REPORT OF THE MAINE

ATLANTIC SALMON COMMISSION

TO THE MAINE LEGISLATURE

FISHERIES AND WILDLIFE JOINT STANDING COMMITTEE

FOR THE PERIOD

JANUARY THROUGH DECEMBER 2001

PREPARED BY:

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EXECUTIVE SUMMARY

The Maine Atlantic Salmon Commission (ASC) is charged with restoration and management of Atlantic salmon throughout its original range in the State of Maine. With a staff of 16 full time and 9 seasonal people in four offices, the ASC is involved with all aspects of Atlantic salmon management in coastal and eastern Maine.

Adult salmon are captured at the Veazie Dam on the Penobscot River by the ASC to supply brood stock to two Federally operated hatcheries at Craig Brook and Green Lake. These hatcheries, in turn, produce eggs, fry, parr, smolts, and kelts for the ASC to stock under a variety of protocols. Weirs or traps are operated on four salmon rivers (Penobscot, Narraguagus, Dennys and Pleasant) where fish are counted and examined. Any that are determined to be of aquaculture origin (escapees) are removed. Those needed for brood stock are taken to Craig Brook hatchery and the rest are released upstream to spawn.

ASC staff also conducts electrofishing surveys to evaluate juvenile fish production in salmon rivers and to measure success of fry stocking programs. Fall redd counts provide an indirect measure of spawning by wild salmon on rivers where there are no counting facilities. Habitat surveys all the ASC to estimate carrying capacity for Maine rivers and suggest ways that improvements may be implemented.

The ASC also manages the Atlantic Salmon Conservation Plan for Seven Maine Rivers (ASCP). This plan, developed to guide the State's procedures for protecting Atlantic salmon populations has achieved significant advancement toward riverine and riparian zone protection on several Maine rivers. The ASC is working with the Federal Services (NMFS and USFWS) on developing a Federally mandated Recovery Plan for Maine's Atlantic salmon. Maine's ASCP is expected to form the nucleus for the Recovery Plan which is now in draft form and is expected to be available for public comment in May 2003 and to be finalized by May 2003.

INTRODUCTION

Maine State Statute established the Maine Atlantic Salmon Commission (ASC) in 1999 [C.401, Pt. BB, § 8 (amd).]. This law replaced earlier legislation that formed the Maine Atlantic Sea-Run Salmon Commission in 1947 and, subsequently, the Atlantic Salmon Authority in 1995. The 1999 legislation structured the ASC with a three-member board comprised of the Commissioners of the Maine Departments of Inland Fisheries and Wildlife and Marine Resources and a third, at-large, member appointed by the Governor, subject to Senate confirmation. The Salmon Board appoints the Executive Director who is responsible for hiring and managing all other ASC staff.

The 1999 enabling legislation requires that the ASC Executive Director appoint (with Board approval) a public advisory panel. Panel members are to be selected from designated geographic areas of the state and will serve at the pleasure of the Executive Director. This task was completed in 2001 and panel members assembled for initial formative sessions. A list of panel members can be found in Appendix 1.

The Atlantic Salmon Conservation Plan for Seven Maine Rivers (ASCP) is also under the auspices of the ASC and a report on this task has been prepared for the Governor and is available under separate cover. An executive summary can be found in Appendix 3 of this report.

The period covered by this report (January through December 2001) was filled with many challenges and progress on several fronts. The ASC participated in various statewide issues (e.g. water use policies; Land and Water Resources Council), many local issues (e.g. dam relicensing; fish passage) and, of course, a significant amount of biological activities designed to monitor and enhance Maine's wild Atlantic salmon stocks. ASC staff also participates in International forums appropriate to furthering restoration efforts in Maine (e.g. International Council for Exploitation of the Seas [ICES] and the North Atlantic Salmon Conservation Organization [NASCO].

ATLANTIC SALMON COMMISSION OFFICES AND STAFFING

The Atlantic Salmon Commission (ASC) has offices in Augusta, Sidney, Bangor, and Jonesboro. The main office in Augusta relocated to 323 State Street in June 2001. The Executive Director, the Policy Development Specialist who supervises the Atlantic Salmon Conservation Plan (ASCP), and the Administrative Assistant, are located here.

The Downeast ASC office in Cherryfield was closed in October 2001 and the staff relocated to a new facility shared with Inland Fisheries and Wildlife (IFW) biologists in Jonesboro. ASC has three full time and three seasonal people in this office and two full time and three seasonal people in Sidney where ASC also shares space with IFW field staff.

The Bangor ASC office also shares space with IFW on the BMHI campus. This office houses the Senior Biologist, a secretary, and most of the research and field staff that is responsible for much of ASC's work on the Penobscot, Aroostook, and other non-DPS rivers in northern and eastern Maine.

A list of staff and their addresses can be found in Appendix I.

FUNDING

The ASC operates with a General Fund appropriation of approximately $1,109,555.59 (FY 2001) to fund monitoring, management, and enhancement activities. Included in this is an annual appropriation of about $144,000 to support staff and activities identified within the Atlantic Salmon Conservation Plan for Seven Maine Rivers (ASCP). These latter funds are spent to support efforts of the various watershed councils that are working to protect and enhance habitats along the DPS salmon rivers. A one-time, non-lapsing, State appropriation of $750,000 was also allotted to the ASC in 1999 for additional habitat protection on the DPS rivers. An accounting of these funds is included in Appendix 3.

The ASC conducts various Atlantic salmon research projects in collaboration with, and financial support from, the National Marine Fisheries Service (NMFS). These projects include evaluation of various stocking practices, smolt migration studies, fishway effectiveness, etc. NMFS contracted with the ASC for about $537,000 in 2001 to perform these studies and it is expected that this amount will be increased to about $900,000 in 2002. Most of the staff of the ASC is support by these monies. A separate Federal report is filed on these activities and is available from the ASC upon request.

The ASC received $2 million in non-lapsing Federal money in December 2000 to supplement funding previously received from the USFWS and to enable the State of Maine to pro-actively address some of the several issues identified in the Endangered Species Listing for Maine's Atlantic salmon. These activities include operation and maintenance for weirs on some of the Downeast salmon rivers, improving aquaculture activities, research into juvenile salmon survival issues, irrigation research and assistance to the agriculture community, water flow monitoring, staff support, habitat protection, etc.

The ASC also receives approximately $30,000 per year from the Kennebec River Restoration account. The ASC has hired and equipped additional staff with these funds and this has given us the ability to monitor salmon activities in the Kennebec and to evaluate the habitat suitability for future enhancement of this, Maine's second largest, river. Most of the Kennebec River below Waterville and all the tributaries in this section have now been surveyed.

ATLANTIC SALMON STOCKING PROGRAMS

The ASC is responsible for all Atlantic stocking in Maine waters. The Commission does this in cooperation with two US Fish and Wildlife Service salmon hatcheries: Craig Brook National Fish Hatchery and Green Lake National Fish Hatchery. These hatcheries receive Atlantic salmon collected by the ASC from wild populations in Maine and hold or raise them for use as broodstock. Progeny of these fish are stocked by ASC at different ages in several Maine rivers.

The current salmon stocking program in Maine uses river-specific fish. Each river receives progeny of fish previously collected from the same river. This protocol is followed on the Sheepscot, Dennys, Narraguagus, Machias, East Machias, and Penobscot rivers. Atlantic salmon restoration in the Saco, Union, and St. Croix rivers is based on Penobscot River origin fish. There are separate rooms at Craig Brook where captured parr or smolts from the Downeast rivers are held through maturity when they are spawned. The embryos are reared to stock back into their natal rivers as fry, parr, or smolts. The adult fish are used as egg producers for one or more years, after which they too are returned to the rivers as kelts. The Penobscot River is the only river where eggs are taken from returning adults in addition to captive reared broodstock. Fry were the most numerous life stage of Atlantic salmon stocked into Maine rivers in the year 2001 (Table 1).

*Table 1. Summary of Atlantic Salmon Stocked in Maine in 2001from USFWS hatchery broodstock *.*

River Name	fry	0+ parr	age 1 parr	age 1 smoltadult	
Dennys	59,000	16,000	1,400	49,800	49
East Machias	242,000	-	-	-	87
Machias	267,000	-	-	-	191
Narraguagus	353,000	-	-	-	201
Penobscot	360,000	173,000	2,100	595,000	
Pleasant	-	-	-	-	-
Saco	798,000	-	-	400	-
St. Croix	-	-	-	8,100	-
Sheepscot	170,000	-	-	-	86
Union	0				

** Numbers of fry are rounded to nearest 1,000.*
Number of parr and smolts are rounded to nearest 100.
Adults are surplus brood fish from Craig Brook and are an actual count.

Adult Atlantic salmon are collected by the ASC at a trapping facility in the Veazie Dam on the Penobscot River throughout the spring and summer season. The fish are held at Craig Brook until sexually mature, stripped and the embryos incubated. Some are sent to Green Lake where they are raised either to the parr stage or the smolt stage for stocking into the Penobscot River. More than 400,000 smolts were stocked in the Penobscot River in spring 2001 (Table 1). Under our cooperative agreement with the USFWS, about 50,000 smolts per year are sent to New Hampshire too support restoration efforts in the Merrimack River. Penobscot River eggs are also used to produce fry that will be stocked into various upstream reaches of the watershed where they will grow for two years before they too will migrate to the ocean as smolts.

There are three satellite hatcheries in addition to the USFWS hatcheries that are operated by non-governmental Atlantic salmon organizations; Union River Salmon Association, Saco Salmon Club, Atlantic Salmon for Northern Maine. The Union and Saco Hatcheries receive embryos from the Penobscot captive broodstock at Green Lake. Atlantic Salmon for Northern Maine receives embryos from St. John River stock spawned In Canada. These are reared and stocked in the Aroostook River, a tributary to the St. John River.

The Maine aquaculture industry cooperated with the ASC by rearing two cohorts of river specific salmon eggs to maturity, providing pre-spawning adults to the ASC for stocking into their rivers of origin. This program yielded its second cohort in fall 2001 when 703 adult Atlantic salmon raised by Atlantic Salmon of Maine, Inc., were stocked into three Maine salmon rivers in Washington County. These fish averaged 18 pounds in weight with females carrying about 11,000 eggs each. All fish were all fitted with an internal tag so they could be electronically identified if recaptured. Forty-three fish stocked into the Dennys River were also fitted with ultrasonic tags. These fish will be tracked with fixed and receiving units to document their movements.

ASC field staff also evaluated spawning success of these fish by counting redds in the rivers. Table 2 summarizes the number of fish stocked in each river and the number of redds found. It must be noted that only on the Dennys River and St. Croix River do we know that there were minimal numbers of wild fish in them prior to stocking the aquaculture reared adults. A dam and fish trap are located near the head of tide on the St. Croix River. All returning fish are captured and taken to a hatchery in New Brunswick for disease analysis and egg production. The ASC operates a weir on the Dennys River that captures all migrating fish just above the head of tide from May through December. Seventeen wild fish were captured on 2001 and put upstream into the river.

Redd counts on the Dennys River and St. Croix may be considered as a reasonably complete accounting of reproduction in 2001. However, because fish were seen on redds as late as December 5, and other Maine rivers did not have late counts, result are less than complete. The numbers of redds listed in Table 2 must, therefore, be considered to be minimal reproductive activity.

Table 2. Aquaculture reared Atlantic salmon stocking into Maine Rivers in October, 2001.

River Name	Number of Adult Fish Stocked	Number of Redds Counted Fall 2001
Dennys	75	71
Machias	104	21
St. Croix	524	429
Total	703	521

Additional studies of egg fertilization rates and fry emergence from selected redds will be conducted in spring 2002. A full analysis of fish movement, redd production, and fry and parr production will be completed prior to making any management decisions about whether to continue this program.

RESEARCH AND MANAGEMENT

The Atlantic Salmon Commission staff conducts routine monitoring of the abundance and status of salmon in most of Maine's Atlantic salmon watersheds. ASC staffing levels are too small to operate fish traps on all rivers with Atlantic salmon populations and cooperators operate fish traps to monitor Atlantic salmon returns on some rivers. Great Northern Paper Company, for example, operates the fishway at the Mattaseunk Dam on the Penobscot River, Florida Power and Light operates traps on the Saco River, DMR the Brunswick Trap on the Androscoggin River, and the St. Croix Waterway Commission operates the trap on the St. Croix River in Baileyville.

The 1999 Federal listing of the Atlantic salmon as an Endangered Species has generated additional funding for Atlantic salmon research and habitat protection in Maine. The National Marine Fisheries Service has, for many years, funded ASC staff positions and research activities. Recently funding from NMFS has increased from approximately $250,000 per year to more than $500,000 in 2001 and will approach $900,000 in FY2002. Federally funded, limited period, staff positions have been authorized by the Maine legislature so the ASC can utilize these funds effectively. A report on research projects funded by NMFS has recently been published and interested parties can obtain copies from the ASC Bangor office.

Current and proposed research projects are targeted at understanding why adult Atlantic salmon numbers returning to Maine waters have been in precipitous decline. Speculation ranges from commercial fisheries in distant waters, predation by marine mammals and/or pisciverous birds, contamination of freshwater habitats with chemicals that interfere with smoltification, diminished quality of freshwater habitats, or other, yet to be defined, causes. A better understanding of these and other survival issues is vital to solving the problem of declining Atlantic salmon populations. Projects currently underway in Maine include smolt survival and migration studies on the Pleasant, Narraguagus, Dennys, and Penobscot Rivers. Additional research has begun to study predation on salmon by seals in the estuaries of some Maine rivers. Other research proposals address the potential for chemical disruption of smoltification processes in wild smolts.

Summaries of individual salmon river activities can be found later in this document but Table 3 presents data on returns of adult salmon in those rivers where we have counting capabilities and Table 4 presents data on juvenile population densities.

Table 3. Returns of adult Atlantic Salmon to Maine rivers in 2001 as compared to the previous four years.

