New York State of Dams

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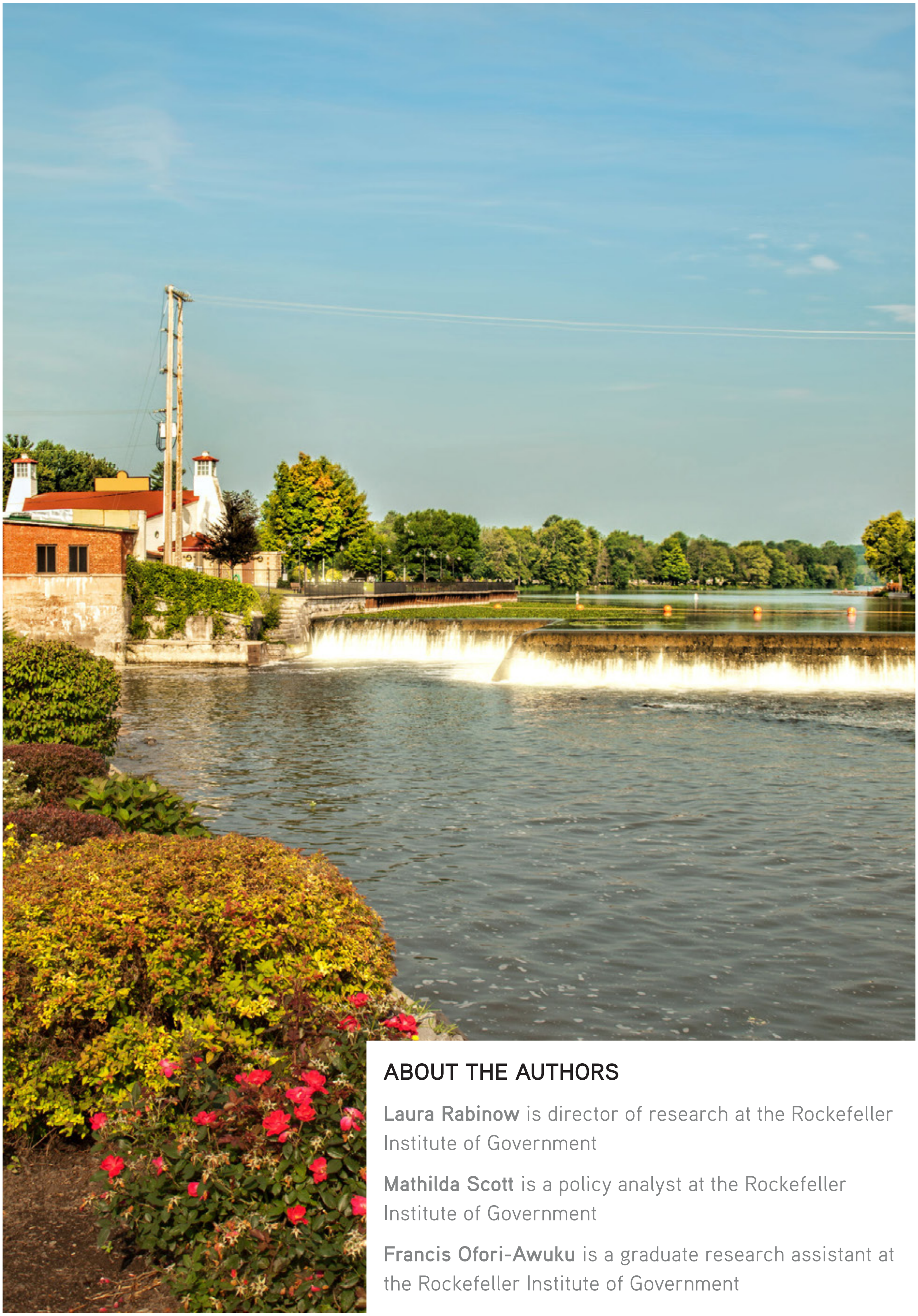

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Executive Summary

New York State faces challenges with its aging dam infrastructure. Dams in the state are an average of 87-years-old, over 20 years older than the national average, and a growing number of dams in New York are classified as high hazard or in poor condition. Climate change and increasingly extreme weather events have intensified both the safety risks of aging dams and the urgency of addressing dam infrastructure.

While there has been growing consensus on, and funding to address, the risks and impacts of dam infrastructure, challenges remain—particularly when it comes to removing dams. Recent research has further reflected important shifts in how dam removal, modifications, and decisions around them are being made. These shifts include greater attention to ecological restoration as a driver for dam removals and modifications (or retrofitting). They also demonstrate that most dam removals in the Northeast are being conducted on small dams (under five meters) and at much lower relative costs. These shifts suggest there are significant potential opportunities for expanding cost-effective river ecosystem restoration efforts in New York, particularly as the state has approximately 6,000 dams, with the average height of a dam in the state being just under 15 feet.

Given the human safety, economic, and ecological factors, it may not be surprising that dam removal or decommissioning rates have been on the rise, and that many owners of dams have sought to decommission, modify, or divest from them. It may also not be surprising that New York has taken steps over the last 25 years to clarify and improve its regulatory oversight, and that both the state and federal government have committed funding towards dam repair, modification, and removal in recent years.

While there has been growing consensus on and funding to address the risks and impacts of dam infrastructure, there have also been challenges—particularly when it comes to decommissioning or removing dams.

This report examines the history and current landscape of dams in New York and the current state of removal and modification policies through stakeholder interviews in order to identify opportunities for further improvement.

Between late summer and early fall 2025, we conducted semi-structured interviews with dam owners, engineers, nonprofit staff, and regulatory staff engaged in dam removal and modification projects across New York and in other states. These conversations revealed systematic challenges and opportunities to improve dam removal and modification policy and practice in New York.

1. **Personnel Capacity**

   While state agency staff in New York currently perform key roles related to dam removals, establishing a dedicated and centralized team of staff working on dam removals could increase project coordination, institutional knowledge, and process consistency statewide. States with dedicated teams of agency staff members working on dam removal, such as Massachusetts, have reported a higher rate of completed dam removal and modification projects compared to New York.

2. **Removals and Ecological Benefits**

   Current regulatory frameworks inadequately account for the ecological benefits of dam removal and the environmental harms of leaving dams in place. Many of New York's bedrock dam regulations predate the broader integration of ecological restoration approaches, such that permitting frameworks often focus primarily on preventing construction-related harm and do not weigh or balance considerations about the restoration benefits of a project. The state therein considers removals as one option for addressing cases of dam safety, but does not prioritize it. Other states, however, that prioritize or more actively promote dam removals and modification as part of ecological restoration efforts, have consequently seen a greater rate of sites addressed.

3. **Project Management and the Role of Nonprofits**

   Individual and small-organization dam owners described project management as an overwhelming "second job" requiring coordination across multiple agencies, navigating funding sources, and multiyear timelines. Nonprofit organizations play indispensable roles in the current system as educators and advocates for dam removals, connectors between owners and technical/funding resources, providers of project management services, and sources of ecological and regulatory expertise. However, given current resources and technical capacity, nonprofits have to make choices between projects, leaving some owners without sufficient support and resulting in further project challenges and missed opportunities for restoration efforts. Additionally, dam owners consistently operate with incomplete information about the actual project duration (projects take far longer than initially expected), available funding sources and typical cost ranges, and all the agencies and offices that will need to be involved. This lack of comprehensive education from the outset means that critical decisions are often made without full understanding.

4. **Interagency and Intergovernmental Coordination**

   Dam owners seeking to remove their structures must navigate multiple agencies at the federal, state, and local levels, including DEC, State Historical Preservation Office (SHIPO), US Army Corps of Engineers, and local governments, sometimes with conflicting requirements and little coordination. Late-involvement of additional agencies or offices can also require additional costly design changes and project delays. Stakeholder experiences reflected that existing pre-application conferences fail to consistently produce meaningful alignment, leaving owners to coordinate across offices and processes themselves, and sometimes learning of additional requirements well into the design phase that could have been addressed earlier.

5. **Historical Preservation**

   Stakeholders noted that, in their experience, dam removal projects face challenges with respect to historic preservation requirements that are sometimes in tension with ecological restoration efforts. Some of them further noted that while preservation can bring cultural benefits, it was not considered alongside or balanced with respect to the benefits of ecological restoration. Stakeholders also repeatedly contextualized dam sites in longer ecological and cultural timeframes. They raised that while some dams are on the order of 100-years-old, Indigenous communities have existed in New York for thousands of years and some river systems have existed for hundreds of thousands if not millions of years and do not always receive the same consideration in existing processes.

6. **Funding Accessibility and Timing**

   As noted with respect to broader project management challenges, dam owners face barriers to funding—including complex and unfamiliar application processes, requirements for upfront costs before grants are awarded, and timing mismatches between funding availability and project timelines (that sometimes, if not often, shift). Consequently, many small entities and individual owners lack the capacity to navigate many of these funding complexities and may be deterred from removal projects, experiencing high unexpected costs and creeping timelines.

7. **Sediment Testing and Management**

   Sediment management consistently emerged as a challenge during dam removal projects. Dams trap sediment that rivers transport naturally. During dam removal projects, there are concerns about releasing potentially contaminated or polluted sediment downstream, and these concerns, understandably, inform regulatory approaches in both policy and practice. Stakeholders, however, reported a lack of clear standardized guidance around testing and management and regulatory uncertainty, even in cases with relatively low related risk that increased project timelines, costs, and complicated the forward movement of projects.

8. **Community Engagement**

   Community responses significantly influence project outcomes in stakeholder experiences. They noted that nonprofits and other stakeholders may not prioritize, choose to pursue, or continue involvement with projects based on the tenor of community response. Communities, understandably, often have strong attachments to ponds and lakes created by dams, valuing them for recreation and aesthetics, and sometimes economic benefits. These features are also often perceived as "natural" features, even though they are human-made. Additionally, construction impacts such as noise, road closures, and increased turbidity can inform community concerns, as can fear of the unknown post-removal, despite ecological benefits and potential new recreation, aesthetic, or economic benefits. Particularly, if there is not sufficient community engagement to set expectations, outline benefits, and create meaningful avenues for continued communication.

Recommendations

1. **Create a Dedicated Ecological Restoration and Dam Team**

   Establish a centralized team focused on dams and ecological restoration. This team should provide coordination, maintain institutional knowledge, and support regional offices so that processes remain consistent across regions.

2. **Prioritize Dam Removal and Further Integrate Ecological Benefits in Regulatory Frameworks**

   Establish removals as a priority, as some other states have done, based on widely recognized research demonstrating ecological benefits. The ecological benefits of projects should be further integrated into the permitting process to recognize that dam removals and modifications are ecologically restorative.

3. **Streamline and Clarify Certain Regulatory Process**

   Enhance pre-application coordination to better align multiple agencies and offices at the beginning of the dam removal process. Complete and publish sediment assessment flow charts that are already being developed by staff at the Department of Environmental Conservation. In addition, establish general permits for qualifying dam removal projects to reduce timelines and complexity in cases with lower risks involved in removal processes, and create comprehensive "road maps" or decision trees outlining the entire process of removal or modification for dam owners.

4. **Expand Project Management Support**

   Increase funding and resources for nonprofits and other entities to expand project management capacity for owners. Make project management costs eligible for grant funding and expand technical assistance to help dam owners navigate this complex process.

5. **Improve Funding Accessibility**

   Making upfront engineering and planning costs eligible for grant funding opportunities could expand access for individual and small-entity dam owners. Additionally, reducing or eliminating the matching requirement of some grants under certain conditions could alleviate the burden on small or individual dam owners. Further, providing administrative and technical assistance for applicants unfamiliar with state funding processes could also improve accessibility. And, last but not least, shifting funding timelines to better align with typical project timelines could better ensure project completion without added administrative or financial burden.

6. **Enhance Dam Owner and Community Education**

   Develop comprehensive resources explaining the removal processes, typical timelines, potential funding sources, and regulatory requirements to provide clear expectations. Supporting existing nonprofit efforts pertaining to community education about ecological benefits, river restoration, and post-removal landscapes could help increase broader knowledge and address concerns.

New York State's dam removal and modification processes face a number of challenges to better realize the benefits of ecological restoration alongside ensuring public safety, but there are tangible opportunities to make meaningful changes in the near to mid-term, some of which are already beginning to be implemented.

The benefits of ecological restoration can—if further integrated, centralized, aligned, and prioritized in current regulatory processes and public engagement efforts—help the state achieve greater rates of removals and modifications. These potential changes, along with investments in technical capacity and adjustments to existing funding resources, help New York achieve greater restoration and connectivity across our waterways.

Introduction

Legacy dam and reservoir infrastructure is not unique to New York State. However, dams within New York have a much higher average age, according to the National Inventory of Dams, at 87 years old, than the national average of 64 years old.[1] The number of dams classified as high hazard and significant hazard, which pose more substantial impacts if they were to fail, and those that are assessed as being in poorer condition, has generally continued to grow both in New York and across the United States. This has occurred as dam and reservoir infrastructure has continued to age, and as a consequence of long-term patterns of economic and community development that have occurred alongside and downstream of this aging infrastructure.[2] These risks have only been compounded by climate change and the associated projections of increased extreme weather events,[3] and in addition to the underlying ecological impacts that dams and reservoirs can themselves cause.[4] There are a number of dams for which there is a lack of important hazard classification and condition assessment data, or other regulatory information.

