# STATE WATER PROJECTS INFORMATION REPORTS

Row One: Painted Rocks Spillway and Reservoir (Ravalli Co.), Row Two: Willow Creek Spillway and Reservoir (Madison Co.), Row Three: East Fork of Rock Creek Spillway and Reservoir & Gatehouse (Granite Co.)

The Montana Department of Natural Resources & Conservation

October 2024 (4th Edition)

**East Fork of Rock Creek Spillway, Granite County**

**Prepared By:**
Department of Natural Resources and Conservation
Water Resources Division
State Water Projects Bureau

MONTANA DNRC Water Resources

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## INTRODUCTION

The State Water Projects Bureau (SWPB) is the successor to the original State Water Conservation Board created in the 1930s for building water infrastructure projects throughout Montana. Today, SWPB administers the operation, maintenance, management, and rehabilitation of 18 state-owned water projects including 22 dams, approximately 250 miles of irrigation canals, and one hydropower facility. The SWPB also assists in the operation and maintenance of nine dams owned by the Montana Department of Fish, Wildlife and Parks (MT FWP).

Water from state-owned facilities is marketed to local water users associations, primarily for irrigation. In 2024, SWPB had 1,872 water marketing contracts with water users associations. The total volume of water marketed was 322,847 acre-feet. The water user associations are responsible for the daily operation and maintenance of the projects, under SWPB oversight.

The SWPB has three sections: Project Management, Project Rehabilitation, and Hydropower.

The ***Project Management Section*** is responsible for:

- Protecting project water rights
- The sale or transfer of projects
- Various management functions associated with project lands, such as recreational, cabin site and agricultural leases, weed control, easements and right-of-ways.
- Dam Safety Inspections
- Instrumentation
- Hydrography

The ***Project Rehabilitation Section*** is responsible for:

- Overseeing the operations and maintenance of state-owned dams and canals
- Rehabilitating and repairing state-owned dams and canals
- Maintaining Operating Permits for all SWPB's high-hazard dams
- Annually inspecting MT FWP dams
- Coordinating with the Hydropower Section to evaluate hydropower facilities for DNRC dams

The ***Hydropower Section*** is responsible for:

- Administering the Hydropower Program
- Operating and maintaining the Broadwater Power Project
- Generating revenue to repair and rehabilitate other state-owned water projects

The following report provides maps, statistics, and historical information about state-owned water projects.

***Summary of State-Owned Water Projects***

| Project Name | Year Completed | Storage (acre-feet) | Height (feet) | County |
|---|---|---|---|---|
| Ackley Lake Dam | 1938 | 6,722 | 51 | Judith Basin |
| Bair Reservoir Dam | 1939 | 7,300 | 106 | Meagher |
| Cooney Dam | 1937 | 28,230 | 102 | Carbon |
| Cottonwood Dam | 1953 | 1,905 | 39 | Park |
| Deadman's Basin Dam | 1941 | 72,218 | 60 | Wheatland |
| East Fork of Rock Creek Dam | 1938 | 16,040 | 88 | Granite |
| Fred Burr Dam | 1949 | 525 | 50 | Ravalli |
| Frenchman Dam | 1952 | 2,801 | 44 | Phillips |
| Glacier Lake Dams (2) | 1937 | 4,200 | 57 (N)<br>20 (S) | Carbon |
| Martinsdale Dams (2) | 1939 | 23,348 | 91 (N)<br>49 (E) | Wheatland & Meagher |
| Middle Creek Dam (Hyalite) | 1951 | 10,184 | 125 | Gallatin |
| Nevada Creek Dam | 1938 | 11,152 | 105 | Powell |
| Nilan Dams (2) | 1951 | 10,092 | 54 (N)<br>51 (E) | Lewis & Clark |
| North Fork of Smith River Dam | 1936 | 11,500 | 84 | Meagher |
| Painted Rocks Dam | 1939 | 32,362 | 143 | Ravalli |
| Ruby River Dam | 1938 | 37,642 | 112.5 | Madison |
| Tongue River Dam | 1940 | 79,071 | 93 | Big Horn |
| Toston Dam (Hydropower) | 1940 | 4,100 | 51.5 | Broadwater |
| Willow Creek Dam | 1938 | 18,000 | 105 | Madison |
| Yellow Water Dam | 1938 | 3,842 | 37 | Petroleum |

# MONTANA STATE WATER PROJECTS DAMS

# ACKLEY LAKE DAM

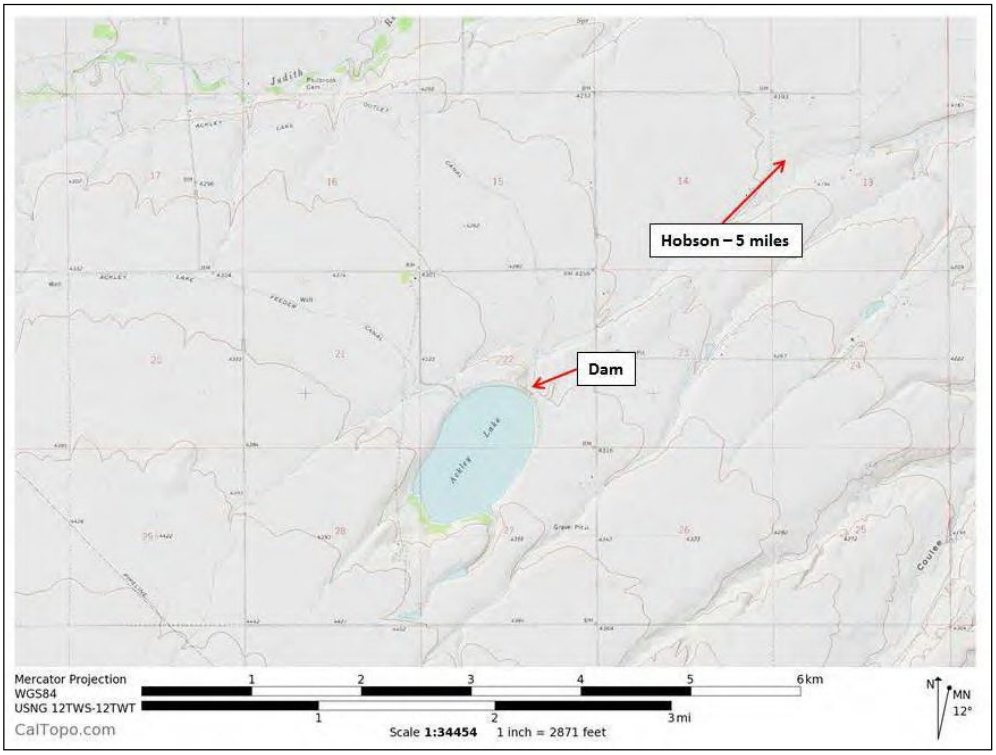
Fact Sheet

## PROJECT DESCRIPTION

- Off-Stream storage with a supply canal from the Judith River
- Located in Judith Basin County, 5 miles southwest of Hobson
- Built in 1938
- Owned & managed by DNRC-SWPB
- Operated by the Ackley Lake Water Users Association since 1938
- Project consists of:
  - Earthen embankment dam, 51 feet high, 3,514 feet long
  - Unregulated, trapezoidal earthen section spillway
  - 44-inch diameter outlet conduit, plastic-lined corrugated metal pipe -
  - 48-inch diameter, manually operated slide gate
- Storage at full pool is 6,722 acre-feet, covering 250 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life; farms, ranches, numerous homes, roads, bridges, and utilities are in the flood plain

## WATER USE

- Water users have 53 contracts for 4,766 acre-feet of water
- Primary water use is irrigation; reservoir also used for water-based recreation
- Popular recreation site –Ackley Lake State Park, managed under lease by the MT Fish, Wildlife and Parks, surrounds the northern half of the reservoir



## REHABILITATION SUMMARY

Ackley Dam was rehabilitated in 2009 and included:

- Installation of a toe berm and drain system
- Lining of the existing corrugated metal pipe outlet with a cured-in-place plastic pipe
- Construction of a new principal spillway crest structure and auxiliary spillway
- Installation of new fencing and a redesigned access road

DNRC received a $100,000 RRGL grant and a $200,000 RRGL loan for the rehabilitation project (2009 biennium). Additionally, a biennial appropriation of $1.1 million came from the Water Storage and Hydropower Earnings Account.

## FUTURE NEEDS

The project was rehabilitated in 2009 and meets or exceeds current dam safety standards. No deficiencies currently exist.

Spillway approach and earthen spillway

Outlet Works

# BAIR DAM

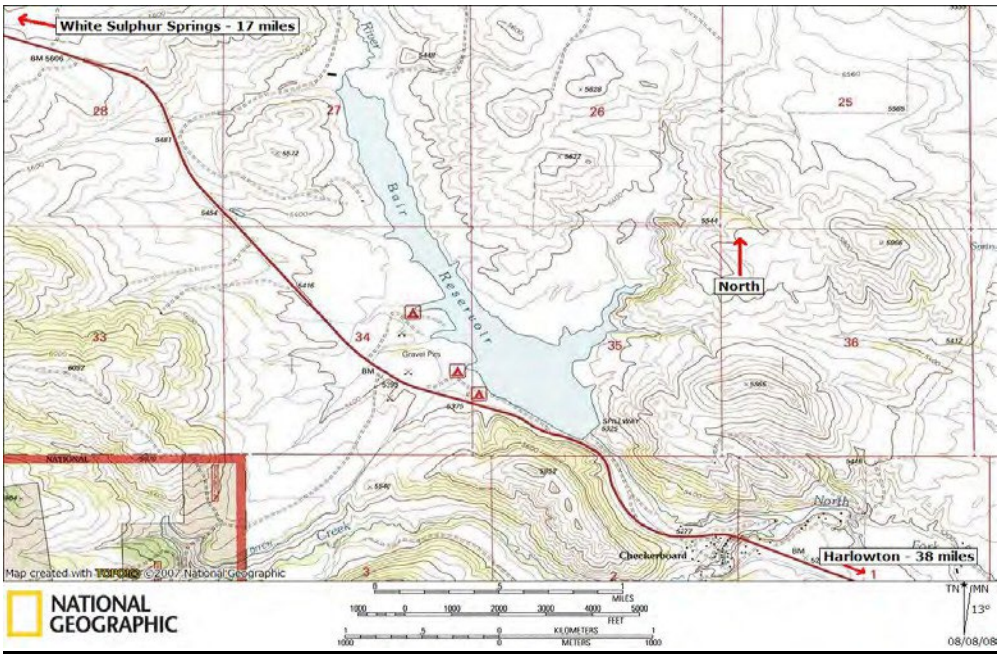
Fact Sheet

## PROJECT DESCRIPTION

- Located on the North Fork of the Musselshell River in Meagher County, Approximately ¾ mile upstream of Checkerboard
- Built in 1939
- Owned & managed by DNRC-SWPB
- Operated by Upper Musselshell Water Users Association (UMWUA) since 1940
- Project consists of:
  - Earthfill dam, 106 ft high, 580 ft long
  - Ogee crest with concrete chute spillway
  - 54-inch reinforced concrete outlet conduit, with two 48-inch diameter gates (butterfly operating gate and slide guard gate) with manual operators in the gate house (on the dam crest) and bottom of the gate tower
- Normal storage at full pool is 7,300 acre-feet, covering 280 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life, 94 people would potentially be impacted; Checkerboard, numerous houses, roads, bridges, and utilities are in the flood plain

