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September 18, 2018

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Sent via Email, Fax and USPS

RE: Friends of Merrymeeting Bay and Friends of Sebago Lake
Comment on Department Order
#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N
MWDCA PERMITS & WATER QUALITY CERTIFICATION AMENDMENTS to Saccarappa Dam, Presumpscot River, Westbrook, Maine, FERC Project 2897-048 (Surrender); Mallison Falls Dam, FERC Project 2932-047; Little Falls Dam, FERC Project 2941-043; Gambo Dam, FERC Project 2931-042; Dundee Dam, FERC Project 2942-051

Dear Mr. Sroka:

Please accept the following comments on behalf of the Friends of Sebago Lake ("FOSL")[1], Friends of Merrymeeting Bay ("FOMB")[2], and members of these respective organizations concerning your agency's Draft Order regarding amendments to the Water Quality Certifications ("WQC") for the following projects:

- Mallison Falls Dam, FERC Project 2932-047
- Little Falls Dam, FERC Project 2941-043
- Gambo Dam, FERC Project 2931-042
- Dundee Dam, FERC Project 2942-051 (hereinafter "Presumpscot River Dams").

Both FOSL and FOMB have been long time participants in Presumpscot restoration and water quality proceedings and accepted interveners in different state and federal proceedings related to this river.

In addition to these comments below, FOSL and FOMB incorporate by reference all prior state and FERC comments the organizations, as well as its members Douglas Watts, Roger Wheeler and Ed Friedman, have submitted throughout public comment periods associated with the proposed WQC amendments that authorize the operation of the Presumpscot River Dams and extensions to fish passage requirements at same.

[1] FOSL is a membership organization whose mission is to promote an understanding of the interconnected harmful impacts of
[2] FOMB is a membership organization whose mission is to preserve, protect and improve the unique ecosystems of Merrymeeting Bay and related waters. It does this primarily through research, advocacy, education and land protection.

Additionally, FOSL and FOMB specifically request the full document of each citation referenced in both this and past comments be included in the administrative record associated with this agency action.

FOSL and FOMB support Sappi's decommissioning of the Saccarappa Dam and installation of anadromous fish passageways at this juncture of the Presumpscot River. In addition, FOSL and FOMB support the proposed WQC at the Mallison Falls Dam and Little Falls Dam in so far as the certifications require fish passage or dam removal once specific numbers of anadromous fish have been accounted for at the downstream locations.

However, FOSL and FOMB oppose the issuance of any WQC, as proposed in the Department of Environmental Protection's ("DEP") September 11, 2018 Draft Order, for the Gambo and Dundee Dams, as they do not require fish passage once particular fish populations identified in the 2003 WQC have been met in the dam farther downstream. FOSL and FOMB specifically request that prior to issuance of any WQC for the Gambo and Dundee Dams, that there be a requirement for fish passage at these sites when specific anadromous fish populations have been reached at downstream dams.

Detailed below are FOSL and FOMB's specific issues and comments:

I. Introduction and Background

The Presumpscot River runs for 25.8 miles in Cumberland County from Sebago Lake to the Gulf of Maine's Casco Bay. It flows through the communities of Standish, Windham, Gorham, Westbrook, Portland and Falmouth.

Currently, Sappi North America, Inc. (hereinafter "Sappi") owns and operates the following dams operating on the Presumpscot: Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo, and Dundee Dams. With the exception of Cumberland Mills, none of these dams have fish passage for anadromous fish species native to the Presumpscot.

Several species of anadromous fish, including alewives, blueback herring, shad and Atlantic salmon, have used the Presumpscot River as habitat since pre-colonial times. While dam construction has restricted upstream passage for anadromous fish on the Presumpscot, these fish species have not permanently left the river.[3]

Since the removal of the Smelt Hill Dam in 2002 and installation of fish passage at the Cumberland Mills Dam, upstream areas of the Presumpscot are now seeing a resurgence of the anadromous fish species native to its waters. Specifically, the record in this matter is abundant with examples of alewives, blueback herring, and shad having returned to inhabit the Presumpscot in the seven miles up to the Cumberland Mills Dam.[4] As well,

[3] *See In Re: Cumberland Mills Dam Fishway Proceedings Findings of Fact Proceeding*, p. 4 (2009)(reporting runs of anadromous fish in 1990 after a fishway was installed on the Smelt Hill Dam)(attached as Exhibit A).

[4] *Id.* at 5 (stating "evidence in the record that small runs of alewife, blueback herring and American shad are currently present in the Presumpscot River in the seven mile stretch above the site of the former Smelt Hill Dam and below the Cumberland Mill"); *see also* DIADROMOUS FISH SURVEY OF THE PRESUMPSCOT RIVER (Feb. 2004)(attached as Exhibit B); *see also* Watts underwater video 5/31/18 in the administrative record for this matter.

while Sappi has not turned over data concerning fish passage at Cumberland Mills from 2017 and 2018, a report from the company in 2016 indicates both shad and river herring use the Cumberland Mills fish passage (installed in 2013) to access the mile of Presumpscot leading up to the Saccarappa Dam.[5]

Several Maine agencies, including the Maine Department of Environmental Protection ("DEP"), have made it a priority to restore the historic anadromous fish runs along the Presumpscot.[6] For instance, DEP, the Department of Marine Resources ("DMR"), and the (former) Maine Atlantic Salmon Commission ("ASC") developed a *Draft Fishery Management Plan for the Presumpscot River Drainage*, which focused on developing a "management plan [that] includes agency recommendations for fish passage and other issues that must be addressed for the successful attainment of stated management goals."[7] In fact, in line with the priority of protecting, restoring and enhancing anadromous fish habitat on the Presumpscot, DMR installed a fishway at the Highland Lake dam, and has participated in stocking efforts near Highland Lake and other parts of the Presumpscot, which have resulted in the restoration of anadromous fish in both a Presumpscot tributary, as well as the lower reaches of the River.[8]

Without a scientific doubt, anadromous fish today have an established use of the Presumpscot River as habitat. The only barrier to these fish traveling the entirety of the river are the six dams currently owned and operated by Sappi and the North Gorham dam owned by Brookfield (not including Eel Weir at Sebago). It has been DMR's longstanding position and goal that anadromous fish could and should be restored farther upstream from the Saccarappa Dam.[9]

II. Reopener Clause

FOSL and FOMB specifically encourage the MDEP to retain the reopener clause associated with the WQCs in this matter. The language of this clause permits the agency to revisit and possibly amend the WQC should there be important changes along the Presumpscot River.

III. Maine's Water Quality Standards Require Fish Passage at the Gambo and Dundee Dams

Considering anadromous fish have a recognized established and designated use of the Presumpscot River as habitat, any issuance of a WQC for any dam along the Presumpscot that does require anadromous fish passage

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[5] *See* Report: Stage 1C Shad Presence Study Freshet Channel Fishway, Cumberland Mills Site, Westbrook, Maine (Sep. 30, 2016)(attached as Exhibit C).

[6] *See e.g.* REPORT TO THE JOINT STANDING COMMITTEE ON MARINE RESOURCES AND THE JOINT STANDING COMMITTEE ON NATURAL RESOURCES, Departments of Marine Resources and Environmental Protection, p. 10 (2008), *available at* http://lldc.mainelegislature.org/Open/Rpts/kf5588_z99m25_2008.pdf (attached as Exhibit D)(stating that the Presumpscot River is a high restoration priority).

[7] *See* DRAFT FISHERY MANAGEMENT PLAN FOR THE PRESUMPSCOT RIVER DRAINAGE, p. 3 (Dec. 2001)(attached as Exhibit E).

[8] *Id*. at 12.

[9] *See* PRE-FILED TESTIMONY OF GAIL WIPPELHAUSER, *In Re: Cumberland Mills Dam Fishway Proceeding*, p. 16 (Nov. 6, 2008)(attached as Exhibit F)(stating "[i]f fish passage is installed upstream of Saccarappa, the resulting numbers of alewife, blueback herring and shad will be even greater."); *also* DRAFT FISHERY MANAGEMENT PLAN FOR THE PRESUMPSCOT RIVER DRAINAGE, *supra* n. 5 at 6 (stating "[t]he remaining dams on the river are hydropower projects licensed by FERC. Fish passage has been requested by the state (MDMR, MASC, MDIFW) and federal (USFWS) fisheries agencies and non-governmental organizations at the six projects currently being relicensed.").

would have the effect of improperly revising Maine's Water Quality Standards without EPA approval. Nevertheless, the Draft Order, as written, does not require fish passage at Gambo and Dundee Dams should population goals of anadromous fish be attained at the downstream Little Falls Dam. These population numbers are clearly outlined in the Presumpscot River's Draft FMP, and have been historically advocated for by several Maine environmental agencies.

In turn, if MDEP implements the Draft Order as written, the WQCs for Gambo and Dundee Dams would constitute a new or revised water quality standard requiring approval by EPA pursuant to section 303(c)(3) of the Clean Water Act. As written, the Draft Order degrades water quality standards for the Class A and Class B reaches of the Presumpscot and its tributaries upstream from the Gambo Dam[10] by specifically excluding anadromous fish, even though these fish are indigenous aquatic life species protected by Maine's narrative water quality criteria for Class A and Class B waters. The Draft Order also degrades the water quality standard for the Class GPA pond (Dundee Pond) upstream from the Dundee Dam. Maine's water quality criteria for Class A waters specify that, "[t]he *aquatic life . . . shall be as naturally occurs.*"[11] "As naturally occurs" means "conditions with essentially the same physical, chemical, and biological characteristics as found in situations with similar habitats free of measurable effects of human activity."[12] Maine's water quality criteria for Class B waters specify that the habitat for fish and other aquatic life "must be characterized as unimpaired."[13] Unimpaired means "without a diminished capacity to support aquatic life."[14] These criteria protect Maine's designated uses for Class A and B water, which include "habitat for fish and other aquatic life."[15] Maine's water quality criteria for Class GPA ponds require that habitat for fish and other aquatic life be characterized as "natural."[16]

EPA's Clean Water Act regulations require water quality criteria protect designated uses.[17] Designated uses are "those uses specified in water quality standards for each water body or segment, whether or not they are being attained."[18] Designated uses for Class A and Class B waters in Maine include "habitat for fish and other aquatic

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[10] The water quality classifications for the Presumpscot River are as follows:

A. Presumpscot River, main stem.

(1) From the outlet of Sebago Lake to its confluence with Dundee Pond - Class A.

(1-A) From the outlet of Dundee Pond to its confluence with the Pleasant River - Class A. For the purposes of water quality certification of the hydropower project at the Dundee Dam under the Federal Water Pollution Control Act, Public Law 92-500, Section 401, as amended, and licensing modifications to this hydropower project under section 636 and any other licensing proceeding affecting this project, the habitat characteristics and aquatic life criteria of Class A are deemed to be met in the waters immediately downstream and measurably affected by that project if the criteria of section 465, subsection 3, paragraphs A and C are met.

(2) From its confluence with the Pleasant River to U.S. Route 202 - Class B. Further, there may be no new direct discharges to this segment after January 1, 1999.

See 38 M.R.S. § 467(9).

[11] 38 M.R.S. § 465(2)(B)(emphasis added).

[12] *Id.* § 466(2).

[13] *Id.* § 465(3)(A).

[14] *Id.* § 466(11).

[15] *Id.* § 465 (2)(A), (3)(A).

[16] *Id.* § 465-A(1)(A).

[17] *See* 40 C.F.R. § 131.11(a)(1).

[18] *Id.* at § 131.3(f).

life" with the habitat being characterized as "natural" for Class A waters and GPA ponds and "unimpaired" for Class B waters.

As discussed above, anadromous fish are naturally occurring and indigenous to the Presumpscot River and should thrive in the Presumpscot River upstream to the Gambo Dam once fish passage is constructed via mandatory provisions of the WQCs for the Mallison and Little Falls Dams. In turn, by not mandating fish passage at the Gambo and Dundee Dams for the term of Sappi's WQC, the MDEP has effectively revised the above-cited criteria so they now provide that aquatic life in Class A and B waters upstream from the Gambo Dam shall be as naturally occurs or unimpaired, *with the exception that anadromous fish shall not be present.* In addition, MDEP's seemingly arbitrary selection of the Gambo Dam as the location where fish passage no longer needs to occur does not even comport with the Legislature's boundary of the Presumpscot's change in water classification from Class B to Class A at the confluence with the Pleasant River.

By not conditioning Sappi's WQCs for the Gambo and Dundee Dams with a fish passage requirement, the MDEP will violate the Presumpscot River's statutorily protected designated uses. This position contradicts MDEP's prior position in its 2003 WQCs for these dams where it states:

> Nowhere, as appellant [S.D. Warren] suggests, does the statute state that 'some' of the waters be suitable for the designated uses; that 'some' of the aquatic species indigenous to the waters be supported; or that 'some' of the habitat must be unimpaired or natural. On the contrary the terms 'receiving waters' and 'habitat' are unqualified and the statute specifically states that the water quality must be such as to support 'all' indigenous aquatic species.[19]

This position by MDEP (eventually affirmed by the United States Supreme Court) was the basis for its 2003 fish passage conditions in the Presumpscot River Dams WQCs. However, MDEP's position has atrophied without legitimate or justifiable reason. As evidenced by its recent Draft Order, it appears as if the MDEP's reasoning for excluding mandatory fish passage in the Gambo and Dundee WQCs is a litigation threat from Sappi should it not gain this exemption in exchange for the removal of the Saccarappa Dam. However, the Clean Water Act does not permit the States to authorize the degradation of the nation's waters in order to avoid a possible lawsuit.

Furthermore, existing uses are "those uses actually attained in the *water body* on or after November 28, 1975, whether or not they are included in the water standards."[20] The term "water body" is not defined in the Clean Water Act, its implementing regulations, or Maine's water quality standards. Wikipedia defines a body of water as "any significant accumulation of water, generally on a planet's surface . . . A body of water does not have to be still or contained; *rivers*, streams, canals, and other geographical features where water moves from one place to another are also considered bodies of water."[21] Without any reason to interpret otherwise, for purposes of 40 C.F.R. §131.3(e), the Presumpscot River as a whole is a "water body," and its uses should be assessed as one *water body*, and not several water bodies artificially created by Sappi's dam operations. Consequently, within this framework, the Presumpscot River is currently active habitat for indigenous populations of anadromous

[19] *See In Matter of S.D. Warren Company*, Presumpscot River Hydro Projects Water Quality Certification, Findings of Fact and Order on Appeal to BEP, p. 9 (Oct. 2, 2003).
[20] *Id*. at 131.3(e)(emphasis added).
[21] *Body of Water*, WIKIPEDIA, https://en.wikipedia.org/wiki/Body_of_water (Sep. 17, 2018)(emphasis added).

fish, thus making this use of the Presumpscot by anadromous fish an "existing use" protected by the Clean Water Act.

In turn, as written, the Draft Order establishes a desired condition for aquatic life upstream from the Gambo Dam that creates the artificial exclusion of anadromous fish from its habitat. The Order therefore violates the Clean Water Act because it does not protect the designated and existing uses for Class A and B waters upstream from the Gambo Dam.

As described above, and more fully supported by the extensive record in this matter, there is no sound scientific rationale for excluding indigenous anadromous fish from the Presumpscot River upstream from the Gambo Dam. MDMR purports without certainty that it is possible those population numbers as defined in the Draft FMP that trigger the need to construct anadromous fish passage at the Gambo and Dundee Dams "might never be achieved."[22] MDMR's position, however, is rooted in a belief that shad have not been documented above Cumberland Mills.[23] However, this assertion directly contradicts Sappi's own 2016 study that indicates some shad have used the Cumberland Mills fish passage.[24]

Despite repeated attempts by FOSL and FOMB to obtain 2017 and 2018 data from the Cumberland Mills fishway for consideration by the MDEP, the record remains void of any fish counts from the last two years from Cumberland Mills. Nevertheless, MDMR continues to push its opinion, without scientific basis, that it is impossible to know when anadromous fish will run to the Gambo Dam, except that it is unlikely before 2053. It is irresponsible and legally questionable for MDEP to defer to MDMR's opinion without a full presentation of accessible and recent data. For example, MDMR conveniently disregards examples of other much shorter term successful restoration efforts, such as on the Sebasticook River and Seven-Mile Stream and tributaries of the Kennebec, where in about ten years, river herring returns have reached close to 6,000,000 fish.[25]

As written, should anadromous fish population goals historically identified by MDMR be met at Little Falls, Sappi would not have to construct any form of fish passage around Gambo Dam to allow further upstream migration. A scientific uncertainty of when anadromous fish will reach a certain population at Little Falls Dam does not justify exclusion of mandatory fish passage in the WQCs for the Gambo and Dundee Dams.

In fact, express exclusion of fish passage in the Gambo and Dundee Dams' WQCs would have dramatic impact on the river's overall water quality if fish population goals are met at Little Falls, but those fish are unable to continue their migration past Gambo. Without passage at Gambo, the receiving downstream waters of the Presumpscot all the way to tidewater would lose all of the fish that would be going up to Gambo and going back downstream as juveniles. As such, the lack of anadromous fish inhabitation and access to the Presumpscot upstream from Gambo would have profound and measurable negative water quality impacts on the river immediately below Gambo and extending to tidewater.

If implemented, the Draft Order would constitute a de facto revision of the narrative criteria for Class A and Class B waters. In turn, it would require EPA approval to move forward, but would likely not be approved because it is not based on sound scientific rationale as required by 40 C.F.R. § 131.11(a)(1). There is no

[22] *See* MDMR comments, p. 2 (Apr. 10, 2018).
[23] *Id*. at n. 2.
[24] *See supra* n. 5.
[25] *See* DMR Annual Reports and Benton Alewive Harvest Report (attached as Exhibit G).

evidence in the record indicating that MDEP or the Attorney General has submitted their proposed WQC amendments to the EPA for review. Neither does the record have any evidence or discussion as to why MDEP believes it is not legally required to submit for EPA approval it's WQC amendments for the Gambo and Dundee Dam. As a matter of law, FOSL and FOMB asserts that EPA review and approval is mandatory.

In addition, if MDEP implements the Draft Order without mandatory fish passage at Gambo and Dundee Dams, it would violate the State's anti-degradation law found at 38 M.R.S. § 464(F). As such, the MDEP can only issue a WQC that results in "lowering the existing quality of any water body after making a finding, following opportunity for public participation, that the action is necessary to achieve important economic or social benefits to the State . . .[and] that finding must be made following procedures established by rule of the board."[26] In this case, the MDEP has not followed any procedures by the Board of Environmental Protection in coming to this Draft Order, which is also absent of any finding of an economic or social benefit related to the exclusion of fish passage from the Gambo and Dundee Dam WQCs.

IV. Conclusion

For these reasons stated above, FOSL and FOMB continue to oppose the issuance of any WQC for the operation of the Gambo and Dundee Dams that does not include specific population criteria of anadromous fish that would trigger the construction of fish passage through these dams.

As a matter of law, the MDEP cannot issue a WQC that does not mandate fish passage at the Gambo and Dundee Dams, as the absence of this condition changes and impacts the designated and existing uses of the Presumpscot's water quality. Should MDEP move forward with issuing the Draft Order as written, which excludes fish passage at the Gambo and Dundee Dams, then FOSL and FOMB respectfully request the agency to address in its final order whether and when they submitted this for approval to EPA and if not, specific rational for avoiding this required process.

Should your agency have any questions concerning these comments, please do not hesitate to contact us.

Sincerely,

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[26] 38 M.R.S. § 464(F)(5).

EXHIBIT LIST

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit A

STATE OF MAINE
DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

IN THE MATTER OF

CUMBERLAND MILLS DAM FISHWAY PROCEEDING	**)** **)** **)**	**FINDINGS OF FACT AND DECISION**

In order to conserve, develop or restore anadromous or migratory fish resources, the Commissioner of the Maine Department of Inland Fisheries and Wildlife is authorized by 12 M.R.S. § 12760(1) to require that fish passage be erected, maintained, repaired or altered by the owners, lessors or other persons in control of any dam or other artificial obstruction within inland waters frequented by alewives, shad, salmon, sturgeon or other anadromous or migratory fish species.

At issue in this proceeding is whether fish passage should be constructed and maintained at the Cumberland Mills Dam, located on the Presumpscot River in the City of Westbrook, Cumberland County, Maine. The dam is currently owned by S.D. Warren Company.

PROCEDURAL HISTORY

By letter dated October 19, 2006, American Rivers and Friends of the Presumpscot River (AR/FOPR) requested that proceedings be initiated pursuant to 12 M.R.S.A. § 12760(4) to consider construction of fish passage at the Cumberland Mills Dam. By letters dated November 1, November 6 and November 7, 2006, the Maine Department of Environmental Protection (DEP), the Maine Department of Marine Resources (DMR), and the Atlantic Salmon Commission all expressed support for the AR/FOPR request. By letter dated December 7, 2006, S. D. Warren (Warren) requested that, if fishway proceedings are initiated, a public hearing be held pursuant to 12 M.R.S.A. § 12760(5)(B). On January 10, 2007, based on a review of the available information, I determined that one or more of the statutorily-required conditions may exist and initiated this fishway proceeding.[1] I further determined that, based on the request by the dam owner, a public hearing would be scheduled.

In February, 2007, DIFW issued a public notice that adjudicatory proceedings were being initiated to consider construction of fishways for the two spillways that make up the Cumberland Mills Dam. A deadline of March 23, 2007 was established for the filing of petitions to intervene

[1] Pursuant to 12 M.R.S.A. § 12760(4), the Commissioner shall initiate proceedings to consider construction, repair or alteration of fishways in existing dams or other artificial obstructions whenever the Commissioner determines that one or more of the following conditions may exist: (A) fish passage at the dam or obstruction in issue, whether alone or in conjunction with fish passage at upriver barriers, will improve access to sufficient and suitable habitat anywhere in the watershed to support a substantial commercial or recreational fishery for one or more species of anadromous or migratory fish; or (B) fish passage at the dam or obstruction in issue is necessary to protect or enhance rare, threatened or endangered fish species.

in the proceeding. AR/FOPR, DEP, DMR, the Maine Atlantic Salmon Commission (ASC),[2] and the Coastal Conservation Association (CCA) sought to intervene in support of fishways, and the Maine Pulp & Paper Association (MPPA) sought to intervene in opposition. All petitions to intervene were granted.

The proceedings were subsequently stayed, at the request of Warren, AR/FOPR and DMR, to allow the parties to engage in settlement discussions. After the last stay expired on June 15, 2008, the parties notified the Commissioner that settlement efforts had failed and requested that the fishway proceeding be re-started.

Pre-hearing conferences were held on August 28, 2008, October 3, 2008 and December 8, 2008. At these conferences, and in a series of procedural orders, rulings were made regarding the applicable legal standards and organization of the hearing. The first procedural order, in particular, provided that the proceeding would be held in two phases, with the first phase addressing whether fish passage should be required under the decision criteria of 12 M.R.S.A. § 12760, and with the second phase, if needed, addressing the fishway design. A second procedural order consolidated AR/FOPR and, separately, DEP/DMR, for the purposes of the proceeding. The second procedural order also required the parties to submit pre-filed testimony on the issue whether construction of fish passage should be required at Cumberland Mills Dam under the legal standards set forth in 12 M.R.S.A. § 12760.

A hearing on the first phase of the fishway proceeding was held on December 15th and 16th, 2008 in Westbrook and public notice of the hearing was issued. The parties presented oral testimony summarizing their pre-filed testimony and were provided an opportunity to cross-examine the other parties' witnesses. An evening session was held on December 15 to take public testimony.

At the conclusion of the hearing on December 16th a deadline of February 27, 2009 was established for the submission of written closing arguments and proposed findings of fact and conclusions. Written closings and proposed findings were submitted by Warren and jointly by DEP/DMR and AR/FOPR on February 27th. CCA submitted a letter supporting the filings submitted by DEP/DMR and AR/FOPR. MPPA did not file a written closing or proposed findings.

DECISION CRITERIA

Pursuant to 12 M.R.S.A. § 12760(6), the Commissioner of DIFW may issue a decision requiring the owners, lessees or other persons in control of a dam or obstruction to construct, repair, alter or maintain a fishway. Such a decision must be supported by a finding based on evidence submitted to the Commissioner that either of the following conditions exist:

(A) One or more species of anadromous or migratory fish can be restored in substantial numbers to the watershed by construction, alteration, repair or maintenance of a fishway and habitat anywhere in the watershed above the dam or

[2] The ASC was subsequently incorporated within a new Bureau of Sea Run Fisheries and Habitat at DMR, and these two parties became one.

obstruction is sufficient and suitable to support a substantial commercial or recreational fishery for one or more species of anadromous or migratory fish; or

(B) The construction, alteration, repair or maintenance of a fishway is necessary to protect or enhance rare, threatened or endangered fish species.

No evidence has been presented in this proceeding that the construction of a fishway at the Cumberland Mills Dam is necessary to protect or enhance rare, threatened or endangered fish species. Therefore, the decision to require construction of a fishway at the Cumberland Mills Dam must be supported by a finding that one or more species of anadromous or migratory fish can be restored in substantial numbers to the watershed by construction and maintenance of a fishway and habitat anywhere in the watershed above the dam or obstruction is sufficient and suitable to support a substantial commercial or recreational fishery for one or more species of anadromous or migratory fish.

FINDINGS OF FACT

The Presumpscot River flows for 25 miles from the outlet of Sebago Lake in Standish and Windham to the ocean in Falmouth.

There are currently eight dams on the Presumpscot River. Starting at the tidewater, the first dam is the Cumberland Mills Dam.[3] Proceeding in order upstream from the Cumberland Mills Dam are the Saccarappa Dam, the Mallison Falls Dam, the Little Falls Dam, the Gambo Dam, the Dundee Dam the North Gorham Dam finally, the Eel Weir Dam, located at the outlet of Sebago Lake. Each of these dams, with the exception of the North Gorham Dam, are owned by Warren.

The Cumberland Mills Dam is located approximately seven miles upstream from the head-of-tide and is the only major coastal Maine river that lacks fish passage for anadromous or migratory fish at the first, most downstream dam on that river. The Cumberland Mills Dam is not a hydropower dam and, therefore, is not subject to licensing by the Federal Energy Regulatory Commission (FERC).

The five dams immediately above the Cumberland Mills Dam (Saccarappa, Mallison Falls, Little Falls, Gambo and Dundee) are licensed by FERC as hydropower projects (known collectively as the Presumpscot River Hydro Projects). The licenses issued by DEP and FERC for these dams require the phased installation of upstream and downstream passage facilities designed to pass river herring (alewives and blueback herring are collectively referred to as "river herring"), American shad, and Atlantic salmon at all five dams. The first of these fish passage facilities must be operational at the Saccarappa Dam no later than two years after passage is available at the Cumberland Mills Dam, with the sequential installation of fish passage facilities at the Mallison Falls, Little Falls, Gambo and Dundee Dams occurring thereafter based on specific trigger numbers of returning fish at each dam. Until fish passage is

[3] Historically, the Smelt Hill Dam was the first dam on the river. This dam was removed in 2002 as a habitat restoration project to increase habitat and fish passage opportunities for various species of anadromous and catadromous fish.

available at Cumberland Mills, the requirements for upstream fish passage at Warren's upriver dams are not triggered.[4]

Historical Anadromous Fish Populations in the Presumpscot River

There is convincing evidence in the record that the Presumpscot River historically supported large quantities of anadromous and migratory fish, including Atlantic salmon, American shad and river herring. There is also evidence that, with the construction of the first dam on the river at Presumpscot Falls (at or near the site of the former Smelt Hill Dam) sometime between 1732 and 1735, fish migration up river was diminished. Over time, these species were eliminated from the river by the construction of dams that blocked passage and by pollution.

In 1869, the Maine Legislature enacted laws that, for the first time, asserted the state's authority to require the construction and maintenance of fish passage in dams or other artificial obstructions in rivers and streams. The 1875 annual report to the Maine Legislature of the Maine Fisheries Commission reported that a fishway was built at the Cumberland Mills Dam. By 1876, The Commissioners of Fisheries were able to report to the Legislature that the "Presumpscot River may now be pronounced accessible to salmon and alewives, as far as Mallison Falls…" Further, there is evidence in the record that, as a result of the presence of fishways and the construction of the Cumberland and Oxford canal alongside the river, anadromous fish again had access to Sebago Lake.

By 1900, the Cumberland and Oxford canal had been abandoned, fish passage up the Presumpscot River was blocked by a dam at Smelt Hill, and there were no reported runs of anadromous fish in the river until a fishway was again installed at the Smelt Hill Dam in 1990.

Warren did not contest the evidence regarding the existence of historic native anadromous fisheries nor the history of construction of impassable dams, with a brief intervening time period in the later part of the 19th century during which fishways existed on all dams on the Presumpscot.

Based on the historical records, I find that the Presumpscot River once supported large self-sustaining runs of native anadromous fish, including river herring, American shad and Atlantic salmon, and these historical fisheries were eliminated by the construction of impassable dams.

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[4] In issuing water quality certifications for these dams, the DEP determined that the installation of upstream and downstream anadromous fish passage facilities at all five dams would provide access to significant habitat for American shad, blueback herring, and Atlantic salmon. Moreover, DEP determined that the phased installation of anadromous fish passage at each of the dams is necessary and appropriate to allow access for target anadromous fish species to spawning and nursery habitat. In its Final Environmental Impact Statement (FEIS), with respect to anadromous fish, FERC concluded that, if fish passage or dam removal was provided at the Cumberland Mills Dam, upstream and downstream passage at all five projects would benefit American shad and river herring by providing access to potential spawning and rearing habitat.

Current Status of Anadromous and Migratory Fish in the Presumpscot River

At the present time, there are no anadromous fish in the Presumpscot River above the Cumberland Mills Dam. There is, however, evidence in the record that small runs of alewife, blueback herring and American shad are currently present in the Presumpscot River in the seven mile stretch above the site of the former Smelt Hill Dam and below the Cumberland Mills Dam.

The lower Presumpscot River, from Cumberland Mills Dam downstream to Casco Bay, has been open to migratory species since 1990. A fishway at the Smelt Hill Dam (designed to pass Atlantic salmon, American shad and river herring) was in operation between 1990 and 1996. Fish counts were conducted from 1994 to 1996. Approximately 27,000 river herring passed upstream through the fishway in 1994 and 1995. Approximately 5, 300 river herring passed upstream through the fishway in 1996. Due to damage caused by floods, no fish counts were conducted at the Smelt Hill Dam after 1996, although the gates at the dam remained open to allow for passage. The Smelt Hill Dam was removed in 2002.

Alewives were stocked into Highland Lake (a tributary which enters the Presumpscot approximately two miles below the Cumberland Mills Dam) in 1997 and 1998 by the owners of the Smelt Hill Dam; and in 2000 and 2001 by DMR. During the spring of 2003 (a year after the Smelt Hill Dam was removed) a boat electrofishing survey conducted by Normandeau Associates. The primary objective of the study was to qualitatively determine whether diadromous fish species were present in the river reach between the Cumberland Mills Dam downstream to the I-95 Bridge. Because of limitations associated with electrofishing, limited sampling dates, and other factors such as fish that likely avoided capture, the study was not suitable to establish quantitative estimates of the number of diadromous fish species present in the river. In any event, the study documented the presence of spawning adult shad and river herring, and juvenile American eels, in the reach between Mill Brook and the Cumberland Mills Dam (a section of river approximately 200 yards downstream to the dam was not sampled because of obstructions in the river that prohibited boat access).

In 2004, DMR trapped 7,560 pre-spawn alewives at the top of the Highland Lake fishway. There is no reason to believe that river herring have ceased migrating up the Presumpscot and its tributaries since then. [5]

Another electrofishing survey conducted by the Midwest Biodiversity Institute in the fall of 2006/spring 2007, also confirmed the presence of alewife and American shad in the lower Presumpscot.

In addition, three recreational fishermen with experience fishing the Presumpscot River testified that there has been a dramatic improvement in water quality and an increase in the number of anadromous fish, including river herring and shad. One witness in particular, Dana

[5] The continued runs of river herring in the Presumpscot are consistent with continued large runs of river herring in the Kennebec, Androscoggin and Union rivers, and other small coastal rivers.

Eastman, testified as to his familiarity with blueback herring which, he also testified, he has personally observed and caught in the portion of the river below the Cumberland Mills Dam.[6]

There are no natural impediments in the river that would prevent the existing small runs of alewife, blueback herring or American shad from reaching the Cumberland Mills Dam.

Warren witness Dr. Richkus agreed that remnant populations of alewife and shad are in the Presumpscot River, but stated that he does not believe blueback herring exist in the river and that a coastwide decline of river herring will prevent its restoration in substantial numbers to the watershed. While DMR has not collected data specifically documenting the presence of blueback herring in the lower Presumpscot, Dr. Wippelhauser testified that they are likely present due to their historical presence and the documented occurrence and growth of blueback herring populations in other Maine coastal rivers such as the Kennebec and Saco. DMR also disagrees that there is a coastwide decline of river herring, stating that while the State has closed some overfished river herring runs to fishing for conservation purposes, other runs of river herring, such as those on the Kennebec, Androscoggin and Union rivers, have remained robust.[7]

Based on the available data for the Presumpscot River, DMR's knowledge of the alewife, blueback herring and American shad runs in surrounding rivers, and the absence of natural impediments that would prevent these species from reaching the Cumberland Mills Dam, I find that alewives, blueback herring and American shad are currently present in the seven miles stretch below Cumberland Mills Dam.[8] I also find that the current populations of these fish may serve as a seed population for restoration.

DMR's Efforts to Restore Anadromous and Migratory Fish to the Penobscot River.

Over the past 25 years, the State has spent significant resources on the recovery of anadromous and migratory fish within the Presumpscot River.

In 1983, based on DMR's plans to restore alewives to the Presumpscot River, DEP and FERC approved the redevelopment of the Smelt Hill Dam as a hydropower project with a requirement that fish passage facilities be installed at the dam within 5 years. The required passage facilities were installed in 1990, giving alewives access to the Presumpscot River up to the Cumberland Mills Dam and to Highland Lake, which drains into the river via Mill Brook.

In 1996, the Smelt Hill Dam generating and fish passage facilities were severely damaged in a flood and project operation ceased. In 2001, following several years of negotiations, DMR

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[6] Mr. Eastman testified at hearing that this occurred at a point in the river past which he believed the Mill wouldn't allow access.

[7] DMR witness Patrick Keliher stated that by combining the regulation of depressed stocks with continued restoration efforts statewide, any declines in river herring will be reversed. Mr. Keliher cited to the Atlantic States Marine Fisheries Commission's Management Plan for American Shad and River Herring which contains three objectives for these species: regulate overfishing of depressed stocks, improve habitat accessibility, and stock these species into waters that historically supported but do not presently support natural spawning migration. Dr. Richkus was a principal author of this management plan.

[8] In addition, American eel currently inhabit the entire Presumpscot River, although the size of the population is unknown.

signed a purchase and sale agreement with the dam owner to buy the project for the purpose of removing the dam to provide fish passage and restore the aquatic ecosystem of the lower Presumpscot River. DEP and FERC subsequently approved the removal of the dam, and in 2002 the dam was removed by the U.S. Army Corps of Engineers.

In 2001, DMR collaborated with DIFW and ASC to write a draft fisheries management plan for the Presumpscot River that proposed restoring migratory fish (including alewife, blueback herring, American shad and eel) to the entire river and promoting existing and potential commercial and recreational fisheries for these species.[9]

In addition, DMR participated in all aspects of the relicensing process for the Presumpscot River Hydro Projects, which began in the mid-1990s.

Finally, in a report to the Legislature last year, DMR listed obtaining fish passage at the Cumberland Mills Dam as one of DMR's highest priorities for the next five years.

DMR has had extensive experience restoring alewife, American shad, and, more recently, blueback herring to both natural and impounded habitat throughout Maine. It has successfully established runs of river herring to the Kennebec, Androscoggin and Union rivers, and river herring and American shad to the Saco River, among others. While the total restoration of these anadromous species to a river system can take 30-50 years, Patrick Keliher testified that, if fish passage is ordered at Cumberland Mills, DMR will jump start the process in the Presumpscot River by trapping alewife and blueback herring from proven sources in Maine and trucking them above the Cumberland Mills Dam, likely to the impoundment created by the next upriver dam, Saccarappa, to allow them to spawn. DMR is ready to commence this stocking program using existing resources. Warren's witness, Dr. Richkus, acknowledged that stocking of alewife has been successfully used by DMR to reintroduce alewife to the Sebasticook River and the Royal River, and that he recommended stocking of alewife in the Penobscot watershed as an effective restoration technique.

I find that obtaining fish passage at the Cumberland Mills Dam is consistent with the long-standing efforts of the state and federal fisheries agencies to restore anadromous and migratory fish to the Presumpscot River, and that DMR is prepared to jump start the restoration process by trapping and trucking alewife and blueback herring to the habitat above Cumberland Mills Dam.

Sufficiency and Suitability of Habitat above Cumberland Mills Dam for Alewife, Blueback Herring and American Shad

Gail Wipplehauser has been a diadromous fisheries scientist and fisheries manager with DMR for the past 12 years. She has extensive experience with the Presumpscot River. She participated in all aspects of the FERC relicensing process for Warren's hydroelectric projects on the Presumpscot, and was the lead person for DMR in the DEP water quality certification

[9] The overall goal of the plan is to integrate the fishery management goals of DMR, DIFW and ASC so as to cooperatively manage the diadromous and resident fishes of the Presumpscot River for optimum habitat utilization, abundance and public benefit.

proceedings. She co-authored the Draft Fisheries Management Plan for the Presumpscot River Drainage.

In her pre-filed and oral testimony, Dr. Wipplehauser testified that habitat above Cumberland Mills Dam is suitable for production of alewife and blueback herring. She expressed the opinion that impoundments existed that were of sufficient size and that had sufficient food and oxygen to support populations of these species. She indicated that these species are "broadcast spawners" – that is, that they simply release their eggs into the water column. They don't make nests like smallmouth bass, nor do they require a particular substrate. She stated that alewife would spawn in parts of the impoundment where water currents were slow, whereas blueback herring would spawn where water currents are swifter. Her testimony indicates that the river above the Cumberland Mills Dam contains both slow moving water and faster current. Finally, Dr. Wipplehauser testified that, while it is unknown whether more alewife or more blueback herring will use the habitat above Cumberland Mills, DMR and FERC agreed that both alewives and blueback herring will likely pass upstream if fish passage is provided at Cumberland Mills, and that the available upstream habitat will be used by both species. She testified that there are many examples in the northeast of populations of alewife, blueback herring and shad that have been restored to historic habitat that has been converted from riverine to impounded habitat by mainstem dams, citing DMR's experience on the Kennebec and Saco Rivers.

