

Remove all Obstructions

THE LONG, SLOW ROAD TO RESTORING RHODE ISLAND'S RIVERS

by **Hugh Markey**

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FOR THE HARDY SOULS WHO SURVIVED THE BRUTAL WINTERS OF COLONIAL New England, there was only one choice: tame the new land. Build farms, mills, and factories that would feed families and ensure that investors back in England would be repaid for the cost of sending settlers to the New World. And building meant changing the landscape, clearing woods, and bending rivers to the needs of the colonists. Water was needed to turn the massive granite stones that would grind the grain they had struggled to raise. Water was needed to power the machines and factories that would, in the years ahead, turn the land from a tiny, struggling colony to a mighty world power. Dams were built everywhere because there was work to be done, fortunes to be made, and surely there were more than enough plants, wildlife, and fish to compensate for any losses incurred by halting the natural flow of water.

Whether that assumption was true or not, the building went on. And on. And as years turned into decades turned into centuries, the dams that provided such a vital link to colonial success fell out of use. New sources of power made the dams obsolete. Yet the dams remained, because communities didn't consider it worth the bother and the expense to remove them, and what harm would they do? In the 21st century, it turns out that the answer to that question is simple: plenty.

From source to sea

Jim Turek, an official with NOAA's Habitat Restoration division, says that even here, in the smallest state in the country, there are at least 800 dams still in existence, and "those are known ones." Some still stand in the centers of towns, such as in Wakefield or West Warwick. Yet many others have been forgotten as their owners died off or moved away. "There are many others that are abandoned out in the

Construction of the Slater Mill Dam in Pawtucket was completed in 1793, and marked the beginning of the American Industrial Revolution.





woods. I can pretty much guarantee that if you go for a walk in the woods somewhere, you'll find an old decrepit dam."

These dams, along with poorly designed culverts, affect what's known as hydrologic connectivity. According to Catherine Pringle, a research professor at the University of Georgia, hydrologic connectivity is "water-mediated transfer of matter, energy, and/or organisms within or between elements of the hydrologic cycle." Artificial water impoundments change the way organic materials, from sediment to plants to fish, are distributed within a watershed. The trouble is, the trail leading to the ownership of those impoundments that inhibit hydrologic connectivity is often a murky one.

Rachel Calabro, community organizer and advocate with Save The Bay, says there's a term for these dams: orphans. "A lot of these dams are orphan dams. You go back through the records, and it's unclear who owns it. (Because of the financial burden of maintaining them) the state doesn't want to take them, the town doesn't want to take them. The responsibility has to lie with somebody."

It is those dams, the tiny ones that turned mill wheels two centuries past, as well as those much larger ones around which cities and towns were built, that affect us today. Picture the 100-year floods of 2010, or Superstorm Sandy of 2012—two of the most significant weather events to hit Rhode Island in decades. In Charlestown alone, Sandy saw to it that there were only six houses in the whole town with lights on the night the storm struck. But the biggest impacts were from water. A report from the Wood-Pawcatuck Watershed Association (WPWA) says the three storms in March 2010 dumped over 16 inches of water on the state. Damage from Sandy was well into the tens of millions of dollars. That damage was due in part to the dams built so long ago, now obsolete but still obstructing rivers, still changing fish migration habits, and still causing floods.

Those massive storms did prompt an influx of money from the federal government, which was intended not only to repair the damage the storms inflicted, but also to ameliorate the potential for future flooding. Flooding occurred, according to reports compiled in the aftermath of the two events, because dams that were no longer in use prevented the water that had poured into Rhode Island from being quickly carried downstream. Impoundments had created conditions that made ponds, and these ponds quickly overran their banks in the storms. With no way of moving the excess water, it inundated places like the Warwick Mall, which had to be closed for months after it was flooded by the nearby Pawtuxet River.

"There's a safety issue here," says Rachel Calabro. "A lot of these dams are crumbling. They're hundreds of years old. They're way beyond their design life.



They're not being used for any active purpose; they're just a safety hazard. Then the people who own them do not want to own them (because of costs involved in repairing them). The town or the city does not want to put the money into taking care of them. Everyone's trying to pass the buck and pretend that it's not their problem that the dam's failing. In those cases, it's of-



ten to everyone's benefit that these dams are removed. Then you don't have to worry about a catastrophic event (the dam failing), and you don't have to worry about flooding. For the health of the river, it turns the river back to a river again, rather than being a pond." Before that happens, though, there is the matter of establishing just who owns the dam.

A fish ladder was constructed at Horseshoe Falls Dam in the Pawcatuck River to allow fish to migrate upstream.