## WATER USE

- One of three dams (two reservoirs) providing 21,478 acre-feet for the UMWUA
- Project irrigates approximately 4,100 acres with two canals: Northfork Diversion Canal (11.7 miles long) and Two Dot Canal (32.2 miles long)
- Reservoir also used for water-based recreation



## REHABILITATION SUMMARY

Bair Dam was rehabilitated in 2001 – 2003 with the following:

- A new structural concrete spillway in the same location as the old one
- Excavation of the steep slope above the spillway to arrest slope failure and rock fall
- Replacement of the outlet terminal structure
- Construction of a toe berm to buttress the downstream embankment
- Construction of a new gate house, fence, security gates and access road

Total project cost (design and construction): $2,738,562 (2004)

## FUTURE NEEDS

The project was rehabilitated in 2001 – 2003 and meets or exceeds current dam safety standards. No deficiencies currently exist.

Spillway and Gatehouse

Outlet Structure

Spillway

# COONEY DAM

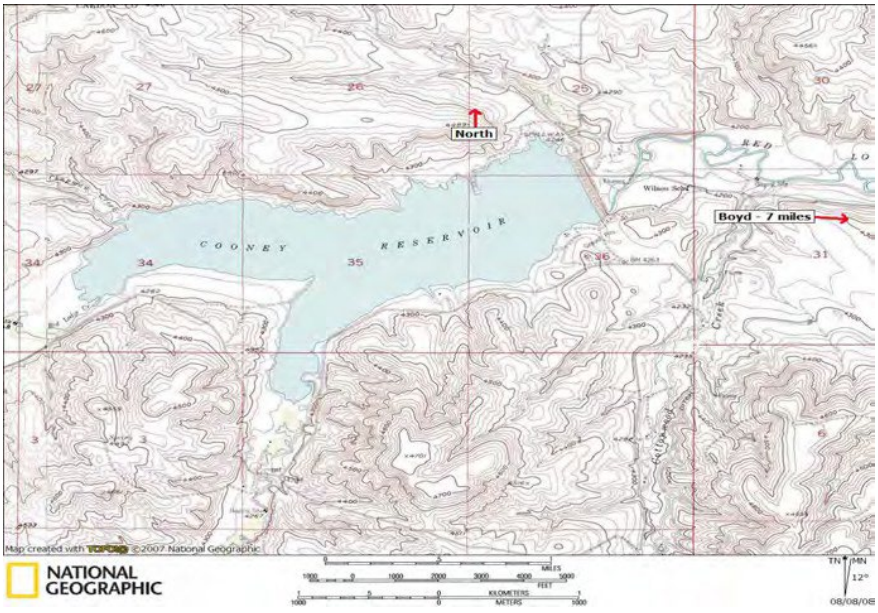
Fact Sheet

## PROJECT DESCRIPTION

- Impoundment on Red Lodge Creek; also obtains water from Willow Creek
- Located approximately 7 miles west of Boyd in Carbon County.
- Built in 1937
- Owned & managed by DNRC-SWPB
- Operated by Rock Creek Water Users Association (RCWUA) since 1937
- Project consists of:
  - Earthfill Dam, 103.5 feet high, 2,369 feet long
  - Ogee crest principal spillway with upstream guard dike and concrete drop structure in left abutment; fuse plug auxiliary spillway
  - 6-foot horseshoe-shaped 630 foot-long concrete outlet, with two 60-inch diameter gates (butterfly operating gate and slide guard gate)
- Stores 28,230 acre-feet at guard dike crest; surface area at normal full pool is 1,078 acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain. The towns of Boyd and Joliet are immediately downstream

## WATER USE

- One of two reservoirs providing 21,495 acre-feet for the RCWUA
- Provides irrigation on approximately 20,000 acres
- Reservoir is a popular recreation site with Cooney State Park, through lease to the MT Fish, Wildlife and Parks



## REHABILITATION SUMMARY

The 1982 Cooney Dam rehabilitation included:

- Raising the dam embankment five feet to increase storage by 4,200 acre-feet
- Replacing the upper portion of the principal spillway and adding a baffled drop to the lower principal spillway channel
- Adding a guard dike in the spillway approach channel
- Adding a fuse plug auxiliary spillway
- Replacing the wooden bridge over the principal spillway with a concrete bridge
- Installing additional drains
- Rehabilitation cost (1982): $1,288,065
- Downstream weir was replaced in 2015

## FUTURE NEEDS

- The original principal spillway drop is beginning to deteriorate and will require replacement
- The concrete outlet structure is deteriorating and will require replacement

Spillway

# COTTONWOOD DAM

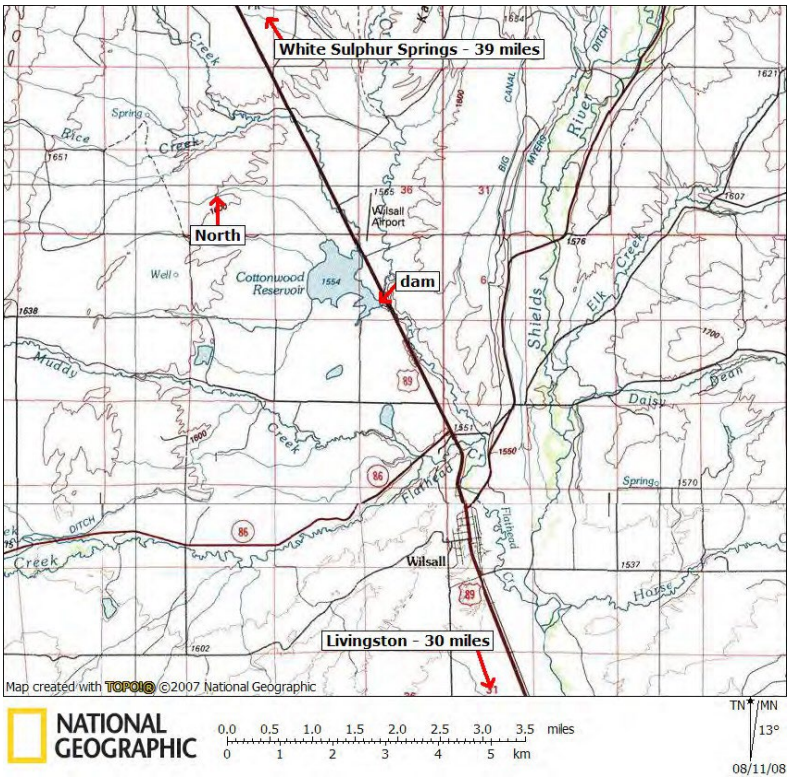
Fact Sheet

## PROJECT DESCRIPTION

- Impounds Cottonwood Creek in Park County, located approximately 3.5 miles northwest of Wilsall
- Built in 1953
- Owned & managed by DNRC-SWPB
- Operated by the Shields Canal Company since 1953
- Project consists of:
  - Earthen embankment dam, 39 feet high, 610 feet long
  - Earthfill dike, 8 feet high, 825 feet long
  - Ogee crest spillway with upstream guard dike and baffled chute
  - 36-inch, 197 foot-long corrugated steel pipe outlet with 36-inch vertical slide gate in a rectangular wet tower
- Reservoir capacity is 1,905 acre-feet at spillway crest, covering 235 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- 1,379 acre-feet is under contract with the Shields Canal Company
- Primary water use is irrigation; reservoir also used for water-based recreation



## REHABILITATION SUMMARY

The 1986 rehabilitation increased the spillway capacity. The project also constructed a guard dike, a baffled apron chute and increased the chute wall height.

## FUTURE NEEDS

- Outlet conduit is deteriorating and at the end of its design life. The outlet conduit will require replacement
- Spillway complies with current minimum dam safety standards with zero freeboard. Either the spillway will need to be replaced or the freeboard increased to meet current industry recommendations. Estimated cost: $1,500,000
- New drains need to be installed for seepage control

