

Sheyenne Dam, in Eddy County, had a rock ramp installed in 2008, in a cooperative effort with eight cost-share partners, including the Water Commission and the Game and Fish Department. The structure no longer is affected by the roller effect, and fish are able to move upstream.



Known low head dams in North Dakota, and those that have had rock ramps installed.

State Agencies Work Together to Eliminate “DROWNING MACHINES”

Starting over a century ago, many low head dams were built throughout North Dakota for use in livestock watering, irrigation, water supply, and recreation. Low head dams are usually simple concrete or rock masonry structures that span the width of the river or stream, raising the water level behind them until it reaches a height sufficient to flow over the dam.

These low head dams can create dangerous conditions that recreational river users may not be aware of or may underestimate. Under the right conditions, water flowing over the dam can cause a “roller effect” on the downstream side of the dam. Strong recirculating currents can trap and drown boaters, swimmers, or other water users. Air mixing in the turbulent water below the dam reduces buoyancy, making it more difficult to stay afloat even with a life jacket. Karen Goff, the State Water Commission’s Dam Safety Program Manager says that “One of the problems with these dams is that the level of danger can change depending on the flow conditions in the river. Hazardous conditions may not exist at a dam

all the time, potentially giving people a false sense of security. What may be a pleasant, inviting looking place on one day can be very dangerous on another day under different conditions.” Over the years, multiple deaths have occurred at low head dams in North Dakota.

According to the Association of State Dam Safety Officials (ASDSO), “Each year, dozens of lives are lost at dams on U.S. streams and rivers, many at low-head dams, also known as run-of-river dams or “drowning machines.” These structures, generally less than 15 feet high, can create backflow currents and turbulence capable of producing disorientation, hypothermia, exhaustion, and brutal battering. The forces combine to create a practically inescapable circular trap for even the strongest, life jacket-clad swimmer.”

Nationwide, many deaths at low head dams occur when people have drowned attempting to rescue someone else. Even trained rescue personnel have fallen victim to low head dams.

LOW HEAD DAM - SAFETY TIPS



KNOW THE WATER COURSE

Know the water course **BEFORE** you travel on it or play in it. Low head dams can be very difficult to spot from upstream.



DO NOT ENTER THE WATER TO ATTEMPT TO RESCUE

Do **NOT** enter the water to attempt to rescue pets, swimmers, or boaters that may become trapped in the hydraulic roller of a low head dam. Call 911, stay on shore, and throw a line or extend a pole from shore if possible.



BOAT RESPONSIBLE

Boat with responsible, experienced boaters.



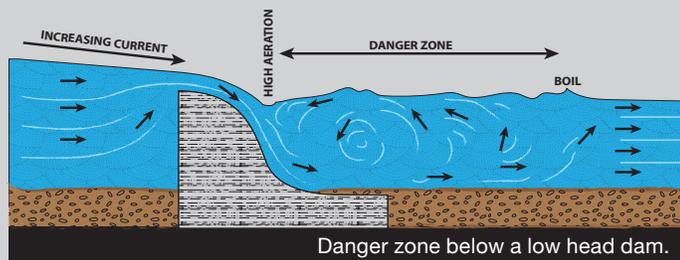
PORTAGE AROUND ALL DAMS

Portage around all dams and re-enter well downstream of the boil.

Options to eliminate the public safety concerns associated with low head dams include removing the dam or modifying the dam to eliminate the dangerous conditions. In addition to the danger aspect, low head dams can prevent fish migration to upstream spawning habitat, especially for species that spawn in late spring or early summer.

In some instances, when complete removal of the dam isn't a desirable option for local entities, the fix is a gently sloping bed of rocks that, when strategically placed according to engineers' designs on the downstream side of the low head dam, resembles rapids in a western river. Instead of a sudden drop over the dam, water flows over the rock incline, eliminating the dangerous undertow and providing fish passage at the same time.

"Connectivity of the river system as a whole can be vitally important for a healthy aquatic community," said Scott Gangl, North Dakota Game and Fish Department Fisheries Management Section Leader. "When we are involved in these projects, we do want to maintain or improve public benefits, such as shoreline fishing access that previously existed, and also make sure there's some kind of conservation benefit as well."



Progress has been made in North Dakota toward eliminating this public safety hazard. To date in North Dakota, one low head dam has been removed, and 11 low head dams have had rock ramp fish passage installed (see map). "We know of 51 low head dams that remain in North Dakota. Removal or modification of these dams should be considered to make them safer," said Goff.

Because low head dams are known to be dangerous, the State Water Commission and Game and Fish Department have been very supportive of local entities interested in removing structures that no longer serve any purpose. Or, installing improvements, such as rock ramp fish passages on dams that are still necessary. Under the Water Commission's cost-share program, local dam owners are able to get up to 75% of their project covered by the state, if dam safety concerns exist. In the coming years, the State Water Commission and the Game and Fish Department will continue to provide education and will work with local dam owners to reduce risk and improve riparian habitat by providing cost-share to convert low head dams statewide.

As part of the state's education efforts, the State Water Commission has purchased signs that are available free of charge to dam owners who want to install them at low head dams. For more information on the free dam safety signs, call 701-328-2782, or email jessiewald@nd.gov.

For additional information on low head dams visit ASDSO's website at <https://damsafety.org/public-awareness>