Calabro spent years involved with the Pawtuxet River dam removal project. Save The Bay had to determine just who would be affected by removing the dam, which meant laboriously wading through deeds that

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sometimes drew boundaries by landmarks no longer in existence. An 1870 deed instrumental in establishing the Pawtuxet River dam cites boundaries such as “the foundation wall of the Grist Mill, formerly standing thereon” and “the east side of a crib standing on an adjoining lot”, and another direction “following the thread or middle of the river, till it strikes the bridge.” Since the person or entity who owns the dam is likely to be held responsible for the costs involved in removing it, great care has to be taken in tracing ownership. Only once proper ownership is established will agencies move on to the next step: gathering public input on taking out that dam.

Bass and flat water

Then there is the issue of what some have called emotional constraints on removing the dams. “People like to go warm-water bass fishing, or they have nice memories of a seeing a tranquil pond, if you will. Because people have grown up along the impoundment or like going to the impoundment, those are more social challenges that you have to deal with, too,” said Turek. He uses a recent Wakefield dam modification as an example.

“That pond in Wakefield had become more of an icon of the community. It’s difficult to convince people that ‘Hey, that icon is not as important as a fish passage or other ecological services involved with restoring it to what it was.’ Most organizations (like The Nature Conservancy, NOAA, Save The Bay and others) would much prefer removing the dam than having to build a fishway, but sometimes that’s just not practical.”

Chris Fox, executive director of the WPWA, witnessed similar concerns several years ago, when the prospect of altering dams in the upper Pawcatuck River went for public comment. “There were rumors around that removing (one of) the (dams) was going to drain Worden Pond,” he said. “Of course, that simply wasn’t

so, but that’s the kind of emotional reaction you have to deal with.”

Save The Bay’s Calabro concurs: “We’re emotionally invested in these places, and we’re invested in the animals, but we’re also invested in the landscape. When we were working on the Pawtuxet dam removal, there were a lot of people who were talking about canoeing or taking out paddle boats on the river. We said, well, you’re not going to lose the flat water. It’s just that the flat water becomes narrower and a more natural river, where you get a more natural floodplain, rather than an impoundment.”

Regarding the Pawtuxet, Calabro points to a May 24, 1924, *Providence Journal* story that states that, even back then, canoeists were concerned about water level changes resulting from the construction of the dam. After the Providence General Assembly created the Water Supply Board, canoeists got a clause inserted in the regulations that gave Providence the responsibility to maintain that depth.

“There was an old timber dam at Pawtuxet Falls that was leaky and could easily break, so they took the opportunity to have a new watertight dam built at the expense of Providence, and not Cranston. Providence did not complain because the cost was fairly small overall.”

“Forty shillings”

Aside from emotional concerns, there are laws affecting the fate of Rhode Island dams. “Any dam more than 50 years old is potentially a historic feature through the National Historic Preservation Act of 1966,” says NOAA’s Turek. “If we’re going to take any federal action, we are required to coordinate with a historic preservation and/or tribal preservation society to determine whether there will be any adverse effects projected. We have to have a historical archaeologist do a preliminary survey on the sites.” Turek points out that this is yet another hurdle to overcome in the removal or modification process: “What dams aren’t more than 50 years old?”

In some cases, the laws are simply outdated. Calabro cites a law against obstructing fish passage that dates back to October 1719. It was intended to “... remove all Obstructions made by Rivers, that prejudice the Inhabitants, by stopping of Fish from going up the same ... and whoever shall, build or erect and dam or Weir, across, or in any River, or draw any sein or net in the same, in a Town within the Colony, whereby fish in the accustomed course are hindered from going up the same ... shall forfeit for every offence, the sum of Forty shillings.” According to Calabro, “The act was repealed

The Hope Dam on the Pawtuxet River is a legacy of the manufacturing village of Hope that sprang up in Scituate in the 18th century.





in 1780 for the Pawtuxet River, and was largely ignored elsewhere. The first dam and gristmill at Pawtuxet Falls was actually built in 1638 by Stephen Arnold and Zachary Rhodes. The first fishway in Rhode Island was built (into that) dam in 1874, but the dam was breached in 1899.” While the level of protection afforded fish in centuries past was spotty, the design of today’s dam modifications and removals, as well as the funding for them, places a great emphasis on native fish passage and restoration.