Adults

	1997	1998	1999	2000	**2001**
Union	8	13	9	2	**0**
Narraguagus	37	22	32	23	**33**
Pleasant	1			3	**11**
Dennys	0	1		2	**17**
St. Croix	28	41	13	19	**25**
Androscoggin	1	4	5	3	**5**
Saco	28	28	66	49	**69**
Aroostook		30	25	17	**28**
Penobscot	1355	1210	968	535	**786**
Totals	**1458**	**1349**	**1118**	**653**	**974**

Redds

	1997	1998	1999	2000	**2001**
Narraguagus	78	63	43	21	**24**
Dennys	35	32	23	60	**71**
Pleasant	1	9	0	1	**3**
East Machias	11	74	24	10	**3**
Machias	59	74	4	23	**21**
Ducktrap	2	9	29	2	**0**
Sheepscot	8	4	18	15	**18**
Cove Brook	4	5	0	1	**0**
Souadabscook	0	4	1	2	**0**
Kenduskeag				2	**0**
TOTAL	**198**	**274**	**142**	**137**	**140**

0s denote no fish
Blanks denote no sample

Table 4. Summary of juvenile Atlantic salmon population densities (fish/100m^2) in Maine Rivers, 2000 and 2001.

Year	River	Young-of-the -Year				Parr			
		Minimum	Median	Maximum	Sites	Minimum	Median	Maximum	Sites
2000	Cove	0.00	0.00	0.00	2	0.00	1.41	2.82	2
	Dennys	0.70	4.45	8.21	2	1.72	2.23	2.74	2
	Ducktrap		12.39		1		0.00		1
	East Machias	4.85	19.33	32.46	4	2.59	3.79	7.36	4
	Kenduskeag	0.00	0.00	0.00	2	0.00	0.15	0.00	2
	Machias	0.00	0	39.25	13	0.00	1.06	13.01	7
	Narraguagus	0.0	0.1	27.1	27	0.0	2.0	17.9	38
	Pleasant	0.00	0.00	0.00	26	0.00	0.00	2.89	26
	Saco	17.78	18.93	20.09	2	0	1.89	3.77	2
	Sedgunkedunk		3.32		1		0.00		1
	Sheepscot	0.92	8.42	15.91	2	9.78	10.25	10.72	2

Year	River	Young-of-the -Year				Parr			
		Minimum	Median	Maximum	Sites	Minimum	Median	Maximum	Sites
2001	Cove		0.00		2		0.00		2
	Dennys	0.00	0.34	3.33	24	0.00	2.53	7.03	24
	Ducktrap		0.00		1		5.46		1
	East Machias	0.57	32.90	44.98	4	6.12	8.33	9.38	4
*	Eaton		0.00		1		0.00		1
*	Felts		0.00		1		0.00		1
	Kenduskeag		0.00		10	0.00	0.00	0.00	10
	Kennebec		0.00		1		0.36		1
	Machias	0.33	6.04	18.06	5	2.18	4.18	17.18	5
*	N Br Marsh	0.00	0.00	0.00	17	0.00	0.00	0.00	17
	Narraguagus	0.0	2.4	22.0	33	0.0	1.5	11.7	39
*	Passagassawakeag		0.00		2		1.48		2
	Pleasant	0.00	0.00	0.00	3	0.00	0.00	0.23	3
*	S Br Marsh	0.00	0.00	0.00	6	2.15	3.80	5.45	6
	Saco	1.68	31.15	111.37	13	0.00	10.14	24.22	13
	Sedgunkedunk		0.00		1		2.47		1
	Sheepscot	0.00	2.10	7.91	4	0.97	1.97	4.88	4
*	Souadabscook		0.15		3		1.16		1

* Additional rivers sampled in 2001 were possible because of increased staffing.

A Summary of Water Quality Monitoring Results From the 2001 Field Season, Maine Atlantic Salmon Rivers Project

Mark Whiting, Ph.D.

Project Objectives:

In 1999 the DEP and the salmon rivers watershed councils began a water quality monitoring program to monitor environmental trends and to evaluate environmental stresses that may be effecting salmon. This project began its third field season in 2001. This is a collaborative effort that involves the Department of Environmental Protection (DEP), the salmon river watershed councils, and the University of Maine's George Mitchell Center for Environmental and Watershed Research (formerly the Water Resources Institute).

Two kinds of water samples are collected for analysis at the George Mitchell Center. "Baseflow" conditions are monitored when river conditions are dominated by groundwater (i.e., when there has not been a major rain event in the last 7 days). Stormwater is monitored in the salmon rivers during and after a rain event. In order to investigate the water chemistry variability during a storm, some stormwater samples are taken before the flood peak, near the peak, and again as the flood waters recede. The water quality parameters that are monitored include pH, alkalinity, temperature, conductivity, major nutrients, turbidity and total suspended solids. Because of its association with acid rain, total dissolved aluminum was measured in baseflow samples beginning in year 2000. In the 2001 field season, total dissolved aluminum was measured in both baseflow and stormwater samples. In addition, if the pH was less than 6.0, total dissolved aluminum was separated into organic and "exchangeable" forms. Exchangeable aluminum is known to bind to the ion-exchange sites on the gills of fish, thereby damaging the fish's ability to osmoregulate. This can lead to neurological and developmental disorders and death.

In 2001, the State Planning Office, Priority Coastal Watersheds Initiative gave us $4,080 to amplify our stormwater monitoring program. Acid rain and suspended sediments have been identified as two pollutants that might effect salmon survival and reproduction. Both of these environmental issues are most extreme during stormwater events. The data presented in this report is from the year 2001 field season and has both stormwater and baseflow data. Although this work is funded from several sources, including the SPO Coastal Priority Watersheds Initiative, it is analyzed and discussed in one report for a more holistic look at the water chemistry of these streams.

Progress in Year 2001:

In general, the highest stream flows are expected in Maine in March and April with a second peak in the fall. The 2001 field season was the first concentrated effort to sample stormwater during the spring high flow events. This spring was unusual because of the

large snowpack that persisted into April. Rain-on-snow events usually generate the most extreme flood events. However, this spring was characterized by snowstorms in March through mid-April and was then followed by weak rainstorms that built up to an increasingly severe drought through September. Because we were anticipating a potential rain-on-snow event, we took individual stormwater samples but did not intensively sample during a single storm. The individual smaller storms were supposed to provide a perspective for evaluating an anticipated larger storm event.

However, the summer of 2001 was the driest since weather records started being recorded on a systematic basis 107 years ago (Bangor Daily News). The Narraguagus and many other rivers in Maine experienced historic low flows in late summer and fall. Baseflow samples were taken during the summer and then additional stormwate samples were taken when moist weather returned in the fall. A fairly significant storm arrived in the downeast area on the evening of October 16-17, 2001. Although the storm was not as intense in central Maine, samples were also taken on the Sheepscot, Ducktrap and Cove Brook. Most streams were sampled multiple times during and following this event.

Significant Findings:

Results from the 1999 and 2000 baseflow sampling suggest that the eight salmon rivers have moderate pH (range 6-7) and positive alkalinity (ANC range 37-874 ueq/L). Since the alkalinity is positive, and the sum of the base cations is in excess of SO4, it is apparent that acid rain is being consumed within the watershed. To date, there is no evidence of chronic acidification in any of the salmon rivers. However, since rainwater may dominate streams during storm events, episodic acidification remains a possibility.

Baseflow samples taken in 2001 show similar results to past years. The pH ranged from 6.26 to 8.23 now that Cove Brook has been added to official salmon rivers. The alkalinity ranged from 81.1 to 2250 ueq/L. The expanded range also reflecting Cove Brook data. Cove Brook is the most strongly buffered of the salmon rivers. A pairwise correlation of major water chemistry parameters shows a weak positive correlation of pH with nitrate and a better correlation with sulfate. The coincidence of high pH with high sulfate indicates geologic origins, not an acid rain effect. Since baseflows are characterized by groundwater flow, this is not a surprising relationship.

Stormwater samples taken this spring were generally lower in pH and alkalinity than baseflow samples. While the pH ranged from 5.46 (Pleasant R. at Saco Falls) to 8.06 (Cove Brook), these values are still relatively moderate. The alkalinity ranged from 23 ueq/L (Tunk Stream) to 1,580 ueq/L (Cove Brook) indicating that all streams have residual buffering capacity even during runoff events. And while total dissolved aluminum is high, especially in the downeast rivers (range 12-315 ug/L overall), stormwater samples with pH as low as 5.46 (see Pleasant R at Columbia Falls on 6/6/01) have all the dissolved aluminum bound in an organic form. In studies of the interaction of low pH with aluminum and fluoride, Hamilton and Haines (1995) found that a pH of 5.5 without exchangeable aluminum is not a toxic condition. The stormwater samples taken this fall are similar to the spring samples except that pH was more moderate.

Dissolved aluminum values in the Pleasant and Narraguagus Rivers were lower in the fall. This is probably due to the historic low river flows that continued into the fall in spite of significant rainfall in October.

The water chemistry of streams generally changes within the same runoff event as the contribution of surface runoff and groundwater changes, and as chemical transformations occur during the flood cycle. To illustrate this, individual water chemistry variables were plotted for the same sample sites at different flood stages of the October 16-17 storm. Flood stage or river discharge was taken from USGS gauges. In general, rainfall brings dilution of river water which causes decreases in pH, conductivity, and in mineral concentrations. Aluminum generally increases during high flow events. This is because silt and clays are suspended by the greater stream velocity. The increase in total aluminum reflects the suspension of mineral materials. Even though the solubility of aluminum is low around pH 6, with time even the low solubility results in the decomposition of some aluminosilicate. Dissolved aluminum tends to peak with peak discharge. Exchangeable aluminum is expected to be rare as long as the pH is moderate (around 6-7) and as long as complexing agents are present (e.g., dissolved organic matter, fluoride, sulfate, carbonates, etc.). Carbonates would play a role in complexing metals only in Cove Brook. Most metals form insoluble carbonates at pH 8.

Patterns in stormwater were further investigated by pair-wise correlations among chemical variables. River pH is positively correlated with sulfate, suggesting there is no relationship between lower river pH and atmospheric pollution for the storms sampled. There is a strong negative correlation of pH with dissolved organic carbon (DOC) that suggests that organic acids play a role in the natural acidity of these streams. There is also a strong negative relationship between pH and dissolved aluminum. This reflects the strong role that pH plays in the dissolution of aluminosilicate. Aluminum and dissolved organic matter have a strong positive relationship. Approximately 80% of the variation in dissolved aluminum may be related to the amount of dissolved organic matter present. Many metals will form complexes with organic matter.

There is no indication that precipitation chemistry dominated any of the sampled runoff events in the 2001 field season. This is true even of the spring when there was a large amount of runoff (almost all snowmelt). A correlation matrix only for the spring samples shows weaker but still positive relationships with pH and sulfate.

The chemistry of the fall storm flows are most similar to the baseflow chemistry. This is because storms do not necessarily produce surface runoff. After the drought this summer, Maine soils were very dry. The Palmer drought index shows significant rain shortages for every month except for March in northern Maine. Although the storm of October 17 produced significant rainfall (almost 2 inches recorded in Machias), due to the dry conditions most of this would have been absorbed in the ground. The differences in flood stage would be mostly due to an increase in hydraulic head on the groundwater. Goundwater would then be displaced from discharge points, primarily springs and seeps. The dominance of groundwater even after a rain event would explain the similarity to baseflow conditions.

Partial data from Venture Brook on the Dennys River shows that there are significant sources of natural acidity in the downeast rivers. The low pH in fall samples appears to be due in part to organic acids (observed as darkly colored water, but no lab results are available at this time) and in part to dissolved carbon dioxide. The influence of carbon dioxide can be seen by comparing the difference between the field pH and the stirred lab pH values. When pH is measured in the lab, the sample is allowed to warm to room temperature and is mechanically stirred to drive off excess CO2. When the sample has equilibrated to atmospheric CO2 levels, the pH is measured on a quiescent sample. The summer's drought appears to have lowered the water table in Venture Brook, allowing more aeration of the soil and more decomposition of organic material. Low rainfall also caused groundwater flows to become slower, allowing more accumulation of decomposition products (organic acids and CO2). The observed pH in Venture Brook is low enough to be a significant stress to Cyprinid fishes (minnow family) and salmonids (any value below pH 5.5). However, judging by the pH values observed in the main stem of the Dennys and in Cathance Stream, the impact of Venture Brook on larger water bodies is minimal. Venture Brook is a very small tributary. The lower part of Venture Brook has mapped salmon habitat, but otherwise most of the salmon habitat in the Dennys River appears to have remained in a moderate pH range.

Turbidity and suspended sediments found in stormwater samples are also generally moderate, but TSS may exceed 30 mg/L in the Sheepscot and 100 mg/L in Cove Brook. Turbidity and TSS were highest this spring during snowmelt. Considering all the salmon rivers, turbidity is poorly correlated with stream discharge. This suggests that the problems in the Sheepscot and Cove Brook are river specific.

In a review of the effects of suspended sediment on fish health, Newcombe & Jensen (1996) suggest that TSS in excess of 20 mg/L can lead to reduced feeding success for juvenile and adult salmonids. Exposure to TSS in excess of 55 mg/L for extended periods can lead to loss of weight and condition. While not high enough to cause acute respiratory failure or other mortality, the observed values for TSS in the Sheepscot River and Cove Brook are enough to harm fish and degrade habitat.

Comparisons with Other Studies

Approximately 64% of the surface waters of Maine fall into the same pH range of 6-7 as do the salmon rivers (Figure). Only about 30% of Maine surface waters are better buffered than the officially listed salmon rivers. Cove Brook is unique among the salmon rivers with its high pH and alkalinity. Only 0.5% of surface waters in the State of Maine have an average pH of 8 or greater.

Other studies in the Maine salmon rivers (Haines, 1981) have demonstrated that episodic acidification can occur. The greatest danger for fish is through the transformation of dissolved aluminum species during periods of low pH. Exchangeable aluminum is most involved in toxic reactions with aquatic species. Since these earlier studies, the Clean Air Act has reduced SO4 emissions in the Mid-west and atmospheric precipitation in Maine

has become less acidic. Data from the National Atmospheric Deposition Program shows that the volume weighted average pH for wet precipitation was 4.3 in 1980 and 4.7 in 1998. It is possible that reductions in atmospheric pollutants have allowed partial recoveries in the downeast rivers.

Because 2001 was an extreme drought year, the sampled runoff events were not extreme storm events. Spring 2001 was remarkable for a lack of a rain in early spring and relatively mediocre rain events in May, June, and again in the fall. Almost no rain fell from July through September. The summer of 2001 was a historic drought year. When rains returned in the fall, the gentle rains and dry soils resulted in very little surface runoff. Precipitation chemistry would be expected to dominate surface waters when storm events are extreme and when surface runoff dominates over groundwater discharge. A wet year would be a better test of the potential for episodic acidification.