Outside Maine, American shad has been successfully restored to the Merrimack River above the Lawrence project dam. In addition, DMR witness Stephen Gephard, a fisheries biologist from the Connecticut Department of Environmental Protection, provided testimony describing seven restoration projects in which alewife, blueback herring and/or American shad have been restored to impounded habitat in Connecticut rivers.

Other evidence in the record shows that the water quality in the Presumpscot has improved to the point of being suitable for fish restoration.

Warren witness Dr. Richkus stated his opinion that the restoration of alewife, blueback herring and American shad must fail because only a very low percentage of these species stray, as opposed to homing back to their natal waters, therefore not enough fish will use the fish passage at Cumberland Mills Dam. Responding to this testimony, Dr. Wippelhauser cited an example in Maine where strays have re-colonized non-natal habitat. The first year that fish passage was available at the lower set of dams on the Saco River (Cataract Project), previously undetected shad and river herring strayed upriver into non-natal habitat and establish spawning runs. Mr. Gephard also provided examples from rivers in Connecticut where strays re-colonized non-natal habitat when fish passage was provided.

Moreover, as noted above, DMR has testified that it is committed to stocking river herring above the Cumberland Mills Dam, which will accelerate the restoration process considerably. Dr. Richkus agreed that stocking is a viable tool in reintroducing extirpated anadromous species to a river system.

Based on the evidence in the record on the character and quality of the upstream habitat, the spawning and nursery needs of alewife, blueback herring and American shad, and the experience of Maine and other states with restoration of these species to historically riverine but currently impounded habitat, I find that the habitat of the Presumpscot River watershed above Cumberland Mills is suitable and sufficient for alewife, blueback herring and American shad.

DMR's Estimates Regarding the Number of Anadromous Fish that can be Restored to the Watershed if Fish Passage is Constructed at Cumberland Mills Dam.

Dr. Wipplehauser testified as to her estimates of harvestable fish that can be produced in the habitats above the Cumberland Mills Dam. The estimates were provided for alewives and blueback herring separately. She arrived at the estimates by first determining the surface acres of the impoundment using GIS technology, and then multiplying the total by a unit production of fish. For alewife she used 235 fish per acre; and for blueback herring she used 600 fish per acre. She factored in spawning escapement and passage efficiency, and also took into consideration the DMR's experience in the Saco and Kennebec Rivers. Dr. Wipplehauser testified that the estimates were based on current river conditions, without stocking, and that the timeframe for reaching the estimated numbers of fish would be approximately 30 to 50 years. The timeframe would likely be shortened by a stocking program, as planned by DMR.

Dr. Wipplehauser estimated that the existing habitat in the Cumberland Mills and Saccarappa impoundments can produce a run of 40,025 alewives and 145,823 by habitat in the Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo and Dundee impoundments. When spawn escapements and passage efficiency is factored in, the estimates of harvestable alewives become 33,180 and 121,868, respectively.

With regard to blueback herring, Dr. Wipplehauser estimated that the existing habitat in the Cumberland Mills and Saccarappa impoundments can produce a run of 102,191 blueback herring and 372,314 by habitat in the Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo and Dundee impoundments. When spawn escapements and passage efficiency is factored in, the estimates of harvestable blueback herring become 84,591 and 310,716, respectively.

Because the harvestable surplus will be a mix of river herring, the potential production range is between 33,180 and 84,591 that will be produced by the Cumberland Mills and Saccarappa impoundment habitat; and the harvestable surplus of river herring the will be produced in the six impoundments above the Cumberland Mills Dam is between 121,868 and 310,716 fish.

Dr. Wippelhauser also testified that the existing habitat in the Cumberland Mills and Saccarappa impoundments can produce a run of 14,681 American shad each year, and that the existing habitat in the Cumberland Mills impoundment plus the five upriver impoundments can produce a run of 41,523 American shad each year.

Warren witness Dr. Richkus criticized the methodology used by Dr. Wippelhauser in predicting the number of fish that could be produced by the impounded habitat upstream.

However, there is ample evidence in the record that this is a proven methodology used by state and federal fisheries agencies and FERC to estimate production of alewife, blueback herring and shad, and that it has accurately predicted fish production in other similar restoration efforts.

The estimated numbers of river herring and American shad that can be produced by the habitat above Cumberland Mills is substantial when compared to current runs on the Presumpscot River and to current and potential runs on other southern Maine rivers.

With respect to river herring, Dr. Wippelhauser testified that there is currently a complete lack of river herring production above Cumberland Mills Dam due to the lack of fish passage. There are currently small runs of river herring on other southern Maine rivers (including the Piscataquis/Salmon Falls River, Mousam River, Kennebec River, and Saco River), none of which have supported a commercial harvest in at least 25 years. Only the Saco River has sufficient habitat to support a larger run than the Presumpscot.

With respect to American shad, Dr. Wippelhauser testified that there is currently a complete lack of shad production above Cumberland Mills due to the lack of fish passage. There currently exist small runs of American shad in the Piscataquis/Salmon Falls and Mousam Rivers, and a substantial run of shad in the Saco River, all of which support local recreational fisheries. In southern Maine, only the Saco River has sufficient habitat to support a larger run than the Presumpscot River.

Based on the evidence, I find that alewife, blueback herring, and American shad can be restored in substantial numbers to the watershed by the construction of a fishway at Cumberland Mills Dam.

Restoration of Substantial Numbers of American Eel to the Watershed if Fish Passage is Constructed at Cumberland Mills Dam

There is evidence in the record that American eel currently inhabit the entire Presumpscot River, although the size of their population is unknown. The habitat above Cumberland Mills Dam is suitable growth habitat for eel, and dissolved oxygen levels are sufficient to maintain the species. DMR believes that eel passage at Cumberland Mills will enlarge the population. Eel passages are very effective at allowing eels to move upstream.

Warren witness Dr. Richkus stated his opinion that, while construction of a fishway at the Cumberland Mills Dam might result in an increase in the numbers of eels present in the watershed, the existing presence of eels indicates that this would not be restoration of the species, but an enhancement of the abundance of that species. However, "to restore" means to bring back to or put back into a former or original state.[10] The fact that there are already eels in the Presumpscot River does not deprive me of authority to order eel passage at the Cumberland Mills Dam in order to restore the eel population to a former or original state.

[10] Merriam-Webster Online Dictionary. 2009.

Accordingly, I find that there is sufficient and suitable habitat in the impoundments above Cumberland Mills for American eel and that this migratory species can be restored to the watershed in substantial numbers if an eel fishway is constructed and maintained at the Cumberland Mills Dam.

Substantial Commercial or Recreational Fishery for Anadromous and Migratory Fish

The record supports a finding that the habitat that would be made available by the provision of fish passage at the Cumberland Mills Dam can support a substantial commercial or recreational fishery for one or more species of anadromous or migratory fish.

River Herring

According to Mr. Keliher's testimony, at the present time there is no commercial river herring fishery in the Presumpscot River, and that there are no other such fisheries west of the Kennebec River. River herring are an important source of bait for Maine's lobster industry, especially during the May-June harvest period when there is a limited supply of sea herring. A small niche market also exists for smoked alewife for human consumption. Additionally, a small amount of river herring could be used as bait for halibut and striped bass.

Dr. Wipplehauser's estimated that a potential river herring harvest of 33,180 to 84,591 fish would be created in the Cumberland Mills and Saccarappa impoundment habitats, and a potential harvest of 121,868 to 310,716 fish would be created in the six impoundments above Cumberland Mills. This is substantial compared to current conditions in the Presumpscot River or to current or potential conditions in other southern Maine rivers.

American shad

There is currently no recreational shad fishery in the Presumpscot River. Dr. Wipplehauser estimated that the habitat in the Cumberland Mills and Saccarappa impoundments can produce a run of 14,681 American shad each year, and the habitat in the Cumberland Mills impoundment plus the five upriver impoundments can produce a run of 41,523 American shad each year.

According to Dr. Wipplehauser's pre-filed testimony, there are small runs of American shad in the Piscataquis/Salmon Falls and Mousam Rivers and a substantial run of shad in the Saco River, all of which support popular local recreational fisheries. The number of shad in the Piscataquis and Mousam Rivers is unknown, but the recreational fishery in the Saco is supported by an annual run that has ranged from 399 to 4994 adult American shad annually. In southern Maine, only the Saco River has sufficient habitat to support a larger run than the Presumpscot River. A run of 14,681 to 41,523 shad would be substantial for southern Maine.

Mr. Keliher cited the Saco and Narraguagus Rivers as examples of rivers that have substantial recreational fisheries that will be of similar size, or larger, to the one created on the Presumpscot. He testified that a current average annual return of less than 2000 adult shad in the Saco River has created a substantial local recreational fishery and that he has observed as many

as 15 or 20 people fishing for shad in the Saco at any one time. He stated that as the population grows more anglers will target this fish.

American eel

There is evidence in the record that the habitat made available by the provision of fish passage at Cumberland Mills Dam can support a substantial commercial American eel fishery in the Presumpscot River watershed. Although eels were commercially harvested by weir in the 1990's at the outlet of Sebago Lake, that fishery has been closed. Yellow eels can be harvested by pot in the impoundments on the river. The habitat made available by the provision of fish passage at Cumberland Mills Dam will substantially enlarge the existing eel population and, therefore, a potential pot fishery for them in the Presumpscot River watershed. Given that there is currently no commercial American eel fishery in the river, as compared to the 13,000 pounds of eel commercially sold in Maine every year, this potential commercial eel fishery is substantial.

Based on the evidence, I find that the habitat that would be made available by the provision of fish passage at the Cumberland Mills Dam can support a substantial commercial or recreational fishery for one or more species of anadromous or migratory fish, specifically river herring, American shad and American eel.

CONCLUSIONS OF LAW

Based on the above Findings of Fact and the evidence contained in the record of this proceeding, I make the following conclusions:

1. One or more species of anadromous or migratory fish, specifically alewife, blueback herring, American shad and American eel, can be restored in substantial numbers to the Presumpscot River watershed by construction and maintenance of a fishway at Cumberland Mills Dam; and

2. Habitat in the Presumpscot River watershed above Cumberland Mill Dam is sufficient and suitable to support a substantial commercial or recreational fishery in the Presumpscot River watershed for anadromous or migratory fish, specifically river herring (alewife and blueback herring), American shad, striped bass and American eel.

DECISION

After having carefully considered the testimony and exhibits of the parties, the public testimony and other related record materials, I conclude that fish passage should be constructed and maintained at the Cumberland Mills Dam, in order to conserve, develop or restore anadromous or migratory fish resources.[11]

[11] The number of fishways needed to provide effective fish passage at the Cumberland Mills Dam will be determined in the second phase of these proceedings. Any reference to "fishway" singular in this decision should not be construed as a finding on this question.

Because this proceeding is being held in two phases, the decision herein does not constitute final agency action. Further proceedings will follow to determine the requirements for fishway design and operation, including the appropriate number and location of fishways. Following those proceedings, a final order in the matter will be issued.

A separate procedural order will be issued, in which I will schedule further proceedings to determine the requirements for fishway design and operation, including the appropriate number and location of fishways, following which a final order will be issued in this matter pursuant to 12 M.R.S.A. § 12760(6).

DATED AT AUGUSTA, MAINE, THIS 29th DAY OF June, 2009.

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ROLAND D. MARTIN
Commissioner, Maine Department of Inland Fisheries and Wildlife

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit B

DMR-2

DIADROMOUS FISH SURVEY OF THE PRESUMPSCOT RIVER

FEBRUARY 2004

DIADROMOUS FISH SURVEY
OF THE
PRESUMPSCOT RIVER

Prepared for
COASTAL CONSERVATION ASSOCIATION,
FRIENDS OF CASCO BAY AND
FRIENDS OF THE PRESUMPSCOT RIVER

Prepared by
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P-19753.099

February 2004

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION

Normandeau Associates, Inc. was contracted by the Coastal Conservation Association (CCA), Friends of Casco Bay (FOCB) and Friends of the Presumpscot River (FOPR) to conduct a fisheries survey in the lower Presumpscot River during spring 2003. The primary objective of this fish survey was to qualitatively determine whether diadromous fish species were present in the river reach between Cumberland Mills Dam downstream to the I-95 bridge, and to determine the presence and distribution of diadromous fish in this river reach. A secondary objective was to determine the distribution of resident fish species in this stretch of river. Because of the limitations of gear type (e.g. an electrofishing boat was used to sample the river) and number of sampling dates (sampling was only conducted on six days between 5/24/03 and 6/12/03), it was not possible to establish quantitative estimates of the number of diadromous fish present in the river during spring 2003. Additionally, other diadromous fish species may have been present in the river during spring 2003 and avoided capture either due to the limited sample dates or the limitations of the sampling gear (see Methods section for a discussion of the limitations of using an electroshocking boat to capture diadromous fish species).

Cumberland Mills Dam, located 9.6 miles upstream of Casco Bay, is currently the lowermost dam on the Presumpscot River because of the recent removal of Smelt Hill Dam, which was located at head of tide approximately 2.5 miles upstream of Casco Bay.

2.0 METHODS

Normandeau had proposed to use a combination of sampling gear to capture diadromous fish in the Presumpscot River including floating gill nets, electrofishing and jigging. However, the Maine Inland Fish and Wildlife has restrictions on gill nets and would not allow their use; therefore an electroshocking boat was used as the primary capture method. In most instances, gill nets are more effective at capturing certain diadromous fish species in rivers, including American shad, river herring and striped bass, because the nets can be set to capture fish throughout the water column. Typically, these species reside in deeper water in pools (>5 ft) or in the channel during the day, which cannot be effectively sampled with electrofishing gear. A shock boat is most effective in shallow water less than 5 or 6 ft deep, however, the channel depth in Presumpscot River was deeper than six ft in much of the river segment sampled. Most of the shad and river herring captured were found in the deeper channel areas. The field biologists noted that some of the temporarily stunned fish were able to avoid capture and identification. Because of this capture bias, the fish collections are qualitative; catch-per-effort or an estimate of the abundance of shad, river herring and other fish species collected cannot be determined.

During sampling, the field biologists would sample a river reach with the shock boat moving downstream with the current, electrofishing the main channel areas and deeper pools where most of the diadromous fish were captured. One of the problems with sampling in this manner is many fish are able to detect the electric field as the boat approaches, and most escape capture. Capture was further hampered by water depth and visibility, because the crew could not see the entire water column in many of the areas sampled.

The section of the Presumpscot River sampled in this study was located between the Cumberland Mills Dam and the I-95 bridge (Figure 2-1). This section of the Presumpscot River was divided into six river reaches. River reach 1 extended from Cumberland Mills Dam downstream to the power lines that cross the river near 789 Warren Ave; river reach 2 extended from the power lines downstream to the Constitution Drive culvert; and river reach 3 went from the culvert downstream to the Route 302 bridge (near the mouth of Mill Brook). River reach 4 began at the Rte. 302 bridge and continued downstream to Minnow Brook; river reach 5 extended from Minnow Brook down to Meader Brook; and river reach 6 went from Meader Brook downstream to the I-95 bridge.

The river reaches upstream of Mill Brook (reaches 1-3) were not as wide and typically had higher water velocities than river reaches 4 through 6, which had wider, deeper channel areas. River reach 1 was shallow compared to the other river reaches sampled and the bottom could be seen throughout most of its length. This was also the case for some sections of river reach 2. In river reach 1, the crew could not safely get the shock boat up to the base of the Cumberland Mills Dam due to fast-moving shallow water and obstructions (rock and wood debris). Therefore, approximately 200 meters of this river reach downstream from the dam could not be sampled.

The sampling began when an established run of river herring were observed ascending Mill Brook. River herring migrating up Mill Brook encounter a fishway at the outlet of Highland Lake that allows the fish access to the lake, which is currently their principal spawning area. Volunteers from the three funding organizations CCA, FOCB and FOPR monitored Mill Brook for the start of the run. Once fish were observed ascending the brook, the electrofishing survey was initiated and sampling continued at approximately twice per week, for a total of 6 sampling events.

All resident fish species stunned and captured during the electroshocking surveys were quickly netted and placed into holding tanks on the boat. Diadromous fish species captured (American shad, river herring and American eels) were not held in the tanks, but instead were quickly identified, sexed and released. None of the fish captured (diadromous or resident fish species) were measured or weighed to limit handling stress. Shad and river herring were photographed prior to their release and their sex and spawning condition was noted as either green, ripe or spent. Additionally, the capture location of most of the shad and river herring was recorded with a GPS. The locations of shad or river herring that were temporarily stunned by the shock boat but evaded capture by the biologist netting the fish were also recorded, but only if the fish could be clearly seen and positively identified. Some fish that were temporarily stunned by the shock boat evaded capture and could not be positively identified. Resident fish species captured were identified, enumerated and released unharmed.

Other data collected from each river reach sampled included date and time of capture, Secchi disk readings, water temperature, dissolved oxygen (mg/l) and conductivity. Additionally, water quality data were collected by staff of FOCB at six sites along the Presumpscot River between Rte 302 and the Sappi Mill in Westbrook. Surface water and water column profiles were collected on 2 June and 21 August 2003. Unattended diurnal hourly samples were collected at the FOCB Buoy, located 300 yards downstream of the Sappi Mill discharge between 2 June and 6 June 2003 and between 21 August and 26 August 2003. All samples were collected using a calibrated YSI 6600 multi-parameter data sonde. Data parameters collected included temperature (°C), conductivity (µS/cm), dissolved oxygen (mg/l), dissolved oxygen percent saturation (%), pH and Chlorophyll *a*.

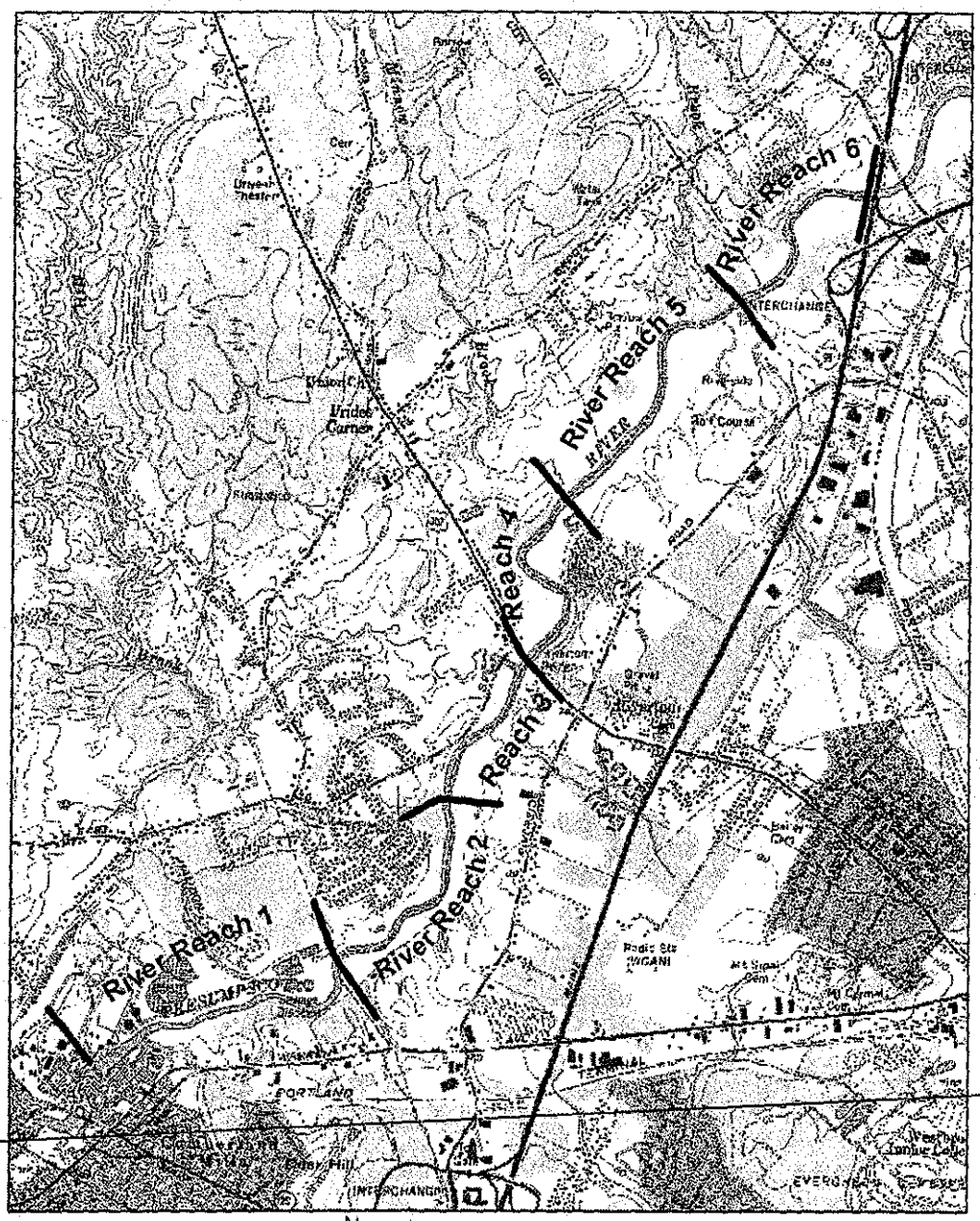


Figure 2-1: **Locations of River Reaches Sampled in the Presumpscot River with an ElectroShocking Boat during Spring 2003.**

3.0 RESULTS

3.1 DIADROMOUS FISH

The Presumpscot River electrofishing survey began on May 24, 2003 and ended on June 12, 2003, with a total of six sampling events (2 sampling events/week). Numbers of diadromous fish captured or identified during this survey are presented in Table 3-1. There were 175 juvenile American eels captured over the six sampling dates, along with 15 river herring and 10 American shad. Five of the shad were not netted, but the biologists were able to positively identify the fish. Of the 15 river herring reported, 9 were not netted and the 6 that were netted were alewives. As with the shad, the field biologists were able to identify the 9 river herring not netted because they were stunned by the boat shocker and observed at close range. Shad and river herring are difficult to capture using electroshocking gear because many quickly "break out" of the electric field by swimming in rapid, erratic movements or they get stunned and quickly sink out of sight.

Table 3-1. Diadromous Fish Captured in the Presumpscot River during Spring, 2003.

Common Name	Scientific Name	Total Captured
American eel	*Anguilla rostrata*	175
Alewife	*Alosa pseudoharengus*	15[1]
American shad	*Alosa sapidissima*	10[2]

[1] Nine of these alewives were identified as being stunned by the shock boat but were not netted

[2] Five of these shad were identified as being stunned by the shock boat but were not netted

Field crews sampled river reaches 1 through 3 on May 24, the first sampling date, and captured a total of 36 juvenile eels, 1 alewife and 3 American shad (Table 3-2). American eel was the only diadromous fish species captured in river reach 1 on May 24 (35 juvenile eels collected). In river reach 2, two shad were collected, a green female and a ripe male along with one ripe male alewife and 1 juvenile eel (Table 3-2). One shad was identified (fish was not netted) in river reach 3 on May 24 about 400 yds upstream of the mouth of Mill Brook and this fish was the only diadromous fish captured or identified in reach 3 on this date. No water quality data were collected on May 24 because of a faulty meter.

On the second sampling event on May 29, river flows and turbidity had increased due to heavy rains, which made sampling difficult. River reaches 1 through 3 were sampled again but catches were low due to the high flows and reduced visibility. One ripe alewife male was caught in reach 1 near the Sappi treatment plant and 2 juvenile eels were also captured in reach 1 on this date (Table 3-2). No diadromous fish were captured in river reaches 2 or 3 on May 29, 2003. Surface water temperatures on May 29 ranged from 14.6 to 15.2°C, with Secchi readings of 3 ft, reflecting the turbid conditions (Table 3-3). Dissolved oxygen readings were good in all three reaches sampled and surface readings ranged from 9.82 mg/l in reach 3 to 10.47 mg/l in reach 1.

The third sampling effort was conducted on June 4 and the high river flows and turbidity observed on May 29 had subsided. Secchi readings had increased from 3 ft on May 29 to 5 ft on June 4, indicating that water clarity had improved after the high flows subsided. River reaches 1, 3, 4, 5, and 6 were sampled on June 4 and diadromous fish were collected in reaches 1, 3, 4 and 6 (Table 3-2). Only

Table 3-2. Diadromous Fish Collected on Presumpscot River during Spring 2003.

Species	Date	Time	Number	Sex	Sex Condition	Area	Comment
American eel	5/24/2003	11:00 AM	3			Region 1†	
American eel		11:20 AM	5				
American eel		11:55 AM	15				
American eel		12:30 PM	3				
American eel		12:40 PM	9				
American shad		1:08 PM	1	F	Green	Region 2	Netted
American shad		1:25 PM	1	M	Ripe		Netted
American eel		1:53 PM	1				
Alewife			1	M	Ripe		Netted
American shad		2:19 PM	1			Region 3	Missed - 400 yds upstream of Mill Brook
American eel	5/29/2003	12:40 PM	2			Region 1	Netted. Flows are higher than on 5/24/03
Alewife			1	M	Ripe	Caught at SAPPI Treatment	and visibility into water is diminished
American eel	6/4/2003	11:30 AM	9			Region 4	
American eel		12:02 PM	9				
American eel		1:04 PM	21			Region 1	
American eel		1:39 PM	9				
American eel		2:55 PM	23				
American shad		3:22 PM	1			Region 3	Observed, not netted
American shad		3:37 PM	1				Netted
Alewife		3:50 PM	1	M	Spent	Mouth of Mill Brook	Netted
River herring			6			Mouth of Mill Brook	Observed, not netted
River herring		4:09 PM	1			Region 6	Observed, not netted
American eel	6/6/2003	12:00 PM	2			Region 3	
American shad			1	M	Ripe		Netted
American shad			1				Observed, not netted
Alewife			1	F	Spent		Netted
American eel		1:54 AM	42			Region 1	
American eel	6/9/2003	12:16 PM	4			Region 2	
American eel		12:39 PM	3			Region 3	
American eel		3:00 PM	5			Region 2	
American eel		3:56 AM	8			Region 1	

Table 3-2 (Continued)

Species	Date	Time	Number	Sex	Sex Condition	Area	Comment
American shad		4:17 PM	1			Region 1, under power lines	Observed, not netted
River herring			1				Observed, not netted
American shad		2:20 PM	1	M		Region 2	Netted
American shad	6/12/2003		1				Observed, not netted
American eel			2				
Alewife		2:35 PM	1	M		Region 3	Netted
River herring			2				Observed, not netted

†Key:

Region 1 – Tailrace to power lines (crossing near 789 Warren Ave, Portland)
Region 2 – Power lines to culvert (drainage from Constitution Dr, Westbrook)
Region 3 – Culvert to Rte 302 bridge
Region 4 – Rte 302 bridge to Minnow Brook
Region 5 – Minnow Brook to Meader Brook
Region 6 – Meader Brook to Rte 95 Bridge

Table 3-3. Water Quality Data Collected on the Presumpscot River, Spring 2003

Date	River Reach[1]	Depth	Temp (C)	DO mg/l	Conductivity	Secchi (ft)	Comments
05/29/03	1	surface	14.6	10.47	100.0	3.0	River height High
	2	surface	14.9	10.60	112.3	3.0	
	2	bottom	14.7	9.93	112.5	3.0	
	3	surface	15.2	9.82	112.2	3.0	
06/04/03	4	surface	17.4	9.47	109.3	5.0	River height Mid
	4	bottom	17.0	9.49	113.7	5.0	
	1	surface	16.9	10.30	90.0	5.0	
	1	bottom	16.6	10.12	90.8	5.0	
	5	surface	17.5	9.77	114.3	5.0	
	6	surface	17.7	9.20	116.4	4.5	
06/06/03	3	surface	19.2	9.64	114.6	5.0	River height Mid
	3	bottom	18.6	8.69	114.4	5.0	
	1	surface	18.4	10.10	87.5	4+	visibility to bottom
	2	surface	19.4	9.55	117.8	5.0	
	5	surface	19.5	9.26	115.4		
06/09/03	2	surface	18.0	8.66	118.0	4.0	River height Low
	3	surface	18.0	8.78	123.0	4.0	
	1	surface	17.8	9.83	85.0	4+	visibility to bottom
06/12/03	1	surface	19.4	9.20	77.2	6.0	Pool below dam
	3	surface	20.5	9.24	97.4	5.5	

[1] Reaches depicted in the order sampled; see times in Table 3-2.

juvenile eels were captured in reach 1 (53 juvenile eels) and reach 4 (18 juvenile eels) but in reach 3, two shad and seven river herring were recorded. All the river herring were either captured or identified (six were not netted) near the mouth of Mill Brook, and the one alewife netted was a spent male. The two shad captured in reach 3 were recorded upstream of the mouth of Mill Brook. One of these shad was identified (not netted) and the other shad that was netted and photographed was inadvertently released by the crew before they recorded its sex and condition (see Photo 4 in Appendix). One river herring was observed in river reach 6, the only diadromous fish recorded from this reach. Field crews suspected the deeper water and larger pools found in river reaches 4 through 6 contributed to the low catches, because the shock boat is not as effective in water deeper than 5 or 6 ft. Surface water temperatures on June 4 ranged from 16.9°C in river reach 1 up to 17.7°C in reach 6 and surface dissolved oxygen levels ranged from 9.20 mg/l in reach 6 to a high of 10.30 mg/l in reach 1 (Table 3-3).

On June 6, the field crew sampled river reaches 1 through 3 and captured diadromous fish in reach 1 and 3. A total of 42 juvenile eels were collected from reach 1, no diadromous fish were captured from reach 2 and two shad, one alewife and two eels were captured or identified from reach 3 (Table 3-2). Two shad were recorded upstream of Mill Brook; one ripe male shad was netted but the other shad was not netted. The alewife captured was a spent female collected upstream of Mill Brook. Surface water temperatures on June 6 ranged from 18.4°C in reach 1 up to 19.5°C in reach 5. Dissolved oxygen was highest in reach 1 (10.1 mg/l) and lowest in reach 2 (9.55 mg/l). Secchi

readings were 4 to 5 ft in all three reaches sampled on June 6 and visibility extended to the river bottom in reach 1 (Table 3-3).

The fifth sampling effort occurred on June 9 and river reaches 1 through 3 were sampled. Eels were the only diadromous fish captured in river reaches 2 and 3 on June 9 – nine juvenile eels were captured in reach 2 and three juvenile eels were taken in reach 3. However, one shad was identified in river reach 1 (under the power lines) on this date along with 8 juvenile eels (Table 3-2). Water temperature in the three reaches averaged 18°C on June 9 and dissolved oxygen ranged from 9.83 mg/l in reach 1 to 8.66 mg/l in reach 2. Secchi readings on this date were 4 ft, and visibility in reach 1 extended to the river bottom.

The sixth and final sample effort occurred on June 12 in river reaches 2 and 3. Two shad were recorded from river reach 2 and of these, one male shad was netted (sex condition was not recorded). One alewife was also identified from reach 2 on this date (Table 3-2). Two river herring and 2 juvenile eels were recorded from reach 3 on June 12; one male alewife was netted and the second river herring was observed but not netted. Surface water temperature was 19.4°C in reach 1 and 20.5°C in reach 3 and dissolved oxygen ranged from 9.20 to 9.24 mg/l (Table 3-3).

Water quality data collected by FOCB from the Presumpscot River in June and August 2003 are presented in Appendix 2.

3.2 RESIDENT FISH

Six resident fish species were captured from the six river reaches sampled during the Presumpscot River study (Table 3-4). There were a total of 228 white suckers collected, 111 golden shiners, 90 smallmouth bass, 22 brown trout, 5 threespine sticklebacks and 1 fourspine stickleback.

White suckers and smallmouth bass were captured on all six dates sampled during the study and they were found in all river reaches except river reach 6 (Table 3-5). River reach 6 was only sampled on June 4 and the field crew focused sampling in the deeper channel areas of this reach to target

Table 3-4. Resident Fish Captured in the Presumpscot River during Spring 2003.

Common Name	Scientific Name	Number Captured
White sucker	*Catostomus commersoni*	228
Golden shiner	*Notemigonus crysoleucas*	111
Smallmouth bass	*Micropterus dolomieu*	90
Brown trout	*Salmo trutta*	22
Threespine stickleback	*Gasterosteus aculeatus*	5
Fourspine stickleback	*Apeltes quadracus*	1

diadromous fish species. Few fish were captured in reaches 4 through 6 and it was suspected that most fish escaped the shock boat because of the deeper water present in these river sections.

Brown trout were captured on most sampling dates and were found in river reaches 1 through 4 during the study. Golden shiners were only collected from river reaches 1 and 2 (Table 3-5). Capture of threespine and fourspine sticklebacks occurred in river reach 1. Water quality data for the dates sampled are presented in Table 3-3.

Table 3-5. Resident Fish Collected on Presumpscot River during Spring 2003

Species	Date	Time	Number	Area	Comment
White sucker	5/24/2003	11:00 AM	11	Region 1†	
White sucker		11:20 AM	8		
Smallmouth bass			2		
White sucker		11:55 AM	4		
Smallmouth bass			2		
Golden shiner			1		
White sucker		12:30 PM	4		
White sucker		12:40 PM	4		
Smallmouth bass			3		
Golden shiners			100		
Brown trout			1		
Three-spined stickleback			5		
White sucker		1:53 PM	25	Region 2	
Brown trout			4		
White sucker		2:19 PM	20	Region 3	
Brown trout			2		
White sucker	5/29/2003	12:40 PM	17	Region 1	
Smallmouth bass			2		
Golden shiner			3		
White sucker		1:50 PM	2	Region 2	
No catch		2:35 PM	0	Region 3	
White sucker	6/4/2003	11:30 AM	7	Region 4	
Brown trout			2		
White sucker		12:02 PM	8		
Smallmouth bass			1		
Brown trout			2		
White sucker	6/4/2003	1:04 PM	13	Region 1	
Smallmouth bass			19		
Brown trout			1		
White sucker		1:39 PM	2		
Smallmouth bass			4		
White sucker		2:34 PM	4		
White sucker		2:55 PM	11	Region 1	
Smallmouth bass			2		
Four-spined stickleback			1		
White sucker		4:09 PM	3	Region 5	
White sucker		4:44 PM	2		
White sucker	6/6/2003	12:00 PM	8	Region 3	

Table 3-5 (Continued)

Species	Date	Time	Number	Area	Comment
Smallmouth bass			1		
Brown trout			1		
White sucker			25		
Smallmouth bass		1:54 PM	18	Region 1	
Brown trout			1		
White sucker			4		
Smallmouth bass		3:15 PM	2	Region 2	
Brown trout			3		
White sucker			14		
Smallmouth bass		12:16 PM	6	Region 2	
Golden shiner			7		
Brown trout			3		
White sucker		12:39 PM	8	Region 3	
Smallmouth bass	6/9/2003		5		
White sucker			14		
Smallmouth bass		3:56 PM	17	Region 1	
Brown trout			1		
White sucker		3:00 PM	2	Region 2	
Smallmouth bass			5		
White sucker		2:20 PM	3	Region 2	
Brown trout			2		
White sucker	6/12/2003	2:35 PM	5	Region 3	
Smallmouth bass			1		
Brown trout			2		

†Key:

Region 1 – Tailrace to power lines (crossing near 789 Warren Ave, Portland)

Region 2 – Power lines to culvert (drainage from Constitution Dr, Westbrook)

Region 3 – Culvert to Rte 302 bridge

Region 4 – Rte 302 bridge to Minnow Brook

Region 5 – Minnow Brook to Meader Brook

Region 6 – Meader Brook to Rte 95 Bridge

4.0 DISCUSSION

The capture of American shad in the Presumpscot River in spawning condition offers strong evidence that the shad in this river are members of a remnant population that may have persisted since the river was dammed. It has been documented that shad were present in the Presumpscot River both prior to and after the river was dammed in the early 1730s. Other diadromous fish species that historically ascended the Presumpscot River include river herring, American eel and Atlantic salmon (The Presumpscot River Plan Steering Committee and Land & Water Associates 2002).

The presence of shad in the Presumpscot River in spawning condition, suggesting that these fish could be a remnant population, is further supported by data from the Smelt Hill Dam's fish lift in 1995 and 1996 that documented adult shad moving upstream during the spawning season. American shad ascending the Presumpscot River past Smelt Hill Dam were documented in 1995 and 1996 when shad were lifted via the Smelt Hill Dam's fish lift. One shad was counted in the lift in 1995 and thirty-one shad were lifted in 1996, the last year the lift was operational before flooding destroyed it (The Presumpscot River Plan Steering Committee and Land & Water Associates 2002). After the 1996 flood, the gates on the Smelt Hill Dam were periodically opened to allow shad and other diadromous fish access above the dam, but there is no record of the species or numbers of fish passed upstream when the gates were opened. The fish lift began operation in 1990, however, no data exist on the numbers or species of fish observed using the lift until CMP assumed ownership in 1995. Although the numbers of shad lifted were low in 1995 and 1996, the fish lift's efficiency at attracting and eventually passing shad is unknown, so it is not possible to estimate how many shad were present below the dam in those years.

Previous investigators have suggested that shad return to their natal rivers, but in many studies there was no direct evidence. However, Melvin et al (1986) proved that site fidelity of spawning shad in the Annapolis River in Canada was 97%, demonstrating that only a small percentage of shad strayed from this river during the spawning season. Although the present study offers no direct evidence that the adult shad captured in 2003 in the Presumpscot River were born in the stretch of river below Smelt Hill Dam prior to its removal, indirect evidence suggests that this is occurring, given that numbers of adult shad that do return to the river.

Even though the data collected during this study is qualitative because many of the fish could avoid the sampling gear, it did document the presence of spawning adult shad and river herring, and juvenile American eels in the reach between Mill Brook and Cumberland Mills Dam. The only section of the river not sampled between Mill Brook and Cumberland Mills Dam was approximately 200 yds of river just downstream of the dam, which could not be sampled due to obstructions in the river that prohibited boat access.

5.0 BIBLIOGRAPHY

Melvin, G.D., M.J. Dadswell and J.D. Martin. 1986. Fidelity of American Shad, *Alosa sapidissa* (Clupeidae), to its River of Previous Spawning. Can. J. Fish. Aquat. Sci., Vol. 43, 1986.

