

Operational Plan For the Restoration Of
Shad and Alewives
To The Kennebec River

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Operational Plan

BACKGROUND

The Operational Plan defines how the Department of Marine Resources intends to implement the strategies identified in Phase I of the Strategic Plan. This revised Operational Plan reflects the conditions set forth in an agreement between the state fishery agencies and some upriver dam owners known as the Kennebec Hydro Developers Group (App. 3). The previous Operational Plan (Squiers and Smith, 1985) utilized the method of trapping and trucking of alewives from the Edwards Dam to selected upriver lakes and ponds for an interim period of ten years. The revised plan will utilize the same methods and seek to accomplish the same objectives, but at an accelerated rate. The Kennebec Hydro Developers Group (KHHDG) has agreed to fund the trapping and trucking of alewives from alternate sources until a suitable facility is provided at the Edwards Dam in order to facilitate the attainment of Phase I goals. KHHDG will continue to fund the trapping and trucking of alewives once a fish passage/trapping/sorting/transportation facility is obtained at the Edwards Dam. If suitable numbers of adult alewives are not initially available at the Edwards Dam fish passage facility, then this source will be augmented with alewives obtained from other sources.

The revised Strategic and Operational Plans, relative to shad restoration, differ from the original plans in that Phase II restoration for shad is delayed for a period of up to twelve years. The original plan and the revised plan utilize fish passage as the primary method of restoration. The original plan stressed fish passage for shad at all dams in its historical range and was triggered by a relatively small number of shad (500). The revised plan calls for passage of shad at the Edwards Dam preceded and/or supplemented by trapping and trucking of adult shad from the lower Kennebec River estuary or from out-of-basin. At the end of Phase I (December 31, 1998), fish passage will be provided at all mainstem dams on the Kennebec, Sebasticook, and Sandy Rivers in chronological order (App. 2 and App. 3). Truck stocking of shad in the river segments above each dam will be initiated five years prior to the scheduled completion date of the fish passage facility in that dam.

The revised plan will accelerate the shad restoration program if there is a delay in obtaining passage at the Edwards Dam and/or if there is only a small stock of shad present below the Edwards Dam. The revised plan could result in a delay in shad restoration to the Kennebec River if a large population of shad develops below the Edwards Dam during the Phase I period.

GENERAL PLAN

The implementation of the Operational Plan is in large part dependent on the completion of a fish passage/trapping/sorting/transportation facility at the Edwards Dam, Augusta. This type of facility is necessary in order to:

- 1) allow for the removal of undesirable fish species such as carp and lamprey eels
- 2) allow for passage of American shad into the river segment above the Edwards Dam

- 3) allow for the trapping and transportation of shad to upriver impoundments as outlined in Table 4
- 4) allow for the trapping and transportation of alewives to suitable upstream habitat as identified in Table 3

During the thirteen-year period, 1986 through 1998, the Department of Marine Resources intends to initiate restoration of alewives to 55% of the historically available habitat above Augusta (Table 1). This would involve trapping alewives at the fish passage/trapping/sorting/transportation facility at the Edwards Dam and transporting them to selected waters in the Seven Mile Stream, Sebasticook River, and Wesserunsett Stream drainages (Table 2).

Alewives will be stocked in sequential priority as listed on Table 3. Once the minimum number indicated for each lake system is met, the next lake system will be stocked. Restoration of alewives has already been initiated with the stocking of 3,567 adult fish into the Sebasticook drainage in 1985 and 10,223 in 1986.

After sorting at the Edwards Dam fish passage/sorting/trapping/transportation facility, shad will be allowed to pass into the Edwards Dam headpond. No shad will be transported from the Edwards Dam facility to upriver areas until 1994 or after, as outlined in Table 4.

CONTINGENCY PLAN

In the event that the fish passage/trapping/sorting/transportation facility at the lowermost dam is not operational concurrent with the initiation of the Operational Plan, then shad and alewives will be stocked from other sites in the lower Kennebec River or from out-of-basin. Funding of this contingency plan is the responsibility of the Kennebec Hydro Developers Group (KHDG), as outlined in the appended agreement (App. 3). In order for the progeny of these stockings to gain access to their natal freshwater habitat, it is imperative that the fish passage/trapping/sorting/transportation facility at the Edwards Dam be completed no later than 1989. This contingency plan is deemed much less preferable than trapping and trucking from the Edwards Dam.

KHDG also agrees to fund trapping and trucking from other sources in addition to trapping and trucking from the Edwards Dam fish passage/trapping/sorting/transportation facility in the event that sufficient broodstock is not available at the Edwards Dam facility.