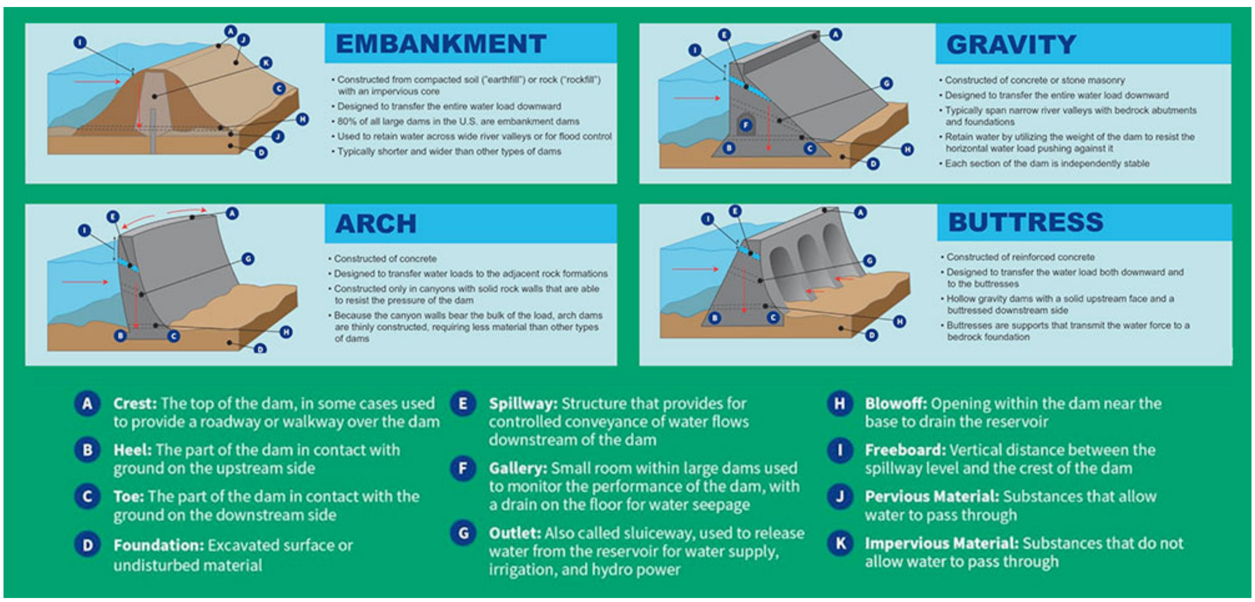
Given these human safety, economic, and ecological factors, it may not be surprising that dam removal or decommissioning rates have been on the rise,[5] and that many owners of dams have sought to decommission, modify, or divest of them. It may also not be surprising that New York has taken steps over the last 25 years to clarify and improve its regulatory oversight, and that both the state and federal government have committed funding towards dam repair, modification (or retrofitting), and removal in recent years. While there has been growing consensus on, and funding to, address the risks and impacts of dam infrastructure, there are also significant challenges—particularly when it comes to decommissioning or removing dams. Though some high-risk dams and their associated reservoirs are legacy dams that no longer serve their original intended purpose, they may be of local significance with respect to recreation, tourism, real estate, and other socioeconomic or aesthetic values and purposes. As a result, residents of communities around these reservoirs sometimes prefer to maintain or modify that legacy infrastructure and the functions they now serve.[6] However, in some contexts the risks and benefits posed to either maintain or deconstruct a dam may not be evenly or equitably distributed across a local community or communities up and down stream. Given the different perspectives towards and potential experiences of the risks and benefits of dam and reservoir decommissioning or modification, regulatory and public policy decision-making surrounding those processes is often challenging. Likewise, the efficient and effective allocation and prioritization of related public resources is also challenged by that context.

This report outlines the history of dams in New York and across the United States, related state policy developments, and recent funding concerning dams and dam decommissioning, modification, or divestment. In addition, the report draws on 15 semi-structured interviews conducted with dam owners, stakeholders, nonprofit staff, engineers, and regulators to identify challenges and opportunities in New York State's dam removal processes.

History of Dams in the United States and New York

In the American geographical imagination, dams loom large. We tend to think of them as giants, totalizing forms built across a midwestern and western landscape. They are seen as everything from icons of human engineering and technological power, to symbols of colonial settlement of indigenous land, to the domination of natural environments, and the growth of industry and economic power. Much of that imagination is tied to a history of large-scale federal infrastructure projects, and often more specifically rooted in the "Big Dam Era" of the mid-20th century, also referred to as the "golden age of dam building,"[7] when projects like the Hoover Dam were built. And while New York's geographies and residents have been integral to that history, it is a much longer and broader and sometimes smaller scale one than our collective imagination might suggest.

FIGURE 1 | Types of Dams



SOURCE: "Explaining the 'Dam' Family" Building Specifier, January 9, 2024, https://buildingspecifier.com/explaining-the-dam-family/.

Over the last few centuries, several types of dams have been built in New York and across the country that differ in materials, construction style, scale, and purpose—though there are a few more common types of dams. The most common type of dam is an embankment dam—these are commonly used to hold water in a reservoir and are constructed from compacted soil and/or rock. Masonry dams, another common type of dam, are, as their name reflects, composed of stone, concrete blocks, and/or bricks.[8] The broader construction of both embankment[9] and masonry[10] dams dates back several millennia, while masonry dams found in the US today were mainly constructed before the mid-20th century. Concrete dams, on the other hand, are relatively "newer." Though there are early examples of concrete dams during the Roman Empire, they disappeared and reemerged in 1872 with the construction of the Boyds Corner dam in Kent, New York.[11] Concrete may be used for different types of dam designs, including: gravity, buttress, and arch dams (see image). Concrete dams are also used to create water reservoirs, may be reinforced, and are used to build large dams for hydroelectric power generation.

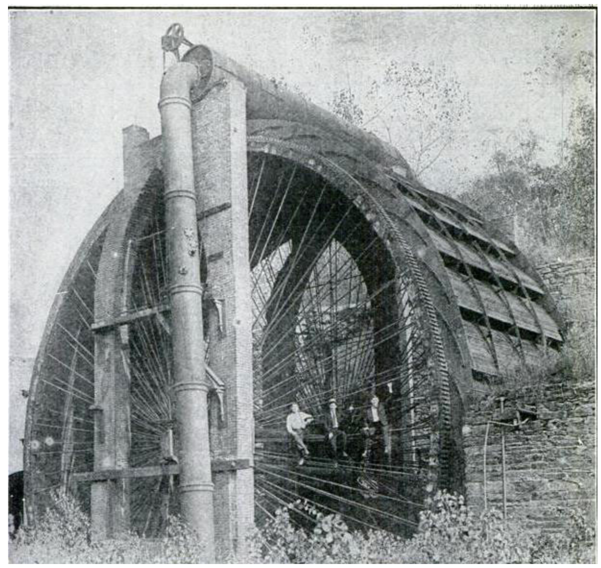
Boyd Corners Reservoir," NYC Environmental Protection, https://www.nyc.gov/site/dep/water/boyds-corner-reservoir.page.

Dams were first constructed by colonists in the 17th and 18th centuries across New York and New England to harness hydropower for thousands of small-scale mills alongside streams and brooks. These included grist mills for food, fulling mills for cloth, and sawmills for lumber.[12] Consequently, it may be unsurprising that New York's dams (along with some of its neighboring Northeastern states) are "significantly older than those across the rest of the United States."[13] This kind and scale of infrastructure is exemplified by the Stony Brook Grist Mill, built in 1698 on Long Island, and others like it (see image). Through the 19th century, these smaller mills—and some increasingly larger ones—grew into the tens of thousands. During the first half of the century, there was more significant private investment in canals and dams, as the Industrial Revolution developed and investors established corporations to control and harness the power of waterways.

This industrial development included the construction of the Burden Water Wheel and the damming of the Wynants Kill in Troy, New York, creating Burden Pond. In the early 1830s, five smaller wheels on the Kill powered the Troy Iron and Nail Factory (later known as the "Upper Works" of The Burden Iron Works).[14] But in 1836 those were replaced by a single larger wheel, and in 1851 that was replaced by an even larger wheel—one

"Stony Brook Grist Mill, West Brewster MA," Wikipedia, https://commons.wikimedia.org/wiki/File:Stony_Brook_Grist_Mill,_West_Brewster_MA.jpg.

that was 62 feet in diameter, 22 feet in width, and estimated to have produced approximately 1,200 horsepower. That wheel, which served as the inspiration for the first Ferris Wheel, was dismantled by the late 1890s,[15] but it more broadly reflected the growing use and increasing magnitude of dam systems and infrastructure during the 19th century.



"Burden Iron Works," Wikipedia, https://en.wikipedia.org/wiki/Burden_Iron_Works.

Federal policy also began to address waterways with respect to use for irrigation, land ownership, and navigation, and began to carve out a role for government in related projects and their funding during the 19th century. In 1802, President Jefferson signed the Military Peace Establishment Act, authorizing him to found the US Army Corps of Engineers as a permanent branch of the military and stationing the Corps at the US Military Academy at West Point in the Hudson Valley of New York. And in 1808, the Secretary of the Treasury Albert Gallatin then submitted a report calling for federal funding to build a broader system of roads and canals to link the Atlantic to interior lands.[16]

While the Corps was initially focused on fortification or military construction, public officials also saw the Corps role as constructing civil or public works projects. This was particularly the case following the Supreme Court's decision in *Gibbons v. Ogden*, which established federal authority over interstate commerce in 1824 and the subsequent passage of the General Survey Act[17]—through which the Corps was authorized to conduct surveys of military or commercial routes of national importance, including canals—as well as further legislation appropriating funds for navigation on the Ohio and Mississippi Rivers. The Corps would come to play a key role in federal dam policy and in the survey and building of many dams across the US (along with the Bureau of Reclamation, established a hundred years later).

During this time, there was also increasing interest in public funding for canals, "open-channel" improvements, and navigation of waterways, including larger rivers. This was seen as a way of improving transportation and increasing commerce, particularly as the use of steamboats steadily rose. At the national level, this included investments through federal rivers and harbors legislation. These acts generally funded improvements to get rid of snags (or large wood debris) that caused steamboat losses, and deepen channels by building wing dikes (also called spur dikes) that extended from one side of a river to narrow the flow of water and increase the velocity and depth of a channel.

At the state level, public interest in these kinds of improvements was most notably reflected in the building of the Erie Canal (1817–25) in New York State and its system of locks and dams to move boats and their cargo 363 miles from Albany all the way to the Great Lakes in Buffalo.[18] Meanwhile, by the 1830s, New York City's water supply was also facing multiple challenges. The existing supply, the Reservoir of Manhattan Water Works, built by the Manhattan Company in 1798 to hold 550,000 gallons, was proving inadequate. Large fires, including one destroying 700 buildings, and a cholera epidemic pointed towards the need for a more robust supply, and led to the survey of potential upstate reservoirs.

"Fifth Avenue looking south with Croton Reservoir on right, copy 1," New York Public Library Digital Collection, https://digitalcollections.nypl.org/items/79906380-c5b5-012f-175e-58d385a7bc34?canvasIndex=0.

Consequently, between 1837 and 1842, the first such reservoir was built—the 400-acre Old Croton Reservoir and Dam.[19] The first Old Croton Distributing Reservoir (or Murray Hill Reservoir) was located at the current address of the New York City Public Library's Main Branch,[20] and was followed by a second large reservoir in Central Park in 1862, which is no longer operational.[21] This, too, proved insufficient, however, as the city's population rose from a few hundred thousand to over a few million between 1842 and the 1890s as the city expanded and incorporated more boroughs. Much of what makes up today's New York City watershed, its reservoir, and aqueduct system was built later in the 20th century, between 1907 and 1967.[22] Compared to its earlier iteration, the present system is orders of magnitude larger with a total storage capacity of roughly 550 billion gallons across 19 reservoirs.[23]

Following the Civil War (1861-65), Congress passed numerous rivers and harbors bills, including significant related appropriations. This legislation included the 1866 Rivers and Harbors Act, which resulted in new leadership (first under William Milnor Roberts and then Colonel William Merrill) to oversee work on the Ohio River. Under this new leadership, the Davis Island Lock and Dam was built on the Ohio River in Pittsburgh, Pennsylvania, from 1878 to 1885. In addition to being the first movable dam built in the country, the dam (at 1,223 feet long) and lock (at 110 by 600 feet long) were the largest in the world at the time. This "opened a new era in the improvement and navigation of the western rivers" in the US, as many new areas were surveyed.[24] This notably included those by John Wesley Powell in his 1878 Report on the Lands of the Arid Region of the United States, which contributed to the founding of the United States Geological Survey the following year.[25]

Anglo-American settlements were already remaking western landscapes by that time, diverting streams to irrigate crops in places like Utah's Salt Lake Valley, Central Arizona, and the San Joaquin Valley of California. The 1862 Homestead Act, building upon earlier policies and efforts, more significantly incentivized and propelled westward settlement by providing those with US citizenship 160 acres in exchange for five years of residence on it before receiving the title for a nominal fee.[26] But by the 1880s, it was becoming clearer that continued development and expansion, particularly in more arid regions, would require larger dams that states, banks, and private industry were not willing or able to fund by themselves. In addition, in 1878, the first hydroelectric dam was completed in Northumberland, England, foretelling a new era in dam history. Just a few years later, in 1882, the first hydroelectric dam in North America began operating in Appleton, Wisconsin, using Thomas Edison's newly developed electrical generators. In the next few years, dozens more plants like it were announced, and by the early 20th century, hydroelectric power constituted a significant portion of the energy sector in the US.