The Presumpscot River Plan Steering Committee and Land & Water Associates. 2002. Fisheries Conditions, Issues and Options For the Presumpscot River: A Background Paper for the Development of A Plan for the Future of the Presumpscot River. *Prepared for* the Casco Bay Estuary Project.

APPENDIX 1

Photos of Anadromous Fish Captured in the Presumpscot River, Spring 2003

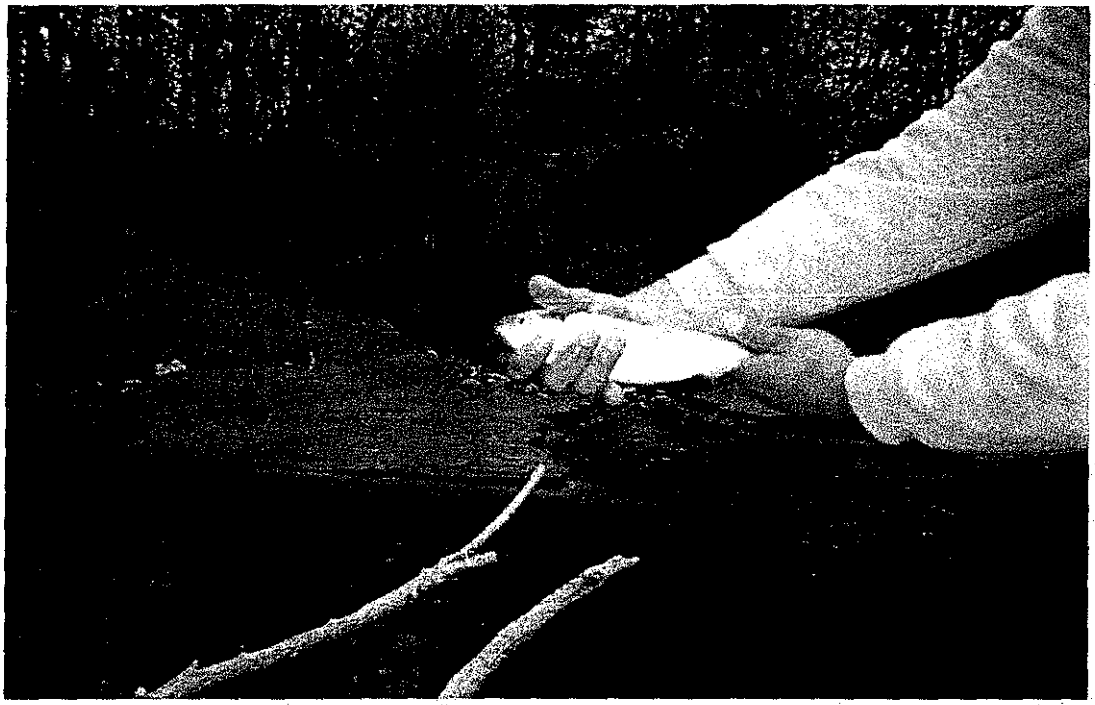


Photo 1. **Alewife collected on May 24, 2003 in the Presumpscot River near culvert draining under Constitution Drive.**

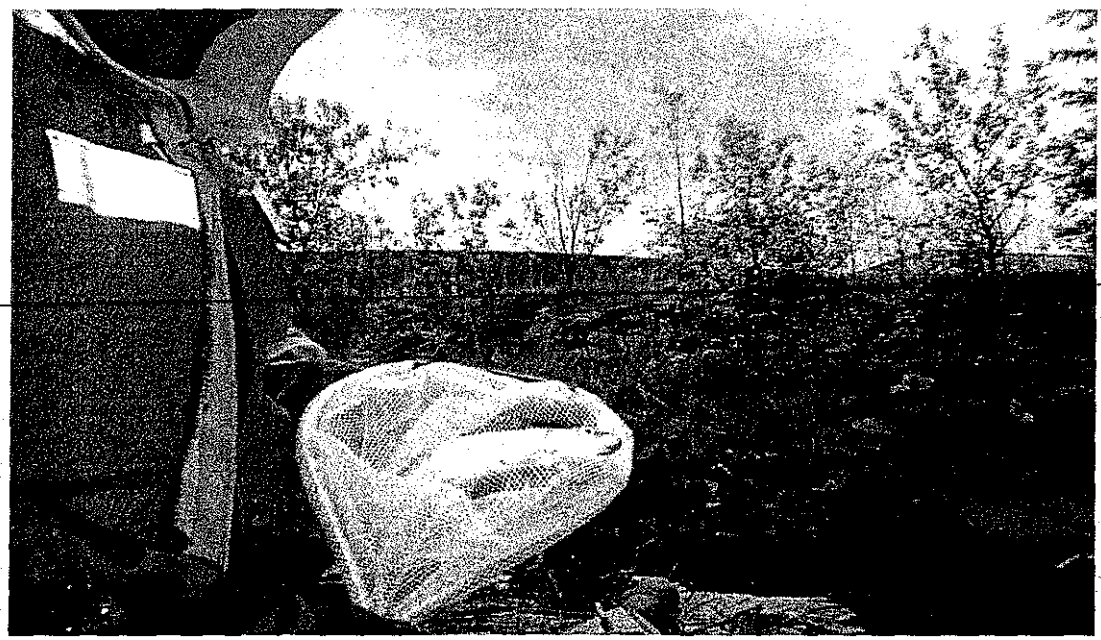


Photo 2. **Alewife collected on May 29, 2003 in the Presumpscot River near the Sappi treatment plant in Westbrook, Maine.**

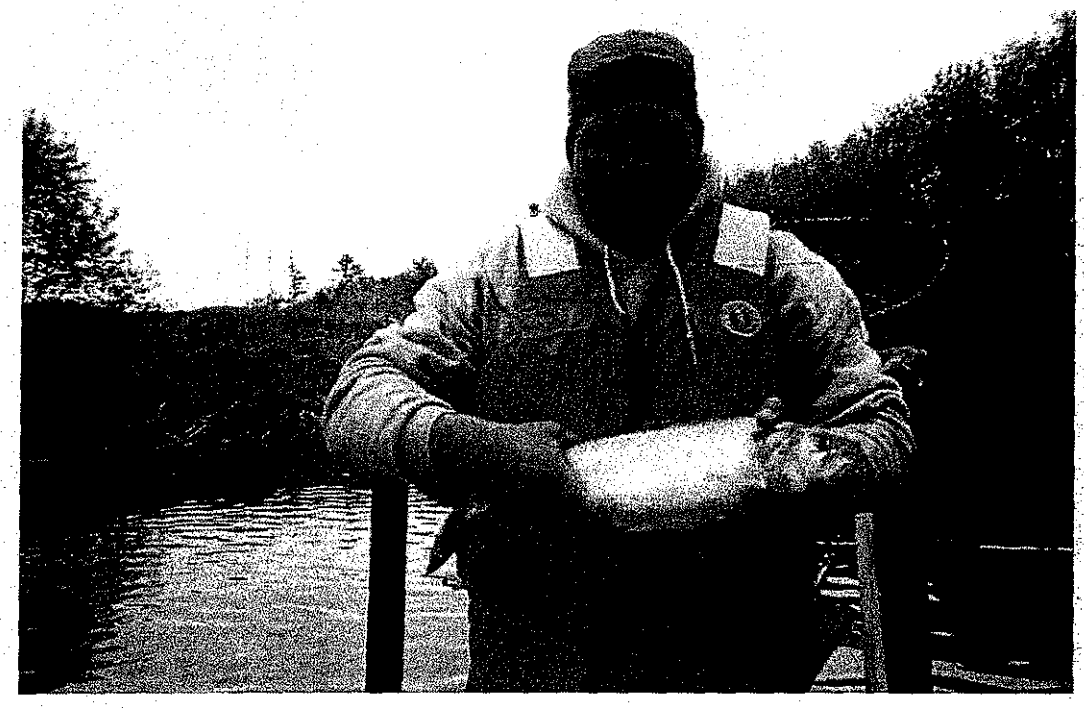


Photo 3. **American Shad collected on May 24, 2003 in the Presumpscot River near power line crossing, 789 Warren Ave., Portland, Maine.**

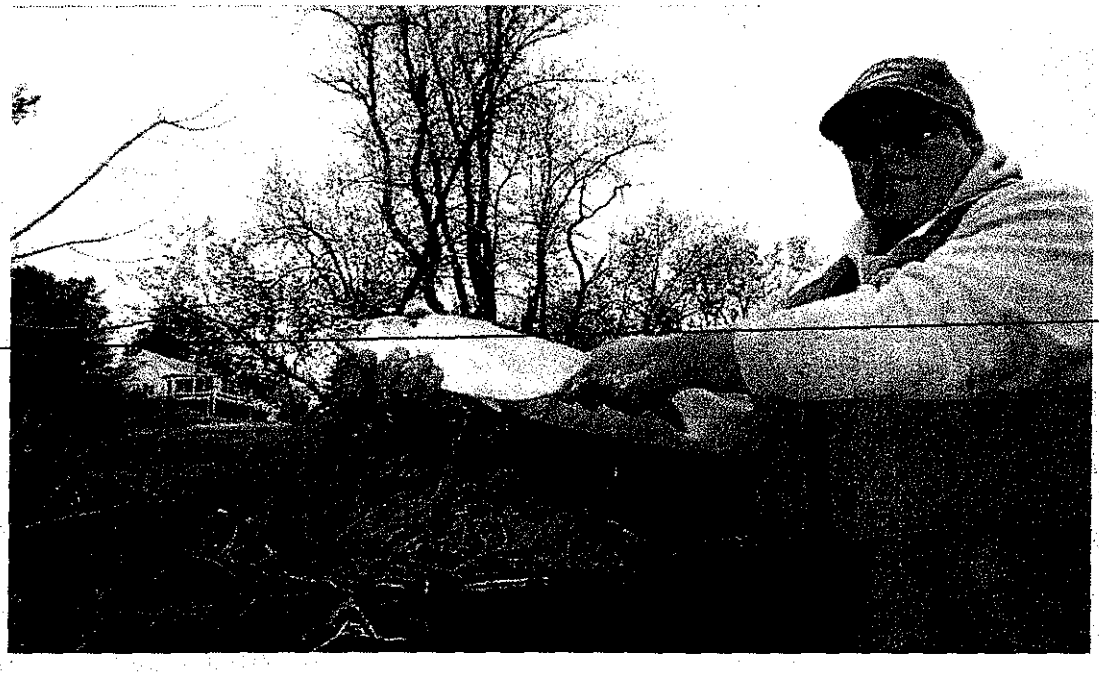


Photo 4. **American Shad collected on May 24, 2003 in Presumpscot River. House on Independent Drive in background.**

Photo 5. **American Shad captured on June 4, 2003 in the Presumpscot River upstream of Mill Brook.**

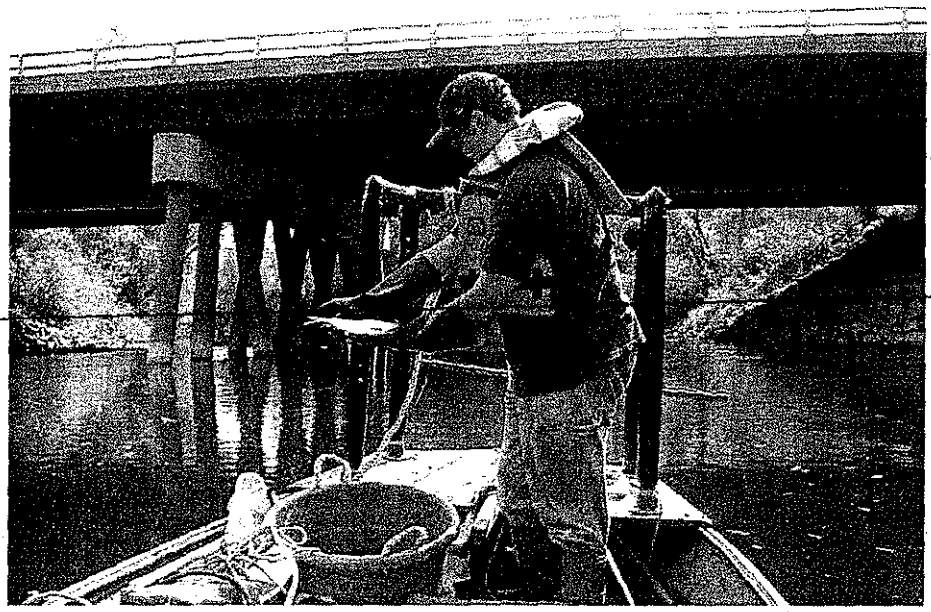


Photo 6. **Alewife captured on June 4, 2003 in the Presumpscot River near the mouth of Mill Brook.**

Photo 7. **Shock boat sampling the Presumpscot River, June 6, 2003.**

Photo 8. **American Shad captured on June 6, 2003 in the Presumpscot River upstream of Mill Brook.**

APPENDIX 2

Appendix 2. Water Quality (surface or water column profiles) collected by FOCB at six locations in the Presumpscott River during June and August.

Site Name	Date M/D/Y	Time hh:mm:ss	Depth m	Secchi/depth m	Temp °C	SpCond uS/cm	Cond uS/cm	DO Conc mg/L	DO % %	pH
Old Steamboat Landing	6/2/2003	10:05	0.0	0.5	16.5		97	9.7	99.0	8.05
(profile)	6/2/2003		1.0		16.5		95	9.6	98.5	7.79
	6/2/2003		2.0		16.5		95	9.6	98.1	7.73
	6/2/2003		3.0		16.5		95	9.6	97.9	7.69
	6/2/2003		4.0		16.5		95	9.6	97.8	7.69
	6/2/2003		5.0		16.5		95	9.5	97.5	7.62
Mill Brook	6/2/2003	10:30	0.0	*	14.5		85	10.4	101.0	7.78
Above Mill Brook	6/2/2003	10:40	0.0	*	16.9		99	9.5	98.3	7.54
50 Yards above Sappi Discharge	6/2/2003	11:10	0.0	*	16.4		89	9.7	99.3	7.76
Sappi Discharge-depth	6/2/2003	11:20	0.0	*	17.0		102	9.8	101.3	7.83
Sappi Discharge-surface	6/2/2003	11:25	0.0	*	17.5		150	9.8	102.6	7.77
FOCB Bouy	6/2/2003	11:50	0.0	*	16.7		94	9.8	100.2	7.77

* = No Secchi data recorded
Note: 6/2/03 data was hand written on a field data sheet and not logged as a data file as the 8/21/03 data.
Also, Chlorophyll a was not recorded on 6/2/03 because sonde was not equiped w/ chl probe.
FOCB Buoy was located 300 yards dwnstream of the Sappi discharge.

Site Name	Date M/D/Y	Time hh:mm	Depth m	Secchi/depth	Temp °C	SpCond uS/cm	Cond uS/cm	DO Conc mg/L	DO % %	pH	Chlorophyll ug/L
Mill Brook	8/21/2003	10:30	0.0	BSV-0.3	21.5	134.6	125.7	8.3	94.0%	7.09	1.4
Above Mill Brook	8/21/2003	10:33	0.0	BSV-0.5	25.9	87.2	88.7	7.8	96.0%	7.31	1.4
Old Steamboat Landing-surface	8/21/2003	10:41	0.0	BSV-1.2	25.7	87.6	88.8	7.9	96.9%	7.36	0.6
Old Steamboat Landing-depth	8/21/2003	10:42	1.0		25.7	87.5	88.7	7.9	96.9%	7.33	1.8
Sappi Discharge-depth	8/21/2003	11:35	1.5		25.8	80.3	81.5	8.4	103.2%	7.67	1.7
Sappi Discharge-surface	8/21/2003	11:37	0.0	BSV-1.5	26.3	80.0	81.9	8.2	101.6%	7.51	0.8
FOCB Bouy	8/21/2003	11:38	0.0	BSV-1.3	27.2	130.0	135.6	8.1	102.0%	7.67	1.4

BSV = At the bottom, disk still visible.

Appendix 2 Continued. Diurnal Water Quality Data Collected in the Presumpscott River at the FOCB Buoy 300 yards downstream of Sappi Discharge between 2 June and 6 June 2003.

Date M/D/Y	Time hh:mm:ss	Temp °C	SpCond uS/cm	Cond uS/cm	DO Conc mg/L	DO % %	pH
6/2/2003	12:00:40	16.9	115.4	97.6	9.9	102.6	7.3
6/2/2003	13:00:40	16.9	109.3	92.5	10.2	105.0	7.3
6/2/2003	14:00:40	17.2	109.4	93.1	10.2	105.8	7.3
6/2/2003	15:00:40	17.1	103.6	88.0	10.2	105.4	7.3
6/2/2003	16:00:40	17.3	108.9	92.9	10.1	105.0	7.4
6/2/2003	17:00:40	17.3	108.6	92.5	10.1	104.9	7.3
6/2/2003	18:00:40	17.2	108.6	92.4	10.0	104.4	7.3
6/2/2003	19:00:40	17.1	109.4	92.9	10.0	103.5	7.3
6/2/2003	20:00:40	17.0	116.5	98.7	10.0	103.0	7.3
6/2/2003	21:00:40	16.9	114.0	96.2	9.9	102.4	7.3
6/2/2003	22:00:40	16.8	116.8	98.6	9.9	102.2	7.3
6/2/2003	23:00:40	16.9	119.9	101.3	9.9	102.4	7.3
6/3/2003	0:00:40	16.8	118.5	100.0	9.9	102.5	7.3
6/3/2003	1:00:40	16.7	118.2	99.6	10.0	102.6	7.3
6/3/2003	2:00:40	16.6	117.2	98.5	10.0	102.7	7.3
6/3/2003	3:00:40	16.5	116.9	97.9	10.0	102.7	7.3
6/3/2003	4:00:40	16.4	117.9	98.5	10.1	102.8	7.3
6/3/2003	5:00:40	16.2	117.9	98.2	10.1	102.9	7.3
6/3/2003	6:00:40	16.1	116.4	96.6	10.1	102.8	7.3
6/3/2003	7:00:40	16.0	119.3	98.9	10.2	103.3	7.3
6/3/2003	8:00:40	16.1	121.8	101.0	10.3	104.1	7.4
6/3/2003	9:00:40	16.1	120.7	100.2	10.3	104.9	7.4
6/3/2003	10:00:40	16.3	121.8	101.5	10.4	105.8	7.4
6/3/2003	11:00:40	16.7	128.6	108.2	10.4	106.7	7.5
6/3/2003	12:00:40	17.0	131.3	111.1	10.4	107.4	7.5
6/3/2003	13:00:40	17.0	125.2	106.1	10.4	107.6	7.4
6/3/2003	14:00:40	17.4	131.1	112.1	10.3	107.9	7.5
6/3/2003	15:00:40	17.4	125.8	107.6	10.3	107.2	7.4
6/3/2003	16:00:40	17.5	126.0	108.0	10.2	107.1	7.5
6/3/2003	17:00:40	17.5	125.5	107.5	10.2	106.5	7.5
6/3/2003	18:00:40	17.3	124.3	106.0	10.2	105.8	7.5
6/3/2003	19:00:40	17.2	123.9	105.4	10.1	104.9	7.5
6/3/2003	20:00:40	17.1	123.4	104.9	10.0	104.0	7.5
6/3/2003	21:00:40	17.1	124.3	105.6	10.0	103.7	7.5
6/3/2003	22:00:40	17.2	124.2	105.6	10.0	103.4	7.4
6/3/2003	23:00:40	17.2	124.2	105.7	10.0	103.3	7.5

(continued)

Appendix 2 Continued.

Date M/D/Y	Time hh:mm:ss	Temp °C	SpCond uS/cm	Cond uS/cm	DO Conc mg/L	DO % %	pH
6/4/2003	0:00:40	17.2	123.1	104.7	10.0	103.5	7.5
6/4/2003	1:00:40	17.1	122.4	103.8	10.0	103.5	7.5
6/4/2003	2:00:40	17.0	121.1	102.6	10.0	103.4	7.5
6/4/2003	3:00:40	17.0	120.9	102.3	10.0	103.6	7.5
6/4/2003	4:00:40	16.8	119.4	100.8	10.0	103.5	7.5
6/4/2003	5:00:40	16.7	119.9	100.9	10.1	103.8	7.5
6/4/2003	6:00:40	16.6	118.8	99.9	10.1	103.7	7.5
6/4/2003	7:00:40	16.6	119.2	100.1	10.2	104.2	7.5
6/4/2003	8:00:40	16.6	119.9	100.7	10.2	105.0	7.5
6/4/2003	9:00:40	16.5	112.1	93.8	10.3	105.6	7.4
6/4/2003	10:00:40	16.7	116.3	97.9	10.4	106.7	7.5
6/4/2003	11:00:40	17.0	123.8	104.9	10.4	107.6	7.6
6/4/2003	12:00:40	16.7	113.8	95.8	10.4	107.4	7.5
6/4/2003	13:00:40	17.0	122.8	104.0	10.4	107.5	7.6
6/4/2003	14:00:40	17.1	124.0	105.4	10.4	107.9	7.6
6/4/2003	15:00:40	17.3	122.4	104.4	10.4	108.1	7.6
6/4/2003	16:00:40	17.4	122.9	105.0	10.3	107.7	7.7
6/4/2003	17:00:40	17.4	123.0	105.2	10.3	107.5	7.7
6/4/2003	18:00:40	17.4	123.0	105.2	10.3	107.1	7.6
6/4/2003	19:00:40	17.3	124.0	105.8	10.2	106.0	7.6
6/4/2003	20:00:40	17.3	122.9	104.7	10.1	104.9	7.6
6/4/2003	21:00:40	17.2	123.3	104.9	10.0	104.1	7.6
6/4/2003	22:00:40	17.1	123.4	104.9	10.0	103.6	7.6
6/4/2003	23:00:40	17.1	123.2	104.7	10.0	103.6	7.5
6/5/2003	0:00:40	17.2	123.6	105.1	10.0	103.4	7.6
6/5/2003	1:00:40	17.2	123.1	104.7	10.0	103.4	7.6
6/5/2003	2:00:40	17.2	120.3	102.3	9.9	103.3	7.5
6/5/2003	3:00:40	17.2	120.5	102.5	9.9	103.2	7.5
6/5/2003	4:00:40	17.2	122.3	104.1	9.9	103.3	7.6
6/5/2003	5:00:40	17.2	122.4	104.2	9.9	103.2	7.6
6/5/2003	6:00:40	17.2	123.4	105.1	9.9	103.1	7.6
6/5/2003	7:00:40	17.2	124.8	106.3	10.0	103.5	7.6
6/5/2003	8:00:40	17.2	125.1	106.6	10.0	103.5	7.6
6/5/2003	9:00:40	17.0	117.0	99.2	10.0	103.6	7.5
6/5/2003	10:00:40	17.4	126.4	107.9	10.0	104.0	7.6
6/5/2003	11:00:40	17.1	114.5	97.3	10.0	104.2	7.5
6/5/2003	12:00:40	17.4	123.7	105.7	10.1	104.8	7.6
6/5/2003	13:00:40	17.5	127.0	108.9	10.1	105.3	7.6
6/5/2003	14:00:40	17.4	120.6	103.0	10.1	105.2	7.6
6/5/2003	15:00:40	17.5	125.2	107.2	10.0	104.9	7.6
6/5/2003	16:00:40	17.5	124.1	106.3	10.0	104.9	7.6
6/5/2003	17:00:40	17.5	125.5	107.5	10.0	104.5	7.6
6/5/2003	18:00:40	17.4	126.2	107.9	10.0	103.9	7.6

(continued)

Appendix 2 Continued.

Date M/D/Y	Time hh:mm:ss	Temp °C	SpCond uS/cm	Cond uS/cm	DO Conc mg/L	DO % %	pH
6/5/2003	19:00:40	17.4	126.2	107.9	9.9	103.4	7.6
6/5/2003	20:00:40	17.4	126.9	108.4	9.9	102.8	7.6
6/5/2003	21:00:40	17.3	129.2	110.0	9.9	102.8	7.6
6/5/2003	22:00:40	17.2	129.2	109.8	9.9	102.9	7.6
6/5/2003	23:00:40	17.1	129.8	110.3	9.9	103.1	7.6
6/6/2003	0:00:40	17.2	129.1	109.9	10.0	104.1	7.6
6/6/2003	1:00:40	17.1	126.7	107.6	10.0	103.9	7.6
6/6/2003	2:00:40	17.1	125.8	106.7	10.0	104.0	7.6
6/6/2003	3:00:40	17.1	125.3	106.3	10.1	104.2	7.6
6/6/2003	4:00:40	17.0	124.9	106.0	10.1	104.3	7.6
6/6/2003	5:00:40	17.0	124.5	105.6	10.1	104.6	7.6
6/6/2003	6:00:40	17.0	124.6	105.7	10.1	104.5	7.6
6/6/2003	7:00:40	17.1	123.7	104.9	10.1	104.5	7.6
6/6/2003	8:00:40	17.1	123.4	104.8	10.2	105.3	7.6
6/6/2003	9:00:40	17.0	113.0	95.9	10.2	105.8	7.5
6/6/2003	10:00:40	17.5	121.0	103.6	10.2	107.1	7.6

Appendix 2 Continued. Diurnal Water Quality Data Collected in the Presumpscott River at the FOCB Buoy 300 ft downstream of Sappi Discharge between 21 August and 26 August 2003.

Date M/D/Y	Time hh:mm:ss	Temp °C	Cond uS/cm	SpCond uS/cm	DO Conc mg/L	DO % %	pH	Chlorophyll ug/L
8/21/2003	12:00:39	26.1	89.3	87.4	8.4	104.0	7.5	1.8
8/21/2003	13:00:40	26.2	89.9	87.8	8.4	104.5	7.5	1.7
8/21/2003	14:00:39	26.4	91.7	89.4	8.4	104.6	7.5	1.6
8/21/2003	15:00:39	26.5	91.2	88.7	8.4	104.7	7.6	1.4
8/21/2003	16:00:39	26.5	87.5	85.0	8.4	104.3	7.5	0.9
8/21/2003	17:00:39	26.3	80.4	78.4	8.3	103.0	7.4	1.6
8/21/2003	18:00:40	26.2	79.7	77.9	8.2	101.3	7.4	2.2
8/21/2003	19:00:39	26.1	79.2	77.6	8.1	99.6	7.3	1.8
8/21/2003	20:00:39	26.2	86.3	84.3	8.0	98.4	7.4	1.6
8/21/2003	21:00:39	26.2	86.1	84.2	7.9	97.5	7.4	1.3
8/21/2003	22:00:39	26.2	86.2	84.2	7.9	97.1	7.3	1.6
8/21/2003	23:00:40	26.4	87.3	85.0	7.8	97.1	7.4	1.9
8/22/2003	0:00:39	26.4	88.2	85.9	7.8	97.0	7.3	1.5
8/22/2003	1:00:39	26.4	88.1	85.9	7.8	96.8	7.3	1.3
8/22/2003	2:00:39	26.3	87.2	85.1	7.8	96.5	7.3	1.1
8/22/2003	3:00:39	26.3	86.4	84.4	7.8	96.3	7.3	1.7
8/22/2003	4:00:40	26.2	85.2	83.2	7.8	96.0	7.3	2.0
8/22/2003	5:00:39	26.2	85.9	84.1	7.8	96.0	7.3	2.1
8/22/2003	6:00:39	26.2	86.0	84.2	7.8	95.8	7.3	2.9
8/22/2003	7:00:39	26.1	86.9	85.1	7.8	96.0	7.3	1.2
8/22/2003	8:00:39	26.0	86.3	84.6	7.9	96.8	7.3	1.4
8/22/2003	9:00:40	26.1	88.4	86.5	8.0	98.7	7.4	1.4
8/22/2003	10:00:39	26.3	90.4	88.2	8.1	100.6	7.4	1.7
8/22/2003	11:00:39	26.5	90.9	88.3	8.2	102.0	7.5	0.7
8/22/2003	12:00:40	26.7	90.3	87.5	8.3	103.0	7.5	1.3
8/22/2003	13:00:39	26.8	88.6	85.7	8.3	103.4	7.5	1.2
8/22/2003	14:00:39	26.9	87.9	84.9	8.3	103.5	7.6	1.0
8/22/2003	15:00:39	27.0	87.6	84.4	8.2	103.3	7.6	1.9
8/22/2003	16:00:40	27.0	87.4	84.1	8.2	102.6	7.6	1.6
8/22/2003	17:00:39	27.1	87.7	84.4	8.1	101.6	7.6	1.5
8/22/2003	18:00:39	27.0	87.5	84.3	8.0	100.0	7.5	0.7
8/22/2003	19:00:40	27.0	86.5	83.4	7.8	97.9	7.4	2.0
8/22/2003	20:00:39	27.0	86.4	83.2	7.7	96.8	7.4	1.4
8/22/2003	21:00:39	27.0	87.7	84.5	7.6	95.7	7.4	1.8
8/22/2003	22:00:39	27.0	92.8	89.3	7.6	95.6	7.5	1.2
8/22/2003	23:00:40	27.0	88.0	84.8	7.6	95.2	7.4	1.9

(continued)

Appendix 2 continued

Date M/D/Y	Time hh:mm:ss	Temp °C	Cond uS/cm	SpCond uS/cm	DO Conc mg/L	DO % %	pH	Chlorophyll ug/L
8/23/2003	0:00:39	27.0	87.5	84.3	7.6	95.3	7.4	1.7
8/23/2003	1:00:39	26.9	87.0	84.0	7.6	95.2	7.4	1.5
8/23/2003	2:00:40	26.7	87.1	84.3	7.6	95.1	7.4	1.2
8/23/2003	3:00:39	26.6	86.9	84.4	7.6	95.0	7.4	1.3
8/23/2003	4:00:39	26.4	87.3	84.9	7.6	94.9	7.4	1.8
8/23/2003	5:00:40	26.3	87.7	85.5	7.7	94.9	7.4	0.9
8/23/2003	6:00:39	26.2	86.1	84.3	7.7	94.9	7.4	1.1
8/23/2003	7:00:39	26.1	85.3	83.6	7.7	94.9	7.4	1.3
8/23/2003	8:00:39	26.0	85.4	83.9	7.8	95.7	7.4	1.5
8/23/2003	9:00:39	26.0	88.0	86.3	7.9	97.4	7.5	1.4
8/23/2003	10:00:39	26.1	88.9	87.0	8.0	99.2	7.5	1.6
8/23/2003	11:00:39	26.3	90.7	88.4	8.1	101.0	7.6	1.0
8/23/2003	12:00:40	26.4	91.3	88.9	8.2	101.6	7.6	1.0
8/23/2003	13:00:39	26.5	91.0	88.5	8.2	101.7	7.6	1.4
8/23/2003	14:00:39	26.6	89.8	87.2	8.2	102.5	7.7	1.1
8/23/2003	15:00:39	26.5	88.1	85.6	8.2	102.5	7.7	1.0
8/23/2003	16:00:40	26.6	87.4	84.9	8.2	101.7	7.7	1.7
8/23/2003	17:00:39	26.5	87.6	85.1	8.1	100.8	7.7	1.1
8/23/2003	18:00:39	26.4	87.8	85.5	8.0	99.2	7.6	1.4
8/23/2003	19:00:39	26.3	87.1	85.1	7.9	97.2	7.5	1.2
8/23/2003	20:00:39	26.2	87.3	85.4	7.8	96.1	7.5	1.2
8/23/2003	21:00:39	26.1	86.5	84.7	7.7	95.5	7.4	1.8
8/23/2003	22:00:39	26.1	86.5	84.7	7.7	95.4	7.4	1.4
8/23/2003	23:00:39	26.1	85.5	83.7	7.7	95.3	7.4	1.9
8/24/2003	0:00:40	26.0	85.5	83.9	7.7	95.3	7.4	1.2
8/24/2003	1:00:39	25.8	85.1	83.8	7.8	95.4	7.4	1.1
8/24/2003	2:00:39	25.6	84.5	83.5	7.8	95.2	7.4	0.5
8/24/2003	3:00:40	25.5	83.0	82.2	7.8	95.0	7.4	0.8
8/24/2003	4:00:39	25.4	83.3	82.6	7.8	94.9	7.4	1.2
8/24/2003	5:00:39	25.3	82.7	82.2	7.8	94.8	7.3	1.9
8/24/2003	6:00:40	25.2	82.4	82.1	7.8	94.8	7.3	1.9
8/24/2003	7:00:39	25.1	81.8	81.7	7.8	95.0	7.3	1.2
8/24/2003	8:00:40	25.0	81.6	81.5	7.9	95.8	7.3	1.5
8/24/2003	9:00:39	25.2	87.1	86.9	8.1	97.7	7.4	0.8
8/24/2003	10:00:39	25.2	82.7	82.3	8.2	99.6	7.4	1.1
8/24/2003	11:00:39	25.3	84.2	83.7	8.3	101.2	7.5	0.8
8/24/2003	12:00:39	25.4	84.0	83.3	8.4	102.0	7.5	1.7
8/24/2003	13:00:40	25.5	84.3	83.4	8.4	102.3	7.6	1.1
8/24/2003	14:00:39	25.6	83.0	82.1	8.4	102.4	7.6	1.2
8/24/2003	15:00:39	25.6	82.7	81.8	8.4	102.3	7.6	1.3
8/24/2003	16:00:39	25.6	82.8	81.8	8.3	101.7	7.6	1.2
8/24/2003	17:00:39	25.6	82.4	81.5	8.2	100.8	7.6	0.9
8/24/2003	18:00:40	25.4	82.5	81.8	8.1	99.2	7.5	1.9

(continued)

Appendix 2 continued

Date M/D/Y	Time hh:mm:ss	Temp °C	Cond uS/cm	SpCond uS/cm	DO Conc mg/L	DO % %	pH	Chlorophyll ug/L
8/24/2003	19:00:39	25.3	82.6	82.1	8.0	97.4	7.4	1.8
8/24/2003	20:00:39	25.1	82.4	82.1	7.9	95.9	7.4	1.9
8/24/2003	21:00:39	25.1	82.5	82.4	7.9	95.1	7.3	0.8
8/24/2003	22:00:39	25.0	81.8	81.8	7.8	95.0	7.3	1.1
8/24/2003	23:00:40	25.0	81.1	81.1	7.9	95.2	7.3	1.5
8/25/2003	0:00:39	25.0	80.4	80.5	7.9	95.4	7.3	1.4
8/25/2003	1:00:39	24.8	79.0	79.3	7.9	95.4	7.3	1.3
8/25/2003	2:00:39	24.7	78.4	78.8	7.9	95.3	7.3	0.5
8/25/2003	3:00:39	24.7	78.8	79.3	7.9	95.2	7.3	1.5
8/25/2003	4:00:39	24.6	78.8	79.4	7.9	95.0	7.3	0.9
8/25/2003	5:00:39	24.5	79.0	79.7	7.9	94.9	7.3	1.3
8/25/2003	6:00:40	24.5	79.1	79.9	7.9	94.7	7.3	1.8
8/25/2003	7:00:39	24.4	79.6	80.5	7.9	94.7	7.3	1.6
8/25/2003	8:00:39	24.3	80.7	81.8	7.9	94.7	7.3	1.7
8/25/2003	9:00:40	24.2	82.9	84.1	8.0	95.3	7.3	0.4
8/25/2003	10:00:39	24.2	83.9	85.1	8.1	96.7	7.3	1.6
8/25/2003	11:00:39	24.2	84.0	85.3	8.3	98.8	7.4	1.1
8/25/2003	12:00:39	24.4	82.4	83.3	8.4	100.8	7.4	1.3
8/25/2003	13:00:39	24.6	82.2	83.0	8.5	101.6	7.5	0.6
8/25/2003	14:00:40	24.5	82.5	83.3	8.4	101.0	7.5	1.2
8/25/2003	15:00:39	24.4	81.6	82.5	8.3	99.6	7.4	1.4
8/25/2003	16:00:39	24.3	80.1	81.1	8.2	98.5	7.4	1.2
8/25/2003	17:00:39	24.3	79.6	80.7	8.2	97.3	7.3	1.5
8/25/2003	18:00:39	24.1	78.9	80.2	8.1	96.6	7.3	2.0
8/25/2003	19:00:40	24.1	79.4	80.8	8.1	95.9	7.3	1.4
8/25/2003	20:00:39	24.0	79.2	80.7	8.0	95.1	7.3	1.1
8/25/2003	21:00:39	24.0	79.2	80.8	8.0	94.7	7.3	1.8
8/25/2003	22:00:39	24.0	79.7	81.3	8.0	94.7	7.3	1.3
8/25/2003	23:00:39	23.9	79.1	80.8	8.0	94.6	7.3	1.9
8/26/2003	0:00:39	23.9	78.8	80.5	8.0	94.7	7.3	1.1
8/26/2003	1:00:39	23.8	78.2	80.1	8.0	94.7	7.3	0.9
8/26/2003	2:00:40	23.8	78.1	79.9	8.0	94.7	7.3	1.2
8/26/2003	3:00:39	23.8	77.5	79.4	8.0	94.6	7.3	0.7
8/26/2003	4:00:39	23.7	77.5	79.4	8.0	94.6	7.3	1.1
8/26/2003	5:00:40	23.7	77.4	79.4	8.0	94.5	7.2	1.7
8/26/2003	6:00:39	23.6	77.2	79.3	8.0	94.4	7.3	0.8
8/26/2003	7:00:40	23.6	77.1	79.2	8.0	94.5	7.3	1.1
8/26/2003	8:00:39	23.5	78.2	80.5	8.1	95.5	7.3	1.7
8/26/2003	9:00:39	23.6	80.7	83.0	8.2	96.9	7.3	1.3
8/26/2003	10:00:40	23.7	80.5	82.6	8.3	98.0	7.4	0.9
8/26/2003	11:00:39	24.0	84.3	86.0	8.4	99.7	7.5	2.2
8/26/2003	12:00:39	23.9	81.4	83.1	8.4	99.4	7.4	1.8
8/26/2003	13:00:40	23.9	81.1	82.8	8.4	99.3	7.4	0.9
8/26/2003	14:00:39	24.0	80.3	81.8	8.4	99.6	7.5	1.5
8/26/2003	15:00:40	24.2	79.8	81.0	8.4	100.4	7.5	1.7

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit C

Report:
Stage 1C Shad Presence Study
Freshet Channel Fishway, Cumberland Mills Site, Westbrook, Maine

Submitted by:

S.D. Warren Company dba Sappi North America
89 Cumberland Street
Westbrook, Maine 04092

Date:

September 30, 2016

With Assistance from:

Acheron

Engineering, Environmental and Geologic Consultants
Newport, Maine

1.0 BACKGROUND

On October 5, 2010, the Commissioner of the Maine Department of Inland Fisheries and Wildlife (MDIFW) signed a Final Order (Order) regarding fish passage facilities at the Cumberland Mills site on the Presumpscot River in Westbrook, Maine. The Order included an Effectiveness Testing Plan (April 8, 2010) that specifies the nature and scope of studies that are required to evaluate the effectiveness of the fish passage facilities at the Cumberland Mills site after they are placed into operation. The Effectiveness Testing Plan (2010) includes provisions for various stages of testing over a period of several years to evaluate the effectiveness of the Cumberland Mills fishway.