Spillway

Outlet

# DEADMAN'S BASIN DAM

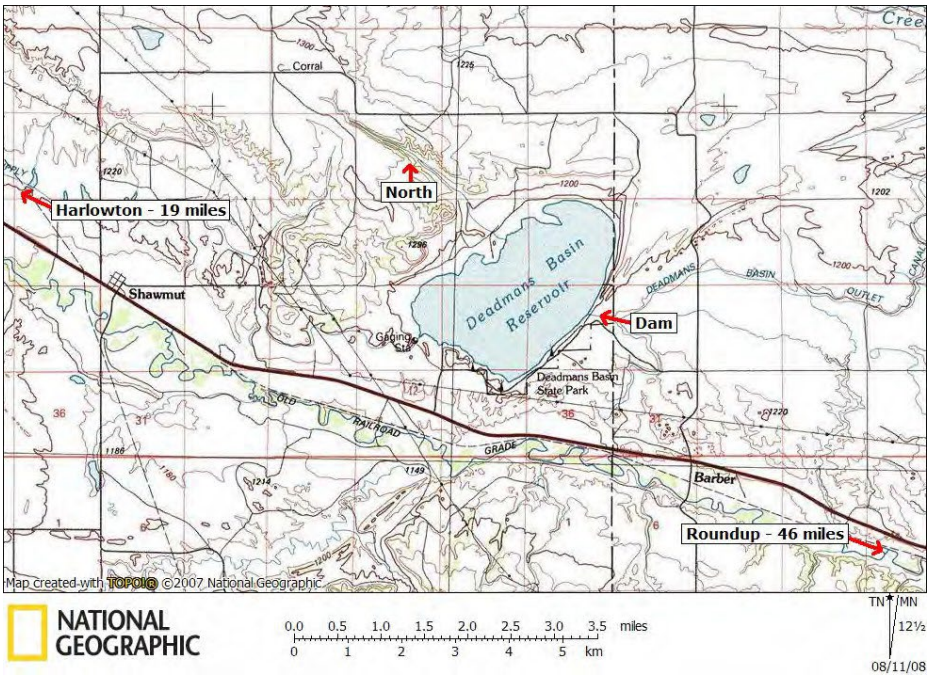
Fact Sheet

## PROJECT DESCRIPTION

- Off-stream reservoir with supply canal from the Musselshell River, located 10 miles east of Harlowton in Wheatland County
- Built in 1941. The dam was raised 10 feet in 1958
- Owned & managed by the DNRC-SWPB
- Operated by Deadman's Basin Water Users Association since 1959
- Project consists of:
  - Earthen Embankment Dam: 60 feet high and 1,490 feet long
  - Earthen Embankment Dike: 18 feet high and 2,950 feet long
  - 300-foot long horseshoe-shaped reinforced concrete outlet tunnel, with 102-foot long 8-ft concrete box culvert extension and two 60 x 60-inch cast iron slide gates with vertical gate tower
  - 11.5-mile supply canal (600 cfs), two delivery canals (total 12.5 miles): Barber and Careless Creek
- Reservoir stores 72,218 acre-feet at normal full pool, covering 2,120 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- 40,254 acre-feet through 139 contracts used for irrigation and municipal water (Melstone, Ryegate, and Roundup)
- Reservoir is a popular recreation site; MT Fish, Wildlife, and Parks maintains two day-use facilities



## REHABILITATION SUMMARY

The Deadman's Basin Dam was rehabilitated in 2009 – 2013 and involved extending the outlet, installing a filtration and drainage system to allow for the safe discharge of seepage, constructing a toe berm, and replacing the original gatehouse. Funding included a $100,000 RRGL grant, $400,000 RRGL loan, $585,000 from the Water Storage Special Revenue Account, and $65,000 from Deadman's Basin Water Users Association.

- 2009-2010 Outlet Extension Project Approximate Costs = $780,000
- 2011 Gatehouse Replacement Project Approximate Costs = $340,000

## FUTURE NEEDS

The project was rehabilitated in 2009 – 2013 and meets or exceeds current dam safety standards. No deficiencies currently exist.

Terminal outlet structure

Gatehouse

# EAST FORK OF ROCK CREEK DAM

Fact Sheet

## PROJECT DESCRIPTION

- Located on the East Fork of Rock Creek 15 miles south of Philipsburg on the Beaverhead-Deerlodge National Forest in Granite County
- Built in 1938
- Owned & managed by DNRC-SWPB under a U.S. Forest Service Special Use Permit
- Operated by Flint Creek Water Users Association since 1938
- Project consists of:
  - Earthen Embankment Dam, 87 feet high, 1,075 feet long
  - Concrete chute spillway with flip bucket energy dissipater
  - 54-inch horseshoe-shaped 472 foot-long reinforced concrete outlet tunnel, with one 54-inch diameter butterfly operating gate and one 54-inch diameter slide guard gate
  - 7-foot diameter gate tower on the dam crest
- Project includes the Main, Metcalf, East, Marshall, and Allendale Canals, totaling 46.59 miles. All but the 7.7 mile-long Main canal are proposed for transfer to the water users association
- A new diversion and vertical panel fish screen was constructed in 2014. The fish screen protects endangered bull trout and other fish species from entrapment in the canal
- Reservoir stores 16,040 acre-feet at normal full pool covering 390 acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- Provides irrigation through 67 contracts for 23,080 acre-feet
- Reservoir also used for water-based recreation

## REHABILITATION SUMMARY

In 1996 a sinkhole formed on the dam's downstream face. Downstream areas were evacuated and the reservoir was drained. An extensive system of dewatering wells, drains, and a stability berm was constructed. The emergency repairs cost approximately $2,000,000.

## FUTURE NEEDS

- Spillway capacity is inadequate based on US Forest Service dam safety standards.
- Excessive seepage requires additional drains or berms
- The outlet works are satisfactory overall, but are more than 80 years old and require repairs to improve reliability and extend their service life.
- Rehabilitation began Fall 2024, construction is anticipated to go through Fall 2026

Spillway

Outlet Channel

Spillway Bridge

Main Canal Vertical Panel Fish Screen

# FRED BURR DAM

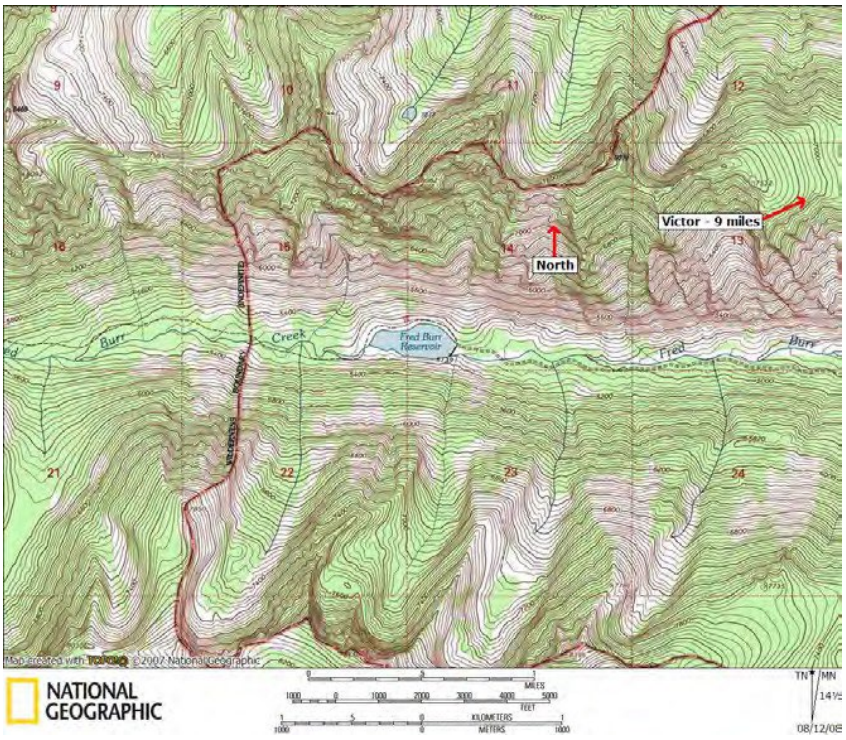
Fact Sheet

## PROJECT DESCRIPTION

- Located on the Bitterroot National Forest in Ravalli County, 9 miles southwest of Victor; impounds the headwaters of Fred Burr Creek
- Original construction completed in 1948; the dam failed during a high runoff episode in the spring of 1948 and was reconstructed in 1949
- Owned & managed by DNRC-SWPB under a U.S. Forest Service Special Use Permit
- Operated by Fred Burr Water Users Association since 1948
- Project consists of:
  - Rolled earthfill embankment dam, 50 feet high, 325 feet long
  - 20-foot wide, 120 foot-long, concrete rectangular chute spillway with 4.3 foot-high radial gate
  - Four-foot diameter reinforced concrete conduit, single cell wet tower with control mechanism at the top of the tower on the dam crest; Manually operated 48-inch diameter slide gate
- Reservoir stores 525 acre-feet at normal full pool and covers 28 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- 515 acre-feet through 44 contracts used primarily for irrigation
- Water also provides water-based recreation and stream flow regulation



## REHABILITATION SUMMARY

- A sinkhole was discovered on the crest of the dam adjacent to the gate controls in 2011. Emergency repairs were made and a reservoir level restriction implemented
- A feasibility study was conducted in 2014 to investigate potential issues related to the sinkhole and the integrity of the dam
- Based on recommendations from the 2014 Feasibility Study, monitoring instrumentation was installed. An enhanced monitoring program was implemented the summer of 2014
- Lower left spillway wall stabilized by adding a concrete footer and filtered drain in Fall 2019. The project cost $62,573.
- Voids under spillway floor slab repaired with hydraulically placed pea gravel in October 2021

## FUTURE NEEDS

- The spillway is deteriorating and near the end of its design life. It requires replacement
- The concrete outlet is deteriorating and needs recurring repair. Lining or replacing the outlet are the primary repair options
- The 2014 Feasibility Study provided alternatives for rehabilitating the dam but recommended additional monitoring before a final evaluation can occur. Dam monitoring is ongoing to help select the best alternative

