



SC DEPARTMENT of
**ENVIRONMENTAL
SERVICES**

2025

State of the Dams

*Protecting South Carolina's People, Natural Resources
and Infrastructure through Dam Safety*



PREPARED BY:

Dam Safety Program

SCDES Bureau of Water

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Cover photo: An SCDES dam inspector performs a routine inspection at Lake Robinson Dam in Greenville County, S.C.

Introduction

The South Carolina Department of Environmental Services (SCDES) is charged under the state's Dams and Reservoir Safety Act with implementing a program to Dam Safety Program to provide for the certification and inspection of certain dams in the state. SCDES does so in the interest of public health, safety, and welfare to reduce the risk of failure of the dams, and to prevent injuries to persons and damage to property.

Dams across South Carolina play key roles as infrastructure: providing water supply to the state's citizens, maintaining a ready supply of water to irrigate agriculture, supporting the state's system of local roads and major highways, and for many people, simply creating a place to enjoy a pleasant vista. The historic rainfall that inundated the state in October 2015 had a devastating impact. The failure of 49 state-regulated dams highlighted the vulnerability of these manmade structures to natural disaster.

Building a Robust Dam Safety Program

SCDES — and its predecessor, the South Carolina Department of Health and Environmental Control (DHEC) — leveraged funding from the South Carolina General Assembly after the 2015 storm, and from others since, to reconstruct a program that had dwindled. At that time, fewer than four full-time equivalent employees (FTEs) were overseeing inspection, permitting, and owner interactions for more than 2,300 state-regulated dams. In the decade since, the state's Dam Safety Program has made strides in key areas, as outlined below.



Increased staffing: The program now has 18 FTEs, nearly half of which operate from one of seven regional offices, performing inspections and working closely with local dam owners.



Inventory management: A one-time statewide assessment of Low Hazard dams (2017) and ongoing evaluations are improving records of condition statuses for a classifications of dams throughout the state.



Owner engagement: With dam owners playing such a critical role in dam safety, several educational resources have been developed, detailing proper operations and maintenance.



Emergency preparedness: Emphasis has been placed on working with dam owners and local officials to develop and share Emergency Action Plans that outline response actions during emergencies.

More Work Ahead

Gaining insight into the condition of state-regulated dams and working collaboratively with the state's dam owners have laid a valuable foundation for responding to the challenges we still face with dam infrastructure, such as the age of dams. Condition and age of dams are key indicators of how susceptible a dam is to fail. Dam Safety Program's engineers assign the condition of dams during routine inspections. The ratings given are based on criteria rooted in national standards. As we will address more thoroughly in *The State of the Dams*, more than 1,000 dams have been rated as "Poor" or "Unsatisfactory" condition, meaning they need repair or removal to address deficiencies that could lead to failure.

Compounding concerns with the condition of many of our state's dams is the fact that an increasing proportion of regulated dams have been reclassified to a level indicative of South Carolina's unprecedented growth and potential for loss of life if the dam were to fail.

Limited funding options are available for dam owners, and dam repair costs are unobtainable for many dam owners. Though the status of federal funds for repair of High Hazard dams under FEMA's High Hazard Potential Dam Grant program are in doubt, the South Carolina General Assembly has provided \$1.5 million for the creation of a cost-sharing grant program to correct dam safety deficiencies identified by SCDES. This grant is only available for High and Significant Hazard Potential dams

Another option dam owners may choose is the decommissioning, or removal, of dams. Decommissioning of dams provides a long-term, financially viable solution to address dam safety concerns when compared to rehabilitation. Not only does removal yield a benefit to public safety by removing an unsafe dam, but it can also serve to restore ecosystems to a natural state, a common practice in conservation and stream mitigation.

State of the Dams

The primary objective of this report is for SCDES to provide readers a detailed picture of the condition, risk, and ownership responsibility of regulated dams in the state. The data included in this report are accurate of this report's printing.

A second objective is to showcase the evolution of the state's dam safety program since 2015 to one focused on empowering dam owners with the knowledge and tools needed to maintain and operate dams in a safe manner. A final object is to summarize critical challenges to dam safety in South Carolina. We should point out that these issues are not unique to South Carolina — aging dams, ownership, and funding for rehabilitation or removal are issues SCDES is engaged with addressing on the national level.

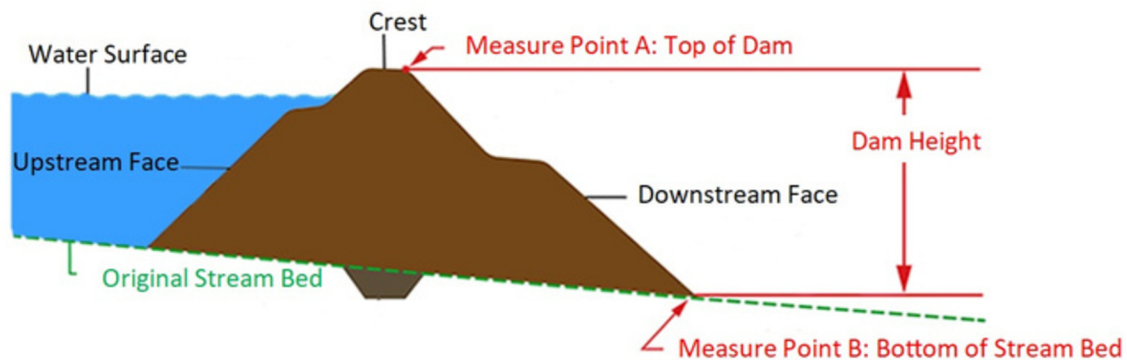
Dams 101:

Dam Safety Basics

As defined in the [S.C. Dams and Reservoirs Safety Act](#), a dam is any artificial barrier — together with its appurtenant works, including (but not limited to) dams, levees, dikes or floodwalls — for the impoundment or diversion of water or other fluids where failure may cause danger to life or property. A dam is subject to the authority of the S.C. Dam & Reservoir Safety Program (the Program), which is implemented by the S.C. Department of Environmental Services (SCDES), when it meets at least one of the following:

- Measures 25 feet or more in height from the invert of the receiving stream or natural ground
- Impounds 50 acre-feet or more of water or other fluid
- Failure of the dam will likely result in loss of human life, regardless of size

Measuring the height of a dam



What is an “acre-foot”?

An acre-foot is a unit of volume. One acre covered in one foot of water = 325,851 gallons, and 50 acre-feet would be equivalent to:

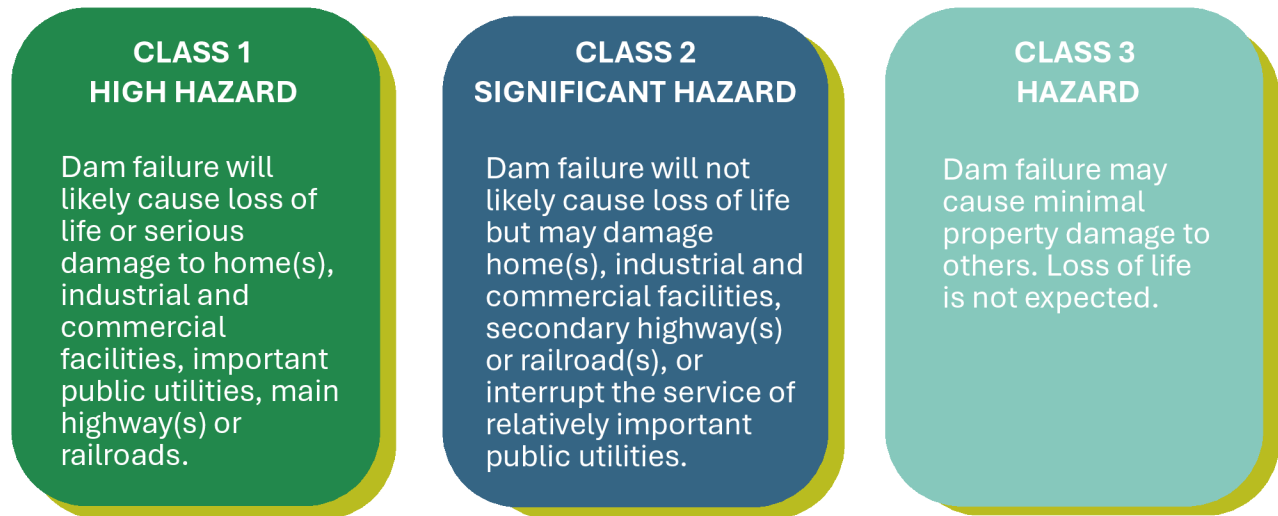
- 2.25 feet of water covering the South Carolina State House grounds
- 26.6 Olympic-sized swimming pools



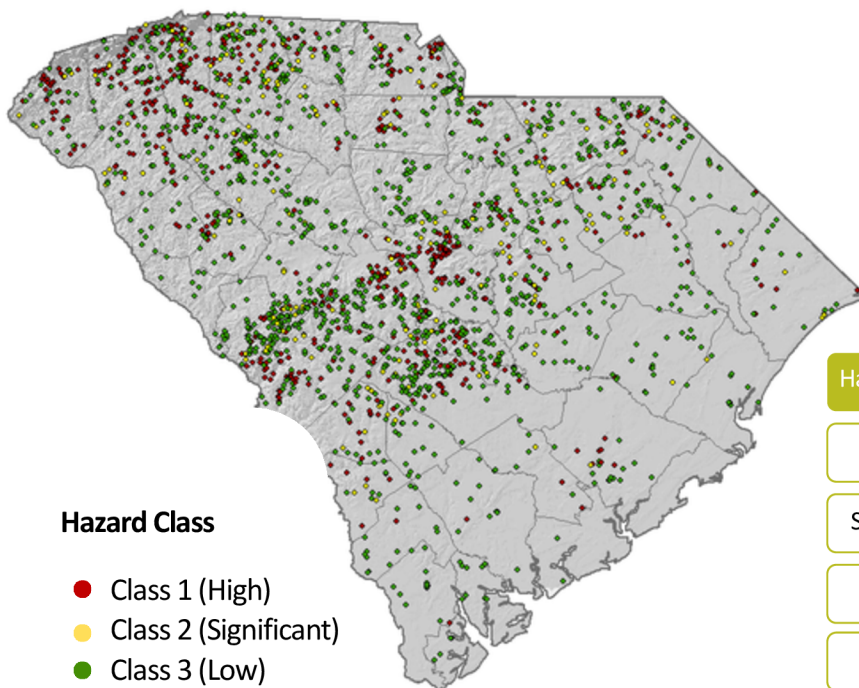
Dams 101: Dam Safety Basics

Hazard Potential Classification of Dams

A dam subject to regulation under South Carolina's Dams and Reservoir Safety Act (the Act) is classified based on its potential for causing loss of life or damage to improved property in the event of the dam's failure or improper operation. Consequences from dam failure that the Program considers and evaluates in assigning a Hazard Potential Classification include potential impacts to homes, businesses, roads, railroads, industrial facilities, and critical utilities (water, sewer, electric, gas). Additionally, 2018 Joint Resolution 231 (S.1190) also impacts hazard classifications of dams.



