

Newsletter Spring 2021



Spring into the Freshet Thing in Town

Many local rivers show a seasonal pattern in their flow regimen: medium in the cold weather of late fall and winter, high in the spring, medium in the early summer, low in late summer and early fall. The high flow of spring is usually called the “freshet” and results from the melting of snow and thawing of the landscape that surrounds the river. This additional water usually builds gradually and lasts several weeks, but exact conditions can result in great variability. A slow melt or low snow depth will generally result in a subtle freshet, whereas heavy snowpack, quick melting, and abundant rain can lead to a disastrous flood.



Springtime freshet

Photo by RH Lord

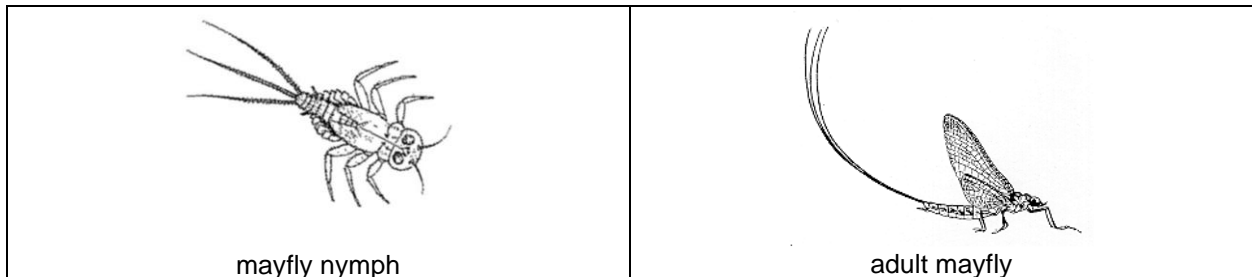
The typical spring freshet along the Lamprey River is manifested when the river’s rich floodplains cease to be dry land and become one with the river. Paddlers can test their skills on white water. Anadromous fish, such as river herring, return from the ocean and swim to their freshwater spawning grounds. Aquatic insects start to emerge as adults and provide high energy food for hungry songbirds that live along the river.

Most freshets do not result in floods that impact human homes and infrastructure, but many of the worst floods along the Lamprey River did occur in spring. (The five worst floods in the past 100 years: #1. May 2006, #2. April 2007, #3. April 1987, #4. March 2010, #5. October 1996) By definition, floods are extreme events that cause expensive and long-term damage to affected areas. Floods on the Lamprey River can occur whenever a sudden influx of water causes the water level to rise and flows to accelerate. Recent Lamprey River floods have been caused by extreme rain events and were exacerbated by human development in the landscape, especially along known flood-prone areas.

While big floods are, for the time being, rare, the freshet marks the beginning of another year along our Wild and Scenic Lamprey River.

Mayflies

Mayflies, despite their name, hatch from early spring to fall, depending on the species. Almost all species of mayfly prefer clean, cold water, much like the fish that eat them, trout. Fly fishermen know that in order to catch a trout, the fly on the end of the line must match the dominant species hatching. In New Hampshire, researchers have documented 121 mayfly species. (Chandler, Donald S., et al. "The Mayflies (Ephemeroptera) of New Hampshire: Seasonality and Diversity of the Stream Fauna." *Transactions of the American Entomological Society*, vol. 132, no. 1/2, 2006, pp. 25–73.)



Life for mayflies begins when a female deposits her fertilized eggs on or in the water. After sinking to the bottom and hatching, the mayfly nymph feeds on tiny plants or decaying material underwater and grows in size, shedding its exoskeleton several times to accommodate its growth. When it reaches its final size as a nymph, it crawls out of the water and molts its exoskeleton to reveal a winged, adult form. Mayflies are unique aquatic insects in that they need to molt a second time as air-breathing adults, this time to transition from sexually immature to sexually mature. As sexually mature adults, mayflies have one job: mate. This in large part explains why mayflies belong the taxonomic order, *Ephemera*, meaning short-lived. Their mouth parts are so weak that the mayflies cannot feed; their legs are so weak that they might not be able to support themselves on a solid surface. But short-lived does not mean that these creatures are rare; there have been instances when hatching mayflies have been so abundant that they were detected on Doppler radar. Motorists driving through these hatches might find their car fronts covered in smashed mayflies. In nature, a good hatch is an opportunity for mayflies to mate and for trout and song birds to catch a good meal.

