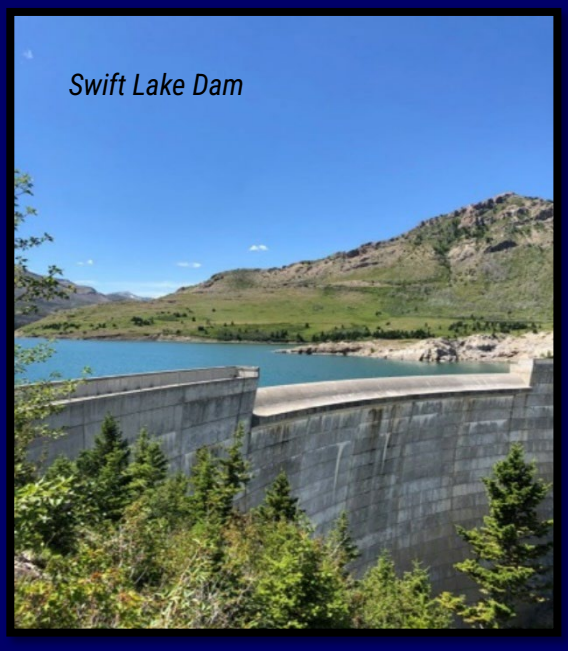
A Pilot Study of Dam Inspection Expense Assistance

A Report to Montana Dam Owners

By the Montana Department of Natural Resources & Conservation Dam Safety Program

"Dam inspections are crucial for ensuring the safety, stability, and reliability of dams." ~Association of State Dam Safety Officials



Swift Lake Dam

MONTANA DNRC

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EXECUTIVE SUMMARY

In 2024, the Department of Natural Resources and Conservation (DNRC) initiated a two-year dam inspection cost share pilot study using Bipartisan Infrastructure Law (BIL) funding. This report summarizes the pilot study design, sets forth conclusions from the first year, and recommends that the state pursue a permanent cost-share program.

The value to the public of high-quality dam inspections and safety evaluations cannot be overstated. According to the Association of State Dam Safety Officials, "dam inspections are crucial for ensuring the safety, stability, and reliability of dams." Dam inspections and safety evaluations help dam owners and engineers identify needed repairs to make appropriate operational modifications that will safeguard the critical infrastructure that dams provide throughout Montana.

However, proper inspections can be expensive. The average cost of Montana's mandatory *Five-Year Dam Inspection & Safety Evaluation* is $27,000. Whereas most nearby states conduct these major inspections using state-employed engineers, in Montana they are the responsibility of the dam owner. Given the benefits of high-quality, thorough inspections, DNRC's Dam Safety Program seized the opportunity presented by federal grant funding to study how to make inspections more affordable for dam owners through a pilot study. The goal of the pilot study was to understand the benefits, feasibility, and costs of an inspection cost-sharing program.

Owners of dams with public benefits were eligible to participate by applying to DNRC. Owners of 19 dams across the state participated in the first year of the study, and feedback from dam owners and their engineers was very positive. The pilot study resulted in three main conclusions:

1. A *Five-Year Dam Inspection & Safety Evaluation* for a single dam costs an average of $27,000. This amount depends on dam access, complexity of the dam, and the population at risk downstream from the dam.
2. Participants supported a cost share of 50 percent to balance a dam owner's responsibility for the dam with the public benefits provided by the dam and reservoir.
3. Cost-sharing dam inspections ensures thorough, quality inspection reports. The inspection reports received during the pilot study were vastly improved from reports received in the past due to more funding for a thorough inspection and more substantial reports.

DNRC tabulated the number of high hazard dams offering public benefits that are due for five-year inspections over the next four years. Assuming a 50 percent cost share and an average inspection cost of $27,000, the total cost share obligation would range from $67,500 in 2027, with 5 dams due for inspections, to $270,000 in 2025, with 20 dams due for inspection. If high hazard dams located on U.S. Forest Service (USFS) property

were to be included, the cost estimates would increase by approximately $40,000 per year.

The results of this 2024 pilot study demonstrate that a cost-share concept is both feasible and enormously popular. A cost-share program supports water storage in Montana, protects the downstream public, and brings Montana in line with our peer states. Therefore, the Montana Dam Safety Program recommends implementation of a state funding mechanism for cost-sharing inspection expenses.