Also, in order to conserve our resources, the monitoring program this spring focused on the main stems of rivers or major tributaries (like the West Branch of the Sheepscot and the West Branch of the Narraguagus River). It is likely that acidic episodes are most important in the smaller tributaries and/or are limited to the more extreme weather events (Haines, 1981).

The high pH and alkalinity of Cove Brook suggests that there is a source of carbonate rock in this watershed. The pH of water that is in equilibrium with the partial pressure of atmospheric CO2 and in equilibrium with carbonate minerals is 8.2 (Norton, 1982). Carbonate rocks are not common in Maine. Only 0.5% of Maine surface waters have pH values in excess of 8.0 (Maine Volunteer Lake Monitoring Program website). Thus, Cove Brook is unique among the salmon rivers and is virtually unique in Maine.

Plans for Future Monitoring:

We plan to continue both baseflow and stormwater monitoring. In particular, we need to sample the more extreme stormwater events and continue to collect many samples per storm. Since pH, aluminum, and suspended solids vary greatly within a storm as well as between storms, it will clearly take more than one season to completely characterize the less normal events.

Also, since smaller tributaries can be more sensitive to acid rain events, we plan to focus more attention on tributaries. Venture Brook is an example of a naturally acidic tributary that might be sensitive to additional acidity from precipitation. Shorey Brook on the Narraguagus and Rocky Brook on the East Machias are also good.

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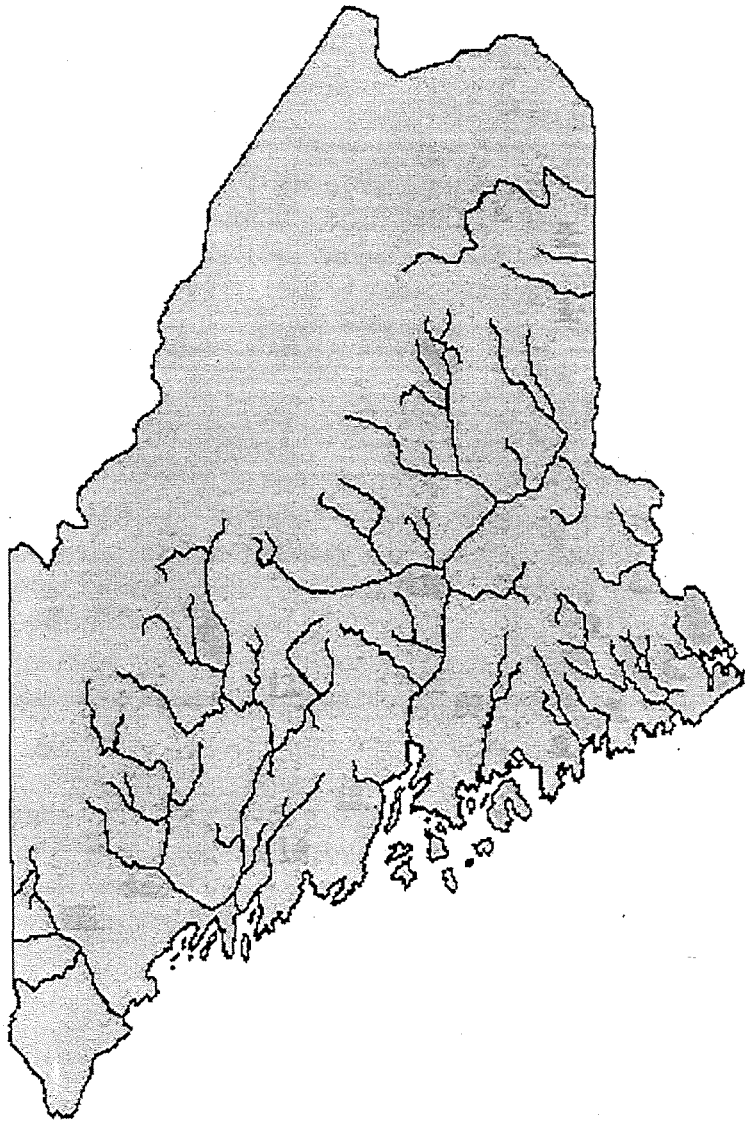
Individual River Reports

Summaries of Management and Enhancement Activities



Aroostook River

The Aroostook River is located primarily in Maine, but it is a tributary to the Canadian St. John River system, which enters the Bay of Fundy at the city of Saint John, New Brunswick. Management of Atlantic salmon in the Aroostook River is an international effort between the Maine Atlantic Salmon Commission (ASC), the Canadian Department of Fisheries and Oceans (DFO), Maine Dept. of Inland Fish and Wildlife (MDIFW), New Brunswick Dept. of Natural Resources (NBDNR), and a non-government organization the Atlantic Salmon for Northern Maine (ASNM).

Activities

1. Population Monitoring

a. Adult Trap Operations

Mactaquac Dam. The Canadian DFO operated a fish trapping and sorting facility on the St. John River at Fredericton, NB. Total MSW (multi-sea-winter) salmon returns to Mactaquac in 2001 (1204 fish) increased by over 100% compared to last year's record low returns but remained well below the 5-yr average. Returns of 1SW grilse dropped from 2,983 fish in 2000 to 1,669 in 2001. The low grilse return this year is predictive for decreased MSW returns in 2002.

Tinker Dam. PDI Canada, Inc. operated a fish trapping and sorting facility at their Tinker Dam Hydro Project on the Aroostook River in New Brunswick under an agreement with ASNM. They reported a total trap catch of 28 salmon (14 MSW and 14 1SW), which were inspected and released above the dam. The ASC notified IFW regional personnel that two landlocked salmon had been captured and released early in the season. This prompted the IFW regional biologist to request that all landlocked salmon encountered at the Tinker fish trap be excluded from entering the Aroostook River. The ASC worked cooperatively with IFW, DFO, and PDI to develop and implement a new sorting protocol, based on measured fish length, designed to identify and exclude landlocked salmon.

b. Electrofishing

A total sample of 30 brook trout was collect by electrofishing in three different Aroostook tributaries between Caribou and Fort Fairfield. The IFW fish health lab examined these fish for IPN disease, which is considered endemic in the New Brunswick portion of the St. John River but is not well documented in the Aroostook sub-drainage. All fish tested negative for IPN and other fish pathogens of regulatory concern.

2. Population Enhancement

a. Stocking

Juvenile Salmon. Approximately 180,000 Atlantic salmon fry were distributed in the Aroostook River between Masardis and Fort Fairfield by the ASNM. These fry were produced from the eggs of sea-run Atlantic salmon captured and held as broodstock by the DFO at Mactaquac. Importation of the eggs in 2001 was facilitated by a new disease screening protocol developed and implemented in 2001. ASNM retained and reared 250 of these fry at the Dug Brook Hatchery until August when they notified the ASC of their presence in the hatchery. The Dug Brook Hatchery does not posses the water quality certification and other permits required to operate as a rearing facility (only a hatching facility) and the ASC directed that the fish, now parr, be released immediately into the river. In consultation with the IFW, ASC staff assisted ASNM in releasing the fish in to Gardner Brook, a cold-water tributary to the Aroostook River.

Adult Salmon. DFO transported and released the annual Aroostook allotment of 50 sea-run grilse, obtained at the Mactaquac fish trap, into the river near the Maine-New Brunswick border.

b. Broodstock Management

The strategy developed in 2000 to individually test all broodstock on station, and isolate eggs lots was employed again in 2001. This procedure permits the segregation of healthy eggs from potentially diseased eggs, and increases the likelihood that eggs will be available for importation to the Aroostook program. A total of 25 MSW females were spawned with 25 males to produce an estimated 180,000 to 200,000 eyed eggs for transfer to the ASNM Dug Brook Hatchery early in 2002. Due to legislative changes, responsibility for issuance of the "License to Cultivate" (LIC) required by hatcheries shifted from the IFW to the ASC. The ASC developed a licensing procedure and issued LIC for the first time in 2001. The DFO and IFW are conducting the required disease testing of all Aroostook/St. John broodstock collected in 2001. Results are expected in early January. The ASNM has provided funding and contracted with the DFO to captive rear additional broodstock for the Aroostook program.

3. Habitat

a. Habitat Surveys

Habitat surveys were conducted on over 37 kilometers of the main stem of the Aroostook River between Ashland and the Washburn area. A team of four biologists surveyed over 30,000 metric units (1 unit = 100 sq meters) of the river to identify and map potential salmon habitat. The survey was discontinued in late August due to drought conditions. These data are currently be analyzed

b. Water Quality

A strategy of thermograph deployment and time series water temperature monitoring was developed cooperatively between the IFW, ASC, and Aroostook River Advisory Council.

Thermographs were deployed and recovered by IFW and ARAC personnel and data analysis by the IFW and ASC is in progress.

The ASNM succeeded in having the confluence of Gardner Brook dredged to restore the stream channel which had been altered by erosion and sediment deposits. The action was undertaken in an effort to improve fish passage in to this important cold-water refugia.

4. Fish Passage

a. Monitoring Fishways.

(see section 1.a.)

b. Fish Passage Consultation and Review

ASC consulted with the IFW and USFWS regarding required improvements to the fishway in the dam located on the Little Madawaska River. The Loring Development Authority is responsible for maintenance of the fishway but has not allocated funds for the repairs requested since 1997. The USFWS in consultation with the ASC is exploring options to obtain federal grants that may be applicable to repairs at the fishway. The impoundment created by the dam serves as the primary water source for the Loring property and is considered vital to the long-term development goals of the LDA. Transfer of dam ownership from the U.S. Air Force to the LDA was finalized in 2000.

5. Public Meetings and Outreach

ASC staff attended Aroostook River meetings with the Atlantic Salmon for Northern Maine organization, Aroostook River Advisory Council, and with the international St. John River Advisory Committee in St. John, New Brunswick.

Cove Brook

Cove Brook is located on the northern edge of Waldo County; one of its small tributaries originates in southern Penobscot County. Cove brook is a small tributary to the Penobscot River estuary located approximately 13 miles below the Veazie Dam (head of tide). Cove Brook flows approximately 16.5 km from its headwaters and drains a watershed of only 9.5 square miles in Winterport and Hampden. The National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) listed the Atlantic salmon population in Cove Brook as endangered on November 13, 2000. ASC staff conducted the following enhancement and management activities on Cove Brook in calendar year 2001.

Activities

1. Population Monitoring

a. Electrofishing

Juvenile salmon populations were surveyed by electrofishing at two sites on Cove Brook. The Pipeline and Back Winterport Road index sites (both in Winterport) were sampled during August at the beginning of the decline in water levels. There were no young-of-year (YOY) salmon or parr found at either site. Parr were captured in low densities during follow-up surveys above and below both of these sites. Biological data were obtained for age and origin determination as well as tissue samples for genetics analysis by the USFWS. Other attempts were made throughout the drainage to locate YOY salmon, but none was found. These data will be further analyzed during winter 2001-2002.

b. Redd Counts

There were three attempts to find redds in Cove Brook in 2001 (November 6, November 15, November 28). No salmon digging activity was observed during any sampling period. Extremely low flows in Cove Brook most likely precluded access by adult salmon to spawning grounds during 2001.

2. Habitat

a. Property Purchases or Conservation Easements

The Cove Brook Watershed Council meets monthly and is in the process of developing a Cove Brook Watershed Management Plan. The plan will address many environmental issues concerning the Cove Brook watershed. The Council has applied for tax-exempt status as a non-profit organization so it would be able to hold land through conservation easements. The Council has received a grant from the Grass Roots Foundation to hire an engineer to undertake a stream survey to identify areas of concern in the watershed.

b. Obstruction Surveys and Removal

Three obstruction surveys were conducted on Cove Brook during October to identify Atlantic salmon passage problems. A number of obstructions that blocked fish passage were observed between Baker Brook and the gravel pit above the Back Winterport Road. Many of these were compounded by extremely low flows throughout summer and fall. Six beaver dams were breached on three occasions within this reach to provide additional water flow to the lower river. On two occasions debris was removed to allow fish movement from pool to pool. Additional surveys will be conducted in spring 2002 to assess debris blockages after spring run off.

c. Water Quality

DEP is conducting a long-term suite of water quality parameters in Cove Brook. The purpose of the water quality-monitoring program is to provide baseline information. It is hoped that trends can be developed from information and environmental stressors identified. Cove Brook has the highest pH (range 7.2-8.2) and highest alkalinity (measured as Acid Neutralizing Capacity, or ANC, range 724-2350 ueq/L) of any listed salmon rivers. Only 0.5% of surface waters in the state have a pH greater than 8.0. All data will be analyzed by DEP during winter 2001 - 2002.

3. Meetings

ASC staff attended several meetings of the Cove Brook Watershed Council.

Dennys River

The Dennys River is located in eastern Washington County. Beginning at Meddybemps Lake it flows approximately 32 km to its confluence with Cobscook Bay in the Town of Dennysville. Cathance Stream is the only major tributary. The Atlantic salmon population was listed as endangered by the National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) on November 13, 2000. ASC conducted the following enhancement and management activities during calendar year 2001.

1. Population Monitoring

a. Adult Weir Operations

A weir, located at the head of tide in Dennysville, was operated from May 7 through December 7, 2001 to trap upstream migrating salmon for the purposes of evaluating the size of the wild run and to intercept escaped aquaculture fish. Seventeen wild fish were released upstream after measuring length, and taking scale and tissue samples. One of these was found dead near the weir several days later. The cause of death was unclear, but it appeared that an animal had dragged the fish partially out of the water. One fish of unknown origin was captured and released downstream.

Suspected aquaculture fish captured in the trap were either killed for disease sampling in accordance with ASC protocols, or released alive downstream to prevent upstream passage. We captured 65 suspected aquaculture escapees. Of these, 29 were killed, and the remaining 36 were released downstream. Of the 29 sacrificed fish 23 were sampled for disease and sexual maturity; in addition, we collected maturity data on three additional fish. Disease sampled fish were weighed, measured, scale sampled, tissue sampled for genetics and disease, and evaluated for maturity. The sex and maturity of the sampled fish were as follows: 4 mature females (one was spent), 15 immature females, 1 mature and 6 immature males. All tested negative for diseases.

