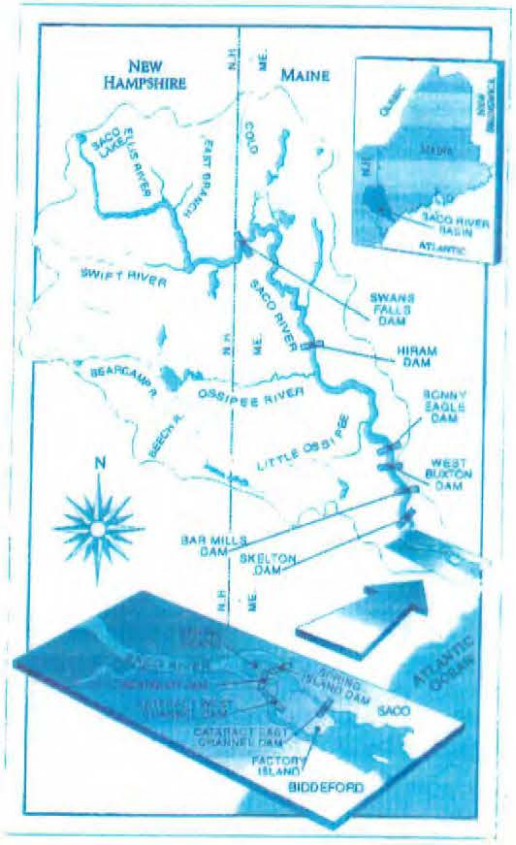
2000 ANNUAL REPORT

SACO RIVER
FISH PASSAGE ASSESSMENT PLAN



(Graphics from Florida Power & Light)

PREPARED IN ACCORDANCE WITH
SACO RIVER FISH PASSAGE AGREEMENT
ANNEX 1: ASSESSMENT CRITERIA

BY
SACO RIVER COORDINATING COMMITTEE
MARCH 2001

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FISH PASSAGE ASSESSMENT PLAN

Executive Summary

Beginning in July 1993, stakeholders in the Saco River basin hosted a series of meetings to negotiate a consensus plan for the construction of fish passage facilities at dams on the main stem Saco. The Agreement includes specific deadlines and criteria for constructing upstream fish passage facilities at Cataract and Skelton and provides assessment criteria for scheduling construction of upstream fish passage at Bar Mills, West Buxton, Bonny Eagle, Hiram, and Swans Falls. This report summarizes progress made towards addressing these criteria in 2000.

STATUS OF ADULT RETURNS AND HATCHERY RELEASES

There were no major operational problems involving upstream passage at the East and West Channel dams of the Cataract Project. Fish passage facilities in the form of locks continued for the fourth year at Springs and Bradbury dams. Fish passage efficiencies for American shad at Springs and Bradbury continued to be disappointingly low; returns of Atlantic salmon, river herring, and American shad are presented in Attachment 2 for the period 1993-2000.

Shad returns (1,323) were the third highest on record. In 2000, approximately 410 American shad were passed at Cataract during fish passage efficiency investigations at Springs and Bradbury, while 769 were trucked above these dams and 144 were taken to the Waldoboro shad hatchery. For the third consecutive year, adult shad were taken as broodstock, resulting in a release of 259,090 shad fry below Bar Mills.

River herring returns (25,136) were the second highest since 1993 when records were first maintained. These returns were about 6,000 less then the previous high of 31,070 in 1999, but much higher than the 1993-1999 average of 9,300. An unusual event in 2000 was that 18,694 -- 74% of the entire run -- were passed on June 2. A total of 16,693 alewives were transported to Skelton headpond.

In 2000, there were 50 documented returns of adult Atlantic salmon. While less than that of 1999, this was above the average of 42 for the 1993-1999 period. Atlantic salmon releases from 1990-2000, as well as corresponding adult returns, are presented in Attachments 2 and 3. Numbers of parr and smolts released have remained constant over the years, while releases of fry hatched by the Saco River Salmon Club have increased dramatically.

Several assessment criteria such as turbine mortality, attrition at multiple dams, and fallback were deferred for this assessment cycle and not specifically addressed during 2000.

The Saco River Anadromous Fish Restoration Program continues to be one that stresses partnerships among state and federal government agencies, nongovernment agencies, and the Licensee. FPL Energy (FPLE) and nongovernment agencies, such as the Saco River Salmon Club, provide the major initiatives behind this program, as the agencies are not funded to implement it adequately. The Saco River Coordinating Committee, through the Fisheries Agencies Advisory Committee, completed the final assessment and report for the 1996-1999 cycle in 2000.

2000 ANNUAL REPORT
SACO RIVER
FISH PASSAGE ASSESSMENT PLAN

Background

Beginning in July 1993, Central Maine Power Company (now FPL Energy) hosted a series of meetings to negotiate a consensus plan for fish passage facilities at dams on the main stem of the Saco River. The incentive for this plan was to assist in restoring populations of anadromous fish, including Atlantic salmon, American shad, and river herring; provide a structured, cooperative planning process; and determine how to best utilize available resources. Participants included Central Maine Power Company (CMP); Swans Falls Corporation; the U.S. Fish & Wildlife Service (USF&WS); the National Marine Fisheries Service (NMFS); the Maine Atlantic Sea-Run Salmon Commission (MASRSC), currently known as the Maine Atlantic Salmon Commission (MASC); the Maine Departments of Marine Resources (DMR), Inland Fisheries & Wildlife (IF&W), Environmental Protection (DEP), and State Planning Office (SPO); the Cities of Saco and Biddeford (Cities); a coalition of nongovernmental conservation organizations including the Saco River Salmon Club, Trout Unlimited, the Maine Council of Trout Unlimited, the Atlantic Salmon Federation, the Maine Council of the Atlantic Salmon Federation, and American Rivers, Inc.; the New Hampshire Department of Fish & Game; the Biddeford-Saco Water Company; and the Maine Energy Recovery Company.

The Saco River Fish Passage Agreement, dated May 24, 1994 (the Agreement), was signed by Central Maine Power Company (CMP), Swans Falls Corporation, and 15 other parties, including state and federal fisheries agencies, the Cities of Saco and Biddeford, and a coalition of conservation organizations to settle licensing issues relating to fish passage at seven hydroelectric projects on the main stem of the Saco River. The Agreement includes specific deadlines and criteria for constructing upstream fish passage facilities at Cataract and Skelton and provides conditions for scheduling construction of upstream fish passage at Bar Mills, West Buxton, Bonny Eagle, Hiram, and Swans Falls. Sections 6 and 14 of the Agreement require state and federal fisheries agencies to develop criteria for use in future assessments "to determine the need for timing and design of interim and permanent upstream fish passage facilities at Bar Mills, West Buxton, Bonny Eagle, Hiram, and Swans Falls."

In 1995, the agencies and other parties to the Agreement developed a document entitled, ***Annex 1: Assessment Criteria of the Saco Fish Passage Agreement*** (the Annex). The Annex is intended to address only upstream fish passage facilities or measures.

As described in the Annex, a Coordinating Committee comprised of representatives of all the parties to the Agreement is responsible for implementing the assessment process. In addition, a Fisheries Agency Assessment Committee (FAAC) comprised of the Maine Atlantic Salmon Commission, the Maine Departments of Marine Resources and Inland Fisheries & Wildlife, the U.S. Fish & Wildlife Service, the National Marine Fisheries Service, the U.S. Forest Service, and the New Hampshire Fish & Game Department, functions as the Executive Committee for the full Coordinating Committee. Typically, the FAAC prepares recommendations for the Coordinating Committee to review, revise, and accept by consensus.

The assessment process is designed around a four-year planning/data collection/ assessment cycle. The purpose of the four-year cycle is to plan for and collect appropriate data to prepare an Assessment Report in the fourth year, based on defined assessment criteria. The first cycle began in 1996 and ended in 1999, with an Assessment Report completed in 2000. The second cycle began in 2000 and ends with an Assessment Report in 2003. The criteria of the Saco Fish Passage Agreement for 2000-2003 was not completed by 2000; the Assessment for 2000 addresses the criteria established for 1996-1999. Additional cycles will be completed in 2007 and 2011.

This ***2000 Annual Report*** of the Saco River Coordinating Committee has been developed as part of the assessment process and leads toward the four-year 2003 Assessment Report. Its purpose is to document the status and progress of anadromous fish restoration on the Saco River for 2000 and to outline projected activities for 2001. In addition, proposed modifications to the Assessment Plan and process are noted for incorporation into future assessment cycles.

The annual meeting of the Saco River Coordinating Committee was held on March 21, 2001, at the Department of Marine Resources office in Hallowell, Maine, from 9:30AM to 2:30PM. Objectives of the meeting were to:

a) review study results from 2000
b) develop a work plan for 2001
c) develop format and content of 2000 Annual Report
d) discuss and refine the assessment criteria for 2000-2003 cycle

Minutes of the March 21, 2001 meeting were prepared by the Chairman and are on file. Attendees included: Sandra Lary (NRCS); Francis Brautigam (IF&W); Michael Brown, Tom Squiers, Lew Flagg (DMR); Paul Christman, Norm Dube, Joan Trial (ASC); Matthew LeBlanc, Bob Richter (FPL); Jerry Marancik, Larry Miller, Dave Bean, Ken Sprankle (USF&WS); and Mark Woodruff (Saco River Salmon Club).

Anadromous fish restoration activities for 2000 on the Saco River, as they address the following assessment criteria, are:

A. Trends in Population Size and Biological Characteristics - 2000

Matt LeBlanc distributed and reviewed the "2000 Cataract, Springs, and Bradbury Fishway Monitoring Results" (Attachment 1)

East Channel Fish Passage:

Upstream Passage

Opened May 1; Closed October 27, 2000

River Herring

23,112 river herring were counted May 4 - June 19: 16,391 were trucked above Skelton; 3,316 were trucked above Springs and Bradbury; and 3,405 were passed.

American Shad

1,049 American shad were counted June 2 - July 21: 769 were trucked above Springs and Bradbury; 136 were passed; and 144 were transported to the Waldoboro hatchery.

Atlantic Salmon

30 Atlantic salmon were counted from May 27 - September 18: 12 were trucked, 16 were passed, and two were mortalities.

West Channel Fish Passage:

Upstream Passage

Opened May 1; Closed October 27

River Herring

2,024 river herring were passed from May 7 - June 27

American Shad

274 American shad were passed from June 1 - July 5

Atlantic Salmon

20 Atlantic salmon were passed from May 11 - October 20

Springs and Bradbury:

Upstream Passage

Both upstream passages were open from May 11 - October 27

River Herring

A total of 5,429 river herring were passed through the East and West Channels: 2,809 were detected by an underwater video camera at Springs (52%); 339 were detected by an underwater video camera at Bradbury (6%).

American Shad
A total of 410 American shad were passed through the East and West Channels: 10 were detected by an underwater video camera at Springs (2%); 4 were detected by an underwater video camera at Bradbury (1%).

Atlantic Salmon
A total of 36 Atlantic salmon were passed through the East and West Channels: 3 were detected by an underwater video camera at Springs; 4 were detected by an underwater video camera at Bradbury.

Additional activities are contained in the ***2000 Cataract Fishways Report,*** which was distributed and is available from FPL. The new fish locks at Springs and Bradbury dams became operational in 1997, but have experienced a number of problems. In 2000, the efficiency of the locks for passing fish was still not as expected. The levels of known adult returns for Atlantic salmon, American shad, and river herring for the years 1993-2000 are presented in Attachment 2.

Electrofishing data collected in tributary streams indicated poorer survival of age 0+ salmon in comparison to 1999. However, age 1+ parr numbers were higher in 2000 than in 1999. The Saco River Salmon Club presented electrofishing data collected from sample activities conducted in Saco tributaries; population estimates are presented in Attachment 7.

DMR released 259,000 American shad fry into the Saco River below Bar Mills to compensate for the 144 adults transferred to the Waldoboro hatchery.

Plans for 2001
FPL will continue to identify and enumerate all species utilizing the Cataract fish passage facilities. The first 15,000 river herring will be passed upstream to evaluate the effectiveness of the Springs and Bradbury fish locks. Alewives will be trapped at the East side lift and trucked to the Skelton headpond until the escapement rate of 35/acre is reached; alewives will then be trucked and released above Springs and Bradbury.

The first 500 American shad will be passed to evaluate the effectiveness of the Springs and Bradbury fish locks. American shad will be trapped, trucked, and released to the river segment above Springs and Bradbury.

Atlantic salmon will be trapped/trucked and released into the Ossipee River, with some allowed to swim freely into the Cataract impoundment, depending upon water temperatures. Once the Skelton fish lift is operational, all Atlantic salmon will be allowed to swim freely into the Cataract impoundment. In addition, alewives, shad, and salmon using the West Channel fishway will be allowed to swim freely upriver.

FPL requested that it be allowed to pass a limited number of striped bass at the East Channel in order to facilitate the passage of Atlantic salmon into upstream habitats. The majority of striped bass passed would be in the 12-25 inch range and passage upstream would occur only when it would be impractical to easily separate the Atlantic salmon from the large numbers of stripers. IF&W has no objections at this time, provided this practice is used sparingly.

Monitoring studies will continue at the Springs and Bradbury fish locks. Work proposed at this site for 2001 include continued underwater video, flow alteration/ direction, and lighting. FPL proposed to pass 100-150 cfs into the tailrace of the upper dam (lock) to encourage shad passage. As previously stated, the first 500 American shad will be passed to evaluate the effectiveness of these modifications. Also, the first 15,000 river herring will be passed upstream.

For the 2001 field season, the MASC will be coordinating efforts with Saco River Salmon Club members, FPL, and USF&WS personnel to increase the number of Atlantic salmon fry stocking assessments. Three of the five Saco River tributaries that have been assessed will be discontinued and five new streams will be added.

B. Level of Recent Releases and Future Plans – 2000

In 2000, the Saco River Salmon Club released 599,000 Atlantic salmon fry into the Saco River and its tributaries; releases from 1990-2000 are graphically presented in Attachment 3. A spreadsheet summarizing releases of trout, American shad, Atlantic salmon, and landlocked Atlantic salmon in the Saco River (NH and ME) for the years 1990-2000 is included in Attachment 4. The 2000 report of the Saco River Salmon Club hatchery activities is also included in this attachment.