Included in the nation's hydropower development at that time was Niagara Falls, New York. The power of the falls had been harnessed far earlier using other technologies, beginning in 1759 when Daniel Joncairs implemented a water wheel on the American side of the falls. But in 1882, a smaller generator was installed by the Bush Electric Light Company, powered by the water turbines of Jacob Friedrich Schoellkopf, which had enough capacity to power streetlights in Niagara Falls but had limited range. Then, in 1895, Nikola Tesla and George Westinghouse engineered and built the first large-scale alternating current (A.C.) hydroelectric power plant in the world at Niagara Falls, one that could transmit electricity over much longer distances.[27]

Shortly after the turn of the 20th century, in 1902, an early iteration of the Bureau of Reclamation was established with the support of President Theodore Roosevelt.[28] At the time, the term reclamation was used to refer to irrigation and related projects, as "irrigation would 'reclaim' or 'subjugate' arid lands for human use."[29] Although the Bureau is today the largest producer of hydropower in the US, it went through what it has referred to as a "learning period" during the early 20th century before being renamed and somewhat reshaped in the 1920s. Nonetheless, by 1920, hydropower made up approximately 40 percent of the nation's power supply.[30] Congress also passed the Federal Power Act[31] that year, which established the Federal Power Commission (FPC) and governed the wholesale transmission and sale of electric power, as well as the regulation of hydroelectric power (some powers of which were later transferred to the Federal Energy Regulatory Commission in 1977).[32]

These and other technical advances, as well as the increased demands for irrigation and power (particularly in the West), established federal regulatory infrastructure and interstate compacts. Combined with the impetus of the Great Depression for public works-jobs programs, this confluence ushered in a new Big Dam Era—primarily from the 1930s through the 1960s. Many hydroelectric projects of that time were financed based on their ability to recover costs through the sale of the power produced, though initial timelines proved too short. These projects, however, found markets as wartime manufacturing continued the increased demand for power in the 1940s.

Perhaps more than most, the Hoover Dam and Lake Mead have come to epitomize this era of dams. Initially proposed in 1921, the Hoover Dam was built between 1930 and 1936,[33] following the ratification of the Colorado River Compact by six of seven Colorado River Basin states and the enactment of the Boulder Canyon Project Act in 1929, authorizing $165 million for its construction. The dam is 726 feet high and 1,244 feet wide,[34] while Lake Mead stands behind it, covering over 158,000 acres or

248 square miles—the nation's largest human-made reservoir.[35]

"A 1941 photograph of Ansel Adams of the then Boulder Dam," Wikipedia, https://commons.wikimedia.org/wiki/File:Photograph_Looking_Down_the_Colorado_River_Toward_the_Boulder_Dam,_1941_-_NARA_-_519846.tif?page=1.

While some ecological provisions were included in certain policies and projects of this era, it was not until the ensuing decades that landmark federal environmental laws and regulatory systems were implemented. Consequently, it is generally only since the 1970s and 80s that such concerns have been integrated into regulations related to siting and impact assessment, licensing, maintenance, and enforcement. Key among those policy changes with respect to dams was the National Dam Inspection Act of 1972, in which Congress first authorized the US Army Corps of Engineers to inventory dams in the United States.[36] The National Inventory of Dams (NID) was first published in 1975 and was more recently reauthorized as part of the Water Resources Reform and Development Act of 2018. The NID's current data[37] is discussed below in the section on dam characterization. In addition to the NID, the Electric Consumers Protection Act (ECPA) was passed in 1986 (which amended the 1920 Federal Power Act (FPA)).[38] The ECPA newly required that when licensing power projects, the Federal Energy Regulatory Commission (FERC) must balance the existing consideration of energy production potential with non-power considerations—including the preservation of environmental quality, the enhancement of fish and wildlife, and the provision of recreational opportunities. Further policy changes, particularly at the state level in New York, have also taken place in recent decades regarding the regulation of dams, although those state regulatory developments have tended to focus more (though certainly not entirely) on issues of safety. Those changes will be more fully discussed in a later section.

Impacts and Benefits of Dams, Their Maintenance, Removal, and Modification

Ecological Impacts

Although dams can have many social and economic impacts, and decisions around them may be dominantly framed in terms of safety or risk, stakeholders and experts also often advocate for dam removal or modification because of a dam's detrimental ecological impacts. Dams can act individually and collectively to impact river ecosystems negatively. Dams influence the natural flow of streams and rivers and affect the flow pattern of receiving rivers and other bodies of water across the watershed.[39] Dams also significantly alter sediment flow by trapping sediment that would naturally travel downstream. When rivers flow freely, they carry sediment that replenishes downstream ecosystems, creating fertile soil, nourishing wetlands, and maintaining the natural shape of riverbeds and deltas. Dams act as a barrier to that, however, causing sediment to accumulate in reservoirs instead of being distributed along a river's waterway.[40]

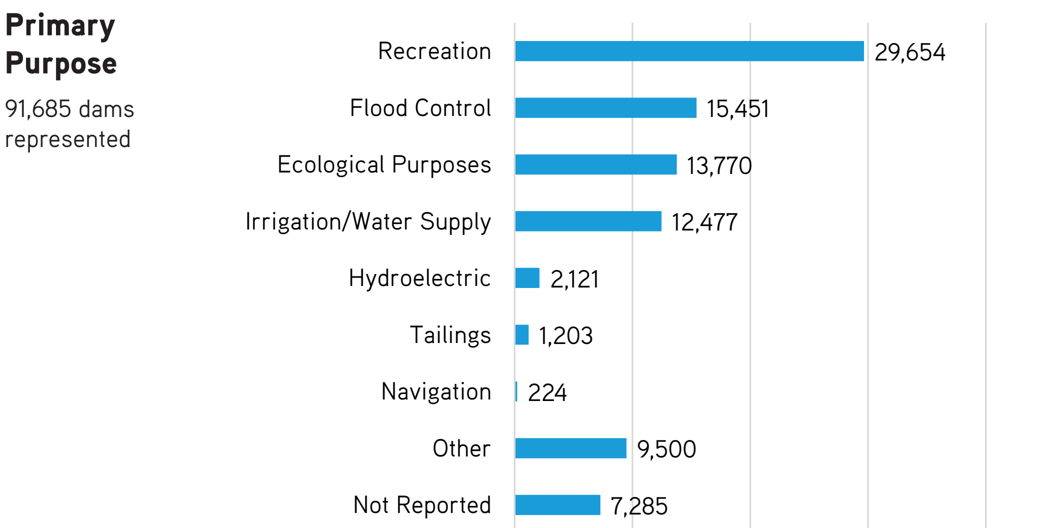
Dams can also increase water temperature and lower water oxygen levels. The damming process disrupts the natural water flow and creates stagnant conditions that decrease the mixing of oxygen into the water and can also provide conditions for the formation of harmful algal blooms (HABs). Dams can also cause water to stratify, meaning it forms layers with different temperatures. The warmer, less dense water closer to the surface holds more oxygen, while the cooler, denser water near the bottom holds much less. Without mixing between these layers, oxygen levels in the deeper parts of the reservoir can become dangerously low, creating hypoxic (low oxygen) or even anoxic (no oxygen) conditions and making it hard for aquatic life to survive. These negative effects do not remain isolated to the dammed area; scientists have observed increased water temperature and lower oxygen levels downstream and throughout the larger watershed that dams are in, making it more difficult for that area to support biodiversity.[41]

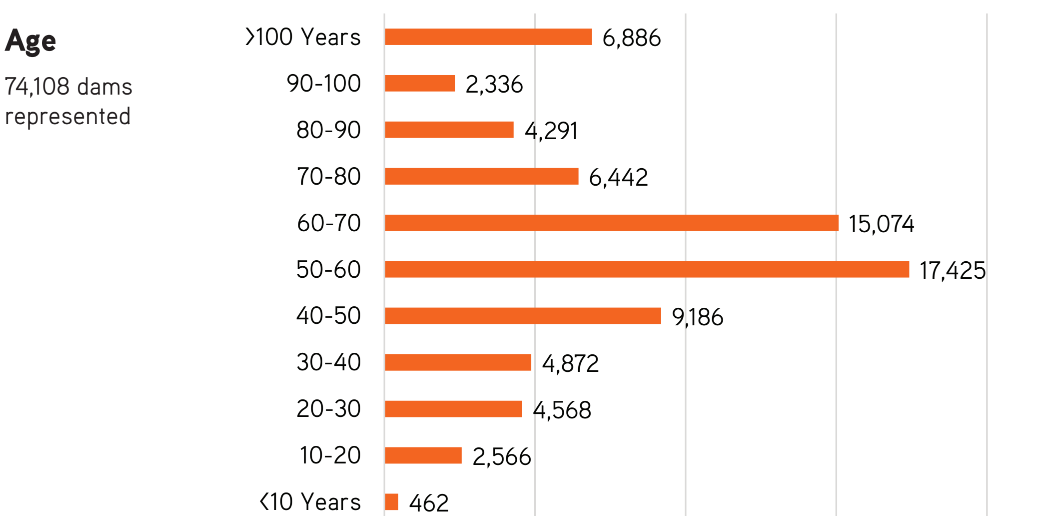
Dams are also especially harmful for both upstream and downstream migratory and resident fish and other species that require access to many different ecosystems across their life cycle.[42] Encounters with hydraulic turbines used in hydroelectricity and floodgates can be fatal for many fish.[43] But even very small dams can prevent migration and impede the lifecycle of key species.[44] In New York, this includes impeding the migration of river herring,[45] salmon, American shad,[46] and American eels,[47] which have been important both ecologically and economically in the state's history.[48] Dams can also restrict habitat access to resident fish, including salient fish species in New York, like the Brook trout, among others.

It is important to note that not every dam has an equal impact on the environment; rather, impacts vary considerably with dam type, size, waterbody, and surrounding ecosystem. And though dams present several ecological challenges, they play complex roles in ecosystems and can sometimes offer environmental benefits. Thus, while dams may hinder a river's natural ability to handle flooding,[49] some dams, particularly those built for irrigation or flood control, can mitigate flooding, creating or maintaining wetlands in downstream areas by controlling water flow.[50] Nationally, flood control is the second most common primary purpose of dams (see Figure 2). According to New York State's

Department of Environmental Conservation (DEC), there are 156 dams in the state with the primary purpose of irrigation and 320 dams whose primary purpose is flood control. Additionally, some well-maintained dams can help prevent catastrophic flooding that would otherwise harm communities, damage built infrastructure, and hurt downstream habitats and species—though this is not most dams, and that capacity comes with certain trade-offs, including potentially lengthening the flooding event.[51] Thus, despite these benefits, dams generally pose significant negative ecological impacts.

FIGURE 2 | National Dam Statistics





SOURCE: "Congressional Research Service (CRS) with National Inventory of Dams data, updated January 18, 2023.

Dam Benefits, Maintenance, and Risks

Dams in New York State and across the country can provide significant economic benefits, particularly through the generation of hydroelectric power. In 2022, 21 percent of the state's total power generation was from hydropower.[52] New York is the third-largest producer of hydroelectric power, following Washington and Oregon.[53] A large share of this hydropower comes from the Robert Moses Niagara power plant, which is the third-largest conventional power plant in the country and is comprised of 12 pump turbines and 1,900-acres of storage reservoir.[54] This renewable energy source plays a vital role in reducing dependence on fossil fuels and lowering energy costs for residents and businesses across the state.