Spillway

Outlet Conduit


Downstream Channel


Outlet

# FRENCHMAN DAM

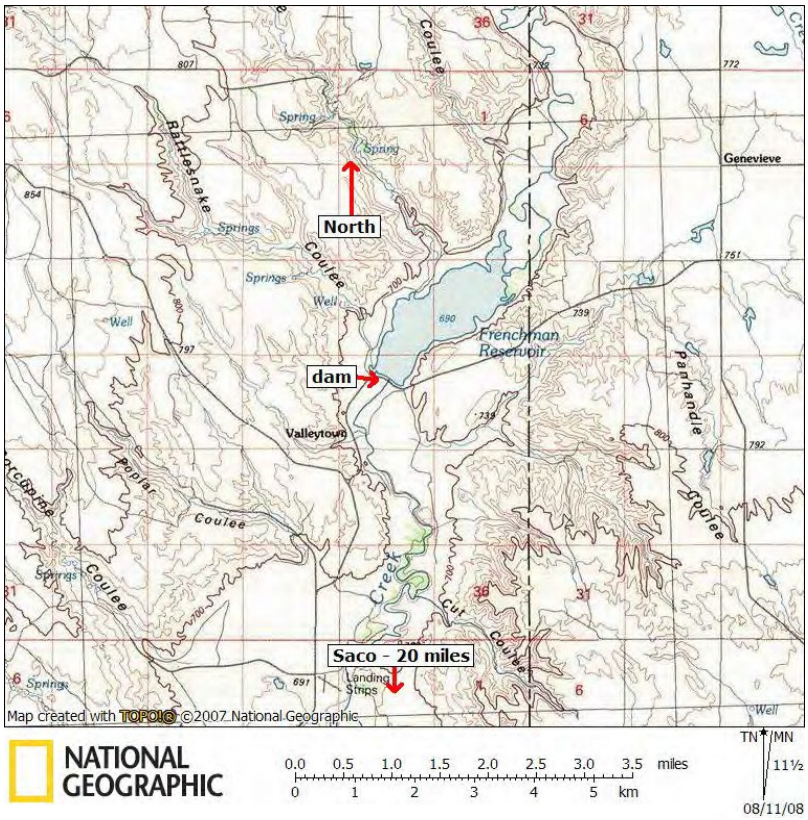
Fact Sheet

## PROJECT DESCRIPTION

- Impounds Frenchman Creek in Phillips County; located approximately 22 miles north of Saco
- Original construction completed in 1951; the dam failed during a flood in 1952 and was subsequently rebuilt
- Owned & managed by DNRC-SWPB
- Operated by the Frenchman Water Users Association since 1952
- Project consists of:
  - Earthen embankment dam: 44 feet high & 2,100 feet long
  - Reinforced concrete spillway: 119 feet wide, with uncontrolled ogee crest
  - 60-inch, 230 foot-long reinforced concrete outlet with two 60-inch slide gates (one operating and one guard)
- Original reservoir storage design capacity was 7,010 acre-feet at spillway crest, covering an estimated 800 to 1,000 surface acres; actual reservoir capacity is 2,801 acre-feet due to ongoing sedimentation

## WATER USE

- 7,000 acre-feet through 40 contracts
- Water primarily used for irrigation; reservoir also used for water-based recreation and regulation of stream flows



## REHABILITATION SUMMARY

- In 2011, the 24-inch irrigation gate and conduit were replaced, and a sinkhole adjacent to the gatehouse was repaired. Project cost: $260,000. FEMA funded 75% of the costs and the Frenchman Water Users Association funded the remainder
- A new operating gate system was installed in Fall 2022 for $254,000. The project included installing a new 60-inch cast iron slide gate, mechanical lift, stem guides and brackets; and conduit repairs

## FUTURE NEEDS

- Voids beneath the floor and deteriorated joints compromise the spillway integrity. Spillway replacement is necessary. Spillway repairs were last completed in 2020 and 2021
- Sedimentation has reduced the storage capacity from 7,010 acre-feet to 2,777 acre-feet (2013 Feasibility Study)
- The 2013 feasibility study evaluated options for dam rehabilitation and enlarging storage, or building a new dam nearby to address deficiencies and potentially help address water compact issues. Costs for constructing an enlarged dam were estimated at $49,700,000 to $80,100,000. Estimated costs for rehabilitating or removing the existing dam range from $3,200,000 to $6,500,000. No final alternative has been selected

Gatehouse

Outlet

Spillway and county road bridge

# GLACIER LAKE DAM

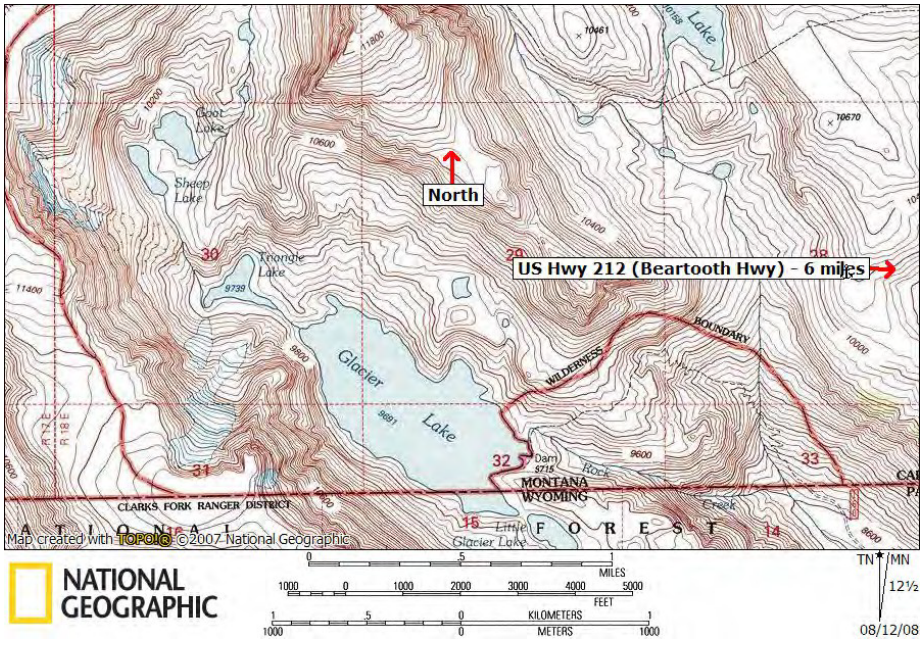
Fact Sheet

## PROJECT DESCRIPTION

- Located on Rock Creek, approximately 19 miles southwest of Red Lodge on the Custer National Forest in Carbon County
- Built in 1937
- Owned & managed by DNRC-SWPB under a U.S. Forest Service Special Use Permit
- Operated by Rock Creek Water Users Association (RCWUA) since 1937
- Project consists of:
  - Two rockfill dams with concrete upstream faces:
    North Dam – 57 feet high & 230 feet long
    South Dam – 20 feet high & 253 feet long
  - Uncontrolled rock channel spillway discharging over a concrete weir
  - Low-level outlet is a rock tunnel beneath the North Dam, approximately 6.5 feet high by 5.5 feet wide; outlet is controlled by one, 48-in rectangular slide gate
  - The operating controls are in a wooden gatehouse on the North Dam crest
- Normal full-pool storage is 4,200 acre-feet with a surface area of 151 acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- One of two reservoirs providing 21,495 acre-feet for the RCWUA
- Used to supplement Rock Creek flows during late irrigation and for municipal water (Red Lodge); reservoir also used for water-based recreation
- There is no motor vehicle access to this remote site



## REHABILITATION SUMMARY

- Various maintenance activities are ongoing

## FUTURE NEEDS

- Spillway capacity is inadequate based on past safety standards. Evaluation is underway to determine if spillway is compliant with current standards
- If needed, based on evaluation of spillway capacity, a feasibility study will be conducted for spillway rehabilitation

Outlet

Upstream face

Spillway

# MARTINSDALE DAMS

Fact Sheet

## PROJECT DESCRIPTION

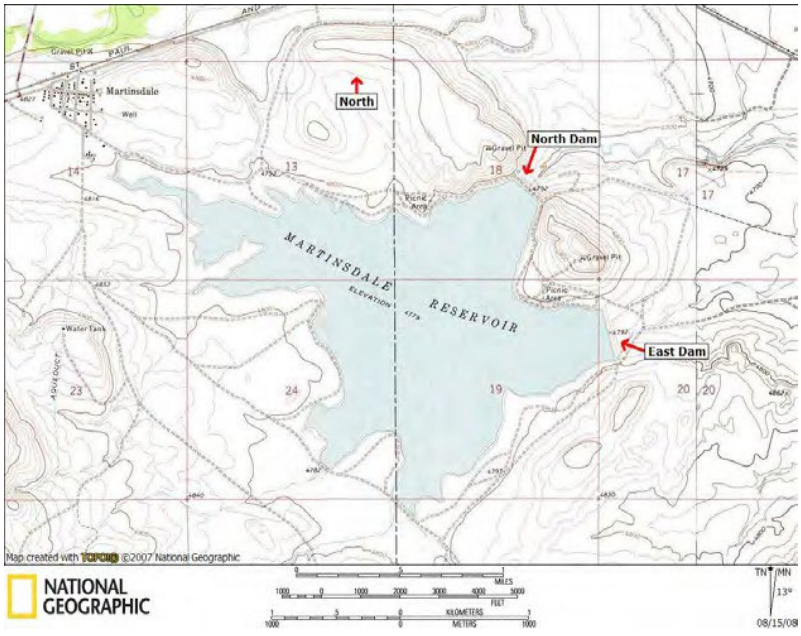
- Off-stream storage in Wheatland and Meagher Counties, 2.5 miles southeast of Martinsdale
- Built in 1939
- Owned & managed by DNRC-SWPB
- Operated by Upper Musselshell Water Users Association since 1939
- Project consists of:
  - Two zoned earthfill dams:

    North Dam – 92 ft high & 1,000 ft long
    East Dam – 49 ft high & 1,550 ft long

  - Reinforced concrete 60" outlet conduit beneath the North Dam, 120 feet-long; 54-inch butterfly operating gate with controls at the top of the tower and 54-inch slide guard gate with controls at the bottom of the tower
  - Concrete chute spillway at the East Dam
  - Earthen auxiliary spillway
- Storage at full pool is 23,348 acre-feet covering 985 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- One of several dams providing 21,478 acre-feet for the UMWUA
- Irrigation for farm/ranch operations is the primary water use
- Reservoir is also a popular recreation site, primarily for fishing. A MT Fish, Wildlife, and Parks Fishing Access Site is on the reservoir's north shore



## REHABILATION SUMMARY

Drain system modifications were completed in 2011 for more accurate and safe measurements of flows and sedimentation. Automated reservoir level instrumentation was also installed for continuous monitoring. The project was funded with a $100,000 Renewable Resource Grant, awarded by the 2009 Legislature. The total project cost was $99,545. Braces were installed in the chute spillway in 2016 to arrest inward tilting of the walls.

