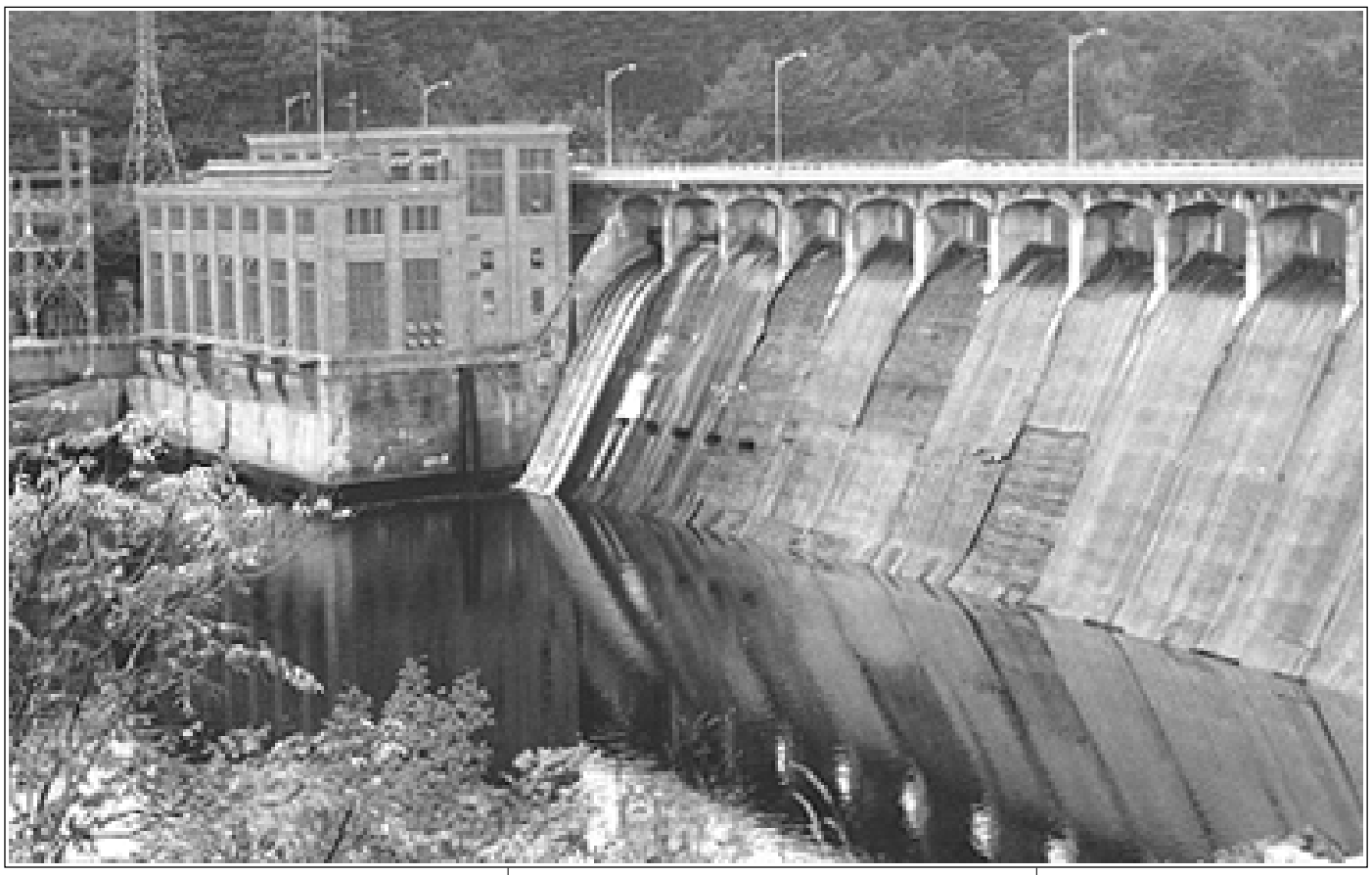
The power of dams



The Stevenson Dam, bordering Monroe and Oxford, is the largest of the five Connecticut Light & Power hydroelectric dams on the Housatonic River.

file photo

Water is our lifeline. The early settlers enjoyed a seemingly endless supply of water in the form of free-flowing rivers, along with vast forests, abounding wildlife, copious mineral deposits, nutrient rich open fields.

Today, nearly 600,000 miles of previously free-flowing rivers are contained behind dams. Whether earthen, wooden or concrete, these dams all have one thing in common — they have forever changed the face of the rivers they impede. No longer do these dammed rivers support natural blue-ribbon fisheries, adventure-class white-water, or habitat for many endangered aquatic and plant species.