Manpower and Equipment Needs

The size of the budget for the first two years of the Operational Plan will depend on when the fish passage/trapping/sorting/transportation facility at the Edwards Dam becomes operational and on the availability of shad and alewife broodstock at this facility. The budget presented in the Appendix 1 represents the implementation of the Contingency Plan where shad will be captured in the lower Kennebec River, transported, and stocked above the Edwards Dam and also transported from out-of-basin. Alewives will be transported from the Royal River (Table 5).

Once the fish passage/trapping/sorting/transportation facility becomes operational at the Edwards Dam, it may still be necessary to obtain shad from the lower Kennebec River and from out-of-basin and to supplement the number of alewives obtained at the Edwards Dam with alewives from out-of-basin.

Table 1: Potential Alewife Production in the Kennebec River for Fully Restored Phase 1 Lakes.

Ponded Area	Surface	Total Fish ¹ Production (235/acre)	Allowable ² Harvest (200/acre)	Spawning ³ Escapement (35/acre)
Webber Pond	1252	294,220	250,400	43,820
Three Mile Pond	1077	253,095	215,400	37,695
Three Cornered Pond	195	45,825	39,000	6,825
Unity Pond	2528	594,080	505,600	88,480
Pattee Pond	712	167,320	142,400	24,920
Lovejoy Pond	324	76,140	64,800	11,340
Pleasant Lake	768	180,480	153,600	26,880
Sebasticook Lake	4288	1,007,680	857,600	150,080
Plymouth Pond	480	112,800	96,000	16,800
Douglas Pond ⁴	525	123,375	105,000	18,375
Wesserunsett Lake (Hayden Lake)	<u>1446</u>	<u>339,810</u>	<u>289,200</u>	<u>50,610</u>
TOTAL	13,595	3,194,825	2,719,000	475,825

¹Based on an annual commercial yield of 100 pounds per surface acre and an escapement rate of 15%. Average weight of .5 pounds/fish

²Assumes 100% fish passage efficiency

³The escapement rate of 35 adult alewives per acre refers to the escapement needed into the pond or lake. Higher rates would be needed downriver depending on the number of dams and fish passage efficiency

⁴Acreeage will be 525 acres if 3 foot flashboards are added to the Waverly Avenue Dam (FERC #4293) as proposed.

Table 2: Initial stocking rates and manhours involved in Phase I of the Kennebec River alewife restoration program with a fish passage, collection, sorting, and transportation facility at the Edwards Dam.

Ponded	Surface Acreage	Initial Stocking 6/acre	Round Trip Miles from Augusta	# Trips ¹	Total Miles	Manhours ² Trip	Total Manhours
Webber Pond	1,252	7,512	20	5	100	3.0	15.0
Three Mile Pond	1,077	6,462	24	5	120	3.2	16.0
Three Cornered Pond	195	1,170	20	1	20	3.0	3.0
Unity Pond	2,528	15,168	70	16	1120	5.5	88.0
Pattee Pond	712	4,272	40	5	200	4.0	20.0
Lovejoy Pond	324	1,944	50	2	100	4.5	9.0
Pleasant Pond	768	4,608	120	5	600	8.0	40.0
Sebasticock Lake	4,288	25,728	98	26	2548	6.9	179.4
Plymouth Pond	480	2,880	100	3	300	7.0	21.0
Douglas Pond	525	3,150	88	4	352	6.4	25.6
Wesserunnett Lake	<u>1,446</u>	<u>8,676</u>	<u>94</u>	<u>9</u>	<u>846</u>	<u>6.7</u>	<u>60.3</u>
TOTALS:	13,595	81,570		81	6306		477.3

¹For trips less than 30 minutes, 1500 alewives would be carried per trip. For trips greater than 30 minutes, 1000 alewives would be carried per trip.

²Two (2) men per truck; one half hour unloading. Average speed, 40 mph.