## FUTURE NEEDS

- Seepage monitoring at the North Dam is ongoing and modifications are made as necessary
- Select a long-term solution to the principal spillway structural problems

North Dam

Outlet at North Dam

East Dam

Spillway Chute at East Dam

# MIDDLE CREEK DAM (HYALITE)

Fact Sheet

## PROJECT DESCRIPTION

- Located on Middle Creek in Gallatin County, 15 miles south of Bozeman
- Built in 1951
- Owned & managed by DNRC-SWPB under a U.S. Forest Service Special Use Permit.
- Operated by Middle Creek Water Users Association since 1951
- Project consists of:
  - Earthen dam with mechanically-stabilized earth crest, 125 ft. high & 1,900 ft. long
  - 5-foot diameter, cast in place steel-lined concrete conduit
  - One 54-inch diameter butterfly operating gate and one 54-inch slide guard gate; operated from a tower on the dam crest
  - The principal spillway has a single cycle labyrinth crest inlet and two baffled apron spillway chutes
  - The auxiliary spillway is earthen with a 550-foot long concrete crest
- Reservoir stores 10,184 acre-feet at normal full pool, covering 490 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, homes, schools, roads, bridges and utilities are in the flood plain

## WATER USE

- Provides irrigation for farms and ranches and drinking water for 2,000 households (1/3 of the City of Bozeman water supply is provided by the project) through 105 contracts for 10,164 acre-feet of water
- Reservoir is also used for water-based recreation

## REHABILITATION SUMMARY

- The dam embankment was raised 8 feet in 1991-1992 as part of a major rehabilitation that included a new spillway, and seepage control measures. Storage was increased 1,917 acre-feet. Project cost (1992 Dollars): $5,200,000
- An automated instrumentation system was installed fall of 2008. The new system improved seepage, drain flow, and reservoir monitoring. Project cost: $122,430
- Gallatin County funded and installed an early warning system in 2010
- Tower Safety Improvements installed in 2022

## FUTURE NEEDS

The project was rehabilitated in 1991-1992 and the current outlet works needs replacement.

Gate Tower

Lower spillway baffled drop

Upper spillway baffled drop

# NEVADA CREEK DAM

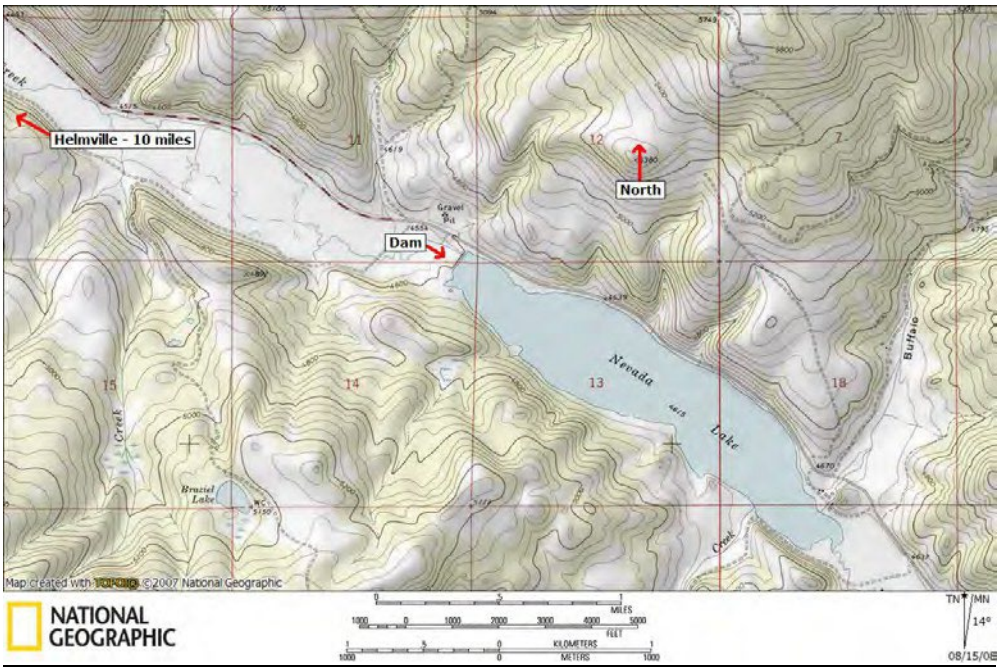
Fact Sheet

## PROJECT DESCRIPTION

- Located on Nevada Creek in Powell County, adjacent to State Hwy 141, between Avon and Helmville
- Built in 1938
- Owned & managed by DNRC-SWPB
- Operated by Nevada Creek WUA since 1939
- Project consists of:
  - Earthfill Dam, 105 feet high, 1,083 feet long
  - Uncontrolled ogee crest concrete chute spillway
  - 5-foot diameter 400 foot-long and 6-foot diameter 140 foot-long, gated, reinforced concrete outlet conduit
  - 54-inch butterfly operating gate and 54-inch diameter slide guard gate
- Normal storage at spillway crest is 11,207 acre-feet, covering 368 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Numerous houses, roads, bridges, canals and utilities are in the flood plain

## WATER USE

- 8,440 acre-feet through 35 contracts with two canals: Douglas Canal (12.7 miles long) and North Canal (13.4 miles long)
- Water primarily used for irrigation but also used for water-based recreation and regulation of stream flows



## REHABILITATION SUMMARY

Nevada Creek Dam was rehabilitated in 2001 – 2003 and included:

- Spillway replacement
- Extension of the outlet works
- Installation of relief wells to reduce foundation pressures
- A toe berm to enhance embankment stability
- Project cost (design and construction): $2,800,000 (2004)

## FUTURE NEEDS

The dam was rehabilitated from 2001 – 2003 and meets or exceeds all current safety standards. No deficiencies currently exist.

Spillway

Outlet

Upstream Face

# NORTH FORK OF THE SMITH RIVER DAM

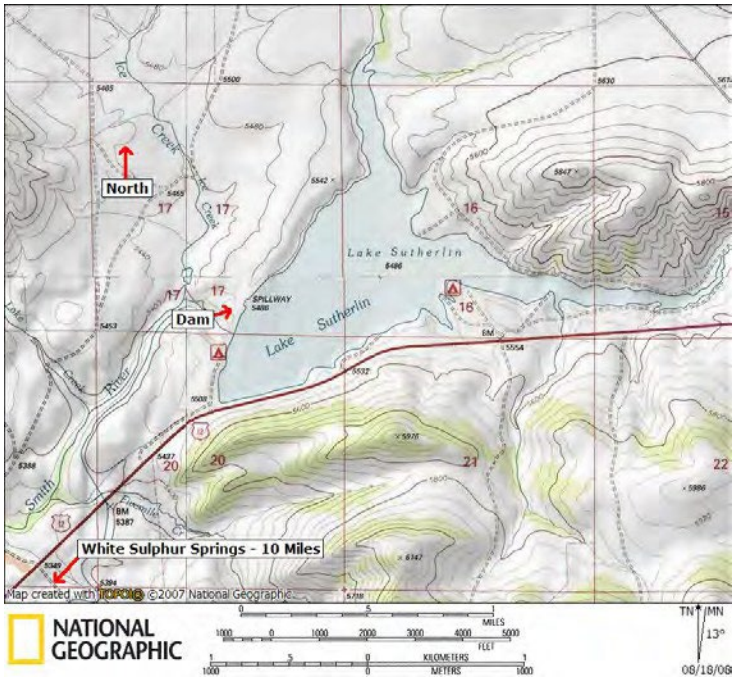
Fact Sheet

## PROJECT DESCRIPTION

- Located on the North Fork of the Smith River in Meagher County, 10 miles East of White Sulphur Springs
- Built in 1936
- Owned & managed by DNRC-SWPB
- Operated by the North Fork of the Smith River Water Users Association since 1936
- Project consists of:
  - Earthen Embankment Dam, 84 feet high, 1,300 feet long
  - Labyrinth weir spillway with excavated rock channel
  - Gated, reinforced concrete outlet conduit
  - 5-foot by 5-foot reinforced concrete, modified horseshoe shaped conduit with manually operated 54-inch butterfly operating gate and 54-inch diameter slide guard gate
- Normal storage is 11,528 acre-feet, covering 335 surface acres.
- The dam is "high hazard," meaning its failure could cause loss of life. Numerous roads, bridges, and utilities are in the flood plain

## WATER USE

- Water users have 44 contracts for 11,000 acre-feet; delivered by one canal (Southside Canal; 13.2 miles long)
- Primary use is irrigation; the reservoir is a popular recreation site as well



## REHABILITATION SUMMARY

The North Fork of the Smith Dam was rehabilitated in 2006 and included:

- Constructing a new two-cycle labyrinth weir concrete spillway
- Raising and leveling the dam crest
- Replacing the outlet works terminal structure
- Enlarging the rock spillway channel
- Constructing a stability berm at the dam toe
- Installing new drains for seepage control
- Project Cost: $825,000

## FUTURE NEEDS

- The project was rehabilitated in 2006 and meets or exceeds current dam safety standards. No deficiencies currently exist.

Spillway

Upstream Face

Outlet

# NILAN DAMS

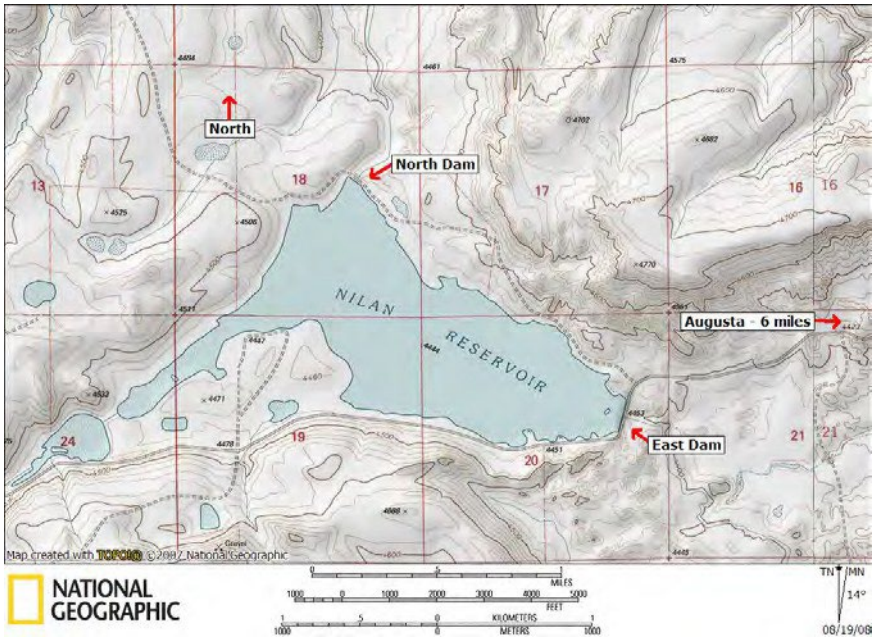
Fact Sheet

## PROJECT DESCRIPTION

- Off-stream reservoir in Lewis & Clark County, located 7 miles west of Augusta
- Built in 1951
- Owned & managed by DNRC-SWPB
- Operated by Nilan Water Users Association since 1952
- Project consists of two dams:
  North Dam – 54 ft high & 530 ft long
  East Dam – 51 ft high & 1,010 ft long
  - The East Dam has an earthen spillway with a concrete control section
  - Each dam has a gated 4-foot diameter cast-in-place reinforced concrete tunnel
  - Control towers at each dam are on the dam crest, consisting of a double-chambered wet tower with a 48-inch diameter slide operating gate and 48-inch square slide guard gate. Gate controls are at the top of the towers
- Normal storage is 10,092 acre-feet, covering 525 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Augusta (population 284) is 6 miles east of Nilan Reservoir and numerous houses, roads, bridges, and utilities are in the flood plain below the dam

