PENNSYLVANIA STATE POLICE
COMMUNITY AWARENESS BULLETIN
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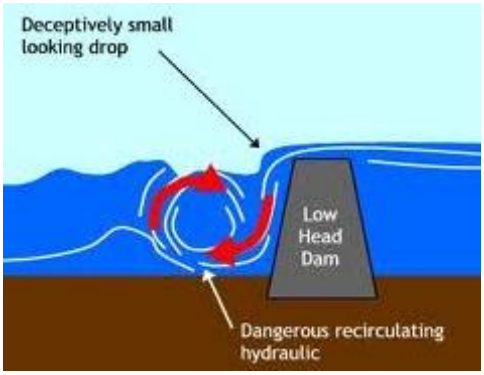
DANGERS ON THE WATER: LOW-HEAD DAMS

Pennsylvania's waterways are home to more than 3,300 dams and reservoirs.[1] Of these, more than 300 are considered low-head dams; structures usually less than 15 feet in height stretching across a body of water.[2] These dams, also known as weirs, cause water to pool behind the barrier, raising the water level, but continue the flow of the waterway by allowing water to flow over the top.[3] Hundreds of low-head dams were built in the 1800s to power mills and other industries; hundreds more were constructed in the 1900s for irrigation, water supply diversion, and flood control.[4] The majority of them are no longer used.



These unimposing dams appear harmless, but are actually one of the most dangerous hazards on the water for boaters, swimmers, and waders. Frequently called "killer dams" or "drowning machines," these barriers can create an underwater hydraulic cycle that is nearly impossible to escape.[5] The water above the dam picks up speed as it is squeezed over the top of the structure. Fast moving water plunges to the bottom of the dam, forcing the water already there to the surface. Water is then forced back down to the bottom by the water falling over the dam, and the cycle repeats itself.[6] This recirculating hydraulic, known as a "boil," is incredibly dangerous. Anything caught in it will be repeatedly forced under the water and back up again. The "boil" can extend a few feet in front of the dam or more than 100 feet, depending on the size of the river and the depth of the water.[7]

Approximately 300 dams in Pennsylvania fit the statutory definition of a low-head dam and are regulated by the Department of Environmental Protection. However, more than 2,000 dams throughout the Commonwealth can have characteristics of a low-head dam during certain river/stream conditions. While the regulated structures must be marked with signs and buoys to warn anyone approaching the dam to stay back, non-regulated dams are not always marked.[8] Even with warning signs, these structures are not always visible from upstream to unsuspecting boaters and swimmers. Additionally, not everyone adheres to the warning signs. Since the dams look small and insignificant, many people ignore the warnings and get too close or attempt to go over the structure. Many states do not require markings and most do not keep track of the number of structures in their state because, if these particular dams fail, it would have little to no effect on property and people downstream.[9]

These "drowning machines" are responsible for dozens of deaths and injuries across the country each year. According to an on-going study by a University of Tennessee professor, there have been 204 deaths at low-head dams in 30 states between 1960 and August 2010. More than 50% of those deaths, or 115, have occurred since the year 2000. Pennsylvania and Minnesota have the highest number of fatalities with more than 20 each.[10,11] In fact, in the past 30 years, dam failures have only been responsible for 40 deaths, while low-head dams, by their very nature, have been the cause of 160.[12]

Low-head Dam Incidents in Pennsylvania:

- May 2012: One person was killed and another injured when a jet ski they were riding went over the Dashields Dam outside of Pittsburgh. The passenger drowned after being caught in the current at the base of dam.[13]
- June 2011: A kayaker drowned after going over the Dock Street Dam in Harrisburg. Investigators say the man was unable to escape after being caught in the dam's hydraulic current.[14]

- May 2011: A man drowned after being thrown from his kayak while paddling over a low-head dam in Columbia County. Attempts to rescue him were unsuccessful.[15]

RECOMMENDATIONS

In order to avoid becoming a victim of a low-head dam, boaters, swimmers, and others in the water should be aware of the hazards in the area. If traveling the river, obtain a river map and be sure to scout ahead so you are not caught off guard. Do not go out on the water alone and always inform a reliable person of your route of travel and when you expect to return.[16]

If you are caught in a low-head dam:

- Stay with the boat, or on-top of anything that floats, for as long as possible
- Try to swim parallel with the dam to get to either shore
- If pulled to the bottom, try to crawl along the river bottom until you are clear of the hydraulic "boil"[17]

These maneuvers are very dangerous and do not guarantee your survival. Very few people have performed these attempts successfully because they require great endurance and proper breathing. The best way to avoid becoming a victim is to completely stay away from low-head dams.

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