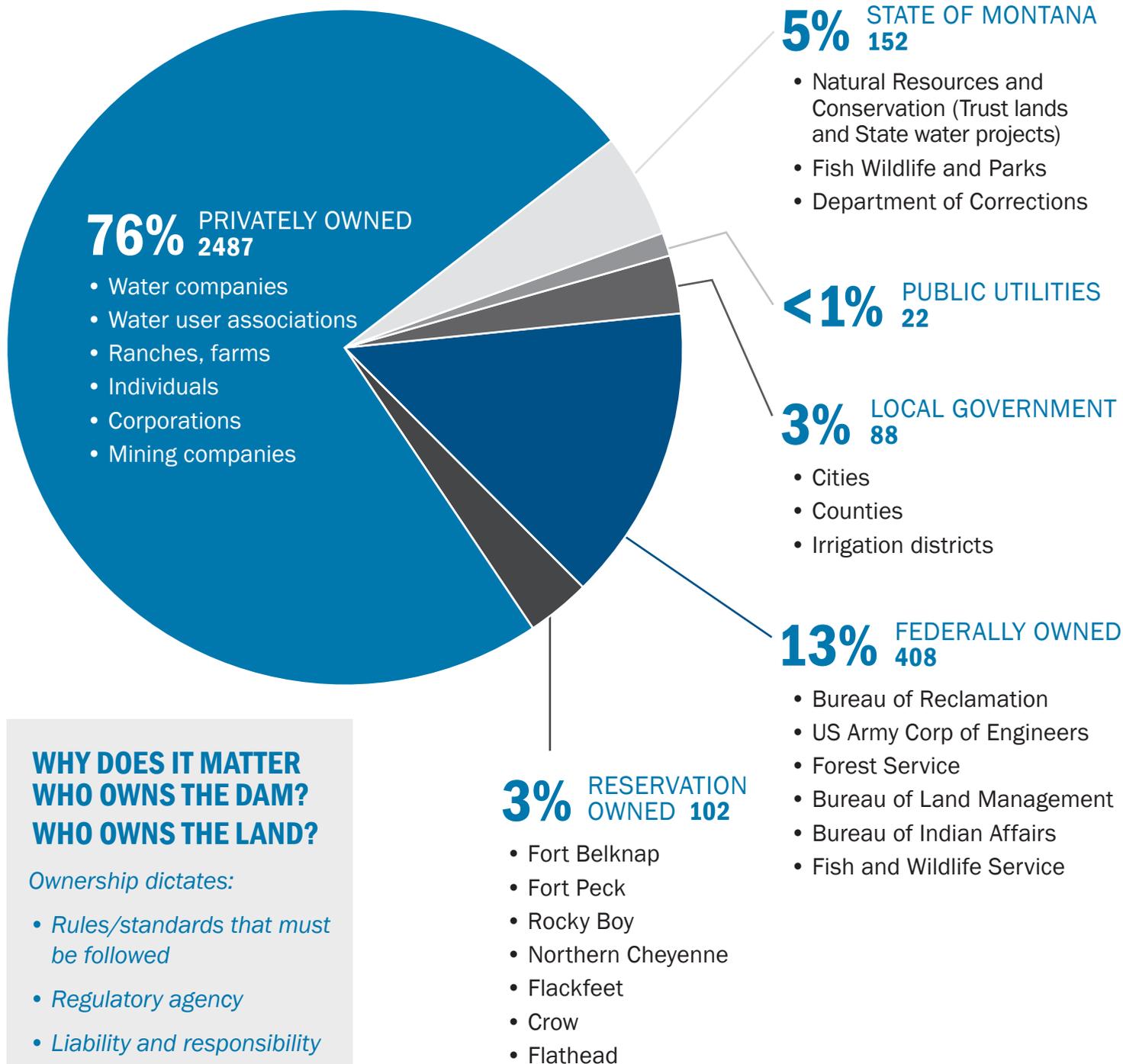


**NOT ALL HIGH HAZARD DAMS ARE THE SAME.** In Montana, a dam can be classified as “high hazard” with any potential for loss of life, including campgrounds or paved roads. However, dams with a large population at risk downstream are held to much higher standards.

# Dams in Montana

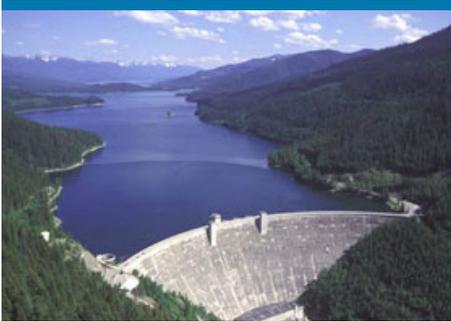
## OWNERSHIP OF MONTANA'S DAMS

(PER NATIONAL DAM INVENTORY)



# Dams in Montana

## REGULATION OF DAMS – FEDERAL



### US BUREAU OF RECLAMATION (USBR)

- The USBR self-regulates the dams and dikes they own on 13 reservoirs.
- The USBR also regulates dams that are part of irrigation projects under its supervision and several diversion dams.