Additionally, dams serve as an important economic engine for New York. Through the New York Power Authority's (NYPA) low-cost economic development programs, the hydroelectric power generated by dams supports more than 400,000 jobs.[55] These jobs span various sectors, including manufacturing, technology, and services. The reservoirs created by dams in New York and across the nation also promote local economies through recreation and tourism. Nationally, recreation is the largest primary purpose of dams,[56] while in New York, there are 2,962 dams whose main purpose is recreation.[57] Boating, fishing, and swimming can attract visitors, boosting local tourism and generating revenue for nearby communities. Hospitality services, such as hotels, restaurants, and outdoor equipment rentals, benefit from increased tourism, creating jobs and stimulating economic activity in rural and small-town areas. Importantly, dams and reservoirs in New York also play a vital role in providing potable water to residents, particularly in more urban areas. New York City, for example, relies on 19 such reservoirs[58] to supply its drinking and other potable water for the roughly 8.5 million people who live there (nearly half the state's population).[59]

Maintaining dams, however, involves a comprehensive range of activities and costs to ensure their structural integrity, operational efficiency, and compliance with safety regulations. For example, the DEC currently recommends that dam owners inspect their dams at least once every three months and after significant storm events such as earthquakes or floods.[60] Necessary maintenance includes concrete and masonry repairs, fixing cracks, erosion, or other damage to the dam structure to maintain its integrity. Erosion prevention and repairs usually involve reinforcing embankments and shorelines to prevent degradation caused by water flow or weather conditions.[61] Additionally, to address seepage (leaks that all dams experience), dam owners must monitor and repair problematic leaks and maintain drainage systems.[62] Dam owners must also manage sediment, including dredging—or removing accumulated sediment in the reservoir—to maintain water storage capacity and ensure proper dam function.[63] These maintenance activities are crucial for prolonging the lifespan of dams, ensuring their safety, and minimizing risks to downstream communities and ecosystems. Neglecting regular maintenance can lead to more significant and expensive repairs over time, emphasizing the importance of ongoing investment in dam infrastructure. A 2018 report by the New York State Comptroller estimated that municipalities face approximately $360 million in expenses to repair locally owned dams classified as high- or intermediate-hazard.[64]

Degrading conditions of dams, particularly in conjunction with unmaintained dams and extreme weather events, can pose a serious risk to property and even risk to life. According to the Association of Dam Safety Officials, "no one knows precisely how many dam failures have occurred in the US, but they have been documented in every state."[65] The Association notes, for example, that there were 173 dam failures and 587 incidents documented between January 2005 and June 2013 across the US. Such incidents refer to "episodes that, without intervention, would likely have resulted in dam failure."[66] Thankfully, the loss of life to date due to these events has been relatively few and not recent. Since 1897, there have been 15 reported deaths from dam failures across New York State. All of these deaths occurred before the 1980's.[67]

However, climate change and increasing storm frequency, intensity, and unpredictability can impact both the further degradation of a dam's condition and its likelihood of failure. For example, during the summer of 2024, after powerful storms passed through Long Island, two dams in Stony Brook and Smithtown failed, leading to historic flooding.[68] Adding to these impacts is the fact that many homeowners do not have flood insurance (just 4 percent nationally[69]) and that the Federal Emergency Management Agency (FEMA) flood maps have not been consistently updated to help assess where such risks are more likely.[70]

Dam Removal and Modification

There have been 2,000 recorded dam removals in the US since 1912.[71] Of these, 49 have been recorded in New York State (see Table 1), with roughly 80 percent of those occurring since 2010, just after new related state policies were implemented (as will be discussed further below). But this increase is part of a broader trend towards removals over the last two to three decades across states, within which New York falls at the bottom of the top third. New York ranks 13th out of all states with respect to the number of dam removals, and 16th when the state's relative size is taken into account (dams removed per square mile). However, among northeastern states with more similar geographies and historical patterns of development (if still quite diverse), New York ranks 6th out of nine states. Among those northeastern states, two stand out: Massachusetts, which has removed 83 dams, and Pennsylvania, which has removed 389 dams. Further work should seek to better understand the comparative policies and practices that may help explain the different rates of removals across states.

TABLE 1 | Dam Removal in Northeastern States

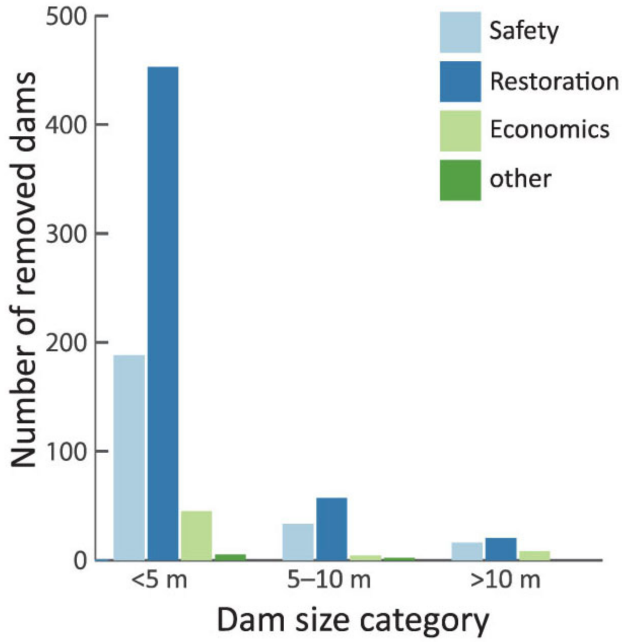
States	1916-69	1970s	1980s	1990s	2000s	2010s	2020-24	Blank Year	Total
Pennsylvania	6	1	1	18	148	149	64	2	389
Massachusetts	1	2			12	46	22		83
Vermont		1	1	3	7	28	23	2	65
New Jersey			1	7	5	30	15		58
Maine			1	7	10	23	11		52
New York		1			7	27	12	2	49
New Hampshire					13	27	7		47
Connecticut	1	1	1	7	5	19	7	1	42
Rhode Island		1			1	3	2		7
Connecticut-Rhode Island						1			1

SOURCE: "Map of U.S. Dams Removed Since 1912," American Rivers, accessed January 26, 2026, https://www.americanrivers.org/threats-solutions/restoring-damaged-rivers/dam-removal-map/.

Further work has analyzed the drivers of those dam removals. A 2023 study by researchers at USGS and the Army Corps of Engineers analyzed available reports related to cost drivers and reasons for dam removal in the US, identifying records for 668 of the dams that were removed between 1965 and 2020. Their analysis reflected that restoration of aquatic ecosystems was the most common reason, while safety was the second (see Figure 3). It also reflected that in the northeast (as in other regions) the largest number of removals was for small dams of less than 5 meters, accounting for 236 of 277 removals in the region, and that the median cost for the removal of those smaller dams was $130,000 compared to $750,000 for dams 5-10 meters, and $2,254,000 for those greater than 10 meters (see Table 2).

It is estimated that by 2050, somewhere between 4,000 and 32,000 more dams will be removed across the United States.[72] Removing dams can repair ecosystems over short-term and longer-term periods, and create upstream, downstream, and within-reservoir ecological benefits.[73] Wetlands, riparian zones (the transition area between land and water), and floodplains, which often degrade under stagnant reservoir conditions caused by dams, can recover when dams are removed, supporting a wider variety of plant and animal species.[74] Research suggests that dam removal may decrease elevated stream temperatures and therefore increase ecosystem resilience by restoring important cold-water habitats throughout river ecosystems.[75] Additionally, removing dams can lead to the reestablishment of fish and wildlife populations that thrive in free-flowing rivers.[76]

FIGURE 3 | Reasons for Removal



SOURCE: Jeffrey J. Duda, et al., "Patterns, drivers, and a predictive model of dam removal cost in the United States," *Frontiers in Ecology and Evolution* 23 (July 2023), https://doi.org/10.3389/fevo.2023.1215471.

TABLE 2 | Dam Removal Cost by Region and Size Category

Region	State	n	Median Cost (Range) In Millions of 2020 $USD Per Size Category			Total Cost In Millions of 2020 $USD
			<$5M	$5-10M	>$10M	
Midwest	IA, IL, IN, KY, MI, MN, OH, SD, WI	222	0.223 (0.0063-8.82)	0.453 (0.031-20.61)	2.092 (0.020-12.23)	240.0
Northeast	CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT, WV	277	0.130 (0.0032-9.33)	0.750 (0.027-46.95)	2.254 (0.55-18.80)	235.8
Northwest	AK, ID, MT, OR, WA, WY	50	0.389 (0.060-23.41)	4.634 (0.057-162.49)	26.421 (3.941-268.80)	775.8
Southeast	AL, FL, GA, NC, SC, TN, VA	41	0.130 (0.014-11.87)	4.303 (0.082-19.11)	—	80.5
Southwest	AZ, CA, CO, NM, NV, UT	78	0.0223 (0.001-5.99)	4.291 (0.84-16.90)	7.825 (0.95-98.19)	190.0
	Total for US	**668**				**1,522.1**

NOTE: In this study, West Virginia is counted in the northeast region.

SOURCE: Jeffrey J. Duda, et al., "Patterns, drivers, and predictive model of dam removal cost in the United States," *Frontiers in Ecology and Evolution* 11 (2023), https://doi.org/10.3389/fevo.2023.1215471.

The removal of two dams on the Lower Saranac River in 2024 restored the migration routes of Atlantic salmon, which had been blocked for decades, helping to reinstate the key species to its historic habitat and support the broader ecosystem's health. The dams were removed as a result of a project between the US Fish and Wildlife, Trout Unlimited, and additional public-private partners.[77] Salmon's presence—or absence—can have a ripple effect throughout the entire food web. As salmon return to spawn, they become a vital food source for numerous predators, including birds, bears, and other wildlife. Likewise, the removal of dams in 2016 on the Wynants Kill in Troy, New York, led to the return of herring to spawn in the waterway for the first time in 85 years, demonstrating the potential for fish populations to return and to do so quickly in this case.[78]

Dams can also be modified to reduce some of these negative ecological impacts. For example, dams can install fish passage systems like fish ladders, fish lifts, and juvenile fish bypass systems that can help migrating fish around obstacles such as dams.[79] However, the research on systems like fish ladders and lifts since around 2013[80, 81] has demonstrated that they do not work effectively across many dam types and sizes, waterways, or key species of fish.[82] Dams can also be modified with sediment bypass systems or periodic sediment flushing, which can restore sediment flow to downstream ecosystems, helping to maintain soil fertility and riverbed structures.[83] Additionally, dams can be modified to release water that mimics natural flow patterns that can reduce the impact on downstream environments.[84] This includes maintaining seasonal flows and preventing sudden, unnatural changes in water levels, which can disrupt surrounding ecosystems, agriculture, and communities.

Dam removals do come with potential impacts that should be considered and accounted for, such as releasing sediment accumulated behind a dam. For example, the Rockdale Dam removal in Wisconsin on the Koshkonong Creek in 2001 released sediment that was rich in phosphorus, posing risks of eutrophication—the process in which a water body becomes overly enriched with nutrients—which led to a short-term overgrowth of plant life that can harm the ecosystem.[85, 86] Sediment releases can also temporarily increase turbidity (a measure of how clear the water is), disrupt ecosystems, and sometimes, in rare cases, spread pollutants throughout the broader watershed if not known or prevented. For instance, in New York, the Fort Edward dam's removal in 1973 released PCBs (polychlorinated biphenyls), a harmful human-made chemical contaminant, into the lower Hudson River.[87] However, generally speaking, these disturbances are relatively temporary and should be weighed against the broader long-term benefits removals can provide, including with respect to sediment flow.[88]

Dam removal decisions can be challenging. Researchers have acknowledged that dams and dam removals can have complex social implications for affected communities. In some cases, certain homeowners or communities, particularly those upstream with access to the impoundment, may be concerned that the removal of a dam might significantly change a social or recreational amenity, one that may increase property value or provide other economic opportunities. On the other hand, dam removals can enhance property values, decreasing risks for homes and communities downstream.[89] Restored riverfronts can become more attractive for residential and commercial development, as they offer improved water quality, better flood management, and may further recreational opportunities.[90] Changes in home values from dam removal vary drastically and depend on specific community characteristics, such as whether they are in a rural area or an urban community.[91] Additionally, Indigenous communities have cultural, spiritual, and historical connections to specific free-flowing rivers, and dam removal can help restore these areas.[92]

While dams in New York State have historically contributed to economic development, the removal of aging or legacy dams can also provide economic benefits. Dam removal often leads to cost savings by eliminating the need for ongoing maintenance, repairs, and liability associated with aging infrastructure. While in the case of a privately owned dam, this cost savings may benefit a single owner, in the case of municipal or state-owned dams that require taxpayers to fund their maintenance and repair, this has broader public benefits. According to the Massachusetts Division of Ecological Restoration, which conducted a study on three-dam removals, over a 30-year period, the removal of these dams was 60 percent less expensive than repairing and maintaining them.[93] Similar to Massachusetts, many dams in New York were constructed several decades or even centuries ago, and the cost to maintain and upgrade them to modern safety and environmental standards can be substantial. One report by the Association of State Dam Safety Officials in 2023 estimated that rehabilitating New York State dams would cost an estimated $3.40 billion, including $1.01 billion for those high-hazard dams.[94]

Dam removal can result in short-term economic costs. It is estimated that small dam removal projects can cost $100,000 or more, and larger dam removal projects that require sediment management plans, additional infrastructure, and other expenses can cost millions.[95] One study analyzing 668 dam removal projects in the United States found median costs for small dams (<5 meters in height) of $157,000, medium dams (5–10 meters) of $823,000, and large dams (>10 meters) of $6.2 million.[96] Other researchers found that, on average, each vertical foot of a dam's height contributes between $22,331 and $30,620 to the cost of removal.[97] Industries that rely on dams for water storage or hydropower generation may also experience disruptions, requiring investments in alternative energy sources or infrastructure adjustments. Nevertheless, in many cases, the long-term economic and ecological gains from environmental restoration, reduced maintenance costs, and new economic opportunities can outweigh the initial expenses of dam removal.

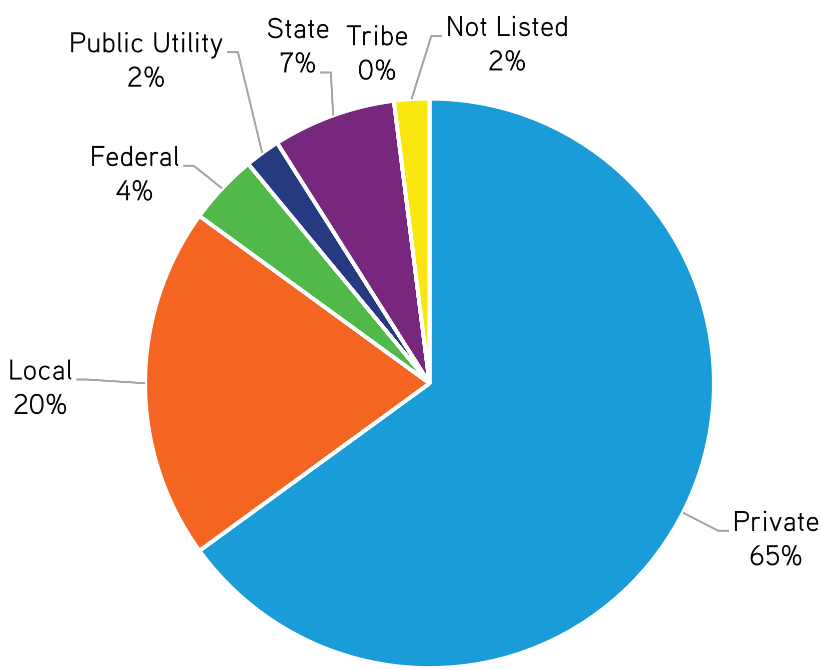
Characterization of Dams

Nationally

The National Inventory of Dams (NID), which is maintained by the US Army Corps of Engineers (USACE) in cooperation with the Association of State Dam Safety Officials (ASDSO), includes a total of 92,490 dams (as of March 2025), with an average age of 64 years.[98] Most of these dams are privately owned, about 65 percent as of 2021, though local governments also own a sizeable amount (20 percent) of the dams listed. A much smaller number are owned by state governments (7 percent) and the federal government (4 percent). The remainder are owned by public utilities and other entities (see Figure 4).[99] State governments regulate approximately 70 percent of the dams listed in the NID, while only about 5 percent are federally regulated.

