

Fisheries Conditions, Issues and Opportunities

Why are Fisheries a Concern for the Presumpscot River?

Fisheries management is one of the central issues in planning for the Presumpscot River. For the first time in over a century, the future of the Presumpscot River includes new possibilities for fish restoration. Water pollution on the river has been greatly abated with the development of water treatment facilities and SAPPI's elimination of its pulp mill. Further, with the removal of the head-of-tide dam at Presumpscot Falls (the Smelt Hill Dam) in the Fall of 2002, 7 miles of the lower Presumpscot River has been restored to its original free-flowing condition. State and federal resource agencies, and river constituencies now see new potential for both existing resident and potential migratory fishes of the Presumpscot River.

What Fisheries Currently Exist in the Presumpscot River?

The existing fishery of the Presumpscot River includes:

- 1) An intensively managed stocked trout and salmon fishery located primarily in the Eel Weir Bypass, and secondarily in several other tailraces below the downstream dams and selected tributaries. The Eel Weir bypass (approximately 1.25 miles in length), the original river channel located immediately below Sebago Lake, is stocked annually by the Maine Department of Inland Fisheries and Wildlife with up to 2,500 brook trout.
- 2) Resident species, primarily bass, perch, and bullhead, found in the series of impoundments that characterize nearly 15 miles of the river below the Eel Weir Bypass (from the upper end of the North Gorham impoundment to the Cumberland Mills Dam); and
- 3) Migratory species, principally eels, found in all the impoundments, and alewives, found seasonally in the river below the Cumberland Mills Dam.

What Affects Fisheries Habitat in the River?

Development with Dams

Much of the river is impounded by low head dams. Presently, there are eight dams on the river, from its source at Sebago Lake to its outlet at Casco Bay. These include: Eel Weir Dam at the outlet of Sebago Lake, North Gorham Dam, Dundee Dam, Gambo Dam, Little Falls Dam, Mallison Falls Dam, Saccarappa Dam, and Cumberland Mills Dam. The dams have created a series of impoundments that have replaced the natural pools, riffles, runs, and falls originally present in the river. Until the removal of the Smelt Hill Dam in 2002, impoundments occupied approximately 22 of the 27 miles from head-of-tide to the present day outlet of Sebago Lake. Today, 15 of 27 miles remains impounded.

Ecology of an Impounded River

Dams have altered the ecology of the river. Narrow riverine impoundments are too slow moving to function like a natural river, and too fast moving to function as a lake or pond. As a result, planktonic communities, which are the typical food base of lakes, are unable

to develop, and the abundance and diversity of the benthic (bottom dwelling) organisms are diminished compared to a river, lake or pond. Hence, the river is not well suited either to riverine fishes (those that prefer cold, fast-flowing well oxygenated shallow waters, including trout and salmon), or lake dwelling fish (including bass, perch, pickerel, and bullheads). A 1997 baseline fisheries study concluded the bass and panfish habitat was marginal in the five impoundments studied: Dundee Dam, Gambo Dam, Little Falls Dam, Mallison Falls Dam, Saccarappa Dam.

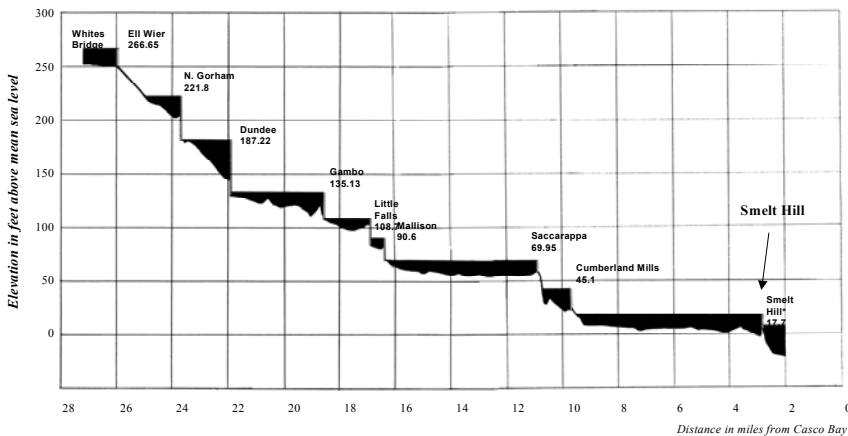
The result is relatively low numbers of fish in the river, composed primarily of species adapted to the impounded environments, i.e., smallmouth bass, pumpkinseed, and yellow perch; and a small seasonal population of stocked brook trout, landlocked salmon, and brown trout principally in the tailrace areas below the dams where conditions are more riverine.