## WATER USE

- Water users have 54 contracts for 8,500 acre-feet, irrigating approximately 10,000 acres with two canals (12.7 mile-long North Canal; 5.8 mile-long East Canal)
- The reservoir is a popular recreation site, primarily for fishing. The MT Fish, Wildlife, and Parks manages a Fishing Access Site under a DNRC lease on the south shore of the reservoir



## REHABILITATION SUMMARY

- East Dam repairs were completed in 1999 to repair sinkholes along the upstream toe
- A new outlet terminal structure and drain system was installed at the North Dam in spring of 2008. Project Cost: $113,608

## FUTURE NEEDS

- Sinkholes were discovered in the upstream right abutment of the East Dam in 2012, 2013, 2019, and 2020. The sinkholes were subsequently repaired. Enhanced monitoring has been implemented to detect future sinkholes. More extensive mitigation may be necessary
- The East Dam outlet terminal structure is deteriorated and requires replacement

North Dam

East Dam

Outlet Terminal Structure at North Dam

Spillway at East Dam

# PAINTED ROCKS DAM

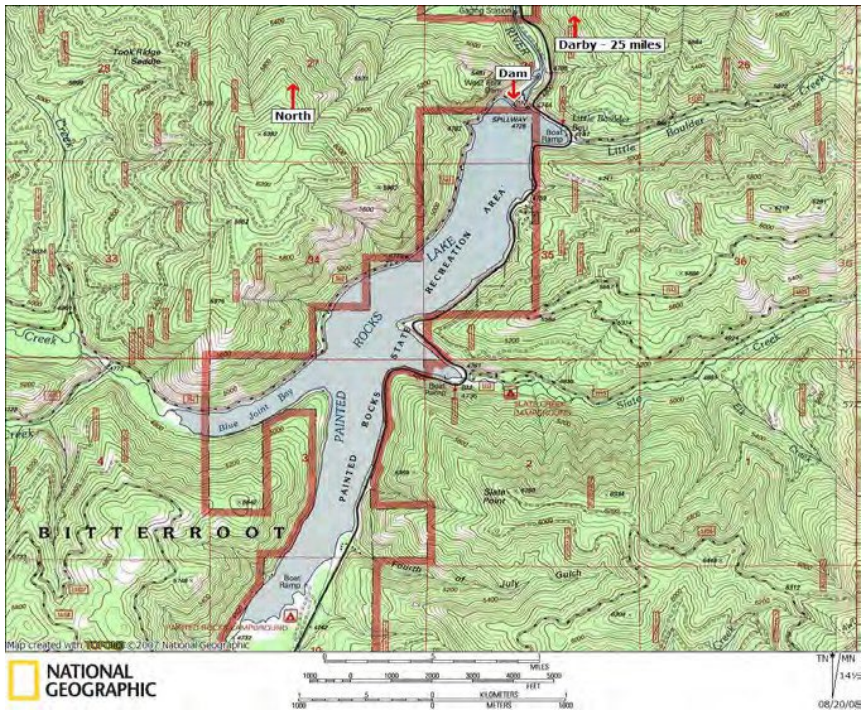
## Fact Sheet

## PROJECT DESCRIPTION

- Located on the West Fork of the Bitterroot River in Ravalli County, approximately 22 miles southwest of Darby
- Constructed in 1939
- Owned, managed and operated by DNRC
- Project consists of:
  - 143 foot-high, 800 foot-long earthfill dam
  - Reinforced concrete chute spillway
  - 10-foot diameter, horseshoe shaped reinforced concrete tunnel, with two 5-foot by 8-foot gates (one operating and one guard), at the bottom of a wet tower
  - Storage at full pool is 32,362 acre-feet, covering 655 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms, ranches, numerous homes, roads, bridges, and utilities are in the flood plain

## WATER USE

- MT Fish, Wildlife and Parks (DFWP) purchases 15,000 acre-feet for downstream fisheries; The Painted Rocks Water Users Association (PRWUA) has 27 contracts for 8,820 acre-feet
- Operating and maintenance costs are shared between DFWP and PRWUA
- Water is primarily used for irrigation and fisheries (downstream flows). The reservoir is also used for water-based recreation



## REHABILITATION SUMMARY

Repairs and maintenance are on-going and have included the following:

- A new log boom and security fence was installed in 2004. Project Costs: $21,000 for the log boom (paid by PRWUA & MT FWP) & $4,900 for the fence (paid by DNRC)
- The gate hoist mechanism was rehabilitated in 2005. Project cost: $23,000 (paid by PRWUA & MT FWP)
- The guard gate roller chain was replaced in 2006. Project cost: $50,000 (paid primarily by PRWUA & MT FWP)
- Feasibility study to assess the spillway condition and provide rehabilitation alternatives for the outlet conduit and gates was completed in 2007. Project cost: $130,000 (paid by the DNRC)
- The operating gate was repaired in 2008. Project cost: $53,000 (paid by PRWUA & MT FWP)
- Concrete repairs were made in 2013, 2019, 2020, and 2021 to the spillway and the outlet tunnel
- The wire rope for the gate hoist was replaced in 2014
- The spillway bridge railing was replaced in 2014
- An access road and bridge to the dam toe were constructed in 2021 for $1.2 million to facilitate future dam repairs
- A feasibility study was completed in 2021 to identify preferred rehabilitation alternatives for continued safe dam operation. Project cost: $1.1 million. Rehabilitation planning, permitting, and funding are in process (2024)

## FUTURE NEEDS

- The spillway stilling basin floor is severely eroded. Periodic dive inspections are required. Repairs or replacement will be necessary
- The spillway chute concrete is deteriorated. Increased monitoring and periodic repairs are on-going in the short term. Replacement will be necessary. In addition, the spillway has undesirable flow characteristics reducing its safe capacity
- The outlet conduit discharges in the spillway chute, making it difficult to conduct outlet repairs without impacting downstream flows. Future modifications or replacement may be required
- The outlet gates have exceeded their design life and do not close reliably. Replacement is recommended

Spillway


Outlet

# RUBY DAM

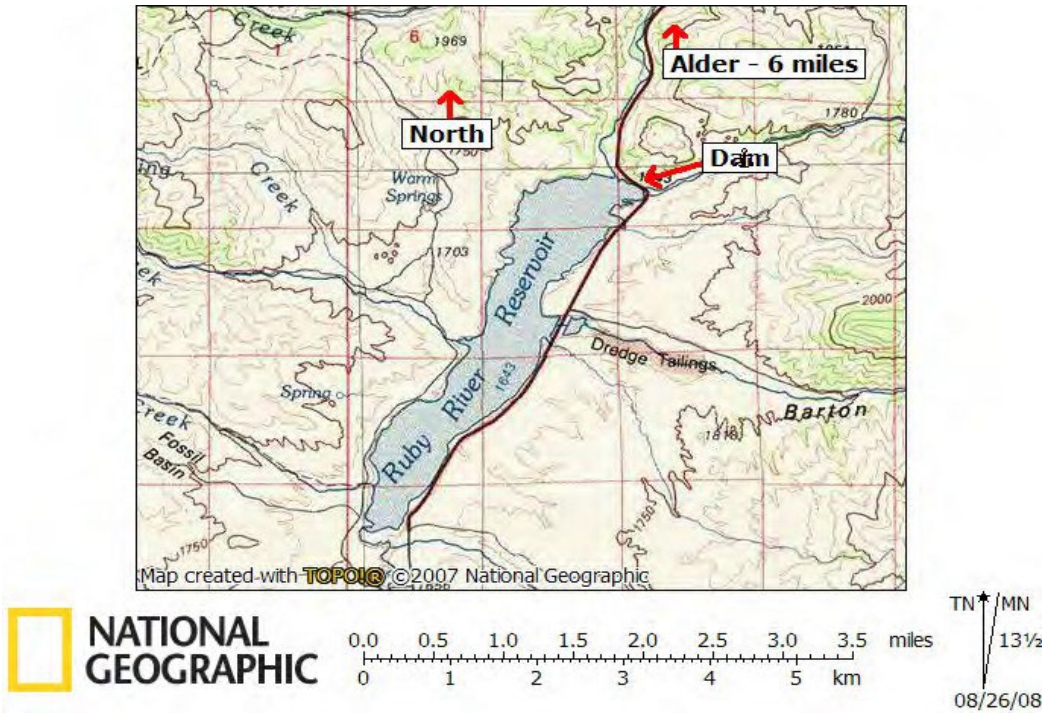
Fact Sheet

## PROJECT DESCRIPTION

- Located on the Ruby River in Madison County, 7 miles south of Alder
- Built in 1938
- Owned & managed by DNRC-SWPB
- Operated by Ruby Water Users Association since 1938
- Project consists of:
  - Earthen Embankment Dam, 112.5 feet high, 846 feet long
  - Reinforced concrete chute spillway with 3-cycle labyrinth weir crest
  - 90-inch reinforced concrete outlet conduit upstream of gates; 72-inch steel conduit downstream of gates
  - 60-inch and 18-inch jet flow operating gates and 72-inch knife guard gate
- Storage at full pool is 37,642 acre-feet, covering 970 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms, ranches, numerous homes, roads, bridges, and utilities are in the flood plain

## WATER USE

- 198 contracts for 38,845 acre-feet delivered through two canals: West Bench (12 miles long) and Vigilante (26 miles long) Canals
- Water is primarily used for irrigation; reservoir also used for water-based recreation and regulation of stream flows



## REHABILITATION SUMMARY

A major rehabilitation of the Ruby Dam began in August 2010.