Regulation 72-2.C. Hazard Potential Classification



Hazard Class	Count	Percentage
High	614	28%
Significant	228	10.6%
Low	1,352	61.6%
Total	2,194	100.0%

As of Jan. 1, 2025

Dams 101: Dam Safety Basics

SCDES Inspections & Condition Ratings

The Program reports the condition of state-regulated dams to the U.S. Army Corps of Engineers' (USACE) National Inventory of Dams (NID). As part of routine inspections, every dam is assigned a condition rating based upon [criteria established by USACE](#)¹. Those standardized condition ratings are:

- **Satisfactory:** No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions in accordance with state engineer's rules and regulations for dams or tolerable risk guidelines.
- **Fair:** No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.
- **Poor:** A dam safety deficiency is recognized for loading conditions, which may realistically occur. Remedial action is necessary. A poor condition is used when uncertainties exist as to critical analysis parameters, which identify a potential dam safety deficiency. Further investigations and studies are necessary.
- **Unsatisfactory:** A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
- **Not Rated:** The dam has not been inspected, is not under state or federal jurisdiction, or has been inspected but, for various reasons, has not been rated.



The Lexington Old Mill Pond Dam, one of the dams to breach during the historic 2015 flood event, held a ribbon cutting ceremony to celebrate the official opening of the 1.15-mile trail that now encircles the pond in September 2024.

¹www.fema.gov/grants/mitigation/learn/dam-safety/national-inventory-dams

Dams 101: Dam Safety Basics

Dams Not Regulated by SCDES

Due to exemptions found in the Act and Regulations, the vast majority of dams in the state are exempt from regulation. These exemptions, found in [Section 49-11-120 of the Act and Section 72-2.D](#) of the Regulations, are as follows:

1. Any dam that meets the following: a) is less than 25-feet in height, b) has less than 50-acre-feet of impounding capacity, and c) failure or improper reservoir operation would not cause loss of life. [\[S.C. Code Ann. § 49-11-120\(4\)\(a\)\]](#)
2. Any dam owned or operated by a department or agency of the federal government. [\[S.C. Code Ann. § 49-11-120\(4\)\(b\)\]](#)
3. Any dam owned or licensed by the Federal Energy Regulatory Commission (FERC), the South Carolina Public Service Authority (Santee-Cooper), the Nuclear Regulatory Commission (NRC), the United States Army Corps of Engineers (USACE), or any other responsible federal licensing agencies considered appropriate by the department. [\[S.C. Code Ann. § 49-11-120\(4\)\(c\)\]](#)
4. Any dam upon which the Department of Transportation (SCDOT) or county or municipal governments have accepted maintenance responsibility for a road or highway where that road or highway is the only danger to life or property with respect to failure of the dam. [\[S.C. Code Ann. § 49-11-120\(4\)\(d\)\]](#)
5. Any dam, which in the judgment of the department, because of its size and location could pose no significant threat of danger to downstream life or property. [\[R.72-2.D.5\]](#)



Lake Murray's Saluda Dam is an example of a dam not regulated by the state Program. It's regulated by the Federal Energy Regulatory Commission. (Photo courtesy of ColaDaily, 2024)

Dam Ownership and the Dams and Reservoirs Safety Act and Regulations

What does the law say?

Dam “owner” means those who own, control, operate, maintain, manage or propose to construct a dam or reservoir. Dams can be co-owned by more than one party, and even by a variety of entities. This can include but is not limited to homeowner associations (HOAs), limited liability companies (LLCs), private trusts, etc. Anyone who owns or is responsible for any piece of property containing a portion of the dam or its appurtenant structures may also be considered a dam owner.

When evaluating ownership, state regulations direct the Program to first investigate those entities who hold title to the property on which the dam is constructed. Regulations also direct the Program to investigate if there are covenants or other legal agreements that have some bearing on the dam’s ownership.

What drives the need for properly identified ownership?

To effectively protect public safety, dam owners need to be clearly identified in SCDES records in order to carry out all programmatic activities.

How does the Program determine dam ownership?

While the Program can’t make formal legal determinations of who owns a piece of property or where boundary lines are, it uses the best available data to determine who meets state criteria to be considered a dam owner. Program staff review the SCDES file for the dam in conjunction with other public records, including county Geographic Information Systems (GIS) maps, property records from county tax and deed offices including deeds, plats, and other agreements, and other relevant sources including SC Secretary of State filings.

Initial ownership determinations are made after internal consultation with dam inspectors, SCDES’s Office of General Counsel as well as enforcement staff.



SCDES must routinely review deeds and plats, such as the one above, in determining ownership of dams, oftentimes going back through property transfers over several decades. (Image courtesy of Richland County Register of Deeds.)

State-Regulated Dams by the Numbers

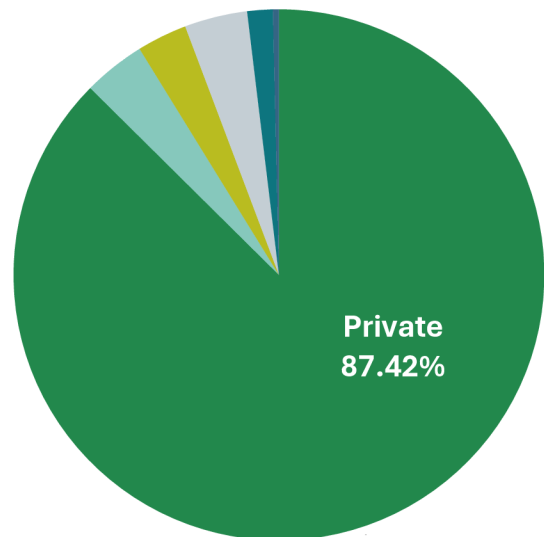
Ownership Type

The following chart displays the breakdown of ownership type for state-regulated dams in South Carolina. Dams can have more than one owner under state definitions. Note that each dam is counted individually and any one dam may be owned by multiple parties of the same type.

Most regulated dams in South Carolina are privately owned (87.42%). Examples of private ownership include but are not limited to individuals, homeowners associations and corporations. The next most common type of dam ownership is government-owned.

Ownership Type Breakdown

- Private: 1,918 (87.42%)
- State: 83 (3.78%)
- Local - Municipal: 67 (3.05%)
- Local - Special purpose district: 84 (3.83%)
- Local - County: 34 (1.55%)
- Joint - State, private, county: 8 (0.36%)

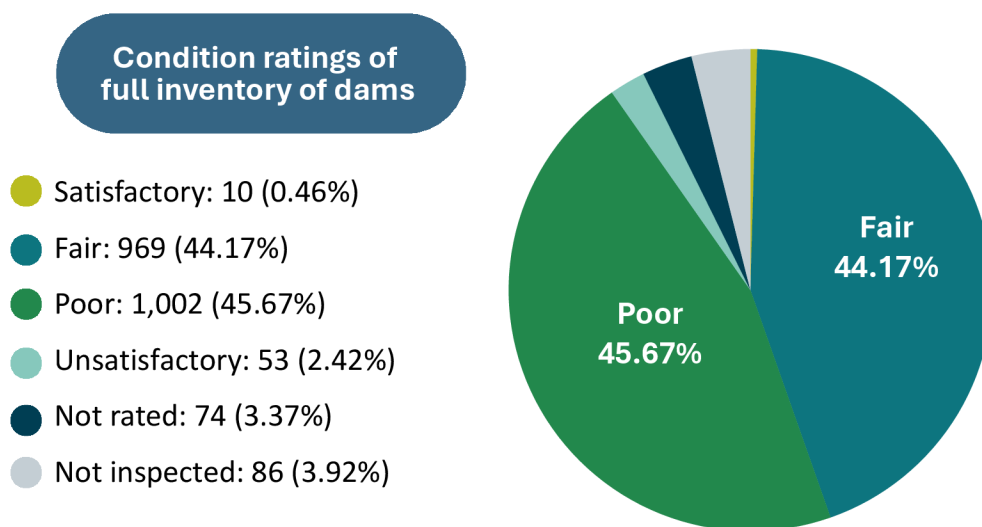


State-Regulated Dams by the Numbers

All Dams Condition Rating

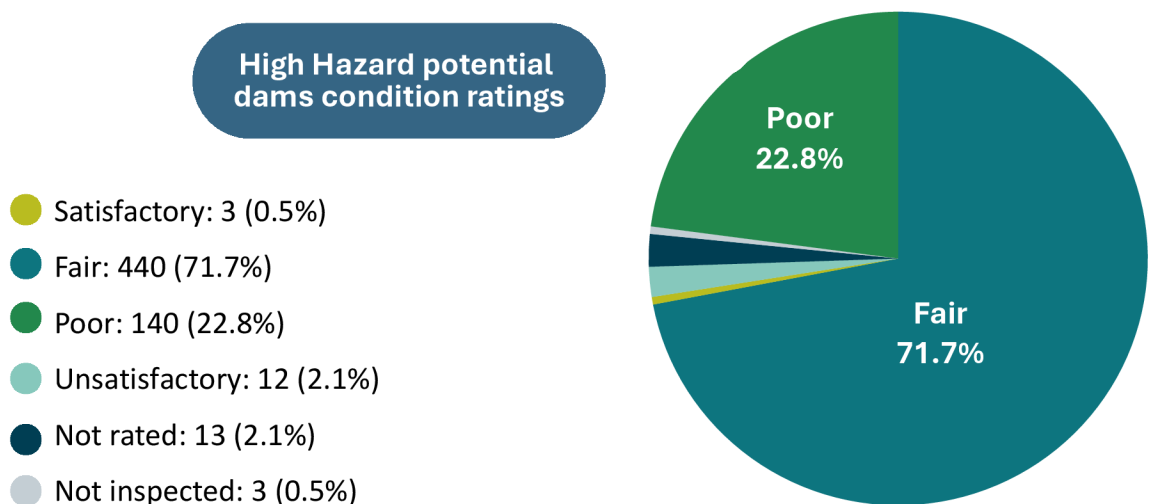
When Program staff perform a preliminary inspection of a regulated dam, the overall condition of the dam is assigned a rating that complies with requirements established by the National Dam Safety Review Board and the U.S. Army Corps of Engineers for the National Inventory of Dams (NID). “Not rated” is applied in situations where a full inspection couldn't be completed due to various factors, such as heavy vegetation, safety issues, breached dams, or inability to gain access to the dam property. “Not Inspected” is applied in situations such as newly constructed dams that aren't yet due for their first preliminary inspection, or Low Hazard dams that don't receive preliminary inspections.