National Dam Ownership

FIGURE 4 | Dam Ownership in the US (2021 NID and 2021 State Program Performance Data)

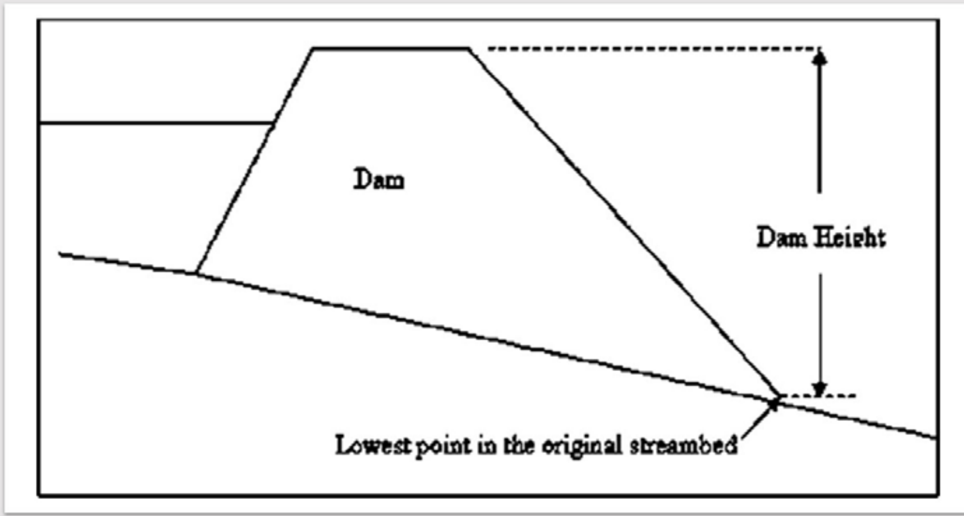


SOURCE: "Dam Facts and Stats for the Media and Public," Association of State Dam Safety Officials, accessed January 26, 2026, https://damsafety.org/media/statistics.

It is important to note that there are thousands of dams that do not meet NID standards for listing them and, as a result, are not included in their data.[100] A dam is only included in the NID if it has a storage capacity at a maximum elevation of over 15 acre-feet and it is higher than 25 feet from the natural bed of the waterway or lowest elevation; it has a storage capacity at a maximum elevation of over 50 acre-feet and height over 6 feet; or it is classified as "high hazard" or "significant hazard" as described below.[101] According to the Army Corps, "approximately half of the dams in the US are relatively small structures that are fewer than 25 feet tall. Only 7 percent of dams in the US are classified as 'large dams' (50 feet or taller), and fewer still are on the massive scale of projects like the Hoover Dam."[102]

The National Inventory of Dams, therefore, does not include a sizeable portion of smaller dams across the country or across New York State. The NID, for example, includes roughly 1,900 dams in New York State,[103] while the State's Department of Environmental Conservation (DEC) lists nearly 6,000 dams in the state.[104] While the number of high hazard and intermediate—or significant—hazard dams listed by each are quite close, the number of undetermined and low hazard dams diverge significantly between the state and federal lists.

FIGURE 5 | Dam Height Measurement



Category	Impoundment Height (feet)	Impoundment Storage (acre-feet)
Small	25 to <40	50 to <1,000
Intermediate	40 to 100	1,000 to 5,000
Large	More than 100	More than 50,000

SOURCE: "Dam Safety Program Description, Definitions, and Standards," US Fish & Wildlife Service, updated August 31, 2018, https://www.fws.gov/policy-library/361fw2.

The Federal Emergency Management Agency (FEMA) administers the National Dam Safety Program—a partnership of federal agencies, states, and stakeholders—which is aimed at promoting dam safety and reducing related risks.[105] The program, and accordingly the NID, provide two main ways of categorizing dams with respect to their risks: their hazard potential and an assessment of their condition.

The Hazard Potential Classification System for Dams is used in order to identify which dams, if they experience a failure or mis-operation, would present a potential danger,[106] but does not reflect the current condition of a dam.[107] The system (see Table 3) classifies dams as being a "low," "significant," "high," or "undetermined" hazard dam according to the impact of its potential failure on the loss of human life, economic losses, environmental damages, and disruption of lifeline facilities. According to NID's 2023 data, roughly 60 percent of listed dams are designated as "low hazard," while 16 percent are listed as "significant hazard" indicating potential environmental and economic impacts, and 11 percent are listed as "high hazard" indicating loss of at least one life is probable. An additional 13 percent have an undetermined hazard potential.

TABLE 3 | Hazard Potential of Dams in the United States

Hazard Potential	Result of Failure or Mis-Operation	Number of NID Dams	Percent of NID Dams
High Hazard	• Loss of at least one life is probable • Other economic or environmental lost possible but not necessary for this classification	14,934	16%
Significant Hazard	• No probable loss of life • Could result in economic loss, environmental damage, disruption of lifeline facilities, etc.	10,387	11%
Low Hazard	• No probable loss of life • Few economic or environmental losses; losses are generally limited to the owner	54,819	60%
Undetermined	• Hazard potential has not been designated or was not provided	11,545	13%

NOTE: Low-hazard dams are not included in the NID if they are less than 25 feet in height with a storage capacity of 15 acre-feet or less, or are 6 feet or less in height with a storage capacity of less than 50 acre-feet.

SOURCE: Dam Safety Overview of the Federal Role (Washington, DC: Congressional Research Service, April 13, 2023), https://sgp.fas.org/crs/homesec/R45981.pdf.

The hazard classification does not, however, take into account a dam's actual state or potential for failure. A second rating referred to as a "condition assessment" is meant to evaluate its safety, identify any deficiencies, and state if remedial actions are necessary (see Table 4).[108] The condition of a dam is rated as either satisfactory, fair, poor, or unsatisfactory, while uninspected dams are listed as unrated. Nationally, over 3,600 dams were assessed as being in either poor or unsatisfactory condition *and* are classified as being significant or high-hazard dams. While some dam condition ratings are not publicly shared due to security reasons, the majority of dams—over 58,000—were unrated. This includes roughly 7,000 high and significant hazard dams, as well as nearly 10,000 with an undetermined hazard classification. Once more, many of those with an existing assessment have not been reevaluated in decades. Each state has different dam safety inspection requirements for state-regulated dams (New York's will be discussed below). High-hazard dams in Massachusetts[109] and Virginia,[110] for example, are required to be inspected every two years, and Alaska requires inspections every three years.[111] Reporting requirements also vary by state regulations. Alabama does not have an agency that oversees dams, so they do not have state-specific requirements for hazard or condition classifications.[112]

TABLE 4 | Conditional Assessment of Nonfederal Dams In the United States

Condition Ratings	Description of Condition Ratings	High Hazard Dams	Significant Hazard Dams	Low Hazard Dams	Undetermined Hazard Dams
Satisfactory	• No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all conditions in accordance with the minimum applicable regulatory criteria or tolerable risk guidelines.	4,515	2,428	4,308	334
Fair	• No existing dam safety deficiencies are recognized for normal operating 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.	3,881	2,315	4,234	1,038
Poor	• A dam safety deficiency is recognized for normal operating conditions that may realistically occur. • Remedial action is necessary. • Uncertainties may exist to identify a potential dam safety deficiency and investigations and studies are necessary.	1,758	1,513	3,367	185
Unsatisfactory	• A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.	251	116	304	98
Not Rated	• The dam has not been inspected, is not required to inspected, or has been inspected but not rated.	3,265	3,721	41,346	9,884

NOTE: A dam safety deficiency is an unacceptable dam condition that may affect the safety of the dam either in the near term or in the future.

SOURCE: Dam Safety Overview of the Federal Role (Washington, DC: Congressional Research Service, April 13, 2023), https://sgp.fas.org/crs/homesec/R45981.pdf.

New York

As evidenced in the tables below (based on state data), dams across New York State tend to reflect a different picture than the large-scale dams like the Hoover Dam, and are generally older than those across the country. The average height of a dam in New York is just under 15 feet, and the average year built is 1944, or over 80 years old—though the National Inventory places this number even higher at 87 years old for the state—with the earliest year an existing dam was built dating back to 1699. One-quarter of all recorded dams in New York were built before 1922, and half of all recorded dams in the state were built before 1953. In recent years, as public awareness of the environmental risks posed by dams has increased, alongside other shifting trends related to dams, there has also been a drastic decrease in the number of dams constructed, with only 5 percent of all recorded dams built after 1990. The majority of these more recently constructed dams' primary purpose is listed as recreation, and the second most common purpose listed is flood control and stormwater storage.

The New York State DEC maintains a database for dams,[113] which reflects that there are roughly 6,000 dams in the state.[114] Half of these dams (50 percent) are used for recreation, while 5-6 percent (each) are used for flood control, fire protection or stock or small farm, and hydroelectric production. And even less, around 2 percent (though not necessarily small in size), are used for water supply. The plurality of these dams (36 percent) is privately owned, while local governments own around 14 percent, and the state government owns around 9 percent. Both public utilities and the federal government own less than 1 percent each.

As with the National Inventory of Dams, state dam databases also have limitations, even if they are comparatively more complete. In recent years, researchers have further considered those unaccounted-for dams and other barriers, as well as ways to better identify them in order to support the restoration of connectivity in different watersheds.[115] For example, using a machine learning and remote sensing approach to identify dams, researchers found that "existing dam inventories underestimated the true number of dams by 80-94 percent" in two subbasins in the Hudson River watershed. Many of these dams that are not included in existing state or federal datasets may be smaller dams not meeting regulatory thresholds to be under the jurisdiction of the state (see further discussion on more recent state policies below), but they can still have consequential ecological impacts.

Like the National Dam Safety Program, New York State's dam hazard classification system categorizes dams based on the consequences of potential failures (as outlined in 6 NYCRR Subpart 673.5(b)). The DEC Conservation classifies hazard potential similarly to the federal government as Class "A" or Low Hazard Dam, Class "B" or "Intermediate Hazard" dam, Class "C" or "High Hazard" dam and Class "D" or "Negligible or No Hazard" dam.[116, 117]

New York State law requires that when the DEC performs a dam condition inspection, each dam is assigned a condition rating—unsafe, unsound, deficiently maintained, or no deficiencies noted.[118] Dams can be designated unsafe, meaning "deficiencies of such a nature that failure of the dam is imminent and immediate action is required to eliminate or reduce the danger. Among the deficiencies that could result in this rating are: seepage, which is carrying soil particles; significant erosion problems; and serious structural deficiencies, which may involve movement or cracking of the structure. Severely inadequate spillway capacity may also result in a condition rating of 'unsafe.'" Dams with deficiencies for which the safety of the dam cannot be assured are classified as unsound. This includes dams that are developing seepage problems, structural stability inadequacies, or seriously inadequate spillway capacity. Deficiently maintained dams have physical or operational deficiencies that do not require further significant engineering analysis.

TABLE 5 | Hazard Classification

Classification	Loss of Human Life	Economic, Environmental Lifeline Loss
Class A or Low Hazard	Not expected	Failure is unlikely to damage anything beyond isolated or unoccupied buildings, undeveloped land, or minor roads such as town or county roads. It is also unlikely to interrupt essential utilities like water supply, sewage treatment, power, fuel, or communication services, and poses little risk of personal injury, significant economic loss, or major environmental impact.
Class B or Intermediate Hazard	Not expected	Failure or mis-operation could damage isolated homes, major highways, and minor railroads. It may also interrupt critical utilities, such as water supply, sewage treatment, power, fuel, or communication services. While such a failure or mis-operation could lead to personal injury, significant economic loss, or substantial environmental damage, loss of life is not expected.
Class C or High Hazard	Expected	Failure or mis-operation could result in severe damage to homes, major highways, industrial or commercial buildings, railroads, and critical utilities like water, sewage, power, fuel, and communications. It could also cause significant environmental damage, with a high likelihood of loss of life and substantial economic consequences.
Class D or Negligible or No Hazard	Not expected	Defined in 6 NYCRR Subpart 673.5(b) to track structures that were never built or are no longer functioning as dams. This includes dams that have been breached, removed, failed, or no longer impound water, as well as those that were planned but never constructed. Class "D" dams are considered inactive and pose negligible or no hazard.

SOURCE: Dam Safety Design Standards, Technical and Operational Guidance Series (TOGS) 3.1.5 (Albany: New York State Department of Environmental Conservation, Division of Water, revised August 1989), https://extapps.dec.ny.gov/docs/water_pdf/togs315.pdf.