Freshwater rivers, lakes, ponds and wetlands are quite limited, covering only about one percent of the earth's surface. According to the World Conservation Union, which tracks threats to the world's biodiversity, freshwater ecosystems have lost a greater proportion of their species and habitat than any ecosystem on land or in the oceans. They also estimate some 34 percent of all fish species, mostly from fresh water, are threatened with extinction. Dams and channelization remain the two most pervasive threats to freshwater ecosystems today.

There are more than 75,000 dams on our nation's rivers, including hydropower projects, and most of these have been built in this century. According to American Rivers, for each mile of river that has been preserved, 65 miles have been dammed. Is this good or bad? The pros and cons of dams, and dam removal, are framing a national debate as well as local ones right here in the Housatonic River watershed. ❑

Reassessing Dams

Pros and cons of dams

by ***Ruth Malins***

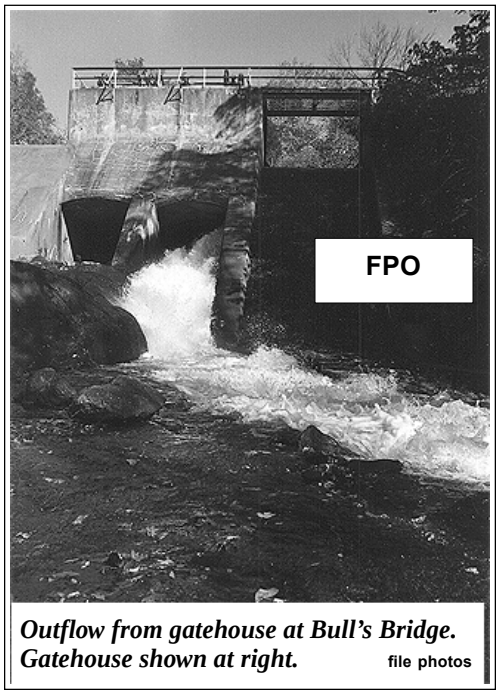
Environmental organizations across the nation have been focusing increased energy on river restoration, including the removal of dams. Many of these dams, often built of timber and rock, are nearly 100 years old and are deteriorating, posing a significant risk to public safety. Many were built to power grist mills, sawmills and waterwheels and are no longer used.

What's so bad about dams?

The Hydropower Reform Coalition, a group of national, regional, state and local conservation and recreation organizations working to restore river resources damaged by dams, recently published this list:

Ten ways dams damage rivers

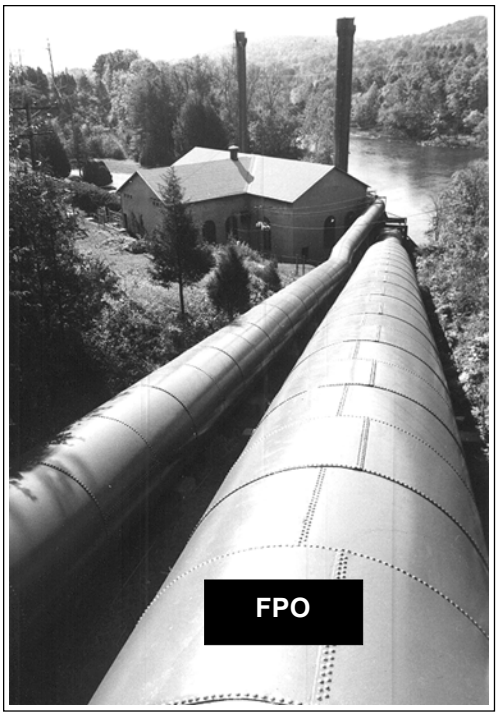
- **Reducing water levels**.
  By diverting water for power, dams remove water needed for healthy in-stream ecosystems. Stretches below dams are often completely de-watered.
- **Blocking rivers**.
  Dams prevent the flow of plants and nutrients, impede the migration of fish and other wildlife, and block recreational use. Fish passage structures can enable a percentage of fish to pass around a dam, but multiple dams along a river make safe travel unlikely.
- **Slowing rivers**.
  Many fish, such as salmon, depend on steady flows to flush them downriver early in their life and guide them upstream years later to spawn. Stagnant reservoir pools disorient migrating fish and significantly increase the duration of their migration.
- **Altering water temperature**.
  By slowing water flow, most dams increase water temperatures. Some dams decrease temperatures by releasing cooled water from the reservoir bottom. Fish and other species are sensitive to these temperature irregularities, which often destroy native populations.
- **Altering timing of flows**.
  By withholding and then releasing water to generate power for peak demand periods, dams cause downstream stretches to alternate between no water and powerful surges that erode soil and vegetation, and flood or strand wildlife. These irregular releases destroy natural seasonal flow variations that trigger natural growth and reproduction cycles in many species.
- **Fluctuating reservoir levels**.
  Peaking power operations can cause dramatic changes in reservoir levels – often up to 40 feet – which degrade shoreline and disturb fisheries, waterfowl, and bottom-dwelling organisms.
- **Decreasing oxygen in reservoir waters**.
  When oxygen-deprived water is released from behind the dam, it kills fish



Outflow from gatehouse at Bull's Bridge. Gatehouse shown at right. file photos

History was made July 1!