We also captured seven surplus broodstock that had been released into the Denny's river estuary according to TAC recommendations. We released six of these fish downstream and one died in the trap of self-inflicted injuries. Another one of these broodstock was found dead downstream of the weir, an apparent victim of a predator.

b. Electrofishing

We electrofished 36 sites in the Dennys River drainage, collecting population estimate data for juvenile salmon at 29 sites and seven additional sites to collect parr for captive broodstock. The population estimate data collection efforts were structured around a Basin-wide Geographical Population Estimate (BGEST) sampling design. The drainage was divided into environmentally similar strata and electrofishing sites were randomly chosen within these strata. This approach allows us to more accurately estimate the juvenile population in the river and better evaluate the effects of environmental factors and management approaches on the juvenile salmon population.

c. Telemetry

We deployed 15 VR-2 automated ultrasonic receivers in the Dennys drainage and estuary to monitor movements of Dennys-specific pen-reared adult salmon released during October 2001. The VR-2 units were positioned to monitor fish movement to spawning habitat. Forty-three of the 75 fish released in the Denny's River were tagged with ultrasonic pingers. This was a continuation of the evaluation of the stocked pen-reared adults from last year. Data has recently been retrieved from these units and is currently being analyzed by NMFS. Ten of these units will be run over-winter and retrieved in the Spring, 2002.

We also retrieved the VR-20 (replaced by VR-2 units this year) units in Spring 2001 that were deployed in Fall 2000 to track over-winter movements of adults stocked in 2000. These data are being analyzed by NMFS. In addition, we surveyed the entire Dennys mainstem with a VR-60 telemetry receiver (allows live tracking) to find any fish that might still be residing in the river from the previous year. We did not detect any fish; however, this was done near the end of the expected battery life of the ultrasonic tags.

d. Reproductive Performance Evaluation

We developed a study to evaluate the gamete viability of the aquaculture reared adult salmon to evaluate their reproductive performance. This was done in cooperation with NMFS and the Center for Cooperative Aquaculture Research (University of Maine, Orono).

Twenty-six fish from the cohort stocked into the St. Croix in 2001 were evaluated for sexual maturity weekly, and once ready to spawn, were manually stripped of eggs and milt. The eggs were fertilized according to a mating scheme that allowed us to identify any parents with high rates of defective gametes. Fertilization rates were estimated after approximately 24 hours. Fertilization rates ranged from 85% to 100% with an average of 97%. However, more than half of the fish did not mature sexually, suggesting that the effective population of spawners may be significantly lower then the number of fish stocked. Further aspects of this study include an evaluation of an in-stream egg planting method and more detailed analysis of the development of these progeny through early life history stages.

We attempted to trap emergent fry on nine redds in May and June by placing fry traps over the redds. These were redds likely to have been constructed by pen-reared adults stocked into the Dennys the previous year. One trap was placed on a redd in Cathance Stream, where pen-reared adults were stocked and reproductive behavior closely monitored last year. The other fry traps were placed on redds in the mainstem. We caught one fry at the Cathance Stream site, and none in the other traps. Temperature data and embryonic developmental modeling indicated that the traps were placed when fry would have been expected to emerge. We subsequently excavated redds where traps were placed and found no indications of alevins or eggs. It is unclear if we missed the fry through a methodology weakness, or if our results indicate poor reproductive success. However, electrofishing in these same areas later in the year found low densities of

young-of-the-year, supporting our fry trapping findings and the low rate of reproductive behaviour observed in Cathance Stream.

e. Redd Counts

We conducted two redd surveys in fall 2001 on the Dennys River mainstem in an attempt to capture the spatial and temporal distribution of spawning, particularly by pen-reared adults released in October. We conducted more frequent redd counts on the lower section of the Dennys. We counted 71 redds distributed throughout the drainage, with increasing numbers over time, suggesting that fish moved from their release sites and that spawning continued later than expected. Lower Cathance Stream was surveyed once with no redds observed. We also found four redds downstream of the weir, in a short section of habitat between the weir and tidewater. These are likely redds constructed by suspected aquaculture escapees or broodstock released by Craig Brook National Fish Hatchery

f. Smolt Trapping

We operated a pair of experimental smolt traps built into the adult weir. The objective was to evaluate the traps as well as collect data on stocked and wild smolts. The traps did not perform very well and caught relatively few fish. However, we did collect useful data on the effectiveness of three smolt release sites. The traps are being redesigned by NMFS and will be re-tested in 2002.

2. Population Enhancement

a. Stocking

We stocked several life-history stages of salmon into the Dennys River including 49,801 smolts and 1,400 I+ parr in Spring 2001, 59,000 fry distributed into appropriate habitat throughout the drainage in May, and 16,522 0+ parr at two sites in October. Seventy-five pen-reared, river-specific adults (50 female, 25 male) were stocked in October.

In October, 31 surplus Dennys captive broodstock salmon, and, in December, 18 spawned out broodstock from CBNFH were stocked in the estuary according to TAC recommendations.

b. Broodstock Collection

We collected 159 parr via electrofishing for transfer to the captive broodstock program at Craig Brook. All fish were weighed, measured, and sampled for scales and tissue (genetics).

3. Habitat

a. Habitat Surveys

The mainstem habitat survey was completed in 1999 and in Cathance Stream in 2001. Other small tributaries still remain to be surveyed.

b. Habitat Enhancement

We did not conduct habitat enhancement in the Dennys drainage in 2001. An Instream Flow Incremental Methodology (IFIM) study was begun. The IFIM data will allow us to adjust water releases at the Meddybemps dam to optimize salmon habitat and optimally manage the water budget of the system. Kleinschmidt Associates has been contracted to do the IFIM and is expected to finish in 2002. ASC staff assisted in defining study reaches and helping Kleinschmidt staff locate sampling sites in the drainage.

The Dennys River Watershed Council and Project SHARE volunteers spent approximately 55 hours cleaning and improving passage conditions at two fishway locations on the Dennys River in 2001. They also installed two informational kiosks at popular access sites along the river.

c. Property Purchases or Conservation Easements

The ASC, in cooperation with the Lands for Maine's Future Program and International Paper Company closed on a deal in late 2001 whereby IP transferred ownership of most of the riparian habitat that they owned along the Dennys River and Cathance Stream to the ASC. This will allow the ASC to ensure, forever, the integrity of the streamside habitat along the Dennys River and will provide significant benefit to all fish and wildlife and especially Atlantic salmon.

d. Obstruction Surveys and Removal

While doing redd counts we also documented obstructions to fish passage. We did not record any fish passage problems on the mainstem. On Cathance Stream several passable and impassable and impassable beaver dams were noted during habitat survey. Extremely low water levels prevented fish passage into Cathance Stream. For this reason, we did not pursue obstruction removal further upstream on Cathance. We did not perform any obstruction removal in 2001.

ASC is cooperating with, and monitoring, a study on the effects of beaver dams and beaver dam removal by Dr. Alan Lewis at the University of Maine, Machias. The initial study proposal was reviewed and subsequent activities will have ASC participation.

e. Water Quality

The ASC recorded water temperatures with automated temperature loggers at 4 sites in the Dennys drainage. We will record over-winter temperatures at 2 of these sites. An extreme low water event occurred on November 2-4, the result of an illegal closing of the dam at Meddybemps Lake.

4. Public Meetings and Outreach

The ASC staff attended meetings of the Dennys River Watershed Council, Dennys River Sportsmen Club, Downeast Rivers Coalition, and Project SHARE. All of these organizations work on salmon habitat and riparian habitat issues in the Dennys River watershed. ASC staff and NMFS also met with the Meddybemps Lake Association in response to concerns

over low lake levels and implications of the endangered species listing. ASC staff also met with selectmen and planning board members in the Town of Dennysville to work out arrangements that will permit ASC to take title to lands currently owned by IP within town limits.

Ducktrap River

The Ducktrap River is located in Waldo County. It flows approximately 17 km from its source at Tilden Pond to its confluence with the lower Penobscot River esturary at Ducktrap Harbor in Lincolnville. Kendall Brook, Tucker Brook, and Black Brook are the only major tributaries. The National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) listed the Atlantic salmon population in the Ducktrap River as endangered on November 13, 2000. ASC conducted the following enhancement and management activities on the Ducktrap during calendar year 2001.

Activities

1. Population Monitoring

a. Electrofishing

The Black Brook index site on the Ducktrap River was sampled during early August prior to the onset of extremely low water levels. No young-of-year (YOY) salmon were found but a few parr were captured. We decided not to sample the Rte. 52 index site due to extreme low water levels that may have compounded stresses on the fish. Other surveys to locate YOY salmon were undertaken throughout the drainage, but none was found. This data will be further analyzed during winter 2001-2002.

b. Redd Counts

There were three attempts to document spawning in the Ducktrap River (October 30, November 14, November 28) in fall 2001. On November 14, brook trout were seen digging redds below the Rte. 52 Bridge. However, no salmon were observed. Extremely low flows in the Ducktrap River most likely precluded access by adult salmon to spawning grounds.

2. Habitat

a. Property Purchases or Conservation Easements

The Coastal Mountains Land Trust (CMLT) purchased two riverfront properties during 2001. The Dunton Tract is a 312-acre parcel that includes 4,390 feet of water frontage along the main stem and 2,258 feet along Black Brook. The second purchase, the Pottle Tract, is 188 acres with 2,425 feet of frontage on the main stem of the Ducktrap and 10,560 feet of shoreline along Tucker Brook. The addition of these properties brings the total of permanently conserved land along the Ducktrap River to more than 80% of the main stem river frontage and to 46% of the land along the three principal tributaries - Kendall, Black, and Tucker brooks.

b. Obstruction Surveys and Removal

We recorded a number of fish passage problem on the main stem below the Rte. 52 Bridge. Extremely low flows throughout the fall season compounded the effect of obstructions. Two beaver dams were breached on two occasions below Rte. 52 to provide some moving water through the lower river. On two other occasions, small amounts of debris were removed to provide flow through this reach. The Ducktrap Coalition and ASC staff worked to remove larger debris obstructions.

c. Water Quality

ASC recorded summer water temperature on the Ducktrap River at two sites: below the Rte. 52 and the Mill Road Bridges. The MDEP also collected water quality data from the Ducktrap. In addition to the summer collection of water temperature data, the ASC will also collect temperature data at one location throughout the winter months. All data will be analyzed during winter and spring 2001 - 2002.

3. Meetings

The ASC staff attended several meetings of the Ducktrap Coalition.

East Machias River

The East Machias River is located in Washington County. Originating at Pocomoonshine Lake, it flows approximately 59 km to its confluence with Machias River Bay in the town of East Machias. Beaverdam Stream, Northern Stream, Seavey Stream and Chase Mill Stream are significant tributaries in the drainage. The Atlantic salmon population was listed as endangered by the National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) on November 13, 2000. The Atlantic Salmon Commission (ASC), in an effort to restore the salmon, conducted the following enhancement and management activities in calendar year 2001.

Activities

1. Population Monitoring

a. Adult Weir Operations

The ASC obtained State and Federal permits to install a salmon weir on the mainstem of the East Machias River at the Gaddis pool site, just upstream of the Route 1 bridge. Local permitting issues have delayed installation of the weir until certain objections can be resolved.

b. Electrofishing

We electrofished four sites using a two-pass depletion method. We also collected 138 parr at three of these sites for use as captive broodstock. These data have been entered in a database and will be analyzed during winter 2001 - 2002.

c. Telemetry

Some of the 5 VR-20 automated ultrasonic receivers deployed during 2000 were kept in the river until March to monitor over winter movement of the 16 salmon with ultrasonic pingers. The VR-20s were recovered during March. Data has been retrieved from these and is currently being analyzed by NMFS. No new telemetry was done in the East Machias drainage for the year 2001.

d. Redd Counts

We conducted two redd surveys on the East Machias covering a majority of the available spawning habitat. We counted 3 redds, all located downstream from Round Lake.

2. Population Enhancement

a. Stocking

We stocked approximately 242,000 fry into appropriate habitat throughout the drainage in May. No smolts or pen-reared adults were stocked in the East Machias River this year.

In October 35 surplus East Machias captive broodstock salmon, and, in December, 52 spawned out broodstock from CBNFH were stocked into the estuary by USFWS according to TAC recommendations.

3. Habitat

a. Habitat Surveys

Habitat survey of the Mainstem from Hadley Lake to tidewater and Chase Mill Stream were conducted, as well as several overlay surveys, completing all major components of the East Machias habitat survey. These data will be added to the GIS habitat database.

b. Habitat Enhancement

We did not conduct habitat enhancement in the East Machias drainage in 2001, however, the East Machias Watershed Council and Project SHARE conducted some on site projects (see #4 below).

c. Obstruction Surveys and Removal

We documented obstructions to fish passage while on the river for other work. We did not record any fish passage problems on the main stem but some beaver dams on Northern Stream were breached prior to spawning season.

d. Water Quality

The ASC recorded water temperatures with automated temperature loggers at five sites in the East Machias drainage. We will record over-winter temperatures at 2 sites.

4. Public Meetings and Outreach

ASC staff attended meetings of the East Machias River Watershed Council, Downeast Rivers Coalition, and Project SHARE. All of these organizations work on salmon habitat and riparian habitat issues in the East Machias River watershed. We participated in several meetings with stakeholders concerning removal of the East Machias dam and powerhouse remnants. We discussed plans with watershed councils to build a bridge across a section of Munson Rips with watershed councils to minimize impact from fording ATV traffic on river habitat. Staff also attended E. Machias town planning committee meetings pursuant to local demands that a town building permit be acquired for the weir.

Kenduskeag Stream

Kenduskeag Stream drains an area of 214 square miles west of Bangor and is the largest lower Penobscot River tributary. Salmon have been found in many of the cool tributaries above Kenduskeag Village in recent years. These tributaries include French Stream, Black Stream, Pierre Paul Brook, Allen Stream, and Crooked Brook. The ASC, in cooperation with the USFWS, NMFS, MDIFW, PIN, USDA, and additional stakeholders, conducted the following enhancement and management activities in calendar year 2001.

Activities

1. Population Monitoring

a. Electrofishing

The juvenile salmon population on Kenduskeag Stream was surveyed via electrofishing at six locations during September to determine presence or absence of salmon. In an attempt to gather genetic samples for the USFWS, areas were electrofished where salmon had been found in recent years. No salmon were found at any location sampled in the Kenduskeag drainage.

b. Redd Counts

This was the first time redd counts had been done by ACS staff on the Kenduskeag Stream in recent years. Historic data, and communications with other biologists that had previously observed redds and/or electrofished areas of the Kenduskeag watershed, indicated that many areas have produced salmon young-of-the-year and parr. Thus, staff personnel were confident that they surveyed areas of the river and tributaries that had the most potential for adult spawning. No salmon redds or evidence of digging activity was found in 2001.