TABLE 6 | New York State Dams by Year Built, Last Inspection, and Height

	N	Average	Minimum-Maximum	SD	Missing Data (%)
Year Built	4,755	1944	1699-2022	34.35	20.11
Last Year of Inspection	5,638	1988	1901-2023	35.19	5.27
Dam Height (feet)	5,719	14.78	1-215	14.67	3.91

SOURCE: "Dams," GIS Data, New York State GIS Clearinghouse, updated December 5, 2025, https://data.gis.ny.gov/datasets/5a7d83359cc842e08711215408f5b55c_29/about.

The vast majority of dams in the DEC's dam shapefile (updated in November 2024), 5,299 or 89 percent, do not have a publicly available condition rating. The majority of these dams (4,411) are Class A (low hazard) dams, but this also includes 104 high hazard, 272 intermediate hazard, and 512 unknown hazard status dams (as shown in Table 7).

The average last year of inspection according to the state dam dataset is 1988; however, the date of last inspection or assessment of a dam's condition in New York varies according to its hazard classification. Performing a dam safety Engineering Assessment, as outlined by the New York DEC, involves reviewing historical records, conducting an on-site engineering inspection, analyzing data through calculations, and drawing conclusions. The findings are compiled into an Engineering Assessment Report, which is filed with the department and shared with the dam owner for their records. Inspections must review previously observed issues, track their progression, and identify new or ongoing corrective actions with recommendations and schedules, which may be deferred pending technical analysis. All observations, including minor ones, must be recorded, and photographs are required to provide a permanent visual record for condition comparisons over time.[119]

TABLE 7 | New York State Dams by Hazard Code, Owner Type, and Last Condition Rating

Hazard Code	N	% of Total	Not Rated	Deficiently Maintained	No Deficiencies Noted	Unsound-Deficiency Recognized	Unsound-Fair	Unsound More Analysis Needed
0 = No Hazard Code Assigned	512	8.6	512					
A = Low Hazard	4,444	74.66	4,411	6	5	13	6	3
B = Intermediate Hazard	571	9.59	272	39	36	71	33	120
C = High Hazard	425	7.14	104	63	110	60	53	35
Total	**5,952**		**5,299**	**108**	**151**	**144**	**92**	**158**
Owner Type								
Private	2,188	36.76	1,952	27	45	47	24	93
Missing Data	2,235	37.55	2,071			1		
Local Government	856	14.38	559	57	90	60	44	46
New York State	534	8.97	449	21	9	26	19	40
Federal Government	48	0.81	40	1	3	1	0	3
Public Utility	37	0.62	30	1	3	3	0	0
Local Government, Private	38	0.64	26	1	1	5	1	4
Private, State	9	0.15	5	0	0	1	1	2
Total	**5,945**			**108**	**151**	**144**	**85**	**188**

SOURCE: "Dams," GIS Data, New York State GIS Clearinghouse, updated December 9, 2025, https://data.gis.ny.gov/datasets/5a7d83359cc842e08711215408f5b55c_29/about.

Table 5 reflects the distribution of hazard codes and dam owner categories by condition rating for dams in New York. Based on this data, which was most recently updated in November 2024, there were no dams that are in an unsafe condition, but there were 394 unsound dams comprised of three subcategories: unsound-deficiency recognized, unsound-fair, and unsound more analysis needed. Out of these unsound dams, 148 were Class C (high hazard), 224 were Class B (intermediate hazard), and 22 were Class A (low hazard). Of these unsound dams, 164 were privately owned, while 150 were owned by local governments, and 85 were state-owned dams. It is also important to note that a significant part of this data is missing complete information—2,071 dams are missing owner type and do not have a condition rating, making it difficult to gain a complete picture of the dam landscape across New York State.

New York Policy and Practice: 1990s-2020s

Permitting and Defining Dams

Beginning in the late 1990's and through the 2010's, policymakers in New York first delineated a narrower definition of the dams that fell under the state's regulatory oversight for permitting, and then established more stringent regulations to ensure the safety of dams that met certain criteria. In the mid-late 1990s, New York experienced some very significant weather events—particularly heavy rains and rapid snow melt in January 1996,[120] and ice storms in January 1998.[121] These events led to severe flooding and dam failures, bringing heightened attention to issues of dam safety. Following these events, the Department of Environmental Conservation (DEC) stated that its authority was "deficient" with respect to when and how it could require dam owners to have emergency action plans, and for dam structures to be fixed or removed. Once more, the department noted that 75 percent of the 300 high-hazard dams under their purview at the time had documented maintenance deficiencies, but less than one-third of high-hazard dam owners had voluntarily submitted an emergency action plan.[122]

Consequently, at the request of the DEC, state lawmakers (through what's known as a program bill[123]) unanimously enacted a new law in 1999, amending dam regulations. This new law, among other things, allowed the DEC to require owners to prepare safety programs, which could include emergency action plans and maintenance measures; enabled the DEC to take further actions in the case of dams posing an imminent danger if owners fail to comply with abatement orders; and more explicitly defined "dams" in state law. That definition, which is still in current law, included: any artificial barrier, including any earthen barrier, that has a height equal to or greater than fifteen feet or a maximum impoundment capacity equal to or greater than three million gallons.[124] It also further specified that this definition does not include any structure which: "has (i) a height equal to or less than six feet regardless of the structure's impoundment capacity, or (ii) an impoundment capacity not exceeding one million gallons regardless of the structure's height."

In its supporting memo accompanying the legislation, the DEC noted that this new definition would eliminate the need to obtain certain state permits to erect, construct, reconstruct, or repair any dam that was smaller than this height or capacity. It supported this action in stating that this would "ease the regulatory burden on the public without compromising public safety" and while realizing cost savings for owners. In particular, the department noted that:

> *The volume of permit applications for small size dams has significantly increased as small size dams are becoming more commonly used in projects such as wetlands restoration and storm water management. However, these small dams generally pose little or no threat to safety. Elimination of permitting requirements for these dams will allow DEC to focus its resources toward larger dams which are more likely to pose a threat to public safety.*[125]

Action Plans, Assessments, and Annual Certifications

Beginning in 1984, the DEC had internal policy guidelines that outlined timeframes for the frequency of inspections based on certain criteria of dams. The policy guidelines at that time stated that all high-hazard dams should be inspected every two years, all intermediate-hazard and low-hazard primary source water supply dams meeting the major size criteria should be inspected every three years, and other dams should be inspected in response to specific requests.[126]

In 2006, an audit of the DEC's dam safety program by the Office of the New York State Comptroller (OSC) found that the department had identified "133 high- and intermediate-hazard dams with a high-priority deficiency that requires further engineering study or remedial work."[127] The audit also found that the department's 1984 inspection policy was not enforced consistently, and outlined some proposed regulatory changes.[128] For example, the proposals would require owners of high- and intermediate-hazard dams to certify on an annual basis that their operation and maintenance plans, as well as their emergency action plans, were current; and owners would be required to hire an engineer to inspect high-hazard dams every two years, as well as to perform a more detailed assessment every 10 years.[129]

In 2009, new regulations were promulgated that reflected some of those proposed changes. The state's Dam Safety Regulations (Section 673.7) were updated to require dam owners to file Emergency Action Plans for dams with a Class B (intermediate-hazard) or C (high-hazard) classification.[130] An Emergency Action Plan (EAP) is a written document that identifies incidents that can lead to potential emergency conditions at a dam, identifies the areas that can be affected by reservoir reductions in capacity or reliability, and specifies preplanned actions to be followed to minimize property damage, potential loss of infrastructure, water resources, and potential loss of life because of failure or mis-operation of a dam.[131] Additionally, the new regulations required that most owners of high-hazard and intermediate-hazard dams have an engineering assessment conducted at least every 10 years and submit the report to the DEC. Certain state-owned and public authority-owned dams were, however, exempt from this requirement.[132]

More recently, in February 2025, the State Comptroller released another audit of the DEC's dam safety program and found that many dam owners were not in compliance with agency regulations. More specifically, the audit found that nearly 20 percent of dams, including 153 Class B and five Class C dams, did not have an EAP on file with the DEC; while one-third of all Hazard Class B and Hazard Class C dams were found to not have an engineering assessment on file.[133] Additionally, the report noted that 14 percent of dams, including 110 Class B and five Hazard Class C dams, did not have any annual certifications—in which dam owners must attest that regulatory requirements have been met and convey detailed information about their dam—on file. Thirty-four percent of dams with an annual certification did not have one in the last 10 years. And, as discussed in the prior section, the audit also found that there were 220 Class B and C dams that had not yet been assigned a condition rating (as of March 2024), though the DEC noted they anticipated assigning condition ratings to the majority of currently unrated dams over the next few years. Perhaps most consequential in terms of the work the department had already done, however, was that of those Class B and C dams that did have a condition rating; the report found that 78 percent, or 483, were rated as "unsound or deficiently maintained."[134] As reflected in the DEC's data presented in the section above, this number appears to have decreased between March 2024 and November 2024 (when the OSC reviewed this data and when we did) to 372.

With respect to agency actions, the Comptroller did, however, find that the "DEC predominantly met its goals and was up to date on inspections of Hazard Class B dams every 4 years and Hazard Class C dams every 2 years."[135] But, they found that the DEC's current enforcement procedures were not enforced against owners who do not comply with regulatory requirements. In response, the DEC stated that they currently do not have noncompliance procedures for certain regulatory requirements, including Engineering Assessments, Emergency Action Plans (or Emergency Plans), and Annual Certifications, and they are working towards developing those enforcement procedures.

Recent Funding

Other reports have noted issues with funding trends for dam safety. A report by the Association of State Dam Safety Officials found that while New York State's budgeted funding level per regulated dam in 1999 was about $350, the same as the national average at that time, by 2010, New York's budget was $250, half of the national average of $500 for that year. While New York State's budget slightly increased to $280 per regulated dam by 2022, the national average significantly increased to over $800 per regulated dam at that time.[136] Saliently, according to the Association, New York State had seven full-time equivalent (FTE) staff working on dam safety in 2006, when the Comptroller's earlier audit was released; this increased to 11 FTE staff in 2010 following the new regulations put in place at that time, and by 2022, staffing decreased to nine FTE members.[137] At each of these junctures, according to the data reported by the Association, however, the number of state-regulated dams per FTE state staff was substantially higher than the national average. By 2023, the Association cited nearly 700 state-regulated dams in New York per Full-Time Equivalent (FTE) staff, with a comparative national average of less than 200 dams per FTE.[138]

In recent years, there has been new federal and state funding for dams, particularly with respect to addressing safety. In 2016, the Water Infrastructure Improvements for the Nation Act (or the "WIIN Act") was signed into law. The Act established a new grant program under the Federal Emergency Management Agency's (FEMA) National Dam Safety Program.[139] Under the 2021 Bipartisan Infrastructure Law, $800 million was made available for existing programs in five federal agencies related to dam safety, modification, or removal.[140] Consequently, FEMA made $733 million available to states and territories from 2022 to 2026 for grants to enhance dam safety and rehabilitate or remove aging dams.[141] For example, in 2023, the DEC awarded $766,000 to nine projects to improve dam safety in the Capital Region, Southern Tier, and Mid-Hudson Valley from FEMA's High Hazard Potential Dam Grant Program.[142]

In 2022, New York voters approved a ballot proposition through the Environmental Bond Act that made $4.2 billion available for environmental projects. Of these funds, $650 million was allocated for flood risk reduction projects, including removing, altering, or right-sizing dams by adjusting the size or capacity to better align with current water needs.[143] The Bond Act required that disadvantaged communities (as defined by the state's Climate Justice Working Group) receive no less than 35 percent of the benefit of the total funds, with the goal of 40 percent.[144] In 2024, the state issued draft eligibility and accounting guidelines for different parts of the Bond Act and established a website to track opportunities for funding and awards from the Bond Act.[145] The draft eligibility guidelines under the Bond Act included criteria for Water Quality Improvement Project Program (WQIP) grants aimed at "Restoration and flood risk reduction through the removal or repair of municipal dams; enhancing aquatic connectivity through dam removal and culvert replacement; and fish and wildlife habitat acquisition, restoration and enhancement projects."[146] These grants were made available to local governments, Indian nations, Soil and Water Conservation Districts, and not-for-profits, for:

- Projects to improve dam safety through the removal or repair of dams
    - ◊ that provide flood attenuation; and
    - ◊ have a downstream hazard classification of Class C (High) and Class B (Intermediate).
- Projects that reduce a hazard condition and result in a safe impoundment structure that meets Dam Safety criteria and other sound engineering principles.
- Project listed in the County or State-approved Hazard Mitigation Plan.
- Projects with an up-to-date Emergency Action Plan (EAP).