For the full inventory of state-regulated dams, approximately 45% were given a “Satisfactory” or “Fair” rating and approximately 48% were given a “Poor” or “Unsatisfactory” rating.



High Hazard Potential Dams Condition Ratings

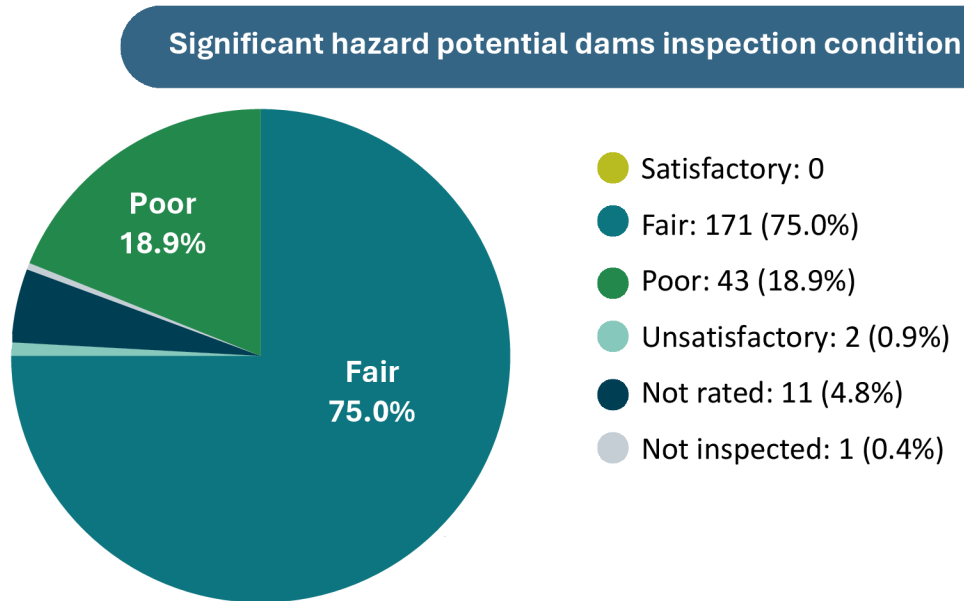
For High Hazard potential dams, a significant percentage (72%) are either in “Satisfactory” or “Fair” condition and a much smaller percentage (25%) are “Poor” or “Unsatisfactory.”



State-Regulated Dams by the Numbers

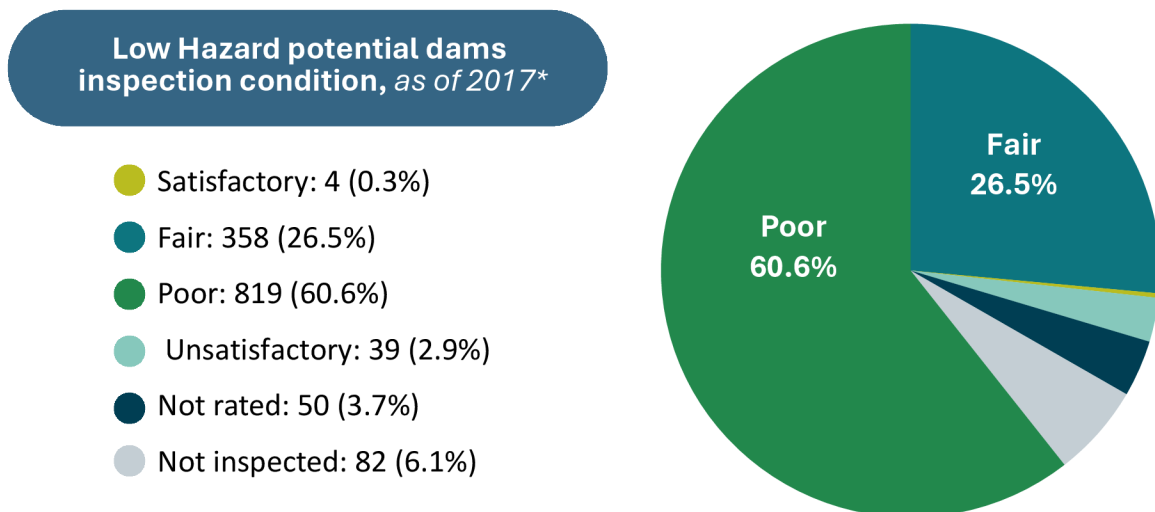
Significant Hazard Potential Dams Condition Ratings

Significant hazard potential dams are in slightly better condition than High hazard potential dams, with just 20% either in “Poor” or “Unsatisfactory” condition and 75% in “Fair” condition.



Low Hazard Potential Dams Condition Ratings

Not surprisingly, a large percentage of Low Hazard potential dams fall into the “Poor” condition category. This is likely because the Program doesn’t routinely inspect Low Hazard dams, and instead only performs a routine “classification inspection” to determine if any changes in the inundation area necessitate a reclassification of the dam to a higher hazard classification.



**These inspections were primarily performed in 2017 as a result of one-time legislative funding.*

State-Regulated Dams by the Numbers

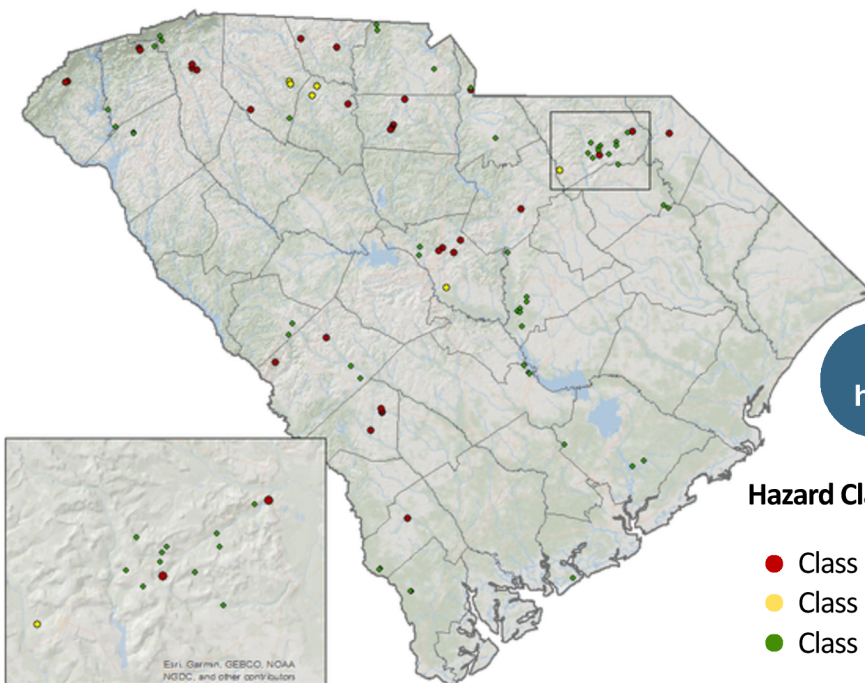
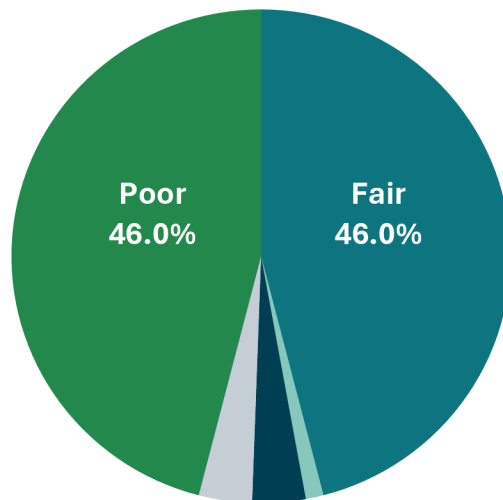
State-owned Dams Condition Ratings

Multiple state government agencies own, operate and maintain dams. These agencies are responsible for the condition of the dams on the state lands they control.

State agencies that own more than one dam are: S.C. State Forestry Commission; S.C. Department of Parks, Recreation, and Tourism; S.C. Department of Natural Resources; Clemson University; S.C. Department of Corrections; and S.C. Department of Disabilities and Special Needs. About 46% of state-owned dams are in “Fair” or “Satisfactory” condition.