Riverbank restoration

Even with emotional and historical concerns attended to, there are other issues that need to be addressed before adjustments to the dams can be made. In some cases, the dams may be 200 years old, and the sediment behind them may contain toxins that have built

The Barden Dam on the Ponaganset River was built in the late 19th century for the Ponaganset textile mill.

up over the centuries. “We have a legacy sediment problem then. The question becomes, ‘What are we going to do with all this sediment?’” says Calabro. “Most of the time, the sediment is contaminated. In some cases, the sediment can just go downstream (provided it is deemed safe). Where it ends up can be an issue, because you don’t want to have some other area become silted. The sediment may need to be removed and placed somewhere else.”

As the river shifts to a more natural state, the newly formed banks are initially barren. Plants are chosen both to replicate the former, natural state, and to play their role in restoring the overall environmental conditions. They shade the river, decreasing water

temperatures and evaporation rates—important in light of climate change, Turek says. And when storms hit, “the vegetation cover (slows) the peak discharge. You have far fewer homes getting flooded. With climate change ... there’s a greater frequency of peak discharges: more intense storms at more frequent intervals. We’re only going to see more of those. It will be more of a service to have these communities become more resilient,” he adds.

Just add fish

Once the dam is altered, the sediment issues are addressed, and the riparian changes have begun, there is one last item to complete the transformation—and often its role in acquiring funding for projects like these is the most influential. It is the restoration of fish. Species such as alewife, or blueback herring, while no longer listed as endangered, are still being actively reintroduced to freshwater habitat. That reintroduction means an infusion of federal funds into Rhode Island projects.

Phil Edwards is a supervising fisheries biologist with the R.I. Department of Environmental Management (DEM), and is tasked with initiating and monitoring fish migration in situations where drastic changes have been made to the aquatic environment. In many cases, construction of dams meant that the anadromous fish population could not make the return migration to spawn that was essential to its life cycle. Fish like herring or shad may hatch in an upriver location. When they are ready, the fry make their way to salt water, where they will spend their time until reaching sexual maturity. “It takes 3 to 4 years before river herring return to a spawning area, and 4 to 5 for shad,” Edwards says. At that time, they follow their genetically programmed sense of direction to attempt to spawn in the same freshwater location in which they were born. If obstacles such as dams or outdated fishways interfere with that migration, few if any of them may survive to spawn. Modifying or removing a dam restores the environment to something approximating its original state, thereby allowing fish to move freely.

Even before a dam removal takes place, according to Edwards, DEM may jumpstart the migration process by placing fry in the headwaters of that river. When the time comes for them to move to the sea, the seeded fry will have imprinted the region of their origin, which will encourage their successful return migration. From there, DEM tracks the program’s success using U.S. Fish and Wildlife staff or volunteers. “It’s basically asking the question, ‘Are fish using the new fishway?’” Edwards says, and includes measurements such as counting the number of fish sighted in a given location per hour.

In the case of the Pawtuxet dam removal, DEM staff set out to use electrofishing in order to determine

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whether the fish that had been seeded in the headwaters above the dam several years earlier were returning to their spawning grounds. The process involves using a boat and a kind of backpack that a staffer uses to produce an electrical charge in the water. The charge temporarily stuns the fish, allowing them to be collected and monitored before being returned to the water. Similar techniques are used in parts of the Pawcatuck River as well. This monitoring seems to indicate that, once a dam alteration or removal takes place, anadromous fish that once populated the headwaters and rivers make a successful return. And while fish such as freshwater bass may be displaced by cooler, faster water, others will take their place.

“When we remove warm water species, we often return cold water (species), such as brook trout,” Turek says. “We lose the natural riparian community in a dam, but when we take the dam out, we see the riparian community repairing itself.”

Nature, or nature-like?

The process of repairing 300 years’ worth of anthropogenic influence through dam removal or amendments will take years. Simply deciding on the best choice, given historical, emotional, and physical constraints is a constant source of conflict, according to Turek.

“The preference is full dam removal. More commonly, though, will likely be hybrid sites, where we adjust a dam, but create a better design ... with a notch big enough for fish to get through, along with a fishway down below the dam.”

These choices rarely please everyone. “How do you look at hybrid projects? Are nature-like projects good or bad? Half of the people you ask will say they’re bad, because we can’t guarantee what will happen without removing the dam. But half will say that they’re good, because they’re a trade-off,” Turek says.

WPWA’s Chris Fox agrees that perhaps the single biggest factor in restoring hydrologic connectivity is ensuring that the public understands the benefits of these changes. “WPWA’s job (in the Pawcatuck River dam changes) was to make sure everyone’s interests were represented.” That recognition that projects will address as many concerns as possible is perhaps the single biggest influence in any dam project’s success, according to Fox. “To get these projects done, you have to hang your hat on trust.”