On July 1, 1999, the 24-foot Edwards Dam on the Kennebec River in Maine was breached. This dam, constructed in 1837, is the first hydroelectric dam ordered to be removed by the Federal Energy Regulatory Commission (FERC), the agency which licenses and regulates non-federal hydropower dams. For 10 years environmental groups lobbied for the dam's removal, and achieved a victory when FERC determined that the environmental harm from the dam outweighed the benefits of the power it produced.



The Bull's Bridge power plant in Gaylordsville. The pipes carry water from the gatehouse above Route 7. *file photo*

and vegetation downstream.

- **Holding back silt, debris, and nutrients**. By slowing flows, dams allow silt to collect on river bottoms and bury fish spawning habitat. Silt trapped above dams accumulates heavy metals and other pollutants. Gravel, logs, and other debris are also trapped by dams, eliminating their use downstream as food and habitat.
- **Cutting up fish in turbines**. Following currents downstream, fish are drawn into and cut up by power turbines. When fish are trucked or barged around dams, they experience increased stress and disease and decreased homing instincts.
- **Increasing predator risk**. Warm, murky reservoirs often favor predators of naturally occurring species. In addition, passage through fish ladders or turbines injure or stun fish, making them easy prey for flying predators like gulls and herons.

So . . . what's good about dams?

Dammed rivers are often managed for human benefit, not for the river's natural inhabitants or ecology. Benefits that dams may provide include:

- improved flood control
- enhanced electricity generation and system reliability (from hydropower production)
- the creation of domestic (drinking water,) industrial and irrigation water supplies, and
- improved recreational opportunities.

Even certain species of fish and waterfowl may benefit from an increase in habitat area associated with new reservoirs.

Chance to restore rivers

Seeking dam removals may be a viable alternative for dams that are severely degraded, if hydropower operations are not economically viable or if scientific studies demonstrate irreversible adverse environmental impacts.

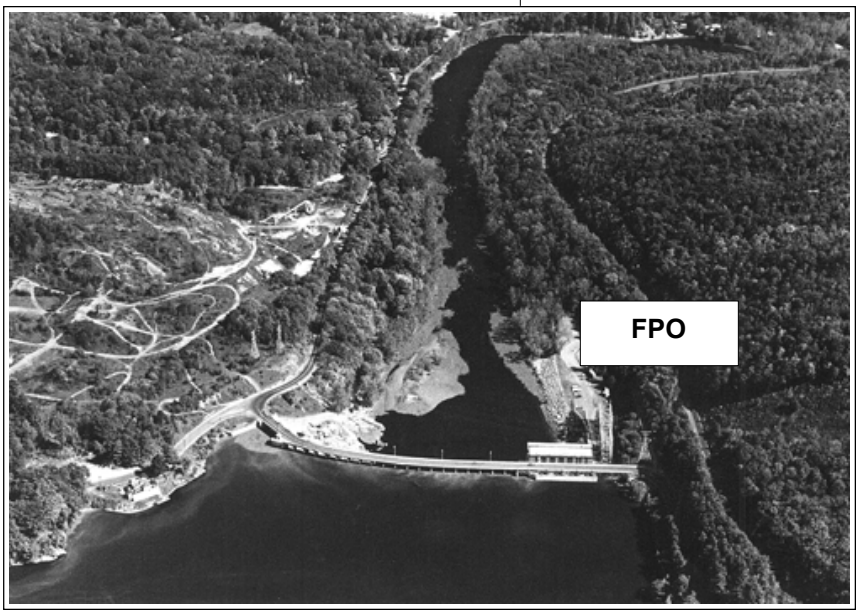
If a dam is not removed, the Federal Energy Regulatory Commission's (FERC) relicensing process can require river improvements by minimizing impacts to the natural environment, and lobbying for safer, more efficient dam and station operations, fish protection and environmental and recreational enhancements.