State-owned dams inspection condition

- Satisfactory: 0
- Fair: 40 (46.0%)
- Poor: 40 (46.0%)
- Unsatisfactory: 1 (1.1%)
- Not rated: 3 (3.4%)
- Not inspected: 3 (3.4%)



State-owned dams hazard classifications

Hazard Class

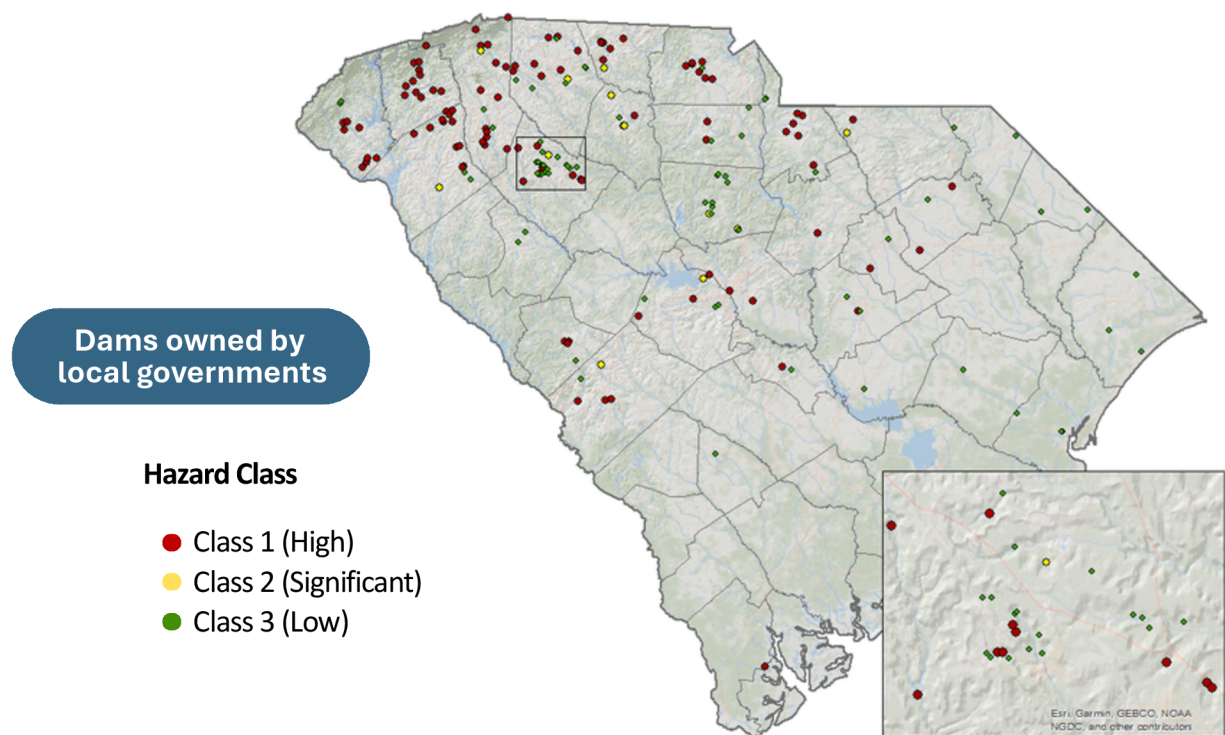
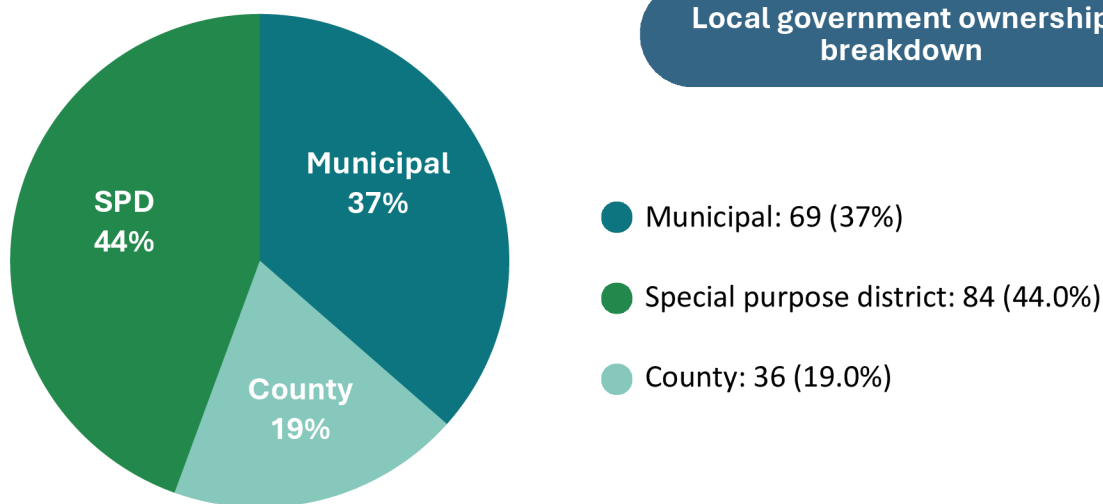
- Class 1 (High)
- Class 2 (Significant)
- Class 3 (Low)

State-Regulated Dams by the Numbers

Local Government Ownership

Municipalities, counties and special purpose districts own a substantial number of regulated dams. Many are used for water supply or as wastewater lagoons, some are found at city or county parks, and a particularly large subset are dams operated by watershed conservation districts that were built by the NRCS under Public Law 566.

The category “municipalities” includes commissions of public works. The category “special purpose districts” includes water and sewer districts, watershed conservation districts, and soil and water conservation districts.



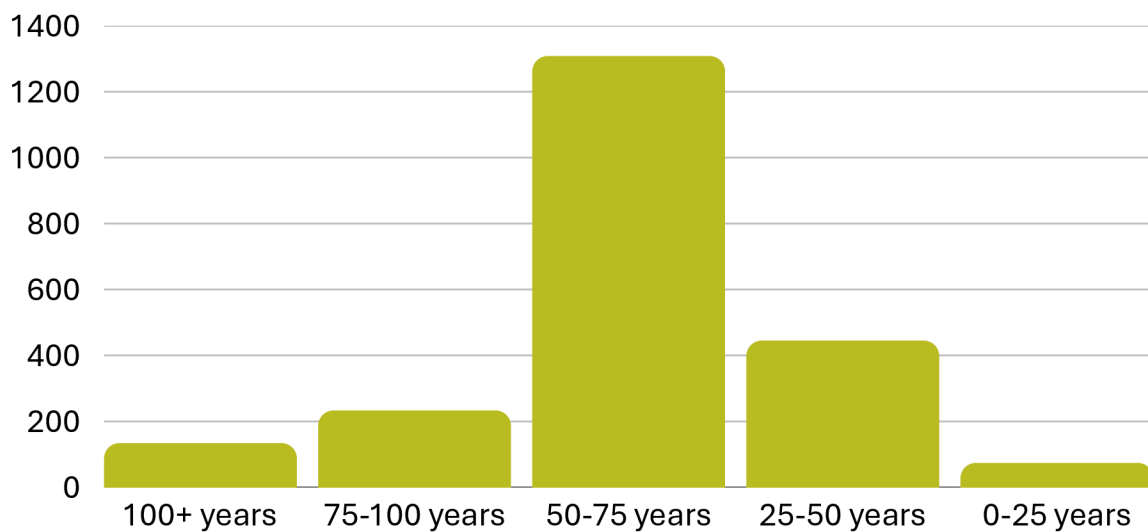
State-Regulated Dams by the Numbers

Age of Dams

Many of the actual construction dates of state-regulated dams are unknown due to the fact that the Act was passed recently (in 1978) relative to the age of many dams. A large percentage (~77%) of the existing inventory of dams were already constructed by the time the general assembly established a regulatory framework for dam safety in the state. Few if any records are available that note when state-regulated dams were constructed prior to 1977.

However, the Program uses historical aerial photography and other records to fill in the blanks of its records and establish estimated construction dates. Even if the precise year of construction is unknown, what is clear is that the majority of the dams in the inventory have exceeded the useful lifetimes for the construction methods and materials of their day. This is a national problem, as the 1950s and 1960s were a heyday for dam construction in this country. Even today, it's rare that a dam is constructed with a design lifespan that exceeds 50 years.

Age of state-regulated dams in S.C.



100+ years: 134 (6%)

75-100 years: 233 (11%)

25-50 years: 445 (20%)

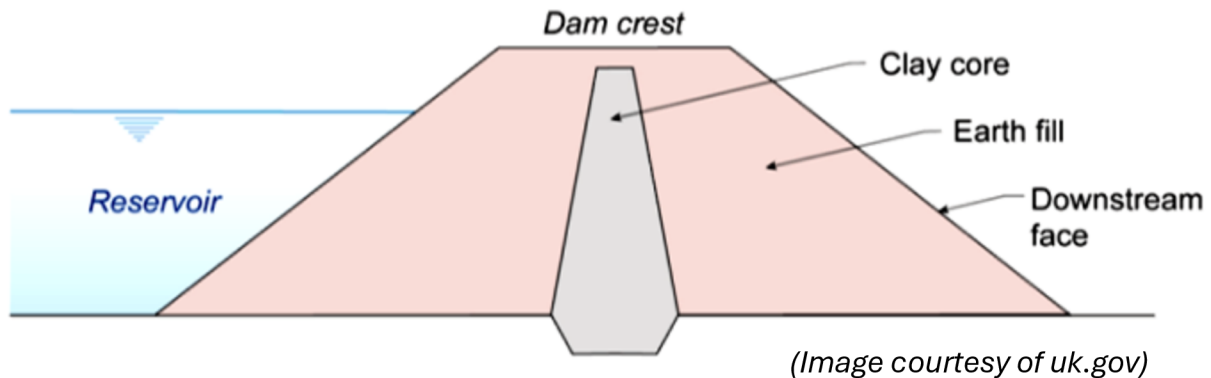
50-75 years: 1,308 (60%)

25 years or less: 74 (3%)

State-Regulated Dams by the Numbers

Average State-regulated Dam in South Carolina

To summarize, the average state-regulated dam in South Carolina is an aging earthen embankment dam under private ownership. More than half of the inventory is comprised of Low Hazard dams, and of those Low Hazard dams, more than half are in “Poor” or “Unsatisfactory” condition.



With South Carolina’s growing population, these Low Hazard dams are prone to “hazard creep” wherein new development within the dam’s potential inundation area downstream of the dam, can result in reclassification as a Significant or High Hazard dam. This reclassification brings new regulatory pressures for owners and often, responsibility for costly repairs.