For more information:  
[www.usbr.gov/projects](http://www.usbr.gov/projects)



### US FOREST SERVICE (USFS)

- The USFS self-regulates the 21 dams they own.
- 78 dams located on USFS property are privately or state-owned. The Department of Natural Resources and Conservation and the USFS are developing an agreement for efficient joint regulation of these dams. Most of these dams are remote and are generally less than 30 feet high.



### US ARMY CORP OF ENGINEERS (USACE)

The USACE self-regulates 2 large dams in Montana (Fort Peck and Libby Dam).

### NATURAL RESOURCE CONSERVATION SERVICE (NRCS)

The NRCS does not regulate dams, they do however play a big role. The NRCS constructed flood control structures for communities throughout the state. Most of these reservoirs provide multiple benefits to the surrounding areas. The NRCS continues to provide technical assistance on these dams in the form of engineering inspections and guidance on repairs, operation and maintenance.

### US BUREAU OF INDIAN AFFAIRS (BIA)

The BIA regulates dams located on Indian reservations. This includes 101 dams owned by the reservations, with the exception of one hydropower producing facility that is regulated by the Federal Emergency Regulatory Commission.

# Dams in Montana

## REGULATION OF DAMS – FEDERAL (CONTINUED)

### US FISH AND WILDLIFE SERVICE (FWS)

- The FWS self-regulates the 26 dams they own.
- Most of these dams are less than 15 feet high, and classified as low hazard, although they can store large amounts of water.

### US BUREAU OF LAND MANAGEMENT (BLM)

- The BLM regulates 353 dams that are located on its land in Montana.
- BLM owns some of the dams, others are privately owned. In both cases, BLM provides regulatory oversight
- Most of these dams are located in low population areas and are classified as low hazard.

### ENVIRONMENTAL PROTECTION AGENCY (EPA)

- Montana has dams located on superfund sites. EPA actively regulates 4 of these dams.
- Although EPA is the lead agency, they work closely with state agencies on dam regulation.

## WHAT DOES IT MEAN TO BE SELF-REGULATED?

Many Federal agencies manage their own dam safety programs. Dams are held to stringent requirements. Although the requirements vary by agency, they conform to common guidelines referred to as the “Federal Guidelines for Dam Safety.” For More Information: [www.fema.gov/federal-guidelines-dam-safety](http://www.fema.gov/federal-guidelines-dam-safety)



# Dams in Montana

## REGULATION OF DAMS – STATE

### DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION (DNRC)

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DNRC provides regulatory oversight for dams owned by the State, local government and private individuals or organizations. Note that dams in these categories that are regulated by the Federal Energy Regulatory Commission (i.e. hydropower) are exempt from DNRC oversight.

#### DNRC AS A DAM OWNER, DAM REGULATOR AND LAND OWNER



The DNRC State Water Projects owns 33 dams and dikes. These dams are operated by water users associations. Regulatory oversight includes the DNRC Dam Safety Program; the US Forest Service and the Federal Energy Regulatory Commission (FERC).



The DNRC Dam Safety Program administers the Montana Dam Safety Act, providing oversight of the majority of dams in the state.



The DNRC Trust Lands Management Division owns the land under many dams that were built and are operated by trust land leasees.



### DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

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DEQ provide regulatory oversight of wastewater pond dams, tailings dams and dams located at the Colstrip facility.