Impediments to Fish Migrations

Dams on the Presumpscot River impede the movement of both resident and sea-run fishes.

- Dams block or impede sea-run fish from returning to fresh water (alewives, shad and salmon return to spawn, while immature eels migrate to fresh water to mature).
- Dams have isolated sections of the river, reducing the ability of resident and migratory fishes to reach spawning areas in the river and its tributaries, and coldwater refuges during hot weather.

PROFILE OF PRESUMPCOT RIVER*



* Before removal of Smelt Hill

Sources: Federal Emergency Management Agency: Flood Insurance Study: Portland (1998), Falmouth (1984) Westbrook (1980), Gorham (1981), Windham (1981); and Portland Water District (survey of riverbed elevation at White's Bridge).

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Water Temperatures

Like many other small coastal rivers in southern Maine, during the summer the Presumpscot River water temperatures are limiting for native trout and salmon species outside of any coldwater refuges that may exist near springs. This is true of both the impounded and unimpounded reaches, including the Eel Weir Bypass. In the summer, native brook trout move to colder water near springs or in the tributaries where waters are naturally cooler due to shade and a higher groundwater component to the flows (base flows).

For this reason, restoring trout and salmon to the Presumpscot River may also require efforts to enhance tributary habitats through re-establishment of wooded riparian buffers and reduction of sedimentation and pollution discharges. Other species that can tolerate the higher summer temperatures in the river include the introduced brown trout, sunfish, bullheads, and bass.

What Do Historical Accounts Tell Us About the Past Fisheries on the Presumpscot River?

Early historical accounts attest to the abundance and importance of fisheries in the Presumpscot River. They also document a long history of controversies related to blockage of fish migrations by dams on the river. The first dam was constructed at the head-of-tide, Presumpscot Falls, in the 1730's. Others soon followed. The dams caused public protests and prompted Chief Polin of the Rockomecook Tribe to walk to Boston to confer with Governor Shirley about restoring fish to the river. Failing to gain an adequate response, Chief Polin made a second trip to Boston and threatened to force the settlers out if the fish were not returned to the river. The first armed conflict between the Indians and the settlers along the Presumpscot River ensued, which was ended when Chief Polin was killed by the settlers in 1756.

On October 30, 1781 the selectmen of the towns of Gorham, and agents from the towns of Windham, Standish and Bridgton (which includes the Crooked River flowing into Sebago Lake), petitioned the Governor and

Legislature of the Commonwealth of Massachusetts to “*appoint a Committee that shall cause good and sufficient fish courses to be made through the several dams on the river*” to restore the fisheries to the river. They stated that the Presumpscot River “*in times past has been remarkable for being frequented by Shad, Bass, (and) Salmon. . .*” They argued that restoring these fish runs was necessary to support the early settlers of the Plantations adjoining the stream and would also benefit cod fishermen, “*For it is well known that the small fish running in shore for fresh water streams draw the Cod after them.*” This petition cites repeated previous petitions on this continuing problem (records of the Maine State Archives).

Charles Atkins, in his report “The River Fisheries of Maine” included in a report from the U.S. Commission of Fish and Fisheries to the 47th Congress in 1887, says of the Presumpscot River, “*It was frequented by salmon, shad, and alewives, but seems to have been best adapted to salmon. All fisheries were practically extinguished early in the present century (the 19th century) by a dam at the head of the tide.*”

What Are the State Fisheries Agencies’ Goals and Objectives for the Presumpscot River?

In a jointly written Draft Fishery Management Plan for the Presumpscot River Drainage (December 2001), the Maine Department of Marine Resources, Maine Department of Inland Fisheries & Wildlife, and the Maine Atlantic Salmon Commission, call for restoring sea-run fish to the river, including alewife, blueback herring, American shad, striped bass, Atlantic salmon, and possibly Atlantic sturgeon, rainbow smelt, sea-run brook, brown trout, and tomcod. The Plan also states objectives to improve the runs of American eels; stock trout to provide angling opportunities in areas which provide suitable habitat; and provide angling opportunities for other resident sportfish, including smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads and black crappie.

What Can be Done to Improve Fisheries in the Presumpscot River?