INTRODUCTION

DNRC identified three primary reasons for pursuing the pilot study and for implementing a cost-share program for required *Five-Year Dam Inspections & Safety Evaluations*.

MONTANA DAM OWNERS PAY THE MAJORITY OF EXPENSES REQUIRED TO KEEP THEIR DAMS OPERATIONAL.


Ruby Valley below Ruby Dam in late August

In most cases, the dam owners pay all operation and maintenance expenses of the reservoirs, even those that provide public benefits. Most reservoirs do not generate sufficient revenue from water supply and irrigation releases to cover these expenses. Even hydropower-generating facilities do not always generate enough revenue to offset expenses. Yet many dam owners conscientiously operate their reservoirs for public benefit, by maintaining a minimum pool, offering recreational access, and delivering late season flow to Montana streams and valleys. This allows Montanans to enjoy our reservoirs for fishing, boating, bird hunting, wildlife watching, picnicking, and camping.

One of the larger recurring expenses for dam owners is the *Five-Year Dam Inspection & Safety Evaluation*. Required by state law every five years, the dam owner must hire an experienced, professional engineer to conduct a comprehensive visual inspection and safety evaluation of the dam. The *Visual Inspection* usually involves specialty equipment to video the outlet conduit. Multiple visits to the dam are common in order to view the reservoir at various seasonal stages, from spring spillway flows to late season drawdown. The *Safety Evaluation* must validate that the dam is compliant with industry practice and standards, including plans for operation & maintenance and emergency actions, and an assessment of recorded instrumentation data. The


Bynum Dam, Teton County – The dam owners maintain a minimum pool for fishing, even in drought years

safety evaluation lists recommendations for improvements and requirements to keep the facility in satisfactory condition. Engineering costs are understandably higher for dams with remote or difficult access, and for dams with higher downstream consequences. Engineers struggle to balance completing the necessary analysis with keeping costs low for the dam owners. An adequately funded cost-share program would enable them to do an unhindered, quality job.

IT IS EXCEEDINGLY UNLIKELY FOR PROPERLY INSPECTED DAMS TO FAIL.


Dam Inspector

Thorough dam inspections are critical to keeping dams safe. The Association of State Dam Safety Officials has determined that inspections are critical to ensure the safety, stability, and reliability of dams. A comprehensive inspection and safety evaluation identifies problems and allows the dam owner the opportunity to take timely action to prevent a catastrophe. Maintenance and operational issues can be addressed prior to them becoming emergencies or otherwise expensive. As the old saying goes, "*an ounce of prevention is worth a pound of cure*."

Problems left unnoticed or unattended can lead to reservoir restrictions or even emptying of the reservoir, both of which greatly reduce the economic viability of the facility and its public benefit.

ASSISTING DAM OWNERS WITH FIVE-YEAR DAM INSPECTION & SAFETY EVALUATION EXPENSES SUPPORTS LONG-TERM WATER STORAGE IN MONTANA.

Safely functioning dams provide reliable, long-term water storage in Montana. Water storage allows Montana water users to capture the spring runoff and save it to use when it is most needed, creating flexibility to meet the multiple demands of agriculture and irrigation, municipalities, industry, hydropower, fisheries, recreation, and water quality.

Quality inspections ensure safe dams, and safe dams are more likely to operate at full pool, maintaining economic viability. Water storage is critical to coping with Montana's ongoing drought.

Many dam owners make their facilities accessible for recreation and support fish and wildlife habitat by providing minimum pools. Stored water from dams helps contribute to instream flows and can provide releases of much-needed cool water in low-flow summer conditions.

PILOT STUDY RESULTS

DNRC initiated a pilot study using Bipartisan Infrastructure Law (BIL) funding to better understand how a potential inspection cost sharing program could operate and provide an estimate of total expenses. This pilot study was focused on DNRC-regulated dams with (1) clear public benefits and (2) a *Five-Year Dam Inspection & Safety Evaluation* due in 2024. The DNRC State Water Projects Bureau did not participate in the 2024 pilot study, but indicated they would pursue funding if future financial assistance was available.

Interested dam owners were asked to provide DNRC with a letter of interest, along with a description of their public benefits and a rough estimate of anticipated expenses. Table 1, on the next page, summarizes the 19 dams included in the 2024 pilot study.