A summary regarding management activities for American shad and river herring, including a summary of American shad broodstock taken and released as they pertain to the Saco River, is included in Attachment 5.

Plans for 2001

Representatives from the state agencies, as well as the Saco River Salmon Club, will continue to examine potential conflicts between different fish stocking and management programs. Traditionally, 20,000 smolts have been allocated to the Saco River for fish passage evaluation and adult return enhancement. However, with low adult salmon returns to the Penobscot River in 2000, the Craig Brook National Fish Hatchery broodstock program did not meet its target of 600 spawners. Thus, the MASC recommended that smolts reared at the Green Lake National Fish Hatchery be stocked into the Penobscot. It is also unlikely that the Saco River will receive any parr in 2001. Approximately 748,000 Atlantic salmon fry will be stocked in the Saco and its tributaries in 2001 through a cooperative program between the Saco River Salmon Club, USF&WS, and MASC.

Tom Squiers (DMR) recommended that up to 10% of the adult American shad collected at the Cataract Project be allocated for use as broodstock in the Waldoboro hatchery. As mitigation for the removal of the adult shad from the Saco River system, it was recommended that 1,600 fry per adult removed be stocked into the Saco below Bar Mills. The rationale for this number was based on the number of adults returning to the Susquehanna River from hatchery releases (one adult per 400 fry released). It was also agreed that the natural expansion of the shad run might occur at a rate of 4:1 and thus, the fry release was quadrupled to maintain the projected expansion rate.

C. Fish Passage Efficiency - 2000

Proportional use of East and West Channel fish passage facilities for river herring, American shad, and Atlantic salmon are presented in Attachment 6. Fish lock effectiveness at Springs and Bradbury was lower than anticipated and could be attributed to a number of factors: flows through the Springs and Bradbury gates, which compete with those of the fish lock; possible natural passage through Springs and Bradbury gates; behavioral problems, such as inadequate imprinting to upriver locations; fallback to the estuary after exiting the East Channel fishway; or mechanical and/or flow problems associated with fish lock operation. Additional studies will be conducted in 2001 to gather information to help identify the reasons for low passage effectiveness.

Plans for 2001

Work proposed at this site for 2001 include continued underwater video, flow alteration/direction, and lighting. FPL proposed to pass 100-150 cfs into the tailrace of the upper dam (lock) to encourage shad passage. The first 500 American shad will be passed to evaluate the effectiveness of these modifications. In addition, the first 15,000 river herring will be passed upstream.

D. Turbine Mortality - 2000

The 1999 turbine survival studies at the West Buxton Project documented a 97% survival rate at Unit #6 (fixed propeller type) and an 85% survival rate at Unit #4 (Francis type) for salmon smolts. Passage through the bypass sluice combined with passage through the turbines accounted for a total projected salmon smolt passage survival rate of 96% during the 1999 studies.

The turbine survival study was methodically conducted utilizing state-of-the-art methods (i.e., Normandeau Associates HI-Z Turb'Tag) conducted under turbine flow settings representative of normal project operations for the project's fixed propeller and Francis units. The data collected mirrors that of numerous other turbine survival studies conducted throughout the country that documents that salmon smolt survival through fixed propeller units is generally over 90% and survival through Francis units is generally 80-85%. FPL believes that the West Buxton turbine survival study is complete and provided valuable information that helps us understand and evaluate all potential downstream passage options at the project.

Plans for 2001

Turbine studies will be conducted at Bar Mills in 2001. Tagging and release techniques will follow those used by Normandeau Associates for other turbine survival tests (Normandeau Associates, et al, 1996a; Normandeau Associates and Skalski, 1999) and elsewhere (Heisey, et al, 1992; Mathur, et al, 1996; Normandeau Associates, et al, 1995, 1996b, c, d). Fish anesthetized with MS 222 will be equipped with two uninflated balloon tags; tags will be attached by a stainless steel pin inserted through the musculature beneath the dorsal and adipose fins. Prior to releases through the induction apparatus, fish will be allowed to recover from anesthesia; they will then be placed individually into the induction system holding tub, tags will be activated, and the fish released. Operating conditions at the time of fish release will be recorded.

All tagged fish will be released via an induction apparatus that consists of a 75-liter holding basin attached to a 10-centimeter diameter hose. A continuous flow of river water is supplied to ensure that released fish move quickly through and exit the induction hose. Fish will be released into the Unit 2 intake at a point where they are fully committed to turbine passage. The release hose or pipe will be supported and secured to withstand the hydraulic forces.

A total of two separate turbine survival tests, each utilizing 30 fish, will take place. The two tests will evaluate the turbine survival of salmon smolts at the Unit #2 propeller unit under 100% and 50% gate. Additionally, 30 fish will be used to gather information on handling mortalities associated with tagging technique. Fish will be retrieved downstream of the station by boat crews. Recaptured fish will be placed into an on-board holding facility and tags removed; each fish will be examined for descaling and injuries and held for 48 hours to evaluate any delayed mortalities.

A draft report regarding the results of the study will be submitted to agency personnel for review and comment by January 31, 2002. The final report, including agency comments, will be submitted to FERC by March 31, 2002.

E. Degree of Attrition Due to Multiple Barriers - 2000

Nothing was done in 2000.

Plans for 2001

FPL will begin collecting data in 2001.

F. Habitat Suitability and Production Estimates - 2000

River temperatures and dissolved oxygen in the Saco River at the Cataract Project are reported in Attachment 8. Evaluation of the spring 2000 fry stocking of more than 615,000 fish was completed from August 16 -18, 2000 by U.S. Fish & Wildlife Fisheries Biologist David Bean, assisted by Florida Power and Light Company Biologist Matt LeBlanc and Technicians Dan Breed and Tim Arienti. Members from the SRSC and ASC Biologist Greg Mackey also assisted with collecting data for this

year's survey. The preliminary data collected shows good survival of young-of-the-year salmon (YOY) as well as good numbers of parr in the sites surveyed. The data is presented in Attachment 10.

Plans for 2001

To aid in future management decisions, habitat surveys will be initiated in the 2001 field season. The MASC and USF&WS will work with Saco River Salmon Club members to coordinate quantitative habitat surveys on several tributaries that are currently part of the fry stocking program. Electrofishing data will continue to be collected and compiled at approximately the same level as in the past.

Water quality: FPL will continue to collect data, but will not be collecting in the upper Saco or Ossipee Rivers; IF&W will continue to monitor temperatures in the Ossipee River.

In the summer of 1999, the first phase of a habitat improvement project below Skelton Dam was completed. Three four-foot boulders and two boulder clusters were placed along the west side of the river in a 500-foot stretch of river located upstream from where redds were observed during the past few years. This project was outlined in the ***Skelton Project - Draft Salmonid Habitat Enhancement Plan***.

G. Degree and Location of Salmon Fallback - 2000

No studies conducted.

Plans for 2001

No studies planned, but FPL will collect incidental data.

H. Comparison of Saco River with Other Rivers - 2000

FPL continued to add annual data to the Program Comparison Table, presented in Attachment 9.

Plans for 2001

Development of spreadsheets as presented in Attachment 9 will continue and be presented in the 2000-2003 Assessment Report.

I. Evidence of Limiting Factors - 2000

Some of these potential limiting factors were already discussed (i.e., water quality, interspecific interactions, etc.), but there were no specific studies addressed or discussed.

Plans for 2001

Deferred for this cycle; however, anecdotal information will continue to be compiled.

J. Effectiveness and Trap and Truck - 2000

Trap and truck appears to be effective in dealing with the low numbers of fish currently returning each year.

Plans for 2001

Electrofishing surveys for juvenile Atlantic salmon may be conducted to document fry resulting from natural reproduction.

K. Availability of Staff - 2000

Atlantic Salmon Parr Electrofishing: FPL personnel and Saco River Salmon Club members have been assisting USF&WS staff in electrofishing for salmon parr in the upper Saco River tributaries.

Public Tours at the Cataract Fishways: Public tours were again made available in 2000. Open public tours were given five days a week from May 15 to June 30, while educational and recreational group tours were provided throughout the year. Total tour numbers exceeded 1,200 people. Many group and individual tours commented that the Visitors' Center was a nice informative beginning to their fishway tour experience. A facility such as this has become a key tool in educating the public about the fishways and the Saco River in general.

Atlantic Salmon Federation Fish Friends Program: Again this year, FPL personnel will be assisting in the ASF's Fish Friends Program. This project distributes salmon eggs and incubators to local schools. Volunteers provide guidance and knowledge to school children about the Atlantic salmon's life cycle and history. Often a follow-up trip to the Cataract fishways rounds out the activity.

Upper Saco River Water Quality Data: FPL personnel have gathered dissolved oxygen and water temperature data on the Saco and Ossipee Rivers to assist in future evaluations of upper Saco River stocking sites, spawning locations, and year-to-year trends.

Plans for 2001

The MASC will increase its involvement by aiding in juvenile assessments, fry stocking, and overall handling protocols of adult salmon in the Saco River. Operations will continue to be on the same level as in past years of this assessment cycle. Program participants will continue to use a "partnership approach."

L. Interagency Coordination – 2000

The Saco River Salmon Club, USF&WS, MASC, and IF&W continue to work closely on the Atlantic salmon restoration program on the Saco River.

NRCS Saco River Watershed Activities: The Saco River Watershed received funds from the NRCS Environmental Quality Incentive Program (EQIP) to reduce nonpoint source pollution. Agriculture contributes to nonpoint pollution in the watershed due

to poor fertilizer and pesticide handling, soil erosion, improper manure handling and storage, and loss of riparian vegetation. Improvements to riverine habitat will result from installing waste storage and pesticide handling facilities, planting cover crops

on fields, and irrigation water management. Stream bank restoration, protection, and stabilization can also be conducted to improve habitat for fish and wildlife.

The three NRCS Conservation Districts in Oxford, Cumberland, and York Counties are currently working on U.S. Forest Service and Outdoor Heritage Sensitive Areas program grants that were provided for the Saco River riparian buffer restoration and enhancement projects. In 2001, funds were set aside for anadromous fish restoration projects in Oxford, Cumberland, York, and Androscoggin Counties from the NRCS Wetlands Habitat Incentive Program (WHIP). New Hampshire's Department of Fish & Game and the U.S. Forest Service are not actively participating in the program at this time, but are generally supportive.

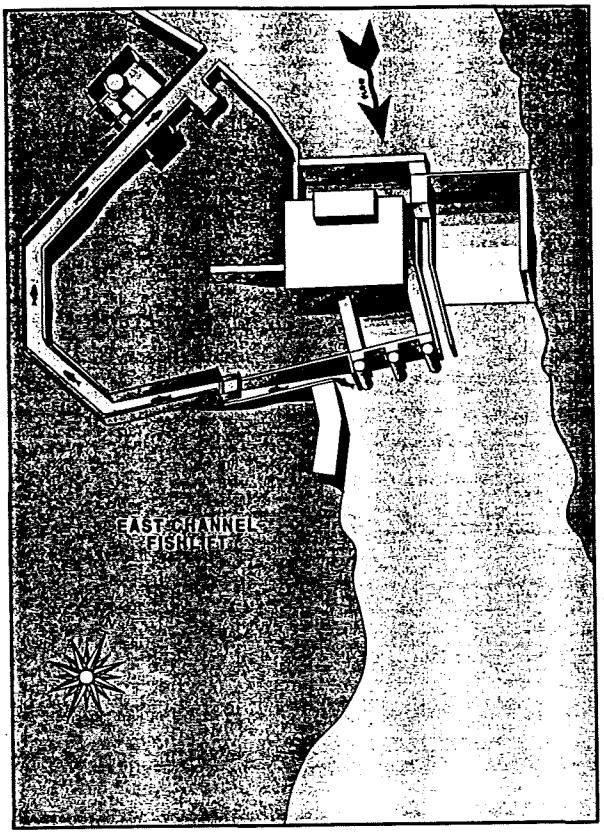
Plans for 2001

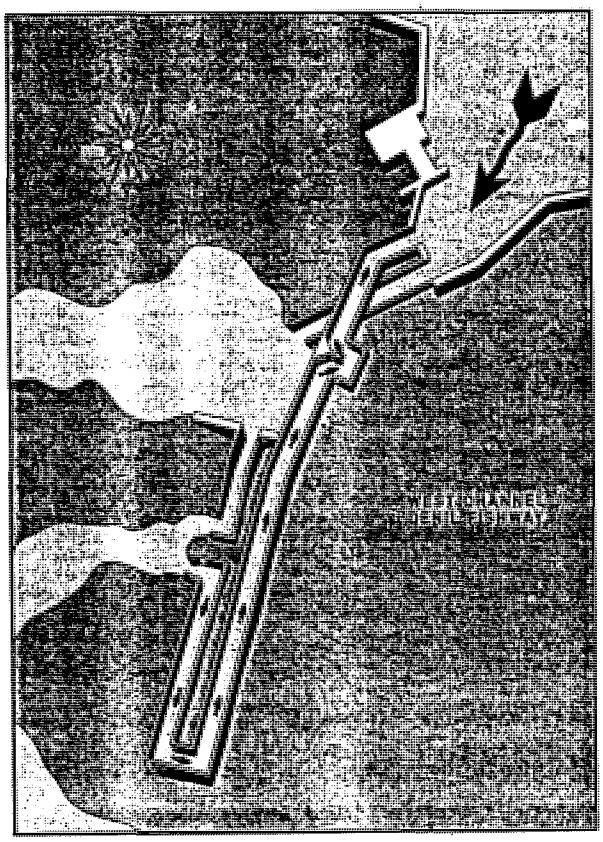
The Saco River Salmon Club, USF&WS, MASC, and IF&W will continue to work closely on the Atlantic salmon restoration program on the Saco River.

ATTACHMENT 1

Cataract, Springs and Bradbury Fishway Results - 2000

2000
Cataract Fishways Report





A Report on the Operation of
FPL Energy s
Cataract Fishways
Saco River, Maine
FERC No. 2528

Prepared by
FPL Energy Maine Hydro LLC

March 2001

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Executive Summary

In 2000, the Cataract fishways (East Channel fishlift and West Channel Denil) were operated by personnel from FPL Energy's Hydro Operations division (FPLE) and Unity College students.

These fishways were built to pass anadromous target species (Atlantic salmon, American shad, and river herring) as part of resource agency plans to restore these species to the Saco River. 2000 marked the seventh full year of operation of the Cataract fishways.