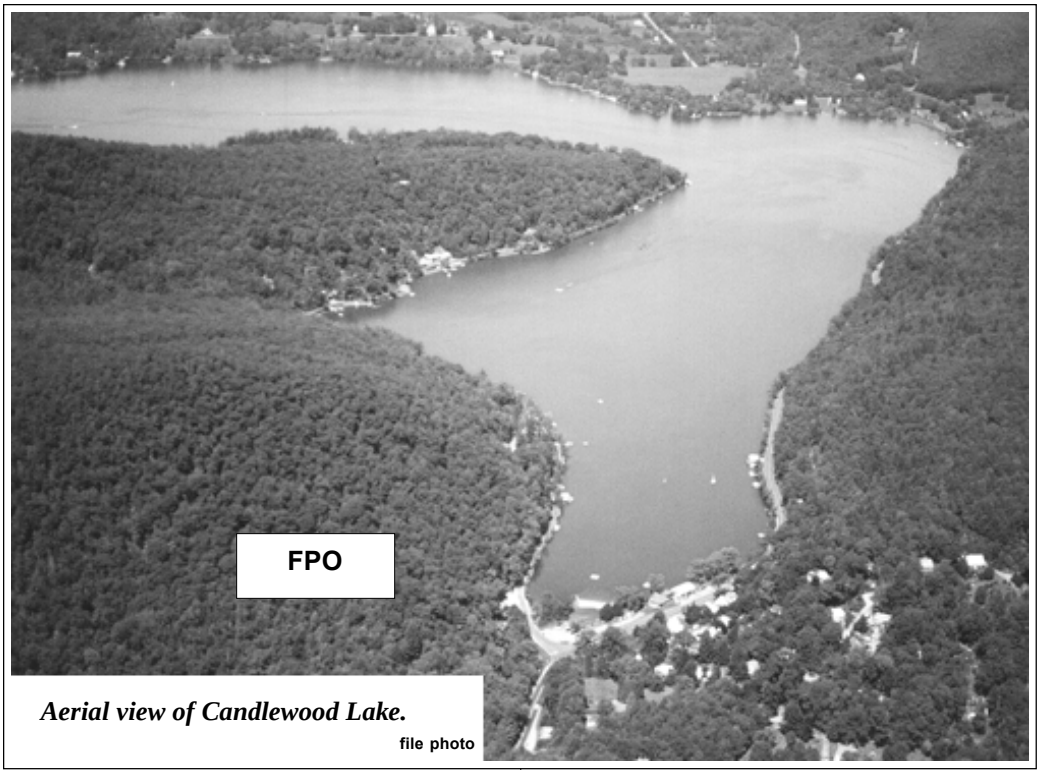
Can dam impacts really be minimized?

Impacts can be minimized if certain steps are taken. American Rivers recently developed a set of criteria designed to determine if a dam will have a minimum environmental impact. The five broad criteria, and the overall goal for each, are:

- **Fish are protected.** Fish requiring upstream and down-

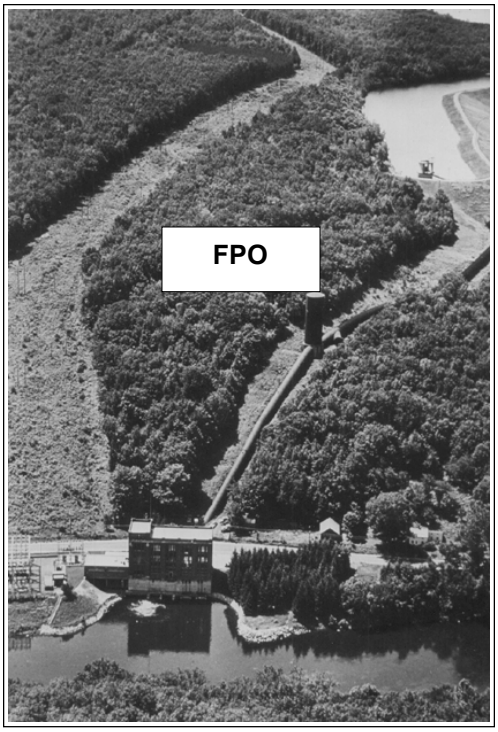
Below: Aerial view of the Stevenson Dam, bordering Monroe and Oxford. The dam creates Lake Zoar. *file photo*





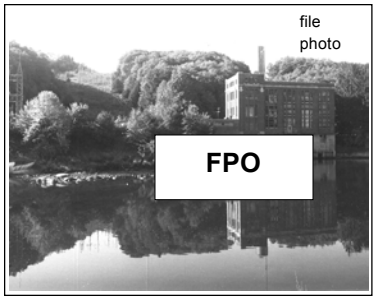
Aerial view of Candlewood Lake.

file photo



Above: Rocky River power station on the Housatonic River in New Milford (bottom of photo and at left). Water is pumped from the river up the bank into Candlewood Lake, a pump storage facility.

photo by G. Betancourt



stream movement shall be provided with safe, effective passage through the project area and all fish shall be protected from entrainment by turbines and other devices.

- **River flows are adequate.**
  The project shall maintain sufficient flow for a healthy river in the affected stream reaches (including any bypassed reach) .
- **Water quality is satisfactory.**
  The project shall meet state water quality standards established by the relevant state agency for the project area and downstream.
- **Flooded habitat is replaced.**
  To protect water quality, recreation, public access and ecological values, the project shall permanently dedicate a significant amount of watershed land to fish and wildlife habitat or wetlands.
- **Recreational opportunities are available.**
  The project shall enhance the public's ability to enjoy river-oriented recreation by allowing free public access to project waters, and by making accommodation in project operations for recreation, such as facilities and flow releases, to the extent this accommodation is consistent with protection of the aquatic ecosystem.