Mill Stones, Rediscovered

During the early days of the COVID 19 shut-down, many people tried baking their own bread at home and stores quickly ran out of flour. Once upon a time, many towns in New England grew their own supply of wheat and corn.

Chances are good that you have seen grist mill stones and thought they were merely decorative landscaping features. Their function today is, in fact, mostly decorative, but in the early days of this country, these stones served an important function in most communities: grinding locally grown corn and other grains to feed people and livestock.



Sample mill stones

Mill stones, or more precisely, grist mill stones, had been in use for a long time throughout Europe and the technology was brought to America by colonists. These stones were used until steel grinding became more available in the late 1800s. The 4-5 feet-wide granite stones were part of an elaborate contraption that captured the flow of water from rivers to create mechanical energy. Millers (professional grinders) used gear ratios to modify how fast the wheels turned based on the flow of water. They would suspend the top milling stone just a hair above the stationary, bottom milling stone. Corn flour is highly flammable and millers had to keep a close eye on operations to prevent sparks. The term, “keeping one’s nose to the grind stone” was more than just hard work; for millers, it was a matter of avoiding fire and staying in business.

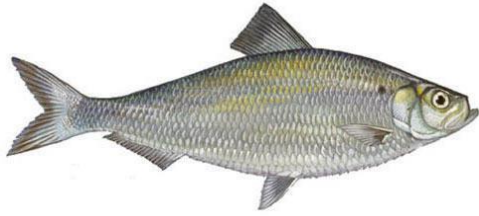


Map of historic mill sites in the Lamprey River watershed.

Grist mills and sawmills were frequently located together to take advantage of water power. More than 100 mills once operated in the Lamprey River watershed. Most of these buildings have been lost to fires and floods, but a few survive as historic working museums. Along the Lamprey River, mill remains can be found at Mary Blair Park in Epping, Wadleigh Falls in Lee and Wiswall Dam in Durham.

(Hard of) Herring Aid, 2021

Normally at this time of year, we invite you to join the LRAC and NH Fish and Game Department biologists to welcome river herring back to the Lamprey River. While the fish will be running free, gathering in large groups, and not wearing masks, we people still need to behave as we should in a pandemic. This year, we will do our best to bring the annual Herring Aid celebration to you virtually.



alewife
photo from dnr.maryland.gov

River herring are comprised of two species: alewife and blueback herring. These two species are anadromous, meaning that they start their lives in freshwater, but then spend most of their time in the saltwater of the Atlantic Ocean. Unlike salmon which spawn once and die, river herring can spawn multiple times over several years. They return to rivers along the East Coast each spring to spawn. Or at least they try...

River herring once were common throughout the eastern seaboard. Due to dams, overfishing, and pollution, their numbers have plummeted. They are being considered for listing as federally endangered. Here on the Lamprey River and on the Cocheco River, alewives are doing relatively well due to fish ladders and active intervention by NH Fish and Game. The best alewife run in recent years was in 2016 with about 97,000 fish passing through Newmarket's Macallen Dam ladder. Historic runs in individual Maine rivers were once in the millions.