In 2000, the East Channel fishway successfully passed 23,112 river herring, 1,049 American shad, and 30 Atlantic salmon; and the West Channel fishway successfully passed 2,024 river herring, 274 American shad, and 20 Atlantic salmon.

Currently, remnant populations of American shad and river herring appear to be large enough to serve as the necessary brood stock for Saco River restoration purposes without resorting to out-of-basin transfers of adults to the Saco River. The Saco River has the largest documented American shad run in the state of Maine and is an important source of brood stock for shad restoration on the Kennebec River. At this time, the small run of Atlantic salmon returning to the Saco River consists mainly of hatchery strays from other rivers and possibly small numbers of wild fish. In the future, increased Saco River Salmon Club (SRSC) fry releases and natural spawning should increase the local component of the Saco River run.

Data contained in this report and other studies will be used as a basis for meeting the requirements of the Saco River Fish Passage Agreement and Saco River Fish Passage Assessment Plan (2000-2003).

1.0 Introduction

The Cataract Project is located on the Saco River in the cities of Biddeford and Saco and in the towns of Dayton and Buxton in the state of Maine. The project is licensed by the Federal Energy Regulatory Commission (FERC No. 2528) and is owned by FPLE. The project includes the Cataract (East Channel) Dam and East Channel fishlift and an integral intake powerhouse containing a single turbine generator on the northeastern side of Factory Island in the City of Saco; and the West Channel dam and Denil fishway in the cities of Saco and Biddeford (see Figure 1). The impoundment formed by these dams extends upriver in the cities of Biddeford and Saco about 0.3 mile to another set of dams at Spring Island (see Figure 1), referred to as Bradbury and Spring Island dams. Newly completed fishlocks at these two dams were first operational in June 1997. The impoundment formed by these dams extends upriver approximately 9.3 miles through the cities of Biddeford and Saco and the towns of Dayton and Buxton to FPLE's Skelton Project.

In 2000, the Cataract fishways were operated by personnel from FPLE's Hydro Operations division and Unity College students. These fishways were built to pass anadromous target species (Atlantic salmon, American shad, and river herring) as part of resource agency plans to restore these species to the Saco River. 2000 marked the seventh full year of operation of the Cataract fishways. Although fishway construction was completed in the spring of 1993, the fishways were not completely operational until June 2, 1993 (East Channel) and June 25, 1993 (West Channel). Subsequently, 1993 did not constitute a full year of operation.

1.1 Operation of the Cataract East Channel Fishway

The fishways at the Cataract Project are designed to operate up to river flows of 11,000 cubic feet per second (cfs). The fishway at the East Channel dam consists of a lower entrance flume and crowding area, a 45-foot high fishlift or elevator, and an upper exit flume leading to the impoundment. Upper flume water flow is approximately 40 cfs with a

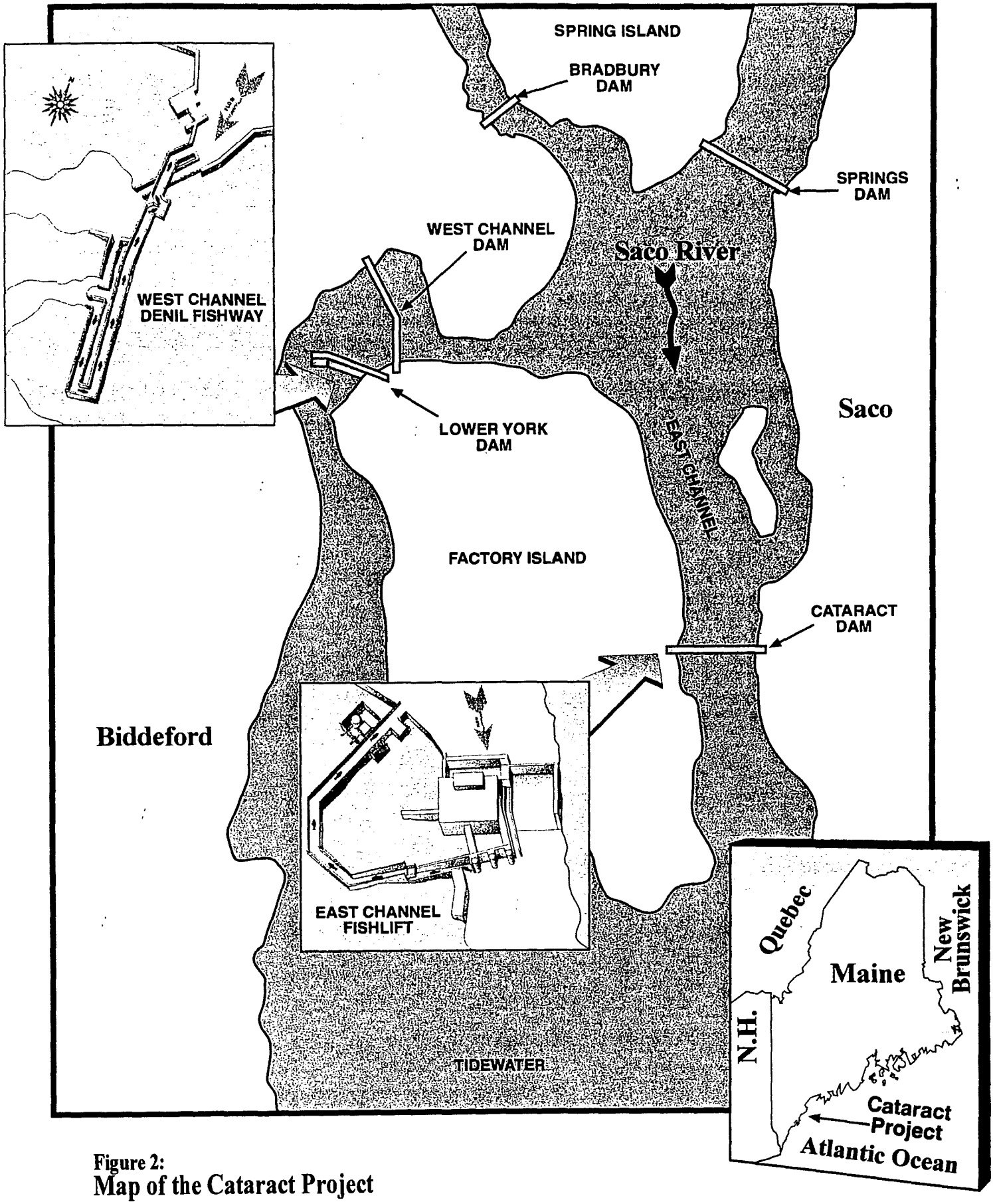

Figure 2:
Map of the Cataract Project

velocity of 1 feet per second (fps). Total attraction water flow is approximately 80 cfs with an entrance velocity averaging 5 fps. In an effort to enhance fish passage in 1995, the East Channel fishlift attraction water system was reprogrammed to shut off water flow to the lower flume downstream attraction water diffuser and increase water flow to the upper diffuser. This change increased velocity in the lower flume and eliminated the upwelling flow from the lower diffuser. The modification proved successful in 1995, and has been continued since. (See 1995 Cataract Fishway study report section 4.4 for more detailed information on water flow modification and fish passage observations made at the East Channel fishlift.)

A counting window and sorting, trapping, and trucking facilities are located near the exit of the upper flume. Fish can be released to swim into the Cataract impoundment or can be transported to upstream locations (i.e. Springs and Bradbury impoundment for shad, Skelton impoundment for river herring and the Ossipee River for salmon, see Figure 2). Fish transport takes place in one of two stocking trucks assigned to the fishway. The trucks are equipped with 1,000-gallon circular fiberglass insulated tanks with aeration systems utilizing bottled oxygen and water pumps that circulate water in the tanks.

In 2000, the East Channel fishway was opened on May 1, and ran trouble free until August 11 when a supporting post on the base of the lower flume crowder broke. The lower flume area was drained and the crowder was repaired. Operations resumed on August 21, 2000 and ran trouble free until it was closed for the season on October 27. During the fall, leaves, grass or other debris create fishway operational problems at East Channel. This debris becomes lodged on a flow meter and causes the programmable logic controller (PLC) to actuate an alarm. To prevent nightly visits to the fishways, East Channel fishway flows were shut down nightly from about 3:00 p.m. until about 7:30 am for the last two weeks in October.

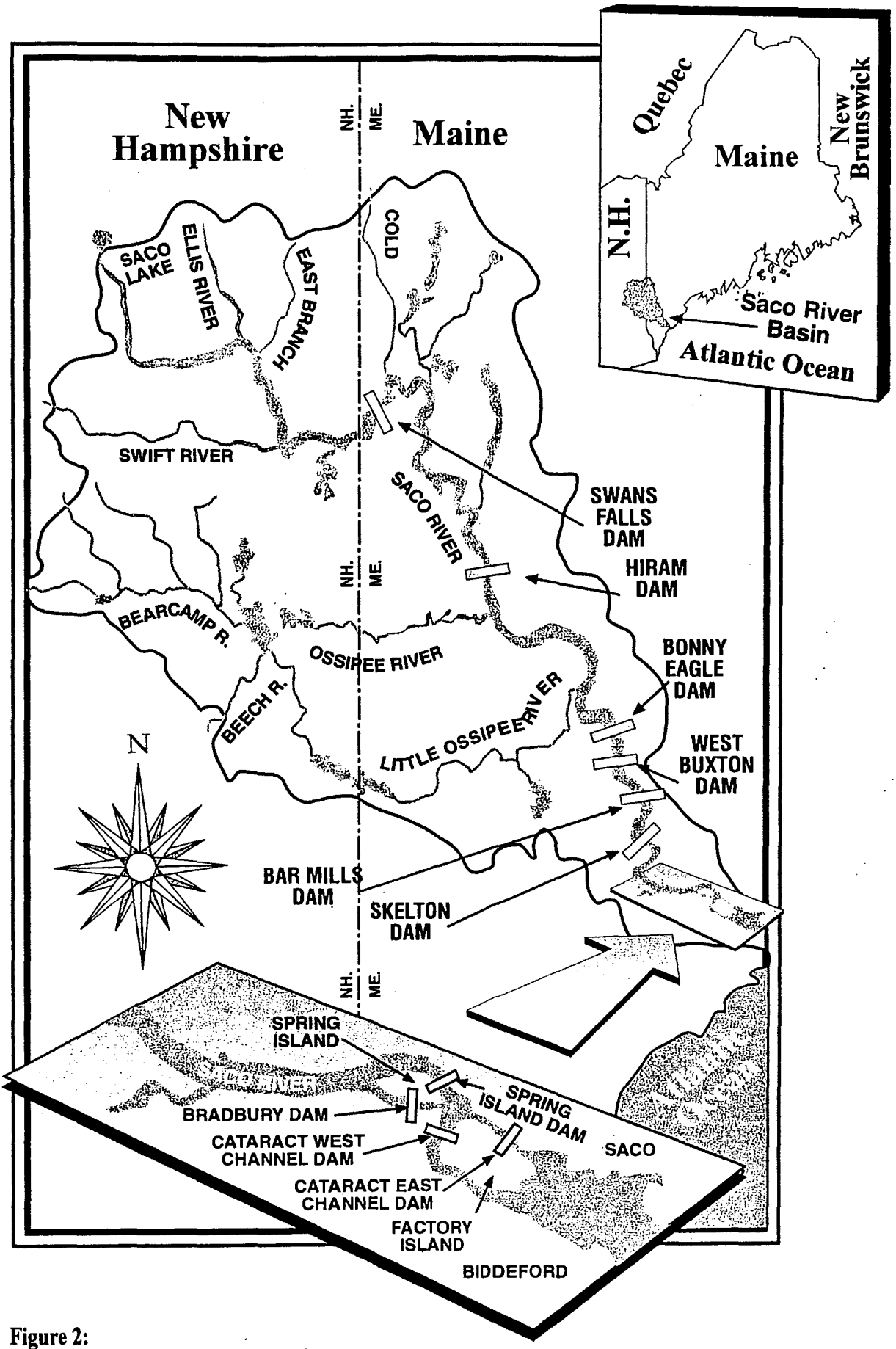

Figure 2:
Map of the Saco River Basin

Two hinged flashboards have been used to facilitate downstream passage at the Cataract facility since 1997. The boards are dropped when adequate numbers of fish appear in the headpond area and fishway personnel are stationed to observe downstream passage. Results of these observations indicate that downstream passage is accomplished by this technique and will be continued in the future.

1.2 Operation of the Cataract West Channel Fishway

The 550-foot-long Denil fishway at the West Channel is 4 feet wide with a 1-foot vertical by 8-foot horizontal slope. The minimum depth of water in the fishway is 2.5 feet with a minimum flow of 12 cfs. The maximum attraction water flow is 33 cfs with an entrance velocity 2 to 6 fps. A counting window and associated trapping structures are located near the exit of the fishway and target species can swim freely into the Cataract impoundment. A floating trash boom was installed in front of the West Channel exit to help keep floating debris from entering the fishway.

In 2000, the West Channel fishway was opened on May 4 and remained in operation (other than very limited down time for general repairs and maintenance) until October 27 when it was closed for the season.

The West Channel flashboards were lost in early April of 2000 and were replaced on June 5. Replacement of flashboards involves drawdown of the headpond to allow hydro workers access to the dam structure. Once the drawdown was completed five FPLE fishway personnel surveyed the area in an attempt to locate stranded fish. Approximately 100 American shad were found stranded below Lower York dam in a tidal area. The majority of the fish were seined out and returned to the tailrace while the remaining fish were monitored until the tide had risen sufficiently to allow exit. Prior to flashboard replacement, West Channel flows continued to pass over the flashboard section (spillway) and occasionally

through the West Channel Gate. River flows exiting the West Channel gate and spillway tended to stay towards the opposite side of the river from the fishway entrance location. During this time, most fish migrating up the West Channel were attracted to this location and not the fishway entrance.

The following biological data have been compiled to provide a summary of fishway monitoring information collected at the Cataract fishways in 2000. East and West Channel water temperature, air temperature, and Saco River flow data for 2000 are provided in Attachment 1. Saco River flow data were obtained from USGS gauge in Cornish, Maine and adjusted to reflect downstream tributary flows.

2.0 River Herring, American Shad, and Atlantic Salmon Information

During 2000, fishway operations concentrated on successfully passing and/or transporting target species (Atlantic salmon, American shad, and river herring) slated for restoration on the Saco River.