Dams on the Housatonic

The Housatonic has many dams. Some of the larger ones in Massachusetts are Rising Pond, Willow Mill, Woods Pond, Columbia Mill, Pontoosuc, and Glendale. In Connecticut, Falls Village, Lake Housatonic (Derby Dam), Spooner, Bulls Bridge, Shepaug, and Stevenson dams are among the largest.

Connecticut Light and Power Company (CL&P) operates five hydroelectric plants on the river in Connecticut. Falls Village, Bulls Bridge, Shepaug, and Stevenson dams are traditional pond-and-release facilities which generate power to meet peak power demands. Rocky River is a pump storage facility which takes water from the Housatonic River, pumps it up a pipe called a penstock, and stores it in Candlewood Lake, the state's largest man-made lake. When power demand warrants, water is sent back down the pipe and through the turbines to generate electricity.

While these plants have operated for many years, they received initial 20-year federal licenses in 1981. These licenses will expire in September and October of 2001 and will be combined into one license during the relicensing process. CL&P must submit its license renewal application to FERC by August 31, 1999. The new license will regulate the Housatonic River for up to 50 years.

What's important?

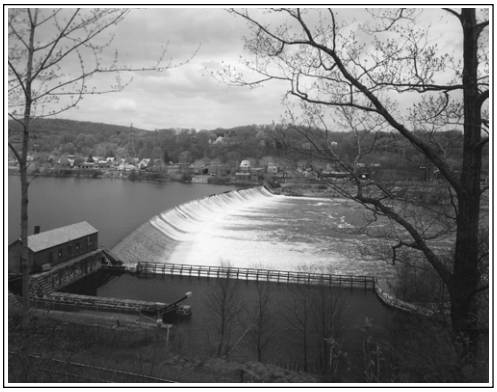
Some of the key issues for the new license that HVA is working on include:

- Operating the Falls Village and Bulls Bridge plants as "run-of-the-river," rather than pond-and-release. This would provide more constant flows in the river during summer months, protect fish habitat and reduce the risk of fish kills. At issue is the extent to which this will reduce artificially high water flows which have made white-water rafting, kayaking and canoeing possible.
- Restoring flows to bypassed sections of river at Falls Village and increasing bypass flows at Bulls Bridge. This will improve ecological as well as scenic values.
- Installing an oxygen line diffuser system in Lake Lillinonah to raise dissolved oxygen levels in waters released from Shepaug station to Lake Zoar to meet state designated water quality standards.
- Providing vegetative shoreline buffer zones on all power company-owned lands and creating shoreline protection zones on lands which may be sold or developed in the future.
- Increasing minimum flows at Falls Village, Bull's Bridge and Stevenson to more closely approximate the aquatic base flow, the standard recommendation of the U.S. Fish & Wildlife Service to protect fish and aquatic life.
- Providing for fish passage to restore native populations of American shad, alewives, blueback herring, sea lamprey and American eel.
- Conducting a decommissioning study to evaluate the pros and cons of dam removal.

How can you help?

Get involved in the fate of your river. Rivers are public resources and belong to all of us. Amendments to the Federal Power Act of 1986 require FERC to balance hydropower with the protection and enhancement of fish, wildlife and the environment, as well as improved recreational opportunities.

If you want to be directly involved, call HVA at 860-672-6678 or 413-394-9796. ❑

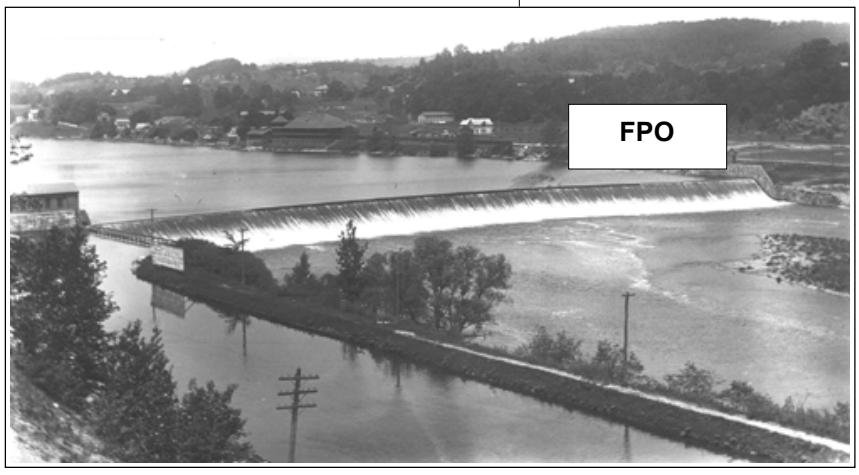


Left: The Derby Dam, constructed in 1870 bordering Shelton and Derby, was the first hydropower dam on the Housatonic River. Huge ice floes burst the dam in 1890 and it was reconstructed. Now, it is no longer used.

