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## Working to Preserve and Restore Outlet Stream's Heritage

China Watershed Research Associates hopes to create awareness and encourage redevelopment of the Outlet Stream. After some initial research we chose Outlet Stream as our focus because of its significant history, such as Masse Mill, and the potential of this stream to once again become a "center of attention" for the Town of Vassalboro.

We have researched redevelopment possibilities such as small scale hydro-

power, reintroduction of sea run fish, and renovation of existing mill structures to improve the stream's value to



**Outlet for China Lake**

owners and the community. A very important part of the res-

toration of the stream would be to improve the larger watershed's water quality.

We want to spread the knowledge we have gained during a semester's study to local organizations, committees, and citizens. Our mission is to bring new awareness that Outlet Stream can be an outstanding place to live, work, and visit.

~Amanda DiBiase and Lauren Driscoll

## Masse Dam: Restoring Maine's History

Located ¼ miles below the Outlet Dam the Masse Mill is the first power mill on Outlet Stream. The mill can trace its history to 1797 when John Getchell, one of Vassalboro's original settlers, reserved exclusive right to erect a Grist Mill on the site.

Together with the Saw Mill that was moved to the site in the early 1800's, the Grist Mill utilized the best site on the Outlet Stream. Unlike lower dams, the first power site was assured of a steady flow of water.

In 1912 Louis Masse purchased



## Masse Dam: Restoring Maine's History cont.



Belts powered by water once ran a table saw inside Masse Mill.

the mills and built a concrete dam. Reusing existing resources became a recurring theme in the history of the Masse Mill in the twentieth century. The existing mill has replacement parts from mills in Alna, Washington, Freedom, Mount Vernon, Weeks Mills, China, and Riverside.

Logs were collected on China Lake and rafted to the Outlet Dam to be sluiced to the mill. From 1918 to 1930, 75 rafts were towed across the

lake. Pine logs were stored in a large mill pond. Herman Masse's History of the Old Water Power Grist and Saw Mill notes that: "Water handling of logs was used largely at the mill until fork lift equipment came into use in 1958 and the Log Debarker in 1964."

The Masse Mill ceased operations about 15 years ago. The site was listed in the National Register of Historic Places in 1982. The

historic significance of this site is important to the future of Outlet Stream. Restored, the mills could be the only original water-powered mill site in Maine. "Local green-milled" lumber, wood and grain products could find a valuable niche market. Visitors to a unique museum could learn how a local energy source has been revived to once again produce the basic products needed by all of us.

~Read Brugger

"...restoration will result in the fish in the lake establishing a new natural balance that will result in a healthier lake."

## The Beginning: China Lake

Peter Wilkens who is the director of *China Region Lakes Alliance* and Jeff Lacasse who is the General Manager of *Kennebec Water District* spoke to us about China Lake. Questions about multiple uses of management of the lake, past and present and apparent future management with or without alewives came up.

One of the primary features of China Lake is the water quality. China Lake has poor water quality featuring annual algae blooms. There are different ways that the lake could be managed. One way is by erosion control. *Kennebec Water District* bought the West Shore Basin so they could better control the organic and phosphorous input. They are trying to get more control through the Legislature.

Working together, the Alliance and the Water District are trying to control erosion by better land use practices around China Lake. They are doing this by improving erosion controls for camp roads. They are also doing this by rip rap. Rip raps are stones that are put along the shore line to prevent soil from going in the lake.

Another possible management possibility that they are looking at is alum treatment. Aluminum sulfate is a nontoxic material used in water treatment. In lakes aluminum sulfate is used to reduce the amount of the nutrient phosphorus in the water. Reducing phosphorus concentrations in lake water can have a similar clarifying effect by limiting the availability of this nutrient for algae production. This could cost millions and would have to

be repeated every year

According to Wilkens, LaCasse, and Jason Valliere of the Maine Department of Marine Resources, another way to improve water quality is alewife restoration. Alewives reduce phosphorous levels as they return to the sea. Misconceptions regarding alewives have, in the past, made this a difficult option to pursue.

There are many options available to China Lake to improve the water quality. The issue of alewives, which is potentially the most beneficial, is discussed more in depth elsewhere in this newsletter.

~Austin Cannaday, Josh Asciani, Max Lurie



# What to Do? The Future of Ladd Dam

The Ladd Dam has been home to dams and mills for almost two centuries. The site was established as a mill location in 1836 to manufacture yarn and clothing. In 1856 a new dam was built next to the old one, and purchased by the American Woolen Company in 1899. The mill has manufacturing things from broadcloth to items for the United States Army.