The Effectiveness Testing Plan (2010) requires that an American shad presence study be conducted at the Cumberland Mills site to determine the presence and relative abundance of American shad. S.D. Warren (Warren) completed Stage 1A of the shad presence study in 2014. No shad were observed at the fishway in 2014. The second year of the American shad presence study in 2015 (Stage 1B) indicated that American shad were present at the Cumberland Mills fishway in very low numbers. Warren repeated the Stage 1 American shad presence study in 2016. The 2016 study is referred as Stage 1C to differentiate it from Stage 1A (2014) and Stage 1B (2015) of the American shad presence study.

The Effectiveness Testing Plan (2010) includes requirements for Warren to make visual observations to establish if American shad are present or absent at the fishway. The 2010 Effectiveness Testing Plan reads in part:

> *"Shad Presence Study. A shad presence study will be conducted by S.D. Warren, in consultation with DMR, during the second and third upstream migration seasons following the completion of the installation of the freshet channel Denil fishway, mechanical flashboard system, main channel gates and flashboards, and fish barrier dam. This study will consist of reviewing fishway video (from the cameras installed at the entrance and exit for herring testing) and conducting visual observations in the vicinity of the fishway entrance to determine the presence and relative abundance of shad. All video camera output will be digitally recorded for review and analysis. No later than 90 days prior to initiation of the study, S.D. Warren shall prepare and submit the details of a shad presence study plan to DMR for approval. By December 31, S.D. Warren shall submit a report to DMR detailing the results of the shad presence study. Based on the results of the shad presence study, DMR may require that Stage 2 effectiveness testing be conducted or that the shad presence study be repeated at a future date, for no more than two upstream migration seasons."*

The 2010 Plan requires Warren to submit a study plan to the Maine Department of Marine Resources (MDMR) prior to undertaking the study, as well as to submit a report for each phase of the study by December 31 of the study year; however, as outlined in the 2016 Study Plan,

dated March 30, 2016, the final report for the 2016 study is due to MDMR by September 30, 2016.

This document constitutes the final report for the 2016 Stage 1C study to determine the presence and relative abundance of American shad. The results of the following tasks comprise the two essential elements of this report:

- Review of underwater video cameras mounted inside the entrance and at the exit end of the Cumberland Mills fishway.
- Review of video recording from a camera inside the entrance and at the exit end of the fishway to determine the presence (or absence) and relative abundance of American shad at the Cumberland Mills fishway.

In addition, at the request of MDMR, this report also contains supplemental data on river herring counts and passage efficiency for the 2016 migration period (See Section 5).

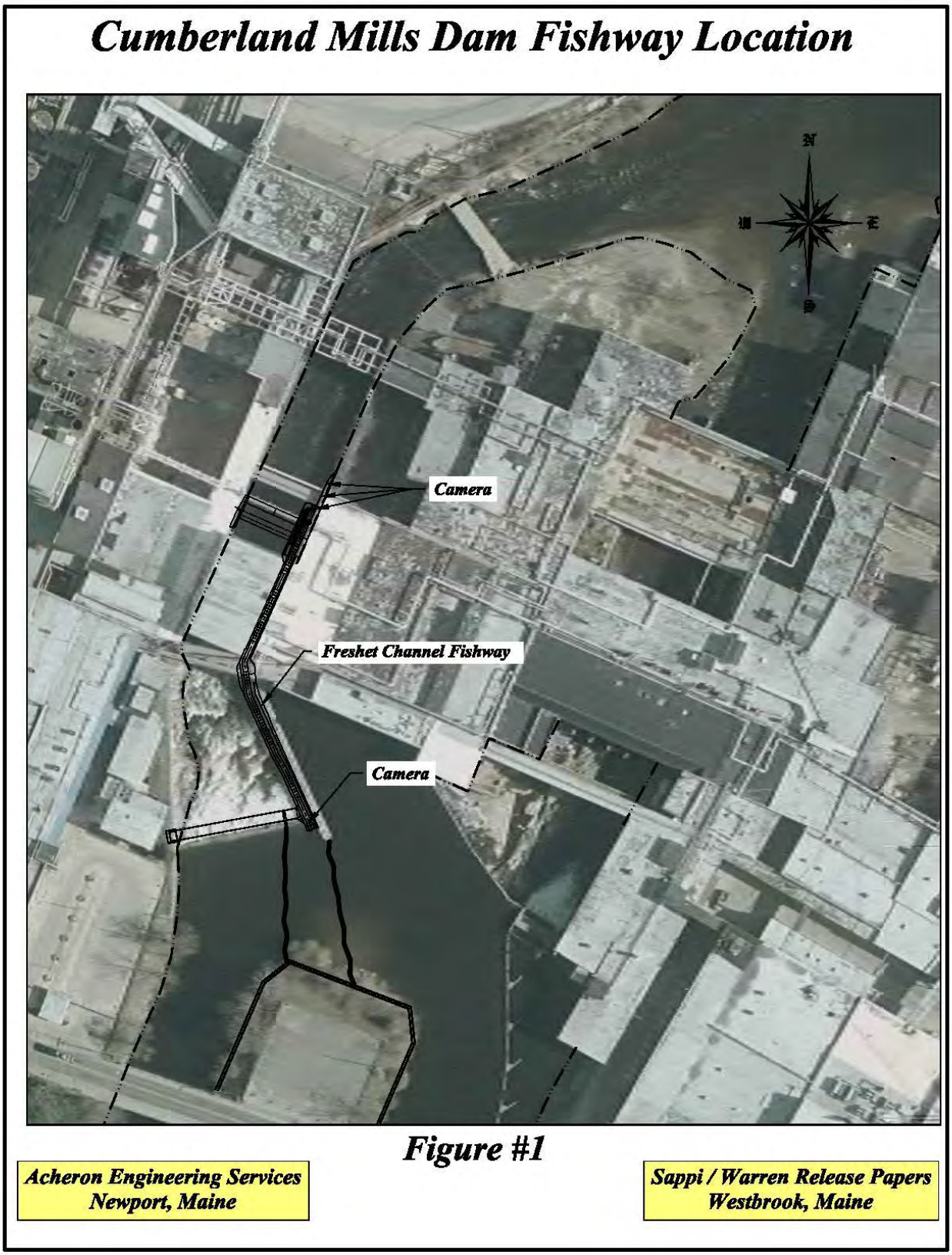


Figure 1 depicts the location of the cameras within the fishway at Cumberland Mills.

For the purpose of this study, the word "presence" means that shad are observed to be present (or not) during the period the videos are reviewed (see Section 3.0). Also, for the purpose of this study, "relative abundance" refers to a qualitative assessment of American shad relative to the abundance of river herring. The determination of relative abundance is based on professional judgment and does not involve counting. During the review of the video recordings, observations of the abundance of shad and river herring were noted and reported. The record of observations allowed for a comparison of the relative abundance of American shad to river herring. The following is a list of the categories that were used to describe the abundance of American shad observed at the fishway.

Category	Description of Abundance
0	None; 0 Shad Observed
1	Few; 1-9 Shad Observed
2	Small School(s); 10-19 Shad Observed
3	Medium Size School(s); 20 – 49 Shad Observed
4	Large Sized School(s); Greater than 50 Shad Observed

2.0 SCOPE OF STUDY

Video recordings were made in the vicinity of the fishway entrance to determine the presence and relative abundance of American shad. Warren installed and activated three video cameras and a multi-channel digital video recorder at the Cumberland Mills fishway site on May 1, 2016 (Figure 1). One camera was installed near the exit end of the fishway, directly toward the downstream side of the bar rack. This camera pointed upstream toward the fishway exit and enabled Warren to observe the fish exiting the fishway. One wide angle camera was installed in the entrance, on the east wall of the fishway, pointing approximately perpendicular to the flow toward the west wall. A black 12-inch by 12-inch grid pattern was installed on the opposing wall of the fishway to assist with observations. This camera was used to observe fish entering the fishway. One additional camera was installed outside of the entrance to the fishway along the training wall. The camera mounting system made it possible to adjust the cameras to achieve the optimum scope of view and video quality. All videos were made and recorded during daylight hours.

The video recordings obtained from cameras inside and outside of the fishway entrance were reviewed for the first 10 minutes of every odd hour during the daylight hours of every odd day from May 1 to May 19 until American shad were observed at the fishway. Between May 20 and July 15 the video recordings were reviewed for the first 10 minutes of every odd hour during

daylight hours every day to determine the presence and relative abundance of American shad at the fishway entrance and exit.

It was relatively easy to differentiate American shad from river herring in the video recordings, as shad are significantly larger than herring. During a portion of the fish passage period, shad and river herring were observed at the exit on the same day and at the same time. The results of these qualitative observations are described in Section 4.0.

3.0 OBSERVATION SCHEDULE

The Denil fishway at Cumberland Mills was in continuous service from May 1 through July 15 of 2016. The following is the schedule for operation of the video cameras and the schedule for viewing the video recording:

- The video cameras inside the entrance and at the exit remained operational during daylight hours from May 1 through July 15.

- Visual observations of one camera inside the entrance were made beginning on May 1 during the first 10 minutes of every odd numbered hour of every odd numbered day until river herring and American shad were observed at the entrance.

- From the date that river herring and/or American shad arrived at the entrance, until July 15, the video of one camera inside the entrance and one camera at the exit was reviewed during the first 10 minutes during every odd numbered hour each day.

3.1 Summary Chart

The following chart, Figure 3-1, depicts the schedule for the tasks described above in graphical format.

Figure 3-1: Summary Chart

S. D. Warren Company, Westbrook, Maine
Stage 1C American Shad Presence Study
Cumberland Mills Fishway, 2016

			Week Ending Date										
Task	**Task Description**	**Observation Frequency**	**5/7**	**5/14**	**5/21**	**5/28**	**6/4**	**6/11**	**6/18**	**6/25**	**7/2**	**7/9**	**7/16**
1	Video cameras inside the entrance and at the exit operational	Combined with Tasks 2 and 3											
2	Visual observations of one camera inside the entrance	The first 10 minutes of every odd numbered daylight hour, every odd day until river herring and American shad were observed											
3	Visual observations of one camera inside the entrance and one camera at the exit	The first 10 minutes of every odd numbered daylight hour.											

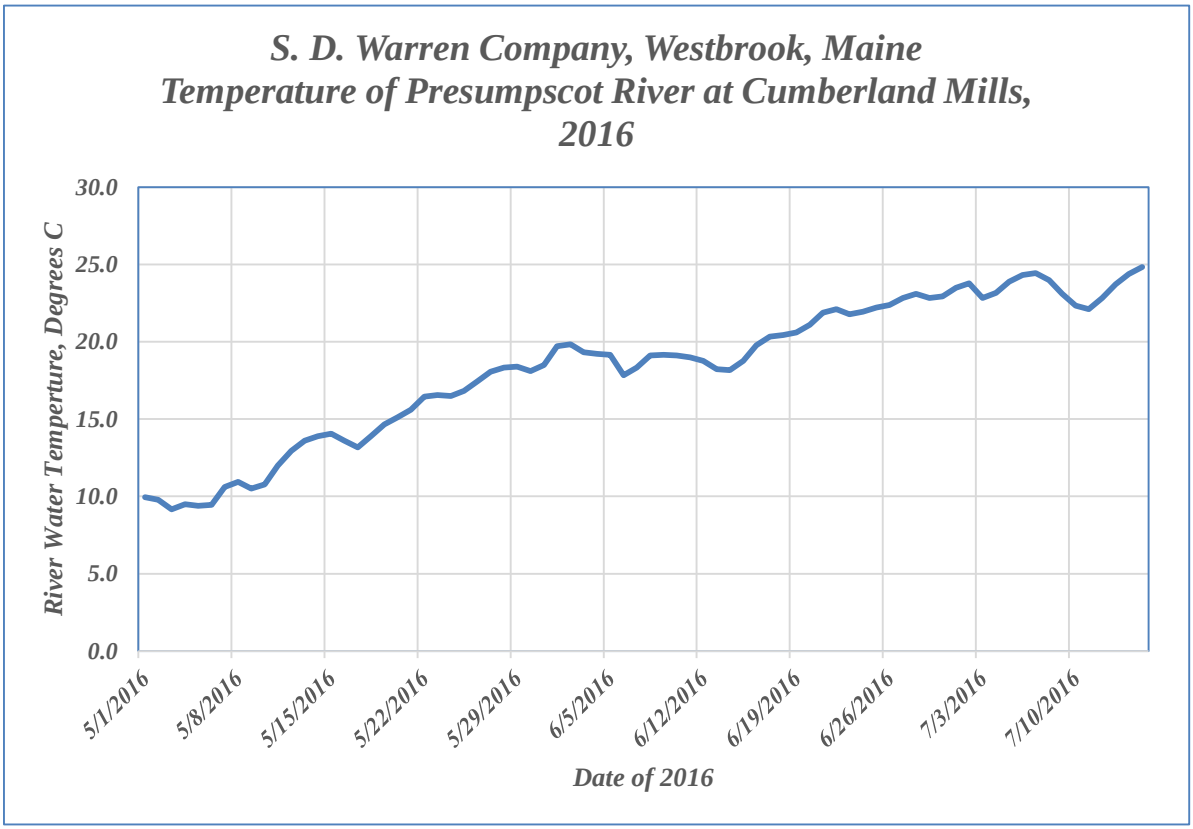
4.0 RESULTS

This section of the Report describes the observations and qualitative measurements from the 2016 Cumberland Mills Stage 1C American Shad Presence Study.

4.1 River Water Temperature

Upstream migration of anadromous fish is influenced by river water temperature. The following figure, Figure 4-1, depicts the temperatures of the Presumpscot River at Cumberland Mills from May 1 through July 15, 2016. The temperature data were obtained using a HOBO temperature recorder that was installed near the exit of the fishway.

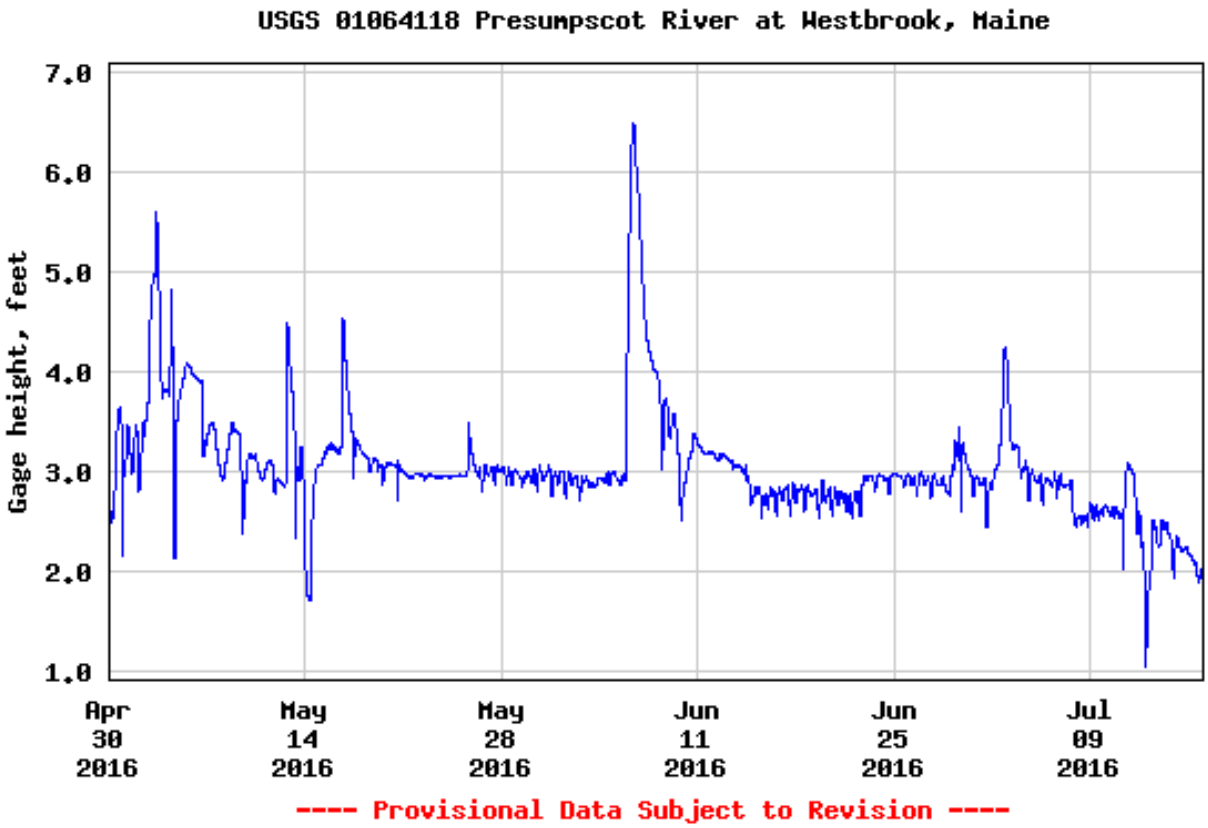
Figure 4-1: Presumpscot River Water Temperatures



4.2 River Flow

The following is a chart of the staff gauge readings from the USGS Gauge No. 01064118, located immediately downstream of the fishway.

Figure 4-2: River Stage Readings at USGS Gauge No. 01064118



This chart depicts the gauge height at the USGS Gauge No. 01064118 located directly downstream of the Cumberland Mills fishway and depicts fluctuations in the flow rate of the Presumpscot River at Cumberland Mills from May 1 through July 15 when the fishway was operational. Generally, the flow rate was very stable with the exception of a few small storm events in early May and one larger event in June.

4.3 Stage 1C American Shad Presence Study

During the 2016 American Shad Presence Study, American shad were observed in videos at the entrance of the Cumberland Mills fishway between May 21 and June 13. Recall that, for the purpose of this study, the word "presence" means that shad are observed to be present (or not) during the period the videos are reviewed. The following is a list of the categories that were used to describe the abundance during each period that the videos were reviewed.

Category	Description of Abundance
0	None; 0 Shad Observed
1	Few; 1-9 Shad Observed
2	Small School(s); 10-19 Shad Observed

3	Medium Size School(s); 20 – 49 Shad Observed
4	Large Sized School(s); Greater than 50 Shad Observed

Figures 4-3 and 4-4 depict the date, time, and relative abundance when American shad were observed to be present during the period of fishway operation in 2016. The description in the chart corresponds to the aforementioned categories and descriptions of abundance listed above.

Figure 4-3: Cumberland Mills Dam, American Shad Presence at Fishway Entrance

Date	**Time**	**Cumberland Mills Fishway Entrance Category and Description of Abundance**	
5/21/2016	20:00	1	Few
5/23/2016	14:00	1	Few
6/2/2016	16:00	1	Few
	19:00	1	Few
6/9/2016	17:00	1	Few
6/10/2016	08:00	1	Few
	18:00	1	Few
	20:00	1	Few
6/11/2016	13:00	1	Few
	17:00	1	Few
	20:00	1	Few
6/12/2016	05:00	1	Few
6/13/2016	20:00	1	Few

Figure 4-4: Cumberland Mills Dam, American Shad Presence at Fishway Exit

Date	**Time**	**Cumberland Mills Fishway Exit Category and Description of Abundance**	
6/1/2016	08:00	1	Few
6/2/2016	16:00	1	Few
6/9/2016	09:00	1	Few
6/10/2016	15:00	1	Few
6/12/2016	06:00	1	Few
	10:00	1	Few
6/13/2016	17:00	1	Few

There were no American shad observed during any of the days/times that are not listed on Figure 4-3 and 4-4. Based on the observation schedule described in Section 3 above, there were 644 observation periods of the entrance video and 644 observation periods of the exit video. At the entrance, a few American shad were observed during 13 of the 644 observation periods (in other

words, 2% of the observation periods). At the exit, a few American shad were observed during 7 of the 644 observation periods (in other words, 1% of the observation periods). On either a comparative or absolute basis, very few American shad were observed at the Cumberland Mills fishway in 2016.

4.4 CONCLUSION – AMERICAN SHAD

Stage 1C of the American shad presence study for the Cumberland Mills fishway on the Presumpscot River in Westbrook Maine was executed in accordance with the Study Plan approved by MDMR by letter dated April 20, 2016. During the 2014, no American shad were observed at the Cumberland Mills fishway. In 2015, very few American shad were observed at the Cumberland Mills fishway. Similarly, in 2016 very few American shad were observed at the Cumberland Mills fishway.

5.0 SUPPLEMENTAL RIVER HERRING DATA

This section addresses the results of the monitoring and counting of river herring to further evaluate the efficiency and effectiveness of the Cumberland Mills fishway. The results of the following tasks are described in this section of the report:

- Observations of fish behavior at or near the fishway entrance.
- Regular visual observation to assess whether alewife and blueback herring (collectively referred to as river herring) are successfully finding the entrance and entering the Denil fishway.
- Observation and counting of fish entering and exiting the fishway using video recording equipment installed at the entrance and exit of the Denil fishway.

5.1 Observation of Fish Behavior at or Near the Fishway Entrance and Exit

Observations of fish behavior at or near the fishway entrance were made with video cameras mounted inside and outside of the fishway entrance. Warren installed and activated three video cameras and a digital video recorder at the Cumberland Mills fishway site on May 1, 2016 (refer to Figure 1). One camera was installed near the exit end of the fishway, directly downstream of the bar rack. This camera pointed upstream toward the fishway exit and enabled Warren to observe and count the fish exiting the fishway. One wide angle camera was installed in the entrance, on the east wall of the fishway, pointing perpendicular toward the west wall. A white background with black lines on a 12-inch by 12-inch grid was installed on the opposing wall of the fishway to assist with observations. This camera was used to observe and count fish entering the fishway. One additional camera was installed outside of the entrance to the fishway along the training wall. This camera enabled Warren to observe fish congregating near the entrance, as well as to assess whether fish were being delayed outside the entrance.

5.2 Assessment of the Ability of River Herring to Locate and Enter Denil Fishway

The video from the camera outside the fishway entrance was used to assess whether alewife and blueback herring successfully found the entrance and entered the Denil fishway. The fixed camera was positioned to observe the behavior of fish approaching the entrance. Using this technique, the camera was positioned near the entrance to observe fish swimming up to and toward the entrance of the fishway. Video observations were recorded during daylight hours.

5.3 Fish Counts at the Entrance and Exit

The process for identifying and counting river herring at the entrance and exit was the same as utilized in the 2015 study. The video from the entrance and exit cameras was reviewed from May 1 through July 15. The viewing of the video was used to determine when river herring arrived at the fishway (May 3, 2016) and when river herring were no longer present at the fishway (June 11, 2015). The estimated number of river herring entering and exiting the fishway was derived by counting the number of river herring passing by the cameras during the first ten minutes of every daylight hour from May 3 through July 15. The count for each 10-minute interval was multiplied by six to estimate the number fish entering and exiting the fishway each daylight hour. The estimate of the number of river herring for each day from May 3 through July 15 was determined by summing the hourly estimates for each day. The estimated total for the period from May 3 through July 15 was derived by summing the daily total estimates.

Following completion of the initial video viewing and counting process, approximately 5% of the 10 minute intervals when river herring were observed at the entrance and exit of the fishway were randomly selected for a second counting by a different person. This was done as a quality control check of the original counts. There were no anomalies identified during this process.

During some of the 10-minute intervals, an estimate was used instead of a count. In some cases, an estimate with a range was recorded. For instance, a group of fish would pass by the camera and an estimate of 4-6 or 6-9 was recorded. In those cases, the midpoint of the estimate was used to calculate the hourly total. If the estimate was 4 to 6 then a value of 5 was recorded. If the estimate was 6 to 9 then a value of 8 was recorded. The midpoint value was always rounded up.

5.4 Observation Schedule

The following are the schedule for operation of the video cameras and the schedule for viewing the video recording:

•The video cameras inside the entrance and at the exit remained operational during daylight hours from May 1 through July 15.

•Visual observations of one camera inside the entrance were made beginning on May 1 during the first 10 minutes of every odd numbered hour of every odd numbered day until river herring were observed at the entrance.

•From the date that river herring arrived at the entrance, until July 15, the video of one camera inside the entrance and one camera at the exit was reviewed during the first 10 minutes during every odd numbered hour each day.

5.5 Results – River Herring

This section of the Report describes the observations and measurements for Alewife and Blueback Herring.

5.5.1 River Water Temperature

Upstream migration of anadromous fish is influenced by river water temperature. Figure 4.1 in Section 4.1 depicts the temperatures of the Presumpscot River at Cumberland Mills from May 1 through July 15, 2016. The temperature data were obtained using a HOBO temperature recorder that was installed near the exit of the fishway.

5.5.2 River Flow

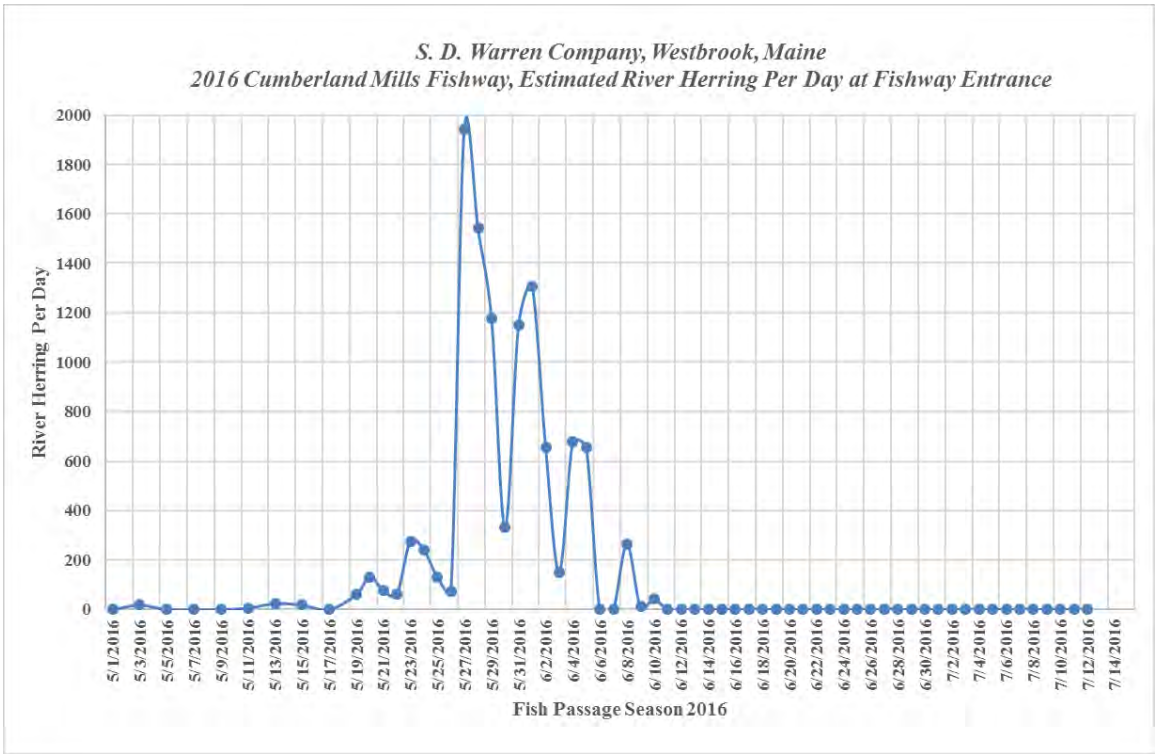
Figure 4.2 in Section 4.2 is a chart of the staff gauge readings from the USGS Gauge No. 01064118, located immediately downstream of the fishway.

This graph depicts the gauge height at the USGS Gauge No. 01064118 located directly downstream of the Cumberland Mills fishway and depicts fluctuations in the flow rate of the Presumpscot River at Cumberland Mills from May 1 through July 15 when the fishway was operational. Generally, the flow rate was very stable with the exception of a few small storm events in early May and one larger event in June.

5.5.3 Observation of Fish Entering Fishway

The process described in Section 5.3 above resulted in an estimate of approximately 11,022 river herring that passed by the entrance end camera during the period of May 1 through July 15, 2016. Figure 5-1 depicts the daily estimates of river herring entering the fishway by the procedure described above.

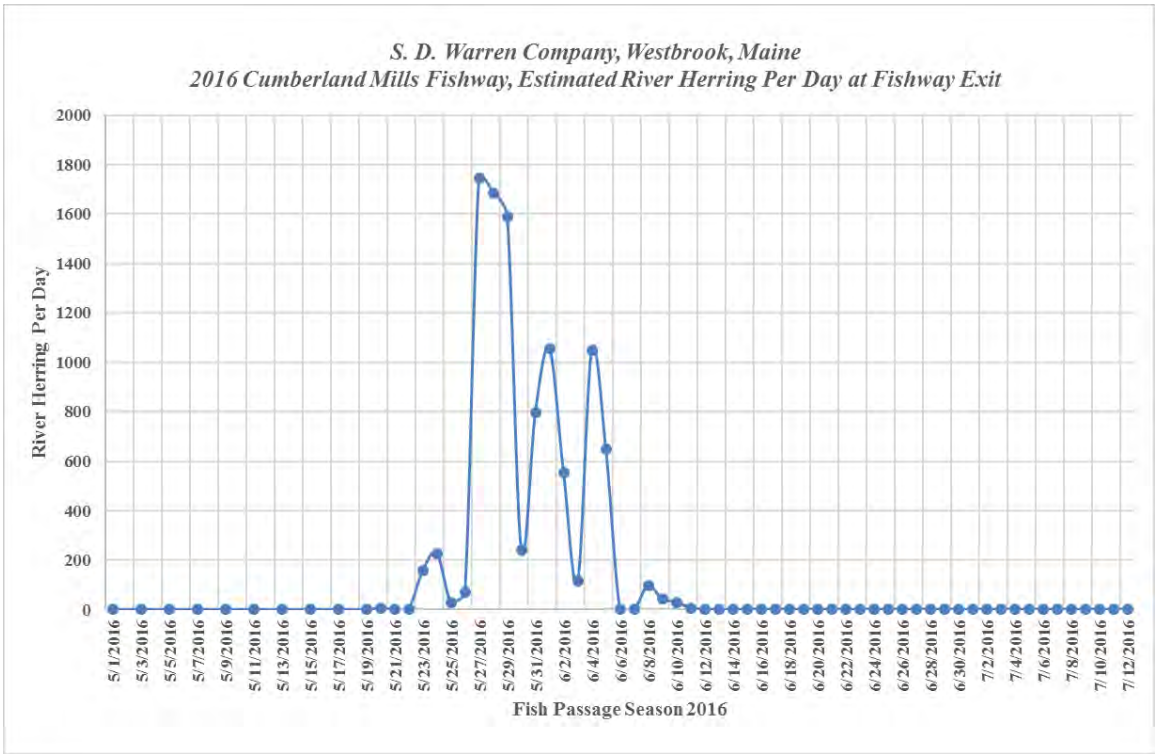
Figure 5-1: Estimate of River Herring Entering the Cumberland Mills Fishway, 2016



5.5.4 Observation And Counting Of Fish Exiting The Fishway Using Video Recording Equipment

An estimate of the number of river herring exiting the Cumberland Mills fishway was developed in accordance with the procedures described in Section 5.3. The process described in Section 5.3 resulted in an estimate of approximately 10,146 river herring that passed by the exit end camera during the period of May 1 through July 15, 2016. The daily estimates of river herring passing the exit end of the fishway are summarized in Figure 5-2.

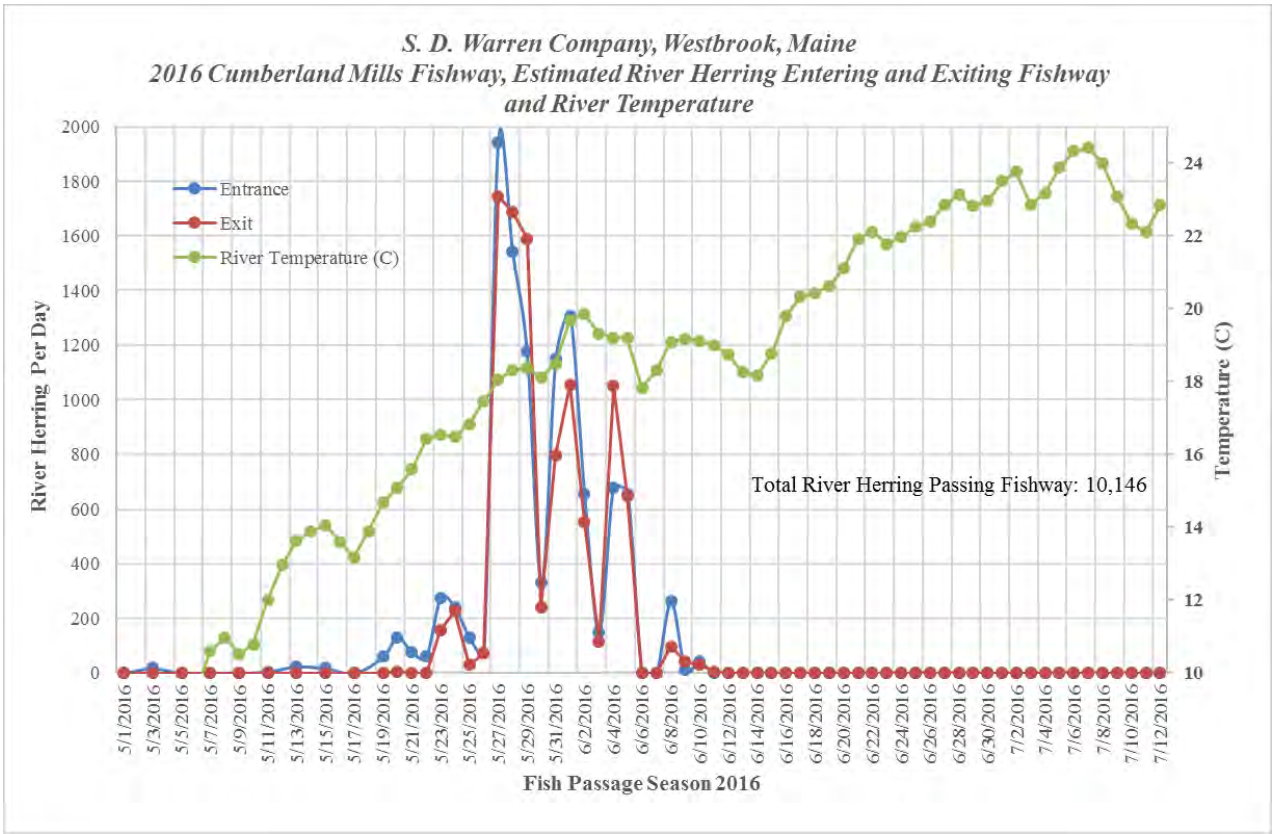
Figure 5-2: Estimate of River Herring Exiting the Cumberland Mills Fishway, 2016



5.5.2 Comparison of Daily Estimate of Fish Passing the Entrance and Exit of the Fishway

The following chart, Figure 5-3, depicts the combined results of the estimates of river herring passing by the fishway entrance camera, the river herring passing by the exit camera of the fishway, and the temperature of the Presumpscot River at Cumberland Mills for the period from May 1 through July 15, 2016.

Figure 5-3: Estimate of River Herring Entering and Exiting Fishway



The following is a year to year summary of the estimates of the number of river herring passing through the exit of the Cumberland Mills fishway.

2014	9,300
2015	2,960
2016	10,146

5.5.3 Fishway Efficiency Calculations

The following table summarizes the fishway passage efficiency at Cumberland Mills. Efficiency calculations are based on the estimates of the number of river herring entering and exiting the fishway presented in Figure 5-1 below.

Table 5-1: Fishway Efficiency Calculations

Description	Number
Estimated Total Number of River Herring Entering Fishway During the Migration Period	11,022
Estimated Total Number of River Herring Exiting the Fishway During the Migration Period	10,146
Estimated Fishway Efficiency for the Migration Period	**92%**

5.6 Conclusion – River Herring

Approximately 10,146 river herring successfully exited the fishway, while approximately 11,022 river herring entered the fishway. The overall efficiency for 2016 was 92%.

The data from the 2016 migration period for river herring provides clear and convincing evidence that:

- No alewife and/or blueback herring (river herring) are bypassing or avoiding the fishway entrance, surmounting the fish barrier dam, engaging in circling or other delaying behavior, and

- The fishway is effective. The data presented in this report demonstrate that the efficiency of Cumberland Mills fishway exceeds the 80% efficiency threshold set forth in the 2010 Effectiveness Testing Plan.

Therefore, having successfully demonstrated compliance with the requirements and criteria listed above, all of the requirements of the 2010 Effectiveness Testing Plan have been met and there is no need for additional effectiveness testing at the Cumberland Mills fishway.

End of Document

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit D

Diadromous Fish
+ Dams

Report to the Joint Standing Committee on Marine Resources and the Joint Standing Committee on Natural Resources

in response to Resolve Chapter 109 (LD 1528, LR 1911)

Prepared by the Departments of Marine Resources & Environmental Protection

January 30, 2008

Resolve Chapter 109 (LD 1528, LR 1911) required the Department of Inland Fisheries and Wildlife (DIFW), the Department of Marine Resources (DMR), and the Department of Environmental Protection (DEP) to :

- review and update their plans for passage of native diadromous fish;
- develop a proposed water quality standard that defines a fish kill; and
- evaluate the processing of petitions filed with the Board of Environmental Protection (BEP) to reopen hydropower licenses.

This report presents the findings and recommendations of this work for the first two matters to the Joint Standing Committees on Marine Resources and Natural Resources. The BEP is presenting its report on the petition process under separate cover.