RESULTS OF ENGINEERS' SURVEY

The BIL grant used to fund the pilot study did not allow DNRC to pass money through to dam owners, so DNRC contracted with each inspecting engineer directly. DNRC recommends that assistance under a permanent, state-funded program would instead go to the dam owner. To ensure enough money was available for all interested dam owners, DNRC limited contracts to 40 billable hours.

DNRC solicited feedback from engineers who participated in the pilot study and noted three overall themes:

- The limit of 40 billable hours for evaluation and report writing was too low, particularly for dams with high downstream consequences.
- The state funding assistance was greatly appreciated. This allowed engineers to complete a thorough evaluation of the dam, with less worry about having to cut corners. That said, some engineers responded that when they ran out of funding due to the 40-hour limit, they continued to work without billing the dam owners.
- The engineers support the State of Montana developing a 50 percent cost-share program. A 50 percent cost-share balances a dam owners' contributions to the public with their responsibility for dam inspections.

Nevada Creek Dam Spillway Inspection

TABLE 1. 2024 DAMS PARTICIPATING IN THE PILOT STUDY

Dam Names	County	Owner	Public Benefits
3 Dams: Boot, Pear, & Anchor	Beaverhead	Beaverhead Water Co.	Camping, picnicking, and fishing (115 angler days recorded by FWP). Water users maintain minimum pool to support fishing. Late season return flow to Birch Creek and Big Hole River.
Lima Dam	Beaverhead	Red Rock River Water and Sewer District	Wildlife (10,000 Canada geese); flood control and irrigation for 20,000 acres and late season instream flows enhancing habitat in Red Rock River.
2 Dams: Silver & Storm	Deer Lodge	Butte-Silver Bow	Fishing, boating, camping; industrial water supply; provides instream flows to support bull trout habitat.
Fred Burr	Granite	City of Philipsburg	Municipal water supply – 70% of town's drinking water.
Beaver Creek Dam	Hill	Hill County	Multiple campgrounds, picnic areas; fishing, boating; flood control, irrigation, and municipal water.
5 Dams: Tin Cup, Mud, Powell, Upper Taylor & Kerns	Powell	Correctional Enterprises	Self-supporting ranch provides transitional services to incarcerated individuals. Produces hay, cattle, dairy and provides water for Livestock and wildlife. Public access for hunting.
Mill Lake	Ravalli	Mill Creek Irrigation District	Popular with backpackers and horse packers; irrigation to 2,200 acres, late season return flows to Bitterroot River.
Bass Lake	Ravalli	Bass Lake Reservoir Co.	Hiking, camping, fishing (regularly stocked by FWP), supplies instream flow for bull trout, flood irrigates 3,200 acres of land.
Canyon Lake	Ravalli	Canyon Lake Irrigation District	Popular hiking and fishing destination; irrigates 1,000 acres; provides late season return flows and instream flows.
2 Dams: Basin#1, Moulton	Silver Bow	Butte-Silver Bow	Municipal water supply – 60 percent of Butte's municipal water needs from Basin 1, reducing reliance on Big Hole River.
Bynum	Teton	Teton Coop. Reservoir Co.	Camping, boating, and fishing (1,500 angler days each year); water users maintain minimum pool to support fishing.

PILOT STUDY CONCLUSIONS

Inspection costs for individual dams are not provided in this report to protect business confidentiality. There is great variation in inspection/evaluation expenses. For planning purposes, the DNRC concluded the following:

- Engineer's billable rate averaged *$180/hour*
- Visual inspection – 30 to 70 hours (2 visits to the dam) → *$12,600*
- Evaluation & report writing – 50 to 80 hours → *$14,400*
- Approximate total average cost of inspection/evaluation → **$27,000 per dam**

Table 2 tabulates the amount of a 50 percent cost share over the next four years, using the average cost per inspection of $27,000. The annual cost varies because the number of dams due for a *Five-Year Dam Inspection & Safety Evaluation* varies by year.

The cost estimates do not include high hazard dams located on U.S. Forest Service (USFS) property. These dams are regulated (not owned) by the USFS and offer public benefits, but the dam owners do not receive federal assistance for maintenance or inspection requirements. DNRC recommends that these owners be allowed to participate in a dam inspection cost-share program, with the requirement they adhere to state law and DNRC's administrative rules regarding periodic dam inspections. The cost estimates in Table 2 would increase by approximately $40,000 per year with the addition of these dams to the program.

