

Dam Maintenance and Safety



COLORADO PARKS & WILDLIFE DAMS

In addition to managing state parks and wildlife areas, outdoor recreation opportunities, and Colorado's wildlife, CPW owns and operates many dams throughout the state. With an inventory of over 110 dams, CPW is the largest dam owner in Colorado. The water impounded by CPW's dams is used for downstream irrigation, fish hatcheries' operations, and a multitude of recreational activities including fishing, boating and swimming.

CPW's reservoirs are some of the most popular places to visit in the state. However, public infrastructure and population centers are often located downstream, which increases the likelihood of devastating consequences in the event of a dam failure. As such, maintenance and rehabilitation of CPW's dams is paramount for upholding its commitment to public safety.

Public Safety is CPW's First Priority

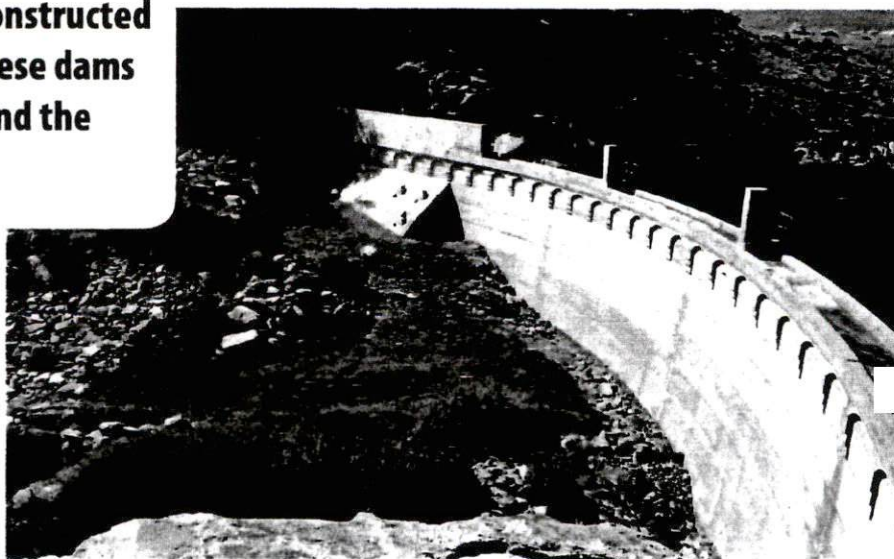
Who takes care of CPW's dams?

CPW has two full-time Dam Safety Engineers who, with the help of other dedicated staff located around the state, manage all the work and monitoring on CPW's dams. They perform regular dam safety inspections on all CPW-owned dams and maintain current Emergency Action Plans for First Responders.

CPW is making dam rehabilitation a priority by allocating capital construction funds to dam improvement projects ahead of any other capital construction projects. Prioritizing the financial needs of CPW's dams has allowed for significant improvements to be made in dams' operating conditions over the last few years.

The average age of CPW's High and Significant Hazard dams is 70 years, including six dams that were constructed over 100 years ago. Most of these dams were built between 1950 and the mid-1970s.

Tarryall Dam,
Park County



Hazard Classification of CPW's Dams

CPW owns over 110 dams, of which 82 are jurisdictional. A dam is considered jurisdictional once its size is large enough to threaten human life and/or property downstream if it should fail. A jurisdictional dam is given one of four hazard classifications, based on the criteria below. As a dam's assigned hazard level increases, so too do the regulations and degree of resiliency required of the dam's operations and its appurtenant structures.

Classification (Based on Colorado Dam Safety Standards)	Number of CPW's Dams
Non-Jurisdictional A dam having less than or equivalent to: 10 feet in height, 20 acres in surface area and 100 acre-feet in storage	28+
Jurisdictional A dam exceeding any of the following: 10 feet in height, 20 acres in surface area, 100 acre-feet in storage	82
High Hazard Loss of human life is expected to result in the event of a dam failure	20*
Significant Hazard Significant damage is expected to result in the event of a dam failure, although no loss of human life is expected	14*
Low Hazard and No Public Hazard Minor damage is expected to result in the event of a dam failure, and will be confined to non-critical infrastructure (Low Hazard) or CPW property only (No Public Hazard); no loss of human life is expected	48
Total number of CPW dams	110+

* Since 2016, three dams have been reclassified from Significant to High Hazard, following a change to public safety conditions downstream.

Funding CPW Dams

By State statute, Parks funding and Wildlife funding must remain separate; therefore, CPW cannot use Parks funds to fix dams in State Wildlife Areas, and vice versa. Funds are strictly monitored when completing these projects.

What is CPW doing about its dams?

As dams age and their structures deteriorate, more involved activities are needed to bring them back into compliance with safety regulations. Given the significant costs associated with those necessary repairs and maintenance, CPW performed a Screening Level Risk Analysis (SLRA) study in 2014 to provide an overview of its dams' risk profiles and assist in the prioritization of future projects. The SLRA study identified only the most major rehabilitation needed on CPW's High and Significant Hazard dams.