Table 3: Alewife Stocking Time Schedule for Implementation of the Operational Plan for the Kennebec River

Lake System	Date of Initial Stocking ¹	Initial Stocking Rate ²	Source
Sebasticook Lake	1985	4288-25,728	Royal River
Unity Pond	1986	2728-15,168	Edwards Dam
Pattee Pond	1986	712-4272	Edwards Dam
Lovejoy Pond	1986	324-1944	Edwards Dam
Plymouth Pond	1986	480-2880	Edwards Dam
Pleasant Pond	1986	768-4608	Edwards Dam
Douglas Pond	1986	525-3150	Edwards Dam
Webber Pond	1986	1252-7512	Edwards Dam
Three Mile Pond	1986	1077-6462	Edwards Dam
Three Cornered Pond	1986	195-1170	Edwards Dam
Wesserunsett Lake	1995	1446-8676	Edwards Dam
Great Moose Lake	1999	3584-21,504	Edwards Dam
Spectacle Pond	1999	139-834	Edwards Dam
China Lake	1999	3992-23,952	Edwards Dam
Big Indian Pond	1999	990-5940	Edwards Dam
Little Indian Pond	1999	143-858	Edwards Dam
Wassokey Lake	1999	1062-6372	Edwards Dam
Clearwater Pond	2000	751-4506	Edwards Dam
Norcross Pond	2000	122-732	Edwards Dam
North Pond	2000	170-1020	Edwards Dam
Parker Pond	2000	128-768	Edwards Dam

¹The stocking of the following lake systems is dependent on the outcome of a cooperative research project sponsored by the Maine Department of Marine Resources and the Maine Inland Fisheries and Wildlife Department in order to assess the interactions of alewives with smelts and salmonids: Great Moose Lake, Spectacle Pond, China Lake, Big Indian Pond, Little Indian Pond, Wassokey Lake, Clearwater Pond, and Norcross Pond.

²The Initial Stocking is based on stocking 1-6 alewives per lake surface acre. The final adult escapement to the lakes is theoretically 35/acre. Alewives will be transported by truck for the full 13 years of the Operational Plan, during which time the feasibility of truck stocking will be evaluated as a substitute for fish passage facilities (for alewives).

Table 4: Sequential Shad Stocking Schedule for the Kennebec River and Tributaries

River Segment	# Stocked	Source	Time
Kennebec River Edwards Dam Augusta to Lockwood Dam, Waterville	2500+	Lower Kennebec River, out-of- basin	1986 up until passage provided at the Edward Dam
Sebasticook River Halifax Dam, Winslow to Burnham Dam, Burnham	500	Edwards Dam, Lower Kennebec River and/or out-of-basin	1994
Burnham Dam, Burnham to confluence East and West Branches	500	same as above	1995
Kennebec River Winslow Dam, Winslow to Shawmut Dam, Fairfield	500	same as above	1994
Shawmut Dam, Fairfield to Weston Dam, Skowhegan	500	same as above	1995
Weston Dam, Skowhegan to Lower Madison Dam, Madison	500	same as above	1996
Sandy River Above Madison Electric Works Dam	500	same as above	1997

Table 5: Contingency Alewife Broodstock Source (Royal River)¹
 Total manhours, trips, and miles involved in accomplishing the Phase I objectives of the Kennebec River Anadromous Fish Restoration Plan by stocking from the Royal River.

Ponded Area	Surface Acreage	Initial Stocking 6/Acre	Round Trip Miles from Royal River	#Trips (1000 alewives/Trip)	Total Miles	Manhours/ ¹ Trip	Total Manhours
Webber Pond	1252	7512	120	8	960	5.7	45.7
Three Mile Pond	1077	6462	124	7	868	5.9	41.3
Three Cornered Pd	195	1170	120	1	120	5.7	5.7
Unity Pond	2528	15,168	170	16	2720	8.1	129.6
Pattee Pond	712	4272	140	5	700	6.7	33.5
Lovejoy Pond	324	1944	150	2	300	7.1	14.3
Pleasant Pond	768	4608	220	5	1100	10.5	52.4
Sebasticook Lake	4288	25,728	198	26	5148	9.4	245.0
Plymouth Pond	480	2880	200	3	600	9.5	28.6
Douglas Pond	525	3150	188	4	752	9.0	36.0
Wesserunnett Lake	<u>1446</u> 13,595	<u>8676</u> 81,570	194	<u>9</u> 86	<u>1746</u> 15,014	9.2	<u>83.1</u> 715.2

¹ Two men per truck. Includes loading and unloading time.

Appendix 1: Manpower and budget needs for implementation of the Contingency Plan.