2. Habitat

a. Water Quality

Water temperature data were collected with thermograph units at two sites. With record low flows, the lower thermograph in the drainage may have been out of the water and data may be unusable. The second thermograph was placed in the stream at Kenduskeag Village. These sites were chosen in an attempt to separate the lower river from the upper river by temperature regime. The upper river at Kenduskeag Village is small and has greater canopy cover and spring water influences than the lower river, which is wider and more exposed, allowing for significant increases in temperatures. These data will be analyzed during winter 2001-2002.

b. Obstruction Survey and Removal

During October 2001, obstructions such as beaver dams or woody debris were located and either removed or breached for encourage salmon migration. We concentrated our efforts to the area below Kenduskeag village because the Kenduskeag watershed is such a large drainage. Numerous beaver dams were breached within this sixteen-mile area. Other beaver dams in the upper river were breached on fewer occasions to permit salmon migration or a surge of water to stimulate migration.

c. Habitat Protection

Dairy cows have used the area known as Bacon Mills, in the upper reaches of Kenduskeag Stream, as a source of drinking water and as a ford to reach pastureland. Money has been raised through several grants to protect this area of river by relocating the cows. In cooperation with the farmland owner, NRCS, USFWS, NMFS, and ASC staff erected a temporary two-strand electric fence to keep cows out of the stream. Alternate means of watering have been used as well as land protection along each side of the river. U. S. Fish and Wildlife staff spent time on the river and tributaries during 2001 recording GPS points of landmarks and habitat areas for updating habitat maps.

Kennebec River

The Kennebec River is the second largest river in Maine and is located portions of Somerset, Piscataquis, Kennebec, and Sagadahoc counties. It flows approximately 240 kilometers (km) from its source at Moosehead Lake to the Gulf of Maine at Phippsburg. Encompassed in its 15,540 square km basin, the Kennebec River has eight major tributaries and numerous small streams. The river has a small population of Atlantic salmon confined to the portion of the river and its tributaries below the first impassable dam at Waterville. ASC conducted the following activities in 2001 in an effort to document Atlantic salmon distribution and abundance in the lower river.

Activities

1. Population Monitoring

a. Electrofishing

We electrofished nine sites in five tributaries below Waterville (Bond Brook, Togus Stream, Sevenmile Stream, Messalonskee Stream, and Eastern River). Additionally, four sites were sampled in one tributary (Sandy River) above Waterville. This data will be analyzed during winter 2001 - 2002.

b. Redd Counts

We completed two redd surveys of the main stem of the Kennebec River between Waterville and Sidney and four of its tributaries (Bond Brook, Togus Stream, Sevenmile Stream, and Messalonskee Stream) between November 13 and December 5. No redds were found in 2001.

2. Habitat

a. Habitat Surveys

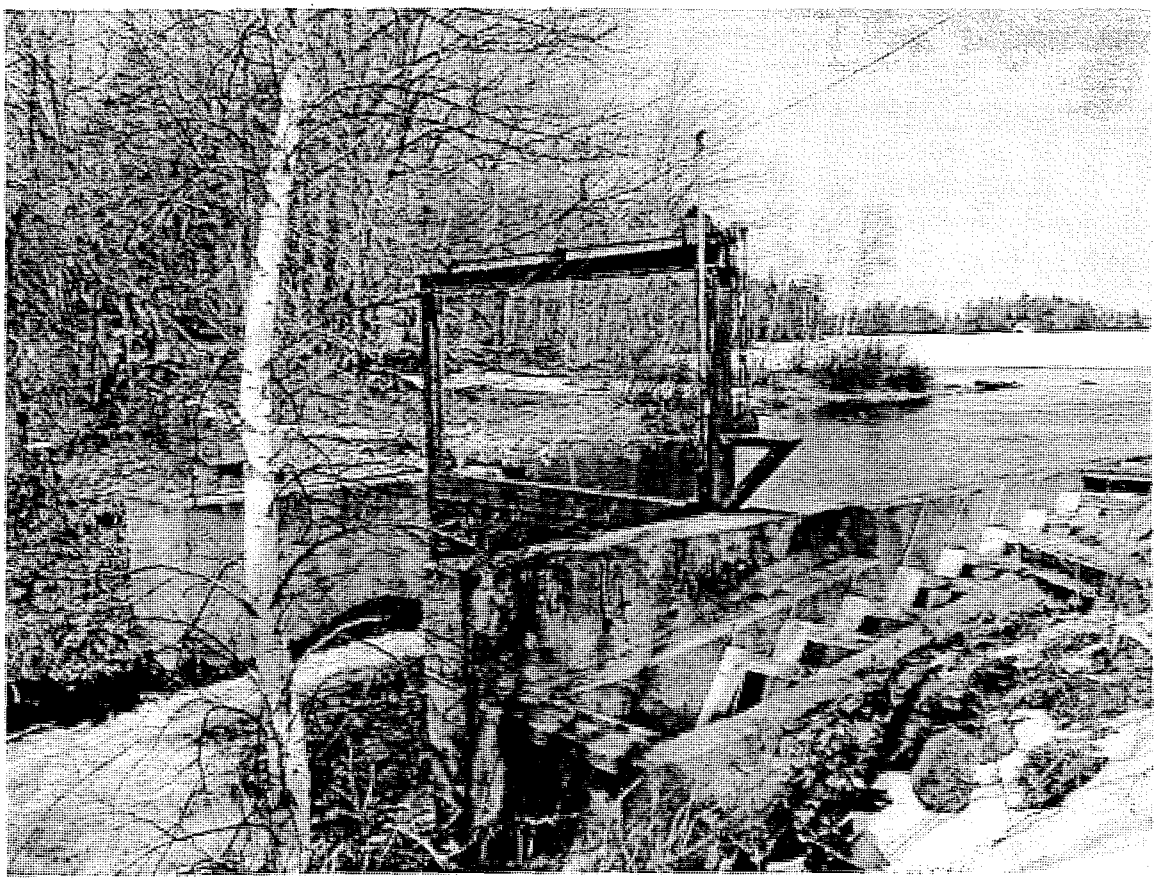
ASC conducted salmon habitat surveys on the main stem and tributaries of the Kennebec River to determine the amount of habitat that may exist for adult spawning and juvenile rearing in the basin. Surveys were conducted on the main stem from Waterville to Augusta and the following tributaries: Messalonskee Stream, Sevenmile Stream, Outlet Stream, as well as a partial survey on the Sandy River. The surveys encompassed approximately twenty-eight miles of riverine habitat. Habitat maps will be produced by USFWS in cooperation with ASC.

b. Temperature Monitoring

Data loggers were deployed in Sevenmile Stream, Messalonskee Stream, Twentyfive Mile Stream, Wesserunsett Stream, Sandy River and Carrabassett Rivers to record summer river temperatures. This data will be analyzed during winter 2001 - 2002.

2. Meetings

ASC staff attended numerous meetings and field events associated with the hydro relicensing of Abenaki and Anson (Madison Paper Industries), Lockwood (Florida Power and Light), Sandy River (Town of Madison), and Fort Halifax (Florida Power and Light) Projects. ASC staff spent considerable time analyzing and commenting on Maine Department of Transportation projects within the watershed.



Machias River

The Machias River is located in Washington and Hancock Counties. The river originates in Fifth Machias Lake and flows approximately 98 km to its confluence with Machias Bay in Machias. Major tributaries include Old Stream, Mopang Stream, and the West Branch Machias River. The Atlantic salmon population was listed as endangered by the National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) on November 13, 2000. The Atlantic Salmon Commission (ASC) conducted the following enhancement and management activities on the Machias River in calendar year 2001.

1. Population Monitoring

a. Adult Weir Operations

Planned construction of a counting and sorting weir and fish trap on the Machias River has been delayed. The adult population is primarily monitored via redd counts.

b. Electrofishing

Sixteen sites were electrofished in the Machias drainage in 2001. Five sites were full depletion population estimates, while the remaining eleven were one-run captures for broodstock collections. These data have been entered in a database and will be further analyzed during winter 2001 - 2002.

c. Redd Counts

We performed redd surveys on the Machias and its major tributaries. We located only 21 redds total, 16 in the mainstem and 5 in the tributaries. This count is lower than anticipated considering the number (104) of adult fish released into the Machias in addition to what wild fish may have returned from sea.

We also conducted a Spring redd count on the Crooked River in an attempt to document late spawning (after our Fall redd counts) by adults stocked in 2000. However, we did not find any redds on this survey.

2. Population Enhancement

a. Stocking

We stocked 267,000 fry distributed into appropriate habitat throughout the drainage in May, and 104 river-specific adults in October.

In October, 93 surplus Machias captive broodstock salmon, and, in December, 98 spawned out broodstock from CBNFH were stocked in the estuary by USFWS according to TAC recommendations.

b. Broodstock Collection

We collected approximately 272 parr via electrofishing for transfer to the captive broodstock program at Craig Brook National Fish Hatchery (CBNFH). All fish were PIT tagged, tissue sampled (genetics), and more than 100 were weighed, measured, and sampled for scales.

3. Habitat

a. Habitat Surveys

We conducted two overlay habitat surveys within the Machias drainage and determined the type of survey required for six additional tributaries: narrative, overlay, or full survey. These data will be compiled and entered into the ASC habitat database this winter. Full surveys were completed on most of the Machias drainage in 1998. These full habitat surveys on the mainstem have been a joint effort between the ASC and USFWS.

b. Habitat Preservation and Protection

The ASC has joined with The Nature Conservancy, the Department of Conservation, and International Paper to develop a permanent conservation easement along most of the main stem of the Machias River and several of its important tributaries. Negotiations are still underway and details not available at this writing. Nearly $10 million in State, Federal, and Private funds have already been committed to this important undertaking.

c. Obstruction Surveys and Removal

Obstruction removal was limited to Old Stream and the Crooked River. No other obstruction removal efforts were made in the year 2001. Obstructions to fish passage throughout the drainage were documented during redd surveys in the fall. We did not record any fish passage problems on the mainstem. We attempted to collaborate with the Machias Watershed Council to have them identify areas where obstructions were present. This collaboration was not successful (we did not receive any report back on obstruction locations). We will attempt to involve the watershed council more effectively next year.

d. Water Quality

The ASC recorded water temperatures with automated temperature loggers at nine sites in the Machias drainage. We will record over-winter temperatures at three of these sites.

4. Public Meetings and Outreach

The ASC staff attended meetings of the Machias River Watershed Council, Downeast Watershed Coalition, and Project SHARE. All of these organizations work on salmon habitat and riparian habitat issues in the Machias River watershed. Volunteers spent 30 hours improving conditions at 2 locations where non-point pollution problems had been identified. They also planted bank-holding trees along one stretch of Dan Hill Brook, a tributary to the Machias. Six informational kiosks were also installed and maintained along the Machias by watershed council volunteers.

Narraguagus River

The Narraguagus River is located in Washington and Hancock Counties. It flows approximately 78 km from its source at Eagle Lake in TWP 34MD to tidal waters in Cherryfield and from there into Narraguagus Bay at Milbridge. The West Branch Narraguagus is its principal tributary. The Atlantic Salmon Commission (ASC) conducted the following enhancement and management activities in calendar year 2001.

1. Population Monitoring

a. Adult Monitoring Operations

We operated a fishway trap at the Cherryfield ice control dam from 1 May through 21 November to trap upstream migrating adults to monitor the wild adult run and to intercept any escaped aquaculture fish that may enter the river. We captured 30 naturally-produced sea-run salmon and two adults salmon that were stocked as smolts in the Narraguagus River. We captured no salmon suspected to be aquaculture escapees in the Narraguagus River in 2001. This year's trap catch represents an increase of 11 salmon from the 2000 catch of 21 sea-run salmon.

b. Electrofishing

We electrofished 40 sites in the Narraguagus drainage, and obtained multiple-pass population estimates at 32 of these. Parr were scarce or absent at five sites, where we sampled juvenile salmon with a single pass. These data have been entered into an electronic database, that is presently being audited for accuracy. These data are used to estimate juvenile salmon abundance on a drainage-wide basis.

c. Redd Counts

We conducted a complete redd count on the mainstem and four tributaries to the Narraguagus River. The West Branch Narraguagus contains relatively little spawning habitat and is logistically impractical for redd counts. We counted 24 redds on the mainstem, 20 of which were located in the waters downstream of Beddington Lake (45 km upstream of tidal waters). No redds were observed in the four tributaries surveyed (Baker Brook, Gould Brook, Sinclair Brook, and Shorey Brook). This year's count is slightly larger than observed in 2000 (21 redds), and represents only about 5% of what is needed to assure full habitat utilization.

2. Population Enhancement

a. Stocking

We assisted in the distribution of approximately 353,000 fry into the Narraguagus River in 2001. These fish were the offspring of wild parr collected as brood fish from the Narraguagus in previous years and reared to maturity at Craig Brook National Fish Hatchery by the U.S. Fish and Wildlife Service. They were distributed throughout the drainage in a manner designed to minimize interactions with naturally produced fry during their first year in the river. Most of these fry were reared at Craig Brook National

Fish Hatchery, but approximately 45,000 Narraguagus River eggs were transferred to the Pleasant River Hatchery in Columbia Falls for rearing in winter 2001. Local volunteers and students distributed more than 40,000 fry from that facility into the Narraguagus River in May 2001.

b. Broodstock Collection

We collected 253 age-1 and age-2 parr via electrofishing for transfer to the captive broodstock program at Craig Brook National Fish Hatchery. We marked these fish with PIT tags, weighed and measured them, and we collected scale samples and tissue samples for genetics monitoring.

3. Habitat

a. Property Purchases or Conservation Easements

The habitat conservation efforts sponsored by the Atlantic Salmon Commission through the Quoddy Regional Land Trust are progressing on several fronts. No new parcels were protected in 2001 but several properties adjacent to important salmon habitats are being negotiated and should be completed in 2002.

b. Obstruction Surveys and Removal

We documented obstructions to fish passage while doing redd counts. Several beaver dams and debris jams were noted, and we manually breached several dams deemed obstacles to migration immediately prior to spawning by Atlantic salmon in November. Dam breaches are typically repaired by the beavers within a few days of occurrence. We observed more beaver obstructions in 2001 than in previous years, probably a result of the prevailing drought conditions this past year.