2.1 River Herring - East Channel

In 2000, a total of 23,112 river herring successfully ascended the East Channel fishlift. The first river herring were lifted on May 4 (see Table 1) when river water temperature was 11.5°C. and the last river herring was lifted on June 19, when river water temperature was 18.5°C. The river herring run encompassed a 47 day period. The peak of the run occurred during May 31 through June 2, when 19,740 fish passed, representing 85% of the river herring passing the East Channel. Maximum daily passage occurred on June 2, when 18,694 river herring were lifted.

The river herring daily lift schedule was adjusted manually by fishway personnel depending on the number of fish observed and the time of the run. This schedule maximized fish

TABLE 1

DAILY AND MONTHLY TOTALS OF RIVER HERRING ASCENDING THE CATARACT EAST CHANNEL FISHWAY 1993-2000

	MAY								JUNE								JULY							
DAY	1993	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000
1										100	171	4876	7		1084									
2						6			260		55	554	1		33	18694	14							
3					1				280		130				5	130	1							
4			31					29	6	66	1161		251	2	6	50								
5							5	32	103				178	102		1								
6							23	40	81	27					35	150								
7							50	9	37			70	292											
8			20				42	330													1			
9				2		19	40	374		90	196				3		11							
10						8	404	8		14							4							
11			11	3			480	7					2			75								
12						65	36	3									9							
13					1	43	1099	77		11			3											
14					9	175	7	11																
15			266		15	355	420	1																
16					4	580	1700	52																
17		4		5		720	3387	200			146										3			
18			18				27	191	1							2	8							
19		2	27		1	38	728	570				1				2	4							
20			46	125			3952	675			5													
21		7	26		1	8133	2260				8													
22				150	372	3053	2412	25	1		4						1							
23		10	35	537	77	400	334	125	1	2														
24		7	549		13	900	510		2	1	2													
25		186	176	1704	191		40		1		1													
26		20	1128	988			12	165			2													
27		24						3	4	1														
28		730	74		2		3				2													
29		225	484		200	210		15		1														
30		432	45		76		20	20	1															
31			2085		151			1046																
TOTAL	0	1647	5021	3514	1114	14705	17991	4008	778	313	1883	5501	734	104	1166	19104	52	0	0	0	4	0	0	0

1993 TOTAL = 830
1994 TOTAL = 1,960
1995 TOTAL = 6,904
1996 TOTAL = 9,019
1997 TOTAL = 1,848
1998 TOTAL = 14,809
1999 TOTAL = 19,157
2000 TOTAL = 23,112

*** EAST CHANNEL FISHWAY NOT OPERATIONAL UNTIL JUNE 2, 1993**

passage while minimizing labor requirements and wear and tear on fishlift components. In May and June, approximately 121 and 195 lifts, respectively, were made to capture river herring.

2.1.1 River Herring Trap and Transport Operations

The majority of the river herring captured at the East Channel lift were transported to the Skelton impoundment stocking location (approximately 9 miles upstream of the fishway).

Transport operations began on May 11, 2000 and ended on June 3, 2000 with 16,391 river herring successfully transported from East Channel to the Skelton impoundment. A total of 13 separate transport trips were made and no transport mortalities were observed. All trucks operated without any mechanical problems. Maximum river herring trucking tank densities occurred on June 2 when 2,300 river herring were transported and minimum river herring trucking tank densities occurred on May 29 when 255 herring were transported. The trucking trip to Skelton takes approximately 18 minutes. In addition to the 16,391 river herring transported to Skelton, 3,316 were trucked above the Springs and Bradbury Dams.

Also, 3,405 river herring were allowed to pass into the Cataract impoundment. These fish were allowed to pass as part of the evaluation studies for the Springs and Bradbury fishlocks.

2.1.2 River Herring Biological and Fishway Mortality Data

In addition to the 23,112 river herring successfully utilizing the East Channel lift, a total of 46 river herring fishway mortalities were noted. This represents a fishway mortality

of 0.2% which is similar to 1999 (0.2%), 1998 (0.3%), 1997 (0.2%), 1996 (0.5%) and 1995 (0.4%). Most mortalities are a result of the river herring trying to swim through the 1 inch by 2-inch square wire overlay on the existing gates or becoming pinched in gates during normal operations.

Scale samples from 14 river herring mortalities will be aged by the Maine Department of Marine Resources and are not available at this time. The majority of the mortalities drifted downstream and were discovered at the end of the upper flume area on the water diffusion screen. These fish can only be sampled when the upper flume is drained. As a result, many of these fish are in various stages of decomposition and biological data collection is difficult.

2.2 American Shad - East Channel

In 2000, a total of 1,049 American shad successfully ascended the East Channel fishlift. The first shad was lifted on June 1, (see Table 2) when river water temperature was 16.3°C. and the last shad was lifted on August 24, when river water temperature was 22.3 °C. The shad run encompassed an 86-day period. The peak of the run occurred during June 6 through June 23 when 685 fish passed, representing 65% of the total run. Maximum daily passage occurred on June 9, 2000, when 103 were lifted.

The shad lifting daily schedule was adjusted manually by fishway personnel depending on the number of fish observed and the time of the run. This schedule maximized fish passage while minimizing labor requirements and wear and tear on fishlift components. In May, June, and July, approximately 121, 195, and 64, respectively, were made to capture shad.

An underwater camera connected to a television monitor and VCR was first used in 1995 to gather information on fish behavior within the lower flume of the East Channel fishlift (see Figure 3). The camera documented that shad exhibit a fallback behavior in and around the

TABLE 2

DAILY AND MONTHLY TOTALS OF AMERICAN SHAD ASCENDING THE EAST CHANNEL FISHWAY
1993 - 2000

	MAY								JUNE								JULY								AUGUST							
Day	1993	1994	1995	1996	1997	1998	1999	2000	1993*	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000
1												1				16	14	11			40		11	2								
2												2		295	303	35	34		4	35	39			15								
3													1		248		29	9	11				40									
4									5		36	32	1	88	440		17							19								
5														104	149		9	17		59				12	1			3	13			
6										2	40	58	2		146	26	6	9					110									
7									10		4				18		5	8	4	35								2				
8											34		7	62		14	3	1		41	66		36						7			
9											27		31	7	97	103				37												
10										2			62	56	119	59	13	2	1	67	21			35								
11														56	99	71	1	1	4		25			25								
12										66	33		76		70	55	3	3		50				13								
13										17	34		26		119	24		23		2	25			12				2				
14										28		33	4			80		3		2	16	20		10								
15			2							13		76	48		122	34		11			9											
16										25			57		78	21						46										
17										10	55	70			148	35	3			23				6					32			
18									76	7	1				152	58			8					5								
19									159	3	32	95			149	4	5							4								
20									88	25	55	12	77		105	2			6			61	36	2				4				
21							53		66		14				300	39																
22				1			360		67	34	18				150	53																2
23							130		25	28		6	166		102	7			1													
24									65	1	7				61				3													
25									47	2	13		53		81	30								18								1
26				1		55			11	26	18	26	58		105	7			2													
27									32			2	4		80	14																
28							43		30	5	14				48	52																
29			7			284	57		29	2		33	21			23	2		5												
30			51			182			21	1	2		46			9			6				130									
31			19			54	39														36											
Total	0	0	79	2	0	575	682	0	731	297	437	446	740	668	3489	871	145	98	55	348	277	127	363	178	1	0	0	11	52	0	0	3

1993 TOTAL = 877
1994 TOTAL = 395
1995 TOTAL = 571
1996 TOTAL = 807
1997 TOTAL = 1069
1998 TOTAL = 1370
1999 TOTAL = 4534
2000 TOTAL = 1049

*EAST CHANNEL FISHWAY NOT OPERATIONAL UNTIL JUNE 2, 1993

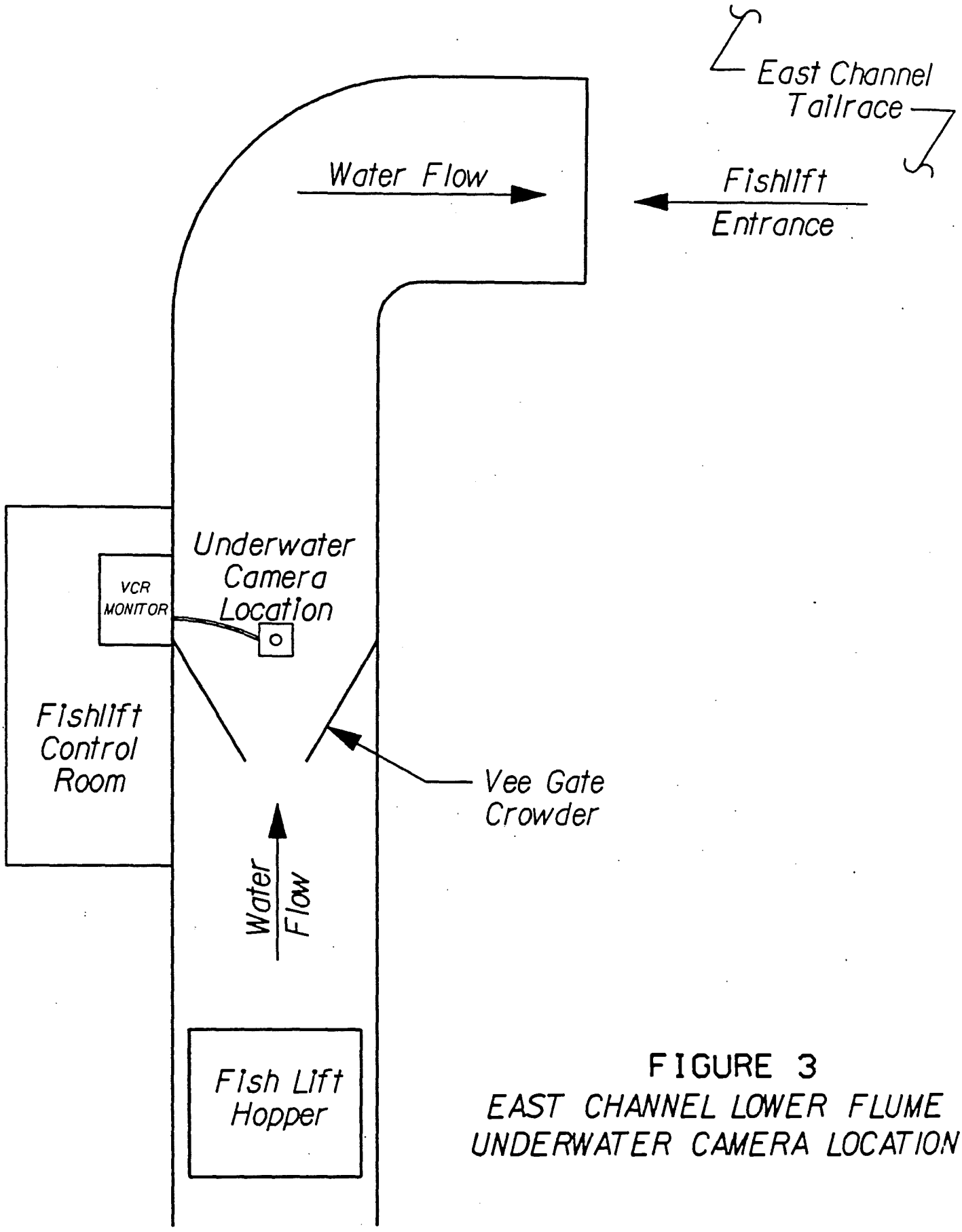

FIGURE 3
EAST CHANNEL LOWER FLUME
UNDERWATER CAMERA LOCATION

East Channel lower flume vee gate crowder. On occasion, shad would swim upstream through the vee gate crowder into the hopper area, then within minutes (and sometimes seconds) swim back downstream through the vee gates and out of the lower flume into the tailrace. Also, on many occasions, shad were reluctant to pass through the vee gate crowder in the fishing position. (See 1995 Cataract fishways study report Sections 3 and 4 for detailed information on camera study and results).

Since 1996, the underwater video camera, combined with keeping the vee gate crowder wide open, was a very important technique that increased East Channel fishway efficiency. Fishway personnel observed that by keeping the vee gate crowder open, shad moved readily into the trapping area. Utilizing the underwater camera, fishway personnel could observe shad as they passed through the wide open vee gate crowder, then close the crowder and trap before the shad had a chance to fall back. This technique will continue in 2001.

2.2.1 American Shad Trap and Transport Operations

The majority of American shad captured at the East Channel fishlift were transported to the Diamond Riverside Boat Ramp stocking location (approximately 1 mile upstream of the fishway) and some were allowed to freely swim through the fishway into the Cataract impoundment. Transport operations began on June 9, 2000 and ended on July 12, 2000 with 769 shad successfully transported. A total of 14 transport trips were made and no transport mortalities were observed. Both trucks operated without any mechanical problems. A total of 136 American shad were allowed to swim freely through the fishway during the 2000 season. These fish were allowed to pass as part of the evaluation for the Springs and Bradbury fish locks. Maximum shad trucking tank densities occurred on June 15 with 105 shad transported and minimum shad trucking tank density occurred on June 18 when 28 shad were taken to the Diamond Riverside stocking site. The trucking trip to Diamond Riverside takes about 10 minutes and a round trip takes about 40 minutes.

Maine Department of Marine Resources (MDMR) transported 144 American Shad to the Medomak river shad hatchery in Waldoboro, Maine. These fish served as brood stock to produce 1,572,517 shad fry for stocking efforts on the Saco and Kennebec rivers. Approximately 259,090 (16%) shad fry were stocked into the Saco River below the Bar Mills dam in Buxton by the MDMR.

2.2.2 American Shad Biological and Fishway Mortality Data

In addition to the 1,049 American shad successfully passing through the Cataract East Channel fishway, a total of 28 shad mortalities were noted. This represents a total fishway mortality of 2.7%, which is similar to 1995 (3.5%), 1996 (4.8%), 1997 (2.7%), 1998 (3.5%) and 1999 (2.6%).

Scale samples from 3 fishway mortalities as well as hatchery mortalities will be aged by the Maine Department of Marine Resources and are not available at this time. The majority of the mortalities drifted downstream and were discovered at the end of the upper flume area on the water diffusion screen. These fish can only be sampled when the upper flume is drained. As a result, many of these fish are in various stages of decomposition and biological data collection is difficult.