Recommendations

- Implement the identified priority projects for fish passage (DMR)
- Maintain the current water quality standard for protection of aquatic life (DEP)

Section 1. DMR review of statewide fish passage efforts

Maine's waters are home to 12 species of native diadromous[1] fishes, each of which has specific habitat requirements. The historical ranges of commercially harvested species were fairly well documented by Maine's first Commissioners of Fisheries. Shortnose sturgeon and Atlantic sturgeon spawned only in the Kennebec and Penobscot rivers. Populations of Atlantic tomcod, rainbow smelt, and striped bass were more widely distributed along the coast, but generally did not migrate above the head-of-tide. Most watersheds had runs of alewife, American eel, American shad, Atlantic salmon, and blueback herring, and in large rivers these fish traveled almost 100 miles from the ocean. Sea lamprey and sea-run brook trout were not harvested commercially, and their historic ranges were not described. By the time the Commissioners of Fisheries were appointed in 1867 most runs of diadromous fishes were greatly reduced or extirpated. The historical abundance of these fishes will never be known with certainty, but larger watersheds generally produced larger runs of fishes.

According to the DEP there are 146 hydropower projects encompassing 179 dams on Maine's waters[2]. One hundred and three projects (136 dams) are Federal Energy Regulatory Commission (FERC) approved projects that operate under a license or an exemption, 20 are inactive projects of which five have been removed, and 23 are FERC nonjurisdictional projects (Appendix 1). Not all hydropower dams are within the known or assumed historical ranges of Maine's diadromous fishes. Only two hydropower dams are within the historic range of shortnose sturgeon, Atlantic sturgeon, Atlantic tomcod, rainbow smelt, and striped bass. Approximately 45% of the hydropower dams (81) are within the historic range of alewife,

[1] Diadromous is a collective term for anadromous and catadromous fishes, species that migrate between the sea and fresh water. Anadromous fishes like the alewife spawn in freshwater, but spend most of their life in the sea. Catadromous fishes like American eel spawn in the sea, but spend most of their life in fresh water, brackish water, or coastal water.

[2] Department of Environmental Protection. 2007. Hydropower projects in Maine January 1, 2007.

American shad, and blueback herring; 53% (95) are within the historic range of Atlantic salmon, and 65% (116) are with the historic range of American eel.

Maine's waters also contain more than 662 nonhydropower dams and many thousands of culverts that can impact diadromous fishes. DMR has identified the nonhydropower dams that impact diadromous fishes in some watersheds (e.g., Kennebec River), but has not done this on a statewide basis. DMR typically partners with federal agencies, conservation groups, and municipalities to provide passage at nonhydropower dams. The location of culverts in the State's waters and the number that impact diadromous fishes currently is unknown. However, the USFWS has initiated a pilot project to map and assess culverts in the Penobscot River drainage, and DMR received a grant in 2007 to assess threats, including nonhydropower dams and culverts, to rainbow smelt populations along Maine's coast.

In the 1970s when water quality in large rivers was very poor, DMR attempted to enhance or restore populations of anadromous fish by constructing fishways at 18 dams in coastal watersheds (Table 1). DIFW and the Atlantic Salmon Commission installed fishways at eight additional dams, and 15 fishways were either privately constructed or the owner is unknown (Table 1). DMR staff conducts numerous site visits each year to inspect and clean the fishways, and in the past five years has collaborated with U.S. Fish and Wildlife Service (USFWS) and the Department of Transportation (DOT) to begin major repairs to several of them. The effectiveness of these fishways, which primarily pass alewives, has not been tested.

DMR began focusing on fish passage and anadromous fish restoration in large watersheds in the 1980s when water quality had significantly improved, and the licenses of a cohort of hydropower projects began to expire. One of the first fishways to be constructed as part of a relicensing was at the Brunswick Project on the Androscoggin River, completed in the spring of 1983. During the consultation process the Licensee and resource agencies identify the species that will be impacted by the hydropower project or develop study plans to identify the species. The licensee proposes actions to reduce or eliminate impacts, and the resource agencies provide comments on these actions. FERC ultimately determines which actions will be required in the license, although it must include conditions set on projects through Section 401 of the Clean Water Act and Department of the Interior fishway prescriptions. Prior to 1995, Maine and other east coast states did not request passage for American eel during the licensing process.

The federal licensing process provides the best opportunity for state agencies to obtain fish passage, but the licenses for hydropower projects in a watershed usually expire randomly over an extended period of time. State and federal agencies can be placed in the situation of recommending fish passage at upriver projects when passage is not available at downstream projects, as was the case with Edwards Dam in the 1980s. The relicensing process often leads to comprehensive settlement agreements that encompass multiple projects, provide for sequential fish passage, eliminate the need for extensive litigation, and sometimes provide funding for restoration programs. State fisheries agencies expend considerable time and effort in the development of these agreements. Obtaining passage at hydropower projects within historic diadromous fish habitat remains a priority for DMR, because these dams are located on the mainstems of large rivers and impact the greatest number of diadromous fishes.

Table 1. Fishways at nonhydropower dams in Maine. Fishways that will be repaired under a cooperative agreement between USFWS and DMR are indicated by an asterisk.

Site name	Owner	River/Stream	Passage type
Jones Pond	DMR	Scarborough Marsh	Alaskan steeppass
Highland Lake	DMR	Presumpscot River	Denil
Elm Street	DMR	Royal River	Denil
Bridge Street	DMR	Royal River	Denil
Philips Lake	DMR	Orland River	Alaskan steeppass
West Bay Pond	DMR	West Bay Pond	Denil
Flanders Stream*	DMR	Flanders Stream	Denil
West Harbor Pond	DMR	West Harbor Pond	Alaskan steeppass
Bristol	DMR	Pemaquid River	Denil
Blackman Stream 1	DMR	Penobscot River	Vertical slot
Blackman Stream 2	DMR	Penobscot River	Denil
Pitcher Pond	DMR	Ducktrap River	Denil
Pleasant River Lake	DMR/DIFW	Pleasant River	Alaskan steeppass
Pleasant River	DMR	Pleasant River	Denil
Gardner Lake	DMR	East Machias River	Denil
Cathance Lake	DMR	Cathance Stream	Alaskan steeppass
Meddybemps Lake 1*	DMR	Dennys River	Alaskan steeppass
Boyden Lake	DMR	Boyden Stream	Denil
Great Works	DIFW	Cathance Stream	Alaskan steeppass
Coopers Mills	DIFW	Sheepscot River	Denil
Pennamaquan Upper*	DIFW	Pennamaquan River	Denil
Pennamaquan Middle*	DIFW	Pennamaquan River	Denil
Pennamaquan Lower*	DIFW	Pennamaquan River	Denil
Bog Brook Flowage	DIFW	Narraguagus	Alaskan steeppass
Cathance Stream	ASC	Cathance Stream	Denil
Meddybemps Lake 2	ASC	Dennys River	Denil
Walker Pond	Unknown	Bagaduce River	Cement sluice
Dedham Falls	Unknown	Orland River	Denil
Wight Pond	Unknown	Bagaduce River	Breached dam
Long Pond Stream 1	Unknown	Long Pond Stream	Pool
Long Pond Outlet	Unknown	Long Pond Stream	Pool&Weir
Long Pond Stream 2	Unknown	Long Pond Stream	Denil
Long Pond Stream 3	Unknown	Long Pond Stream	Rock Pool
Stetson Pond	Stetson	Stetson Stream	Alaskan steeppass
Orland Dam	Champion Paper	Orland River	Alaskan steeppass
Alamoosook Lake	Champion Paper	Orland River	Denil
Toddy Pond	Champion Paper	Orland River	Pool&Weir
Dyer Long Pond	Saltonstal	Sheepscot River	Denil
Winnegance Lake	DOT/Bath	Kennebec River	Denil
Center Pond	Phippsburg	Kennebec River	Denil
Nequasset Lake	Bath Water Co	Kennebec River	Pool & chute

DMR has made significant progress in providing fish passage for diadromous fishes throughout the State. Since 1980, upstream and downstream fish passage has been provided or is a license requirement at 54 hydropower dams, which impacts access to more than 1000 miles of habitat. When fully restored this amount of accessible habitat should produce millions of adult fish. In addition, DMR maintains fish passage at 18 nonhydropower dams along the coast, provided fish passage in the Kennebec watershed at five nonhydropower dams and is working on a sixth site, and has partnered with various groups to provide passage at two nonhydropower dams in the Penobscot watershed. DMR staff also consults with DOT on all road projects that may impact diadromous fish passage.

Just four hydropower projects will undergo relicensing in the next 10 years, thus freeing staff to revisit fish passage at licensed projects where problems are known to exist. Because passage will be pursued outside of the licensing process, termed "reopening" the license, DMR will have to compile site-specific evidence that passage or passage improvements are needed. Ideally the hydropower owner would agree to voluntarily comply with a request from DMR for improved fish passage. In the event that the hydropower owner refuses to provide fish passage, further legal action available to DMR depends on the articles in the federal license. Projects with fish passage issues need to be prioritized, because reopening a license places the burden of proof on the resource agencies, the outcome is not certain, and extensive litigation may be required.

DMR's priorities in the upcoming five years are to:

1. implement the Kennebec River settlement agreements;
2. obtain passage at Pioneer and Waverly (Kennebec watershed);
3. obtain passage at Webber Pond (Kennebec watershed);
4. implement the Penobscot River settlement agreement;
5. implement the Saco River settlement agreement;
6. implement the Union management plan;
7. obtain passage at Cumberland Mills on the Presumpscot River;
8. reopen passage on the St Croix River to alewife;
9. comment on proposed tidal projects;
10. provide technical assistance for Damariscotta fishway repair;
11. document the need for improved fish passage at the Brunswick Project and meet with the Project owner to discuss voluntary improvements; there is a standard license article that reserves FERC's authority to reopen a license for the conservation and development of fish resources.
12. document the need for eel passage at the North Gorham Project and meet with the Project owner to discuss voluntary provision of passage; there is a license article that reserves the authority of the Secretary of the Interior to prescribe fishways.
13. document the need for eel passage at the Messalonskee projects and meet with the Project owners to discuss voluntary provision of passage; there is a license article that reserves the authority of the Secretary of the Interior to prescribe fishways.

No implementing legislation is required. The Federal Power Act governs the relicensing of hydropower projects, and the courts have held that the Federal Power Act pre-empts most State regulations of hydropower projects. One of the few exceptions is the authority of the State to set conditions on projects through Section 401 of the Clean Water Act. In the future, it will be DMR policy to request a State reopener clause at all projects within the historic range of diadromous fishes. At nonhydropower dams, State law, 12 MRSA §6121 and §7701, gives the Commissioners of DMR and DIFW, respectively, the authority to require fish passage for anadromous or migratory fish.

Major impediments to further improving fish passage for diadromous fishes are DMR's small staff (7 full-time people prior to merging of Stock Assessment Division with the Atlantic Salmon Commission), the cost of fishways, and the lack of funding. There are many sources of federal funding for fishways, but most require 50:50 nonfederal match.

Rivers with Hydropower Projects

Piscataqua River: low restoration priority

Four FERC licensed hydropower projects (6 dams), four FERC exempt projects, and one FERC nonjurisdictional project are located within assumed diadromous fish habitat (Fig. 1). A large tidal project has been proposed for the lower Piscataqua River at Portsmouth. Alewife, shad, and blueback herring historically may have stopped at the steep gradient between Lower Great Falls and Mast Point dams, and salmon and eels may not have passed the gradient above North Rochester. A Denil fishway, eel ramp, and downstream bypass at the South Berwick dam pass alewife and American eel. Effectiveness studies are being conducted by the owner.

This is a low priority river because it is a small watershed with limited habitat that is obstructed by a large number of dams, and there is no funding for restoration. The next five dams that require passage (Rollinsford, Lower Great Falls, and Somersworth projects) are licensed until 2021-2022.

Mousam River: low restoration priority

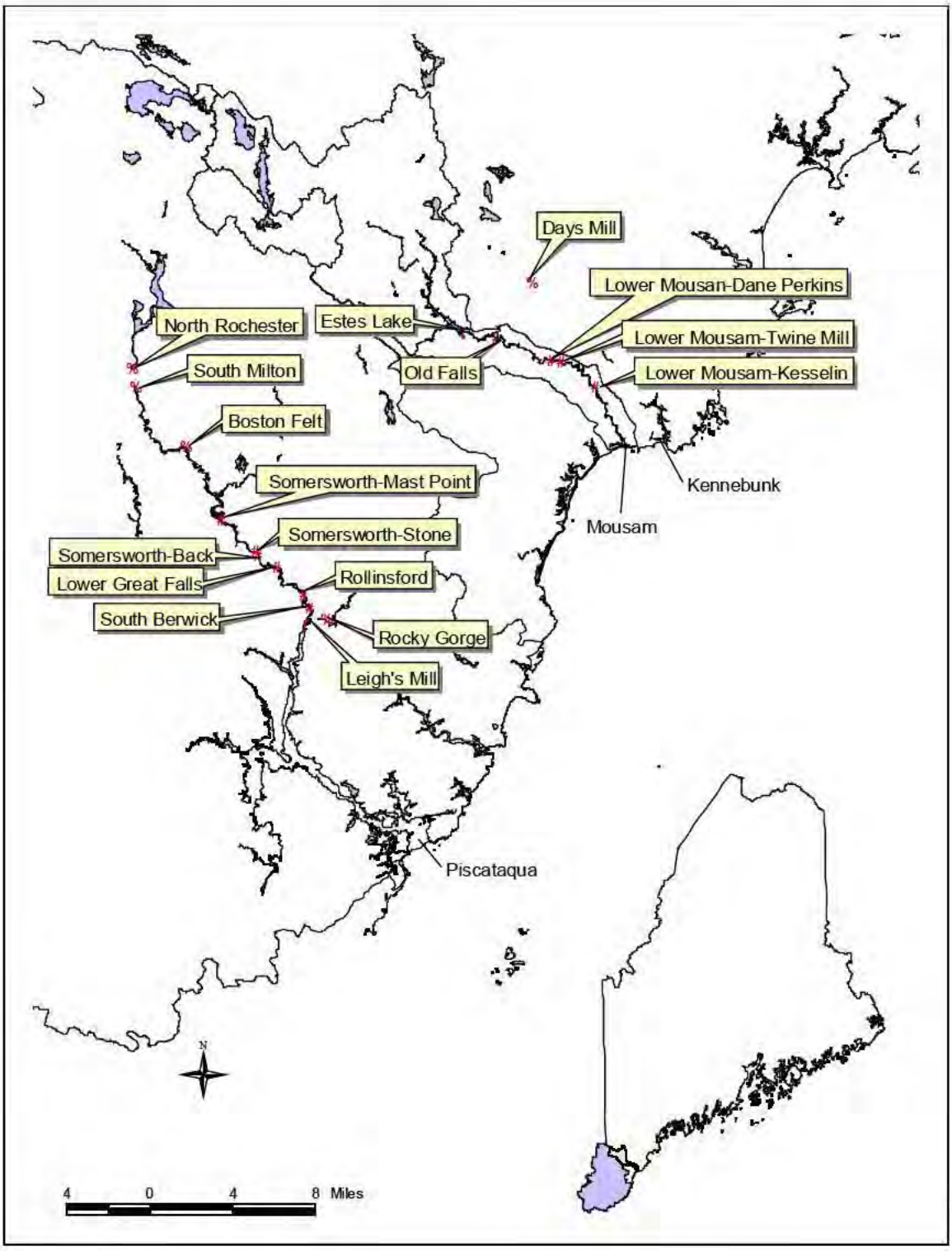
One FERC licensed hydropower project (3 dams) and two FERC nonjurisdictional projects are located on the mainstem of the Mousam River (Fig. 1). Historically, the Mousam was primarily an Atlantic salmon river, although alewife and American shad were also present. The historic upstream limits of these species is not known.

This is a low priority river, because it is a very small watershed with limited habitat that is obstructed by a large number of dams, and there is no funding for restoration. There is no fish passage at the Lower Mousam Project, which is licensed until 2022.

Kennebunk River: low restoration priority

One FERC exempt hydropower project (Days Mill) is located on the mainstem (Fig. 1). It does not have any upstream or downstream fish passage. There is no readily available information on the diadromous species that historically inhabited the river and their distribution within the watershed. This is a low priority river because it is a very small watershed, there is no funding for restoration, and the single hydropower dam may be located beyond the historical range of diadromous fishes.

Figure 1. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Piscataqua River, Mousam River, and Kennebunk River (1:450,000 scale).



Saco River: high restoration priority: High

Six FERC licensed hydropower projects (9 dams, 3 without turbines) and one FERC exempt project are located on the mainstem. In addition, one FERC licensed project (2 dams) and one FERC exempt project are located on tributaries (Fig. 2)

A multi-species fisheries management plan for the Saco River was adopted in 1982. The plan calls for the restoration of alewife, American shad, and blueback herring to the Bonny Eagle impoundment, and restoration of American eel and Atlantic salmon to the Swans Falls impoundment.

A 1994 settlement agreement provided a schedule for anadromous fish passage at the five lowermost dams (Cataract and Skelton projects). Alewife, Atlantic salmon, and blueback herring pass these dams, but American shad do not use the fishlocks at the Spring Island and Bradbury dams. Shad are currently trapped at the East Channel Dam, transported a short distance, and released in the Spring Island and Bradbury impoundment. Alewife, shad, and blueback herring that use the Skelton fish lift are passed upstream, and Atlantic salmon are trucked to upriver spawning habitat.

A 2007 settlement agreement provides a schedule for fish passage at the remaining dams owned by FPL Energy (Table 2), a schedule for effectiveness testing, a schedule for improvements at the Spring Island or Bradbury dam so American shad can pass, funding for raising salmon smolts and fry, funding for resident fish assessment in impoundments, and funding for outreach and management.

Table 2.

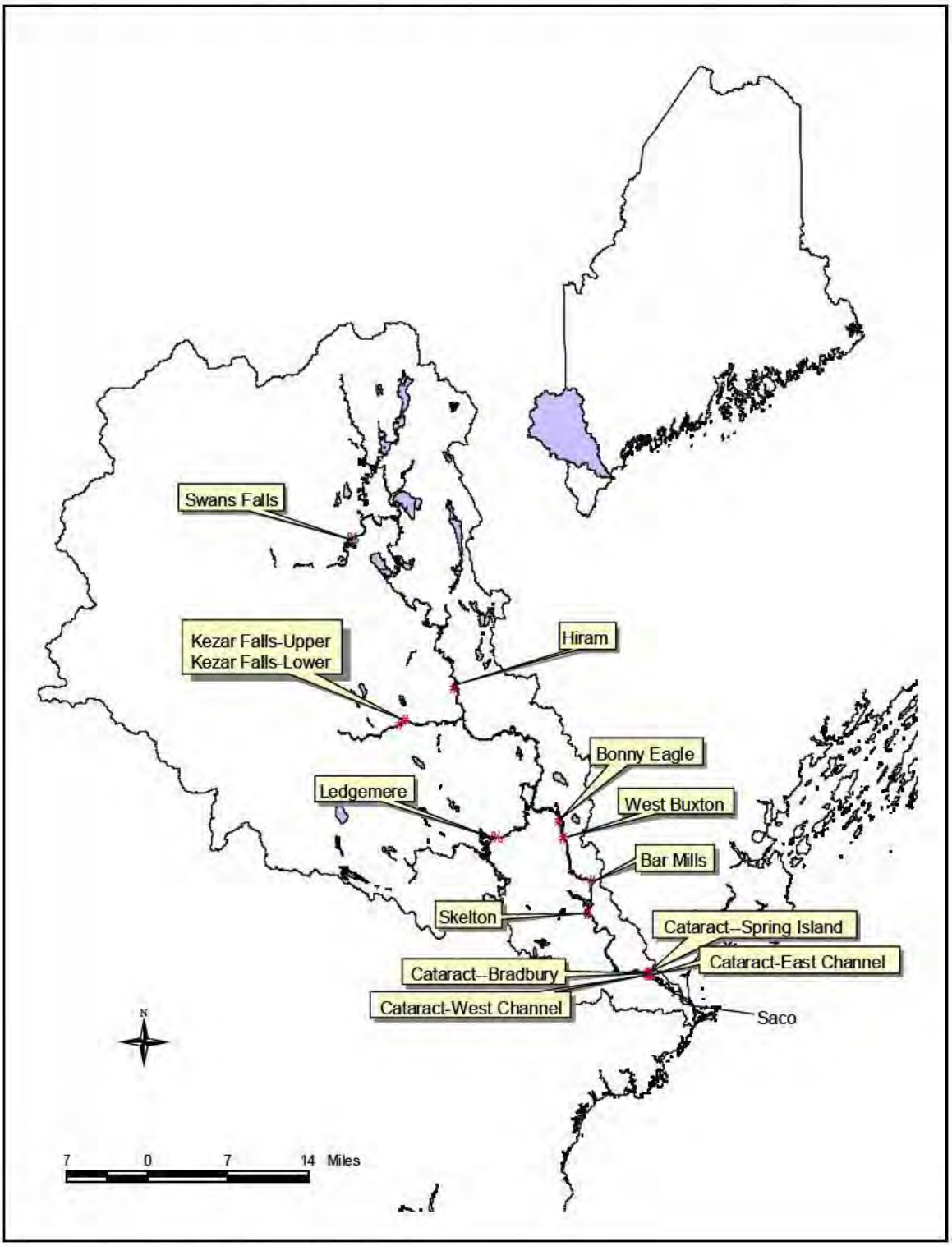
Project – Dam	Upstream eel	Downstream eel	Upstream anadromous
Cataract - East Channel, West Channel	6/1/2008	9/1/2011	fishlift, Denil
Cataract - Springs Island, Bradbury	6/1/2010*	no turbines	fishlocks
Skelton	6/1/2012	9/1/2024	fishlift
Bar Mills	6/1/2014	9/1/2026	5/1/2016
West Buxton	6/1/2016	9/1/2028	5/1/2019
Bonny Eagle	6/1/2018	9/1/2030	5/1/2022
Hiram	6/1/2020	9/1/2032	5/1/2025

*upstream eel passage at either Springs or Bradbury

Implementation of the 2007 settlement agreement for the Saco River, the fourth largest watershed in the state, is a high priority for state and federal fisheries agencies. There are no impediments to implementation, which will require consultation on study plans, review of study results, development of an annual report, and planning of restoration activities during an annual meeting. Pursuant to the settlement, FPL Energy initiated downstream effectiveness studies for alewife and shad at the Cataract Project in 2007.

The state and federal resource agencies and FPL Energy produce an annual report on fisheries activities in the watershed.

Figure 2. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Saco River (1:800,000 scale).



Presumpscot River: high restoration priority

One FERC inactive project (Cumberland Mills) and seven FERC licensed projects are located on the mainstem (Fig. 3). In 2003 a coalition of state and federal resource agencies and conservation groups removed an eighth hydropower project (Smelt Hill) that was rendered inoperable by a flood in 1996. The Eel Weir Project currently is undergoing relicensing. The North Gorham Project, which does not have fish passage, is licensed until 2034.

With one exception the Saccarappa, Mallison Falls, Little Falls, Gambo, and Dundee projects have operational upstream and downstream eel passage, and the licenses contain schedules or triggers for the installation of anadromous fish passage in two phases (Table 3). At the end of Phase 1 the resource agencies will assess the progress of anadromous fish restoration, and determine if Phase 2 should be initiated. Downstream eel effectiveness studies were stopped after one year, because the agencies prefer a study that includes Eel Weir, which is not yet licensed. Upstream eel effectiveness studies were conducted in 2007.

Table 3.

Project – Dam	Upstream eel	Downstream eel**	Upstream and downstream anadromous
Phase 1			
Saccarappa	2 ramps	shutdowns	2 years after passage at Cumberland Mills
Mallison Falls	ramp	shutdowns	2 years after trigger number passed at Saccarappa
Little Falls	delayed*	shutdowns	2 years after trigger number passed at Saccarappa
Gambo	ramp	shutdowns	NA
Dundee	lift	shutdowns	NA
Phase 2			
Gambo	ramp	shutdowns	2 years after trigger number passed at Little Falls
Dundee	ramp	shutdowns	2 years after trigger number passed at Little Falls
Saccarappa	ramp	shutdowns	increase capacity of upstream passage
Mallison Falls	ramp	shutdowns	increase capacity of upstream passage
Little Falls	lift	shutdowns	increase capacity of upstream passage

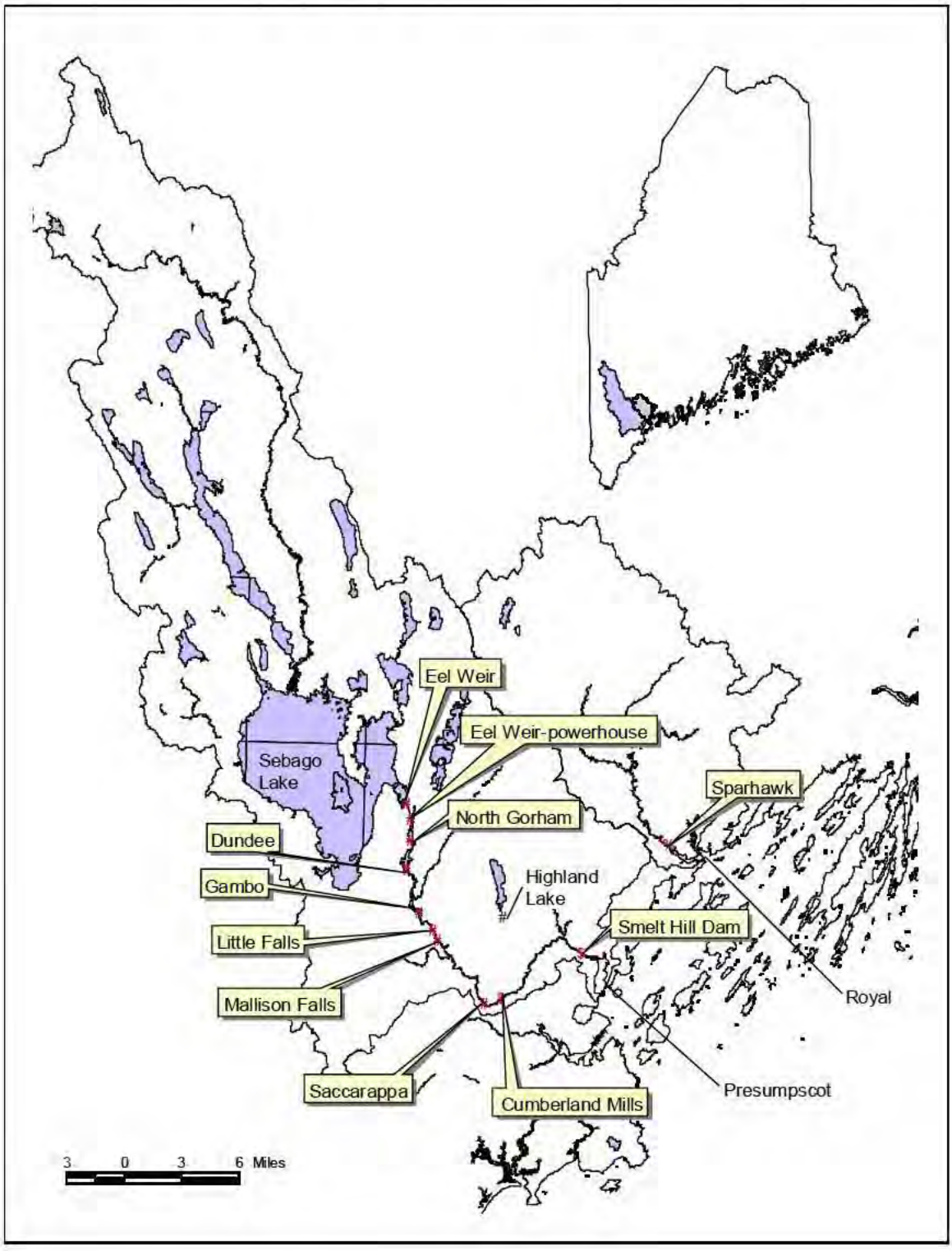
* Upstream eel passage at Little Falls has been delayed, because few eels have been seen at the dam.
** No generation (shutdowns) for 8 hours each night for eight weeks in the fall; eels exit over spillways.

A multi-species fisheries management plan was drafted by the state fisheries agencies in 2001. The plan calls for passage to enhance American eel from the head-of-tide to Sebago Lake and passage to restore alewife, American shad, blueback herring and Atlantic salmon to the Little Falls impoundment (phase 1) and possibly to the Dundee impoundment (phase 2).

Obtaining fish passage at Cumberland Mills is a high priority for DMR, because it would trigger upstream anadromous fish passage and enhance upstream eel passage. State and federal resource agencies and conservations groups have entered into a preliminary settlement agreement with the owner, S.D. Warren, to provide passage at Cumberland Mills, and a final agreement is expected within three months.

DMR owns and operates a fishway at Highland Lake dam (Fig. 3). The dam was damaged by high water in 1996, and passage was diminished after the Town of Westbrook reconstructed the dam. DMR has completed three projects to improve passage, and intermittently stocked the lake with alewives between 1987 and 2003. The stocking established a natural run, whose size is being assessed by DMR.

Figure 3. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in Presumpscot and Royal rivers (1:600,000 scale).



Royal River: low restoration priority

One FERC exempt hydropower project is located at the head-of-tide on the mainstem (Fig. 3). There is no readily available information on the species that historically inhabited this river or the extent of their upriver habitat, but there are currently small populations of alewife, American shad, and blueback herring that use the lowermost fishway, and American eel elvers are harvested at the mouth of the river. DMR owns and operates two Denil fishways in the lower river, one at the hydropower project and one at the next dam upriver. A steep gradient between the two dams appears to prevent the upstream passage of most anadromous fish. There is a downstream bypass channel at the hydropower project, but no upstream eel passage.

This is a low priority river, because it is a small watershed that may not have been extensively used by diadromous fish historically.

Androscoggin River: moderate restoration priority

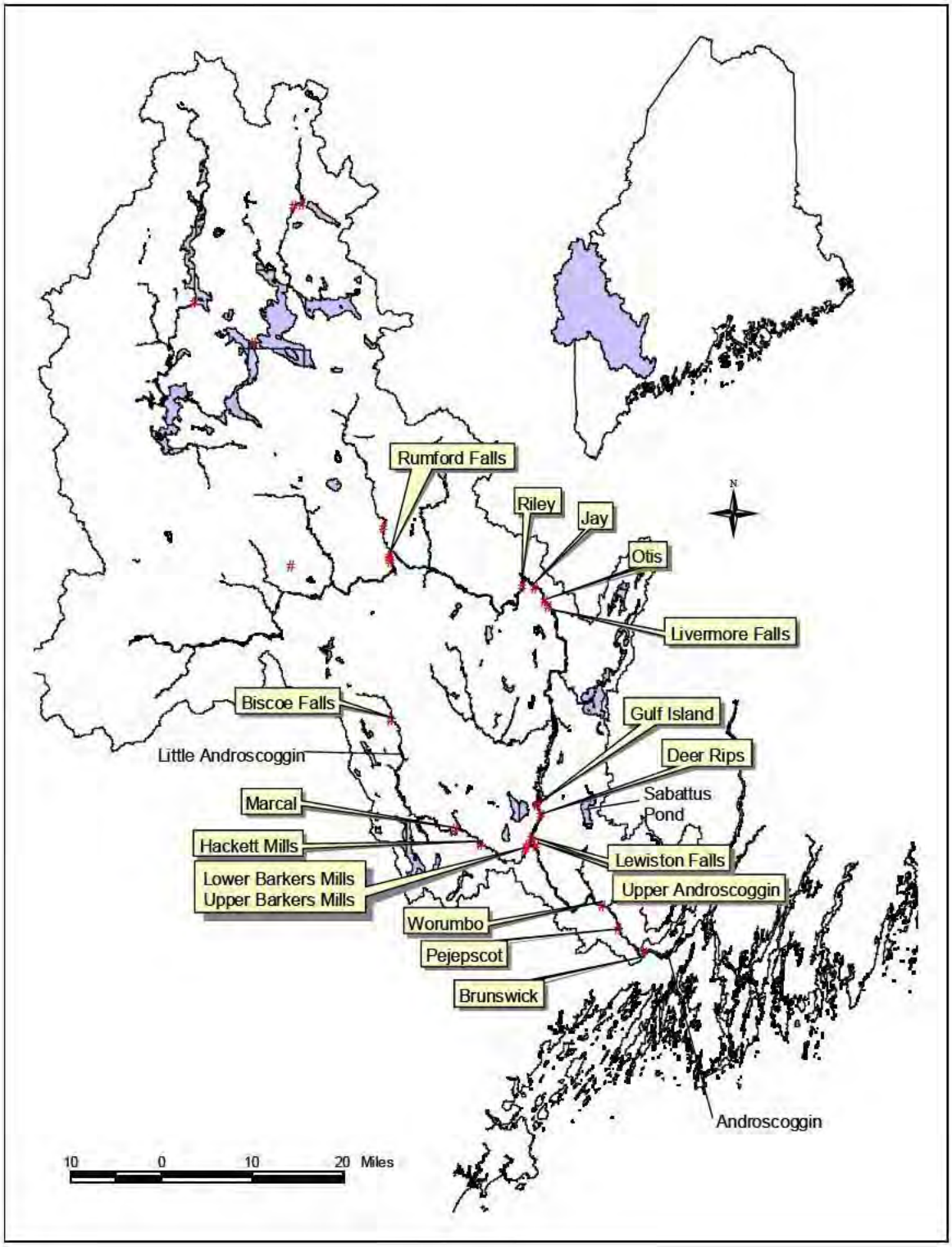
Eight FERC licensed projects (12 dams) are located on the mainstem between the head-of-tide and Rumford Falls, which is believed to be the historical upstream limit of American eel and Atlantic salmon (Fig. 4). The upstream limit for alewife, American shad, and blueback herring on the mainstem was Lewiston Falls. An additional five FERC licensed projects on the Little Androscoggin River are located within historic habitat of all five diadromous species. Upstream anadromous fish passage is available at the Brunswick (vertical slot fishway), Pejepscot (fishlift), and Worumbo (fishlift) projects. However, American shad do not use the vertical slot fishway at Brunswick for reasons that are not understood, and a requirement for effectiveness testing was not included in the license.

Providing fish passage on the Androscoggin, the third largest watershed, is a moderately high priority for DMR, but there are a number of significant impediments. The primary impediment is lack of passage for American shad and American eel at the Brunswick Project, the first dam on the river. Passage for American eel was not requested when the project was licensed, and the fishway as built was designed to pass American shad as well as the other target species. Because the Brunswick Project license does not expire until 2026, the license would have to be reopened to remedy the passage issues. Obtaining immediate fish passage on the mainstem projects above Worumbo and on the Little Androscoggin would also require reopening the existing licenses. Licenses for the mainstem dams expire between 2026-2048 and those on the Little Androscoggin expire between 2019-2037.

There are two impediments to alewife restoration in the Androscoggin River: nonhydropower dams without fishways that prevent adults from reaching spawning habitat and an anti-alewife sentiment that has prevented DMR from stocking alewives in historic habitat. In response to complaints from lake associations and property owners, DIFW has often refused to allow DMR to stock or continue stocking alewives in inland waters. For example, DMR stocked Sabbattus Pond from 1983-1985 to establish a run, was refused permission to stock from 1986-1997, and subsequently regained permission to stock the pond in 1998. DMR has not pursued fish passage at nonhydropower dams in the watershed because of the general lack of public support.

DMR produces an annual report on fisheries activities in the watershed.

Figure 4. Location of FERC licensed (circle), FERC Exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Androscoggin River (1:1,000,000 scale).



Kennebec River: high restoration priority

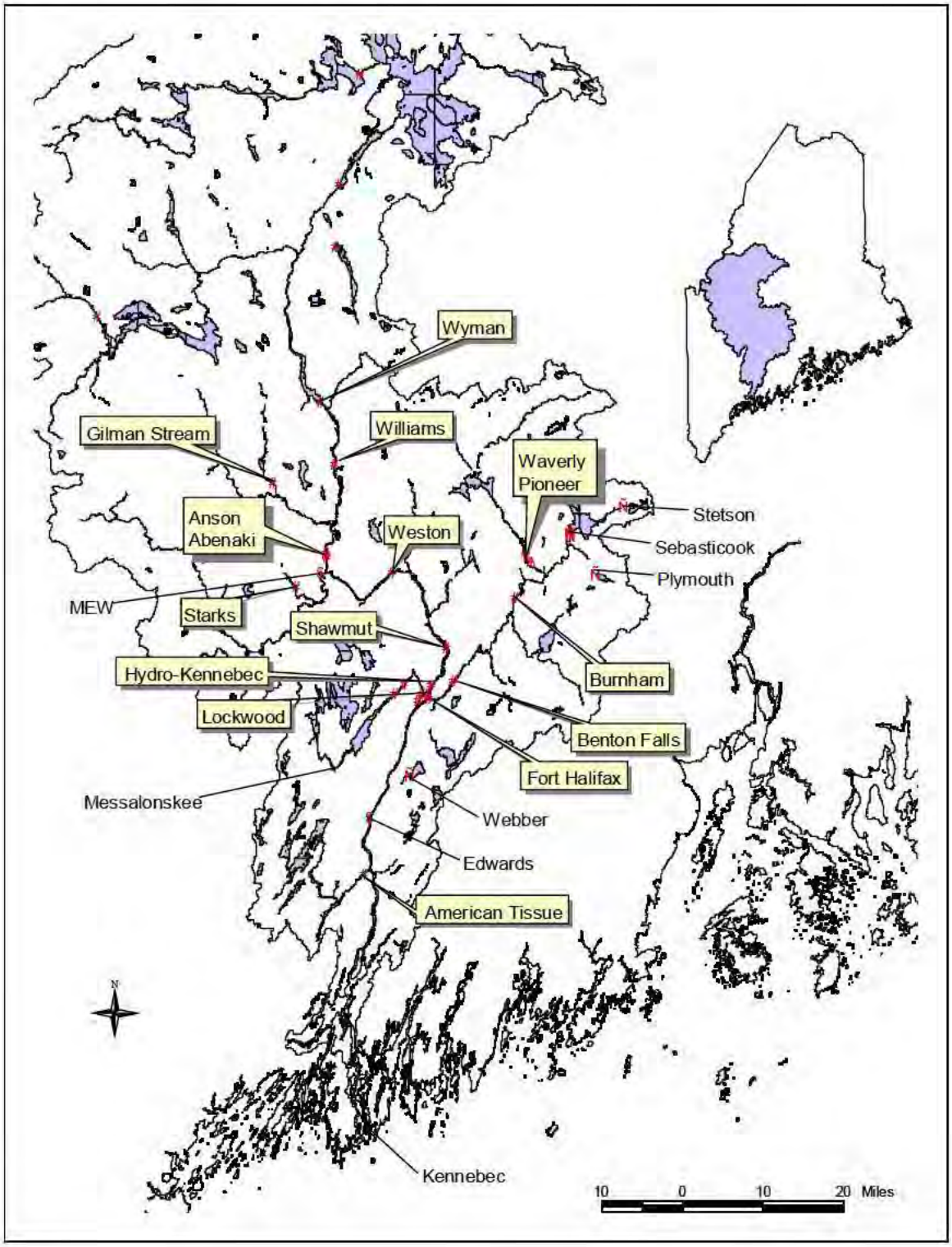
Ten FERC licensed hydropower projects (10 dams) in the Kennebec River watershed are within the historical range of alewife, American shad, and blueback herring (clupeids); 17 projects (17 dams) are within the historic range of Atlantic salmon; and 20 projects (23 dams) are within the historical range of American eel (Table 4; Fig. 5). Two dams in the watershed, Edwards and Madison Electric Works (MEW), have been removed. A large tidal project recently was proposed for the outlet of Merrymeeting Bay. A multi-species management plan for the Kennebec watershed was adopted in 1993.

