

Courtesy of the American Canoe Association

### Solutions to dangerous dams?

Low-head dams exist for many reasons. Many dams were first constructed as mill dams to harness the energy created by the rushing water. Some were built to create a small reservoir for recreational purposes. Today most dams have outlived their usefulness and are no longer serving their original purpose. In order to better protect the public, the Iowa DNR currently encourages dam owners to remove or modify dams that are no longer serving their original purposes. Removal can be the least expensive tactic and can increase the river's environmental health. Although recreational fishing can be good downstream of a dam, species diversity of mussels and fish are severely impacted upstream because river habitat is fragmented. Dams can be retrofitted with rapids, which eliminate their dangerous effects, allow fish passage, and improve fisheries. Alternatively, a dam may be turned into a rapids area that can be enjoyed by whitewater enthusiasts. These options help to improve the water quality and also make it possible to keep a pool of water upstream.

### Rescue

Rescuing a victim from a dam is a very dangerous task that can often lead to the rescuers becoming victims as well. The techniques used during a dam rescue need to be simple and place the highest priority on the safety of the rescuers, not the victims. If a novice is attempting to res-

cue a trapped person, stay on shore, wear a life jacket and throw a line or extend a branch or pole from the shore. DO NOT get in the water. Untrained rescuers should never go near the dam in a boat or by jumping into the water.



[iowaDNR.com/watertrails/](http://iowaDNR.com/watertrails/)

With thanks to the Minnesota Department of Natural Resources Boat and Safety Section

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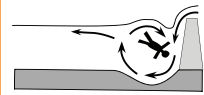
# The Drowning Machine

## Drowning Machine?

"Drowning Machine" is the term used to describe the dangerous situation that is created when water flows over a low-head dam. As the stream of water flows over the dam it drops into the water below creating a backwash or a current. This recirculating current, which is also known as a "hydraulic," can take an object (including a person) to the bottom of the stream. The current then brings the object back to the dam. Once at the face of the dam the object is forced back to the bottom from the water pouring down from above. This recirculation can hold in an object, even a boat, indefinitely and can be impossible for even an expert swimmer to escape.

Low-head dams might not seem dangerous at first glance, but they can be very deceiving. Even a small drop can trap objects and claim lives. When viewed from upstream, a dam with a drop of several feet can be almost impossible to see. Because of this it's important to pay attention to warnings such as signs or buoys. A person may not know they are in danger until they are within a few feet of the dam and it may be too late to escape the current.

**DANGER!**



Recirculating currents below this dam can trap and drown victims

## What is a low-head dam?

A low-head dam is a structure that generally spans from one side of a riverbank to the other, partially blocking the waterway and creating a backup of water behind the dam. As water reaches the wall it flows over the drop off, which can be anywhere from 6 inches to 25 feet. Because the drop off can be as low as 6 inches the dangers of low-head dams are often underestimated.

## Why are low-head dams perfect drowning machines?

- Generally both sides of a dam consist of a vertical concrete abutment that can be difficult to scale if the victim manages to reach it.
- Fallen tree branches, tires, and other debris can be trapped in the hydraulic along with the victim, creating trauma hazards.
- In the months between fall and spring, the water temperature can be extremely cold which can significantly decrease the victim's survival time.
- Air bubbles mix into the water decreasing the buoyancy by one-third, which makes staying afloat even more difficult (even with a life jacket).

These factors, along with the force of the hydraulic make low-head dams, a very dangerous drowning machine.

## Iowa's Low-head Dams

In July 2006, the devastating effects of what was a seemingly harmless dam were realized. A 22-year-old woman and two friends were on a tubing trip on the Des Moines River when all three were swept over the Boone Waterworks dam (pictured on front cover). Two of the friends managed to make it over the dam without harm while one of the friends was unable to escape the hydraulic.

The young woman was eventually pulled free by a near by fisherman and given CPR until paramedics arrived. She was pronounced dead the next day.

The drop over the dam that day was reported to be only 14 inches, proving that even a dam with a small drop can be a dangerous drowning machine.

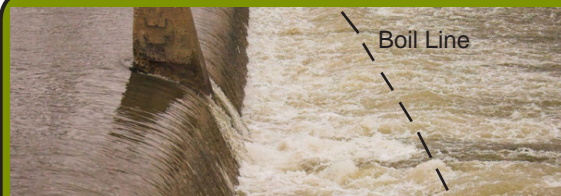
When on the river it's important to keep your eyes open for warning signs, markers, or buoys indicating that there is a dam ahead. Although going over the dam can be dangerous, the area downstream can be just as deadly.

In April of 2007, three friends were canoeing down the Iowa River. As they neared the Alden dam, they paddled to the bank of the river and carried their canoe around and down below the dam. Unfortunately, when they put their canoe back into the water and began paddling, they re-entered the river near the dam. The water flowing over the dam created a hydraulic that pulled their canoe back towards the dam. Two of the three passengers were killed, while the third escaped serious injury.

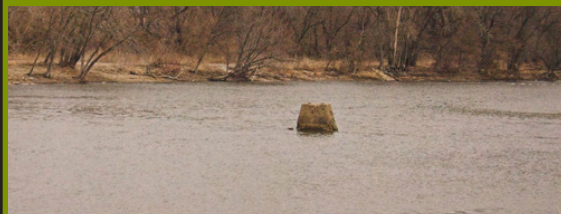
Tragedies like this can be avoided if certain precautions are taken. The canoeists did the right thing by exiting the river upstream of the dam and portaging around it. However, they re-entered the river too close to the dam.



The Alden Dam on the Iowa River, in Alden, IA where two canoeists died on April 29, 2007.



The Fort Dodge Little Dam is easy to see when viewing it from downstream. Here you can clearly see the bridge abutment and the drop off of the dam along with the boil line. **Boil Line:** The surface water downstream of the boil line is going away from the dam while the surface water on the upstream side of the boil line is being pulled towards the dam.



From upstream the drop off of the dam is impossible to see. In this example, the bridge abutment shows where the drop off is, but without it it's virtually impossible to see where the drop begins. This is a perfect example of how hard it can be to spot a dam from upstream.

## Safety Tips

- ◆ Familiarize yourself with the river before recreating on or near it. Obtain a map of the river and ask those people familiar with the river about any hazards on it.
- ◆ Boat with responsible, experienced boaters.
- ◆ Keep your eyes open for dam warning signs, markers or buoys. The retaining walls of a dam can be easier to spot and can be a good indicator that a dam is ahead.
- ◆ Portage around all dams and re-enter well downstream of the boil.
- ◆ Always wear a life jacket.