Passagassawakeag River

The Passagassawakeag River is located the Towns of Waldo, Belfast, Morrill, Brooks, and Knox in Waldo County. It flows approximately 25 km from its source at Lake Passagassawakeag (Brooks) to its confluence with the Penobscot River estuary at Belfast Bay in Belfast. Wescott Stream is its only major tributary. ASC conducted the following assessment activity during calendar year 2001.

1. Population Monitoring

a. Electrofishing

The Passagassawakeag River has had very little juvenile population assessment work in recent years. Extensive electrofishing surveys were undertaken during 2001 in an area just above head of tide to a rock bridge nearly 1.6 miles upstream. Parr were found in this section of river and scale samples were taken for later analysis. This data will be analyzed over winter 2001-2002.

b. Redd Counts

Two attempts were made to search for redds in areas of the lower Passagassawakeag River where they had been observed in previous years. No salmon digging activity was seen on October 30 or on November 14 in the lower Passagassawakeag River near the Doak Farm in Belfast.

Penobscot River

The Penobscot River drains an area of 8,570 square miles, spans seven counties, and is Maine's largest river system. Annual runs of 40,000 to 75,000 Atlantic salmon were possible prior to the 1800's but the current production potential for the river has declined to an estimated 4,000 to 11,000 adult fish due to habitat alteration and loss. Major tributaries to the Penobscot River include the East and West branches, Piscataquis, Passadumkeag, and Mattawamkeag Rivers. In addition, four significant tributaries enter the tidal portion of the Penobscot River: Kenduskeag Stream, Souadabscook Stream, Cove Brook, and Marsh Stream. The National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) listed the Atlantic salmon population of Cove Brook as endangered on November 13, 2000. The ASC, in cooperation with the USFWS, NMFS, MDIFW, PIN, USDA, and additional stakeholders, conducted the following enhancement and management activities in calendar year 2001.

Activities

1. Population Monitoring

a. Adult Trap Operations

Veazie Dam. We operated a fishway trap at the Veazie hydroelectric dam from May 8 through November 5 to capture upstream migrating adult Atlantic salmon. We monitored and collected biological data from the adult salmon run and collected salmon for brood stock use to supply production needs for Penobscot eggs at the Craig Brook and Green Lake National Fish Hatcheries. We captured a total of 786 adult salmon in 2001, which represented an increase of 251 fish from the 2000 catch of 535. We captured one salmon suspected to be an aquaculture escapee in the Penobscot River, and disposed of it in accordance with ASC policy. We released 277 salmon to the river to spawn naturally and transported the remainder (502 salmon) to Craig Brook NFH for use as brood stock.

Weldon Dam. The Great Northern Paper Company operated an Atlantic salmon trap at the fishway of their Weldon dam facility under an existing agreement with the ASC. This trap, located 60 miles upstream from Bangor, facilitates a count of spawning escapement for salmon that have successfully passed all five main stem dams. The trap was operated daily from June 10 to October 31, 2001, with a total catch of 13 grilse and 7 MSW salmon. All fish were counted and permitted to swim from the trap without additional handling to minimize stress.

b. Electrofishing

The process of organizing and entering archival Penobscot River electrofishing data in to a new Access database was initiated and will continue through the winter months. Fieldwork in 2001 focused on habitat survey work and no electrofishing surveys were undertaken in the upper watershed.

c. Redd Counts

The Upper Watershed. Annual redd count surveys are not usually conducted in the Penobscot watershed upstream of the Veazie dam due to the reliability of population data collected at the Veazie fishway trap, the relatively low spawning escapement, and the physical difficulties in obtaining an accurate estimate on such a large river.

2. Population Enhancement

a. Stocking

Only 360,000 fry were available for stocking in 2001 due to poor adult returns and limited broodstock availability the previous fall. Fry were stocked into select reaches of the Piscataquis, Pleasant, and East Branch tributaries in May of 2001. These fry releases incorporated a "genetic tagging" technique, first implemented in 2000, which should significantly improve the opportunity to evaluate and modify stocking practices. A total of 454,000 smolts was stocked, including those targeted for research projects regarding migratory behavior and experimental smolt release ponds. Approximately 236,000 parr produced as a bi-product of the smolt-rearing program were released into the main stem Penobscot, Mattawamkeag, Piscataquis, and Pleasant Rivers as a stock enhancement measure. All parr were marked and distributed in manner that would minimize conflict with other management or research activities.

b. Broodstock Collection

We collected 502 sea-run adult Atlantic salmon at the Veazie fishway trap and transported them to the Craig Brook National Fish Hatchery. We marked all of these fish with PIT tags (miniature versions of the Maine Turnpike *Transpass* transponders) to allow for individual identification at spawning. We also measured all fish and collected scale samples and tissue samples for genetics monitoring. Because of concerns about transmission of the viral disease ISA, blood samples were taken from a portion of the incoming brood fish for pathology testing. None of the salmon tested from the Penobscot River were confirmed positive for ISA, although one fish gave a false positive in the preliminary testing, which was proven negative through viral culture. Despite unusually warm river temperatures at the time of broodstock collection, only 6 brood fish (1.2% of the broodstock) collected from the Penobscot River died prior to the autumn broodstock disease sampling and sorting procedures at the hatchery, which is similar to mortality in previous years.

3. Habitat

a. Habitat Surveys

New habitat survey methodology were developed and implemented in 2001, resulting in greatly increased productivity while maintaining the level of detail required for effective salmon management. Large expanses of the habitat in the East Branch Mattawamkeag River, West Branch Mattawamkeag River, Piscataquis River, and East Branch Penobscot River were surveyed and mapped for salmon potential.

b. Water Quality

The ASC enlisted the aid of Bangor area salmon clubs to deploy a network of temperature monitoring stations throughout the drainage. The Penobscot Indian Nation assisted by loaning the ASC sampling equipment for the effort. These data will be of particular interest given the exceptionally harsh drought observed in 2001.

4. Fish Passage

a. Monitoring Fishways.

Effective fishway operation is essential for returning salmon to pass dams and access headwater spawning areas. Fishways at main stem dams were inspected on a routine basis in order to ensure proper operation and confirm operator compliance with appropriate maintenance procedures. Fishways on tributaries were generally inspected less frequently, unless problems were identified that required attention. Improper fishway maintenance and operation practices were identified on a few occasions at the upper and lower dams in Dover and the owners were instructed to correct those problems. ASC consulted with IFW staff and inspected a new fish ladder installed on the Great Works stream dam to rectify problems with the new installation.

b. Fish Passage Consultation and Review

Staff participated in reviews/consultations regarding downstream passage studies at the West Enfield project and Weldon Dam projects. Staff also provided on site consultation to conservation groups interested in Penobscot River fish passage issues. ASC staff provided consultation and assistance with on site inspection of potential study sites for a proposed "pit tag" fish passage study. Participated in two meetings with the Matagamon Lake Association to develop an East Branch Water Management Plan and coordinate repairs to the Matagamon Dam fishway through the Coastal America Partnership Program.

Pleasant River

The Pleasant River is located in Washington County. It originates in Pleasant River Lake and flows approximately 45 km to the head of tide in Columbia Falls. Tributaries include the Eastern Little River, Western Little River, and Bog Brook. The Atlantic salmon population was listed as endangered by the National Marine Fisheries Service (NMFS) and the U. S. Fish and Wildlife Service (USFWS) on November 13, 2001. The ASC conducted the following enhancement and management activities on the Pleasant River in calendar year 2001.

1. Population Monitoring

a. Adult Weir Operations

A weir, located slightly upstream of the Route One bridge, was operated from May 14 to November 14 to trap upstream migrating adults for the purposes of evaluating the size of the wild adult run and to intercept suspected escaped aquaculture fish. Eleven wild, multi-sea winter fish were released upstream after measuring length, and taking scale and tissue samples for genetic analysis. The run was spread out through the trapping season with the majority being captured in June. No suspected aquaculture fish were captured.

b. Electrofishing

ASC personnel electrofished three sites in the Pleasant River drainage to estimate parr abundance. We captured only one parr in the Pleasant this year. Low adult returns in recent years and lack of stocking enhancements likely account for the depressed population numbers.

c. Redd Counts

We conducted redd surveys on the lower reaches (from Saco Falls to the Route One bridge) of the Pleasant River and counted three redds. This count should be considered a minimum estimate because redd counting in the Pleasant is difficult due to very dark water. Additionally, extreme low water conditions prevented surveying the upper reaches. However, also due to low water we believe that salmon were unlikely to pass upstream of Saco Falls.

2. Population Enhancement

a. Stocking

No Atlantic salmon were stocked in the Pleasant River in 2001. None was available for stocking due disease issues in Pleasant River captive broodstock in 1998. Currently broodstock collected as smolts are being reared at Craig Brook National Fish Hatchery in an effort to re-start the Pleasant River fry stocking program.

ASC staff investigated an accidental release of juvenile salmon resulting from a failure of an oxygen augmentation device at the Deblois Hatchery operated by Heritage Salmon. We believe some salmon escaped but we were unable to verify the number. Electrofishing immediately downstream of the hatchery on Bog Stream, a tributary of the Pleasant, showed that salmon were present, but in seemingly low numbers. Hatchery

staff was unable to provide an estimate of the number of fish that may have escaped because most of the fish died on station.
Staff also investigated a purposeful dumping of chlorine at the Deblois Hatchery. An employee dumped an unknown amount of a chlorine substance into the settling pond at the hatchery in an attempt to kill either fish or pathogens. The substance apparently caused a fish kill in the settling pond and possibly downstream in Bog Brook. The chemical had dissipated by the time ASC and Department of Environmental Protection arrived, and there was no sign of dead fish or other organisms. The magnitude of the effects of this incident on the Pleasant River salmon population is unclear, but appear limited to upper Bog Brook.

b. Broodstock Collection

NMFS and ASC collected 15 smolts with the rotary screw smolt trap located in Columbia Falls. All were transferred to the captive broodstock program at Craig Brook National Fish Hatchery. All fish were sampled for biological information and PIT tagged

3. Habitat

a. Property Purchases or Conservation Easements

The Downeast Rivers Land Trust was formed in 2001 and acquired their first parcel of land on the Pleasant River. This parcel encompasses 70 acres with about 3,000 meters of shore frontage on the Pleasant and Eastern Little Rivers. A conservation easement on another property permanently protects another 1,000 meters of shore frontage in the same vicinity.

b. Water Quality

The ASC recorded water temperatures with automated temperature loggers at one over-winter site in 2000/2001.We used one logger in the water column and one buried in the substrate to study temperature phenomena related to frazzle ice conditions. We continue to record water temperatures via automated loggers at the weir (seasonal) and another site (over winter), as well as one other site with an automated temperature/pH/dissolved oxygen meter.

4. Public Meetings and Outreach

ASC staff attended several meetings of the Pleasant River Watershed Council, Downeast Watershed Coalition, Wild Salmon Resource Center, and Project SHARE. All of these organizations work on salmon habitat and riparian habitat issues in the Pleasant River watershed.

Volunteers spent 48 hours planting trees and improving riparian habitat along the Pleasant River in 2001. Volunteers also spent about 45 hours cleaning and repairing the fishway at Saco Falls on the Pleasant River. Habitat protection was assured through the acquisition of a piece of property with 3,000 feet of frontage on the Pleasant River and another 9,000 feet of frontage on the Eastern Little River, a major tributary to the Pleasant.

Saco River

The Saco River watershed drains an area of 4,395square kilometers (km); 2,253 square km in east-central New Hampshire and 2,142 square km in southwestern Maine (York and Oxford counties). The Saco River flows from its headwaters in the White Mountains of New Hampshire 64 km to the Maine border at Fryeburg were it flows an additional 137 km to the Atlantic Ocean in Saco and Biddeford. It has two large tributaries in Maine, the Ossipee and Little Ossipee rivers. The Saco River has a small Atlantic salmon population currently maintained by annual releases of hatchery stocks and limited natural reproduction. ASC and various stakeholders conducted the following activities in calendar year 2001.

1. Population Monitoring

a. Adult Trap

Florida Power and Light (FPL) currently operates three fish passage-monitoring facilities on the Saco River. The Cataract fish lift, located on the East Channel in Saco was operational from early May to late October. During 2001, 32 salmon were passed into the Cataract head pond from this facility. The Denil fishway sorting facility on the West Channel in Saco and Biddeford, was also operational from early May to late October and passed another 37 salmon into the head pond for a total of 69 salmon that entered the river. Another passage facility upriver at Skelton Dam opened in late summer and 31 salmon were recaptured and transported further upriver for release into the Ossipee River.

b. Electrofishing

The ASC, worked with the Saco River Salmon Club (SRSC), U. S. Fish & Wildlife Service (USFWS) and FPL, to electrofish 18 sites on 14 streams throughout the Saco River drainage. Two other streams were sampled by the Department of Inland Fisheries and Wildlife. Data will be analyzed during winter 2001 - 2001.

c. Redd Counts

ASC staff surveyed the portion of the Ossipee River from Kezar Falls downstream to the Saco River on November 19 and 20 and, with the aid of FPL personnel, below Skelton Dam on the main stem of the Saco River. Twenty-one redds were found in the Ossipee and eight below Skelton Dam.

2. Population Enhancement

a. Stocking

The SRSC, ASC, and USFWS stocked approximately 798,000 Atlantic salmon fry into the Saco River drainage in May 2001. Half of the fry were stocked into the Ossipee River and the remaining in 26 other tributaries. These fry, Penobscot River F2 stock, were all produced from eyed eggs provided to the SRSC by the ASC.

3. Habitat

a. Habitat Surveys

The ASC and USFWS worked with SRSC volunteers to establish a habitat survey program on tributaries to the Saco River. During fall 2001, two streams were surveyed by these teams.

4. Meetings

a. Saco River Salmon Club

ASC staff attended several monthly meetings in an effort to exchange information and keep informed on Club activities.

b. Skelton and Bar Mills Facilities

The ASC staff attended meetings concerning operation protocol for the new Skelton fish passage facility and the relicensing of Bar Mills Hydro Dam.

Sheepscot River

The Sheepscot River drains portions of Kennebec, Waldo, and Lincoln counties. The main stem, originating in West Montville, flows 55 kilometers (km) to the head of tide in Alna. The West Branch originates at Branch Pond and flows 24 km to its confluence with the main stem at Whitefield. The second largest tributary, the Dyer River, empties into the Sheepscot River estuary at the Town of Sheepscot. The Atlantic salmon population was listed as endangered by the National Marine Fisheries Service (NMFS) and the U.S. Fish & Wildlife Service (USFWS) on November 13, 2000. ASC staff, along with various stakeholders, conducted the following enhancement and management activities in calendar year 2001 on the Sheepscot.