1981 photo by Nick Scutti

Bottom: The dam and canal looking toward Derby (circa 1910).

courtesy of Derby Historical Society



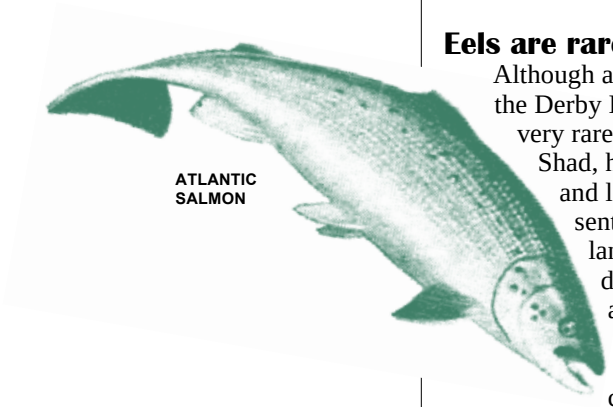
ALEWIVES

Where have all the fishes gone?

by ***Rick Jacobson***
DEP fisheries biologist

The Housatonic River once held large populations of Atlantic salmon, American shad, American eel, alewives, blueback herring, Atlantic and shortnose sturgeon, and sea lamprey. Salmon, eel and lamprey are recorded as far north as the Great Falls in Falls Village; shad and herring to the falls at Bulls Bridge in Kent; and sturgeon and alewives to Lovers Leap in New Milford. This has changed radically with construction of dams on the river.

Eels are rare



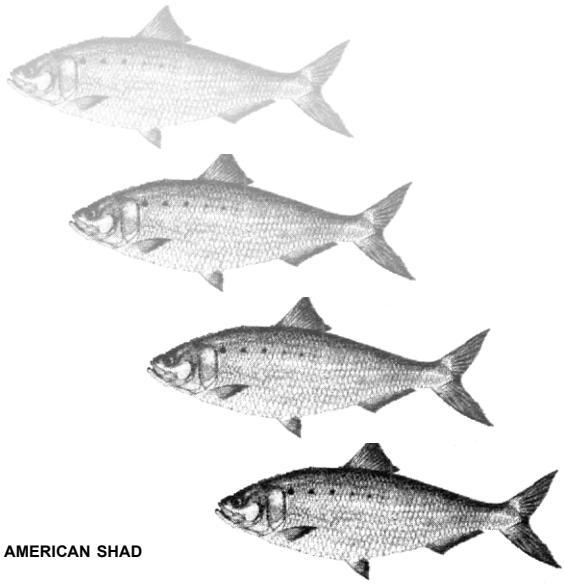
ATLANTIC SALMON

Although a few have been able to scale the Derby Dam, American eels are now very rare above the Stevenson station. Shad, herring, anadromous alewives and lampreys are completely absent from above Derby dam. Atlantic salmon, the federally endangered shortnose sturgeon, and the federally threatened Atlantic sturgeon have been eliminated from the river completely (one Atlantic sturgeon was captured in the lower river in the 1990s, and assumed to be a stray from the Hudson River). All of these fish have been excluded from the upper river by the dams which block their passage to and from historic spawning and rearing areas.

This affects other species, too. For example, shad and herring, hosts for the larval stage of some of the freshwater mussels, are also blocked. This may explain why at least one type of endangered freshwater mussel was not found in recent surveys of the upper river.

Restoration planned

The DEP has preliminary plans to restore American shad, alewives, blueback herring, sea lamprey, and American eel to the upper Housatonic River. Complete restoration could yield more than 192,000 American shad, and nearly 2.9 million river herring (alewives and blueback herring combined). For this reason, DEP is seeking to reserve its authority in the Federal Energy Regulatory Commission relicensing process to require Connecticut Light & Power Company to install upstream and downstream fish passages at the Stevenson, Shepaug and Bulls Bridge stations. DEP would coordinate this with fish ladder installation at the privately-owned Derby dam, too. ❑



AMERICAN SHAD

To go or not to go . . .

That is the question of dam removal

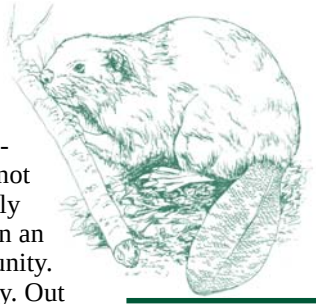
by ***Nicole Waldheim***

Anytime the word "dam" is mentioned two things come to mind – beavers and barriers. Still being a little kid at heart, I think back to Saturday morning cartoons as the animated beavers cut down trees with their oversized front teeth in order to build a wooden barrier across a river. The beavers used the dam they erected for protection and as a place to hide their food from the various villains of that week's episode. In their animated world, they had built a structure that defied the laws of reality. Their dam had no safety issues, was never abandoned, always served its purposes, could be repaired without spending a penny and yielded no adverse affects on the environment.

