

HIDDEN DANGERS OF LOW-HEAD DAMS

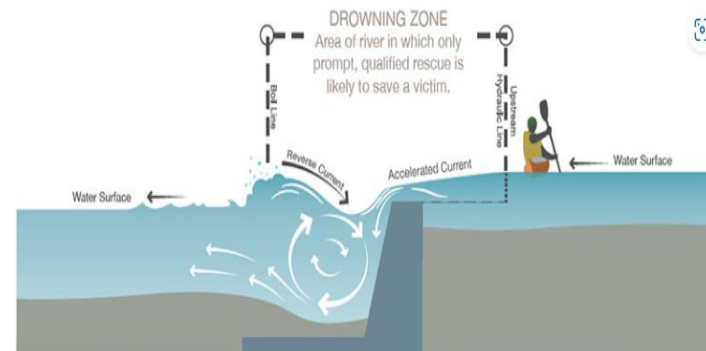
Low-head dams (LHD) raise the water level upstream to allow for water to be diverted for such beneficial uses as producing hydropower and diverting irrigation water. However, when the hydraulic jumps used to power the dam become submerged, it can result in a reverse current, creating a life-threatening hazard. LHD across the United States and around the world continue to needlessly take lives, garnering the moniker “drowning machines,” as victims are lured into seemingly calm waters above these dams. Unfortunately, approximately 1,000 LHD-related deaths have been documented in the United States over the last several decades, a death toll nearly 14 times higher than the death toll from dam failures over a longer time-period. Drowning fatalities have been documented at more than 400 LHD in the U.S. It is anticipated that a large percentage of the 13,500+ LHD structures identified in the [National Inventory of Lowhead Dams](#) include potentially dangerous countercurrents. Without coordinated identification intervention, and implementation of an education strategy, fatalities at these locations are likely to continue.

Currently, there are no systematic procedures to predict what conditions can cause the hydraulic jump to become submerged, resulting in LHD reverse rolling and creation of a reverse current or countercurrent. Without an accurate tool to predict these dangerous conditions, or a way to alert people to their occurrence, water recreationists will continue to be at risk of drowning in LHD, forcing first responders to needlessly put their lives at risk to attempt hazardous swift water rescue operations.

DEVELOPING LOW-HEAD DAM TOOLS AND EDUCATING THE PUBLIC AND FIRST RESPONDERS

The research conducted by the Department of Homeland Security’s (DHS) Science and Technology Directorate (S&T) focuses on developing two freely accessible user-friendly toolboxes to investigate LHD public safety: (1) an LHD Public Safety Assessment Tool and (2) a Computational Fluid Dynamics (CFD) modeling toolbox to enable modelers to consider LHD site-specific conditions.

AVOID THE DROWNING ZONE



Stay out of the Drowning Zone. Source: Iowa Department of Natural Resources

THE IMPACT OF LOW-HEAD DAM TOOLS

- This effort will create tools to help first responders identify LHD hazards and promulgate potential alerting and life-saving information for recreationists
- The combination of updated data and alerting will save lives of first responders and the public

UPCOMING MILESTONES

- Deliver an updated version of the U.S. National LHD Inventory
- Conduct field-data collection at key LHD
- Develop CFD toolbox for simulating LHD hydraulics

PARTNERS/PERFORMERS

Performers:

- Brigham Young University (Provo, UT)
- Utah State University Hydrometrics, Inc. (Logan, UT)
- Follum Hydrologic Solutions, LLC (Casper, WY)

Partners:

- Federal Emergency Management Agency (Washington, DC)
- U.S. Army Corps of Engineers (Washington, DC)
- State, local, tribal and territorial first responders
- State dam safety engineers
- Federal natural resource agencies