1. Population Monitoring

a. Electrofishing

Four index sites were electrofished by ASC staff to assess juvenile Atlantic salmon populations. Additionally, two sites were jointly sampled by the Maine Department of Inland Fisheries and Wildlife (MDIFW) and ASC to assess Atlantic salmon, brook trout and brown trout populations. Data will be analyzed in winter 2001 - 2002 .

b. Smolt Trapping

ASC and NMFS, with help from the Sheepscot River Watershed Council (SRWC), initiated a smolt trapping program at Head Tide Dam in Alna to assess emigrating salmon smolts. All smolts caught were sampled for biological information and released alive. This data will also be analyzed during winter 2001 - 2002.

c. Calcein Marking

ASC, SRWC, and USFWS personnel used calcein to experimentally mark 30,000 fry stocked into the West Branch of the Sheepscot River. The object of the study is to evaluate mark retention and stocked fry performance. Calcein is a fluorochrome compound that chemically binds to the calcium in bony structures of fish and can be seen with the aid of special optical filters. Prior to stocking, fry were immersed in a calcein bath for approximately three minutes facilitating the uptake of calcein. To evaluate the effectiveness of the mark, marked fry were stocked in the West Branch along with equal numbers of unmarked fry. When these fish are recaptured as older fry and parr it will be possible to determine the effectiveness of the mark and its potential for use in research and management. Four electrofishing crews recaptured fry over a two-day period in late summer. This data is currently being analyzed.

d. Redd Counts

Spawning habitat was surveyed by ASC staff between November 6 and December 4, 2001. Two surveys were conducted on the West Branch of the Sheepscot River from Dirigo Road to the main stem. Two surveys were also done on the main stem from Somerville Bridge to Head Tide. Another survey was completed on the upper main stem from the Palermo Fish Rearing Station to the Waldo-Lincoln County line. Four redds

were found between Whitefield and Alna and fourteen below Head Tide Dam. No redds were observed on the West Branch.

2. Population Enhancement

a. Stocking

ASC and USFWS stocked two life history stages of salmon into the Sheepscot River during 2001. During April and May, 170,000 fry were released in the main stem and 60,000 in the West Branch. Additionally, 80 surplus river specific adults from the Craig Brook National Fish Hatchery brood stock pool were released below Head Tide on October 24 and December 4. These fish may have contributed to the number of redds observed below Head Tide.

b. Broodstock Collection

ASC and USFWS collected 140 parr by electrofishing for transfer to the captive river specific brood stock program at the Craig Brook National Fish Hatchery.

3. Habitat

a. Habitat Improvement and Protection

Various efforts were made by state agencies and nongovernmental groups (NGO's) to assess, protect, and enhance habitat throughout the Sheepscot drainage. The Sheepscot River Watershed Council (SRWC) completed eight remediation projects, four of which were Non-Point Source (NPS) sites, removal of an Overboard Discharge (OBD) and drainage repair in Alna, tree planting in Weeks Mills, and road repair in China. Additional projects of the SRWC included the establishment of a site in Windsor where 600 trees were planted for their use during future remediation activities.

The SRWC also worked in conjunction with other organizations and state agencies. The SRWC and the Kennebec Soil and Water Conservation District (KSWCD) 319 Project coordinated efforts to repair eight individual road sites established as detrimental to the watershed. Of the eight sites that were repaired, five were found on roads under the jurisdiction of the Maine Department of Transportation (MDOT), an additional two under the towns of Windsor and Palermo and one under the Branch Pond Association. The SRWC worked with state and federal agencies, Trout Unlimited, and the Town of Whitefield to address issues concerning fish passage at Coopers Mills Dam

The Sheepscot Valley Conservation Association (SVCA) completed a remediation project at Maxcys Mills by planting 500 trees in the riparian zone. They also protected several plots of land from development, including eight acres in Alna and 27 acres in Palermo through land acquisition. The Wellspring Land Alliance also purchased 100 acres in the headwater regions above Sheepscot Pond. to enhance protection of the Sheepscot watershed.

The MDOT repaired several roads in the towns of Kings Mills, Newcastle, Alna, and Whitefield where there were watershed concerns.

SRWC activities included a co-sponsored public forum on the Atlantic salmon endangered species listing. The forum, held in March, included representatives from NMFS and ASC. In August, the SRWC released its first issue of the *Council News* with an initial distribution of 1,200 copies mailed to various watershed stakeholders; in September they hosted the Second Annual Open House at the Windsor Town Hall. The SRWC, with the help of ASC staff, coordinated efforts to educate and promote Atlantic salmon issues by installing an educational kiosk built by Wiscasset High School students at Head Tide Dam in Alna. The SRWC also worked with Project SHARE (Salmonid Habitat And River Enhancement) to organize a tour on October 4th for state and federal agencies to become familiar with problems in the Sheepscot River watershed. The SRWC also worked with NMFS to make endangered species posters for all 21 towns in the watershed to publicly be displayed in the town offices. Additionally, the SRWC joined with Waldo and Kennebec Soil and Water Conservation Districts to create a display at the Windsor Fair for public education.

The SRWC completed an outline for a watershed-wide management plan that will address all the issues in the watershed. This plan outlines various areas of importance from water quality and general function of the watershed to Atlantic salmon restoration.

The SRWC also aids the Department of Environmental Protection by monitoring pH, total phosphorus and storm water discharge. Other water quality samples collected during the 2001 field season included: dissolved oxygen, E-Coli, temperature, and river stage measurements. All of which were monitored bimonthly from May to October.

b. Obstruction Survey and Removal

ASC staff surveyed the main stem Sheepscot River on two occasions from Coopers Mills to North Whitefield between October 16 and October 23. An additional survey was made during these dates from North Whitefield to Head Tide in Alna. All beaver dams found were breached to facilitate salmon passage.

c. Temperature Monitoring

Eight data loggers were deployed throughout the Sheepscot River to monitor winter water temperatures, they will be collected and data analyzed in spring 2002.

4. Meetings

Watershed Councils

ASC staff attended bimonthly meetings of the SRWC and meetings associated with passage issues at Coopers Mills and another meeting concerning renovations to an historic mill at the outlet to Branch Pond.

Souadabscook Stream

The Souadabscook Stream is located in Penobscot County. It flows approximately 35 km from its source at Etna Pond in the towns of Etna and Carmel to its confluence with the Penobscot River in Hampden. Souadabscook Stream has a number of tributaries with the largest being the West Branch, Souadabscook Stream. Smaller tributaries include Wheeler Stream, Ward Stream, Black Stream, Harvey Brook, Tracey Brook, and Hill Brook. Souadabscook Stream had four small dams in the recent past: one hydro dam and three small flow control dams. Two of these smaller dams are still present but one has a slot cut into it to allow a year round concentrated flow. This dam is also used for an alewife trapping operation and an eel weir. The second dam is located above the Emerson Mill Road and is passable at normal flows. The hydro dam located directly under the Rte.1 bridge crossing in Hampden and another low head dam used to store water above the Hampden Recreational area were removed in 1999. The ASC conducted the following enhancement and management activities on Souadabscook Stream in calendar year 2001.

1. Population Monitoring

a. Electrofishing

Two electrofishing sites were sampled on Souadabscook Stream. The lower site was sampled in August during extreme low water levels. There was only one young-of-year (YOY) salmon found and parr were sampled in low densities. Other attempts were made throughout the drainage to locate yoy and parr, but none was found. This data will be further analyzed during winter 2001-2002.

b. Redd Counts

There were three attempts to find redds on Souadabscook Stream in 2001: (November 1, November 15, November 19). We did not find any redds or evidence of digging activity.

2. Habitat

a. Obstruction Surveys and Removal

A number of fish passage problems were recorded on the main stem below the Emerson Mill Road Bridge. The effect of these obstructions was compounded by excessively low river flows throughout the fall season. Five beaver dams were breached on at least two occasions through the section between Emerson Mill Road and Rte. 202 to provide some moving water attraction through the lower river.

b. Water Quality

ASC recorded summer water temperature on the Souadabscook Stream at two sites: below the Hampden Recreational Area, and above the Emerson Mill Road bridge. MDEP also collected water quality data from Souadabscook Stream. Water temperature data is also being recorded by the ASC from one location over winter. All data will be analyzed during the winter 2001 - 2002.

St. Croix River

The St. Croix is the easternmost river in the United States, and describes the Canadian-U.S. boundary from southern Aroostook to Washington counties. The 62 miles of boundary water from Vanceboro to Calais is the focus of current Atlantic salmon restoration efforts. The West Branch, which joins the East Branch to form the main river at Grand Falls Flowage, is intensively managed for inland game fish by IFW and not actively managed for Atlantic salmon. The production potential is estimated to be between 900 and 2600 adult fish and the 10-year restoration goal is for a spawning escapement of 300 mature fish. The St. Croix International Waterway Commission (SCIWC), Canadian Dept. of Fisheries and Oceans (DFO), New Brunswick Dept. of Natural Resources (NBDNR), NMFS, USFWS, IFW, DMR, and other stakeholders cooperated with the ASC to conduct the following enhancement and management activities in calendar year 2001.

1. Population Monitoring

a. Adult Trap Operations

Milltown Dam. The SCIWC captured 77 salmon, including 58 aquaculture escapees, in the fishway trap near the head of tide at the Milltown Dam; 19 were retained for broodstock. Two of the captured fish showed potential signs and an initial RT-PCR positive for ISAV infection (Infectious Salmon Anemia) and were lethally sampled. The fish were then re-tested with RT-PCR and also by the more reliable cell culture technique. Results of these tests showed the fish were not infected with ISAV.

b. Electrofishing

ASC and Canadian biologists cooperatively surveyed fourteen sites encompassing a 33 km section of prime salmon habitat where abundant spawning was observed in 2000. Densities of juvenile salmon were extremely low (> 1 salmon/unit) at all sites. Fluctuations in river water levels prior to sampling and the severe drought of 2001 may have contributed to the low densities observed.

c. Redd Counts

Teams of canoeist inventoried more than 50 kilometers of the St. Croix for salmon spawning activity during October, November, and December 2001. Experimental counts were also done from aircraft to evaluate this as a potential management tool. A total of 429 salmon redds was documented in the area between Spednic Lake and Grand Falls flowage. More were located in several tributaries to Spednic Lake. All redds were produced by the 524 captive-reared adult salmon stocked in the river in October 2001.

d. Smolt Trapping

The NMFS contracted with the SCIWC to initiate a smolt trap program on the St. Croix as a means of evaluating smolt production from the adult stocking experiment. ASC staff provided consultation and on site support for site selection and trap installation. One trap was operated in the Milltown fore bay area but river velocities proved inadequate for

consistent trap operation and no smolt were captured. The river was inventoried to identify alternative sites with improved flow parameters for 2002.

2. Population Enhancement

a. Stocking

Juvenile Salmon. The TAC approved a request by the SCIWC for 8,100 Penobscot origin smolts to facilitate a NMFS sponsored smolt trapping experiment in the St. Croix River. . An additional 6,300 age 0+ parr, reared by the SCIWC from St. Croix River broodstock, were distributed in prime rearing habitat in September.

Adult Salmon. In a unique cooperative effort between Atlantic Salmon of Maine Inc., an aquaculture company, and several government fisheries agencies, 524 large (up to 28 lbs.) sexually mature Atlantic salmon were stocked in the St. Croix River in October 2001. Appropriate release sites and densities were determined through analysis of habitat quality, quantity, and distribution. All salmon were tagged with an internal electronic "PIT" tag prior to stocking. Post stocking movement of these fish was also evaluated by documenting spawning distribution and by monitoring movements with a pit-tag antennae array installed at the Vanceboro fishway by the NMFS and SCIWC. Preliminary results indicate that the pit-tag detector in the Vanceboro fishway contacted 40% of the adults, which were stocked 16-33 km down river from the Vanceboro fishway. Combined with the spawning observations this indicates excellent post-release vigor and performance of the stocked adults.

3. Habitat

a. Water Quality

A variety of water quality monitoring activities was undertaken by the SCIWC and these data are currently being analyzed.

4. Fish Passage

a. Fish Passage Consultation and Review

Alewives have been denied access to their spawning areas in the St. Croix since the spring of 1995 by intentionally blocking the fishway the Woodland dam. The Maine Legislature passed legislation dictating this exclusion of alewives on behalf of local anglers who were concerned that the abundance of alewives had contributed to declines in smallmouth bass populations in the drainage. In spring 2000 a series of discussions and public meetings was held and a compromise reached between U.S. and Canadian fisheries agencies and other stakeholders that would allow a limited number of alewives (90,000) to pass upstream to spawn in the Grand Falls flowage for a 5-year trial period beginning in 2001. The proposed compromise to re-open fishways to permit passage of alewives was not approved by the Maine legislature. Canadian DFO responded by implementing a trap and truck program and moved 3,700 alewives to the Woodland flowage.

St. George River

The St. George River is located in Waldo and Knox counties. The river originates in Lake St. George, Liberty, and flows 56 kilometers through the towns of Searsmont, Appleton, Union, and Warren on its way to the sea in Thomaston. Although the occurrence of Atlantic salmon in this river is currently unknown, ASC conducted several investigations during 2001 in an effort to document the status of Atlantic salmon in the system.

1. Population Monitoring

a. Electrofishing

ASC staff sampled two sites in the section of the St. George River below White Oak Pond in Warren. No Atlantic salmon were found although large spawning redds were observed in this area in fall 2000.

b. Redd Counts

ASC staff surveyed the lower portion of the river near Rt. 90 in Warren on December 4, 2001. No redds were found.

2. Habitat

A temperature data logger was deployed at Rt. 105 in Appleton to record summer water temperatures. Data will be analyzed during winter 2001 - 2002.

3. Meetings

ASC staff attended several meetings associated with dam removal issues below Sennebec Lake on the St. George River. Property owners were assured that the ASC has no current plans to stock Atlantic salmon in this river and that any salmon population that might become naturally established would not automatically trigger an endangered species or critical habitat listing.