2.3 Atlantic Salmon - East Channel

In 2000, a total of 28 Atlantic salmon successfully ascended the East Channel fishlift. The first Atlantic salmon was lifted on May 27 (see table 3) when river water temperature was 15°C and the last salmon was lifted on September 18 when river water temperature was 20.2°C.

TABLE 3

DAILY AND MONTHLY TOTALS OF ATLANTIC SALMON ASCENDING THE EAST CHANNEL FISHWAY
1993 - 2000

	MAY								JUNE								JULY								AUGUST								SEPTEMBER								OCTOBER							
Day	93*	94	95	96	97	98	99	00	93*	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00
1																	1																															
2														1	1		2			2				4																								
3									1						1																																	
4																	3						1																									
5																				1				1																								
6													1		2																																	
7														1	1																																	
8																						2																									
9												3	1	1																																	
10															4					1		2																									
11												1			2						1																											
12												1		1	2	1																															
13										1	1	1																																			
14			1												1							1																									
15												6				2																															
16											2					6																															
17										3					3																																	
18											2				1																																	
19											1	2	5		1	2				1				1																								
20									4		2	1												1				1																				
21									2																																						
22																1				1																												
23									2	1			2								1																											
24																					1																											
25																																														
26			1		1							1			1																																
27								1				4	1		2	8																															
28			1																		1																									
29							1					2																																			
30												1		2		1																															
31																																														
Tota	0	0	3	0	1	0	1	1	9	5	8	23	10	6	22	21	6	0	0	8	4	5	0	7	0	0	0	1	0	0	1	0	0	0	5	0	1	0	0	1	0	0	2	1	0	0	0	0

1993 TOTAL = 15
1994 TOTAL = 5
1995 TOTAL = 18
1996 TOTAL = 33
1997 TOTAL = 16
1998 TOTAL = 11
1999 TOTAL = 24
2000 TOTAL = 30

*EAST CHANNEL NOT OPERATIONAL UNTIL JUNE 2, 1993

The salmon lifting daily schedule was adjusted manually by fishway personnel depending on the number of fish observed and the time of the run. This schedule maximized fish passage while minimizing labor requirements and wear and tear on fishlift components. In May, June, July, August, September, and October, approximately 121, 195, 64, 36, 51, and 47 lifts, respectively, were made to capture Atlantic salmon. An underwater camera connected to a television monitor and VCR was first used in 1995 to gather information on fish behavior within the fishway (see Figure 3). The camera documented that Atlantic salmon exhibit a strong fallback behavior in and around the East Channel lower flume vee gate crowder. Salmon regularly would swim upstream through the vee gate crowder into the hopper area, then within minutes (and sometimes seconds) swim back downstream through the vee gates and out of the lower flume into the tailrace. (See 1995 Cataract fishways efficiency report for detailed information on camera study and results).

Utilizing the underwater camera, fishway personnel could observe salmon as they passed through the vee gate crowder, then close the gate and trap the salmon before they had a chance to fall back. This technique proved to be very effective and resulted in the majority of the captures on the East Channel in 2000, which was the fifth full year that the underwater camera was utilized for the entire season.

In 2000, camera operations started as soon as the fishway opened, and continued from early May through October. When fish activity was slow (August through October), a videotape would record all fish activity in the lower trap area. These videotapes would be reviewed at the end of the day or at an earlier convenient time. When a salmon was spotted using the fishway, fishway personnel would be stationed in front of the TV monitor to wait for and capture the fish. This process almost always resulted in a salmon capture within a 24-hour period. The fact that only one salmon was captured in the months of August, September, and October may be the result of capturing most salmon in the spring. Before 1996, there was no way to identify how many salmon were entering and leaving the lower trap area, or

how long they would stay in the area. Using the underwater camera greatly increased the efficiency of East Channel fishway and will be continued in 2001.

2.3.1 Atlantic Salmon Trap and Transport Operations

Twelve of the 28 Atlantic salmon captured at the East Channel fishlift were transported to the Ossipee River in Kezar Falls. A total of 8 separate trucking trips were made and no trucking mortalities were observed. An additional salmon trucked to the Ossipee River was later determined to be a landlocked salmon.

2.3.2 Atlantic Salmon Biological Data

Biological information on the 28 salmon that ascended the East Channel fishway is presented in Table 4. The sex of these salmon was determined to be 20 males and 8 females. Lengths of the 28 salmon indicated that 9 were multi-sea winter fish and 19 were grilse. Scale samples from 12 fish indicated that five were multi-seawinter fish of hatchery origin, and seven were single sea-winter fish of hatchery origin. Scale samples were not taken from the other 16 fish because water temperatures had exceeded safe handling levels.

Two Atlantic salmon mortalities were noted in 2000. These were the first two Atlantic salmon mortalities encountered at the East Channel fishway since operations began in 1993.

On June 15, 2000 a grilse was lifted at the lower hopper and safely deposited into the upper flume. This fish was not seen again for three days. In an attempt to find out the disposition of the fish, the upper flume was very slowly and carefully drained down to approximately three feet. At this point, visibility to the bottom of the flume was fair and yet the shad, river herring, striped bass and any other species remaining in the flume

Table 4

ATLANTIC SALMON BIOLOGICAL DATA
EAST CHANNEL FISHWAY 2000

	DATE	A OR G	LENGTH	MARKS	SEX	PASS	TRUCK
1	27-May	A	754		F		X
2	28-May	Landlocked	458		M		X
3	12-Jun	G	480	DD	M		X
4	15-Jun	G	557		M	Mort	
5	15-Jun	G	502		M	X	
6	16-Jun	G	509	DD	M		X
7	16-Jun	G	480		M		X
8	16-Jun	G	466	DD	M		X
9	16-Jun	A	743	DD	F		X
10	16-Jun	A	761	DD	F		X
11	16-Jun	A	721	DD	F		X
12	19-Jun	G	505	DD	M		X
13	19-Jun	A	828		F		X
14	22-Jun	G	560		M		X
15	27-Jun	G	511		M	X	
16	27-Jun	G	517		M	X	
17	27-Jun	G	498		M	X	
18	27-Jun	G	475		M	X	
19	27-Jun	G	504		M	X	
20	27-Jun	A	761	DD	M	X	
21	27-Jun	A	795	DD	F	X	
22	27-Jun	A	755		F	X	
23	30-Jun	A	782		F	Mort	
24	2-Jul	G	463		M	X	
25	2-Jul	G	478		M	X	
26	2-Jul	G	521	DD	M	X	
27	2-Jul	G	482		M	X	
28	5-Jul	A	894	DD	F	X	
29	19-Jul	G	499		M	X	
30	20-Jul	G	492		M	X	
31	18-Sep	G	522	DD	M		X

A or G = Adult or Grilse

could continue to swim up and down the flume without additional stress. The Salmon was found dead at the end of the flume without any apparent abrasions or hemorrhaging.

The second salmon mortality occurred on June 30, 2000 when the water temperature was 23.8°C. This fish was lifted with several striped bass, and there were already many striped bass in the upper flume area. With so many striped bass in the upper flume area, there were two options regarding salmon handling/passage. The first option was to lift this salmon into the upper sorting area, quickly pull out all the stripers, and sluice the salmon back into the headpond. The second option was to allow the salmon direct passage into the headpond, while also allowing many striped bass access. (Currently, state and federal agencies do not allow upstream passage of striped bass on the Saco River). The decision was made to lift the salmon and quickly sluice it into the headpond. The salmon appeared fine when sluiced, but quickly fell back against the upper gate of the trap area. The fish was immediately allowed to drop back into the flume, and the water velocity of the flume was dropped to allow the salmon to regain its strength. The salmon was found dead shortly thereafter at the end of the flume.

2.4 River Herring - West Channel

In 2000, a total of 2,024 river herring successfully ascended the West Channel Denil fishway. The first river herring passed the viewing window on May 7, 2000 (see Table 5) when river water temperature was 11.8 °C and the last river herring passed the viewing window on June 27 when river water temperature was 22.8 °C. The river herring run encompassed a 52-day period. The peak of the run occurred during June 6 through June 13, when 1,466 fish passed, representing 72% of the river herring passing the West Channel. Maximum daily passage occurred on June 11, 2000 when 1,116 river herring passed the viewing window. No river herring mortalities were noted.

TABLE 5

DAILY AND MONTHLY TOTALS OF RIVER HERRING ASCENDING THE WEST CHANNEL FISHWAY

1993-2000

	MAY								JUNE							
Day	1993*	1994	1995	1996	1997	1998	1999	2000	1993*	1994	1995	1996	1997	1998	1999	2000
1											47	58	1		730	29
2										4	2	10		973	148	4
3														21	39	
4													69	67	25	
5													158			
6										90			39			86
7								25							13	12
8			1					67		11			5		3	
9			2					100								
10			16				22	97		11		10	9			52
11			7					55		70			1		2	1116
12								25		5			3			159
13			1				13	73								30
14			1				15								3	10
15							13									
16		1	1			157	1511									
17			17			14	1086									
18		1	17			7	895									
19			16				1588	4								
20			4			30	1018	1								
21		1	1	32			519									
22			88	10			88									
23			25	1			8									
24			1647	4			13									
25		6	348	4			140									
26			264	9			699	98	1							
27		1	8	2			446	31								6
28			69	1			1210									
29		47	278				813									
30		32	47				652									
31			9	6			201	3								
Totals	0	89	2867	69	0	208	10950	519	1	191	49	79	282	1061	963	1505

1993 TOTAL = 1
1994 TOTAL = 280
1995 TOTAL = 2,916
1996 TOTAL = 148
1997 TOTAL = 282
1998 TOTAL = 1,269
1999 TOTAL = 11,913
2000 TOTAL = 2,024

*WEST CHANNEL FISHWAY NOT OPERATIONAL UNTIL JUNE 25, 1993

2.5 American Shad - West Channel

In 2000, a total of 274 American shad successfully ascended the West Channel Denil Fishway. The first shad passed the viewing window on June 1 (see Table 6) when river water temperature was 16.7 °C and the last shad passed the viewing window on July 5 when river water temperature was 25 °C

2.6 Atlantic Salmon - West Channel

A total of 20 Atlantic salmon (see Table 7) successfully ascended the West Channel Denil fishway in 2000. The first salmon passed the window on May 11, 2000, when the water temperature was 13.3°C and the last salmon passed the viewing window on October 20, when water temperature was 12.5°C. All salmon utilizing the West Channel fishway were observed for appropriate biological data and then allowed to pass directly into the Cataract impoundment.

2.6.1 Atlantic Salmon Biological Data

Biological data collected from the 20 salmon ascending the West Channel fishway is presented in Table 8. In general, length data indicated that 8 were multi-sea winter fish and 12 were grilse. The sex of the 20 salmon was determined to be 14 males and 6 females. One grilse had a tag indicating that it was a stray from the Merrimack river. Four multi-sea winter fish and four grilse had deformed dorsal fins indicating fish of hatchery origin. Also, one multi-sea winter fish and one grilse had right ventral fin clips, indicating fish of hatchery origin. The remaining 9 salmon showed no marks or clips.

TABLE 6

DAILY AND MONTHLY TOTALS OF AMERICAN SHAD ASCENDING THE WEST CHANNEL FISHWAY
1993 - 2000

	MAY								JUNE								JULY							
Day	1993*	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000	1993	1994	1995	1996	1997	1998	1999	2000
1															7	1				2				
2															5					2				2
3																	1			1				
4															1									
5															1		1							1
6															1	46	1							
7											2	1	2			2								
8													4		1	27		2						
9													7	2		39								
10													3			48								
11											1					36								
12												15	4			17								
13																1								
14													5			7								
15																8								
16							7				3		1			6								
17							3				1	1	3			19								
18							3					2												
19							18					2	1			1								
20							7					1	1			7								
21											1		1			3								
22							2									1								
23							130						1		1									
24						2	79			1			1		3									
25															1									
26							9		1							1								
27							59		1							1								
28			1				51			1														
29							23																	
30							33		1															
31							15														1			
Total	0	0	1	0	0	2	439	0	3	2	8	22	34	2	21	271	3	2	0	5	1	0	0	3

1993 TOTAL = 6
1994 TOTAL = 4
1995 TOTAL = 9
1996 TOTAL = 27
1997 TOTAL = 35
1998 TOTAL = 4
1999 TOTAL = 460
2000 TOTAL = 274

* WEST CHANNEL FISHWAY NOT OPERATIONAL UNTIL JUNE 25, 1993

TABLE 7

DAILY AND MONTHLY TOTALS OF ATLANTIC SALMON ASCENDING THE WEST CHANNEL FISHWAY
1993 - 2000

	MAY								JUNE								JULY								AUGUST								SEPTEMBER								OCTOBER							
Day	93*	94	95	96	97	98	99	00	93*	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00	93	94	95	96	97	98	99	00
1											2											1																				1							
2																	1					1																											
3												1			3		1					2	1																				2							
4														1	1	1																			2														
5													1			2													1													1							
6											2		1	1																													1						
7														1	2					2		2														1													
8										2		1		1										2													1					1							
9															3							3																				2							
10											1				3																				1								1							
11								1					1	1																																			
12												4	1		2																			4														
13							1				2	2				1									1								3	2														
14												3																																	2			
15											1	1																1														1	1					
16												1			2																																1	
17																					1												1			2								1			
18							1								1																														1			
19							2				2							1			1													1														
20										1					1	2	1		1				2												1													1	
21															1	1	1																															
22				1											1							1												1														
23																																		1								2						
24							1									1					1					3						1			1												
25				1					1			1				1														1																		
26								1	2				2		2											1																						
27																										1							1							1							
28			1					1	2							1								2										2							1							
29																																	1														
30															1		2													3																		
31							1										1									1																					
Tot	0	0	1	2	0	0	6	3	5	3	10	14	6	5	23	10	7	1	1	2	3	10	3	2	1	6	0	2	1	0	4	3	14	6	3	0	1	2	2	1	11	0	1	1	1	0	4	2

1993 TOTAL = 38
1994 TOTAL = 16
1995 TOTAL = 16
1996 TOTAL = 21
1997 TOTAL = 12
1998 TOTAL = 17
1999 TOTAL = 42
2000 TOTAL = 20

*EAST CHANNEL NOT OPERATIONAL UNTIL JUNE 2, 1993

Table 8

ATLANTIC SALMON BIOLOGICAL DATA
WEST CHANNEL FISHWAY 2000

	DATE	A OR G	LENGTH	MARKS	SEX	PASS	TRUCK
1	11-May	G	475	AC	M	X	
2	26-May	G	491		M	X	
3	4-Jun	A	718	DD	F	X	
4	5-Jun	A	741	DD	F	X	
5	5-Jun	A	778	DD	M	X	
6	13-Jun	G	531		M	X	
7	20-Jun	G	489	Tag*	M	X	
8	20-Jun	A	727		F	X	
9	21-Jun	A	846		F	X	
10	24-Jun	G	525	DD	M	X	
11	25-Jun	G	490	DD	M	X	
12	28-Jun	A	739	DD	F	X	
13	28-Jul	G	471	DD	M	X	
14	28-Jul	G	521	RV	M	X	
15	8-Aug	G	502		M	X	
16	8-Aug	G	459		M	X	
17	24-Aug	G	519		M	X	
18	27-Sep	A	892	RV	F	X	
19	16-Oct	A	784		M	X	
20	20-Oct	G	486	DD	M	X	

*Tagged fish from the Merrimack River

2.7 Downstream Fish Passage - East and West Channel

As agreed upon during the March 1999 Saco River Coordinating Committee (SRCC) meeting, the East and West Channel downstream bypass remained closed during the 2000 season, and controlled spills using the East Channel hinged flashboards were conducted.