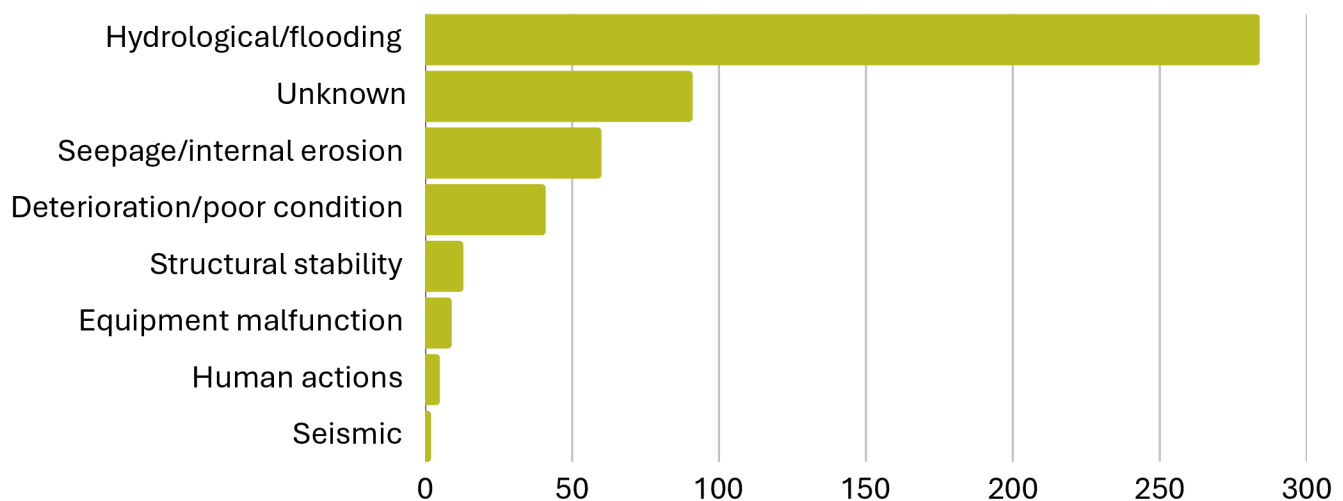
(Image courtesy of the Post & Courier)

A Recent History of the Dam Safety Program

Dams can fail as a result of many causes and by several mechanisms, but hydrologic events (such as flooding) have shown to be the most frequently occurring and damaging of all the threats dams face. Other causes of failure include earthquake, internal erosion, human error, vandalism or terrorism. The chart below provides a breakdown of dam failures in the United States over a 150-year period (1874-2024), and the assumed failure “incident driver.” The “Hydrologic/flooding” incident driver far exceeds any other in this data set.

The pie chart and map on the next page, generated from SCDES data, take a closer look at failures of state-regulated dams in South Carolina over the past 10 years, and the resulting picture is that hydrologic events take on an even larger percentage over the recent past. It’s also worth noting that the 96 dam failures in South Carolina from 2015-2024 account for almost 19% of the nationwide dam failures in the Association of State Dam Safety Officials (ASDSO) database, which covers the past 150 years.

U.S. dam failures by incident driver: 506 incidents between 1874-2024



(Sources: SCDES, 2025; [Association of State Dam Safety Officials, 2024](#))

***A recent history** of the Dam Safety Program*

When extreme rainfall is forecast, the Dam Safety Program relies on its Extreme Rainfall Standard Operating Procedure (SOP) to prepare for and respond to the event. Based on a pre-established threshold for forecast precipitation, Program staff send alerts to potentially affected dam owners as far in advance of the rainfall as time allows. The SOP also calls for pre-storm assessments to be performed at certain dams if time allows.

When the weather event subsides, staff evaluate the rainfall amounts observed near state-regulated dams and send assessment teams to visit the dams that received rainfall amounts exceeding a threshold.

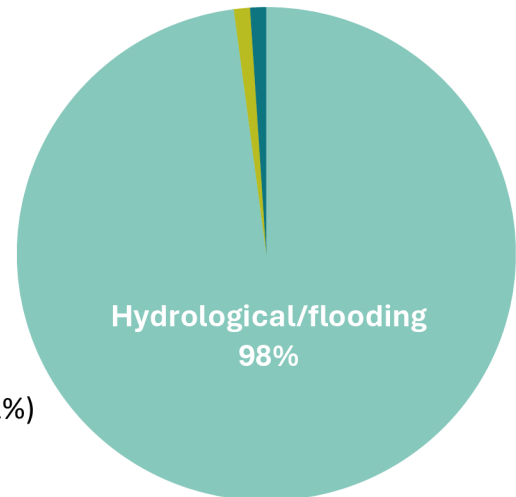
The SOP was created in August 2016 and was first used for Hurricane Matthew. It continues to be used and refined.

S.C. dam failures by incident driver: *96 incidents between 2015-2024*

Hydrological/
flooding: 94 (98%)

Seepage/internal
erosion: 1 (1%)

Deterioration/
poor condition: 1 (1%)



State-regulated dam failures between 2015-2024

Dam Breaches

-
- Other
 - Hurricane Matthew: 2016
 - Hurricane Florence: 2018
 - Hurricane Helene: 2024
 - Nov. 7 rainfall (Orangeburg): 2024
 - Hurricane Joaquin-associated: 2016
 - Hurricane Joaquin-associated 2015/other
 - Hurricane Joaquin-associated 2015/
Hurricane Matthew 2016

Flooding and impacts in recent years

Event name	Rainfall dates	Greatest rain amount during event	Location of greatest rainfall amount	Dams breached (State-reg)	Post-storm assessments performed
Oct. 2015 Historic Floods	Sept. 30-Oct. 7, 2015	27.19"	Charleston	51*	652
T.S. Hermine	Sept. 1-6, 2016	14.17"	Georgetown	0	7
Hurricane Matthew	Oct. 8-10, 2016	17.11"	Dillon	20	474
T.S. Irma	Sept. 10-13, 2017	9.08"	Beaufort	0	53
Hurricane Florence	Sept. 15-18, 2018	23.68"	Horry	11	287
Hurricane Michael	Oct. 9-12, 2018	8.02"	Darlington	0	31
Unnamed event	June 8-10, 2019	10.08"	Lexington	0	0
Hurricane Dorian	Sept. 5-6, 2019	15.43"	Georgetown	0	32
Hurricane Sally	Sept. 17-18, 2020	9.89"	Sumter	0	98
T.S. Eta	Nov. 11-13, 2020	7.50"	Horry	0	12

A Recent History of the Dam Safety Program

Flooding and impacts in recent years, *continued*

Event name	Rainfall dates	Greatest rain amount during event	Location of greatest rainfall amount	Dams breached (State-reg)	Post-storm assessments performed
Unnamed event	July 18-19, 2021	12"	Aiken	0	37
Hurricane Ian	Sept. 30-Oct.1, 2022	10.75"	Charleston	0	3
T.S. Idalia	Aug. 30-31, 2023	13.55"	Orangeburg	0	23
Unnamed event	June 21-23, 2023	11.21"	Lexington	0	12
T.S. Debby	Aug. 6-9, 2024	21.80"	Berkeley	0	255
Tropical Cyclone Helene	Aug. 26-29, 2024	19.69"	Oconee	2	305
Unnamed event	Nov. 7, 2024	12.45"	Orangeburg	10	154
Other/Not storm-related				3	
			TOTALS:	97	2,435

A total of 98 Emergency Orders were issued for the sum of these rain events.

**One federally-regulated dam also breached during the October 2015 historic floods.*

A Recent History of the Dam Safety Program

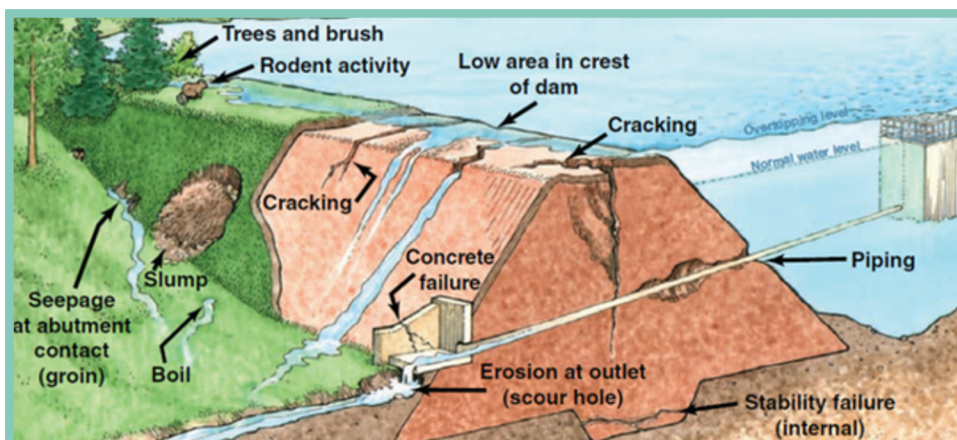
Non-Flood-Related Dam Incidents

Outside of hurricanes and tropical storms, urgent dam safety issues can arise without warning in what the industry refers to “sunny-day” events. Examples of sunny-day events include excessive seepage or a malfunctioning or blocked spillway. Dam Safety Program staff must be ready at any time to respond and assist dam owners if trouble arises and the owner needs help identifying the severity of a situation and evaluating if local emergency response officials should be notified.

Program employees rotate weeklong shifts staffing the 24-hour-a-day Dam Safety Technical Assistance phone line. Since implementing the 24-7 Dam Safety Technical Assistance phone line in 2017, Program staff have responded to 70 reports of incidents with dams, both regulated and unregulated. On-call staff carry an equipment “go-bag”, which includes an agency-issued cell phone and laptop computer in case they must visit a dam and then coordinate urgent information on the dam’s condition.



(Image courtesy of The State newspaper)



(Image courtesy of FEMA)

Owner Outreach & Assistance

The Dam Safety Program has enhanced its outreach efforts to educate dam owners through various initiatives. The primary outreach includes an annual newsletter, first published in August 2017, and a Technical Information Bulletin, which began in June 2020. These materials provide dam owners with essential guidance on dam maintenance and operations. SCDES also offers workshops and online courses, including videos on our YouTube and website.



Additionally, the Program collaborates with numerous state and federal agencies to ensure dam safety. These include Clemson Extension, the SCDOT, SCDNR, NRCS, the National Weather Service (NWS), the US Army Corps of Engineers (USACE), FEMA, SCEMD and the Association of State Dam Safety Officials (ASDSO).

These partnerships help provide regulatory guidance, assist in emergency responses, and offer educational resources. SCDES and Clemson Extension, for example, have worked together to provide a free online training module for educating dam owners for all types of dams that exist in the State, for both the regulated and non-regulated dams.



Top: Dam Safety Program staff discuss plans with owners and engineers. **Bottom:** Program staff perform a tabletop exercise for an Emergency Action Plan.

The Dam Safety Program's resources and collaborations with these agencies, counties and municipalities support the broader goal of ensuring dams are safely constructed, operated and maintained.

Owner Assistance & Outreach

The Dam Safety Program is dedicated to serving South Carolinians by engaging daily with dam owners, residents, emergency management professionals and consulting engineers. The agency's regional dam safety engineers perform routine inspections, provide maintenance and repair advice, and educate dam owners on their responsibilities under the Act and Regulations.