BEGINNING DATE: January 1, 1987

PERSONNEL:

Marine Resources Specialist I (full time)	\$26,643.59
Marine Resources Technician (full time)	24,085.27
Conservation Aide (3 each Seasonal) (26 wks. each)	<u>23,308.00</u>
Total Personnel	\$74,036.86

EQUIPMENT:

2 each - 8 foot diameter fiberglass tanks	\$16,380.00
4 each - 6 HP circulating pumps	3,400.00
2 each - 10,000 lb cap. flatbed trucks	38,000.00
1 each - 16 ft. alu. boat	2,100.00
1 each - 25 HP outboard motor	1,680.00
1 fish trap	<u>23,000.00</u>
Total Equipment Cost	\$84,560.00

SUPPLIES:

Nets	\$265.00
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OPERATION AND MAINTENANCE:	<u>\$5,300.00</u>
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Total Expenses	\$164,161.86
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2ND YEAR

Manpower and budget needs for implementation of the Kennebec River Restoration Agreement.

BEGINNING DATE: January 1, 1988

PERSONNEL:
(6% increase)

Marine Resources Specialist I (full time)	\$28,242.21
Marine Resources Technician (full time)	25,530.39
Conservation Aide (3 each seasonal) (26 wks. each)	<u>24,706.48</u>
Total Personnel Cost	\$78,479.08

SUPPLIES:

Nets	\$280.90
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OPERATION AND MAINTENANCE	<u>\$5,600.00</u>
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Total Expenses	\$84,359.98
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Appendix 2: Kennebec River Basin Fish Passage Action Plan for Shad and Alewives
August, 1986

UPSTREAM PASSAGE

RIVER/TRIBUTARY	DAM REQUIRING FISH PASSAGE	REMARKS
Kennebec River	Edwards Dam (FERC #2389)	A fish passage, sorting, & transportation facility is requested for completion by the spring of 1987.
Sebasticook River	Halifax Dam (FERC #2552)	Fish passage, trapping & sorting facility requested to be operational by May 1, 1999.
	Benton Falls Dam (FERC #5073)	Fish passage requested to be operational by May 1, 1999.
	Burnham Hydro Dam	Fish passage is requested to be operational by May 1, 2000.
	Upstream fish passage on all tributary dams to Sebasticook River deferred until May 1, 2000. The feasibility of permanent trap & truck for alewives in lieu of fishways in tributary dams to be evaluated during the 14 year period.	
Kennebec River	Lockwood Dam (FERC #2574)	Fish passage, trapping & sorting facility requested to be operational by May 1, 1999.
	Winslow Dam (FERC #2611)	Fish passage requested to be operational by May 1, 1999.

Appendix 2 (cont'd):

RIVER/TRIBUTARY	DAM REQUIRING FISH PASSAGE	REMARKS
	Shawmut Dam (FERC #2322)	Fish passage requested to be operational by May 1, 2000.
	Weston Dam (FERC #2325)	Upstream fish passage requested to be operational by May 1, 2001.
Sandy River	Madison Electric Works Dam	Fish passage requested to be operational by May 1, 2002.
	<p>Upstream passage for dams on the Wesserunsett Stream drainage deferred until 2001. Upstream passage for tributary dams on the Sandy River are deferred until 2003. The feasibility of permanent trap & truck for alewives in lieu of fishways to be evaluated during this time period.</p>	
	<p>When a dam is redeveloped the dam owner should seriously consider installing fish passage facilities at the time of redevelopment to prevent costly retrofitting. As a minimum, the dam owner is requested to prepare a conceptual design of the fish passage facility (ies) for review by the state & federal fisheries agencies & to include appropriate provisions during redevelopment in order to preclude costly retrofitting.</p>	

Appendix 2 (con'td):

DOWNSTREAM PASSAGE

Permanent downstream passage is requested to be operational at the following dams on the specified dates:

Edwards Dam (FERC #2389)	1987
Halifax Dam (FERC #2552)	1991
Benton Falls Dam (FERC #5073)	1991
Burnham Hydro Dam	1991
Pioneer Dam (FERC #8736)	1991
Waverly Avenue Dam (FERC #4293)	1991

Until permanent downstream passage facilities are operational, it is requested that the dam owners provide interim downstream measures such as controlled spills, directed flows through a slot in the flashboards, etc. These temporary measures are requested for those dams listed above once anadromous fish have been stocked above them and for the following dams after 1993:

- Lockwood Dam (FERC #2574)
- Hydro-Kennebec (FERC #2611)
- Shawmut (FERC #2322)
- Weston (FERC #2325)
- Madison Electric Works Dam

Permanent downstream passage facilities for the Lockwood Dam (FERC #2574), Hydro-Kennebec (FERC #2611), Shawmut (FERC #2322), Weston (FERC #2325), and Madison Electric Works Dam are requested to be operational at the same dates as required for upstream passages.