Table 4.

	Clupeid	Salmon	Eel	Anadromous passage		Eel passage	
Project (dam)	range	range	range	upstream	downstream	upstream	downstream
Edwards	yes	yes	yes	removed	removed	removed	removed
Lockwood	yes	yes	yes	fishlift	racks/bypass	ramp	racks/bypass
Hydro-Kennebec	yes	yes	yes	trigger	curtain/bypass	ramp	curtain/bypass
Shawmut	yes	yes	yes	trigger	racks/gate	ramp	racks/gate
Weston	yes	yes	yes	trigger	racks/gate	ramp	racks/gate
Abenaki		yes	yes	trigger	trigger		screen/bypass
Anson		yes	yes	trigger	trigger	ramp	screen/bypass
Williams		yes	yes				
Wyman		yes	yes				
Gilman Stream		yes	yes				
MEW	yes	yes	yes	removed	removed	removed	removed
Starks	yes	yes	yes				
Fort Halifax	yes	yes	yes	pump	racks/bypass	ramp	racks/bypass
Benton Falls	yes	yes	yes	fishlift	racks/bypass	ramp	screen/bypass
Burnham	yes	yes	yes	fishlift	screen/bypass	ramp	screen/bypass
Pioneer	yes	yes	yes				
Waverly Avenue	yes	yes	yes				
Automatic			yes				
Messalonskee							
(Union Gas)			yes				
(Rice Rips)			yes				
(Oakland)			yes				
(Messalonskee L)			yes				
American Tissue	yes		yes		notch/pool	ramp	screen/gate

DMR has signed three settlement agreements to implement fish passage in the Kennebec River watershed, and the provisions of the agreements have been incorporated into the 401 Water Quality Certification and the federal license of each project. A 1986 settlement agreement between DMR and the Kennebec Hydro-Developers Group (KHDG, owners of the Lockwood, Hydro-Kennebec, Shawmut, Weston, Ft. Halifax, Benton Falls, and Burnham projects) provided funds to restore alewife and American shad above Edwards Dam in exchange for delays in fish passage at the seven projects. A 1998 settlement between KHDG, state and federal resource agencies, and conservation groups provided for the removal of Edwards Dam, a schedule or triggers for installation of fish passage at the seven KHDG projects, and additional funds for restoration. A settlement between Madison Paper Company, state and federal agencies, and conservation groups provided for passage at the Anson and Abenaki projects and funding for salmon stocking.

Figure 5. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Kennebec River (1:1,200,000 scale). Five dams on Messalonskee Stream are not labeled.



In addition to the two dams that have been removed, fish passage is available or is a license requirement at 10 projects (Table 4). American Tissue does not have fish passage requirements in its license, but the owners voluntarily installed downstream passage for eel and alewife and upstream passage for eel. Anadromous passage at Hydro-Kennebec, Shawmut, and Weston is triggered by the passage of specific numbers of American shad at downstream projects; anadromous passage at Anson and Abenaki is triggered by Atlantic salmon stocking in project waters. Following consultation with the fisheries agencies in the summer/fall 2007, FPL Energy made major changes to the attraction water intake pipe for the Lockwood Project fishlift to fix the problem of reduced attraction water.

Effectiveness testing of fish passage is in various stages (Table 5). Results of these studies are filed with FERC by the project owners, presented at the annual meeting, and summarized in the annual Kennebec River Restoration Project report. Study results are usually available in March for the preceding year.

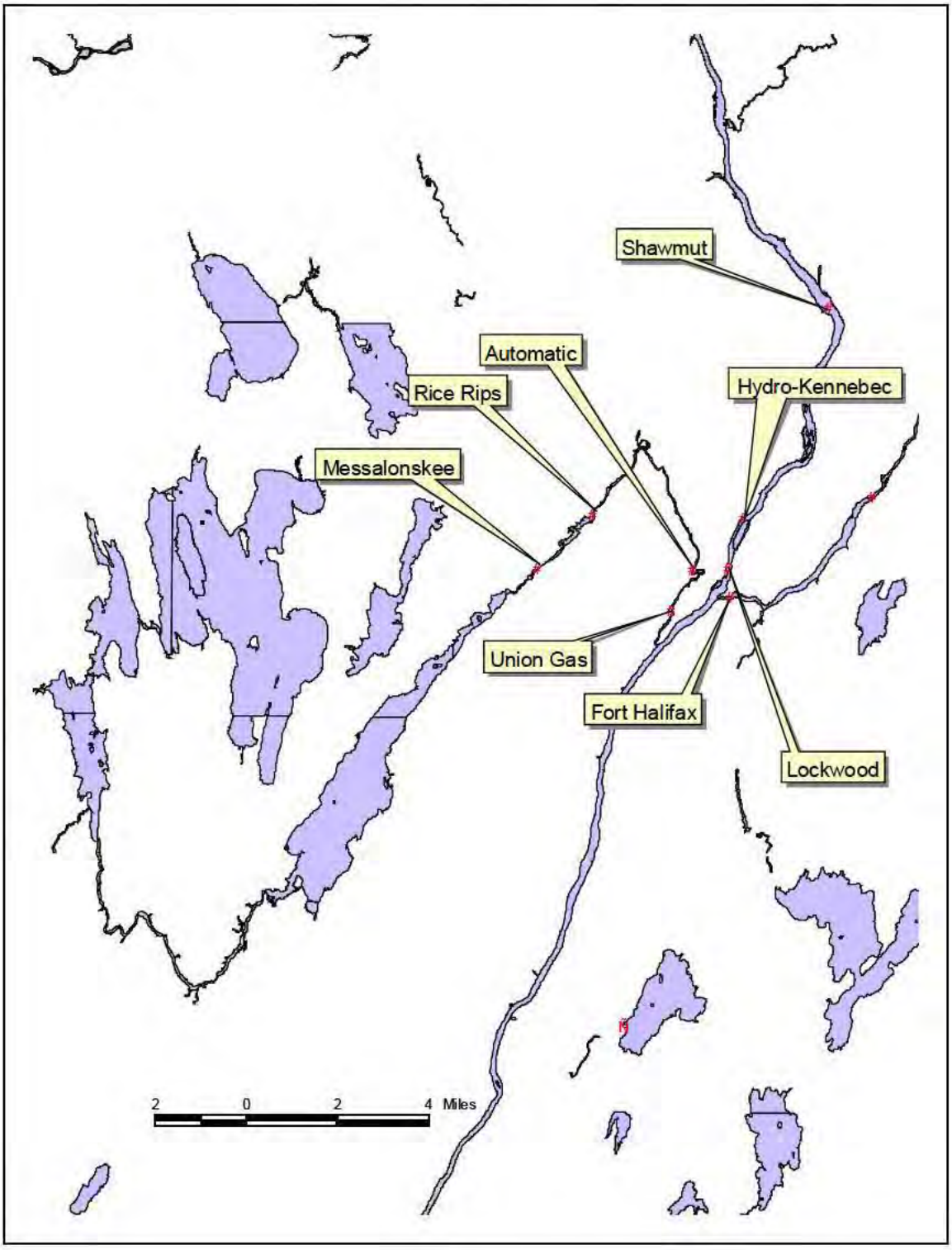
Table 5.

Project/dam	Upstream eel	Downstream eel	Upstream anadromous	Downstream anadromous
Lockwood	2008, 2009	2007 telemetry	2008	2007 telemetry
Hydro-Kennebec	completed	2007 video, sonar	after installation	2007 video, sonar
Shawmut	2006, 2007	2007 telemetry	after installation	after installation
Weston	2007, 2008	2008 telemetry	after installation	after installation
Abenaki		2007 PIT tag	after installation	after installation
Anson		2007 PIT tag	after installation	after installation
Fort Halifax	counts			
Benton Falls	counts	visual	2006-2008	completed
Burnham	2008	visual	2006-2008	2007 tag-recapture
American Tissue	not required	not required		not required

Between 1999 and 2003, DMR partnered with three towns (Newport, Plymouth, and Stetson) and numerous sponsors to install upstream anadromous fish passage at the Sebasticook Lake Dam ($392,000), Plymouth Pond Dam ($122,000), Pleasant Lake (Stetson) Dam ($57,000), and breach the Guilford Dam ($237,000). Passage at these nonhydropower dams triggered upstream anadromous passage at the Benton Falls Project and the Burnham Project. In the last two years, DMR has been working with the Webber Pond Association and other partners to provide passage at the Webber Pond Dam.

Fish passage on the Kennebec River is DMR's highest priority. DMR consulted with the KHDG on a number of effectiveness studies in 2007 and with FPL Energy and USFWS to improve passage for American shad at the newly constructed Lockwood fishlift. Obtaining fish passage at the Pioneer and Waverly dams is the next logical priority. The USFWS is developing fish passage prescriptions for these projects in consultation with DMR. Gilman Falls and Starks are FERC exempt projects, but impact little habitat. Licenses for the remaining projects do not begin to expire until 2017 (Williams in 2017, American Tissue in 2019, Wyman in 2036, Automatic in 2036, and Messalonskee in 2036). Reopening the licenses for the Automatic and Messalonskee would make a large amount of historic eel habitat accessible (Fig. 5b).

Figure 5b. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in Messalonskee Stream (1:235,000 scale).



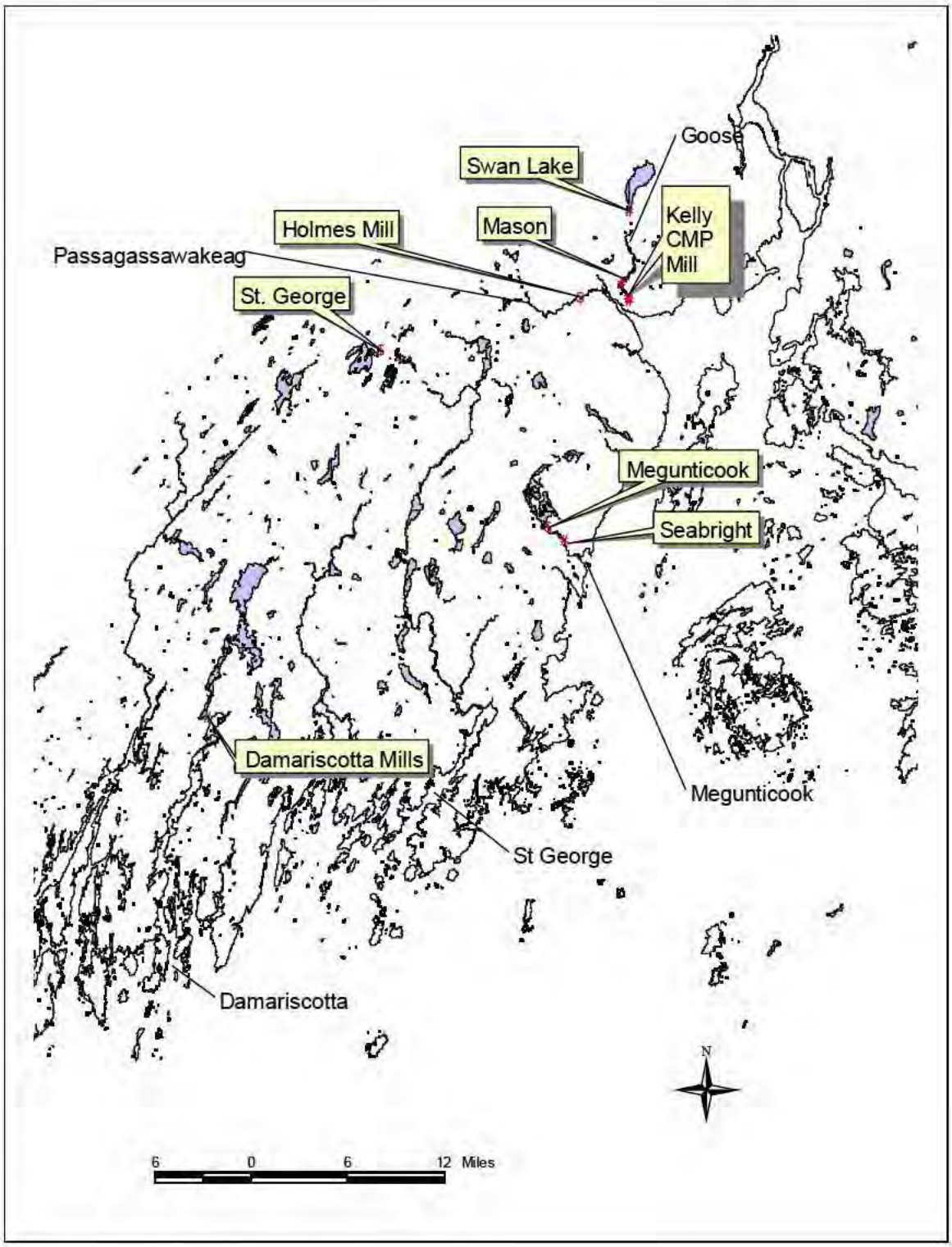
Damariscotta River: high restoration priority

One FERC licensed hydropower project is located at the head-of-tide on the Damariscotta River (Fig. 6). A 200-year old pool-type fishway provides upstream passage for alewife and American eel. The project ceases generation from July 1-November 30, and the fishway serves as a downstream passage for both species. The Towns of Nobleboro and Newcastle are repairing the fishway, and DMR and USFWS staff are providing technical assistance. This project is a high priority for DMR, because the alewife run once served as a source of broodstock for restoration in the Royal River, Androscoggin River, and Kennebec River.

St. George, Megunticook, Passagassawakeag, and Goose rivers: low restoration priority

One FERC inactive hydropower project is located in the upper reaches of the St. George River; one FERC licensed hydropower project and one FERC inactive project are located on the Megunticook River; and one project (5 dams) is located on the Goose River (Fig. 6). All of the projects are presumed to be within historical American eel. At this time these are low priority watersheds because they are small. In addition, the Goose Project is licensed until 2020, and would have to be reopened for immediate passage.

Figure 6. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Damariscotta River, St. George River, Megunticook River, Goose River, and Passagassawakeag River (1:700,000 scale).



Penobscot River: high restoration priority

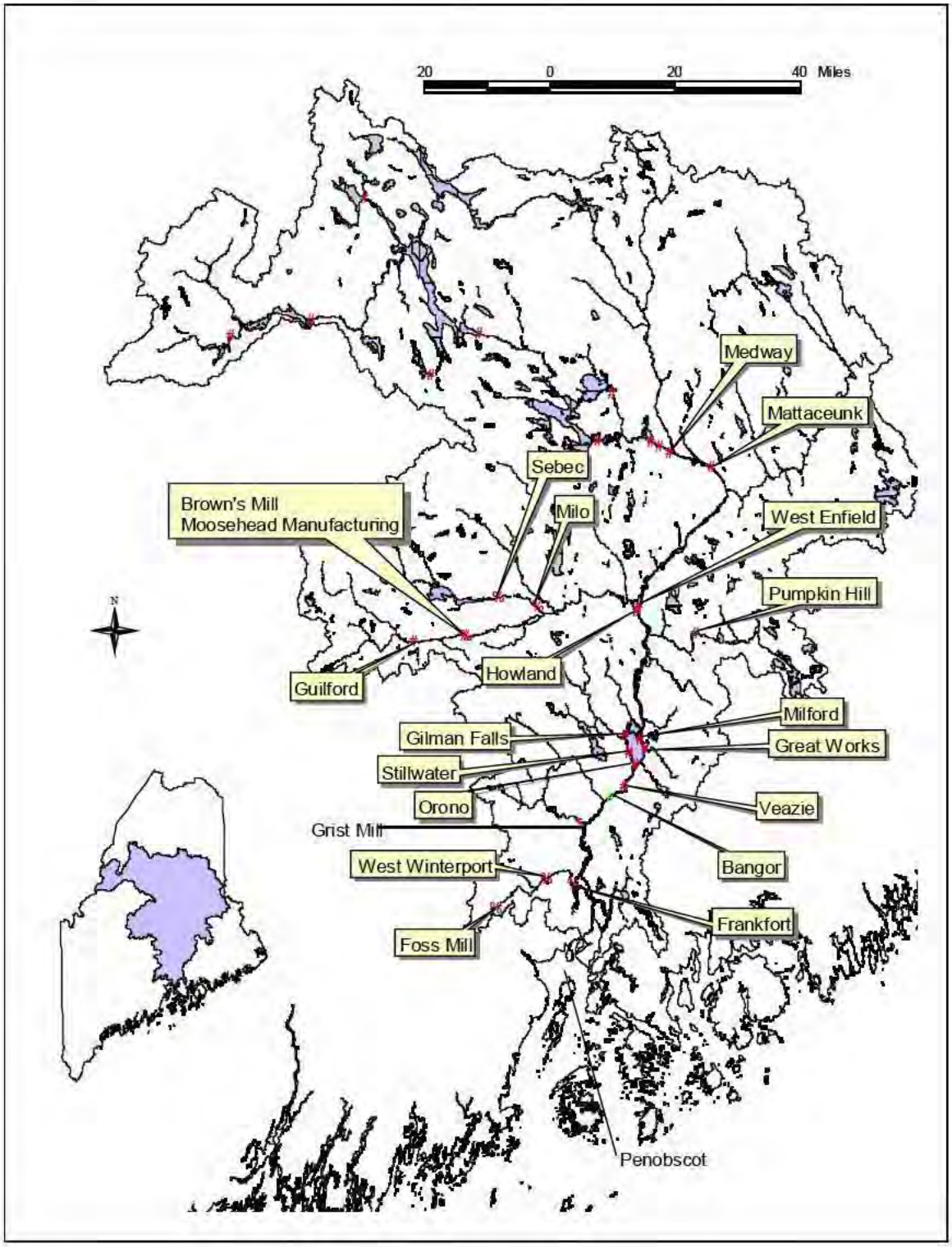
There are 17 FERC licensed hydropower projects (20 dams) within the historical range of diadromous fishes in the Penobscot River basin (Fig. 7). Thirteen of the dams have upstream anadromous fish passage, and 10 have a structure or measures for downstream passage (Table 6). Effectiveness studies for Atlantic salmon have been conducted at several projects, but no studies have been conducted for other species. Upstream passage effectiveness for salmon at Veazie, Great Works, and Howland dams can be very low, depending on flow conditions. Bangor Dam has been breached, and Grist Mill dam was removed in 1998. A large tidal project has been proposed for the channel to the west of Verona Island in Bucksport.

Table 6.

Subdrainage/Project/Dam	Upstream passage type	Downstream passage type
Penobscot		
Bangor	breached	breached
Veazie	vertical slot	guidance-behavioral-operational
Great Works	2 Denils	guidance-behavioral-operational
Milford		
Milford	Denil	guidance-behavioral-operational
Gilman Falls (no turbines)	Denil	
West Enfield	vertical slot	bypass
Mattaceunk	pool-and-weir	guidance-behavioral-operational
Stillwater		
Orono	none	none
Stillwater	none	guidance-behavioral-operational
Piscataquis		
Howland	Denil	guidance-behavioral-operational
Brown's Mill	Denil	guidance-behavioral-operational
Moosehead Manufacturing	Denil	none
Guilford Dam	Denil	none
Milo	none	none
Sebec	none	none
Passadumkeag		
Pumpkin Hill	Denil	bypass
West Branch		
Medway	eel ramp	sluice-bellmouth weir
Marsh Stream		
Frankfort	Denil	none
Foss Mill	none	none
West Winterport	none	none

The most significant obstacles for diadromous fishes are the two lowermost dams on the mainstem, Veazie Dam and Great Works Dam. Removal of these dams will allow Atlantic sturgeon, shortnose sturgeon, rainbow smelt, and Atlantic tomcod free access to Milford, the first impassable natural barrier above head of tide and the historical upstream limit for these species. In addition, removal of these dams and improvements to fish passage at Milford and Howland will significantly improve the chances of restoring or enhancing populations of alewife, American eel, American shad, Atlantic salmon, blueback herring, sea lamprey, and striped bass by eliminating or reducing any inefficiency, delay, and mortality associated with fish passage.

Figure 7. Location of FERC licensed (circle), FERC Exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Penobscot River (1:1,500,000 scale).



A 2004 settlement agreement between PPL Corporation, state and federal resource agencies, and six conservation groups allows for the purchase of Veazie, Great Works, and Howland dams, removal of Veazie and Great Works, installation of a naturalistic bypass at Howland, installation of state-of-the-art fish passage (fishlift) at Milford, and upstream and downstream eel passage at Milford, Orono, Stillwater, and West Enfield. Purchase of the three dams is expected to occur in 2008.

DMR drafted a multi-species management plan for the Penobscot River basin in 2007. The plan envisions the restoration of Atlantic sturgeon, shortnose sturgeon, rainbow smelt, and Atlantic tomcod to Milford; restoration of alewife, American eel, American shad, Atlantic salmon and blueback herring to historical habitat above Mattaceunk on the mainstem, above Guilford on the Piscataquis, and above Pumpkin Hill on the Passadumkeag. A public comment period on the management plan was held on December 13, 2007. Medway is not part of the 2004 settlement, however, it was the first project in Maine to have upstream and downstream eel passage. Effectiveness testing of downstream passage has been delayed because of a lack of eels for study.

Implementation of the 2004 settlement agreement for the Penobscot, the largest watershed, is DMR's second highest priority. Consultation and studies for upstream eel passage have been completed, and the passages will be installed in 2008. The current lack of funding for removal of the dams, construction of the Howland bypass, and diadromous fish restoration are impediments.

Union River: moderate restoration priority

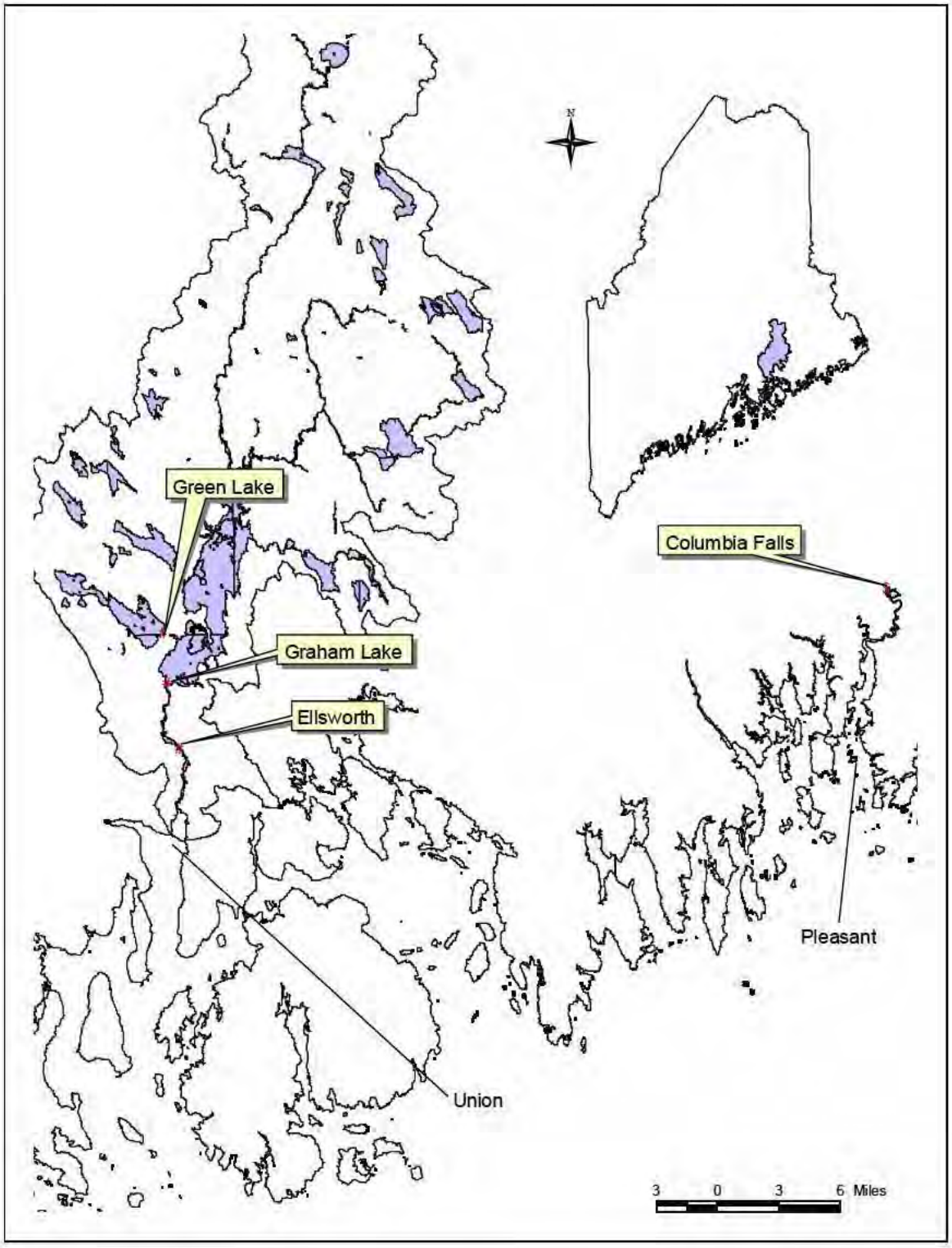
There are two FERC licensed projects in the watershed. Graham Lake dam, a water storage structure without turbines, is part of the Ellsworth Project (Fig. 8). The Ellsworth Project was licensed in 1987, and contained an article requiring the Licensee to develop a plan and schedule for (anadromous) fish passage installation. The Licensee and the Department of the Interior were unable to agree on a plan, a legal battle ensued, and in 1996 the US Court of Appeals for the District of Columbia vacated FERC's order requiring the Licensee to comply with the prescription. After the court decision, the Licensee, state and federal agencies, and other interested entities developed a management plan that was filed with FERC in 2000. Pursuant to that plan, the license was revised to include 1) evaluating impacts on smallmouth bass of stocking alewives in Graham Lake, 2) determining annual alewife escapements needs to achieve restoration goals, 3) collecting and updating information on salmon habitat in the watershed, and 4) evaluating upstream and downstream fish passage needs at the Ellsworth Project and determining the need for additional fish passage for American eel. The Ellsworth Dam is equipped with a fishlift/trap-and-truck facility that allows for the capture and upriver transport of alewife and Atlantic salmon and a downstream passage facility, but not an upstream eel passage.

This has been a moderate priority watershed, primarily because of time and personnel constraints. USFWS and DMR will work with the licensee to provide interim upstream eel passage during the next assessment cycle.

Pleasant River: low restoration priority

The one FERC inactive project on the Pleasant River (Fig. 8) was removed, and the watershed is now accessible to diadromous fishes. With the exception of Atlantic salmon, fish populations should be able to increase naturally without further intervention.

Figure 8. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the Union and Pleasant rivers (1:500,000 scale).

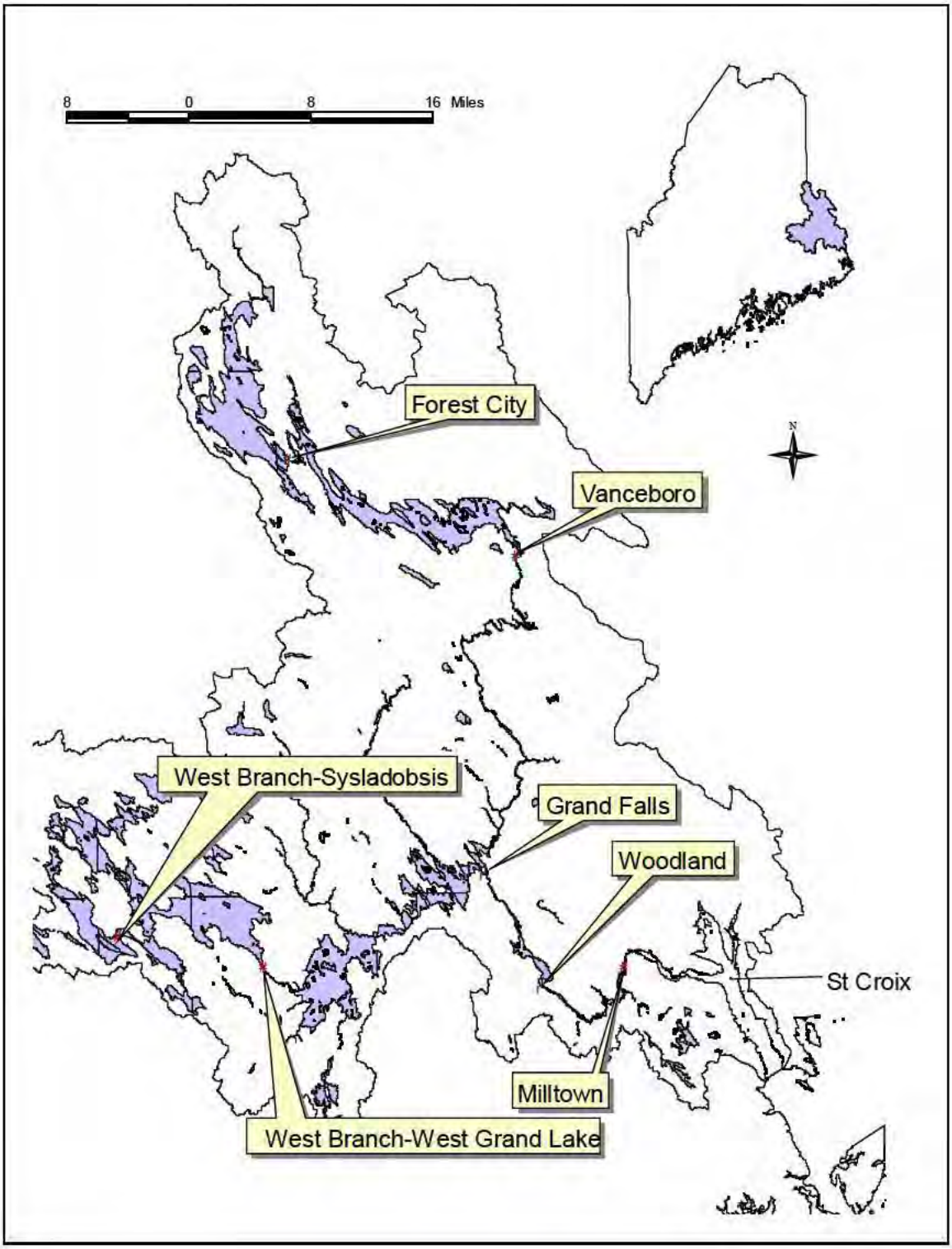


St Croix River: moderate restoration priority

Three FERC licensed projects (4 dams) and three FERC nonjurisdictional projects (3 dams) are located within historic habitat of alewife, Atlantic salmon, and American eel on the St. Croix. Milltown is a Canadian hydropower project. The Milltown, Woodland, Grand Falls, and Vanceboro projects have upstream anadromous fish passage, although the fishways at Woodland and Grand Falls dams were required to be configured to prevent the passage of alewife by 12 M.R.S.A §6134. The Forest City and West Branch projects are currently undergoing relicensing, and DMR has requested upstream eel passage and the right to request anadromous fish passage in the future. Downstream passage has not been requested, because these are water storage dams without turbines and migrants can exit via gates that pass minimum flows.

The major impediment to fish passage in this watershed is 12 M.R.S.A §6134.

Figure 9. Location of FERC licensed (circle), FERC exempt (square), FERC inactive (triangle), and FERC nonjurisdictional (star) projects in the St Croix River (1:800,000 scale).



Section 2. Definition of fish kill

The Resolve directs the Department of Environmental Protection to develop a water quality standard that sets out what are acceptable levels of a fish kill at different types and sizes of dams, based on the biological requirements of the many species of diadromous fish involved. This new water quality standard is envisioned by the Resolve "to the maximum extent possible, (to) enhance[s] the State's ability to require fish passage at licensed and unlicensed dams…" The Committee was concerned in its deliberations that existing language in certain permits was needlessly affecting the state's authority to require fish passage.

The biological staff of the Department of Environmental Protection, in consultation with other state natural resource agency staff and following review of existing state and federal law, spent time this summer and fall attempting to draft definitions of a fish kill that would meet the intent of the Resolve. Following extensive discussion on several different proposals, staff from DEP and the DMR agreed that such a standard would not materially assist the Department in requiring fish passage. Staff found, in fact, that such a new standard was not necessary and could actually diminish the State's current ability to require operational changes or fish passage. This may at least partially explain why no other states have enacted such a water quality standard for fish kills.

The agencies are therefore not recommending such a standard for the following reasons:

- The existing standards in law at 38 MRSA §465 require that licensing decisions and the operation of hydroelectric projects protect aquatic life, which includes diadromous fish species. *In S.D. Warren Co. v. BEP*, 2005 ME 27, the Maine Supreme Judicial Court upheld the Department's authority to condition FERC licenses with, among other things, fish passage requirements. However, this decision did not require the Department to include such passage in every certification. Decisions regarding whether and when fish passage facilities should be required as part of a water quality certification for a given dam are made in the context of information on fishery management goals, migratory fish restoration plans, habitat suitability and availability, and current status of fish passage. These decisions, which are made in consultation with state and federal fisheries management agencies, run the full spectrum from not requiring fish passage, to leaving open the opportunity to require fish passage at a later date, to establishing a schedule for the future installation of fish passage, to requiring the immediate installation of fish passage.These species will not gain further protection from a further refined or specified definition of a fish kill.
- A water quality standard that quantified or further described a fish kill would not give the state more authority to reopen existing water quality certificates issued under Section 401 of the Clean Water Act that do not have a specific reopener clause for fish passage.
- Similarly, such a standard would not enhance the state's authority with the Federal Energy Regulatory Commission (FERC) in a petition request on a standard reopener clause in a FERC license.
- It would be virtually impossible to craft a standard that would capture the many, many different situations envisioned without opening the door to arguments *ad infinitum* about numbers, populations, or circumstances. Ironically, the endless rounds of debate would eliminate the value of the Department's professional judgment and possibly narrow rather than enhance our authority. This outcome is directly contrary to the intent of the Resolve.

As the agencies noted to the Committee in its deliberations on LD 1528, there are no dam facilities that can be operated without incurring some incidental mortality of fish species. However when observed and documented mortalities occur that are not incidental, the Department of Environmental Protection has made decisions and taken action that has resulted in the installation of fish passage or operational changes at facilities to halt the mortalities. A different, or quantified water quality standard would not change, and could actually diminish, the Department's ability in this regard.

Appendix 1. Definitions[3]

FERC APPROVED PROJECTS

FERC approved hydro projects operate under the terms of a license or an exemption.

LICENSE (L): Licenses are issued under the Federal Power Act for the development or continued operation of non-federal water power projects. Licenses are valid for a maximum of 50 years. Under FERC's regulations, a licensee must file to relicense a project no later than 2 years prior to the license expiration date. When a license expires, FERC may deny license renewal, may issue a new license to the original licensee or a new licensee, or may recommend to Congress that the United States acquire the project. If action has not been taken by the license expiration date, the project will operate on an annual license until relicensing action is taken.

EXEMPTION (E): Exemptions from the licensing provisions of the Federal Power Act are issued in perpetuity for the development of non-federal water power projects having a capacity of 5,000 KW or less and utilizing an existing dam or natural water feature. Exemptions are subject to conditions imposed by fish and wildlife agencies

INACTIVE FERC PROJECTS

Inactive FERC hydro projects are projects that at one time were approved by FERC but for which renewal of the project license has been subsequently denied or the project license or exemption has been subsequently revoked, surrendered or otherwise terminated. In most cases, the approved project was never built. In a few cases, a previously constructed and operating project has been shut down due to economic or environmental considerations.

FERC NON-JURISDICTIONAL PROJECTS

Non-jurisdictional projects are those that have been found to not be subject to FERC jurisdiction under the terms of the Federal Power Act.

A non-federal hydroelectric generating project must be licensed if it: (1) is located on a navigable water of the United States; or (2) occupies land of the United States; or (3) utilizes surplus water or water power from a government dam; or (4) is located on water which are non-navigable but over which Congress has Commerce Clause jurisdiction, project construction occurred on or after August 26, 1935, and the project affects the interests of interstate or foreign commerce.

FERC does not have jurisdiction if a project is constructed, operated and maintained in accordance with the terms of a valid federal permit issued prior to June 10, 1920. A storage reservoir is subject to licensing if it is part of a complete unit of hydropower development and any part of the development is subject to licensing.

[3] Department of Environmental Protection. 2007. Hydropower projects in Maine January 1, 2007.

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit E

Draft Fishery Management Plan
For the Presumpscot River Drainage

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Table of Contents

Introduction

In January 2001, the Maine Department of Marine Resources (MDMR), the Maine Department of Inland Fisheries and Wildlife (MDIFW), and the Maine Atlantic Salmon Commission (MASC) completed a document entitled *Presumpscot River: Interim Goals for Fisheries Management*, which outlined management goals for important fishery resources that currently reside or historically resided in the Presumpscot River watershed. Species addressed in the document include alewife, American eel, American shad, landlocked Atlantic salmon, sea-run Atlantic salmon, Atlantic sturgeon, black crappie, blueback herring, brook trout, brown bullhead, brown trout, chain pickerel, largemouth bass, rainbow smelt, smallmouth bass, striped bass, tomcod, yellow perch, and white perch. The three state fisheries agencies developed the interim fisheries management goals in response to several changes within the watershed: the probable removal of Smelt Hill Dam (located at the head-of-tide), the relicensing of six of the seven existing hydropower projects on the river, and improvements in water quality resulting from the closure of the pulping operation in Westbrook. These changes created a new opportunity for the restoration of diadromous[14] fish runs and the enhancement of warm water and coldwater recreational fishing opportunities.