Today, Ladd Dam is owned by the Vassalboro Sanitation District,



**Ladd Dam**

creating water front property for upstream owners. After a spring 2005 flood damaged the Ladd dam, FEMA estimated the cost of repair at \$56,000. The Sanitary district, however, received repair bids beginning at \$150,000. The option of removal has been mentioned instead of repairing the dam. Removal is very expensive because of the challenges of stream restoration, including all the necessary permitting.

There are several options for the Ladd

Dam in the future. They include repair, repair with reduced height, add a fish passage, add hydroelectric production, add recreational facilities such as a park, trails, historic interpretation of former mill canal and complex, small boat access - or remove and restore the stream. All options undertaken will include cooperation with state and federal agencies. When deciding the future of the Ladd Dam, all aspects should be taken into account. Flowage front properties, historical value, sea run fish restoration and passage, and wildlife ecology can all be a part of this site with careful planning and public input.

~Josh Ascani, Mike Lagueux Read Brugger, and Lauren Driscoll

## Hydro? Is it possible?

State Department of Dams and Hydropower Supervisor Dana Murch thinks a lot about Maine's small mill dams. With the energy cost increasing, should the people of Maine be taking a second look at the hydroelectric potential of its old mill dams? We looked at the hydro electrical potential of fix dams on Outlet Stream - they are Outlet, Masse, Mor-

neau, Lombard, and Ladd dams.

Our calculations demonstrate that relatively few of today's households could be energized by this local power source. Three dams along the stream do show some potential for small scale hydroelectric power. They are the Masse, Lombard and Ladd dams; although they would not be able to produce large quantities of electricity they would provide the owners with enough electricity to export power to

the electric grid for the equivalent of about 90 households.

Should this green energy be developed as part of the total energy used in this community to lessen its carbon footprint? Would this provide an example for more communities to follow?

~Max Lurie



**Lombard Dam**

As a beautiful feature of Outlet Stream is the Lombard Dam. Its distinctive three step construction and intriguing old brick power house beside the dam draws the eye.

Now owned by local school teacher Sue Briggs, the Lombard dam was built by A. O. Lombard. He also constructed the house on the property as a place to relax for the summer. Older Vassalboro residents fondly remember swimming in the dam's mill pond.

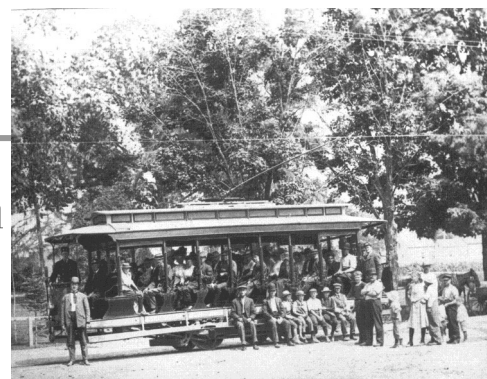
The dam has had many uses but the most important was as an early hydroelectric source. The electric power produced from the dam was used to power the electric trolley that ran through Vassalboro. This trolley system was part of the larger Lewiston, Augusta, & Waterville Street Railway that helped people move between Vassalboro and nearby towns. This is so different from today's individualized vehicles powered by imported fossil fuels from around the world.

With today's rapidly rising fuel prices, new owner Sue Briggs is interested in the possibility

of renovating the dam's hydroelectric power capacity. Of the dams on Outlet Stream, it would be the easiest to restore since many of the key structures are still at the site. However its beautiful three steps also mean it would be the hardest to design a fish passage for. Unquestionably the Lombard dam is significant to the local area's history.

~Nicole Nelson and Lauren Driscoll

## Three Steps to Public Transportation



Local Vassalboro residents getting ready to ride the first trolley in the early 20th century.