With the recent removal of the Smelt Hill Dam, migratory fish have unimpeded access to the lower 7 miles of the Presumpscot River and its tributaries for the first time in over a century. However, migratory fish are still blocked from upriver spawning and nursery habitat (as far as the dam at Sebago Lake) by seven dams.

The goal of the Steering Committee preparing the Plan for the Presumpscot River has been to develop recommendations that work for all interests. The problem, and at the same time the opportunity, is finding a solution that allows the restoration of migratory fish to the river, while minimizing adverse effects to the SAPPI mill. Fish passage is costly (capital costs of several millions of dollars per dam), and removal of the dams, while generally less costly (on the order of one million dollars per dam), will reduce SAPPI’s electrical generation capabilities. According to SAPPI, hydropower is the Westbrook Mill’s lowest cost power source.

“...in times past has been remarkable for being frequented by Shad, Bass, (and) Salmon...”

Review of Options

There are several possible courses of action to enhance or restore fish resources in the Presumpscot River. Options considered in developing this Plan ranged from simply enhancing the resident (bass and trout) fisheries; to restoring migratory fish runs as far as the dam at Sebago Lake through fish passage facilities and dam removals.

Option 1: Enhance the Resident Fish

Measures can be taken to enhance the numbers of or habitat for resident fish. Species of interest for fisheries enhancement include primarily trout, and bass and other pan fishes. Trout can be increased to support additional fishing through increased stocking in suitable areas, including the tailrace areas below Dundee Dam, Gambo Dam and Mallison Falls Dam. However, the degree of enhancement possible through stocking is limited by the small amount of habitat presently suitable for trout due to the changes in the river caused by dams.

Activities to enhance the bass and pan fisheries, on the other hand, are limited to enhancing the habitat, as in Maine there is no program to enhance bass fisheries by put and take stocking – and hatchery-raised fish are not even available in Maine. Habitat enhancement activities appropriate for the Presumpscot could include enhancing the cover provided for these species in impoundments by creating artificial reefs, and adding submerged woody debris or large rocky rubble to littoral areas on river bottom areas.

Option 2: Restore Migratory Fish Runs

One option initially considered for restoring migratory fish to the river, was the removal of the Smelt Hill Dam at the head-of-tide. This option became moot when the dam was removed in September 2002. The removal of the Smelt Hill Dam is expected to result in restored migratory fish runs in the lower river, as far as the Cumberland Mills Dam, and will allow alewives to migrate up the river and Mill Brook to Highland Lake, a historical spawning habitat for these fish. A small run to this spawning habitat has been maintained over the years through a variety of measures, including trap and truck operations.

Estimated Runs of Migratory Fish in the Lower River Following Removal of the Smelt Hill Dam¹	
American shad	6,000 – 24,000
River herring	78,000
Alewives	150,000 – 200,000
Atlantic salmon	25 - 100
¹ Other migratory fish that are expected to utilize the river include American eels, striped bass, and possibly sea-run brook and brown trout, Atlantic sturgeon, rainbow smelt, and tomcod.	

The challenge and opportunity remaining is restoring the Presumpscot River to its full potential for resident and migrating (sea-run) fisheries. The key issue for migratory fish runs is how the obstructions to passage at the remaining dams on the river, including the Cumberland Mills Dam, are to be overcome. The Cumberland Mills Dam is not covered by the Federal Power Act, and hence fish passage cannot be federally mandated at this dam as it can be for the other dams on the river. The Cumberland Mills Dam is, however, covered by a State Statute (12 MRSA§ 7701-A) that authorizes the Commissioner of the Maine Department of

Inland Fisheries and Wildlife to require fishways to be erected by the owners of any dam within inland waters to restore anadromous (sea-run) fish resources.

Opportunities for further restoration of sea-run fish therefore hinge on the future of the Cumberland Mills Dam. The issue of fish passage at Cumberland Mills Dam could be resolved, through State action, or a cooperative agreement involving SAPPI and the various interests that desire the restoration of migratory fish runs above Cumberland Mills Dam.

Alternatives for Further Restoration

There are two basic methods for providing access to the upper reaches of the river: fish passage facilities; or dam removal. Because of the inefficiencies and avoidable mortality of some fish with fish passage facilities, the maximum number of fish passages that will achieve sustainable runs of fish is generally considered to be no more than three. Alternatives considered for this Plan, and the resulting estimated fish runs restored and effects to resident fish are described in the table below and the following text.