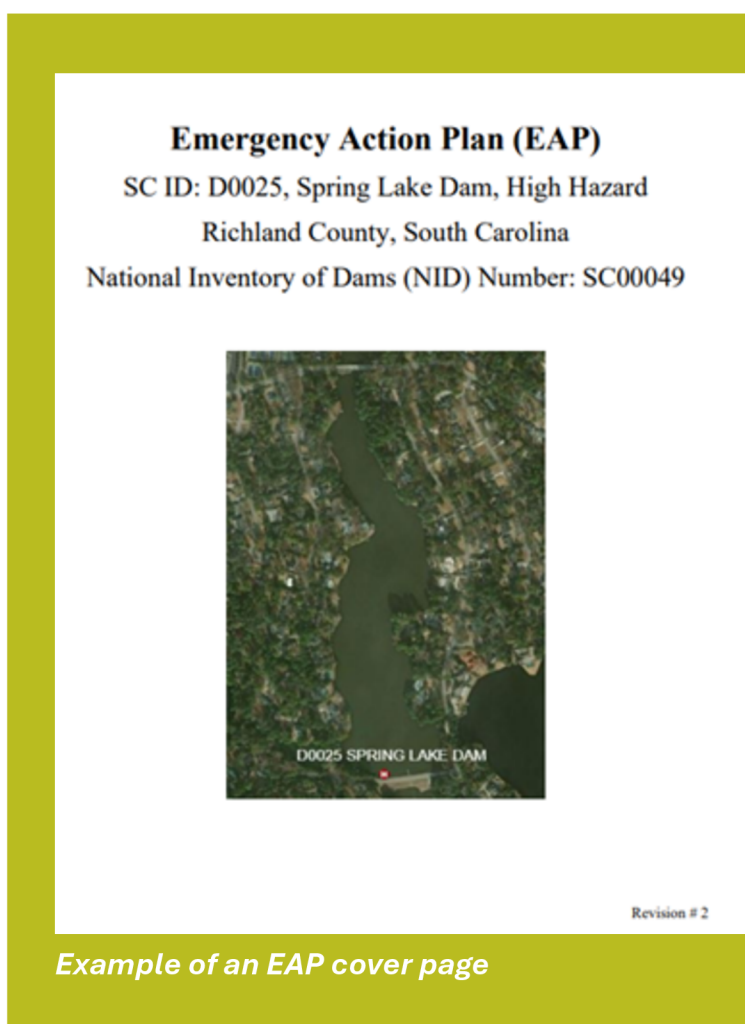
The General Assembly's investment increased funding and allowed the Program to place dedicated staff engineers in regional offices, which has helped foster close, first-name basis relationships with dam owners. As such, the Program has been able to better evaluate the challenges these owners face and provide specific services for their unique situations. One such service provided is drafting of Emergency Action Plans.

An Emergency Action Plan (EAP) is a formal document used to assist dam owners in identifying unusual or emergency conditions at the dam and providing a plan of action should an emergency situation arise.

A current EAP is required for all High and Significant Hazard dams, however, any dam owner can benefit from having one. The document prescribes specific actions that can reduce the potential for downstream loss of life and property damage in the event of a dam failure, and the plans serve as comprehensive guides for potentially hazardous conditions.

Upon request, Program staff draft pre-populated EAPs containing inundation maps, lists of downstream impacts, and call trees for responding to various levels of threat severity. Program staff review EAPs and inundation maps provided by dam owners who take it upon themselves to draft their own. Staff meet with owners to discuss their EAPs at length and also run through these plans via tabletop exercises upon request.

Additionally, Dam Safety Program staff help make sure local emergency management officials throughout the state have access to EAPs within their communities to assist with preparedness and response to incidents of dam failures.



Example of an EAP cover page

Grants & Assistance

Another major challenge dam owners face is acquiring funds for repairs to maintain the safety of their dam. Understanding this difficulty, the Dam Safety Program preemptively reaches out to owners regarding grant funding opportunities and hosts webinars explaining the process. The follow is an overview of grant assistance available.

Federal Grants: Each year, the S.C. Dam Safety Program applies for and receives federal funding in the form of FEMA’s Rehabilitation of High Hazard Potential Dams (HHPD) Grant Program and the National Dam Safety Program (NDSP) State Assistance Grant.

State Grant: A new state-funded Dam Repair Assistance Grant Program first introduced in State Fiscal Year 2025 and continued in State Fiscal Year 2025, this grant offers financial assistance to owners of High and Significant Hazard dams who may not meet the eligibility requirements to receive federal grant funds through HHPD.

FEMA National Dam Safety Program (NDSP) State Assistance Grant: These grants provide financial support for activities that improve the regulation, inspection and overall safety of dams, including (but not limited to) equipment, supplies, contractual engineering services, software purchases, travel and training.

Federal Grant Awards from FFY20-24

Federal Fiscal Year	FEMA NDSP State Assistance Grant	FEMA HHPD Grant
FFY20	\$183,963	\$585,694
FFY21	\$174,986	\$507,208
FFY22	\$325,124	\$1,153,031
FFY23	\$184,317	N/A
FFY24*	\$1,026,372	\$5,853,542

**Two State Assistance grants were awarded in FFY24: this total is the combined amount for both.*

FEMA Rehabilitation of High Hazard Potential Dams (HHPD) Grant:

HHPD funds are awarded to states to be passed through to eligible subrecipients for the repair, rehabilitation, and removal of High Hazard potential dams that fail to meet state dam safety standards and pose an unacceptable risk to life and property. The process: once projects are approved for funding by both SCDES and FEMA, grant awards are executed via subaward agreement to fund pre-construction and construction activities for eligible HHPDs.

Building *Capacity*

Our dedicated team of engineers and support staff work to evaluate the safety and integrity of SCDES-regulated dams by working closely with dam owners and their engineers to comply with regulatory standards. Through inspections, phone consultations, repair plan discussions, and presentations, we provide valuable support and guidance.

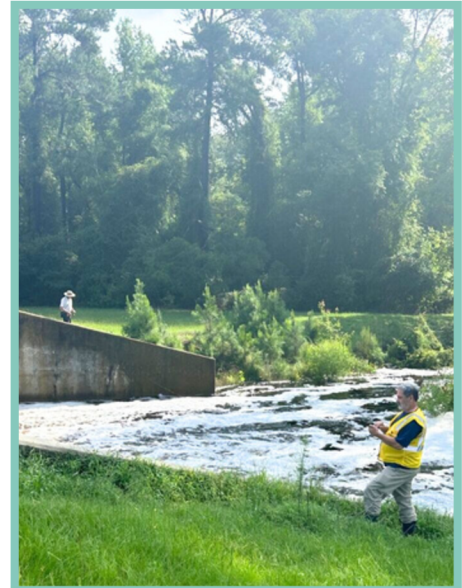
We take pride in helping dam owners understand and implement best practices grounded in science. Our efforts protect lives and properties while promoting sustainable infrastructure and proactive risk management, ensuring South Carolina's dams remain safe, resilient, and environmentally responsible for future generations.

Capacity-building efforts in Dam Safety are led by a full-time manager overseeing daily operations, supported by engineers and staff within the Bureau of Water in Columbia. This team focuses on permitting repairs for regulated dams, developing emergency action plans, and conducting dam inspections.

The other vital half of the Program are the seven regional engineers on the front lines who operate from one of SCDES's offices throughout the state. The focus of the regional dam safety engineers (RDE) is the routine inspection of the roughly 2,200 state-regulated dams. Dam owners have come to rely on the regional engineers as a resource when they have questions regarding the safety or upkeep of their dam.



SCDES Dam Safety Program staff are pictured outside agency headquarters in Columbia.



A regional dam safety engineer performs a routine inspection.

GIS and Web Applications

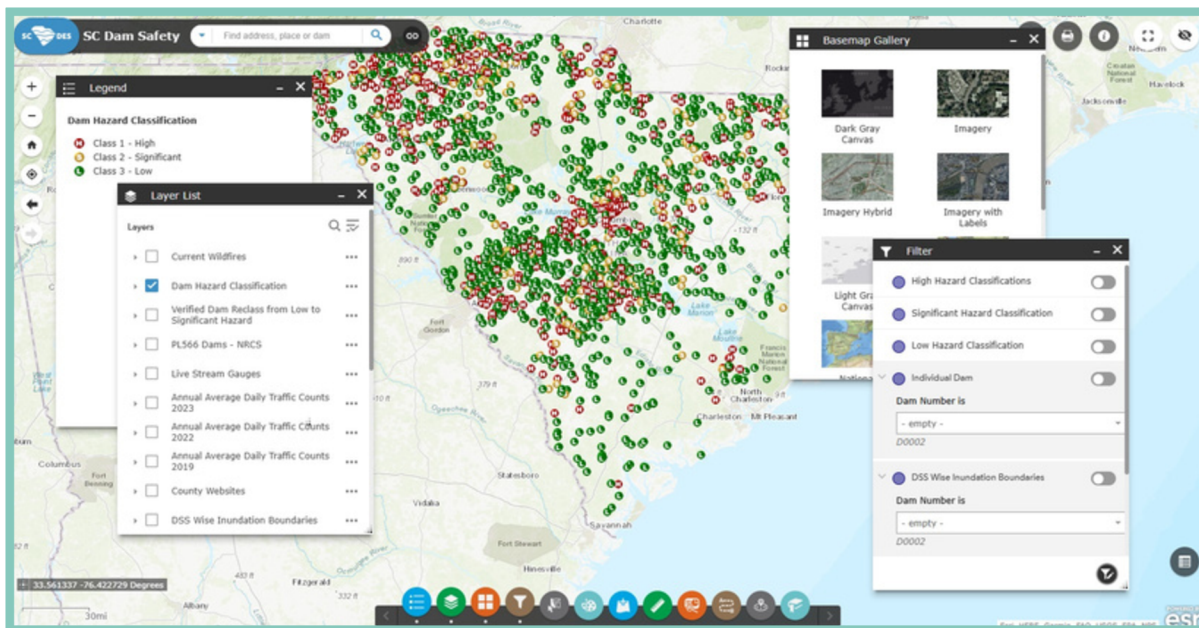
The Dam Safety Program has enhanced its capacity by utilizing Geographical Information Systems (GIS) and publicly available Light Distance and Ranging (LiDAR) technology. GIS allows the program to see and understand geographical data, helping staff make decisions based on updated information. LiDAR provides accurate measurements of elevations, slopes, and areas used to create detailed maps of dams and identify potential areas that would be flooded by failure of a dam.