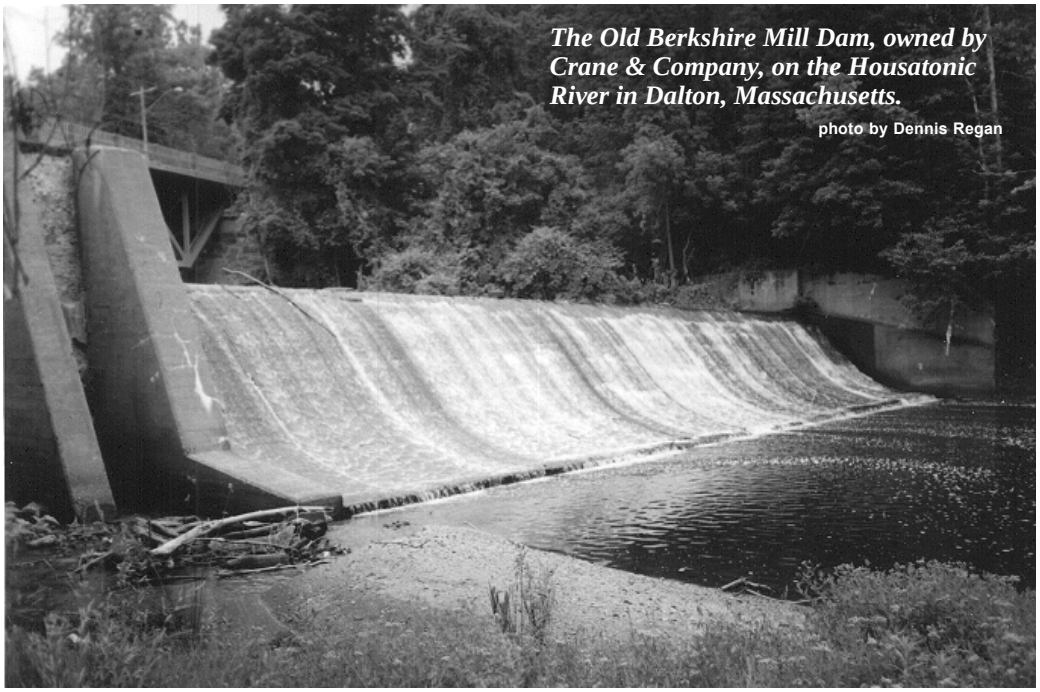
Today, dams are being viewed from an entirely different perspective and are being closely reviewed as to their impact and usefulness. Most dams in New England were created to power local mills and became crucial elements for the economic survival of the community. Many of the mills these dams once served are now out of business, however, and cheaper means of power have been established. Some of these structures are now being identified as barriers in otherwise free flowing rivers. In the cartoon, the dam served as the epitome of usefulness and strength. In reality, it is time to look at the pros and cons of dam removal.

Should dams stay or go?

Dams are not just single structures that take up space in a river. They appeal to the communities that have grown up with them and affect the environment that surrounds them. There is not a lot of scientific information that clearly defines the impact of dam removal upon an economy, the environment, or a community. Each dam needs to be treated differently. Out of the 75,000 dams in the nation, many still serve their original purpose, from providing a water supply to maintaining flood control. However, a large number of dams are still standing despite the fact that they are old, abandoned, or pose safety and environmental



Nicole Waldheim is an intern with HVA working out of the Berkshire office (see page 15).



The Old Berkshire Mill Dam, owned by Crane & Company, on the Housatonic River in Dalton, Massachusetts.

photo by Dennis Regan

Crane dam part of new pilot project

At press time, Secretary of Environmental Affairs Bob Durand said Crane and Company's proposal to breach the Old Berkshire Mill Dam is one of two pilot projects of the new River Restore initiative launched by the Executive Office of Environmental Affairs.

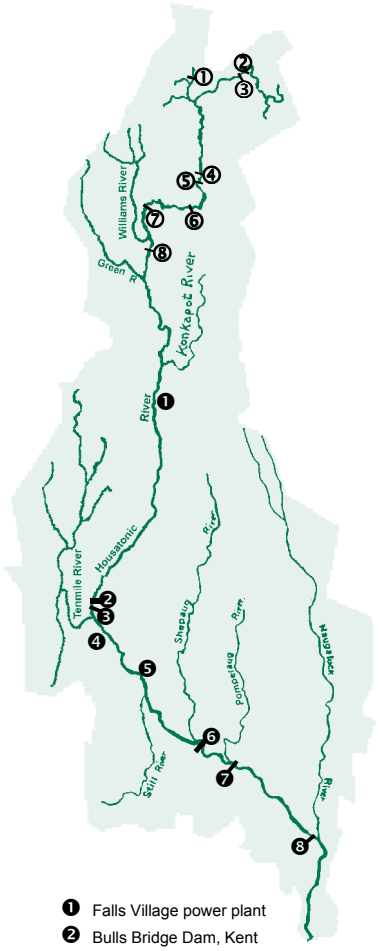
On July 20, Crane presented its project to the Massachusetts Dam Decommissioning Task Force, which will provide regulatory review and oversight of the two pilot projects. The task force is comprised of EOEA and federal agency staff.