# Lets Talk About Alewives!



Picture of an Alewife (above) and Osprey with Alewife (below)



**“The data proved that alewives had no direct negative impact on the smallmouth bass.”**

The Alewife, *Alosa pseudoharengus*, is a sea run fish found from the coast of Northern South Carolina all the way up the coast to Newfoundland. Alewives are anadromous fish that spend much of their life in the sea, but eventually swim upstream as adults in freshwater rivers to spawn in lakes and ponds. The alewife is a small herring with greenish to blue black scales

and silvery sides with dark faint dark stripes. Alewives spawn between late April until early June. First they head into freshwater streams and rivers in large numbers to return to their spawning grounds. Spawning takes place in lakes and more sluggish sections of rivers. The females usually move to the spawning ground just before the males do. Sea run alewives

can produce as many as 60,000- 100,000 eggs. After eggs are laid, the adult alewives leave freshwater and head back to the sea. Within a week the young alewives hatch and remain in their temporary freshwater home eating zooplankton and free floating aquatic plants. The young alewives make their way to the sea again by the fall.

~Derek Patry and Ursula Balmer

## Pros and Cons

One of the major pros to alewives are alewives feed many different predators. As they swim upstream in great numbers they fall prey to some furbearing mammals, birds, and other fish such as the largemouth bass.

Other predators that rely heavily on the alewife runs are the osprey and the eagle. Eagles can easily feed their young from the heavy numbers of alewives making their way through freshwater sources such as the St. Croix River. It is harder for the birds to find food when alewife runs are lower, and it decreases the success and productivity of nesting for the eagles.

Now a bit of news that often creates confusion. A study done on the effect of alewives that are land-

locked in the Great Lakes showed a negative impact on the lake and other fish. One problem with landlocked alewives compared to sea run alewives is that while anadromous alewives leave in the fall before food gets scarce, land locked alewives do not and so they produce food competition with other fish.

And in the case of the Great Lakes, a lot of the fish die and the phosphorous that they take into their bodies is recycled back into the lake, and not taken away like is seen with the anadromous alewives. As the anadromous alewives leave the lake year after year they increase the water quality by lowering levels of phosphorous.

The abundance of the landlocked alewives in the Great Lakes also hurts the commercial fishing industry there. This is the opposite of the economic impact the sea run alewives have in Maine. Fisheries benefit from the seasonal run of the alewives. When trying to educate about these fish, the negative impacts that landlocked non-native alewives have on some lakes negatively impacts restoration efforts of native sea run alewives because some misunderstand the impacts of the two.

So the anadromous Alewives proposed by the Department of Marine resources not only benefit Maine's wildlife they improve water quality and provide economic support for local fisherman.

~Annica McGuirk

## Bass vs. Alewife

The impact of alewives on populations of smallmouth bass was studied in the St. Croix river to learn the interaction between the two species and

their effect upon each other. The study was done to resolve accusations of the smallmouth bass population being negatively effected by the alewives in Spednic Lake in the 1980's.

The research focused on the impact in the small mouth bass, both with alewives present or not present. Studies were also done

on diet overlap. The data proved that alewives had no direct negative impact on the smallmouth bass. Figure 1 shows the data collected on smallmouth bass from one water source and compared their weight for years with alewives present and for years when alewives weren't present.

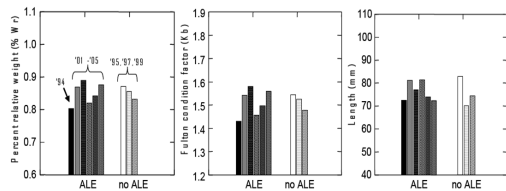


Figure 1: Smallmouth bass condition and length in Woodland Flowage in years with and without anadromous alewives. Individual bars represent annual averages of data within either group.

# Bass vs. Alewife Cont.

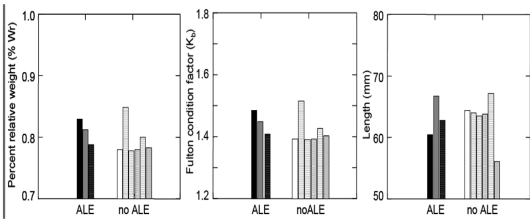


Figure 2: Growth of age 1 and older smallmouth bass in three St. Croix lakes in which alewives were present in some years and absent in others

In this study, alewives also showed no direct impact on smallmouth bass growth, which also debunks the arguments that prevent complete restoration of the fish's historic numbers and returns them to their upriver and lake spawning grounds.

This can be seen in Figure 2 which is a bar graph that depicts the growth of smallmouth bass with alewives present and without them present.

Another complaint raised against alewives in favor of bass is that the alewives supposedly effect number of bass catches in bass tournaments. This too, was proved otherwise by several bass fishing organizations. Figure 3 shows bass fishing tournament catches and helps display the correlation between alewives being

present and not present and the effect this has on bass caught.