In September 2001, the three state fisheries agencies agreed to develop the interim document into a more comprehensive plan to guide future decisions on fisheries management in the Presumpscot River. The goals contained in this management plan reflect a balance between the disparate missions of the three agencies, and are based on considerable discussion to minimize potential areas of management conflict. They also reflect a desire to manage the fisheries of the Presumpscot River within the physical and biological limits of habitat and its capacity to sustain the various resources. This management plan includes agency recommendations for fish passage and other issues that must be addressed for the successful attainment of stated management goals

Description of Drainage

The Presumpscot River drainage extends as far north as Albany Township, however, this management plan addresses only that portion of the drainage from Sebago Lake to the head-of-tide, referred herein as the Presumpscot River. The Presumpscot River is approximately 24 miles long, drains an area of approximately 615 square miles, and flows through the towns of Standish, Gorham, Windham, Westbrook, Falmouth, and Portland. Nine dams are located on the Presumpscot River. Seven of the dams are components of active hydropower projects (Table 1), and are licensed by the Federal Energy Regulatory Commission (FERC). Cumberland Mills Dam is not associated with a hydropower project, and is not licensed by FERC. The Smelt Hill Project was rendered inoperable by a flood in 1996, and is now inactive.

Water Quality

Water quality within the Presumpscot River from the outlet of Sebago Lake to the confluence of Pleasant River is classified by the Maine Department of Environmental Protection (MDEP) as Class A and GPA. Water quality in the reach from the confluence of Pleasant River to Saccarappa Falls has been downgraded to Class B. The MDEP has further downgraded the water quality in the reach below Saccarappa Falls to tidewater as Class C.

[14] Collective term referring to anadromous (spawn in fresh water and spend most of their lives in the sea) and catadromous (spawn in the sea and spend most of their lives in fresh or brackish water) species.

Fisheries Resources

Migratory fishes

Historically, the Presumpscot River supported large numbers of migratory fish. These included both anadromous species (alewife, American shad, Atlantic salmon, blueback herring, rainbow smelt, striped bass) and the catadromous American eel. Prior to the 1600s, the Aucoscisco Indians utilized these fish for food and fertilizer. However, construction of dams without fishways by European settlers, documented as early as 1739, interfered with the movement of the migratory species. The greatest impact probably occurred when a dam without a fishway was constructed at the head-of-tide in 1802, effectively blocking the anadromous species from nearly all spawning habitat. The Commissioners of Fisheries embarked on a statewide program of fishway construction in 1869, and by 1887 all the dams on the Presumpscot River had been provided with fishways. Over the next decade, the fishways fell into disrepair or were destroyed by high water and not replaced, and runs of anadromous fish were not reported in the Presumpscot River after 1900.

The Presumpscot River currently supports a sizeable population of catadromous American eel. In 1995 a commercial fishery for the juvenile (elver) stage of the American eel developed in Maine, and for the next three years the Presumpscot River below Smelt Hill Dam was heavily fished for elvers. In 1999, the State of Maine capped the number of elver licenses and reduced fishing effort (allowable gear) by about 79% because of concerns about the impact of the fishery. The same year, the market for elvers collapsed. The fishery has remained quiescent since 1999, and fishing pressure for elvers on the Presumpscot River has been negligible.

The lower reaches of the Presumpscot River currently support a run of anadromous alewives and a remnant population of American shad and perhaps rainbow smelt and tomcod. In 1987, MDMR constructed a fishway at the outlet of Highland Lake to allow alewives access to their principal spawning area, thereby enhancing the resource. Central Maine Power constructed a fishway at Smelt Hill Dam that became operational in 1990. The fishway provided access to the lower reaches of the river for alewives and American shad until 1996, when it was destroyed by a flood. After the flood, Central Maine Power either stocked alewives into Highland Lake (1997 and 1998) or opened gates in the dam (1999-2001) to allow passage of anadromous fishes. In addition, MDMR stocked alewives in Highland Lake in 2000 and 2001 to maintain the population.

Adult Atlantic salmon have sporadically been observed or caught in the Presumpscot River below Westbrook over the past few years. The origin of these fish is unknown. Juvenile salmon also have been observed in the Piscataqua River, primarily through electrofishing surveys conducted by the MDIFW. Limited access to the Presumpscot's remaining spawning and nursery habitat, located principally in tributaries, has prevented passive redevelopment of a sizeable Atlantic salmon run in the Presumpscot River.

Estimates of migratory fish populations

In order to design efficient fish passage facilities, the number of fish of each species produced in each river reach and the number of fish of each species that will use a facility must be estimated. The MDMR and the MASC typically make these estimates by multiplying fish production per unit area for each species by the total number of area units of aquatic habitat. Because of the assumptions made (described below), the values presented in Table 1 should be considered order-of-magnitude population estimates.

For many years, MDMR has used 235 fish/acre to estimate alewife production. This unit production value was developed from the commercial harvest in six Maine watersheds for the years 1971-1983. On the basis of these data, commercial yield was assumed to be 100 pounds/surface acre of ponded habitat.

This value is slightly less than the average of the lowest yield/acre for all six rivers and within the range of yields experienced in other watersheds. Assuming a weight of 0.5 pounds per adult, the commercial yield equals 200 adults/surface acre. The commercial harvest was assumed to represent an exploitation rate of 85%, because most alewife runs are harvested six days per week. Exploitation rates on the Damariscotta River, for example, ranged from 85-97% for the years 1979-1982. When commercial yield is adjusted for the 15% escapement rate, the total production is 235 adult alewives/acre.

Maine currently has no rivers with extensive runs of American shad or blueback herring and historical information on the size of populations produced by specific Maine rivers generally is lacking, because runs were greatly reduced or extirpated by dam construction beginning in the 1700s. Therefore, potential population sizes must be estimated from information on restored runs in other rivers. In the past, MDMR has used 111 shad/acre (=2.3 shad/100 yd^2), based on shad restoration in the Connecticut River during the early 1980s. MDMR's earlier estimates of shad production for the Presumpscot River (e.g. MDMR reply comments to FERC dated January 24, 2001) were based on 111 shad/acre of habitat. To determine whether this number remained valid, MDMR obtained counts of shad passed at the Holyoke Dam (1^{st}) and Turners Falls Dam (2^{nd}) on the Connecticut River for the years 1983-2000, and a GIS estimate of surface area for this river reach. The average shad production for the reach between the two dams for the 20 year-period was 98.9 shad/acre. Production estimates based on both values have been included in Table 1 for comparison, but MDMR recommends using production based on 98.9 shad/acre.

Use of 98.9 shad/acre for estimating production is further supported by historical information on commercial landings in Maine. A significant fishery for American shad existed in the freshwater tidal section of the Kennebec River and its tributaries after access to inland waters was obstructed by impassable dams at the head-of-tide. From 1896-1906 the average annual landings of American shad in the Kennebec River were 802,514 pounds. This represents 267,500 adult shad, assuming an average weight of three pounds per fish, and a commercial yield of 0.6778 shad/100 yd^2. If the exploitation rate ranged from 25-50%, then the total run from Merrymeeting Bay to Augusta (including tributaries) may have ranged from 535,000-1,070,000 shad. This represents a production of to 68-131shad/acre (equivalent to 1.4-2.7 adult shad/100 yd^2).

In the past, MDMR has not estimated production for blueback herring due to lack of data. However, MDMR recently consulted with Steve Gephard (CT DEP, Bureau of Natural Resources, Fisheries Division) to determine how production of blueback herring is estimated for Connecticut waters. In developing a management plan for the Thames River, the CT DEP estimated shad production, and then used a multiplier (7-8) to estimate blueback herring production. MDMR has further reduced the multiplier to a more conservative 6 (resulting in approximately 600 fish/acre).

Atlantic salmon smolt estimates are based on a production goal of three smolts per unit of habitat (one unit = 100 square meters of Atlantic salmon habitat). The spawning requirement is also habitat based and is derived from an egg deposition rate for optimal smolt production (240 eggs/unit), long-term fecundity rates for Maine Atlantic salmon (7,200 eggs/female), and a 50:50 sex ratio of returning spawners.

Spatially referenced datasets were obtained from the Maine Office of GIS (coastal waters, rivers, ponds, streams, dams), and were combined to estimate the surface area of aquatic habitat in each river reach (dam to dam), tributary, and lake or pond of the Presumpscot watershed. Production/area for each species was multiplied by the total area of appropriate habitat to obtain an order-of-magnitude estimate of total production. The estimate of aquatic habitat for the mainstem Presumpscot River is based on existing conditions, and does not take into account reductions in stream width (and therefore area) that would occur if one or more dams were removed.

Fish passage

Successful restoration and enhancement of diadromous species currently is hampered by the lack of upstream and downstream fish passage at all dams on the Presumpscot River. In January 1999, the US Army Corps of Engineers and the State of Maine, in partnership with non-governmental organizations, announced an initiative to remove the Smelt Hill Dam, located at the head-of-tide, and restore the aquatic ecosystem of the lower Presumpscot River. MDMR is in the process of obtaining a purchase and sale agreement for the property in order to submit an application to FERC and the Maine Department of Environmental Protection (MDEP) to surrender the hydropower project permit and to remove the dam. Removal of Smelt Hill Dam, anticipated to occur in the summer of 2002, is the impetus for restoration because it will allow diadromous species unrestricted access to seven miles of riverine habitat.

The second dam on the river, Cumberland Mills Dam, is located in inland waters and is not a FERC jurisdictional dam. Maine statute (12M.R.S.A §7701-A) authorizes the Commissioner of MDIFW to require a fishway by the owners, lessors or other persons in control of any dam within inland waters frequented by shad, salmon, sturgeon or other anadromous or migratory fish species in order to conserve, develop or restore anadromous or migratory fish resources.

The remaining dams on the river are hydropower projects licensed by FERC. Fish passage has been requested by the state (MDMR, MASC, MDIFW) and federal (USFWS) fisheries agencies and non-governmental organizations at the six projects currently being relicensed.

Resident species

Resident fish are those species that are able to fulfill their life history requirements within the river and its tributaries. The species listed below are known resident inhabitants of the Presumpscot River.

Chain pickerel	Brown bullhead (hornpout)	Fourspine stickleback
Smallmouth bass	Golden shiner	White sucker
Largemouth bass	Bridle shiner	Brook trout
Pumpkinseed	Common shiner	Brown trout
Black crappie	Fallfish	Landlocked Atlantic salmon
Yellow perch	Banded killifish	

Brook trout and landlocked Atlantic salmon are indigenous to the Presumpscot River drainage. Several tributaries to the Presumpscot currently support wild populations of brook trout, but there are essentially no self-sustaining populations of landlocked salmon in the Presumpscot. The historical origin of several other river fish is less certain, however, five species of nonnative fish were more recently introduced, including black crappie, smallmouth bass, largemouth bass, brown trout, and bridle shiner.

Existing recreational sportfisheries are primarily comprised of landlocked Atlantic salmon, brook trout, brown trout, smallmouth bass, largemouth bass, brown bullhead, and yellow perch. MDIFW stocking programs maintain recreational fisheries for trout and landlocked salmon, although wild brook trout produced in river tributaries, as well as stocked and wild landlocked salmon originating from Sebago Lake make a small contribution to the river fisheries. Fisheries for predominantly stocked trout and salmon occur in the tailrace and bypass reaches associated with Eel Weir Dam, North Gorham Dam, Dundee Dam, and Mallison Dam. The Eel Weir bypass, located immediately below Sebago Lake, is intensively managed for brook trout, although, landlocked Atlantic salmon, and to a lesser extent brown trout are also stocked. Up to 2,500 trout and salmon have been stocked annually in the Eel Weir Bypass reach. The other three bypass reaches that are the focus of current MDIFW stocking programs are managed primarily for brown trout and are stocked annually at much lower levels, typically 250 trout per

reach. Limiting environmental factors and available resources currently preclude opportunities to provide season-long recreational fisheries for native salmonid species in some river reaches. In these reaches management has favored more tolerant and available nonnative species like brown trout.

MDIFW will be able to manage for resident species as long as suitable minimum/maximum flow releases and adequate public access are provided where requested at key locations throughout the watershed. The development and enhancement of recreational angling opportunities for both resident and migratory fisheries is dependent on suitable minimum/maximum flows in the tailrace and bypass channels and mainstem river channel, as well as safe public access.

Management Goals, Objectives, and Strategies

The overall goal of the draft fishery management plan is to integrate the fishery management goals of the Maine Department of Marine Resources (MDMR), the Maine Department of Inland Fisheries and Wildlife (MDIFW), and the Maine Atlantic Salmon Commission (MASC) so as to cooperatively manage the diadromous and resident fishes of the Presumpscot River for optimum habitat utilization, abundance and public benefit.

Management objectives (numbers) and strategies (letters) supporting the goal of the fisheries agencies are listed by reach below:

Phase I[15]
Reach 1: Smelt Hill Dam to Cumberland Mills Dam, including Forest Lake, Knights Pond, Piscataqua River, Highland Lake, and Mill Brook

1) Manage Reach 1 as a migratory pathway for alewife, American eel, American shad, Atlantic salmon (smolts and adults), blueback herring, striped bass, and possibly Atlantic sturgeon, rainbow smelt, sea-run brook trout, sea-run brown trout, and tomcod.
   a) Remove Smelt Hill Dam (anticipated to occur in the summer of 2002).
   b) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 1 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 1 is estimated to be 12,800 American shad; 78,000 blueback herring; 147,700-200,000 alewife; 2,310 Atlantic salmon smolts and 56 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Investigate access for alewife at Forest Lake and Knight's Pond.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for Striped Bass, ASMFC's Interstate Fisheries Management Plan for American shad and river herring, ASMFC's Interstate Fisheries Management Plan for American eel, and Amendment 1 to ASMFC's Interstate Fishery Management Plan for Atlantic sturgeon.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

[15] Restoration of anadromous species will occur in phases, allowing the fisheries agencies to assess potential interactions between resident and anadromous species and changes in fishing opportunities. During Phase I, anadromous fish will be restored to Reach 5 (base of Gambo dam). If the three fisheries agencies agree, restoration will continue upriver as described.

4) Promote existing and potential commercial fisheries for alewife and American eel.

5) Promote existing and potential recreational angling opportunities for American shad; adult Atlantic salmon; striped bass; smallmouth bass; largemouth bass; chain pickerel; yellow perch; white perch; brown bullheads; black crappie; and possibly rainbow smelt, sea-run, and resident species of trout, which may include brook trout and brown trout in the mainstem.

6) Establish a seasonal recreational fishery for stocked trout in the mainstem.
   a) Management is contingent upon availability of adequate public access.
   b) Stock legal-size trout, utilizing those species and strains that provide good returns.

7) Manage the West Branch Piscataqua River and Mill Brook for diadromous species and wild brook trout. Enhance recreational trout angling opportunities.
   a) Augment natural recruitment of a small population of wild brook trout by stocking legal-size trout to meet angler use and provide season-long (spring-fall) trout angling opportunities.

8) Manage Forest Lake for diadromous species (American eel and possibly alewife), existing resident species, and establish a coldwater recreational fishery for trout.
   a) Management is contingent upon availability of adequate public boat access that is consistent with existing watercraft use
   b) Develop an annual stocking program to support a put, grow, and take fishery for trout. Brown trout would most likely stocked.

9) Manage Highland Lake for diadromous species (American eel and alewife), existing resident species, and maintain existing recreational fishery for stocked brown trout and landlocked salmon.
   a) MDMR will operate fish passage at Highland Lake from approximately April-November.
   b) Maintain existing annual stocking program, utilizing fall yearling landlocked salmon and brown trout to provide a put, grow, and take fishery consistent with habitat capabilities.
   c) Develop and maintain a quality fishery for smallmouth and largemouth bass.

10) No recreational management for resident species is planned for the East Branch of the Piscataqua River or Knights Pond.

Reach 2. Cumberland Dam to Saccarappa Dam

1) Manage Reach 2 as a migratory pathway for American eel, American shad, Atlantic salmon (smolts and adults), blueback herring, striped bass and possibly sea-run brook trout and sea-run brown trout.
   a) For American eel, upstream passage facilities at Cumberland Dam will be completed two years after Smelt Hill Dam is removed.
   b) For anadromous species, upstream passage facilities at Cumberland Dam will be completed two years after Smelt Hill Dam is removed. Assuming full restoration to the North Gorham Dam the upstream facility ultimately should be capable of passing a maximum of approximately 61,100 American shad and 372,200 blueback herring.
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 2 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 2 is estimated to be 3,100 American shad; 18,800 blueback herring; and 42 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.

b) Monitor juvenile or adult abundances of selected species as funding is available.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for Striped Bass, ASMFC's Interstate Fisheries Management Plan for American shad and river herring, and ASMFC's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.
4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for American shad, adult Atlantic salmon, striped bass, smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, black crappie, and possibly sea-run brook trout, and sea-run brown trout.

6) Establish a seasonal recreational fishery for stocked trout in the mainstem.
   a) Management is contingent upon availability of adequate public access.
   b) Stock legal-size trout, utilizing those species and strains that provide good returns.

Reach 3. Saccarappa Dam to Mallison Falls Dam, including Inkhorn Brook, Little River, and Colley-Wright Brook

1) Manage Reach 3 as a migratory pathway for American eel, American shad, Atlantic salmon (smolts and adults), blueback herring, and possibly striped bass, sea-run brook trout and sea-run brown trout.
   a) For American eel, upstream passage facilities at Saccarappa Dam will be completed within two years of licensing and downstream passage measures[16] will be operational within 30 days of licensing.
   b) For anadromous species, upstream and downstream passage facilities at Saccarappa Dam will be completed two years after passage is available at Cumberland Mills Dam[17]. The upstream passage should be equipped with a trapping and sorting facility. Assuming full restoration to the North Gorham Dam the upstream facility ultimately should be capable of passing a maximum of approximately 58,000 American shad and 353,400 blueback herring.
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 3 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 3 is estimated to be 13,700 American shad; 83,500 blueback herring; 8,283 Atlantic salmon smolts; and 202 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Maintain year-round leakage flow (13 cfs) at Saccarappa Dam.

[16] On the basis of statewide eel harvest data, the fisheries agencies recommend an eight-week shutdown for eight hours each night. If the results of a three-year study conducted within the Presumpscot River indicate that the duration of the downstream migration is less than eight weeks on average, then the shutdown period can be reduced.

[17] Upstream and downstream passage for anadromous species will be completed concurrently. However, in the event that the fisheries agencies notify the project owner that a sustained annual stocking program of anadromous fish above a project has begun or will begin to occur within two years, the downstream passage at this project will be constructed within two years of the notification.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for Striped Bass, ASMFC's Interstate Fisheries Management Plan for American shad and river herring, and ASMFC's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for American shad, adult Atlantic salmon, smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, black crappie, and possibly striped bass, sea-run brook trout, and sea-run brown trout.

6) Establish a year-round fishery for stocked trout in the Mallison Falls tailrace and bypass, or in the event of dam removal, any suitable free flowing reaches.
   a) Management is contingent upon availability of adequate public access.
   b) Stock legal-size trout, which may include brook trout and brown trout.
   c) Promulgate supporting regulations.
   d) Establish suitable year-round minimum flows at Mallison Falls Dam.
   e) Maintain / enhance MDIFW access for stocking.

7) Manage the Little River for diadromous species and wild trout. Enhance recreational trout angling opportunities.
   a) Augment natural recruitment of a small population of wild brook trout by stocking legal-size trout to meet angler use and provide season-long (spring-fall) trout angling opportunities.

8) Manage Colley-Wright Brook for diadromous species and wild brook trout and brown trout. Provide a recreational fishery for brook trout and brown trout commensurate with the small size of this tributary and based on results of the MDIFW stocking study.
   a) Augment natural recruitment of wild brook trout by stocking legal-size trout to meet angler use and provide season-long (spring-fall) trout angling opportunities.

9) No recreational management for resident species is planned for Inkhorn Brook.

Reach 4. Mallison Falls Dam to Little Falls Dam

1) Manage Reach 4 as a migratory pathway for American eel, American shad, Atlantic salmon (smolts and adults), and blueback herring.
   a) For American eel, upstream passage facilities at Mallison Falls Dam will be operational within two years of licensing and downstream passage measures[3] will be operational within 30 days of licensing.
   b) For anadromous species, upstream and downstream passage facilities at Mallison Falls Dam[4] will be completed two years after 2,960 American shad or 18,020 blueback herring are passed in any single season at the passage facility at Saccarappa. This number represents 20% of the estimated production of these species for the reach from Saccarappa Dam to Little Falls Dam. Assuming full restoration to the North Gorham Dam the upstream facility ultimately should be capable of passing a maximum of approximately 44,300 American shad and 269,900 blueback herring.
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 4 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 4 is estimated to be 1,100 American shad; 6,600 blueback herring; and 17 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Seek year-round bypass flows of at least 63 cfs at Mallison Falls Dam.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for American shad and river herring, and ASMFC's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for American shad, adult Atlantic salmon, smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, and black crappie.

6) Establish a year-round recreational fishery for stocked trout in the Little Falls tailrace and bypass, or in the event of dam removal, any suitable free flowing reaches.
   a) Management is contingent upon availability of adequate public access
   b) Stock legal-size trout, which may include brook trout and brown trout.
   c) Promulgate supporting regulations.
   d) Establish suitable year-round minimum flows at Little Falls Dam.
   e) Improve MDIFW access for stocking.

Reach 5. Little Falls Dam to Gambo Dam, including Black Brook

1) Manage Reach 5 as a migratory pathway for American eel, American shad, Atlantic salmon (smolts and adults), and blueback herring.
   a) For American eel, upstream passage facilities at Little Falls Dam will be operational within two years of licensing and downstream passage measures[3] will be operational within 30 days of licensing.
   b) For anadromous species, upstream and downstream passage facilities at Little Falls Dam[4] will be completed two years after 2,960 American shad or 18,020 blueback herring are passed in any single season at the passage facility at Saccarappa. This number represents 20% of the estimated production of these species for the reach from Saccarappa Dam to Little Falls Dam. Assuming full restoration to the North Gorham Dam the upstream facility ultimately should be capable of passing a maximum of approximately 43,200 American shad and 263,300 blueback herring
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 5 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 5 is estimated to be 3,100 American shad; 19,000 blueback herring; and 15 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Maintain year-round leakage flow (26 cfs) at Little Falls Dam.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for American shad and river herring, and ASMFC's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for American shad, adult Atlantic salmon, smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, and black crappie.

6) Establish a year-round fishery for stocked trout in the Gambo tailrace and bypass, or in the event of dam removal any suitable free flowing reaches.
   a) Management is contingent upon availability of adequate public access.
   b) Stock legal-size trout, which may include brook trout and brown trout.
   c) Promulgate supporting regulations.
   d) Establish suitable year-round minimum flows at Gambo Dam.
   e) Improve MDIFW access for stocking.

7) Fisheries agencies will begin evaluation of Phase I of the restoration program when 100 American shad, blueback herring, or 15 Atlantic salmon are passed into Reach 5. A second phase of restoration for American shad and blueback herring will not begin unless agreed to by MDMR, MDIFW, and MASC.

8) No recreational management for resident species is planned for Black Brook.

Phase II
Reach 6. Gambo Dam to Dundee Dam, including the Pleasant River and Little Sebago Lake

1) Manage Reach 6 as a migratory pathway for American eel, Atlantic salmon (smolts and adults), and possibly American shad.
   a) For American eel, upstream passage facilities at Gambo Dam will be operational within two years of licensing and downstream passage measures[3] will be operational within 30 days of licensing.
   b) For anadromous species, upstream and downstream passage facilities at Gambo Dam[4] will be completed two years after 620 American shad or 3,800 blueback herring are passed in any single season at the passage facility at Little Falls if all agencies agree to Phase II. This number represents 20% of the estimated production of these species for the reach from Little Falls Dam to Gambo Dam. Assuming full restoration to the North Gorham Dam the upstream facility ultimately should be capable of passing a maximum of approximately 40,100 American shad and 244,300 blueback herring.
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 6 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 6 is estimated to be 20,100 American shad; 122,300 blueback herring; 3,078 Atlantic salmon smolts; and 75 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Seek year-round bypass flows of at least 40 cfs at Gambo Dam.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for American eel and possibly ASMFC's Interstate Fisheries Management Plan American shad and river herring.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries American eel.

5) Promote existing and potential recreational angling opportunities for smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, black crappie, adult Atlantic salmon, and possibly American shad.

6) Establish a year-round fishery for stocked trout in the Dundee tailrace and bypass, or in the event of dam removal, any suitable free flowing reaches.
   a) Management is contingent upon availability of adequate public access
   b) Stock legal-size trout, which may include brook trout and brown trout.
   c) Promulgate supporting regulations.
   d) Establish suitable year-round minimum flows at Dundee Dam.
   e) Improve MDIFW access for stocking.

7) Manage Pleasant River for diadromous species and wild trout. Enhance recreational trout angling opportunities.
   a) Augment natural recruitment of wild trout by stocking legal-size trout to meet angler use and provide season-long (spring-fall) trout angling opportunities.
   b) Continue to manage the reach between Route 302 and River Road as “catch-and-release”.

8) Manage Little Sebago Lake for existing resident species and American eel, maintain existing put-grow-take recreational fishery for brown trout , provide a quality recreational fishery for smallmouth bass and largemouth bass, and provide a recreational fishery for chain pickerel, yellow perch, white perch, and brown bullheads.
   a) Maintain existing annual stocking program, utilizing fall yearling brown trout to provide a put, grow, and take fishery consistent with habitat capabilities.

Reach 7. Dundee Dam to North Gorham Dam

1) Manage Reach 7 as a migratory pathway for American eel, Atlantic salmon (smolts and adults), and possibly American shad.
   a) For American eel, upstream passage facilities at Dundee Dam will be operational within two years of licensing and downstream passage measures[3] will be operational within 30 days of licensing.
   b) For anadromous species, upstream and downstream passage facilities at Dundee Dam[4] will be completed two years after 4,020 American shad or 24,460 blueback herring are passed in any single season at the passage facility at Gambo. This number represents 20% of the estimated production of these species for the reach from Gambo Dam to Dundee Dam. The upstream facility ultimately should be capable of passing a maximum of approximately 20,000 American shad and 122,000 blueback herring.
   c) Agencies will continue to consult with MDOT on fish passage through culverts.

2) Manage Reach 7 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 7 is estimated to be 20,000 American shad; 122,000 blueback herring; and 6 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Seek year-round bypass flows of at least 57cfs at Dundee Dam.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fisheries Management Plan for American eel and possibly ASMFC's Interstate Fisheries Management Plan American shad and river herring.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, black crappie, adult Atlantic salmon, and possibly American shad.

6) Establish a year-round fishery for stocked trout in the North Gorham tailrace and bypass, or in the event of dam removal, any suitable free flowing reaches.
   a) Stock legal-size trout, which may include brook trout and brown trout.
   b) Promulgate supporting regulations.
   c) Maintain suitable year-round minimum flows at North Gorham Dam.

Reach 8. North Gorham Dam to Eel Weir Dam, including canal and bypass

1) Manage Reach 8 (bypass) as a migratory pathway for American eel and Atlantic salmon (smolts and adults).
   a) Request upstream and downstream passage for American eel and Atlantic salmon using reopener clause in license.

2) Manage Reach 8 for sustained production of resident and diadromous species consistent with habitat capabilities. Annual production of diadromous species in Reach 8 is estimated to be 2,178 Atlantic salmon smolts; and 53 adult Atlantic salmon.
   a) Identify and map habitat (e.g. spawning, nursery) for selected species as funding is available.
   b) Monitor juvenile or adult abundances of selected species as funding is available.
   c) Seek year-round bypass flows at North Gorham Dam.

3) Manage species in accordance with the Atlantic States Marine Fisheries Commission's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in ASMFC management plans.

4) Promote existing and potential commercial fisheries for American eel.

5) Promote existing and potential recreational angling opportunities for smallmouth bass, largemouth bass, chain pickerel, yellow perch, white perch, brown bullheads, black crappie, and Atlantic salmon.

6) Continue to intensively manage the popular Eel Weir bypass reach for brook trout and landlocked salmon to provide a quality, year-round, high use recreational fishery for trout and salmon.
   a) Continued management is contingent upon availability of adequate public access. Stock legal-size landlocked salmon and brook trout of various sizes.
   b) Other species of trout may also be stocked, when available.
   c) Establish suitable year-round minimum flows at Eel Weir Dam.

Reach 9. Sebago Lake

1) Manage as a migratory pathway for American eel.
   a) For American eel, upstream passage facilities at Eel Weir Dam will be operational within two years of licensing and downstream passage measures will be operational within 30 days of licensing.

2) Manage for sustained production of resident species and American eel consistent with habitat capabilities.

3) Manage in accordance with the Atlantic States Marine Fisheries Commission's Interstate Fisheries Management Plan for American eel.
   a) Implement all regulations, assessment, and reporting requirements found in the ASMFC management plan.

4) Promote existing and potential commercial fisheries for American eel.

5) Provide a quality recreational fishery for an indigenous population of landlocked salmon and an introduced population of lake trout. Landlocked salmon are stocked annually to augment natural recruitment from the Crooked and Northwest rivers. The lake trout fishery is sustained entirely through recruitment from natural reproduction. The lake boasts a reputation for its world-class fishery, which is characterized by high angler use. The quality and condition of this fishery is critically dependant upon a healthy rainbow smelt forage base.
   a) Stock spring yearling landlocked salmon at a rate and frequency dictated by the availability and abundance of rainbow smelt.
   b) Implement measures to restore the rainbow smelt population.
   c) Promulgate supporting regulations.

6) Provide a quality warmwater fishery for smallmouth and largemouth bass, as well as secondary fisheries for cusk, white perch, lake whitefish, chain pickerel, brown bullhead, and black crappie.

Identification of Issues and Recommendations

The MDIFW is concerned that proposed stocking, possible natural reproduction, and/or sport fishery prohibition for sea-run Atlantic salmon may adversely impact current or proposed resident coldwater fishery management programs. Angling regulations for Atlantic salmon could unnecessarily impact popular, well-established resident fisheries by complicating species identification or forcing closure of certain stretches of the mainstem Presumpscot River or tributaries to protect sea-run Atlantic salmon. MDIFW is also concerned that sea-run Atlantic salmon could compete with resident coldwater fisheries for limited forage and seasonal habitat, reducing the effectiveness of MDIFW stocking programs designed to enhance trout angling opportunities.

In addition, the MDIFW has identified Forest Lake as a potential site of an alewife-coldwater fishery interaction concern, however, MDIFW does not object to the introduction of alewives into Forest Lake. A lack of suitable public boating access to the lake currently precludes MDIFW from stocking and managing for cold water sportfish. A coldwater fishery program could be initiated once public boating access is provided to the lake. If a program is initiated, MDIFW may request that MDMR reduce the alewife-stocking rate if it is determined that an abundance of sea-run alewives is adversely impacting resident sportfish forage populations.

The MASC is concerned about by-catch mortalities of sea-run Atlantic salmon in areas where MDIFW stocks large catchable-size salmonids. Potential negative interspecific interactions could occur where there are wild and/or stocked resident salmonids co-habiting with sea-run Atlantic salmon. The MASC is especially concerned with releases of non-endemic salmonids (e.g. brown trout and rainbow trout) as these species could negatively impact natural production of sea-run Atlantic salmon by competing for prey items and living space. Additionally, larger non-endemic salmonids could prey upon juvenile sea-run Atlantic salmon reducing populations of sea-run Atlantic salmon and compromising long-term survival to the smolt life stage.

The three agencies also considered potential impacts of non-native or undesirable species, such as gizzard shad and lampreys, if access is provided to upstream reaches of the Presumpscot River. The level of concern associated with this issue does not preclude the attainment of management goals identified in this document. The potential for negative interactions between resident fish and some non-native or undesirable species could occur in the following areas within the Presumpscot River drainage: Highland Lake, Forest Lake, Gambo impoundment, Dundee impoundment, North Gorham Pond, and Sebago Lake. Except for Sebago Lake, North Gorham Pond, and Dundee Pond, MDIFW concerns in the aforementioned areas can be addressed by adopting reasonable safeguards to minimize the opportunity for the introduction of undesirable species when addressing passage needs for migratory species identified in this document. MDIFW does not support upstream passage into Sebago Lake (except for American eels), and has additional concerns regarding passage into North Gorham and Dundee ponds.

Notwithstanding the aforementioned management concerns, there is agreement between the MDIFW, the MASC, and the MDMR that management issues will be resolved for the mutual benefit of all programs. The agencies agree to meet at least annually to review progress and foster continued interagency cooperation.

Table 1. Location and description of dams on the Presumpscot River.

Dam	Miles from Casco Bay	Description
Eel Weir Dam	26.0	FERC Project No 2984
North Gorham Dam	23.65	FERC Project No 2519
Dundee Dam	21.87	FERC Project No 2942
Gambo Dam	18.63	FERC Project No 2931
Little Falls Dam	16.92	FERC Project No 2941
Mallison Falls Dam	16.37	FERC Project No 2932
Saccarappa Dam	10.8	FERC Project No 2897
Cumberland Mills Dam	9.6	Non-jurisdictional (non-hydropower)
Smelt Hill Dam	2.5	Inactive project at head-of-tide

Table 2. Order-of-magnitude estimates of fish production by river reach, which includes production in tributaries and lakes/ponds.

Reach	Shad 98.9/acre	Blueback herring 600/acre	Alewife 235/acre	Salmon smolts	Salmon Adults[a]
8. North Gorham to Eel Weir				2,178	53 (5)
7. Dundee to North Gorham	20,000	122,000			(6)
6. Gambo to Dundee	20,100	122,300		3,078	75 (14)
5. Little Falls to Gambo	3,100	19,000			(15)
4. Mallison Falls to Little Falls	1,100	6,600			(17)
3. Saccarappa to Mallison Falls	13,700	83,500		8,283	202 (39)
2. Cumberland Mills to Saccarappa	3,100	18,800			(42)
1. Smelt Hill to Cumberland Mills	12,800	78,000	147,700[b]	2,310	56 (52)

[a] These numbers represent the spawning requirement, that is, the number of returning adult salmon needed to maintain the run; the number in parentheses is an estimate of the sport catch of salmon.

[b] If alewives are able to reach Knight's Pond and Forest Lake, the total run size might approach 200,000 adult spawners.

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit F

STATE OF MAINE
DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

IN THE MATTER OF

CUMBERLAND MILLS DAM	)
FISHWAY PROCEEDING	)
	)
	)

PRE-FILED TESTIMONY OF GAIL WIPPELHAUSER
MARINE RESOURCES SCIENTIST III
MAINE DEPARTMENT MARINE RESOURCES

November 6, 2008

My name is Gail Wippelhauser. I have a Ph. D. in Zoology from the University of Maine, where I specialized in the ecology and biology of migratory fishes. I serve as a diadromous fisheries scientist and fisheries manager at the Maine Department of Marine Resources (DMR), a position I have held for 12 years. I am responsible for representing DMR during the federal relicensing of hydropower projects located in Maine, directing research activities, and developing management programs related to diadromous fishes throughout the State.

My experience with the Presumpscot River is extensive. I participated in all aspects of the Federal Energy Regulatory Commission (FERC) relicensing process for S.D. Warren's hydropower projects on the Presumpscot River, including site visits, comments on need for fish passage, consultation on the design of fish passage, and consultation and review of fish passage studies and study reports for eel passage. I was the lead person for DMR in the Maine Department of Environmental Protection (DEP) water quality certification proceedings. I co-authored the Draft Fisheries Management Plan for the Presumpscot River Drainage. I consulted

with Normandeau Associates and Dr. Chris Yoder on study design and methods that were used to sample for the presence of diadromous species in the river below Cumberland Mills Dam (Cumberland Mills). I have consulted with the Maine Department of Transportation on fish passage at road crossings on Mill Brook, and supervised a DMR project to assess fish passage into Highland Lake.

The purpose of my testimony is to (1) review the historical presence of migratory fish in the Presumpscot River, (2) review the current presence of alewife, blueback herring, and shad, and habitat for these species, below and above Cumberland Mills, (3) explore the potential for restoring substantial numbers of alewife, blueback herring, and shad to the river, resulting in substantial commercial or recreational fisheries for these species above Cumberland Mills, (4) explore the potential to enlarge the population of already present species, American eel and striped bass, in the river, and (5) describe the potential to improve the prospects for restoring Atlantic salmon to the watershed.

DMR believes that the Presumpscot River has tremendous potential for migratory fish restoration and supports the construction of fish passage at each of the two spillways at Cumberland Mills, the lowermost barrier in the Presumpscot River. (See EXHIBIT DEP-1). The provision of fish passage at Cumberland Mills will automatically trigger fish passage at the next upstream barrier, the FERC-licensed Saccarappa Project dam (Saccarappa). (EXHIBIT DEP-10). These two actions – fishways at Cumberland Mills and the then-automatic construction of a fishway at Saccarappa Dam – will, over time, result in the substantial restoration of alewife, blueback herring, and American shad to the Cumberland Mills and Saccarappa impoundments, and will result in substantial commercial and/or recreational fisheries for these species. The numbers of

alewife, blueback herring and shad that will be restored in these impoundments will greatly increase their population in the southern Maine region. The provision of fish passage at Cumberland Mills also will increase existing runs of American eel and striped bass, and associated commercial and recreational fisheries, in the watershed. Fish passage at Cumberland Mills will also have the additional benefit of improving the prospects for restoring Atlantic salmon to the watershed. In addition to Cumberland Mills and Saccarappa, passage at the four FERC-licensed hydropower projects upstream of Saccarappa, which is triggered in part by specific numbers of returning migratory fish (EXHIBITS DEP-11-14), will provide access to additional habitat and result in even larger runs of all migratory fishes.