Estimated Runs of Migratory Fish¹	Option 2A. Fish passage at one to three dams (Cumberland, Saccarappa and Mallison Falls)	Option 2B. Removing 3 dams, up and downstream, fish passage at 1-3 others, downstream passage at N. Gorham
American shad	7,000 – 56,000	16,000 – 136,000
River herring	97,000 – 187,000	206,000 – 450,000
Alewives	150,000 – 200,000	150,000 – 200,000
Atlantic salmon	25 - 450	100 – 1,000
Resident Fish		
Trout/salmon	No change	More habitat
Bass/panfish	No change	Less habitat
Capital Costs	+\$1 – 8 million	+ \$4 – 13 million
¹ Other migratory fish that are expected to utilize the river after the Smelt Hill Dam is removed include American eels, striped bass, and possibly sea-run brook and brown trout, Atlantic sturgeon, rainbow smelt, and tomcod.		

Option 2A. Fish passage at one to three dams (Cumberland, Saccarappa and Mallison Falls). Passage at Cumberland Mills would open one mile of river to sea-run fish; passage at three dams would open an additional seven miles and would provide access to the Little River. Eel passage would also be provided at all dams up to and including Dundee Dam.

Option 2B. Removing three dams, providing up and down stream fish passage at one to three others, and providing downstream fish passage at North Gorham. Saccarappa, Mallison and Little Falls Dams would be removed, and passage would be provided at Cumberland Mills, and possibly Gambo, and Dundee Dams. Under this option, sea-run fish would gain access to 9 to 14 miles more of the Presumpscot River and the Little River and Pleasant River. Nearly eight miles of free flowing river would be restored, enhancing habitat for native trout and salmon. **This option was selected by the Steering Committee as the Preferred Option.**

Passage, not removal, is proposed for the Cumberland Mills Dam in this option for two reasons: (1) this dam is subject only to the authority of the Maine Department of Inland Fisheries and Wildlife to order fish passage facilities; options for a regulatory solution are thus limited to provision of passage, not removal, at this dam; and (2) dam removal would require agreement by SAPPI; however, the Cumberland Mills pond is used by SAPPI for process water and fire control; this Plan did not include a detailed study of how this could be accomplished together with a full or partial dam removal, as SAPPI expressed no interest in such a solution.

A concern raised about this option was how dam removal would affect the flood storage capacity of the river, and the extent of areas in the river floodplain. Currently, the US Geological Survey is redefining the flood hazard areas for the Federal Emergency Management Agency for the Saccarappa impoundment and downstream communities. However, based on a study conducted for the Federal Energy Regulatory Commission on the effects of removal of the Little Falls, Mallison Falls, and Saccarappa dams (conducted in 2001 using existing flood maps), there appears to be a benefit from the removal of the dams, as the river elevation would drop, as would the flood elevations. The Saccarappa impoundment and the elevation of the 100-year flood are both projected to drop by 10 feet. According to the report, removal of the dams “would allow the river to generally stay within the channel under the 100-year flooding scenario, resulting in a

decrease in floodway width in the lower Saccarappa reach by 500 feet on the eastern shore and 100 feet on the western shore.”

Benefits of Option 2B include:

- Restores eight miles of natural riverine habitat including falls, rapids, riffles, pools, cobble bottom, and the sights, sounds and smells of a flowing river.
- Allows passage for 100% of migratory fish compared to smaller percentages enabled by fish passage devices whose results vary by species and type of device.
- Ends the continuous, unnatural erosion of property along impoundments, which is caused by the flooding of land by the dams.
- Restores previous flooded property to property owners and town tax rolls.
- Eliminates sedimentation caused by the dams and reduces creation of additional suspended particulates brought into the river by ongoing erosion caused by high water behind dams.
- Improves dissolved oxygen levels in the three formerly impounded reaches (these three impoundments are currently "non-attainment" areas – areas not meeting water quality standards due to depressed oxygen levels.
- Reduces the impact of flood events and reduces the size of flood zones above existing dams which are removed, resulting in less property damage and lower insurance rates for property owners. Restores natural bed load movement.

Challenges for Option 2B:

- Cumberland Mills Dam, with fish passage, serves as a limiting factor for allowing sea-run fish access to the free-flowing reach. (Perhaps the answer here is to invest in the best fish passage devices to deliver the most to waters above, including investigation of alteration to the dam to allow a "natural" passage – that is, an altered river bed as opposed to a fish lift or fish ladder.)

How this option will be implemented is harder to envision than why it should be done.