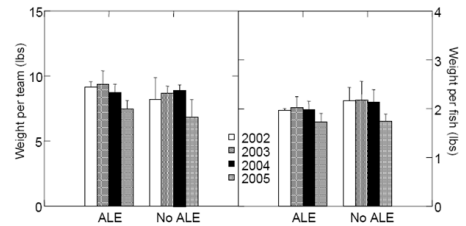


Figure 3: Bass tournament returns from thirteen lakes in Maine and New Brunswick from 2002 to 2005. Bars represent years

~ Colton LeBoeuf

## Kennebec Sea-Run Fish Restoration Project

The Maine Department of Marine Resources (MDMR) goal since 1982 has been to restore Maine's native diadromous fish to their historic numbers in the Kennebec and Sebasticook River watersheds. These species include the alewife, American shad, blue-black herring, Atlantic sturgeon, short nose sturgeon, rainbow smelt, Atlantic salmon, striped bass, Atlantic tomcod, sea lamprey, and American eel. Introduction of dams and the lack of fish ways and fish passages have blocked river access to these fish for the past two hundred years when dams for mills first were built. Overfishing and declining water quality also caused dramatic declines in the abundance of these fishes in the watershed beginning in the

mid-1800s.

In 1982 MDMR signed a settlement agreement with the Kennebec Hydro-Developers Group (KHDG) to stock alewives and American shad into upstream spawning and nursery habitat. These fish then would reestablish populations who were imprinted to the watershed. A second settlement agreement signed in 1998 by state and federal fisheries resource agencies, non-governmental organizations, and the KHDG resulted in the removal of Edwards Dam to provide fish passage for all diadromous species. This caused a domino effect that triggered constructing of fish passage and elevators at the seven KHDG dams. It also provided additional funding for the stocking program.

Currently fish passage has become operational at three KHDG dams: Lockwood, was the first dam on the Kennebec, and Benton Falls and Burnham, the second and third dams on the Sebasticook. The next crucial dam is the Fort Halifax dam. It is the first dam on the lower Sebasticook and is now scheduled to be removed in late 2008. This will allow wild American shad, blue-black herring, alewife, and Atlantic salmon to continue their migration upstream into the local watersheds. If Ft. Halifax dam is not removed, fish passage similar to the Benton Falls fish elevator will be installed.

~ Annica McGuirk and Andrew Russel

**“China Lake could see an overall total of between 97,000 and 130,000 dollars in alewife harvesting.”**

## Alewives Mean Money

Alewives also have an economic impact in Maine. The fish are used as bait for lobsters, and are prey to many sport fishes found in Maine waters.

In order to obtain rough estimates of potential fisheries production on China Lake, we first looked at the total acreage of China Lake. The lake has 3937 acres, and at 35 alewives per acre