2.7.1 Salmon Smolts

Fishway personnel observed concentrations of cormorants in the Saco River between the Route 5 bridge and the Cataract tailrace beginning in late April. This concentration of cormorants coincided with the USFWS stocking of 22,600 salmon smolts on April 19, 2000. Three salmon smolts were seen going downstream in the West Channel denil fishway. One on May 8, 2000, and two on May 14, 2000.

2.7.2 Post-spawned River Herring

Post-spawned river herring were observed periodically in the Cataract impoundment for the entire month of June in 2000 in small schools of 20 to 50 fish. Overall, a very small percentage of river herring that were passed upriver were observed in the Cataract headpond area in 2000.

2.7.3 Post-spawned American Shad

Post-spawned shad were first seen in the East Channel forebay on June 11, 2000 when river water temperature was 22.2 °C. The last post-spawned shad was seen on August 22, when river water temperature was 22.6 °C. As discussed in the January 1996 agency consultation meeting, controlled spills were to be attempted as an alternative to the present downstream passage sluices.

Experiments with controlled spills conducted in 1997, 1998, 1999, and 2000 have documented that effective passage for shad can be accomplished if the taintor gate is closed, spills are conducted on sunny days, and when adequate numbers of fish are present.

The controlled spills consisted of 2 hinged flashboards being dropped for a period of time ranging from 2.5 hours to 3 hours long. The time period for spills was dependent upon river conditions and visual observations of shad numbers and behavior. Two hinged flashboards pass a combined flow of 400 cfs. Fishway personnel would be positioned directly above the downed boards, which provide a clear view of the fish and an accurate count of passage numbers.

On three separate occasions, controlled spills were conducted at the Cataract East Channel with 348 American shad successfully passed downriver. The spills were conducted on July 18 (2.5hrs), August 1 (3hrs) and August 22 (3hrs) and passed 274 shad, 43 shad, and 31 shad respectively.

American Shad numbers seen during controlled spills in 2000 were not as high as in previous years. After the initial spill on July 18 very few American Shad were observed in the Cataract East Channel headpond. The date of the initial controlled spill was later than usual due to 10 radio-tagged American shad being released into the Cataract East Channel headpond for a Springs and Bradbury fishlock effectiveness study. The taintor gate on East Channel was also opened for short periods during July and August. American shad may have passed downstream undetected through the taintor gate.

Experiments conducted in 1997, 1998, 1999, and 2000 using two downed flashboards have shown that American shad and river herring will use this route to migrate downstream if conditions are correct (i.e. taintor gate shut, clear weather, full headpond

and adequate numbers of fish). FPLE plans to continue to use this method to pass river herring and American shad downstream.

2.7.4 Post-spawned Atlantic Salmon

No post-spawned Atlantic salmon were seen in the vicinity of the East or West Channel forebay areas.

2.7.5 Juvenile Clupeids

From July 20 through early October, fishway personnel observed juvenile clupeids in the Cataract headpond as well as in the upper flume of the East Channel fishlift. In 1995, visual observations combined with underwater camera observations indicated that large numbers of juveniles were passing downstream through the East Channel upper flume. In 2000, moderate numbers of juveniles were observed in the East Channel upper flume, but very few were actually caught on tape passing through into the tailrace. Small schools (50-200) of juvenile clupeids were observed passing downstream during the controlled spill on August 22.

Since juvenile numbers in the upper flume varied greatly from day to day, it is assumed that most juveniles migrated down the fishway during late evening and low light conditions.

Juvenile clupeids were sampled on three different occasions, once in July, once in August and once in October. The sample size ranged from 26 to 83 fish. Identification of the juveniles indicated that all 156 were alewives. The smallest river herring was sampled on July 20 and was 28 mm. long, while the largest (102 mm.) was sampled on August 24, 2000.

3.0 Non-Target Fish Species

3.1 East Channel Fishway

Nine non-target species totaling 523 fish ascended the East Channel fishway in 2000 (see Table 8). Striped bass (272 fish) which were returned to the tailrace, were the most numerous of these non-target species. The white perch (110 fish), smallmouth bass (55 fish), brown trout (16 fish), eel (7 fish), sunfish (13 fish), white sucker (4 fish), largemouth bass (2 fish) were released to the headpond. An additional 275 striped bass were captured in the fishlift hopper, but not lifted to the upper flume area. On these occasions, fishway personnel would lower the hopper back into the lower flume and allow the striped bass to swim back into the tailrace. These striped bass ranged from 10 to 28 inches with the vast majority averaging approximately 12 inches. The eels ranged from 8 to 18 inches and appeared to be in the trap area to feed on the dead herring that occasionally fall underneath the elevator into the hopper pit. Forty-four gizzard shad were captured at the East Channel lift in 2000, and all were culled. No carp or lampreys were caught in 2000.

TABLE 9

NON-TARGET FISH SPECIES ASCENDING THE EAST AND WEST CHANNEL FISHWAYS 2000

EAST CHANNEL	Striped Bass	272
	White Perch	110
	Smallmouth Bass	55
	Gizzard Shad	44
	Brown Trout	16
	Sunfish	13
	American Eel	7
	White Sucker	4
	Largemouth Bass	2
	Total	523
WEST CHANNEL	Gizzard Shad	8
	White Sucker	7
	Brown Trout	6
	Smallmouth Bass	4
	Rainbow Trout	1
	Total	26

3.2 West Channel Fishway

Five non-target species totaling 26 fish utilized the West Channel Denil in 2000 (see Table 8). White Suckers (7 fish), brown trout (6 fish), smallmouth bass (4 fish), and rainbow trout (1 fish) constituted the majority of West Channel non-target species. Eight gizzard shad were also viewed in the West Channel viewing window. All gizzard shad were culled and not allowed to pass into the headpond. No sea lamprey or carp were caught in 2000, however two sea lamprey were observed in the West Channel tailrace during the board job on June 5.

4.0 Skelton Fishway Monitoring

Due to the limited number of salmon passing the Skelton fishway in previous years and the limited amount of salmon habitat between Skelton and Bar Mills, the Skelton Fishway remained closed in 2000. Eight Atlantic salmon were observed in a spring hole located in the Skelton tailrace on August 28. Construction of the new Skelton fishway began in 2000 and will be operational for the 2001 migration season.

4.1 Post-Spawned River Herring

River herring were observed actively spawning in the Skelton impoundment during early morning and late evening periods. Construction of the new Skelton fishway began in 2000, as a result, the downstream passage became non-operational on August 8, 2000. Taintor gates were periodically open throughout the downstream migration period allowing adult river herring passage past Skelton.

4.2 Juvenile River Herring

Construction of the Skelton fishway began in 2000, as a result, the downstream passage became non-operational on August 8, 2000. Juvenile clupeid downstream passage was facilitated through the use of taintor gates. Taintor gates were periodically open as part of minimum flow requirements throughout the migration period. Juvenile clupeids were observed throughout the entire Skelton impoundment for the entire months of August and September and were occasionally seen near the taintor gates or in front of the unit intake racks. Large numbers of juvenile clupeids were observed using the Skelton bypass in 1996, 1997 and 1998. The Skelton bypass will be operational for the 2001 migration season.

The downstream passage structure at Skelton consists of a 16-foot long channel, which is 13 feet wide at its upstream end and tapers to 6 feet wide at its downstream end. At the downstream end, an overflow gate controls the depth and amount of water exiting the structure. The trash sluice passes approximately 1 foot (18 cfs) of water, down a flume that discharges into the tailrace.

5.0 Atlantic Salmon Redd Survey

On November 20 and December 7, 2000, personnel from the Cataract fishways attempted to locate Atlantic salmon spawning redds in the Saco mainstem below Skelton dam. Sixteen salmon redds were located in front of the Skelton tailrace carry-in boat access. This site has held redds since 1993. The Ossipee River below Kezar Falls dam was not surveyed for Atlantic Salmon redds in 2000.

6.0 2001 Fishway Operations

The East and West Channel fishways will be operated in 2001 with the benefit of experience and insight gained since 1993. General operational plans are summarized below.

6.1 Upstream Passage

Utilize the underwater camera with the intention of regulating the fishway vee gate crowder operation to increase shad, river herring, and Atlantic salmon capture efficiency.

Allow 15,000 river herring to swim freely into the Cataract impoundment for the evaluation of the new Skelton fishway. River herring in excess of 15,000 will be trucked to the Skelton impoundment if the new Skelton fishway is non-operational.

Allow the first 500 American shad to swim freely into the Cataract impoundment during the evaluation of the Springs and Bradbury fishlocks. Disposition of American shad in excess of 500 will be determined after evaluation of passage at the fishlocks.

Collect biological information (i.e. sex, fork length, and scale sample) from river herring and shad mortalities only.

Allow Atlantic salmon from the East and West Channel fishways to swim freely into the Cataract impoundment. Trap and truck operations to the Ossipee River will resume from the new Skelton fishway. Biological information (i.e., sex, fork length, and marks only) will be collected from Atlantic salmon utilizing the East and West Channel fishways.

Identify and enumerate all fish species utilizing the fishways. Striped bass will be returned to the estuary unless safe passage of Atlantic salmon or American shad is compromised. In the event passage is compromised; limited numbers of Striped bass will be allowed access to the East Channel headpond. Allow all other species (i.e., trout, black bass, etc.) to pass into the Cataract impoundment at both the East and West Channel fishways. Cull out sea lamprey and gizzard shad.

Conduct an Atlantic salmon redd survey in the Saco and Ossipee Rivers during November or December.

6.2 Downstream Passage

Continue to use two downed flashboards on the East Channel to pass outmigrating American shad and river herring. Also, continue to gather information on juvenile clupeids downstream passage through the East Channel upper flume and continue to obtain and document information on emigration routes, timing, and numbers of adult and juvenile shad, river herring, and Atlantic salmon exiting the Cataract impoundment.

Operate the Skelton trash sluice as a downstream passage route for emigrating adult and juvenile river herring when fish are observed in the Skelton forebay area. Continue to obtain and document information on emigration routes, timing, and numbers of adult and juvenile river herring exiting the Skelton impoundment.

ATTACHMENT 1

EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

MAY

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
1	*	*	*	*	6450	6.1
2	*	*	*	*	5870	10
3	*	*	*	*	5520	7.2
4	*	*	*	*	5200	10.6
5	*	*	*	*	4910	18.3
6	*	*	*	*	4420	13.3
7	*	*	*	*	4280	16.7
8	*	*	*	*	4270	18.9
9	*	*	*	*	4370	11.1
10	*	*	*	*	4620	7.8
11	*	*	*	*	5220	10.6
12	*	*	*	*	6010	9.4
13	*	*	*	*	6030	10.6
14	*	*	*	*	6130	13.9
15	*	*	*	*	5990	10.6
16	*	*	12.4	13	5540	10
17	*	*	12	13.4	5260	13.3
18	*	*	12.9	13	5010	13.3
19	*	*	12.5	13	4850	8.9
20	*	*	13.2	13.5	4660	8.3
21	*	*	12.5	12.9	4590	11.1
22	13.7	14.3	12.5	13.3	4340	13.3
23	13.3	14.8	12	14.8	4000	12.8
24	13.9	14.1	13.8	14.1	4060	10
25	14	14.4	13.8	14.1	4730	14.4
26	13.8	14.8	13.8	15.2	4680	16.1
27	14.2	15.3	14.2	15.7	4610	15
28	14.7	15.4	14.7	15.5	4510	13.9
29	15	15.7	14.9	16	4340	11.7
30	15.3	16.6	15	16.9	3790	10.6
31	15.6	17	15.6	17.2	3410	11.7
AVG	**14.4**	**15.2**	**13.5**	**14.5**	**4893**	**12.8**

* Data not available

ATTACHMENT 1

EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

JUNE

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
1	16.3	17.1	16.4	18	3300	20.6
2	16.9	17.9	17.2	18.3	3200	18.3
3	17.6	18.5	17.8	19.2	3230	16.7
4	18.2	18.9	18.4	19	2640	12.8
5	12.3	18.8	13.6	18.9	2410	13.3
6	18.1	18.9	17.9	18.7	2310	11.1
7	17.7	18.4	17.5	18.6	3030	14.4
8	17.8	18.3	17.8	18.4	2740	13.9
9	17.1	18	17.8	18.4	2620	20.6
10	17.4	18.3	17.8	18.6	2530	15.6
11	17.2	17.7	17.3	18	2460	11.1
12	17.2	17.5	17.4	17.6	2490	10.6
13	17.5	17.9	17.3	18.2	2220	11.7
14	17.6	17.8	17.8	17.9	2140	13.9
15	17.6	17.8	17.7	17.9	2050	14.4
16	17.4	18.5	17.4	19	1870	21.1
17	18.7	19.2	18.9	19.9	1830	24.4
18	18.5	19	18.9	19.5	2020	17.2
19	18.1	18.8	18.2	19	2150	17.8
20	18.5	19.5	18.7	19.9	1950	18.9
21	19.6	20	19.6	20.6	1900	19.4
22	19.9	21	19.8	21.3	1860	23.9
23	20.8	21.6	21	22.2	1680	21.7
24	21.3	22.2	21.3	22.4	1640	18.9
25	21.3	22.3	21.6	22.1	1710	19.4
26	22	22.7	21.4	22.4	1730	22.8
27	22.4	23.1	22.5	23.2	1690	24.4
28	22.8	23.8	22.7	23.6	1550	20
29	22.9	24.2	23	23.6	1590	21.1
30	23.2	24.3	23.3	24.2	1480	18.9
AVG	**18.8**	**19.7**	**18.9**	**20**	**2201**	**17.6**