- Phase 1 of the rehabilitation included removing and replacing the spillway, and the development of a new maintenance access road. Phase 1 was completed in December 2011
- Phase 2 included constructing a new outlet works conduit, operating gates, gate operating system, and gate house. Most construction was completed in the summer of 2014
- Funding came from numerous sources including: Hydropower Revenue, Water Storage Account, RRGL Grant and Loan, and the Ruby Water User's Association
- Project costs (engineering and construction): $16,970,000
- Since rehabilitation the spillway has undergone repairs in 2013, 2018, 2020 and 2023

## FUTURE NEEDS

The rehabilitation brought the dam into full compliance with current dam safety standards. No deficiencies currently exist.

Labyrinth weir spillway and footbridge

Spillway

Outlet Works

# TONGUE RIVER DAM

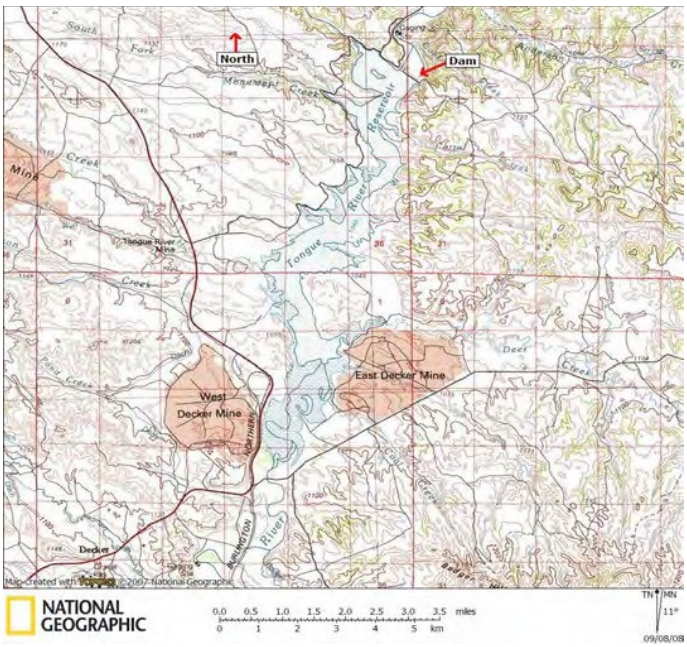
Fact Sheet

## PROJECT DESCRIPTION

- Located on the Tongue River in Big Horn County, 5 miles north of Decker
- Built in 1940
- Owned & managed by the DNRC-SWPB
- Operated by the Tongue River Water Users Association since 1940
- Project consists of:
  - Zoned Earthfill Dam, 93 feet high, 1,824 feet long
  - Uncontrolled, 150-foot wide, 560-foot long concrete labyrinth weir principal spillway. Auxiliary spillway is roller compacted concrete with conventional concrete encasement stair step chute with an ogee crest, 650 feet wide
  - 9-foot horseshoe shaped concrete primary outlet tunnel; 4.5 ft x 7.5 ft bonneted slide operating gate and fixed-wheeled guard gate
  - 16-foot horseshoe-shaped concrete auxiliary outlet tunnel; downstream and upstream wet wells with a 4.5 ft x 7.5 ft fixed-wheel guard gate and a 4.5 ft x 7.5 ft cast iron sluice gate
- Stores 79,071 acre-feet at normal full pool, covering 3,700 surface acres.
- The dam is "high hazard," meaning its failure could cause loss of life. Farms and ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- 40,000 acre-feet through 172 contracts; provides a portion of the Northern Cheyenne Tribe's federally reserved water right
- Irrigation, industrial, fish hatchery
- A very popular recreation site, with Tongue River State Park, managed under lease by the MT Fish, Wildlife and Parks, located on the west shore of the reservoir



## REHABILITATION SUMMARY

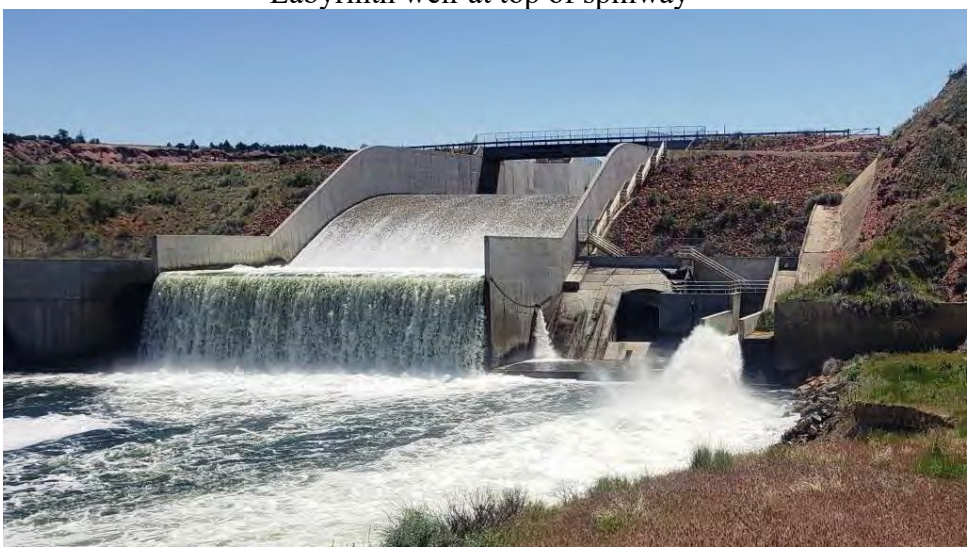
From 1996 to 1999, the DNRC completed a major rehabilitation including:

- Raising the spillway crest an additional four feet, providing up to an additional 14,000 acre-feet of storage
- Construction of a new primary low level outlet tunnel and auxiliary spillway
- Replacing the principal spillway
- Improvements to the drain system
- Improvement to access and maintenance roads
- New gates for existing low level outlet conduit
- Rehabilitation cost (1999): $48,000,000
- Crack repairs in the auxiliary spillway concrete steps are continuing. Estimated cost of the crack repairs is $500,000
- The stilling basin was repaired in 2021
- Consultation for the replacement of the Gate PLC (Programmable Logic Controller) is underway with construction anticipated Fall/Winter 2024

## FUTURE NEEDS

- Determine a long-term solution to the auxiliary spillway chute concrete step cracking.
- Finalize plans to mitigate cavitation issues in the auxiliary low-level outlet operating gate chamber

Labyrinth weir at top of spillway



Outlet and spillway

# TOSTON DAM (Broadwater-Missouri)

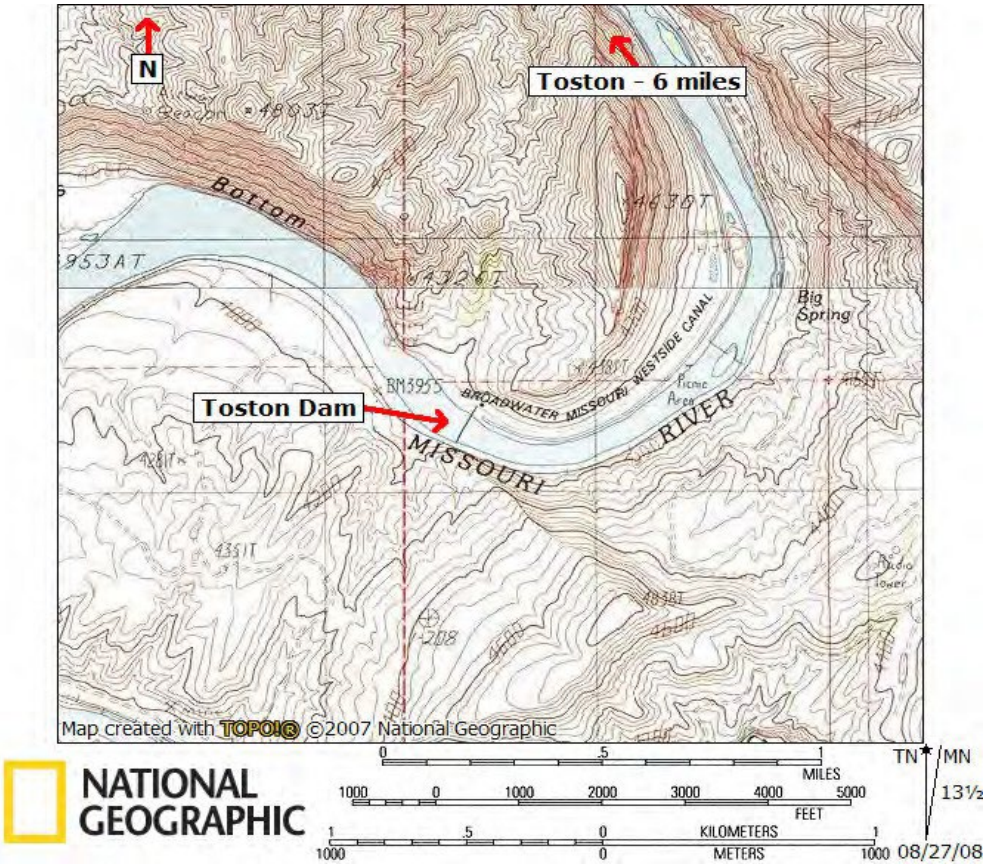
Fact Sheet

## PROJECT DESCRIPTION

- Located on the Missouri River in Broadwater County, 4 miles upstream of Toston, MT
- Dam built in 1940
- Hydropower facility completed in 1989
- Owned & operated by DNRC-SWPB
- Project consists of:
  - Concrete gravity dam, 51.5 feet high, 630 feet long
  - Run-of-the-river dam, 7 bays with inflatable rubber gates
  - A 9.66 megawatt generator
  - A three-mile long electric transmission line
- NorthWestern Energy purchases power from the plant. Hydropower revenue, after operating expenses, is used for rehabilitation and repairs on other state-owned projects
- Impounds 2,400 acre-feet at normal full pool, covering 275 surface acres (2018 Survey)

## WATER USE

- Provides irrigation water through 300 contracts for 42,000 acre-feet, delivered to users through the Broadwater-Missouri Canal System