The SLRA gaged potential risk of CPW's High and Significant hazard dams based on the following criteria in the event of a dam failure:

Primary consideration

- ▶ Loss of human life downstream

Secondary consideration

- ▶ Environmental impact
- ▶ Economic impact
- ▶ Recreational impact

Based on these measures, the SLRA identified 11 dams in CPW's portfolio that posed a higher risk than the others. Since the 2014 release of the SLRA's findings, 3 additional dams were added to that list when their routine safety inspections revealed conditions that surpassed an acceptable level of risk. Of these 14 dams, 3 are Parks-owned dams and 11 are Wildlife-owned dams. There is also a cost to maintaining and rehabilitating the dams posing a less critical risk. The current maintenance and repair estimate for all CPW's dams in 2018 dollars is approximately \$94.4 million. Most of this cost will be incurred by the wildlife part of the agency, as the majority of the dams are wildlife-owned.

Funding for CPW dams

The majority of parks dams are funded with Colorado Lottery and GOCO money, while the majority of wildlife dams are paid for with wildlife cash funds (money gained through license sales), federal match dollars, and more recently, GOCO funds.

Since July 2015, CPW has further allocated funding for routine dam maintenance. The availability of this maintenance funding allows for proactive attention to care for these assets in an effort to reduce the need for large scale, costly rehabilitation that can result from prolonged deferred maintenance.

Over the last four years, CPW has experienced at least one emergency dam repair annually. Projects of this nature require a quick response and reallocation of available funds, including dam maintenance funds, to stabilize rapidly developing, adverse conditions.



CPW Successes

All 3 of the parks' highest risk dams have been allocated funding for repair. This work should be completed by 2020. (Willow Creek Dam Shown)

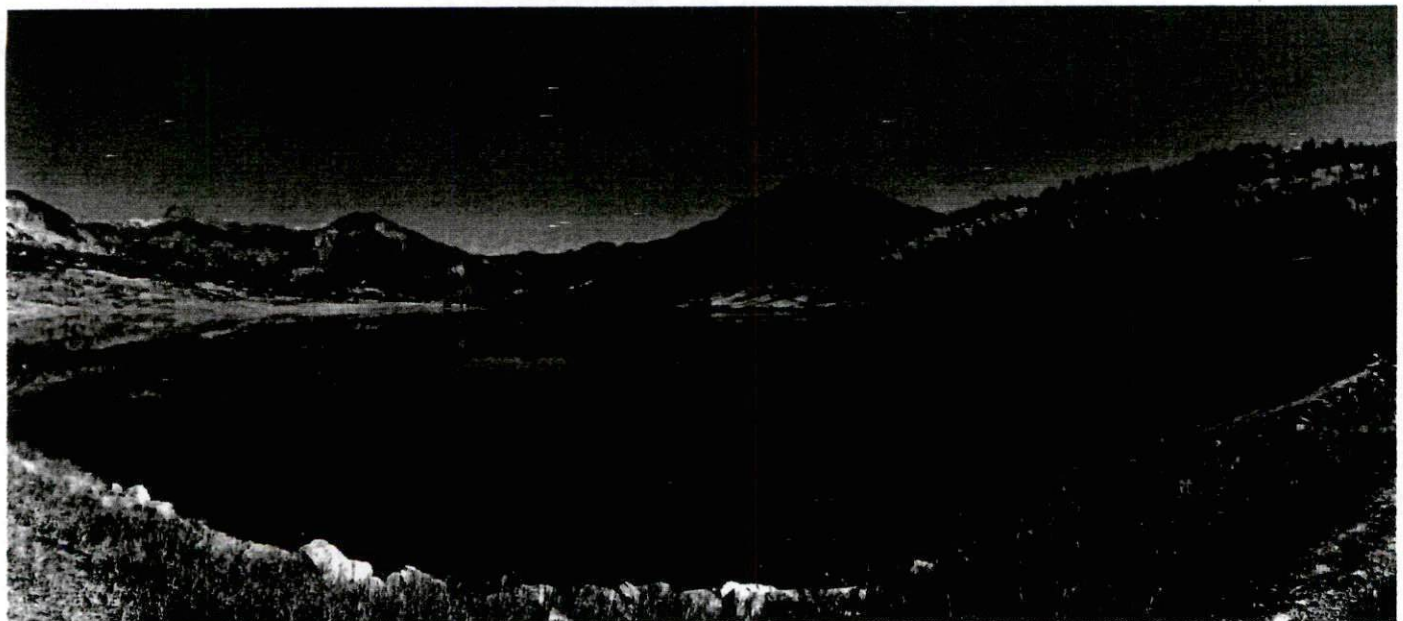


CPW was awarded: ASDSO's 2016 National Dam Rehabilitation Project of the Year - Beaver Park Dam (Beaver Park Dam construction shown)

CPW Challenges

The total maintenance and repair estimate for all CPW Dams is \$94.4 million. CPW has allocated over \$43.7 million for this work; \$50.7 million in funding needs remain*.

***The majority of this is for work on wildlife owned dams**



Williams Creek Dam, Hillsdale County