* Data not available

ATTACHMENT 1

EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

AUGUST

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
1	21.8	22	22	22.1	2480	16.1
2	21.8	22.1	*	*	2290	20
3	21.5	22.1	*	*	1920	24.4
4	21.9	22.3	22	22.8	1830	21.7
5	21.8	22.2	22.4	22.6	1710	20
6	21.8	22.5	22.2	23	1470	20
7	22.1	22.6	22.4	23	1530	21.7
8	22	23.6	22.4	23.5	1450	24.4
9	22.6	24.7	23.6	24.2	1330	23.3
10	22.7	24	23.2	24.8	1400	22.8
11	23.1	23.8	24	24.6	1370	20
12	23.3	23.7	23.9	24.6	1300	18.9
13	23.3	23.4	23.4	23.7	1195	18.9
14	*	*	22.9	23.4	1420	18.3
15	*	*	22.9	23.1	1320	20.6
16	*	*	22.8	23.5	1550	20
17	*	*	22.8	23.5	1500	17.2
18	*	*	22.7	23.2	1350	15
19	*	*	22.6	23.4	1290	18.9
20	*	*	22.5	22.9	1279	16.7
21	23	23.1	21.9	22.9	1196	17.8
22	22.2	23	22.2	23.4	1161	18.9
23	22.1	22.3	*	*	1105	18.9
24	22	22.6	22.3	23.1	1031	20.6
25	21.8	23	22.2	23.3	1124	19.4
26	22.4	23.1	22.9	23.9	1029	20.6
27	22.5	22.8	22.9	23.5	1081	21.1
28	22.6	23.1	23.3	23.8	979	18.3
29	22.5	23	23.3	23.6	973	17.2
30	22.3	22.8	22.6	23.3	940	18.3
31	22.3	22.8	23	23.9	934	22.2
AVG	**22.3**	**22.9**	**22.8**	**23.5**	**1372**	**19.7**

* Data not available

ATTACHMENT 1

EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

SEPTEMBER

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
1	*	*	23.9	24.2	897	26.7
2	*	*	*	*	882	20.6
3	*	*	*	*	883	17.8
4	*	*	*	*	913	16.7
5	21.4	22.3	*	*	926	13.3
6	21.4	21.7	21.8	22.2	912	12.2
7	21.1	21.9	*	*	854	13.3
8	21.1	22.1	*	*	773	18.9
9	21.8	22.6	*	*	734	21.1
10	22	22.6	*	*	732	17.8
11	22.3	22.7	22.4	23.2	731	15
12	22.2	22.6	22.4	23.1	739	20
13	21.9	22.6	22.8	23.2	776	18.9
14	22	22.6	22.4	23.3	763	15.6
15	21.7	22.4	21.7	22.5	794	16.1
16	20.7	21.6	20.9	21.3	965	14.4
17	19.9	21	20	20.5	1360	13.3
18	19.8	20.7	20	21	1310	17.8
19	20.4	21	20.6	21.4	1203	16.7
20	20.2	20.8	20.8	20.9	1310	21.7
21	20.3	20.7	20.7	21	1294	19.4
22	19.7	20.1	19.9	20.2	1118	15
23	19.4	19.7	19.4	19.8	925	14.4
24	19.4	19.5	19.3	19.8	936	15
25	19	19.3	19.2	19.6	856	10.6
26	18.6	19	18.6	19	796	10.6
27	18	18.7	18.1	19	848	11.1
28	18	18.6	17.7	18.5	818	7.8
29	17.5	17.9	17.1	18.1	813	6.1
30	17.1	17.5	16.1	18	751	10.6
AVG	**20.3**	**20.9**	**20.3**	**20.9**	**920**	**15.6**

* Data not available

ATTACHMENT 1

EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

SEPTEMBER

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
1	*	*	23.9	24.2	897	26.7
2	*	*	*	*	882	20.6
3	*	*	*	*	883	17.8
4	*	*	*	*	913	16.7
5	21.4	22.3	*	*	926	13.3
6	21.4	21.7	21.8	22.2	912	12.2
7	21.1	21.9	*	*	854	13.3
8	21.1	22.1	*	*	773	18.9
9	21.8	22.6	*	*	734	21.1
10	22	22.6	*	*	732	17.8
11	22.3	22.7	22.4	23.2	731	15
12	22.2	22.6	22.4	23.1	739	20
13	21.9	22.6	22.8	23.2	776	18.9
14	22	22.6	22.4	23.3	763	15.6
15	21.7	22.4	21.7	22.5	794	16.1
16	20.7	21.6	20.9	21.3	965	14.4
17	19.9	21	20	20.5	1360	13.3
18	19.8	20.7	20	21	1310	17.8
19	20.4	21	20.6	21.4	1203	16.7
20	20.2	20.8	20.8	20.9	1310	21.7
21	20.3	20.7	20.7	21	1294	19.4
22	19.7	20.1	19.9	20.2	1118	15
23	19.4	19.7	19.4	19.8	925	14.4
24	19.4	19.5	19.3	19.8	936	15
25	19	19.3	19.2	19.6	856	10.6
26	18.6	19	18.6	19	796	10.6
27	18	18.7	18.1	19	848	11.1
28	18	18.6	17.7	18.5	818	7.8
29	17.5	17.9	17.1	18.1	813	6.1
30	17.1	17.5	16.1	18	751	10.6
AVG	**20.3**	**20.9**	**20.3**	**20.9**	**920**	**15.6**

* Data not available

2000
SPRINGS AND BRADBURY FISH LOCKS REPORT

A Report on the Operation of
FPL Energy's
Springs and Bradbury Fish Locks
Saco River, Maine
FERC No. 2528

Prepared by
FPL Energy Maine Hydro LLC

March 2001

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Executive Summary

In 2000, the Springs and Bradbury fish locks were operated by personnel from FPL Energy Maine Hydro (FPLE) and Unity College students.

These fish locks were built to pass anadromous target species (Atlantic salmon, American shad, and river herring) as part of resource agency plans to restore these species to the Saco River. 2000 marked the fourth year of operation for the Springs and Bradbury fish locks.

In 1997, a number of mechanical, electrical, and hydraulic problems were encountered during startup and shakedown of the Springs and Bradbury fish locks. Many of these problems were resolved by the end of the 1997 season, however, they limited the ability to successfully evaluate fish lock efficiency.

During the 1998 season, efforts to identify and resolve mechanical, electrical, and flow problems with the fish locks continued. Additional information on fish behavior and passage effectiveness was gathered through underwater video camera monitoring. Fish lock effectiveness in 1998 was lower than anticipated and could be attributed to a number of reasons including: flows through the Springs and Bradbury gates which compete with fish lock flows; natural passage through Springs and Bradbury gates; behavioral problems such as inadequate imprinting to upriver locations; fallback to the estuary after exiting the East Channel fishway; or mechanical and flow problems associated with fish lock operation. Additional evaluation studies were proposed for the 1999 season in an attempt to gather information to help identify the reasons for the apparent low passage effectiveness.

During the 1999 season, river herring passage numbers (78% passage effectiveness) increased significantly over 1998 passage numbers (20% passage effectiveness) due in part to various operational changes made at the fish locks and possible behavioral reasons such as imprinting to upriver locations and schooling activity. In 1998 only 3,218 river herring were allowed to pass into the Cataract impoundment to evaluate the Springs and Bradbury fish locks, however in 1999

12,567 river herring were allowed to pass into the Cataract impoundment. It is believed that this increased number of fish and associated river herring schooling behavior contributed to increased passage in 1999. American shad passage numbers remained lower than expected.

During the 2000 season, river herring passage numbers (58% passage effectiveness) were lower than those encountered in 1999 (78% passage effectiveness). We believe that this is largely due to the smaller numbers seen at the Cataract East Channel fishlift in 2000. Of the 5,429 river herring passed at the Cataract East and West Channel fishways in 2000, 3,148 were observed passing through the Springs and Bradbury fish locks. Based on previous observations at the Cataract fishlift and the Springs and Bradbury fishlocks it appears that increased numbers of fish and associated river herring schooling behavior contribute to increased passage effectiveness. The majority of river herring encountered at Cataract East Channel in 2000 were captured during a two-hour period on June 2. At that time, the decision was made to truck these fish to the Skelton headpond assuming that the following days would provide more fish that could be used in the evaluation of the Springs and Bradbury fish locks. Unfortunately, very few river herring were observed after this day thus limiting the numbers that could be used for fish lock evaluation and the numbers and associated schooling behavior that we believe is necessary to increase fish lock effectiveness.

American shad passage numbers remained lower than expected. The low passage rate for shad could be attributed to a number of reasons including: flows through the Springs and Bradbury gates which compete with fish lock flows; natural fish passage through the Spring Island gates; behavioral problems such as inadequate imprinting to upriver locations and not enough shad released into the Cataract impoundment to take advantage of the schooling behavior; or mechanical and flow problems associated fish lock operation.

Data contained in this report and other studies will be used as a basis for meeting the requirements of the Saco River Fish Passage Agreement and Saco River Fish passage Assessment Plan (2000-2003).

1.0 Introduction

The Cataract Project (FERC No. 2528) is located on the Saco River in the cities of Biddeford and Saco and in the towns of Dayton and Buxton in the state of Maine. The project is licensed by the Federal Energy Regulatory Commission (FERC) and is owned by FPLE. The project includes the Cataract (East Channel) dam and East Channel fishlift and an integral intake powerhouse containing a single turbine generator on the northeastern side of Factory Island in the City of Saco; and the West Channel dam and Denil fishway in the cities of Saco and Biddeford . The impoundment formed by these dams extends upriver in the cities of Biddeford and Saco about 0.3 mile to another set of dams at Spring Island (see Figure 1), referred to as Bradbury and Spring Island dams. These dams are also part of the Cataract Project, and fish locks at these two sites were first operational in June, 1997. The impoundment formed by these dams extends upriver about 9.3 miles through the cities of Biddeford and Saco and the towns of Dayton and Buxton to FPLE's Skelton Station.

1.1 Operation of the Springs and Bradbury Fish Locks

The fish locks at Springs and Bradbury dams are designed to operate at river flows up to 11,000 cubic feet per second (cfs) and consist of a 5.0 foot wide by 28.0 foot long lock chamber and a 5.0 foot wide by 11.0 foot long exitway (Figure 2). The lock fluctuates water elevation allowing salmon, shad, and river herring to be lifted the 5.0-ft elevation difference at the dams. The locks have a minimum water depth of 5.0 ft and operate with a flow of approximately 80-cfs. Fishway entrance velocities are 4 to 6 feet per second (fps).

The 80-cfs attraction water attracts the fish through the downstream lock gate. The fish then swim through the crowder and remain in the lock chamber. During the cycling process, the downstream gate closes and the water elevation in the lock chamber rises from 44.0 to 49.2 ft. The upstream gate then opens and the crowder slowly moves toward the upstream gate and guides the fish into the upstream reservoir. The upstream gate then closes and the crowder moves back to its original position (referred to as the fishing position). The