Historical Fisheries

Diadromous (anadromous and catadromous[1]) fishes historically inhabited the Presumpscot River, but have been adversely impacted by the presence of impassable dams on the river for over 250 years. The history of dam construction on the river and its impacts have been described by DMR, DEP and FERC (EXHIBITS DEP-4, 6-9), and American Rivers and Friends of the Presumpscot River in their October 2006 filing with the Commissioner of Inland Fisheries and Wildlife, but several important points are:

- Prior to the 1600s, the Aucoscisco Indians utilized the abundant salmon, shad, and alewives for food and fertilizer.
- Chief Polin of the Rockomeecook Tribe objected to construction of a dam at Saccarappa Falls in 1739 (first documented dam), because it interfered with the ascent of sea-run salmon to Sebago Lake, and walked to Boston to confer with the Governor. The

[1] Diadromous is a collective term that refers to fish species that migrate between the ocean and fresh water at least once during their lifetime. Anadromous fishes spend most of their life in the ocean, but spawn in fresh water. Catadromous fishes spend most of their life in brackish or fresh water, but spawn in the ocean.

Governor and subsequently the court (1741 act) required the provision of fish passage at all dams on the Presumpscot River.

- When a head-of-tide dam was constructed without a fishway in 1802 the runs of alewives and shad were greatly reduced and the sea-run salmon nearly extirpated, because they were prevented from reaching their primary spawning areas.
- When Maine's Commissioners of Fisheries issued their first report in 1867, the head-of-tide dam had been broken down for 15 years, Cumberland Mills Dam was impassable, and seven other dams without fishways (at six sites) crossed the river. The Commissioners embarked on a statewide program of fishway construction, and by 1887 all the dams on the Presumpscot River had been provided with fishways. Over the next decade, these fishways fell into disrepair or were destroyed by high water and not replaced, and runs of anadromous fish were not reported in the Presumpscot River after 1900.

Alewife and Blueback Herring

Alewife and blueback herring are anadromous, highly migratory, schooling, coastal pelagic fishes that are difficult to distinguish by visual inspection (small differences in eye diameter and body depth). Because adults of these two species are so similar in appearance, can co-occur in portions of their range and are often harvested together without being distinguished by fishermen, they are collectively termed "river herring." Alewife and blueback herring are managed as "river herring" by the Atlantic States Marine Fisheries Commission. Where the two species co-occur, they differ in the timing of peak spawning and the habitat used for spawning.

A small run of alewife currently exists in the Presumpscot River. Prior to the 1996 flood, approximately 27,000 river herring (records did not distinguish the species) were passed upstream at the Smelt Hill Dam in 1994 and 1995. (EXHIBIT DMR-1). After the fishlift became inoperable, alewife were stocked into Highland Lake in 1997 and 1998 by the owners of Smelt Hill dam and in 2000 and 2001 by DMR, and the Smelt Hill Project gates were left open to allow passage of anadromous fish beginning in 1999.

The year after Smelt Hill Dam was removed a boat electrofishing survey was conducted by Normandeau Associates (EXHIBIT DMR-2) to determine the presence/absence of diadromous fishes in the river below Cumberland Mills. A small number of alewife were found between Cumberland Mills and the mouth of Mill Brook, a tributary that enters the Presumpscot 2.2 miles downstream of Cumberland Mills. A more intensive boat electrofishing survey was conducted in the fall of 2006/spring 2007 to assess the fish assemblages in the Presumpscot River. (EXHIBITS DMR-3-4). Small numbers of alewife were found in the river between Cumberland Mills and the mouth of Mill Brook. In 2004, DMR trapped 7,569 pre-spawn alewives at the top of the Highland Lake fishway. (EXHIBIT DMR-1).

DMR has not collected data specific to blueback herring in the lower Presumpscot River. However, this species is found in the nearby Kennebec River (EXHIBIT DMR-5), and my understanding is that blueback herring have been seen below Cumberland Mills by recreational fishermen. Based on their historical presence in the Presumpscot, and the occurrence and growth of blueback herring populations in other Maine coastal rivers, I believe it is entirely likely that blueback herring are already in the lower Presumpscot watershed.

There are no natural impediments to prevent alewife or blueback herring from reaching the Cumberland Mills Dam. DMR is aware of adult alewife currently migrating as far as Cumberland Mills (EXHIBITS DMR-2-3) and into Highland Lake via Mill Brook. Blueback herring have not been collected by DMR below Cumberland Mills, but there is no scientific reason why they cannot also ascend the river as easily as alewife.

There is documented evidence of Denil fishways passing adult alewives (South Berwick Project on the Salmon Falls River, Cataract Project West Channel on the Saco River, and Woodlands and Grand Falls Dams on the St. Croix River). I am not aware of data on the use of Denil fishways by blueback herring in Maine, but Benedetto Rizzo of the U.S. Fish and Wildlife Service (USFWS) has testified that blueback herring use Denil fishways in other states.

Habitat above Cumberland Mills is suitable for the production of alewife and blueback herring. Both species releases gametes into the water column, and eggs and larvae are pelagic to semi-demersal. Neither species depends on substrate for spawning habitat. DEP water quality standards ensure that dissolved oxygen levels are sufficient to maintain both adults and juveniles. Alewife would spawn in parts of the impoundment where water currents were slow, while blueback herring would spawn in tributaries or the upper section of impoundments where water currents are swifter.

If fish passage is provided at Cumberland Mills, the actual harvestable surplus above Cumberland Mills will be a mix of alewife and blueback herring. When DMR developed its *Draft Fisheries Management Plan for the Presumpscot River Drainage* (EXHIBIT DMR-6) and letter to the USFWS (EXHIBIT DMR-7), it was advocating for the removal of Saccarappa,

Mallison Falls, and Little Falls dams. Removal of these three dams would have converted impounded habitat to riverine habitat, which would have favored the production of blueback herring rather than alewife. Accordingly, DMR believed that the river should be managed to encourage all alewife production downstream of Cumberland Mills in Highland Lake, and that only blueback herring production should be encouraged in the river and tributaries above Cumberland Mills. FERC staff, in the FEIS, looked only at the "existing, primarily impoundment habitat" upstream of Cumberland Mills, and concluded that because alewife readily utilizes ponded habitat, and blueback herring prefers faster current, the habitat above Cumberland Mills might favor the production of alewife rather than blueback herring. (EXHIBIT DEP-4, page 106). In fact, because the dams were not removed, the current upstream habitat contains both slow moving water and faster current. While it is unknown whether more alewife or more blueback herring will use the habitat above Cumberland Mills, DMR and FERC agree that both alewives and blueback herring will likely pass upstream if fish passage is provided at Cumberland Mills, and that the available upstream habitat will be used by both species.

For the purposes of this proceeding, and to develop a very conservative estimate of harvestable fish, I will first calculate production estimates for alewife only, and then for blueback herring only. The production estimates for river herring (alewife and blueback herring) will then be stated as a range between the two numbers. Habitat area in the tables below was determined by DMR using the State's GIS layers (EXHIBITS DMR-2).

ALEWIFE ONLY ESTIMATES Habitat description	Dam passage	Habitat (acres)	Alewife production	Alewife escapement	Escapement with dams	Harvestable surplus
Dundee to North Gorham	0.90	204	47,930	7,138	7,848	40,081
Pleasant River		83	19,608	2,920	2,920	16,688
Gambo to Dundee	0.90	120	28,266	4,210	4,628	23,637
Little Falls to Gambo	0.90	32	7,426	1,106	1,216	6,210
Mallison Falls to Little Falls	0.90	11	2,569	383	497	2,072
Little River		39	9,117	1,358	1,588	7,529
Saccarappa to Mallison Falls	0.90	100	23,563	3,509	4,105	19,458
Cumberland Mills to Saccarappa	0.95	31	7,345	1,094	1,151	6,193
Piscataqua River		23				
Highland Lake		629	147,745	22,005	22,005	125,741
Smelt Hill to Cumberland		107				
Subtotal below Cumberland Mills		**759**	**147,745**	**22,005**	**22,005**	**125,741**
Subtotal Cumberland Mills+Saccarappa impoundments		**170**	**40,025**	**5,961**	**6,844**	**33,180**
Subtotal 6 impoundments above Cumberland Mills		**621**	**145,823**	**21,718**	**23,955**	**121,868**

I have estimated that 40,025 alewife can be produced by habitat in the Cumberland Mills and Saccarappa impoundments and 145,823 by habitat in the Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo, and Dundee impoundments.[2] As described in the *Draft Fisheries Management Plan for the Presumpscot River Drainage*, alewife runs can be sustained when just 15% of fish produced (or 35 fish per acre) are able to spawn.[3] When spawning escapement is corrected for passage efficiency,[4] approximately 33,180 alewife produced by Cumberland Mills and Saccarappa impoundment habitat or 121,868 alewife produced by habitat in all six impoundments could be harvested.[5]

[2] Production = Habitat (acres) * 235 alewife per acre.

[3] In other words, the run of 40,025 alewife produced by the Cumberland Mills and Saccarappa impoundments can be sustained by 5,961 spawning alewife , and the run of 145,823 alewife produced by all six impoundments can be sustained by 21,718 spawning alewife if there were no dams on the river. Escapement = Habitat (acres) * 35 fish per acre.

[4] Escapement with dams = Escapement divided by passage efficiency at each dam that must be passed to reach spawning habitat. For example, alewife that spawn in the Saccarappa impoundment must pass Cumberland Mills Dam (95% efficient) and Saccarappa Dam (90% efficient). Passage efficiencies are those used by FERC staff. (EXHIBIT DEP-4, page 107).

[5] Harvestable surplus = Alewife production – escapement with dams.

BLUEBACK HERRING ONLY ESTIMATES Habitat description	Dam passage	Habitat (acres)	Blueback herring production	Blueback herring escapement	Escapement with dams	Harvestable surplus
Dundee to North Gorham	0.90	204	122,373	18,356	20,182	102,192
Pleasant River		83	50,063	7,509	7,509	42,554
Gambo to Dundee	0.90	120	72,167	10,825	11,902	60,266
Little Falls to Gambo	0.90	32	18,960	2,844	3,127	15,833
Mallison Falls to Little Falls	0.90	11	6,560	984	1,279	5,281
Little River		39	23,277	3,492	4,084	19,193
Saccarappa to Mallison Falls	0.90	100	60,161	9,024	10,555	49,606
Cumberland Mills to Saccarappa	0.95	31	18,753	2,813	2,961	15,792
Piscataqua River		23				
Highland Lake		629	377,222	56,583	56,583	320,639
Smelt Hill to Cumberland		107				
Subtotal below Cumberland Mills		**759**	**377,222**	**56,583**	**56,583**	**320,639**
Subtotal Cumberland Mills+Saccarappa impoundments		**170**	**102,191**	**15,329**	**17,599**	**84,591**
Subtotal 6 impoundments above Cumberland Mills		**621**	**372,314**	**55,847**	**61,598**	**310,716**

I have estimated that 102,191 blueback herring can be produced by habitat in the Cumberland Mills and Saccarappa impoundments and 372,314 by habitat in the Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo, and Dundee impoundments.[6] Using the same 15% spawning escapement figure,[7] and correcting for passage efficiency,[8] approximately 84,591 blueback herring produced by Cumberland Mills and Saccarappa impoundment habitat or 310,716 blueback herring produced by habitat in all six impoundments could be harvested.[9]

Because we know the actual harvestable surplus above Cumberland Mills will be a mix of alewife and blueback herring, we can state the potential production as a range between the lower alewife number and the higher blueback herring number. The harvestable surplus of river

[6] Production = Habitat (acres) * 600 blueback herring per acre.

[7] Escapement = Habitat (acres) * 35 fish per acre.

[8] Escapement with dams = Escapement divided by passage efficiency at each dam that must be passed to reach spawning habitat. For example, blueback herring that spawn in the Saccarappa impoundment must pass Cumberland Mills Dam (95% efficient) and Saccarappa Dam (90% efficient). Passage efficiencies are those used by FERC staff. (EXHIBIT DEP-4, page 107).

[9] Harvestable surplus = Blueback herring production – escapement with dams.

herring (alewife and blueback herring) that will be produced by the Cumberland Mills and Saccarappa impoundment habitat is between 33,180 and 84,591 fish. The harvestable surplus of river herring (alewife and blueback herring) that will be produced by the habitat in the six impoundments above Cumberland Mills is between 121,868 and 310,716 fish. The actual number will be somewhere in the middle of the range since the upstream habitat contains both slow and fast moving water and will thus attract both alewife and blueback herring.

In Maine, river herring are commercially harvested primarily for use as lobster bait, although a small niche market exists for smoked alewife for human consumption. A potential river herring harvest of 33,180 to 84,591 fish in the Cumberland Mills and Saccarappa impoundments, or 121,868 to 310,716 fish in the six impoundments above Cumberland Mills, is substantial whether compared to current conditions in the Presumpscot River or to current or potential conditions in other southern Maine rivers. In the Presumpscot River, there currently is a complete lack of alewife or blueback herring production above Cumberland Mills, because there is no fish passage. In other southern Maine rivers (Piscataquis/Salmon Falls, Mousam, Kennebunk, and Saco), there are small runs of river herring, none of which have supported a commercial harvest in at least 25 years. In southern Maine, only the Saco River has sufficient habitat to support a larger run than the Presumpscot River. By any measure, a run of 40,025 alewife in the Cumberland Mills and Saccarappa impoundments, or 145,823 alewife in the six impoundments, is significant for southern Maine.

American Shad

American shad are an anadromous, highly migratory, schooling, coastal pelagic fish that spawn in rivers. They are related to alewife and blueback herring, but adult shad are easily distinguished by their larger size.

A small run of American shad currently exists in the Presumpscot River. Prior to the 1996 flood, one shad was passed upstream at the Smelt Hill Dam in 1994, and 35 were passed in 1995. (EXHIBIT DMR-1). The Smelt Hill Dam gates were left open to allow passage of anadromous fish beginning in 1999, and this remnant shad population was able to migrate upstream. The year after Smelt Hill Dam was removed a boat electrofishing survey was conducted by Normandeau Associates to determine the presence/absence of anadromous fishes in the river below Cumberland Mills. (EXHIBIT DMR-2). A total of 10 American shad were captured in the river above Smelt Hill Dam. A more intensive boat electrofishing survey was conducted in the fall of 2006/spring 2007 to assess the fish assemblages in the Presumpscot River. (EXHIBIT DMR-3). Adult shad were captured in the spring while adults and juveniles were captured in the fall. I understand that shad have been seen and caught in the lower Presumpscot River by recreational fishermen.

There are no natural impediments to prevent shad from reaching the Cumberland Mills Dam. Adults currently migrate as far as the Cumberland Mills Dam on the mainstem Presumpscot River. (EXHIBITS DMR-2-3).

In Maine, adult shad have been documented using this type of fishway at the Cataract Project West Channel on the Saco River and at the first (nonhydropower) dam on the Narraguagus

River. Benedetto Rizzo of the USFWS has testified that American shad use Denil fishways that are located outside of Maine.

The habitat above Cumberland Mills Dam is capable of supporting a substantial run of American shad and a substantial recreational fishery for them. In the *Draft Fisheries Management Plan for the Presumpscot River Drainage,* DMR originally estimated that habitat in the Cumberland Mills and Saccarappa impoundments could produce approximately 16,800 adults, and habitat in all six impoundments (Cumberland Mills, Saccarappa, Mallison Falls, Little Falls, Gambo, and Dundee could produce 61,100 adults.[10] FERC staff (EXHIBIT DEP-4, pages 106-108) made three calculations of total shad production for the drainage using a range of values, and accounting for passage efficiency.[11] The FERC figures were somewhat lower due to the use of passage efficiency.

For the purposes of this proceeding and to be conservative, I have modified DMR's estimates using efficiency values adopted by FERC, and have included a low and high range for each impoundment using FERC's values. When passage efficiency is considered, the Cumberland Mills and Saccarappa impoundments can produce a run of 14,681 shad (3,715-21,100 per FERC) and all six impoundments can produce a run of 41,523 (10,507-60,025 per FERC).

[10] Assuming 98.8 shad per acre, results rounded to nearest 100.

[11] Values were 98.9 shad per acre (DMR), 25 shad per acre (FERC low), and 142 shad per acre (FERC high). FERC staff stated that DMR did not consider passage efficiency. (EXHIBIT DEP-4, page 106).

SHAD ESTIMATES Habitat description	Dam passage	Habitat (acres)	Shad production	Production with dams	FERC low with dams	FERC high with dams
Dundee to North Gorham	0.90	204	20,151	11,304	2,860	16,247
Pleasant River		83	8,244	5,138	1,300	7,385
Gambo to Dundee	0.90	120	11,884	7,407	1,874	10,646
Little Falls to Gambo	0.90	32	3,122	2,162	547	3,453
Mallison Falls to Little Falls	0.90	11	1,080	831	210	1,195
Little River		39	3,833	3,277	829	4,710
Saccarappa to Mallison Falls	0.90	100	9,906	8,470	2,143	12,174
Cumberland Mills to Saccarappa	0.95	31	3,088	2,934	742	4,216
Piscataqua River		23	2,310	2,310	585	3,320
Highland Lake		629				
Smelt Hill to Cumberland		107	10,541	10,541	2,667	15,150
Subtotal below Cumberland Mills		**759**	**12,851**	**12,851**	**3,252**	**18,471**
Subtotal Cumberland Mills+Saccarappa impoundments		**170**	**16,827**	**14,681**	**3,715**	**21,100**
Subtotal 6 impoundments above Cumberland Mills		**621**	**61,308**	**41,523**	**10,507**	**60,025**

A run of 14,681 to 41,523 adult shad would be a substantial number of fish in the river, and would support a substantially increased recreational fishery whether compared to current conditions in the Presumpscot River or to current or potential conditions in other southern Maine rivers. Currently there is a complete lack of American shad production above Cumberland Mills, because of a lack of fish passage. There exist small runs of American shad in the Piscataquis/Salmon Falls and Mousam Rivers, and a substantial run of shad in the Saco River, all of which support popular local recreational fisheries. The number of shad in the Piscataquis and Mousam rivers is not known, but the recreational fishery in the Saco is supported by an annual run that has ranged from 399-4994 adult American shad annually. In southern Maine, only the Saco River has sufficient habitat to support a larger run than the Presumpscot River. A run of 14,681 shad in the Cumberland Mills and Saccarappa impoundments, or 41,523 shad in the six impoundments, is significant for southern Maine.

American Eel

American eel, the only catadromous species, currently inhabit the entire Presumpscot River (EXHIBIT DEP-4); however, DMR believes that eel passage at Cumberland Mills will enlarge

the population. Habitat above Cumberland Mills is suitable growth habitat for American eel. DEP water quality standards ensure that dissolved oxygen levels will remain sufficient to maintain the species.

The size of the American eel population is unknown, but eels were commercially harvested by weir in the 1990s at the outlet of Sebago Lake. The weir fishery has been closed, but eels could be harvested by pot in the impoundments.

Striped Bass

Anadromous striped bass are already present in the Presumpscot River. DMR does not believe that striped bass will migrate past Cumberland Mills, and even small (schoolie) striped bass may not swim as far as Cumberland Mills. However, a larger run of river herring will attract and hold more striped bass at the mouth of the Presumpscot River, where they can be targeted by recreational fishermen. The recent boat electrofishing survey (EXHIBIT DMR-3) indicates that the small existing runs of river herring attract striped bass to the mouth of the river.

Atlantic Salmon

Atlantic salmon are an anadromous, highly migratory, schooling, pelagic fish that spawn in rivers.

Habitat above Cumberland Mills is suitable for the production of Atlantic salmon. There is appropriate substrate in portions of the river for the construction of redds, the rearing of juvenile salmon, and the production of smolts and DEP water quality standards ensure that dissolved oxygen levels are sufficient to maintain both adults and juveniles.

The habitat above Cumberland Mills is capable of supporting a moderate run of Atlantic salmon and a moderate recreational fishery for them. DMR estimated that lotic habitat above the Cumberland Mills and Saccarappa impoundments requires a minimum spawning escapement of 202 adult returns (EXHIBIT DMR-6), and all habitat above Cumberland Mills requires a minimum of 330 returns. DMR estimated Atlantic salmon returns between Cumberland Mills and Mallison Falls would be between 71 and 212 salmon and for the entire Presumpscot would be between 124 and 620 Atlantic salmon. FERC staff, using a different at-sea mortality figure, estimated a run of 35 to 106 salmon between Cumberland Mills and Mallison Falls and 62 to 186 salmon for the entire drainage.

Even using FERC's lower numbers, a run of 35 to 106 adult salmon would be a moderate number of fish in the river, and would support a small recreational fishery whether compared to current conditions in the Presumpscot River or to current or potential conditions in other southern Maine rivers. Atlantic salmon are considered to be extirpated in Maine waters south of the Kennebec and Androscoggin rivers.

Recolonization of Atlantic salmon in the Presumpscot would require adult straying from Maine rivers with extant runs or an active stocking program.

Conclusion

Full restoration of migratory fish on the Presumpscot River may take up to 50 years, consistent with restoration planning on other rivers. Existing remnant populations of adult spawners are small, generation times are 4-5 years, natural rates of expansion are variable depending on the species, and the provision of fish passage at barriers is often a slow process. However, these

species once inhabited nearly every coastal watershed in Maine and supported important fisheries.

It is my expert opinion that the construction of fish passage at each of the two spillways at Cumberland Mills will restore substantial numbers of alewife, blueback herring, and American shad to the Cumberland Mills and Saccarappa impoundments, and will result in substantial commercial and/or recreational fisheries for these species. If fish passage is installed upstream of Saccarappa, the resulting numbers of alewife, blueback herring and shad will be even greater. The provision of fish passage at Cumberland Mills also will enlarge existing runs of American eel and striped bass, and associated commercial and recreational fisheries, in the watershed. Fish passage at Cumberland Mills will have the additional benefit of improving the prospects for restoring Atlantic salmon to the watershed.

Dated: 11/06/08

Gail Wippelhauser

Gail Wippelhauser
Marine Resources Scientist III
Maine Department of Marine Resources

STATE OF MAINE
COUNTY OF KENNEBEC

Personally appeared before me the above-named Gail Wippelhauser and made oath that the foregoing is true and accurate to the best of her knowledge and belief.

Dated: 11/10/08

Kathleen Bros

Kathleen Brosnan
Print name
Notary Public
My Commission Expires:

KATHLEEN BROSNAN
Notary Public
Maine
My Commission Expires Feb 8, 2014

LIST OF EXHIBITS SUBMITTED WITH PRE-FILED TESTIMONY OF GAIL WIPPELHAUSER

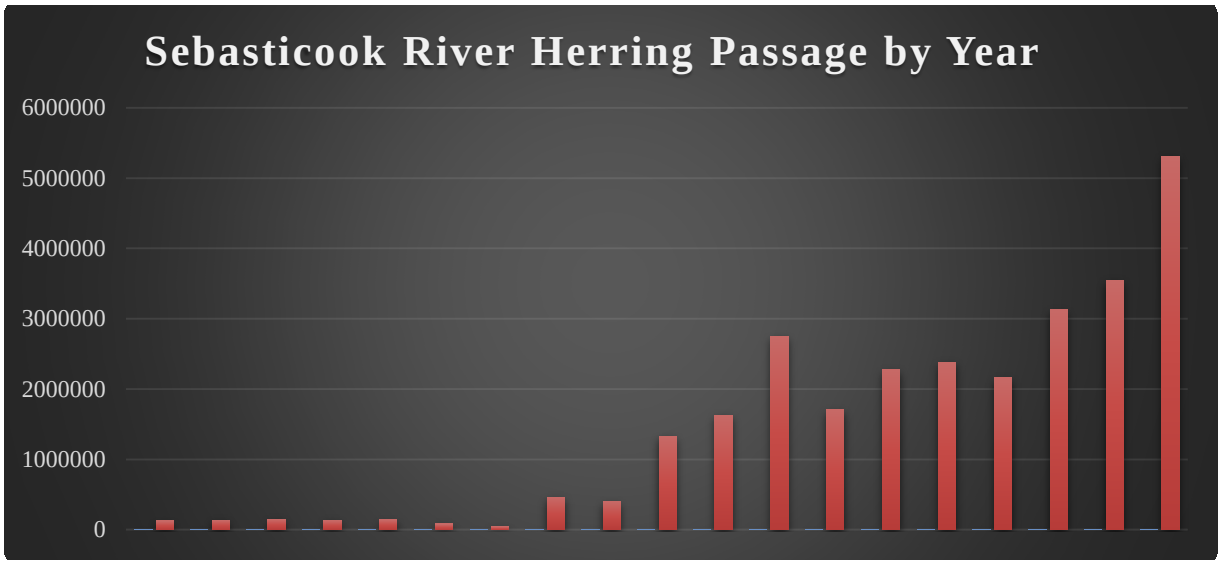
Exhibit No.	Description
DMR-1	Annual Anadromous Fish Passage Report – Reporting Year 2004, July 25, 2005, prepared by S.D. Warren Company.
DMR-2	Diadromous Fish Survey of the Presumpscot River, February 2004, prepared by Normandeau Associates.
DMR-3	Final Presumpscot River Fish Species Results 2006 and 2007, prepared by Chris Yoder, Midwest Biodiversity Institute/Center for Applied Bioassessment and Biocriteria.
DMR-4	2005 Maine Rivers Fish Assessment: I. Northern Maine Rivers Results. II. Maine Rivers Fish Species Distribution Atlas. III. Toward the Development of a Fish Assemblage Index for Maine Rivers, Chris O. Yoder, Brandon H. Kulick, Bryan J. Apell, and John M. Audet, pages 1-8 of 124 page document.
DMR-5	Striped Bass and American Shad Restoration and Monitoring, Project #F-41-R-13 Annual Report, January 1, 2007 to December 31, 2007, Job I-2, prepared by Gail Wippelhauser.
DMR-6	Draft Fisheries Management Plan for the Presumpscot River Drainage, December 2001, prepared by the Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and Maine Atlantic Salmon Commission.
DMR-7	Letter from Gail Wippelhauser, Maine Department of Marine Resources, to Gordon Russell, U.S. Fish and Wildlife Service, dated January 9, 2002.

Friends of Merrymeeting Bay and
Friends of Sebago Lake
Comment on MDEP Department Draft Order

#L-19713-33-N-M
#L-19714-33-G-M
#L-1915-33-G-M
#L-19716-33-G-M
#L-19717-3D-M-N

Exhibit G

year	number river herring passed Benton
2000	126164
2001	138156
2002	152440
2003	132116
2004	144232
2005	81849
2006	47192
2007	463390
2008	401259
2009	1328311
2010	1628739
2011	2752123
2012	1703820
2013	2272492
2014	2378906
2015	2158769
2016	3128753
2017	3547091
2018	5310333



2000-2018. Note major increase with Ft. Halifax removal in 2009

Benton Falls						**Webber**
year	number passed		Alewife	blueback	% BBH	
2000	126,164					
2001	138,156					
2002	152,440					
2003	132,116					
2004	144,232					
2005	81,849					
2006	47,192		40585.12	6606.88	13	18,589
2007	463,390		462370.5	1019.458	2	92,852
2008	401,259		385208.6	16050.36	3	85,022
2009	1,328,311	Ft. Halifax Gone	1,287,636	40,279	3	129,247
2010	1,628,739		1,202,444	424,428	26	83,905
2011	2,752,123		2,091,119	660,354	23	143,463
2012	1,703,820		1,497,926	205,594	12	275,175
2013	2,272,492		1,931,222	304,805	13	119,125
2014	2,378,906		1,795,369	583,537	24	360,090
2015	2,158,769		1,735,102	422,881	19	366,330
2016	3,128,753		2,140,349	988,404	31	352,770
2017	3,547,091		2,338,880	1,208,211	34	335,590
2018	5,579,901		3905931	1673970		461,184

Biosamples not yet run for Benton 2018. I took the liberty of assuming a 30% BBH component. Left it in red.

	ALEWIFE REVENUE/ EXPENDITURES 2011					**ALEWIVES REVENUE/EXPENDITURES**			
			Bushels		***Amount***	**ed at April 23, 2009 Spe**			
	TOTALS FOR 2011		**3053**		**16,348.20**				
			Net after Expenses:		**16,180.26**	d Survey - Broken Stone		05/01/09	**-$750.00**
Receipt	***Rcpt Date***	***Date***	***Bushels***	***Amount***	***.33xAmt***	nton Ave. Property Acqu		07/27/09	**-$6,500.00**
106937	5/13/11	5/11/2011	102	$2,040.00	**673.20**	Len Poulin Bid -		***Var***	**-$10,980.00**
						Attorney Fees (Marden, Dubord		08/31/09	**-$414.80**
106939	5/20/11	5/15/2011	234	$4,680.00		Re-stake sideline, Broken Sto		09/04/09	**-$315.00**
		5/16/2011	102	$2,040.00		***Total Initial Expenditures:***			**-$18,959.80**
		5/17/2011	117	$2,340.00					
		5/18/2011	66	$1,320.00		ALEWIFE REVE		2009	
		5/19/2011	123	$2,460.00				2010	
				$12,840.00	**4,237.20**			2011	
106943	5/26/11	5/20/2011	198	$3,960.00				2012	
		5/21/2011	90	$1,800.00				2013	
		5/22/2011	300	$6,000.00				07/06/05	
		5/23/2011	198	$3,960.00		Total Alewife Payments:			
		5/24/2011	147	$2,940.00		***Expenditures***			
		5/25/2011	225	$4,500.00		AAA - Portable t		06/22/09	**-$95.00**
		5/26/2011	177	$3,540.00		Alewife Harvesters A		06/22/09	**-$132.00**
				$26,700.00	**8,811.00**	rill bit, lags for alewife r		10/05/09	**-$77.55**
						Crate hauler const		05/14/10	**-$160.00**
106944	6/3/11	5/27/2011	45	$900.00		Alewife Harvesters A		06/21/10	**-$149.85**
		5/28/2011	94	$1,880.00		Newport Fence Co		07/12/10	**-$4,295.00**
						AAA - Portable t		07/26/10	**-$142.50**
						Ken Dudley - truc		08/09/10	**-$56.96**
						White Sign - Alewi		10/12/10	**-$19.95**
						Portable Toile		Var	**$133.00**

		5/29/2011	124	$2,480.00		Alewife Road s		06/08/11	**-$26.94**
		5/31/2011	9	$180.00		Warden Name		06/08/11	**-$8.00**
				$5,440.00	**1,795.20**	AAA - Portable t		05/30/13	**$95.00**
						Total Expenditures:			**-$4,935.75**
106946	6/10/11	6/2/2011	27	$540.00					
		6/3/2011	30	$600.00				**REVENUES 2009-2013:**	
		6/5/2011	69	$1,380.00				**INITIAL EXPENDITURES:**	
				$2,520.00	**831.60**			**EXPENDITURES 2009-2011:**	
								ANNUAL EXPENDITURES 2012:	
EXPENSES:		***AAA Portable Toilets:***		**$133.00**				**2013**	
		Alewife Rd sign:		**$26.94**				**NET REVENUES TO 2013:**	
		Alewife Warden nametag:		**$8.00**					
		ALEWIFE REVENUE 2012			**# FISH-350avg/crate. 3bushels/crate**				
106953	5/18/12	5/13/2012	30	$600.00					
		5/14/2012	312	$6,240.00					
		5/15/2012	234	$4,680.00					
		5/16/2012	273	$5,460.00					
		5/17/2012	153	$3,060.00					
			1002	$20,040.00	**6,613.20**				
106956	5/25/12	5/19/2012	90	$1,800.00					
		5/20/2012	255	$5,100.00					
		5/21/2012	240	$4,800.00					
		5/22/2012	225	$4,500.00					
		5/23/2012	195	$3,900.00					
		5/24/2012	72	$1,440.00					
			1077	$21,540.00	**7,108.20**				
106957	6/1/12	5/28/2012	36	$720.00					
		5/29/2012	51	$1,020.00					
		5/30/2012	18	$360.00					
		5/31/2012	15	$300.00					
			120	$2,400.00	**792.00**				

	733 Crates	**ushels 2012:**	**2199**				**256,500**		
	Revenue 2012:				**14,513.40**				
		ALEWIFE REVENUE 2013							
106963	5/13/13	5-May	345	$6,900.00					
		6-May	354	$7,080.00					
		7-May	462	$9,240.00					
		8-May	351	$7,020.00					
		9-May	264	$5,280.00					
		10-May	96	$1,920.00					
		11-May	108	$2,160.00					
			1980	$39,600.00	**13,186.80**				
371302	5/20/13	12-May	6	$120.00					
		13-May	0	$0.00					
		14-May	30	$600.00					
		15-May	75	$1,500.00					
		16-May	69	$1,380.00					
		17-May	114	$2,280.00					
		18-May	69	$1,380.00					
		19-May	87	$1,740.00					
			450	$9,000.00	**2,997.00**				
371305	5/28/13	20-May	48	$960.00					
		21-May	45	$900.00					
		22-May	66	$1,320.00					
		23-May	72	$1,440.00					
			231	$4,620.00	**1,538.46**				
	887 Crates	**ushels 2013:**	**2661**				**310,450**		
	Revenue 2013:				**17,722.26**				
		ALEWIFE REVENUE 2014							
1101	5/17/14	13-May	54 cr	162 bu	1,078.92				
		14-May	91 cr	273 bu	1,818.18				

		15-May	24 cr	72 bu	479.52	Town share			
		16-May	26 cr	78 bu	519.48	**$3,896.10**			
			195	585					
1104	5/23/14	5/17/2014	63cr	189bu	1,258.74				
		18-May	107cr	321bu	712.62	2,137.86	1425.24 due		
		19-May	100cr	300bu	1,998.00				
		20-May	11cr	33bu	219.78				
		21-May	36cr	108bu	719.28				
		22-May	101cr	303bu	2,017.98				
		18-May	correction		1,425.34				
			418	1254		**$8,351.64**			
1107	5/30/14	23-May	42cr	126bu	839.16				
		24-May	62cr	186bu	1,238.76				
		25-May	12cr	36bu	239.76				
		26-May	63cr	189bu	1,258.74				
		27-May	62cr	186bu	1,238.76				
		28-May	28cr	84bu	559.44				
		20-May	26cr	78bu	519.48				
			295	885		**$5,894.10**			
1109	6/9/14	30-May	28cr	84bu	559.44				
		31-May	11cr	33bu	219.78				
		1-Jun	64cr	192bu	1,278.72				
		2-Jun	11cr	33cr	219.78				
			114	342		**$2,277.72**			
		Crates 2014	1,022						
			Bushels 2014:	**3066**			**357,700**		
			Revenue 2014:	$20,419.66					
			ALEWIFE REVENUE 2015			main turbine under repair			
1115	5/26/15		104 cr	312 bu	2,078.00				
1120	6/1/15		92 cr	276 bu	1,838.00	Not paid by day			
1123	6/9/15		14 cr	42 bu	280.00				
		2015 Totals	**210 crates**	**630 bu**		**$4,196.00**	**73,500**		
			ALEWIFE REVENUE 2016			small turbine under repair			
1127	5/14/16		0 no fish						
	5/15/16		22 cr	66 bu	1,320.00				
	5/16/16		16 cr	48 bu	960.00				

	5/17/16		13 cr	39 bu	780.00				
	5/18/16		22 cr	66 bu	1,320.00				
	5/19/16		36 cr	108 cr	2,160.00				
	5/20/16		35 cr	105 bu	2,100.00				
	5/21/16		32 cr	96 bu	1,920.00				
			176 cr	**528 bu**	at .333	**3,516.00**			
1130	5/22/16		45 cr	135 bu	2,700.00				
	5/23/16		69 cr	207 bu	4,140.00				
	5/24/16		35 cr	105 bu	2,100.00				
	5/25/16		72 cr	216 bu	4,320.00				
	5/26/16		14 cr	42 bu	840.00				
	5/27/16		30 cr	90 bu	1,800.00				
	5/28/16		28 cr	84 bu	1,680.00				
			293 cr	**879 bu**	at .333	**5,854.00**			
1132	5/29/16		45 cr	135 bu	2,700.00				
	5/30/16		37 cr	111 bu	2,220.00				
	5/31/16		42 cr	126 bu	2,520.00				
	6/1/16		20 cr	60 bu	1,200.00				
	6/2/16		26 cr	78 bu	1,560.00				
	6/3/16		0	0					
	6/4/16		0	0					
	6/5/16		0	0					
			170 cr	**510 bu**	at .333	**$3,396.60**			
		Crates:	**639**						
			Bushels 2016:	**1917**			**223,650**		
				Revenue 2016:	**$12,766.60**				
			ALEWIFE REVENUE 2017						
1139	5/15/17		77	231	5,775.00				
	5/16/17		80	240	6,000.00				
	5/17/17		59	177	4,425.00				
	5/18/17		30	90	2,250.00				
			246 cr	**738 bu**	at .333	**$6,144.00**			
1143	5/19/17		33	99	2,475.00				
	5/20/17		44	132	3,300.00				
	5/21/17		87	261	6,525.00				
	5/22/17		94	282	7,050.00				
	5/23/17		28	84	2100				

	5/24/17		33	99	2,475.00				
	5/25/17		22	66	1,650.00				
	5/26/17		26	78	1,950.00				
			367 cr	**1101 bu**	at .333	**$9,175.00**			
1144	5/27/17		57	171	4,275.00				
	5/28/17		78	234	5,850.00				
	5/29/17		50	150	3,750.00				
	5/30/17		60	180	4,500.00				
	5/31/17		42	126	3,150.00				
	6/1/17		54	162	4,050.00				
	6/2/17		45	135	3,375.00				
			386 cr	**1158 bu**	at .333	**$9,640.00**			
		Crates:	**999**						
			Bushels2017:	**2997**			**349,650**		
				Revenue 2017:	**$24,959.00**				
			ALEWIFE REVENUE 2018						RevenueTotals:
						TOTAL ALEWIFE REVENUES			2009
931803	5/18/18		720 crates	2160 bushels	54,000.00	17,982.00			2010
									2011
931807	5/25/18		426 cr	1278 bu	31,950.00	10,650.00			2012
									2013
931809	6/8/18		470 cr	1410 bu	35,250.00	$11,738.00			2014
		Crates:	**1616 cr**						2015
			Bushels 2018:						2016
				4848		**at .333:**	**565,600**		2017
				Revenue 2018:	**121,200.00**	#########			2018

$20,000.00
$19,108.32
$13,843.00
$16,348.20
$14,513.40
$17,722.26
$20,419.56
$101,954.74

$101,954.74
-$18,959.80
-$4,935.75
$0.00
$0.00
$78,059.19

$19,108.32
$13,843.00
$16,348.20
$14,513.40
$17,722.26
$20,419.66
$4,196.00
$12,766.60
$24,959.00
$40,370.00
$184,246.44