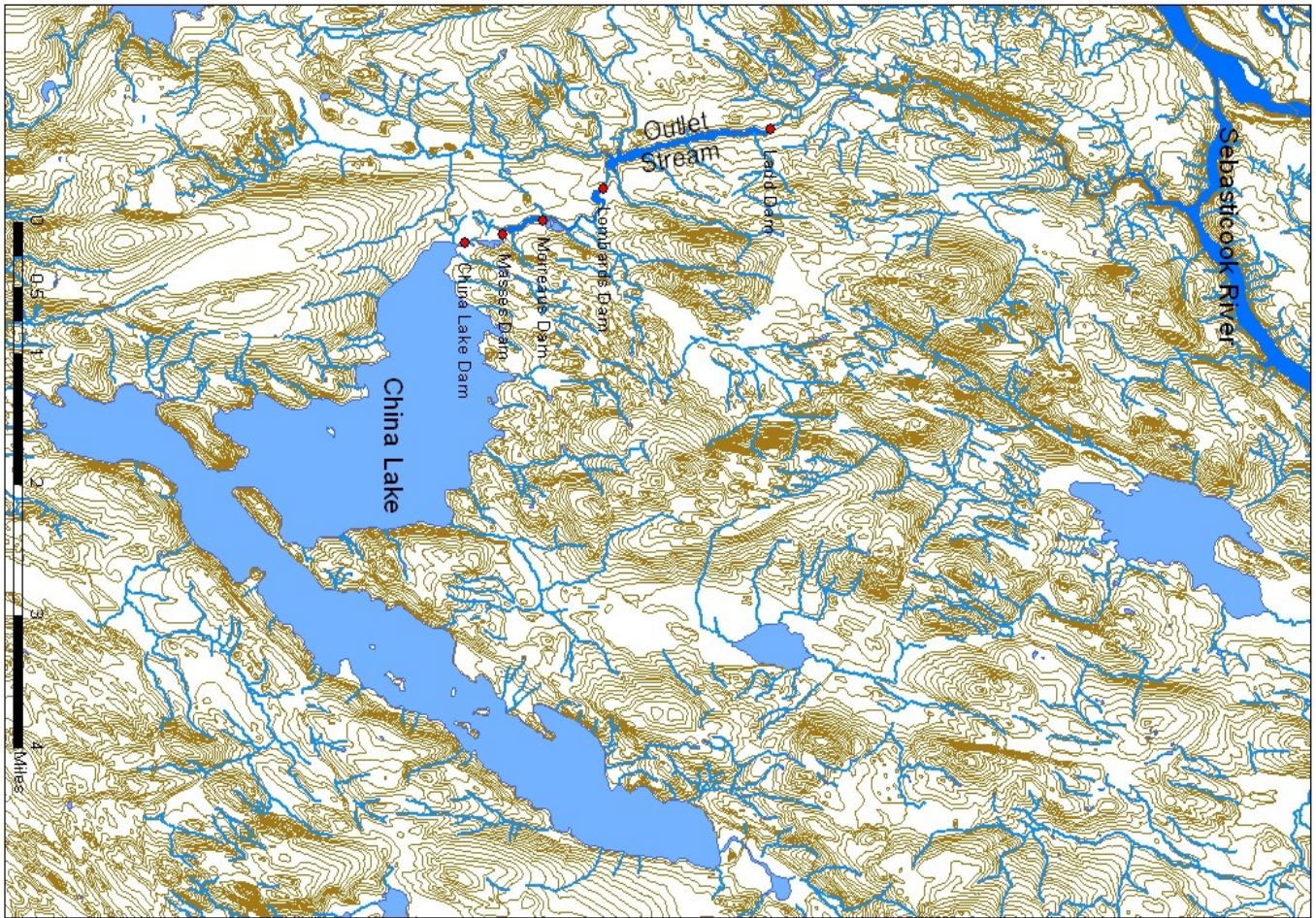
China Lake would produce about 137,795 alewives. The projected total of returning adults would be 925,195. The projected potential harvest would be about 787,400 alewives per year. This equals 6,500 bushels at \$15 to \$20. Thus, once alewives were restored, China Lake could see an overall total of between \$97,000 and \$130,000 in alewife harvesting every year.

With an alewife restored in China Lake, the town of Vassalboro could assume management responsibility for annual harvest. A portion of the harvest revenues would be retained by the town.






~Annica McGuirk

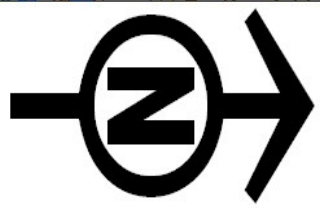


Alewife Fishery in Warren Maine



# Dams Along Outlet Stream

-  River
-  Pond
-  Stream
-  Contour
-  Dam



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 April 2008  
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## Who We Are

China Watershed Research Associates are 16 sophomore students attending Unity College. Our majors show the diversity of the college and allow every view point of the issues to be studied and understood. Some of the majors are Ecology, Education, Environmental Analysis, Conservation Law Enforcement, and Marine Biology. We are all enrolled in a core curriculum class called Environmental Citizens. This class teaches us how to become environmental stewards by choosing a topic, researching it, and then reaching out with the information we have learned. Our choice was to focus on China Lake Outlet Stream and Watershed.

This newsletter is part of our outreach efforts. It has been created by the efforts of all the students during the spring 2008 se-

mester. During the course of the semester we consulted many experts and knowledgeable local people. Using the information we have learned, we made this publication. We hope



**Group Huddle at Outlet Dam.**

that this newsletter will bring awareness about Outlet Stream.

### We Would Like to Thank:

Dana Murch, Jason Valliere, Paul Christman, Matt Bernier, Brandon Kulik, Ray Stuart, Mike Vashon, Paul Mitnik, Members of the Vassalboro Conservation Commission, Staff of the Vassalboro Historical Society, Phil Haines, Matt Masse, Sue Briggs, Don Robbins, Jeff LaCasse, Petter Wilkens, Jim Hart, and David Potter for the time and help you gave us.

~Members of the China Watershed Research Associates