

2008

Recommendations for Future Restoration and Management Efforts for Mill Brook, Westbrook, Maine: Appendix B. Mill Brook Fisheries Reports

Casco Bay Estuary Partnership

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Appendix B-1

Mill Brook Fisheries Reports Maine Department of Inland Fisheries & Wildlife

Explanation of Abbreviations in the Fisheries Reports in this Appendix

Methods

E. F. = electrofished (sampling)

Fish Species

BKT = brook trout

BND = blacknose dace

BNT = brown trout

CCB = creek chub

CMS = common shiner

EEL = American eel

LMB = largemouth bass

PKL = chain pickerel

PKS = pumpkinseed

WHS = white sucker

YLP = yellow perch

STREAM FISHERY INVESTIGATION (06/20/00)

Lake: Mill Brook, Westbrook

Purpose: To evaluate unscheduled BKT stocking to determine if they should be added to regular stocking program.

Regulations: Open under general law regulations.

Stocking History: Periodically gets stocked with unscheduled BKT. Stocked 2x/year with 150 SY BNT at both Brook Rd. and Rte. 302 Xings.

Findings:

Rte. 302 Xing

- E.F. approximately 192' section downstream of Xing and caught 2 – BKT, 3 – BNT, BND, and WHS.
- Habitat looked excellent and very fishable. Water temperatures were quite high at time of sampling (22°C) and is probably quite limiting for trout come July/August.
- Worm containers and beaten down trail along brook indicates heavy use.

Brook Rd. Xing

- E.F. approximately 270' section downstream of Xing and caught no trout, BND, EEL, and WHS.
- Water temperature and habitat was similar to Rte. 302 site.
- No trail and limited evidence of fishing activity except right at culvert pool.

Conclusions:

- Cancel Brook Rd. as a stocking site due to limited evidence of fishing and this Xing is located less than ¼ mile upstream of the 302 Xing.
- Change BNT stocking to a single stocking of 250 SY/year.
- Add 150 SY BKT 2x/year at the Rte. 302 Xing as a put-and-take stocking.

Prepared by: James Pellerin

STREAM FISHERY INVESTIGATION (09/24/02)

Lake: Mill Brook, Westbrook (043007)

Purpose: To evaluate minimum flow release from Highland Lake Dam.

Regulations: Open under general law regulations.

Stocking History: Periodically gets stocked with unscheduled BKT. Stocked 2 x/year @ Rte. 302 with 200/100 SY BNT and 150/150 SY BKT

Findings:

Rte. 302 Xing

- E.F. approximately 390' section downstream of Xing and caught no trout; WHS, CCB, LMB, PKL, BND, and EEL were observed.
- Habitat looked excellent and very fishable under higher flow regime, particularly given the drought. Water temperature was 19°C.
- Worm containers and beaten down trail along brook indicates heavy use.

Behind White Bros. Quarry

- E.F. approximately 264' section upstream of quarry and caught 3 BKT (1 hatchery and 2 wild) and 6 BNT (3 hatchery and 3 wild); BND, EEL, CMS, PKS, YLP, CCB, and WHS were also observed.
- Water temperature and habitat was similar to Rte. 302 site.
- Footpaths were present, and quarry worker often observed anglers walking out of the woods with trout during the spring/summer months.

Conclusions:

- Flows looked excellent despite the severe drought conditions. We were surprised to find a stocked brook trout made it through the warm/dry summer period, and according to our records this was the first time we have ever documented wild trout in the Mill Brook drainage below Highland Lake.
- Our sampling suggests recently established minimum flows have benefited the trout fishery in Mill Brook.

Prepared by: James Pellerin

Draft Fishery Management Plan For the Presumpscot River Drainage

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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 diadromous¹ 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.

¹ 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 yd²), 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 (1st) and Turners Falls Dam (2nd) 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 yd². 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 68-131 shad/acre (equivalent to 1.4-2.7 adult shad/100 yd²).

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 bridge 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 I²

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.
- 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.

² 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.

- 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 be 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 measures³ 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 Dam⁴. 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.
- 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.

³ 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.

⁴ 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.

- 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 measures³ will be operational within 30 days of licensing.
 - b) For anadromous species, upstream and downstream passage facilities at Mallison Falls Dam⁴ 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 Saccharappa. This number represents 20% of the estimated production of these species for the reach from Saccharappa 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 measures³ will be operational within 30 days of licensing.
 - b) For anadromous species, upstream and downstream passage facilities at Little Falls Dam⁴ 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 measures³ will be operational within 30 days of licensing.
 - b) For anadromous species, upstream and downstream passage facilities at Gambo Dam⁴ 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 measures³ will be operational within 30 days of licensing.
 - b) For anadromous species, upstream and downstream passage facilities at Dundee Dam⁴ 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.