Contingent on Bond Act funding, in 2023, the DEC made $75 million available through WQIP for a variety of projects, including those related to dam safety and repair or replacement. Five million dollars of these funds was made available for each of the following three categories: projects to bring a high hazard dam that has an assigned condition rating of unsafe or unsound into conformance with state guidelines for Design of Dams Safety Criteria[147]; projects to bring an intermediate hazard dam that has an assigned condition rating of unsafe or unsound into conformance with state guidelines for Design of Dams Safety Criteria; and other dam repair projects for high and intermediate hazard dams.[148] The final enacted state budget in 2024 further included

$90 million “to repair and maintain state-owned dams, rehabilitate fish hatcheries, improve state campgrounds, and make investments in other core infrastructure.”[149] And in December 2024, the state announced $225 million WQIP grants across the state, including over $20 million related to dam removal and repair.[150]

Likewise, in 2025, the DEC, in collaboration with the state Environmental Facilities Corporation (EFC), made $45 million from the Bond Act available through the Resilient Watersheds Grant (RWG) Program for flood mitigation projects, including the removal of dam structures to local governments, Indian nations, Soil and Water Conservation Districts, not-for-profits, and state agencies.[151] New York’s Department of State (DOS) has also solicited applications for two grants in 2025 from Bond Act funding. One, “Coastal Rehabilitation and Resilience Projects,” makes $20 million available (a minimum of $300,000 per project) for local governments, Indian nations, Soil and Water Conservation Districts, not-for-profits, and state agencies for a number of eligible purposes, including dam removal, fish ladders, wildlife barriers projects, and wetland restoration. And the other, “Inland Flooding and Local Waterfront Revitalization Program Implementation Projects,” makes $15 million available (a minimum of $150,000 per project) for localities that are coastal or have certain inland waterways for purposes that include mitigating “barriers to diadromous species migration, including but not limited to River Herring, American Eel, and Brook Trout.”[152] More recently, in January 2026, New York announced $265 million in funding for water quality and climate resiliency projects, including $55 million for Resilient Watersheds Grants and $208 million awarded to 131 projects under the WQIP.[153]

In her 2024 State of the State address, Governor Kathy Hochul noted with respect to dam infrastructure that “more than ever, streamlined removal processes and adequate funding are required to safeguard public safety and environmental health.”[154, 155] Funding for such projects has increased in recent years, but it has not yet been clear how different stakeholders are navigating these processes and related decision-making at present. The next section of this report will further explore the experiences of such stakeholders and experts working across cases that involve different types of dams; their pathways to modification, repair, or removal projects; and their access to the resources necessary to complete those projects.

Stakeholder Interviews: Recent Experiences in New York and Other States

Throughout late summer and early fall 2025, we conducted 15 semi-structured interviews with dam owners, stakeholders, nonprofit staff, engineers, and regulators who all engage in dam removal, repair, or modification work. In these conversations, we sought to understand each stakeholder’s personal experience with the processes, practices, and policies in New York State. Interviewees identified challenges and opportunities to improve dam-related policies and practices in the state.

Our findings reflect routine challenges concerning dam projects and related policies or practices with respect to regulatory personnel capacity, the promotion of options, and the weighing of ecological benefits. In addition, stakeholders most often highlighted challenges related to personnel, project management, funding applicability and timing, intergovernmental coordination and historical preservation, sediment management, and dam owner and community education or engagement that regularly impacted or impeded dam projects in their experiences. They also presented a number of salient potential opportunities to address these challenges.

Personnel

Dam owners and project managers working for engineering firms or nonprofits have to navigate a somewhat fragmented and at times iterative regulatory system in the process of dam removal, repair, or modification. Interviewees expressed that in New York, there is not a single point of contact within the DEC or elsewhere that handles dam removal projects in particular, and that personnel familiarity with dam-related processes varies across the agency's regional offices. Consequently, participants expressed variations in how they came to encounter state staff, what kind of personnel capacity they found, what information they were initially presented with, and which further contacts, funding, or processes they were made aware of across different regions. An interviewee stated of the DEC that "for a long time, they only had one person that was involved in habitat and within habitat was dam removal, but dam removal takes a lot of time, a lot of effort, you cannot have it as a part-time hobby." This interviewee noted that there have since been changes within the DEC to expand dam removal staffing capacity, though that capacity was not necessarily commensurate with need. Despite such challenges, however, interviewees repeatedly noted that when they did make contact with state agency staff, the staff they interacted with tried to be as helpful as possible. They also repeatedly highlighted some standout staff members who had more/longer-term experience with dams.

Current and former state staff, and those who engaged with them routinely, similarly noted that there has been a limited number of staff who work on dam projects, and that there is no dedicated team that is devoted to dam removal projects. Overall, participants noted that states with a dedicated staff and deeper personnel experience were seen as making more progress with dam removals. They also noted that because there have not been a regular or significant number of dam removals in New York, there have been limited opportunities for personnel development or training, and not many staff are familiar with dam removal processes and therefore may themselves be navigating such processes for the first time alongside owners and project managers. This was reflected in the variable experiences of stakeholders across sites.

Promotion of Removals

Most commonly, stakeholders framed this lack of familiarity in relation to other states' promotion of removals or a more significant number of removals completed. They generally highlighted that New York, by comparison, offers dam removal as one option—in addition to repair or modification—but does not promote any particular option, though it is important to note that funding is generally targeted toward removal and modification. The DEC has funding available through the Resilient Watersheds Grant (RWG) and the Water Quality Improvement Program (WQIP), as well as funding through the Hudson River Estuary Program's Tributary Restoration and Resiliency Grants aimed at restoring habitats for American eels and river herring.[156] Many interviewees identified the lack of a preferred or promoted option as a challenge to achieving further removals and, therein, furthering ecological restoration efforts. Interviewees described the state's position as "neutral," as opposed to actively "promoting" dam removal as a beneficial option for ecological restoration. However, interviews with dam owners also reflected that when they'd made the decision to remove a dam, DEC staff were supportive and helpful.

Stakeholders referenced successful practices in multiple states that New York may be able to learn lessons from with respect to removals. Massachusetts, for example, has a Department of Ecological Recovery (DER) that was established in 2005, and which has dedicated staff (of approximately 25 as of 2021) for the express purpose of helping "dam owners through the dam removal process, providing funding, project management, and technical assistance." Massachusetts has a significant number of dams for a smaller state, at over 3,000, roughly half the number documented in New York. Like New York, this includes many older dams that had been constructed to power small mills in the 1700s and 1800s.[157] Between 2000 and 2024, there were a reported 91 dams removed in Massachusetts, according to data from American Rivers.[158] Over the same period, the data reflected 46 removals in New York.

In Pennsylvania, stakeholders noted the existence of education programs and deeper institutional knowledge of removal processes, given the significant numbers of dams removed in recent years. In particular, they noted the role of nonprofits in providing education, including examples of partnerships between The Nature Conservancy and American Rivers to conduct training for dam removal project managers in the Delaware River Basin. Pennsylvania has a similar number of dams to Massachusetts, at over 3,000 documented dams.[159] In 2024, American Rivers recognized that Pennsylvania was the nation's leader with dam removals, completing 27 projects during the year. After Pennsylvania were Michigan (10 removals), Minnesota (7 removals), and Virginia (7 removals).[160] That year, Massachusetts had just three removals, though it had six recorded the prior year. Comparatively, New York was noted as having only one dam removal in 2024—in Cortlandt on Sprout Brook River (of Sprout Brook Dam 1).

Maryland was also referenced in our interviews because of the clear language the state uses when describing the ecological benefits of dam removals and the reporting of permitting timelines and outcomes. Maryland Department of Natural Resources (DNR) emphasizes specific ecological outcomes in their public communications pertaining to dam removal, such as restoring miles of spawning habitat for multiple fish species and improving overall river ecosystem health. For example, DNR's announcement of Bloede Dam Removal stated that the removal restored more than 65 miles of spawning habitat for the blueback herring, alewife, American shad, hickory shad, and more than 183 miles of habitat for the American eel.[161] Additionally, the Maryland Department of the Environment publishes information about restoration permits issued each year, the percentage issued within 90 days, and the total stream length restored. This information, required under the Whole Watershed Act of 2024, which was passed by the state legislature and signed into law by Governor Moore, allows the public to see some measure of the ecological benefits associated with dam removals and to better understand current permitting timelines.[162]

California was mentioned with respect to the updated California Environmental Quality Act (CEQA) regulation, which exempts ecological restoration projects from the permitting process. More specifically, CEQA has statutory exemptions for restoration projects (SERP), regardless of the size of the project, where the purpose is to restore, protect, or enhance native species in their habitat. California has also created the Cutting the Green Tape (CTGT) program, which is responsible for coordinating agencies involved in SERP projects.[163]

Connecticut was also cited for its use of general permits for minor dam projects with minimal risk.[164] Connecticut's Department of Energy and Environmental Protection has established three general permits authorizing categories of maintenance, repair, alteration, and removal work to smaller dams that have minimal environmental impacts.[165] These general permits include authorization for the removal of low- or moderate-hazard class dams that meet certain criteria. Stakeholders we spoke with stated that this streamlined permitting approach reduced timelines and project costs for dam owners who were removing smaller, low-risk dams.

Ecological Restoration

Ecological restoration is generally understood as the process of supporting the recovery of ecosystems that have been degraded, damaged, or destroyed by practices.[166] Dams, while providing other values, interrupt such natural systems, and dam removals can therefore significantly aid in restoration efforts. Though there has tended to be greater focus on the impacts of larger dam removals, small dam removals—those more akin to the majority of dams in New York—are likewise ecologically beneficial. In 2022, the US Fish and Wildlife Service and the State of Massachusetts published a report documenting the largely positive effects of "small, run-of-river dams and dam removal on water quality (stream temperature and dissolved oxygen (DO)), aquatic macroinvertebrates, and fishes."[167] Many interviewees expressed that they felt current policy frameworks in New York inadequately accounted for the ecological benefits of removal and did not fully consider the environmental and safety risks of leaving dams in place. In doing so, some of them framed such "failure as inevitable" and saw removals as a means of achieving "controlled failure."

The need to better account for ecological impacts and the benefits of recovery was further contextualized by stakeholders with respect to the growth of ecological restoration research and practice over the last few decades. While ecological restoration emerged as a conceptual framework and practice in the early 1900s, it grew more significantly in the 1970s and further developed through the 1980s as the field of Restoration Ecology became more professionalized. But it was not until the last few decades that such frameworks and practices were more broadly understood and applied in regulatory practices.[168] In New York, many of the regulatory frameworks for dam removal, repair, and modification appear to have been established without ecological restoration perspectives that have become more integrated in environmental management frameworks in recent years, with major revisions to dam safety regulation in New York occurring in 1999 and 2009. As such, interviewees tended to frame these regulations as more concerned with preventing harm from typical construction or other permitted processes and not considering the broader ecological benefits of deconstruction projects like dam removal.

Project Management and The Roles of Nonprofits

Overall, dam owners, state staff, engineering firms, and nonprofit stakeholders identified a critical need for increased project management capacity. Multiple dam owners stated that they became project managers and characterized it as a "second job" coordinating across many people and processes, along with funding applications they were generally unfamiliar with. While engineering firms might take on the management of portions or phases of a project, there was typically a need expressed for a considerable amount of upfront labor and time during the early phases of a project, as well as longer-term management across different phases of the project and regulatory processes. This level of labor need acted as a considerable disincentive or barrier for owners who were otherwise interested in and pursuing the removal of their dam. One owner who had already been in a dam removal process for roughly five years, for example, noted that they had only just learned that nonprofit organizations could and do, in some cases, take on project management roles. Those who worked for nonprofits noted that some organizations provide training for those interested in project management. For example, one cited the "Dam Busters" webinar series run by the Mass River Alliance, in partnership with the Massachusetts Division of Ecological Restoration and the Charles River Watershed Association.[169] The series covers planning, permitting, and technical topics for project managers or potential project managers. Other interviewees highlighted efforts at higher education institutions to provide courses or programs on project management for dam removals, such as one offered at Rutgers University on "Dam Removal: Design, Planning, and Implementation."[170] One engineer also noted that project management and other technical training efforts should be further broadened to increase capacity, stating that "project managers do not need to have a PhD" and arguing that technical training should be made more accessible to those interested.

Stakeholders frequently highlighted that nonprofit organizations played an essential role in dam removal and modification processes in New York and across other states. They cited numerous examples of nonprofits serving as not only educators, but as connectors to resources, as experts offering regulatory and local ecological insights, and as advocates for dam removals and ecological restoration. They also particularly noted ways in which such organizations sometimes provide critical project management services that individuals, small entities, or localities may not have the capacity to fully take on. With respect to project management, stakeholders noted that nonprofits were often helpful in providing not only technical and regulatory knowledge but also ensuring continuity across multiyear projects. Nonprofits, along with educational institutions, are also involved in research and mapping efforts to find dams and identify those at risk of failure and/or that might be removed. In some cases cited, they also provided technical or environmental regulatory expertise when navigating the dam removal process. One dam owner stated how a nonprofit helped discover American eel at their dam, which allowed them to apply for more funding related to conservation.

Interagency and Intergovernmental Challenges

The regulatory process for dam removal or modification often involves multiple state agencies, federal regulators, and local governments. In New York, this may include county and/or municipal governments, DEC, State Historical Preservation Office (SHIPO), US Army Corps of Engineers, or the Federal Energy Regulatory Commission (FERC). Often, in the cases spoken to by interviewees, these entities were not necessarily working in coordination, even if there was an initial interagency meeting, joint permit application, or if they represented the same scale of government. The requirements or goals of these entities were also sometimes referred to as being in tension with each other, if not incommensurate, presenting a further challenge for dam owners to navigate.