The program believes it is critical to be transparent in providing dam owners, emergency management officials, and the public with information about the state's regulated dam. A GIS web application was developed in 2017 with information on state-regulated dams such as:

- Location, name of the dam, ID number, and hazard classification
- Dam height, normal and maximum pool areas, and volume
- Dam failure inundation areas, depths of inundation, arrival times of maximum flood depth, and ground elevations. Additionally, it provides parameters extracted from LiDAR, such as dam height, normal and maximum pool areas, and volumes.

Layers from the National Weather Service assist staff and dam owners with anticipating and responding to weather events.

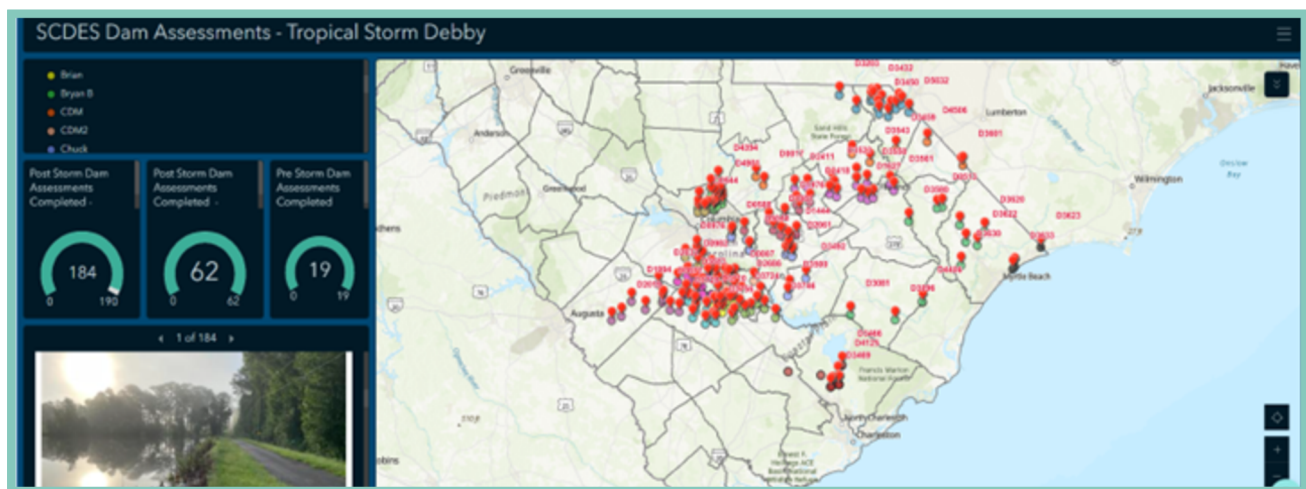
These advancements have significantly improved the program's ability to manage and protect South Carolina's dams.



Dam Safety Program GIS Web App:
<https://gis.des.sc.gov/scdams>

ArcGIS Collector and Field Maps

After a major storm event, SCDES deploys field teams to assess the condition of dams based on such factors as hazard classification, condition, and amount of rainfall the dam received from the storm. ArcGIS Field Maps mobile app by ESRI for every major storm event. This app allows field staff to input dam data on-site and central office staff to view that data in real time. Inspectors can submit observations, pictures, and videos, which central office staff can view through the ArcGIS Online website. This platform shows the progress of field teams towards established goals via a summary “Dashboard” page. The app can be installed on iPhone or Android devices, allowing a large field team to be assembled and deployed rapidly. This capability has been crucial in responding to major flood events throughout South Carolina.



A view of the ArcGis Dashboard from the response to Tropical Storm Debby Response

ReadyOp™ Notifications

ReadyOp™ is a mass notification system SCDES uses to quickly reach dam owners and operators via automated voice calls, text messages, and emails when inclement weather is forecast. The service has been essential in responding to major flood events. Alerts can be targeted at scales of impact depending on forecasts and can be sent on a local, county, regional, or statewide basis. Alerts may also be issued based on prior risk assessments to target dams that present a higher hazard potential or that have known deficiencies increasing their risk of failure. Multiple layered alerts may be issued during a single event to address differing levels of risk.

Leveraging on the increased education and engagement with dam owners over the past 10 years, when road closures from downed trees and power lines following Hurricane Helene prevented field teams from post-storm assessments, Dam Safety staff quickly pivoted to use the ReadyOp™ self-report features to allow owners to report the condition of their dams.

This system has strengthened the program's capacity to ensure dam safety and effective communication during emergencies.

Building Capacity through Technology

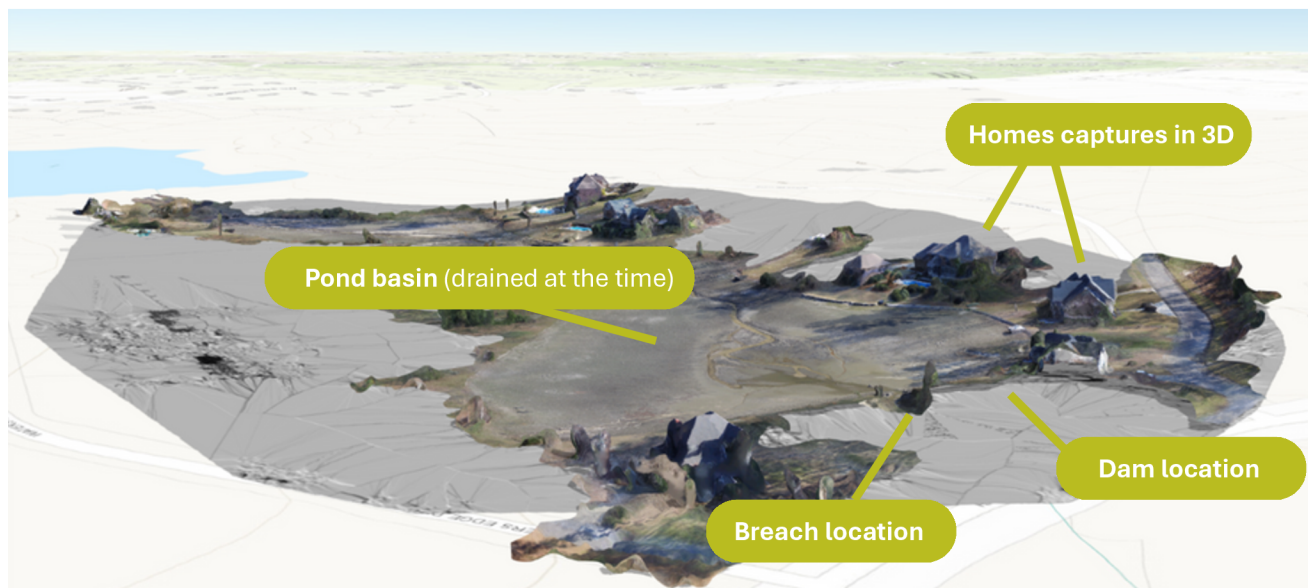
Tools of the Trade

The Dam Safety Program has enhanced its capacity to collect data on dams with the use of modern equipment in the form of drones and bathymetric equipment. Each significantly strengthens the program's ability to ensure the safety and effective management of South Carolina's dams. Use of modern measurement tools has allowed the exemption of around 100 previously regulated dams when program staff determined the dam could hold back 50 acre-feet or more of water.

- **Unmanned Aerial Vehicles (UAV)**, or drones, allow access to areas that are unsafe or difficult to enter, collecting high-resolution pictures and videos, and producing topographic maps and 3-D models of ponds, dams, and surrounding areas.
- **Bathymetry equipment**, including an autonomous boat, create a detailed 3-D models of dam impoundments. These models are essential for determining elevation-storage relationships and maximum impoundment volumes, which are critical inputs for dam breach computer modeling.



The autonomous boat used for performing bathymetric surveys.



Building Capacity through Partnerships

Building Collaborative Partnerships and solving problems through collaborative efforts is one of SCDES core values. Dam Safety exhibits this in their work with various agencies and organizations to ensure dams are constructed correctly, operated safely, and maintained properly. Fostering valuable partnerships help manage emergency situations to protect human life and property and build capacity for our team.

Clemson University Cooperative Extension Service

The Dam Safety Program routinely collaborates with Clemson Extension to educate dam owners and pond managers. Program staff are regularly invited to provide instruction on dam safety as part of Clemson's Master Pond Manager classes. Additionally, the Program is working with Clemson to develop a network of low-cost water level sensors for monitoring reservoir water levels.



University of South Carolina

Dam Safety has held a long and proud partnership with USC to strengthen dam safety and foster innovation. The program has welcomed numerous USC interns, providing them with hands-on experience and valuable opportunities to contribute to our mission.



South Carolina Department of Transportation (SCDOT)

The Program coordinates with the SCDOT in matters concerning roads located on or near dams. This includes emergency closures when a road's integrity be threatened by a distressed dam, coordinating repair efforts with dam owners, and keeping the public advised of dam repair activities as they affect the transportation network.



National Weather Service (NWS)

The NWS provides a vast array of forecasts and weather data relevant to the field of dam safety and is a trusted source of information for Program decision making before and after rainfall events. For example, the Program relies on the NWS' rainfall forecasts to know the appropriate times and locations to send pre-storm alerts of potential adverse weather conditions to regulated dam owners.



South Carolina Emergency Management Division (SCEMD)

Dam Safety Program staff actively engage in exercises and incident responses to ensure SCEMD decision makers have access to the best available information on dam safety issues. They also routinely participate in SCEMD meetings and trainings with County Emergency Managers. Additionally, the Program coordinates with SCEMD on grant management, provides training to their staff, and shares EAP information to enhance overall preparedness and safety.



Building Capacity through Partnerships



US Army Corps of Engineers®

US Army Corps of Engineers (USACE)

The USACE is a key proponent of dam safety, offering extensive tools and resources for dam regulators and owners. Locally, USACE provides staff for emergency assessment and recovery. Our Program coordinates with USACE for dam construction or modifications in areas under its jurisdiction, including navigable waters and Waters of the United States. Our staff participate in USACE's inspections of regulated dams.



