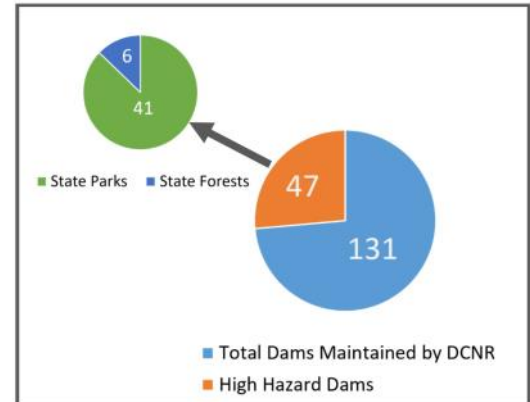




Protecting Access and Human Safety: Dams

The Pennsylvania Department of Conservation and Natural Resources (DCNR) is responsible for operating and maintaining 131 dams across the Commonwealth, including 47 high hazard dams. The Federal Emergency Management Agency (FEMA) defines high hazard dams as those where failure or mis-operation will likely result in the loss of human life and significant property damage. DCNR owns and operates more high hazard dams than any other single public or private dam owner in Pennsylvania.



As dams age, problems develop. Most of DCNR's dams are more than 50 years old. Concrete control towers and spillways crack and deteriorate, exposed reinforcing steel rusts and weakens, increased seepage causes internal erosion of earthen embankments,



Poe Dam at Poe Valley State Park

outlet gates leak, and gate operators wear out. Each year, costly repairs are needed. A single dam rehabilitation project may cost \$10 million or more. To keep them in operation and in compliance with specific regulatory and public safety requirements, DCNR's dams must be routinely inspected and properly repaired and upgraded. The agency has a full-time, on-call dam inspection engineer to manage all dam safety requirements.

DCNR dams that do not meet dam safety standards must be drained and repaired. This interferes with any recreation that might have otherwise occurred on the lake. Visitors go elsewhere, and the economic benefits to that community are reduced or eliminated altogether. Some dams still in operation are at risk of breaching with a large rain event, which could cause destruction and flooding for many communities downstream, as well as create water quality issues from the silt and other pollutants built up behind the dam.

There are several state park and forest dams in such extreme disrepair that DCNR must breach and remove them as the structures threaten public safety. Each dam removal project may cost \$5-\$10 million to remove and dispose of the dam and remove accumulated sediment in the reservoir area.

Examples of DCNR's High Hazard Dams in Need of Repair or Removal

After the Pennsylvania Department of Environmental Protection (DEP) declared Chapman State Park Dam's spillway to be hydraulically



The spillway at Yellow Creek State Park's dam

inadequate, funding was released and major rehabilitation at the dam began in the summer of 2017. **Project cost: \$9.95 million**

While well-maintained, Memorial Lake State Park Dam's spillway passes only approximately 32 percent of the spillway design flood, which the DEP defines as seriously deficient and has the potential for dam failure. **Project Cost: \$10 million**



Crumbling dam at Tobyhanna State Park

Tobyhanna State Park Dam has a deteriorated concrete spillway which must be replaced along with addressing other deficiencies. The design for this dam rehabilitation project began in 2017. **Project Cost: \$8.5 million**

Laurel Run and Pine Run Dams in Pinchot State Forest. These two antiquated former water supply dams were included in a recent DCNR state forest land acquisition deal, but are in very poor condition and must be removed for public safety reasons.

Project Cost: \$5 million

Gunter Valley Dam in Tuscarora State Forest was fully drained in 2011 due to issues of seepage through the dam's embankment and foundation and an inadequate spillway. The dam is scheduled to be removed in 2018. **Project Cost: \$5 million**

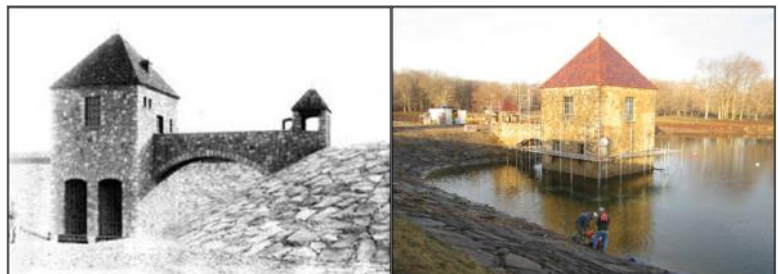


The new spillway at Lyman Run State Park's dam

Ryerson Station State Park Dam was drained in 2005 due to foundation movement caused by mining activities. Cracks in the dam caused excessive leakage and instability, requiring the dam to be drained and breached. The dam structure still remains and is classified as an unsafe dam since the potential exists for the lake to refill during an extreme rainfall event. DCNR is pursuing dam removal, sediment removal, and stream restoration. **Project Cost: \$24 million**

One example of a successful dam restoration project occurred at Pymatuning State Park in western Pennsylvania. The park's dam creates the largest lake in the state, and provides recreational opportunities, economic benefits, and flood protection for residents and visitors. In fact, it is the second most visited park in the system, and has the highest average visitor spending of all the state parks at \$83.60 (in 2010 value).

The Pymatuning Dam rehabilitation project was completed in 2017. The project included removal of the tower roof by crane and its replacement, complete reconstruction of the tower's inner surface with a new reinforced concrete lining while keeping the exterior stone masonry intact, repairs to exterior stone masonry joints, and installation of new sluice gates and operators. Additional work on the dam included modification to the spillway weir to improve dam operability, repaving the park road along the dam embankment crest, repairs to the adjacent stone masonry parapet walls and a new toe drain to improvement dam embankment stability. **The total cost for this project was \$8.8 million.**



The Pymatuning State Park dam control tower before rehabilitation (left) and after (right)

DCNR estimates that \$95 million (\$54 million for state parks and \$41 million for state forests) is needed to maintain and upgrade its dams and impoundments, which includes related hydraulic structures and components as well as the lakes and ponds created by the dams.