One dam owner interviewed explained how, later in their construction process, SHIPO became involved and required them to significantly alter their design and construction plans to preserve the dam walls, which were deemed historic, increasing construction costs. The dam owner noted their frustration with this experience and stated they wished that the SHIPO review had occurred earlier in the process so they could have had the plans designed around their requirements from the outset. Another dam owner noted that during the last stage of their dam removal construction, the local or county government became involved and required an additional sloped land permit and additional insurance. This added process did not significantly delay the removal in that case, but served as an example of the fragmented nature of such governance. As multiple interviewees conveyed, even when pre-conferences occur with multiple agencies and regulators, they do not necessarily serve to meaningfully align regulatory entities and their requirements, processes, or timelines. This lack of governmental coordination, according to interviewees, further increased the labor and time required of dam owners and others serving in project management roles, as well as increased the timeline and associated costs of the project.

Historical Preservation

Beyond environmental considerations, interviewees reflected tensions around historical preservation goals, policies, and priorities. They tended to contextualize preservation efforts in a longer historical timeframe. As one interviewee observed, the dams they work with and their related human infrastructure might be 100 years old, but the Indigenous communities and river systems around them often existed for thousands and tens or hundreds of thousands of years (if not millions) respectively—yet those cultural and ecological landscapes appeared to receive less consideration or weight. In this reframing of the human and natural timescale, multiple stakeholders raised questions about which histories were most valued and the tensions between preserving and restoring in dam removal decisions. For example, one dam removal practitioner stated, “History is often brought up as a reason to keep these dams up, but whose history are we preserving? History is much longer than the past 150 years.”

Funding

Throughout our interviews, funding challenges were noted as a barrier, but not necessarily in terms of the outright amount of funding available. More often, stakeholders interviewed conveyed that there were funding sources available, even significant ones, and that when they applied for funding they often got it. However, they also noted challenges with respect to the application process, applicability during early phases of projects, and alignment with typical project timelines.

The time, effort, and specialized expertise or familiarity required to complete funding applications were cited as a challenge, especially for individual dam owners, small entities, or localities that lack staffing capacity. They also noted in multiple cases that the owner had significant early-phase costs in dam removal or modification processes that were not covered by funding, including initial feasibility studies, which can cost tens of thousands of dollars. This was also the case with respect to unanticipated costs, such as those due to added requirements, like further sediment sampling or work related to historic preservation, that were not initially visible or anticipated. For example, one dam owner we interviewed mentioned that a few years into the design of their removal project, a culvert was added, and this increased project costs by nearly $500,000.

Timing constraints with respect to funding were also commonly mentioned by stakeholders, including uncertainty about when funds would actually be made available, seasonal timing, and delays with respect to changing weather that pushed project implementation and project timelines more broadly. For example, one dam owner who was nearly four years into the permitting process and who had received funding was aiming for the construction phase to happen the following year. The owner stated that the project’s construction phase needs to occur between April and September because of trout spawning, but also stated that they had only recently been told that there may be issues with noise because of eagle nests and bat habitats in the area that could further impact the project’s timing and timeline.

Generally, interviewees noted that dam removal projects in New York had a five (plus) year timeline—with timeframes given of 1.5 years for permitting processes alone, and three to five years for design and permitting combined, followed by the actual (de)construction. On the other hand, they noted that funding timelines were typically shorter (one to three years), leaving owners worried about whether they would still be able to access funding when projects extended past their initial timelines (which was often the case in the accounts of stakeholders). One engineer we spoke with described the funding timelines as “unrealistic” stating that, “A lot of the time when the legislation comes out for the funds, the timelines are unrealistic. They’re like you have to get this done in two years. The actual time it takes to get it done. That’s what gives us engineers and scientists a lot of agita. It’s like we’re never going to get this done. And you can get extensions, but it’s not guaranteed, so I think there needs to be also another component in trying to get the funding issuers to understand the permitting timelines."

Some suggested that state funding programs therefore have timelines more commensurate with or flexible to project timelines, while others emphasized that project timelines should aim to be shortened. One engineer we spoke with who worked across multiple states noted that while permitting in New York might be 1.5 years, in Massachusetts it was closer to one year, in New Jersey seven to eight months, and in Pennsylvania six months—though timelines for projects within each state may vary considerably and some earlier estimates from states did vary from these estimates.[171] Recently, for example, in New Jersey, the Cedar Grove Dam faced 10 months of regulatory review, while the physical removal itself took only a few hours in 2025.[172] The Association of State Dam Safety Officials states that the typical timeframe for dam removals is two to three years from conception to completion.[173] State staff in New York saliently noted that they were working on new potential processes meant to further streamline permitting into tiered requirements according to the project's/site's potential risks. State efforts in this respect were recently presented at the New York Dam Removal Summit on September 23, 2025, a public meeting of dam experts and practitioners, and reflected the potential to shorten the timeline for lower-risk projects/sites and reduce costs in the process.

In addition to the above, interviewee concerns were noted about matching requirements for funding with regard to individual, small entity, or locality dam owners; cost uncertainty, as projects cited typically experienced cost and timeline creep; and need for added allowable expenses, for further project management, technical expertise, etc.

Sediment

Sediment-related issues consistently emerged as a major concern and potential impediment during dam removal projects. Sediment refers to the accumulation of silt, sand, and other organic material that the river naturally transports, but that dams trap behind them. In our interviews, many participants spoke about the pollution risks associated with sediment. In particular, they referenced the Fort Edward Dam in New York that was removed in 1973, and that released PCBs downstream in the Hudson River. The memory of this disaster lives on in not only the dam removal policy, but in regulatory practice and culture, according to the accounts of interviewees. In particular, interviewees noted that they felt that state regulators were reluctant to allow sediment release even in cases where there would not be additional downstream contamination (either because there wasn't contaminated sediment behind the dam, or because there was already contamination downstream which the release would not meaningfully alter). One engineer expressed this reluctance as the result of trauma within state regulators and policymakers. Another stakeholder who worked with local government as well as nonprofits stated that because of Fort Edward, the perception is now that all sediment is "bad" but stated that one of the main jobs of a river is to transport sediment. Another interviewee with private and public sector experience working on dams stated that concerns around pollution in sediment are correct, but that "dilution is the solution to pollution," meaning that instead of trapping this sediment, it should be released (and therein diluted) when it otherwise won't meaningfully add to downstream contamination. This interviewee and others reflected that dam removals are generally (not in cases like Fort Edward) self-mitigating, and that the adverse outcomes are often outweighed by the beneficial impacts.

Throughout our interviews, participants explained how a lack of clear guidance or regulatory expectations leaves owners and project managers uncertain about testing requirements and the impact that sediment management will have on the larger project timeline and costs. One interviewee expressed frustration that during a dam removal project, state regulators rejected eight sediment probes that had been collected, stating that they did not comply with existing (TOG 519) guidance. As a result, the project had to use additional external contractors to sample 16 more cores, and this added $250,000 to project costs. Other interviewees noted that even when sampling plans were approved ahead of time, the results were sometimes not deemed sufficient. A few of the interviewees noted that they saw part of the challenge with sampling being that existing guidance is not based on riverine or fluvial ecosystems, but on tidal systems. State staff also expressed awareness of this frustration in regard to sediment testing, and, as referenced above, noted that they have begun efforts to streamline and standardize this process by creating a flowchart with testing requirements based on the risk associated with sediment for a particular project/site.

Community Engagement, Owners, and Education

Dam owners' buy-in was identified as one of the most critical pieces to moving projects forward, particularly with respect to removals. Owners therein typically cited the decision to remove their dam as based on a financial weighing of options, in which the anticipated cost of removal was less than the continued liability, in addition to the cost of repair. This was especially the case when dams had already begun to fail, and therein presented different risks related to safety as well as potential costs. Being presented with the scenarios of removal, modification, and repair—and the associated costs, liability, and funding—by state regulators and/or nonprofit staff was seen as vital to this decision-making. Some also noted the importance of ecological benefits—that they were already aware of or had been made aware of by regulators and others—in their decision-making processes. Yet, providing owner education, outlining options, and presenting the costs and benefits of each did not happen consistently across sites. In addition, as noted above, owners expressed that even when this did occur, and they made the decision to remove as a result, they expressed that they did not have an accurate sense of how long, how much work, or how much money it would end up costing to finish the project.

Stakeholders that were interviewed also characterized community support (or lack of opposition) as key to project success. Their experiences tended to reflect that community engagement significantly influenced project prioritization and outcomes. Many saw nearby residents as having strong attachments to waterbodies created by dams, oftentimes valuing them for recreation use such as fishing, swimming, and boating, as well as their economic value, and their aesthetic qualities. In these accounts, stakeholders relayed that communities perceived these ponds and lakes as "natural" rather than as human-made features. This sometimes created tensions in dam removals, even as the removals restored the actual natural landscape. Additionally, interviewees noted that with some projects, communities expressed a fear of the unknown, and uncertainty about post-removal landscapes generated resistance, despite the potential for relatively positive changes aesthetically coinciding with ecological benefits. The interviewees further reflected that communities were concerned with construction impacts like noise, closures, disruptions created during removal or modification processes, and the increased turbidity of any water features for a period following construction.

Stakeholders noted successful examples of gaining and/or maintaining community support through public education and engagement efforts and highlighted the efforts of nonprofits in New York and other states, particularly Massachusetts and Connecticut. They also highlighted the positive impacts of research efforts that helped identify, describe, and quantify indicators of ecological health through dam removal or modification processes with respect to community engagement. However, interviewees also noted that such education and engagement efforts varied considerably by project and those stakeholders involved. Consequently, some saw more regular community education and engagement efforts—either by regulators directly or in partnership with nonprofits and other stakeholders—as supporting project success.

Recommendations

Given these key findings, we identify recommendations for potential actions that could make the dam removal or modification process within New York State more efficient and effective. These recommendations are predicated on furthering ecological restoration and, therein, increasing the number of dam removals and modification projects, given the focus and findings of this report.

1. **Create a New York State Ecological Restoration and Dam Team**

   Create a dedicated regulatory team focused on dams and ecological restoration more broadly, increase both centralized staffing and coordination/training with regional offices, and increase New York State's staffing levels. This could help build not only capacity, but a depth of knowledge and experience among personnel as they see more projects to fruition. This team could be modeled on Massachusetts' Division of Ecological Restoration, which works to "initiate projects that restore our rivers, streams, wetlands, and watersheds." As with DER, a dedicated team within New York's DEC could partner with other stakeholders, including nonprofits, localities, and others, in efforts to implement projects.

2. **Prioritize Dam Removals in Permitting and Further Integrate Ecological Benefits**

   Prioritize dam removals within regulation, given the broader ecologically beneficial impacts of restoration, and integrate ecological benefits into regulatory permitting frameworks when assessing risks and cost-benefit.

3. **Streamline and Clarify Certain Regulatory Processes**

   Establish clearer, more streamlined regulatory processes with respect to the relative risks of projects. As noted, DEC staff are already working towards developing standardized processes and guidance with respect to sampling requirements to reduce uncertainty. Finalizing and publishing the flow chart that is currently under development would help achieve this recommendation.

   The state could further establish a general permit for dam removal. A general permit would establish preapproved conditions and standards for dam removal projects that meet specific criteria. Creating a general permit could create more predictable timelines, lead to faster project completion, lessen the burden for small dam owners that may be overwhelmed by regulatory complexity, and enhance regulatory consistency by standardizing requirements.

   The creation of a broader 'road map' that outlines the removal process and informs dam owners on what to expect from the beginning would additionally be helpful for owners and project managers navigating unfamiliar processes.

   Pre-application coordination could also be enhanced, meaning more substantive interagency alignment should occur at the beginning of a project, so that dam owners receive consistent guidance and are not learning new information at a later date than necessary.

4. **Expand Project Management Support**

   Provide greater project management support for individual, small entity, and local government dam owners. Support efforts to train project managers in order to build a deeper bench. This could be achieved by funding educational efforts by nonprofits or through opportunities at higher education institutions, as cited in examples from interviewed stakeholders. Fund further project management support through grants. Make project management costs directly related to restoration eligible expenses for funding.

5. **Improve Funding Accessibility and Applicability**

   The eligibility of upfront costs related to initial engineering and planning for individual, small entity, and local government owned dams could increase owners' choice to proceed with removal processes and lessen the burden of choosing to do so for individual, small entity, and local government owners. Funding match requirements could also be decreased for such owners in order to increase incentives and decrease disincentives for choosing removal. And finally, funding access could be supported with further administrative assistance available for applicants not familiar with state funding processes.

6. **Enhance Dam Owner and Community Education**

   Develop comprehensive resources explaining the removal processes, typical timelines, potential funding sources, and regulatory requirements to provide clear expectations. Support existing nonprofit efforts pertaining to community education about ecological benefits, river restoration, and post-removal landscapes to help increase broader knowledge and address concerns.

Overall, New York State's dam regulatory process faces significant, but solvable, challenges if it is going to increase ecological restoration efforts. To do so requires that more dam owners want to and are able to make the choice to remove or modify their dams, and that requires that the state has the necessary personnel, regulatory structures, and partnerships in place to not only support them in making that choice but to move through the necessary processes more expediently. The current system places the onus on dam owners who—with respect to individual, small entity, and local government owners—often require additional capacity or expertise to navigate existing processes. Likewise, most regulatory staff—who were repeatedly and consistently characterized as helpful and working within existing policy and capacity—are often navigating these processes for the first time and doing so across fragmented processes and policies that were not necessarily designed with ecological restoration projects or benefits in mind. By establishing more centralized coordination, standardizing processes and permitting requirements, expanding personnel capacity, adding support and incentives for owners, and partnering further with nonprofits and other entities to provide project management and education, New York can create a more efficient, equitable, and ecologically beneficial approach to dam regulation.

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