Association of State Dam Safety Officials (ASDSO)

ASDSO provides valuable services and training opportunities to state dam safety officials and dam owners, including monthly webinars. Our Dam Safety Program regularly sends staff to ASDSO training courses to stay current on industry trends and developments. In November 2018, the Program hosted an ASDSO Dam Owners Workshop. Our staff has presented at ASDSO conferences, sharing their expertise and insights.



FEMA

Federal Emergency Management Agency

The U.S. Department of Homeland Security and FEMA provide crucial resources, training, and staff to support state dam safety programs, especially during major weather events. They fund Dam Safety staff's participation in ASDSO training, offer grants for dam safety initiatives, and ensure free access to flood modeling software. Program staff have presented multiple times at FEMA's National Dam Safety Program Technical Seminar, sharing expertise and advancements in dam safety. By fostering strong partnerships and leveraging expertise, FEMA and SCDES are committed to enhancing the safety and resiliency of South Carolina's dams.



SCDES Dam Safety staff present with partners from USACE and CDM Smith on the Lake Paul Wallace incident response during FEMA's National Dam Safety Program Technical Seminar in February 2025.

Successes & Challenges

Successes

Establishment of the Dam Safety Emergency Fund

The South Carolina General Assembly's creation of a dedicated fund for the Dam Safety Program to use to deploy contractors to dams during an emergency is a critical new tool for protecting life, property and infrastructure. The Dam Safety Emergency Fund was created by Proviso 34.65 in the State FY 2023-2024 Appropriation Act, which allocated an initial \$250,000.

Proviso 55.21 in State FY 2024-2025 Appropriations Act allocated an additional \$250,000 to the fund with the intent make available \$1,000,000 for dam safety emergencies. The need for such a fund was discussed in the *2020 State of the Dams*. Creation of the fund ensures the Department's statutory obligation under the Dams and Reservoirs Safety Act to step in when an owner is unable or unwilling.



Replacement of Lake Conestee Dam

Through the efforts of state, local and non-profit partners — and with a \$36 million contribution from the General Assembly — a new dam has been constructed downstream of the 130-year-old Lake Conestee Dam, providing a reliable containment structure to keep contaminated sediments locked at the bottom of the reservoir.

This monumental effort protects the Reedy River, Lake Greenwood and the surrounding communities for the foreseeable future. (Photo courtesy of the Lake Conestee Dam Restoration Project)

Successes, *continued*

Resources for Recruitment and Retention of Staff

The Dam Safety Program has been very successful during its rebuilding over the last 10 years in recruiting and retaining dedicated staff, with several having worked with it since the Department's response to the October 2015 historic floods. Notably successful has been the creation and funding of seven dedicated regional staff positions who are solely responsible for inspecting the dams in their regions. This has created continuity and consistency in dam safety inspections and has allowed relationships of familiarity and trust to be built between dam owners and regional inspectors.

Use of Contractors

Having an engineering firm under contract has proved invaluable for staff training and development, for supporting staff reviews of complex permit applications and related submittals, and for providing supplemental staff and expertise in times of emergency. The Program currently contracts with the engineering firm CDM Smith through June 2027.

Challenges

Public Roads on Dams

It's often difficult to clearly establish who is responsible for a dam when a public roadway sits atop it and when it is in a public easement. Easements often obscure the location of property lines and can modify property rights and responsibilities. The South Carolina Dams and Reservoir Safety Act doesn't give authority to SCDES to require a breached dam that supports a roadway to be rebuilt if the dam poses no risk to downstream populations.

In these situations, the property owners have no incentive or obligation to restore the roadway embankment for public benefit, and conversely, the government entity responsible for the roadway has no incentive or obligation to restore the dam to impound a pond or lake for private benefit. It has been the department's experience that the presence of a public roadway on a damaged or breached dam often results in years of delay before the road is restored. Often, this is achieved by the dam owner agreeing to permanently abandon the impoundment and allowing the government entity responsible for the roadway to install a bridge or culverts.

Dam Ownership

One of the most challenging tasks faced by the Dam Safety Program continues to be determining who owns and is responsible for the upkeep of a dam. Over time, as property is sold and resold, parcel lines are drawn through the middle of dams, along the crest line, around outlet structures, etc. SCDES must perform exhaustive research of titles, plats, deeds and other records, often through multiple ownership changes dating back decades. Easements and rights-of-way on dams further complicate these situations. At times it's only through the court system that the responsible parties can be identified, delaying the department's ability to have the owner make dams safe.

Challenges, continued

Age of Dams

Dams, like roads, buildings, and bridges, are man-made structures which have finite lifespans. Deferring or ignoring maintenance during the dam's lifetime reduces the useful life further. The average age of regulated dams in South Carolina is just over 65 years, with at least 50 dams constructed prior to 1900 and still in service. As dams age, the need for repair and rehabilitation only increases, and the scope of those repairs grows more costly, while at the same time the dams become more susceptible to failure.

Of note, is increased instances of sinkholes in the dam along the of spillway outlet pipe, evidence the pipe is deteriorating and eroding the dam from the inside. Spillways components, critical the safe functioning of a dam, have finite lifespans:

- Galvanized steel components are not expected to last more than 50 years
- Earthen embankments can be damaged by animal burrows and tree roots
- Concrete chutes develop cracks allowing water to infiltrate and undermine the soil beneath
- Gate valves cease to function

As the decades go by, these problems arise and accumulate at an almost exponential rate. As South Carolina's dams age, the cost to repair them will go up, too.



An SCDES dam inspector assesses a High Hazard dam built by the Civilian Conservation Corps in the 1930s.

Challenges, continued

Ambiguity of the 2018 Joint Resolution

In 2018, the South Carolina General Assembly passed a [Joint Resolution](#)¹ directing the Department to “focus the resources of the department’s Dams and Reservoirs Safety Program on regulating high and significant hazard dams only” and mandates SCDES “[only] reclassify dams when the failure or improper operation of a dam will likely result in loss of human life.”

The Joint Resolution indicates “the catastrophic weather events occurring in 2015 and 2016 resulted in great damage to numerous South Carolina dams” and the Department “should focus [its] limited resources on high and significant hazard dams.” The Department believes the situation has improved dramatically, thus the Joint Resolution has fulfilled its purpose and is no longer needed.

Expense of Repairing Dams

Repairs can range from several thousand dollars for tree removal to millions of dollars for the comprehensive rehabilitation of a dam. Owners bear the entire burden of these repairs. Even a dam owner that wants to remove a dam is faced with a project that can easily exceed \$100,000 and require multiple federal, state and local permits and approvals.

The high cost of the construction, repair and removal of dams varies and can have several factors, including:

- **Engineering services:** All new dam construction projects, and most repairs, are not limited to a single engineering discipline. Multiple engineers or engineering firms typically must be involved, as do surveyors.
- **Construction costs:** Typically, the largest cost comes from the need to hire one or more contractors for different aspects of the project. Dam repair and construction can require large quantities of earth to be moved, sometimes having to be trucked to the site. For High Hazard dams, the materials and workers needed to build spillways of adequate capacity easily drives these projects into the million-dollar-plus range.



Dam repair work can come at a large cost, depending on the dam and the scope of the repair work needed.

¹ www.scstatehouse.gov/sess122_2017-2018/bills/1190.htm

Challenges, continued

A Growing State

From 2022-2023, [Census](#)¹ data shows South Carolina grew per capita by 1.7%, an addition of 90,600 residents, making it the fastest-growing state by per capita in the country. With more people comes the need for more homes and infrastructure. The term “hazard creep” is used to refer to instances where a dam’s hazard potential classification must be increased based on new construction and development in the breach inundation area.

Since 2015, the number of state-regulated dams classified as High Hazard potential has quadrupled. This means, SCDES must perform more frequent inspections on a larger percentage of the state-regulated dam safety inventory. To protect life and property from dam failure risk increased dialogue must happen with local planning officials, developers, dam owners, and others. SCDES must maintain the people and tools to routinely monitor areas downstream of dams for new hazards and have the statutory and regulatory support to add new dams to the state’s inventory and to reclassify existing ones.



This imagery in Greenville illustrates “hazard creep,” where new housing developments – as seen when comparing the above image (2005) with the bottom image (2025) – can lead to a dam’s reclassification. Houses have been built within the dam breach inundation area (shaded area).

¹ <https://rfa.sc.gov/data-research/population-demographics/census-state-data-center/estimates-projections-dashboard>

Looking Back *to Look Forward*

This 2025 *State of the Dams* report is published to coincide with the 10-year anniversary of the 2015 rain event that changed parts of South Carolina forever. This historic occurrence was the result of a unique weather system that brought 25 inches of rain to parts of the state.

As we've noted in this report, the 2015 historic rain event — while devastating — wasn't an isolated threat to dams. Between that event and others since, 97 state-regulated dams have breached. The images below show the Etheridge Millpond Dam in Orangeburg County that breached from torrential rainfall on Nov. 7, 2024, leaving a major local highway closed.



South Carolina's dams are aging, just like dams across the nation. With age comes increased repair cost — a challenge many of the state's dam owners aren't capable of bearing. Combined with factors such as roadways on dams and a rapidly growing state, keeping dams safe and improving the condition of unsafe dams has become more critical than ever.

Challenges in dam safety continue



Roads
on dams



Growing
population



Expense of
repairing dams



Aging
dams



Identifying
dam ownership



Ambiguity
of the Joint
Resolution

Looking Back to Look Forward

SCDES can confidently say that the state's Dam Safety Program is in a more supported and capable position than it was 10 years ago. Funding from the State Legislature, increased program staffing, focused engagement with dam owners, increased collaboration with partners, and investment in new technologies have been implemented and have been successful in enhancing the Dam Safety Program's capacity.

We look forward to building upon the improvements made over the past 10 years to help South Carolina's dam owners have the tools and resources they need to maintain safe, resilient dam infrastructure.

For the latest updates and information about South Carolina's Dam Safety Program, visit des.sc.gov/dams.

Additional resources are provided by the Association of State Dam Safety Officials (damsafety.org) and the U.S. Army Corps of Engineers' National Inventory of Dams (nid.sec.usace.army.mil).



The Lake Conestee Dam Restoration Project was completed in fall 2025, achieving a historic milestone that put an end to potential risks posed by the original 130-year-old dam. *(Courtesy of the Lake Conestee Dam Restoration Project)*

2025 State of the Dams



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