River Restore will be administered through the Department of Fisheries, Wildlife and Environmental Law Enforcement, and coordinated by Karen Pelto of the Riverways Program.

Dams and power plants on the Housatonic River

identified in this special report

① Pontoosuc, Pittsfield
② Center Pond, Dalton
③ Old Berkshire Mill, Dalton
④ Woods Pond, Lenox
⑤ Columbia Mills, Lee
⑥ Willow Mill, Lee
⑦ Glendale, Stockbridge
⑧ Rising Paper, Housatonic



❶ Falls Village power plant
❷ Bulls Bridge Dam, Kent
❸ Spooner Dam, Kent
❹ Bull's Bridge power plant, Gaylordsville
❺ Rocky River power plant, New Milford
❻ Shepaug Dam, Southbury
❼ Stevenson Dam, Oxford/Monroe
❽ Derby Dam, Derby/Shelton

HVA
Cornwall Bridge, CT 06754
South Lee, MA 01260

concerns. For these decrepit structures, the cost of repairs and maintenance is enormous. The complete removal of such a dam may be more feasible, but the benefits and setbacks are complex. Each dam situation needs to be thoroughly analyzed so that the most cost-effective, politically sensitive, and environmentally sound solutions are found.

Engineers, biologists, and the local communities need to look at issues such as sedimentation, the overall ecosystem stability, current fish migration and habitat, water quality, the usefulness of the dam, landowner impacts above and below the dam, aesthetics, and the impact on new or existing recreational opportunities. For every dam, each factor takes on a different meaning.

Assessing two dams in Dalton

As each element is assessed, the main question is, will dam removal help or hurt an area? Two dams in the town of Dalton, Massachusetts, owned by Crane and Company, were recently identified by HVA's East Branch Stream Teams for possible breaching. Both structures are old and no longer produce power for the local mills. After the Stream Team's impact analysis, it was felt that one dam should remain while further research is needed to proceed with the potential removal of the second dam.

In the case of the first one, the Center Pond Dam on Route 8, excess sediments behind the dam and the negative responses about dam removal by landowners living around the mill pond, led the stream team to decide that the structure should remain intact.

The second dam, the Old Berkshire Mill Dam, is being considered for removal. This dam serves as a blockade between two distinct fisheries habitats. Below the dam, a well-used cold water fishery thrives, while above the structure is a warm water fisheries environment, which is rarely used by the public. The community felt that the result would be positive if the dam was removed and the original fisheries habitat was restored.

The recreational use of the area was also evaluated. Since the steepness of the river banks greatly restricts public access to the area above the dam and because there is not a great demand to fish in the warm water environment, there was little support for keeping the dam in place. More in-depth studies, such as sediment analysis, need to be done to determine the full impact of dam removal. However, preliminary review indicates that the removal of this dam would benefit the health of the community and the environment.

With each dam, there are different issues and concerns that need to be addressed before answering the question – should dams stay or go? ❑

What if you want to keep your dam?

contributed by ***Tom Maloney***
Connecticut River Steward

There's no doubt about it. Removing dams restores the basic ecology of rivers. But sometimes small dams are desirable. The millpond may provide scenic or recreational values. Ecologically significant wetlands may have developed in the head pond. The site may represent a significant aspect of the community's history.

In these cases where removal may not be the best option, what can we do to improve river health?

Breaching – Dam breaching is an increasingly popular restoration tool. This entails removing part of the dam and allowing the river to flow freely through the breach. Breaching restores the river while retaining part of the dam for historical or scenic purposes.

Bypassing – Sometimes bypass channels that leave dams where they stand are used to restore river flow around a dam.

Fishways – Where migratory fish exist, fishways can be installed to allow access to upstream sections above a dam. Fishways are not always needed, however, and should be planned in consultation with a fisheries biologist.

Ramps – For very small dams (less than four feet), a new restoration technology allows the dam to stay in place with a "roughened ramp" installed on the downstream face of the dam This allows for the passage of fish over the dam and tends to oxygenate the water.

When each of these restoration options is ruled out, there are simple things dam owners and concerned neighbors can do to improve pond management. Working to control nonnative plants is an important step in protecting our rivers. Also, just as on the streams themselves, maintaining vegetation around the pond helps to shade the pond and will provide cover for fish and wildlife. ❑