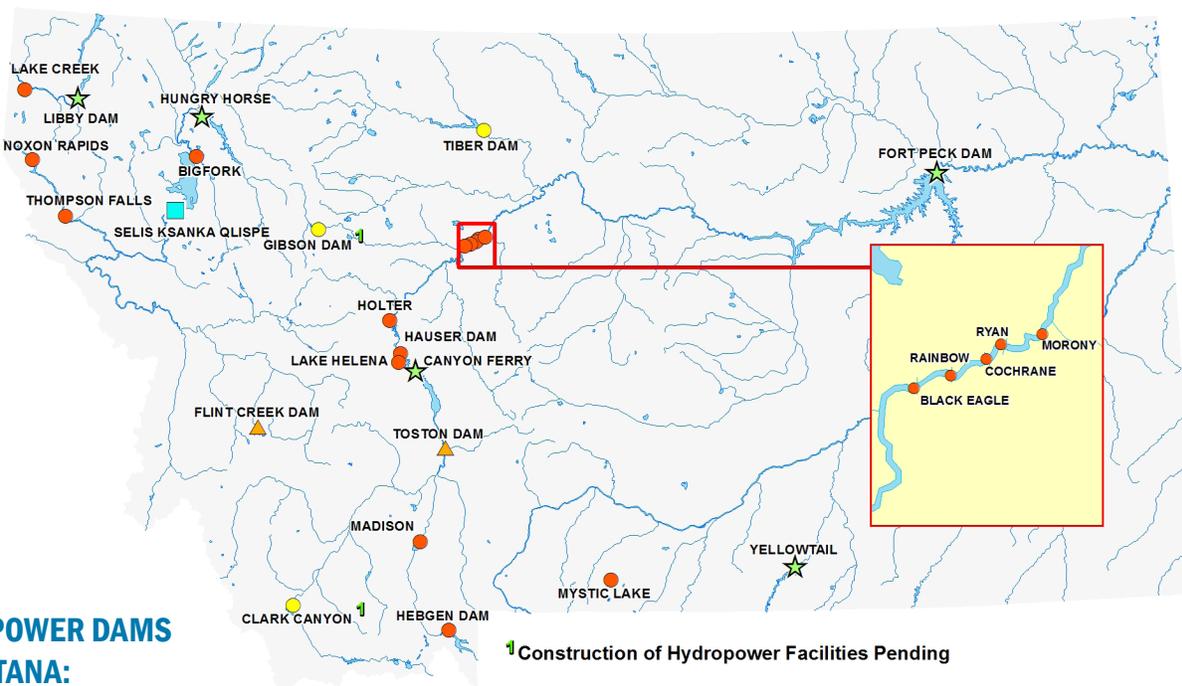
Petrolia was formerly owned by DNRC. Following rehabilitation, the dam was transferred to the Petrolia Irrigation District.

# Dams in Montana

## REGULATION OF HYDROPOWER DAMS

The Federal Energy Regulatory Commission (FERC) regulates most, but not all, hydropower producing dams. Exceptions include dams owned by the USBR and the USACE that have authority to generate power. Note that not all USBR-owned dams are authorized

for hydropower. For these dams, private entities can develop the hydropower. However, these private entities must seek a license from FERC. FERC is known for its stringent design, inspection, operation and maintenance standards.



### HYDROPOWER DAMS IN MONTANA:

- **PRIVATELY OWNED DAMS**  
Privately Operated Hydropower  
FERC Regulated
- ▲ **STATE/LOCALLY OWNED DAMS**  
State/Locally Operated Hydropower  
FERC Regulated
- ★ **FEDERALLY OWNED DAMS**  
Federally Operated Hydropower  
Self-Regulated
- **FEDERALLY OWNED DAMS**  
Privately Operated Hydropower  
FERC Regulated

- **RESERVATION OWNED DAMS**  
Reservation Operated Hydropower  
FERC Regulated



Toston Hydropower Dam

# Dams in Montana

## DAM INSPECTIONS MAKE THE DIFFERENCE

Montana's dams are immensely safer than they were 30 years ago. Inspections identify developing problems long before they lead to an incident or failure. Inspections identify maintenance needs and operational problems and provide dam owners guidance on how to address. Inspections help the dam owner and engineer become familiar with the dam and subsequently more aware of an unusual seep, slump or crack.



*It is exceedingly rare for properly inspected and maintained dams to fail.*



## MONTANA'S #1 DAM PROBLEM: FAILURE OF CORRUGATED METAL PIPE OUTLETS

Many of Montana's dams were built between 1940 and 1960. Corrugated Metal Pipe (CMP) was commonly used as a conduit material during this time period due to its availability, low cost and ease of installation. However, CMP slowly corrodes over time. In recent years, many dam failures have been caused by failure of CMP outlets. Failure usually occurs catastrophically and with little warning.



*This Petroleum County dam failed catastrophically in 2004. No serious downstream damage, however the dam owner lost a season of irrigation water.*



*This Choteau County dam failed in 2011. Located in a remote area, there was no damage downstream.*

Most of the high hazard dams in Montana have rehabilitated their aging outlets. However, owners of many small low hazard dams are not aware of the need to inspect and if necessary repair or replace their outlets, as inspections are not required.