Union River

The Union River is the 19th largest River in Maine, draining 500 square miles of Hancock and Penobscot Counties before entering the sea in downtown Ellsworth. During the 1980's Atlantic salmon management in the Union drainage consisted of an annual smolt stocking and adult broodstock collection program. This program was discontinued after 1990 due to a lack of resources and unfavorable results. The current Union River salmon management program is a cooperative effort between the USFWS, the Pennsylvania Power and Light Company (PPL), Union River Association and the ASC. The following management activities were undertaken in 2000

1. Population Monitoring

a. Adult Trap Operations

Ellsworth Dam. The Ellsworth dam is 65 feet in height and is not equipped with an upstream fishway. Fish passage is provided by trapping fish below the dam and transporting them in tank trucks to upriver release sites. The trap is owned by the ASC but is operated in early spring by commercial fishermen who are permitted to harvest a portion of the alewives entering the trap. The drought of 2001 severely impacted trap operations at the Ellsworth trap. Due to excessive water temperatures, the trap was only operated two days between June and September. In September the first salmon, an apparent non-aquaculture salmon, was captured and trucked up river by PPL. Subsequent analysis of the scale sample from this fish confirmed that it was an aquaculture escapee. A second salmon, an obvious aquaculture escapee, was captured and released below the dam.

2. Population Enhancement

a. Stocking

Juvenile Salmon. No juvenile Atlantic salmon were stocked in the Union River in 2000. The eggs for this year's fry stocking were incubated at the Union River Salmon Association hatchery. Post-hatching the fry developed severe plankton growth on their gills and suffered 100% mortality. Analysis by the IFW fish health lab identified the plankton problem and determined that infectious agents (bacteria or virus) were not responsible. IFW prescribed a remedy for the plankton problem including changes to the hatchery's filtration system.

3. Habitat

a. Habitat Survey

The West Branch of the Union River was surveyed for potential salmon habitat in 2001. Crews surveyed the entire length of the West Branch, from Great Pond to Graham Lake, and these data are currently being analyzed. Results of the habitat survey will be used to refine stocking recommendations and other management actives

APPENDIX

Atlantic Salmon Commission
Public Advisory Panel

Name	Watershed	Affiliation
Gary Arsenault	Penobscot	Eddington Salmon Club
John Banks	Penobscot	PIN
Mike Butler	Cover Brook	Cove Brook Watershed Council
Marshall Demott	Kennebec	Kennebec Fly Fishers
Ken Castner	Saco	Saco Salmon Club
Scott Dickerson	Ducktrap	Ducktrap Coalition
Jo Eaton	Penobscot	Penobscot River Keepers
Tim Foster	Penobscot	Veazie Salmon Club
Mike Herz	Sheepscot	Sheepscot Valley Conservation Assoc.
Bob Hinton	Dennys	Dennys River Watershed Council
Bill Nichols	Presumpscot	Saco Salmon Club
Greg Ponte	Androscoggin	Androscoggin Watershed Council
Gary Sewell	Aroostook	Atlantic Salmon for Northern Maine
Matt Scott	Pleasant	Pleasant River Watershed Council
Charlie Shoppee	Narraguagus	Atlantic Salmon Federation
Donald Sprangers	East Machias	East Machias Watershed Council
Tom Whiting	St. George	Trout Unlimited
Barbara Witham	Union	Union Salmon Association
Gerry Zegers	Machias	Machias Watershed Councils

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Atlantic Salmon Conservation Plan for Seven Maine Rivers
Maine Atlantic Salmon Commission

Summary of Year 2001 Activities

Introduction

Year 2001 was the fourth year of the State of Maine's five-year plan to conserve Atlantic salmon populations in eight rivers. Each year the Atlantic Salmon Commission prepares a report to Governor King on progress and conservation activities. One can access the annual reports from the ASC's website (http://www.state.me.us/asa/ascp.html). Local volunteers, contractors, and agency staff constitute the Conservation Plan workforce. This past year landowners and other interested Winterport residents formed the Cove Brook Watershed Council, establishing a solid local group to address water quality and habitat issues along one of the Penobscot River's special tributaries. For the last several years the Atlantic Salmon Commission has strategically used its General Fund appropriation to provide local watershed councils organizational support and funds to tackle specific restoration and habitat protection projects (see budget page). The following is an abbreviated summary of conservation activities performed with assistance from the Atlantic Salmon Commission for 2001 above and beyond the fish management activities described earlier in this report.

Species Protection

- continued to operate weirs on the Pleasant and Dennys Rivers, intercepting over 60 cultured fish attempting to migrate upstream (see body of this report for details)
- participated in planning sessions with the aquaculture industry and non-governmental organizations to develop fish marking protocols and containment best management practices
- continued to monitor commercial fishing activities to reduce and eliminate by-catch of juvenile and adult salmon
- maintained the statewide prohibition on angling for Atlantic salmon

Habitat Protection

- continued to identify, document, and address non-point source problems along each of the rivers (74 sites identified in four downeast river watersheds, 40 remediated)
- permanently protected several riverfront miles and key riparian land bordering critical spawning and nursery habitat in the Dennys River
- helped a local land trust acquire 65 acres of important riparian land along the Pleasant River with the ASC obtaining a conservation easement on the same parcel
- continued collecting data for a low flow study of eastern rivers
- completed the Water Use Management Plan for the Pleasant, Narraguagus Rivers and Mopang Stream and began its implementation

- provided forest management assistance to woodlot owners in each of the eight river watersheds
- permitted eight water withdrawal applications in the unorganized territories using protective flow standards designed to safeguard Atlantic salmon habitat
- Funded a flow study on the Dennys River to better regulate river water levels in cooperation with lake front property owners on Meddybemps lake.
- permanently protected 500 acres that includes two miles of river frontage on the Ducktrap River and 2.5 miles of one of it major tributaries
- planned and completed 13 restoration projects that addressed non-point source pollution problems along the Sheepscot River
- continued, for the third year, monitoring water quality in each of the eight rivers

Habitat Enhancement

- planted several hundred trees to stabilize river banks and provide shade (eventually) on the East Machias River and its major tributary, Chase Mill Stream
- repaired damage from livestock grazing in an important riparian area and provided an alternate watering source for cattle at the same site
- constructed an ATV/snowmobile bridge that will keeps recreational vehicles from fording the Machias River and causing sediments that clog nearby Atlantic salmon spawning habitat

Budget of Expenditures and Results related to the Atlantic Salmon Conservation Plan Implementation for FY 2001

Using funds dedicated by the Legislature, the Maine Atlantic Salmon Commission (ASC) strategically used funds to further several of the Atlantic Salmon Conservation Plan's 14 goals. These funds have allowed the ASC to assist local conservation groups with their organizational needs and with specific habitat conservation projects. Other uses of these funds have included operating and maintaining two fish weirs and raising the State's capability to gather and analyze important field information related to Atlantic salmon survival. The following brief summary will provide a glimpse of the numerous conservation activities the ASC and its partners have initiated over the last year with the use of State of Maine funds.

I. Assistance to local conservation organizations

1) $147,500 to Project SHARE to assist them in hiring an Executive Director, a conservation project coordinator, and a technical resource assistant.

Result: Project SHARE has hired a full time executive director to raise funds and direct the non-profit organization toward fulfilling its mission. Project SHARE has also hired a full time project coordinator to work with local watershed councils to develop habitat restoration projects and a full time technical coordinator to assist watershed councils with computer and communication needs.

2) $20,000 to Coastal Mountains Land Trust to provide coordinating assistance to the Ducktrap Coalition.

Result: Coastal Mountains Land Trust devoted a staff person to working with the Ducktrap Coalition to develop and implement conservation programs and projects on the Ducktrap River. The DC has developed a watershed management plan and been instrumental in supporting several key habitat protection projects.

3) 22,000 to Time &Tide Resource Conservation and Development to provide coordinating assistance to the Sheepscot River Watershed Council.

Result: Time & Tide Resource Conservation and Development hired a full time staff person to work with the Sheepscot River Watershed Council to develop and implement habitat conservation projects.

4) $25,000 to the Quoddy Regional Land Trust to hire a habitat / land protection specialist charged with developing and carrying out habitat conservation projects along the downeast rivers. These funds leveraged an additional $25,000 from the National Fish & Wildlife Foundation.

Result: The Quoddy Regional Land Trust has negotiated a conservation easement and has several other habitat protection transactions in the works.

5) $20,000 to the Sheepscot Valley Conservation Association to hire a part-time habitat/land protection specialist charged with developing and carrying out habitat conservation projects along the Sheepscot River.

Result: The Sheepscot Valley Conservation Association hired a full time land protection specialist to work with landowners in the Sheepscot River watershed to secure long term habitat protection along the Atlantic salmon rivers as directed in the Atlantic Salmon Conservation Plan for Seven Maine Rivers.

6) $12,000 to Project SHARE to assist six local watershed councils with operational costs such as printing, mileage, telephone, meeting space, supplies, etc.

Result: Project SHARE has distributed $2,000 to each watershed council for operational and organizational support enabling these volunteer groups to focus on conservation projects.

7) $8,000 to the Cove Brook Watershed Council for the development of a watershed conservation plan.

Result: Cove Brook is identifying a handful of qualified consultants to help them prepare a watershed conservation plan they hope to complete during the fall (2001).

II. Conservation Projects

1) $60,000 to the Coastal Mountains Land Trust for the acquisition of riparian land bordering spawning and nursery habitat involving 1.5 miles of frontage on the main stem of the Ducktrap River and nearly two miles along tributaries.

Result: Coastal Mountains Land Trust (CMLT) used these funds to leverage other funds toward the purchase of 472 acres in the Ducktrap River watershed. CMLT purchased two parcels that front important salmon habitat on the main stem and on two tributaries.

2) $8,570 to Project SHARE to assist the Narraguagus River Watershed Council with two restoration projects to reduce non point source pollution in selected areas.

Result: The Narraguagus River Watershed Council (NRWC) is using these funds to leverage in-kind assistance to address several non-point source problems areas they identified along the Narraguagus River. They are actively working on these areas this summer.

3) $18,900 to Project SHARE to assist the Downeast Rivers Land Trust acquire riparian habitat at the confluence of Little River and the main stem of the Pleasant River.

Result: The Downeast Rivers Land Trust used these funds to leverage additional funds making the purchase of 65 acres bordering prime Atlantic salmon habitat possible. The Atlantic Salmon Commission holds a conservation easement on the property as a result of the transaction.

4) $2,500 to Project SHARE to produce an assessment and map of all the information available on non-point source problem areas along the Machias and East Machias Rivers.

Result: Project SHARE has produced a map and an assessment (using several existing sources of data) of non-point source problem areas on the Machias and East Machias Rivers.

5) $20,000 to the Sheepscot Valley Conservation Association for the development of a model conservation easement for riparian land bordering significant Atlantic salmon habitat and the development of several protection projects.

Result: The Sheepscot Valley Conservation Association (SVCA) has produced a model conservation easement targeting the protection of important riparian areas near significant Atlantic salmon habitat. SVCA is currently developing three projects using the model conservation easement that will protect Atlantic salmon habitat.

6) $7,000 to Time and Tide RC&D for a restoration project along the West Branch of the Sheepscot River to repair damage from livestock grazing in the riparian area and to provide an alternate watering source for cattle.

Result: With the cooperation of the farmer the Sheepscot River Watershed Council used the funds to restore and replant the damaged riparian area bordering the West Branch. Additionally, they installed a watering device to keep cattle from returning to the river. This eliminated a significant contributor of non-point source pollution on the West Branch.

7) $4,000 to the Washington County Soil & Water Conservation District for an erosion control project along the Machias River in Whitneyville.

Result: The Machias River Watershed Council is restoring a stretch of riverbank that is eroding due to an existing boat launch site. This will reduce sediments from entering the river.

8) $50,000 to the Quoddy Regional Land Trust to cost-share on the acquisition of riparian land bordering critical spawning and nursery habitat in the Dennys River.

Result: The Quoddy Regional Land Trust (QRLT) is continuing to negotiate with a landowner for the purchase of riparian land. The Atlantic Salmon Commission is contributing to the project with the understanding that these funds will leverage additional funds for the project.

9) $55,000 to Project SHARE to cost-share on the remediation of riparian land bordering nursery habitat and the construction of a bridge to keep ATVs and snowmobiles from running through the Machias River at Munson Rips.

Result Project SHARE and several partners are completing the designs of an ATV/snowmobile bridge that will keeps vehicles from fording the Machias River and causing sediments to clog nearby Atlantic salmon spawning habitat. These funds leverage additional cash and in-kind services for the project.

10) $1,000 to Project SHARE to purchase conservation field equipment.

Result: Project SHARE has hand tools that it routinely makes available to volunteers working to protect Atlantic salmon habitat.

11) $24,000 to riparian landowner at the East Machias weir site for an access easement and weir storage.

Result: The Atlantic Salmon Commission holds an easement on property bordering the Gaddis Pool providing access to construction workers and salmon biologists for the East Machias weir.

12) $50,000 devoted to operation and maintenance of the Pleasant and Dennys River weirs.

Result: The Atlantic Salmon Commission successfully removed and reinstalled the weirs on the Pleasant and Dennys Rivers during Fall 2000 and Spring 2001.

13) $10,000 to repair erosion sites impacting the Sheepscot River at Howe Road, Headwaters and Weeks Mills

Result: No result as yet. ASC recently made this grant award.

14) $10,000 toward the construction of an ATV bridge over the Narraguagus River to eliminate destruction of Atlantic salmon spawning and rearing habitat by irresponsible ATV use.

Result: No result yet. ASC recently made this grant award.

III. Information / Data collection

1) $10,000 to the US Geological Survey as part of a cost sharing arrangement to place and operate a gauge on the Pleasant, Machias, and Dennys Rivers.

Result: The Atlantic Salmon Commission executed an agreement with the USGS to place flow monitoring gauges on the Pleasant, Machias, and Dennys Rivers. These gauges allow biologists to monitor real time flows via a satellite link on the internet.

2) $13,000 to the Department of Environmental Protection for water quality monitoring equipment and research related to acid deposition and aluminum scaring of juvenile salmon tissue.

Result: These funds are being used as part of an ongoing research project conducted with the University of Maine to examine the link between acid rain and aluminum levels in the Narraguagus River.

3) $69,000 to the Champlain Institute to perform a GIS-based, information management system, prepare a pilot application, and train ASC staff on the use of the pilot.

Result: The Champlain Institute (CI) has begun to prepare a GIS needs assessment through a survey of Atlantic Salmon Conservation Plan partners. After interviewing numerous agencies and conservation organizations, CI will begin to design and information management system that will allow the Atlantic Salmon Commission to track progress on a large number on conservation projects and draw relations between various types of geographical data. CI's work will be completed during the winter 2002.