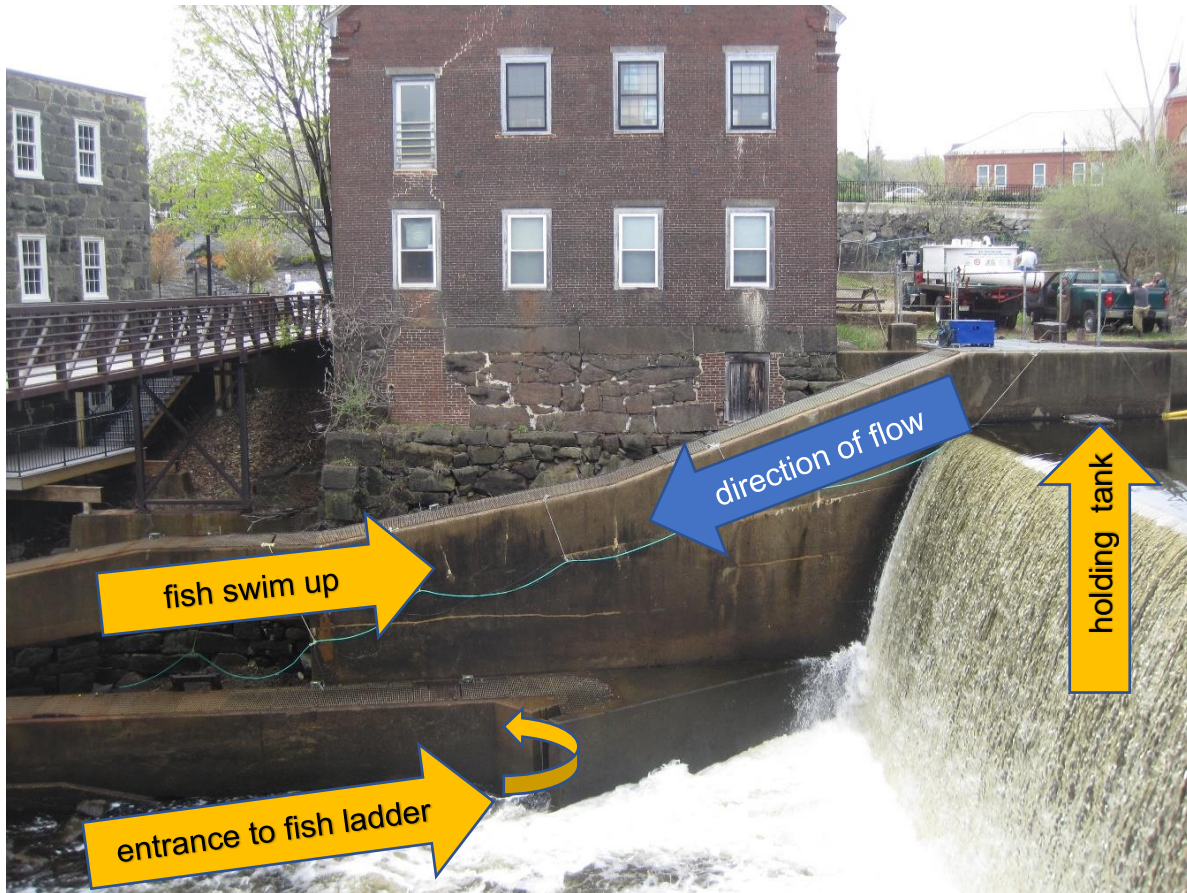
The Macallen Dam in Newmarket has a fish ladder that helps the fish get up and past the 20-foot high face of the dam. This fish ladder starts at the base of the dam and is very similar to a wheelchair ramp inside. Water flows down the ladder at a low slope and enables fish to swim up. Halfway up the vertical distance, the ladder turns back on itself for the second part of the ascent to the top of the dam. Inside the ladder are regularly spaced rest nooks where the fish can get out of the strongest flow before the next hard effort upward. This model is different from salmon fish ladders, where the salmon literally jump out of the water to reach the next step.

The Macallen Dam ladder is more successful with alewife. Blueback herring tend to reach the base of the dam, but don't swim into the ladder. They often lay their yellow/orange eggs at the base of the dam. If the amount of freshwater is good, the blueback herring eggs will often successfully hatch. If freshwater flow is not good, the eggs will not hatch, and the long migration to spawn will have been wasted.

Even for alewives, the fish ladder is not perfect. According to NH Fish and Game data, on average, only 35%-59% of the fish that start at the bottom of the Macallen Dam actually go up all the way. Many fish start to go up, but then turn around. During flood years, alewives often cannot overcome the force of the current and cannot reach the top.

The fish ladder also has another shortcoming: a scary exit. At the top of the fish ladder is a large concrete holding tank. This section has a hole leading to the impoundment behind the dam, but the fish often seem skittish to go through. Sometimes rain will spook them. Sometimes it seems as though they need a crowd to swim forward and very few fish are willing to go through alone. This hole cannot be made larger, as this is where the fish counting device is located and too many fish going through at once does not yield an accurate count. Enter the NH Fish and Game biologists! Every day during the river herring run in spring, these dedicated professionals and volunteers visit each of

the seven fish ladders in New Hampshire and literally transfer nets and nets of thrashing fish from the holding tanks to the freshwater of the river. They also take basic measurements such as length, species, and sex.



Anatomy of the Macallen Dam fish ladder (Switch back is out of this photo at left.)

Most of the fish that successfully make it up the ladder can swim to Wiswall Dam in Durham, where they encounter another fish ladder. From there, they can swim to Wadleigh Falls in Lee. The dam there is breached, but the natural falls are too much for any river herring to pass. Each year, Fish and Game biologists transport about 15% of the Lamprey River run to Pawtuckaway Lake and to other rivers, such as the Merrimack, to help with restoration efforts.



NH Fish and Game fish transport truck

We hope that in 2022, we can meet again in person to welcome the river herring. Until then, please stay safe.