## CONSTRUCTION SUMMARY

- Hydropower was added to the dam in 1989. Construction included new rubber bladder gates to control pool levels, installation of a 9.66-megawatt hydropower plant, and improvements to access and maintenance roads. Project cost (1989): $26,000,000
- A new automated trash rake was installed in 2002. The trash rake cleans debris from the powerhouse intake grates for greater efficiency and less power loss. Project cost: $450,000
- The spillway bridge was replaced in 2005 for $675,000. The bridge is a primary maintenance access and provides public access to the east side of the river
- Operation and maintenance staff replaced two major components of the turbine shaft's mechanical seal in August 2009. Project cost: $95,000
- One spillway rubber bladder failed in 2012, resulting in a loss of reservoir (no resulting property damage or injuries). Subsequently, all seven bladders were replaced in 2014, as they had reached the end of their useable life span. Project cost: $2,149,970

## FUTURE NEEDS

- The generator brushes and holders are of an obsolete design and will be replaced in late 2024
- Safety audit findings are being addressed. They include succession planning, maintenance and capital improvement planning and document handling including data retention, standard operating procedures, and preventative maintenance instructions
- The initial design to replace the rock jetty originally constructed to reduce debris loading on the Broadwater-Missouri Canal intakes has been completed. Replacement of the jetty with twin 9-foot diameter PVC pipes will be completed the winter of 2025/2026
- Placement of overhead fiber optic cable between the Powerhouse and substation (estimated cost $300,000) to allow for future upgrades including protective relaying, security cameras, and back-up power for the control room is planned
- Refurbishment of the governor system (high pressure oil to control wicket gates and turbine pitch, estimated cost $500,000) is planned. The system is old and increasingly unreliable and is essential to plant operation
- Extend SCADA of the (Supervisory Control and Data Acquisition) network to the four blowerhouses (estimated cost $200,000) to ensure continued safe automated control of gates, instrumentation of river levels, and monitoring of blower house conditions is planned

Downstream View of Toston Dam

# WILLOW CREEK DAM

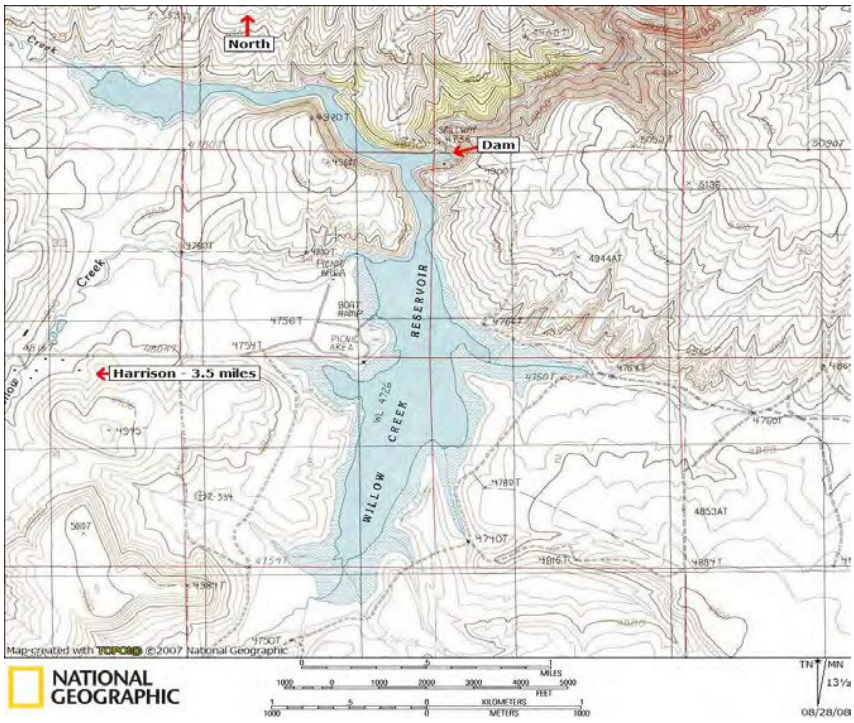
Fact Sheet

## PROJECT DESCRIPTION

- Located in Madison County, 3.5 miles east of Harrison; impounds Willow, Dry Hollow, and Norwegian Creeks
- Built in 1938
- Owned & managed by DNRC-SWPB
- Operated by Willow Creek Water Users Association since 1938
- Project consists of:
  - 105 foot-high, 453 foot- long, zoned earth and rock fill dam
  - Uncontrolled ogee crest concrete chute spillway
  - 60-inch horseshoe shaped 362 foot-long concrete outlet conduit
  - One 54-inch main butterfly operating gate and one 54-inch guard gate
- Storage at full pool is 18,000 acre-feet, covering 885 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms, ranches, roads, bridges, and utilities are in the flood plain

## WATER USE

- 149 contracts for 11,885 acre-feet
- Water is primarily used for irrigation however, the reservoir is also used for water-based recreation. MT Fish, Wildlife, and Parks manages a fishing access site on the west shore under a DNRC lease



## REHABILITATION SUMMARY

- Various maintenance activities are ongoing

## FUTURE NEEDS

- The spillway does not meet current safety standards. Concrete deterioration exists in the spillway wall and floors. A reservoir level restriction was implemented in 2018. The spillway will require replacement soon. Estimated costs to be determined based on pending feasibility study
- The road around the reservoir used to access the dam and gate tower is difficult and sometimes impossible to navigate in the spring and winter
- Currently, Willow Creek is undergoing a feasibility study to determine the best rehabilitation alternative

Upstream face

Spillway

Outlet

# YELLOW WATER DAM

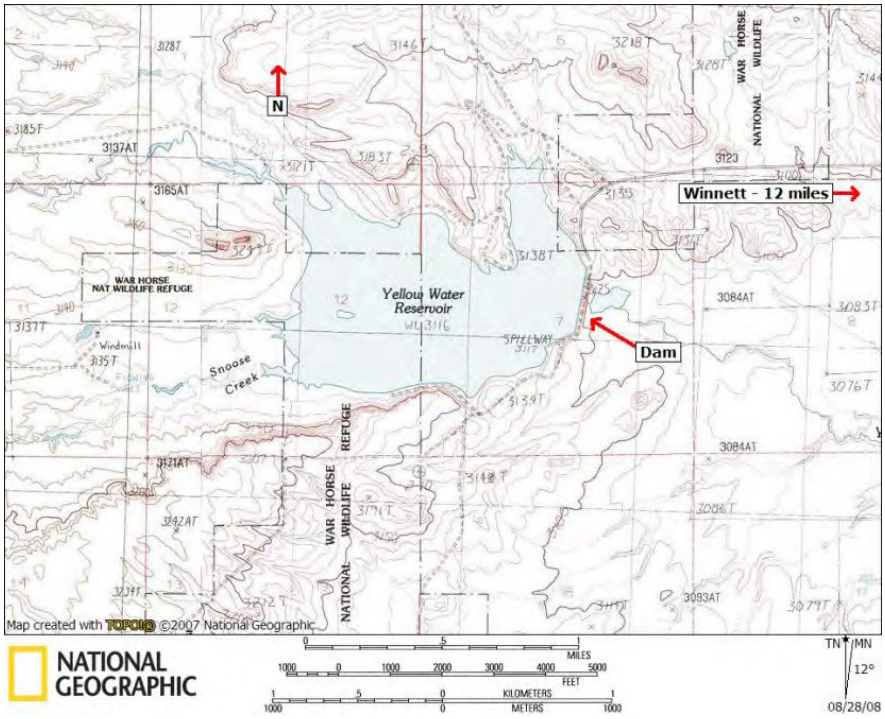
Fact Sheet

## PROJECT DESCRIPTION

- Impounds Yellow Water Creek in Petroleum County, 12 miles southwest of Winnett
- Constructed in 1938
- Owned & managed by DNRC-SWPB
- Operated by the Yellow Water Water Users Association since 1938
- Project consists of:
  - Earthfill dam (Dam No. 1: 37 ft high, 1,695 ft long) and dike (Dam No. 2: 11 ft high, 545 ft long).
  - Uncontrolled trapezoidal earth and rock spillway
  - 42-inch reinforced concrete pipe outlet, 150 foot-long
  - One 42-inch slide gate with manual operator
- Storage at full pool is 3,842 acre-feet, covering 490 surface acres
- The dam is "high hazard," meaning its failure could cause loss of life. Farms, ranches, numerous homes, roads, bridges, and utilities are in the flood plain

## WATER USE

- The Yellow Water Water Users Association has 4 contracts for 2,000 acre-feet
- The west and south shores of the reservoir are part of the War Horse National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service. The reservoir serves as an important nesting area for waterfowl



## REHABILITATION SUMMARY

- In 1979, the original spillway was eroding and threatened the embankment. A new spillway was configured running parallel to the embankment using the original spillway entrance
- Yellow Water Dam underwent a two-phase rehabilitation - in 1985. Phase I included - embankment excavation and removal of the original outlet conduit. Phase II included - construction of a new outlet conduit (42-inch diameter reinforced concrete pipe), inlet and outlet structures, cleaning the original gate and placing riprap on a portion of the upstream face
- High water levels, wind and flooding in 2011 damaged the riprap along the upstream dam face. The damaged riprap was replaced in 2012. Periodic minor riprap repairs have been conducted in subsequent years

## FUTURE NEEDS

- The intake structure has a history of plugging with sediment when the gate is closed during the off season. The intake structure may need to be modified or redesigned to prevent plugging
- The existing spillway capacity may not meet current safety standards. Further analysis is needed and future modification may be required

Estimated Cost of the above repairs: $500,000

Outlet and downstream face of dam

Dam Crest

Upstream face

Downstream face


The State Water Conservation Board (SWCB) was established in 1934 for building water infrastructure projects throughout Montana. 90 years later the successor to SWCB, the State Water Projects Bureau, continues to manage and operate the infrastructure built by SWCB including Middle Creek Dam and Reservoir originally constructed in 1952 and rehabilitated in 1992 (the sign for which is pictured above).

Persons with disabilities who need an alternative accessible format of this document should contact:

Montana Department of Natural Resources and Conservation
Water Resources Division
1424 9th Ave.
P.O. Box 201601
Helena, MT 59620-1601
Telephone: (406) 444-6646

Water Resources (mt.gov)