TABLE 2: ESTIMATES FOR UPCOMING DNRC-REGULATED FIVE-YEAR DAM INSPECTION & SAFETY EVALUATION EXPENSES

Year:	# Dams/Reservoirs [1,2]	Total Inspection Costs (Estimated)	Less 50% Cost-Share	Program Cost
2025	20	$540,000	$270,000	$270,000
2026	14	$378,000	$189,000	$189,000
2027	5	$135,000	$67,500	$67,500
2028	12	$324,000	$162,000	$162,000
				$688,500

[1]Dams on same reservoirs combined where appropriate
[2]There are 20 non-federal high hazard dams regulated by the U.S. Forest Service that may benefit from a dam inspection expense assistance program, but are not included in these numbers.

In Montana's peer states – Idaho, Wyoming, Utah, Colorado, North Dakota, and South Dakota – dam safety engineers employed by their respective states perform the required dam inspections and evaluations. However, Montana law requires that dam owners be responsible for the required inspection and evaluation. In addition to recognizing the public benefits of dams, a cost-share of 50 percent brings Montana into alignment with our peer states.

The *Five-Year Dam Inspection & Safety Evaluation* reports received during the pilot study were vastly improved from ones received in the past when the dam owners were fully responsible for all costs. The pilot study reports:

- Addressed all safety requirements in appropriate detail.
- Followed a standardized template prepared by national experts.
- Provided actionable recommendations to owners.
- Recommended further analyses, when appropriate, to ensure the dam meets current industry standards.

The improved reports support long-term water storage while protecting the downstream public.

QUESTIONS AND ANSWERS

Would a state-sponsored inspection assistance program be open to all dams?

DNRC recommends the program be limited to high hazard dams offering public benefits, subject to § 85-15-213, MCA, and associated rules for several reasons:

- Federally regulated hydropower dams have much higher revenue-generating capability than irrigation and water supply dams. These owners are more likely able to afford to pay for their own inspections.
- Federally owned or federally supported dams enjoy staff and funding resources that are not available to state-regulated dams.
- Although inspections are important for ALL dams, high hazard dams with potential for loss of life downstream have more stringent and costly requirements.
- The Dam Safety Act and Montana Administrative Rules reference current industry practices and standards of care for dam inspections and safety evaluations.

Would a state-sponsored inspection assistance program include non-federal dams on federal property that are exempt from many dam safety act requirements (i.e., the 20 high hazard dams on USFS property)?

- DNRC recommends making these dams eligible for cost share assistance, provided that owners agree to follow state dam inspection requirements. These dams are regulated (not owned) by the USFS and offer public benefits, but the dam owners do

not receive federal assistance for maintenance or inspection requirements. These dam owners face many of the same challenges as state-regulated dams. If these dam owners participate in a cost-chare program, they must follow the same inspection and evaluation requirements as state-regulated dams, to ensure technically sound expenditure of state funds and consistency. The cost estimates set forth in Table 2 would increase by approximately $40,000 per year with the addition of these dams to the program.

DNRC's Conservation Resource and Development Division has a private grant program that dam owners can use to help with dam inspection expenses. Why is this existing program not sufficient?

- The private grants program has been utilized by dam owners to help with inspection costs. However, the program is only available to private organizations, leaving out irrigation districts and municipalities. In addition, the grants are limited to 25 percent of project costs or $5,000, whichever is lower, and they are issued on a first-come, first-served basis. A 50 percent cost-share program with more funding depth and fewer applicant restrictions would benefit more dam owners.

§ 85-15-213, MCA, states "the owner is responsible for inspections required under this section." Would implementing an inspection expense assistance program contradict this part of state law?

- The dam owners maintain responsibility for the inspection by hiring the engineer, coordinating with DNRC, compiling reports and data for the engineer to use in their investigation, as well as implementing and tracking recommendations. A cost-share program only reduces some of the financial burden for dam owners.

CONCLUSION

There are sound economic and public safety reasons to support a funding mechanism to cost-share high hazard dam inspection expenses. The cost of implementing a 50 percent cost-share program would range from $70,000 to $270,000 annually, depending on the number of dams due for an inspection during that year. If non-federal, non-hydropower generating dams on federal property are included, the range would increase to $110,000 to $310,000 annually. During the 2025 Legislative Session, DNRC will work with the Governor's office to identify opportunities to support a cost-share program.