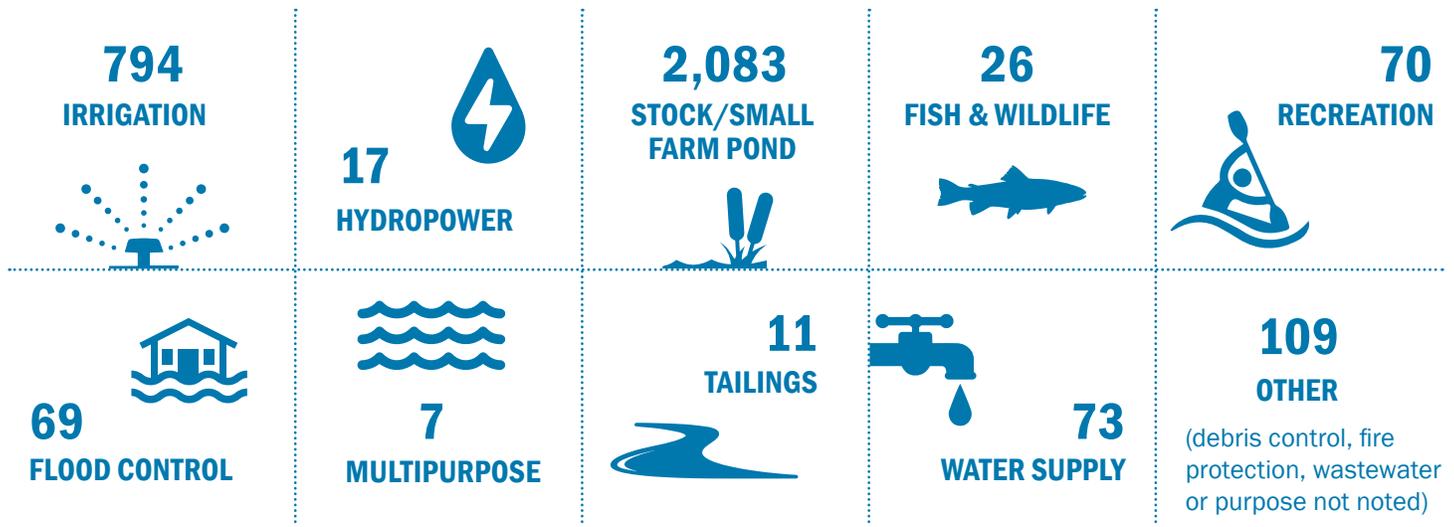
In response to this need, DNRC initiated a number of actions using FEMA National Dam Safety Act Assistance to States funding to address this growing concern including:

- Dam Owner Workshops
- Purchase of Outlet Inspection Equipment that dam owner can borrow
- Educational Tools and Information guides

# Dams in Montana

## MONTANA'S MULTIPLE USE RESERVOIRS

MONTANA RESERVOIRS' PRIMARY PURPOSE: <sup>1</sup>



<sup>1</sup> PER NATIONAL INVENTORY OF DAMS

*The many irrigation reservoirs in the state benefit wildlife and often provide recreational opportunities for the public. Irrigation reservoirs also provide an often-overlooked bonus: late season stream flow and related groundwater recharge and return flow. Montana would look very different in August without these irrigation reservoirs.*



Without late season irrigation water provided by the Ruby Reservoir, the Ruby valley would be a dry and arid place.

# Dams in Montana



Tongue River Dam

## FREQUENTLY ASKED QUESTIONS

### ARE THERE MANY DAM FAILURES IN MONTANA?

Yes, during flood events many small pond dams fail. However, often the only one aware of the failure is the dam owner. During the most recent flooding in counties along the Musselshell River, data suggests that over 50 small stock pond dams failed. In general, the small pond dams do not contain much water and, as a result, when they fail little or no damage occurs.

There have been recent cases where larger dams have failed, primarily due to the deterioration of corrugated metal pipe outlets. None of these dams were classified as high hazard and there was no loss of life or significant property damage. The biggest problem with these failures was the loss of a season

of irrigation water, which can be significant impact to the water users. There was one case where the dam failure flooded a railroad, which resulted in a temporary shutdown of a major railroad line and significant costs to the dam owner.

In 1964, several dams failed on the Rocky Mountain Front during a large rain on snow event causing loss of life.

### WHY ARE THERE SO MANY DIFFERENT REGULATORY AGENCIES?

Federal agencies are required to enforce federal laws for dams they own or are located on their property. Dams not subject to federal requirements fall under the regulatory authority of the state.

### WHO IS RESPONSIBLE IF A DAM FAILS?

State law is clear: the owner of the dam is responsible to maintain their dam in a safe condition, and should it fail, the dam owner may be held liable for damages.

In some cases, the land owner and the dam owner are different. Both share responsibility and should work together to make sure their dam poses an acceptable level of risk to the public. Others who benefit from the water may also be held responsible. If you have an interest in a reservoir, you should make sure the dam is properly maintained.

Regulatory agencies provide an important role in educating dam owners about their risks and ensuring inspections, maintenance and repairs are done in a timely manner.





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