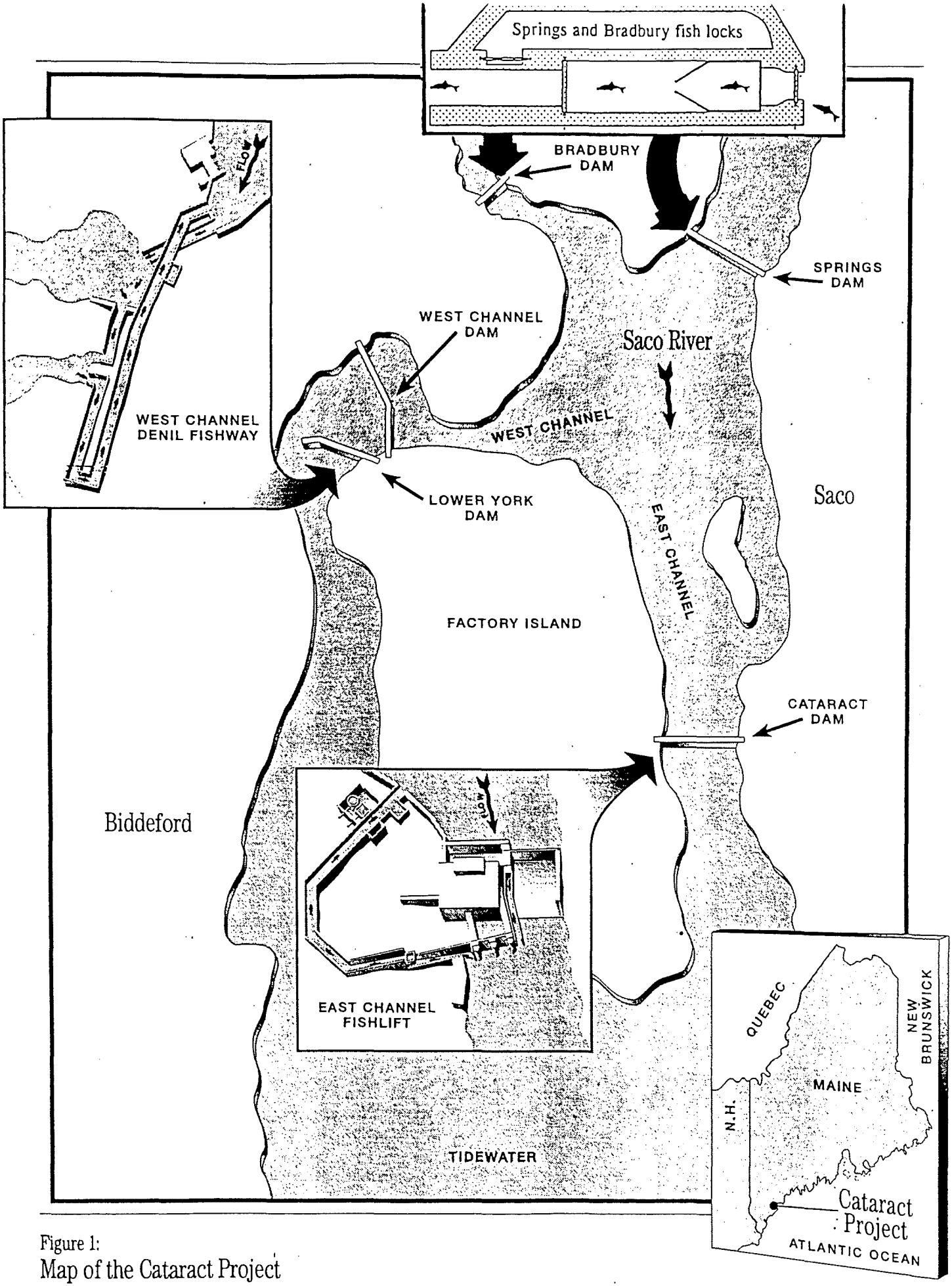


Figure 1:
Map of the Cataract Project

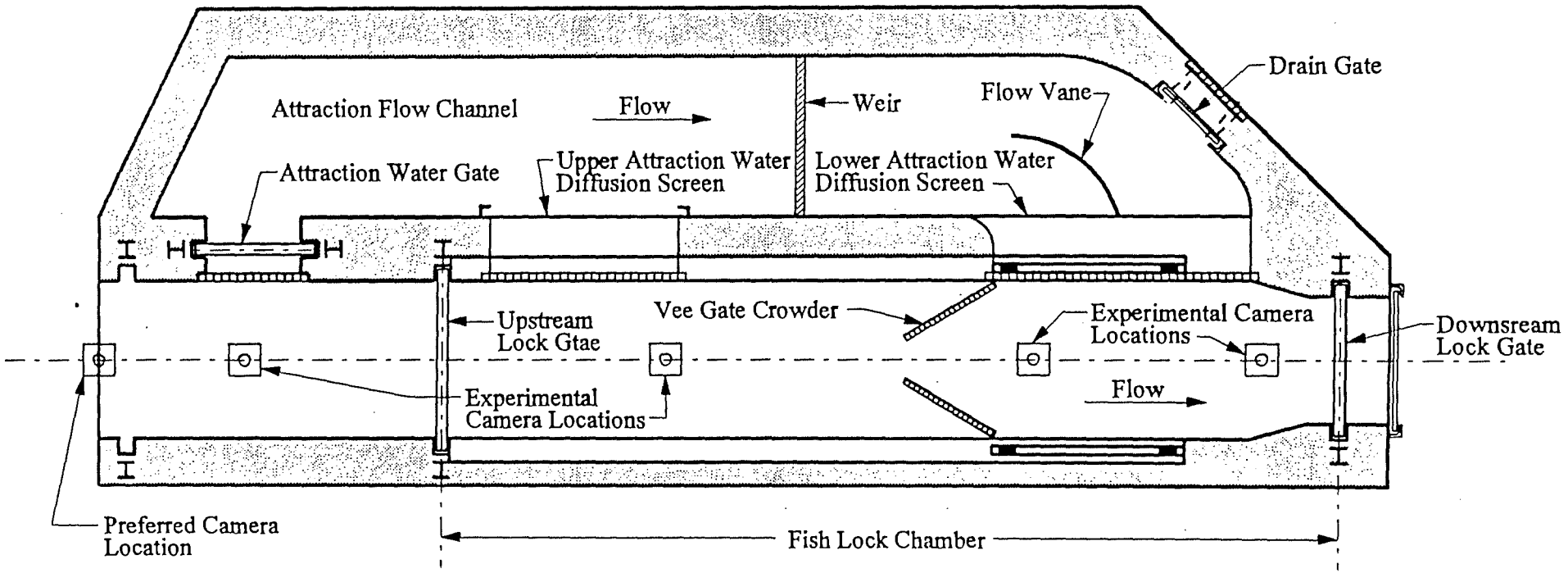


Figure 2 Fish Lock Overview

discharge gate then opens, returning the water elevation in the lock chamber to 44.0 ft. and the downstream gate opens to complete the process.

The hydraulic capacity of the Bradbury gate is approximately 2,060 cfs. River flows up to 2,060 cfs are normally passed through the Bradbury gate because the flows from this gate are directly in line with the Cataract East Channel power house intake structure. This operation produces a more efficient flow pattern than flows out of the Spring Island gates which are directed towards the West Channel. In addition, river flows are normally passed via the Bradbury gate because these flows help dilute the thermal effluent of the Maine Energy Recovery Corporation (MERC) plant. FPLE has an agreement with MERC to provide this water at the Bradbury gate so MERC can be in compliance with its permit conditions. River flows in excess of 2,060 cfs are passed via gates at the Spring Island gatehouse.

River water temperature data (see Attachment 1) is collected at each site via subsurface probes located near the fish lock exits in the impoundment water. River flow data (see Attachment 1) is collected at each site and calculated via the programmable logic controllers (PLC) located at each site. Gate openings at both Springs and Bradbury Dams are documented daily throughout the fish migration season and are included in Attachment 2.

2.0 Underwater Video Camera Installation and Operations

Underwater video cameras identical to the models presently being used at the Cataract East Channel fishlift (Subsea Video Systems models S-603) were utilized during the fish lock evaluation in 1997-2000. Each camera measures 2-3/16 in. by 2-1/4 in. by 2-5/16 in. deep. The cameras were wired to a VCR and monitor located in the gate houses of the Springs and Bradbury dams. This setup provided constant monitoring of fish activity as well as a chance to record and review fish behavior when fishway personnel were not in the immediate area

In 1997, a total of four experimental underwater video camera monitoring locations were utilized at each fish lock (see Figure 2). The four locations evaluated were: the fish lock entrance: just down stream of the vee gate crowder: the lock chamber: and upstream of the lock gate. One location at each fish lock was monitored at a time. The camera at each lock was moved periodically between the study locations. Movement of the camera between several locations was done to allow collection of behavioral information from several sites and identify potential trouble areas which may hinder fish passage within the fish lock.

Due to increased velocities in and around the fish locks, it was not possible to use a cement block to anchor the camera to the fish lock floor (as was done on the Cataract East Channel). To resolve these problems, the camera was mounted to the end of a long metal pipe with the lens oriented upwards towards the water surface. The pipe could then be secured above the desired viewing location. This mounting technique provided the best viewing and coverage at both Springs and Bradbury dams. Entrained air and a narrow field of view were limiting factors during camera placement. The entrained air is caused by the turbulence created when water rushes through the upper attraction water gate and screen.

After evaluating the pipe mounted underwater camera effectiveness in several different locations throughout the fish locks, fishway personnel decided that the lock exit provided the best overall view. The camera was mounted to a metal pole which was moved to the hand rail above the lock exit. The camera lens was oriented upwards and provided clear visibility to fish leaving the fishway.

Although the fish lock exit camera placement provides the best view of fish passing through the trap, it appears that some fish are being missed in the blind spots created by the camera angle. The camera provides 120° of view, and when the camera is in place, the lens is four to five inches from the bottom of the flume. The underwater camera must face in an upward position to utilize the light as an appropriate background. Often, the fish will begin to swim under the upstream lock gate as soon as it starts to open, therefore, they stay close to the bottom of the flume and

through the camera blind spot. On several occasions in 1998, 1999, and 2000 schools of river herring were observed passing on the outside edge of the cameras field of view.

On three occasions in 1999, 50 river herring were deliberately placed in the fish lock area ahead of the closed crowder doors in an attempt to develop an estimate regarding the percentage of the fish the camera could see. During these tests the river herring did not swim directly through the lock, as is the case when fish are passing on their own. They appeared disoriented and milled around before exiting the lock. Schools of river herring would circle the camera passing in and out of its field of view several times before leaving. However, even under these circumstances, it was obvious that some fish passed by the camera undetected. Also, after viewing hundreds of hours of videotape and counting thousands of river herring passing through the fish locks, a fair estimate could be based on general observations. Based on the above tests and other visual observations, it appears that the camera is approximately seventy five percent effective in detecting fish passing through the locks. Fish lock effectiveness numbers presented in this report are adjusted upward by a 25% correction factor to reflect this observation.

On June 11, 2000, it had become obvious that the American shad were not passing through the fish locks at anticipated levels. At this point, an additional camera was then placed at the Springs Dam fishway entrance to gain more insight on the shad's behavior at the entrance area. The findings are included in section 3.2. Also on June 11, 2000, the camera at the Bradbury dam was moved to the fishway entrance. These findings are included in section 4.2.

3.0 Springs Dam Fish Lock - River Herring, American Shad, and Atlantic Salmon Information

In 2000, the Springs dam fish lock was opened on May 11 and ran without major operational problems until October 27 when it was closed for the season. Fish lock cycle time was adjusted daily and ranged from every 30 minutes to twice a day. It appeared that when river herring were in the area, a one half hour to one hour cycle time captured the most fish. Occasionally fishway personnel would observe the video monitor directly as a cycle was occurring, and other times the underwater video camera would record every cycle and was reviewed at the end of every day.

The Springs dam fish lock was closed on June 2 and June 5 when the water was lowered to replaced the flashboards at the West Channel, Springs and Bradbury dams. On June 2, 2000 head differential at Springs and Bradbury dams achieved a low of 2.7 feet during the board job.

3.1 River Herring - Springs Dam Fish Lock

In 2000, approximately 5,429 river herring were passed at the East and West Channel fishways during the evaluation studies for the Springs and Bradbury fish locks. During the 1998 and 1999 evaluation studies, it appeared that more fish in the study area could increase fish passage effectiveness. In 1998, only 3,218 herring were passed at the East and West Channel projects, of which 14% were passed at Springs dam, where as in 1999, 12,567 river herring passed at the East and West Channel fishways and 70% were documented passing through the Springs dam fish lock. The majority of river herring encountered at Cataract East Channel in 2000 were captured during a two-hour period on June 2. At that time, the decision was made to truck these fish to the Skelton headpond assuming that the following days would provide more fish that could used in the evaluation of the Springs and Bradbury fish locks. Unfortunately, very few river herring were observed after this day thus limiting the numbers that could be used for fish lock evaluation and the numbers and associated schooling behavior that we believe is necessary to increase fish lock effectiveness.

Of the 5,429 river herring passed at the East and West Channel fishways, the underwater camera documented 2,809 (52%) passing through the Springs dam fish lock (see Table 1). This was a significant increase over the 1997 and 1998 passage numbers in which 14% of the test fish passing the Cataract fishways used the Springs fish lock, but it was lower than the 70% documented in 1999.

In an attempt to gather additional information on fish movements, daily surveys were conducted to look for river herring around the entire headpond from the Cataract dam up to the Springs and Bradbury dams. Some fish were observed around the Springs fish lock

TABLE 1

DAILY AND MONTHLY TOTALS OF RIVER HERRING ASCENDING THE SPRINGS FISH LOCK 1997-2000

	MAY				JUNE			
	1997	1998	1999	2000	1997	1998	1999	2000
1							825	
2						123	25	
3						46	38	8
4						39	1	101
5						36	25	
6						6		10
7							44	8
8							47	341
9					6			9
10					5			30
11								135
12					14			45
13			221					575
14			9					326
15			206					533
16			563	2				145
17			1265					262
18			1100	1	2			1
19			438		4			13
20			275					43
21			783					2
22			315					81
23			307					0
24		15	51					104
25			9					11
26								7
27								10
28		138	499					5
29		46	868					0
30			848					1
31		7	95					
TOTAL	0	206	7852	3	31	200	1005	2806

1997 TOTAL = 31
1998 TOTAL = 406
1999 TOTAL = 8,857
2000 TOTAL = 2,809

Note: 25% correction factor on river herring daily passage numbers is taken into account

entrance and in the immediate tailrace area and also occasionally around the Jubilee park area, but were not seen in any other area between Cataract and Springs and Bradbury dams.

In 1999, a river herring fallback study was conducted at the Cataract East and West Channel fishways to identify if fallback contributed to the low fish lock passage rates observed in 1997 and 1998 (see 1999 Springs and Bradbury fishway reports). This study consisted of tagging 1,511 river herring and releasing them into the Cataract headpond to observe whether the fish were falling back into the tailrace and being captured in the fishway for a second time. The results of the study indicated that only a very small percentage (3%) of river herring dropped out of the impoundment and reentered the fishways. The majority of these fish dropped out when an East Channel gate was open. It does not appear that fallback is a contributing factor for low river herring passage rates.

3.2 American Shad - Springs Dam Fish Lock

In 2000, approximately 410 American shad were passed at the East and West Channel fishways during evaluation studies for the Springs and Bradbury fish locks. Of these 410 American shad approximately 10 (2%) were documented passing through the Springs fish lock. As discussed in the 1997, 1998, and 1999 Springs and Bradbury reports, the low passage rate in 2000 could also be attributed to the following: flows through the Springs and Bradbury gates which compete with fish lock flows; natural fish passage through the Spring Island gates; behavioral problems such as inadequate imprinting to upriver locations or not enough test fish in the study area; or mechanical and flow problems associated with fish lock operations.

Approximately 90 of the 410 American shad passed through the East and West Channel fishways in 2000 were first handled at the Cataract Project. In 2001, all American shad will be allowed free passage (without handling) through the Cataract facilities in an attempt to reduce any stress or other unnatural delays that may reduce migratory drive or result in other behavioral problems.

TABLE 2

DAILY AND MONTHLY TOTALS OF AMERICAN SHAD PASSED
AT THE EAST AND WEST CHANNEL FISHWAYS VS. SPRINGS AND BRADBURY
FISHLOCKS 2000

	JUNE			JULY		
	PASSED AT EAST&WEST	SPRINGS	BRADBURY	PASSED AT EAST&WEST	SPRINGS	BRADBURY
1	1					
2	35			2		
3	15					
4	14	2	1			
5				1		
6	62	1				
7	2					
8	29	2				
9	39					
10	48					
11	36					
12	17			1		
13	1	1				
14	52		3			
15	8					
16	6					
17	19					
18						
19	1	1				
20	7					
21	3					
22	1					
23						
24	5					
25						
26	1	1				
27	4					
28						
29		2				
30						
31						
TOTAL:	**406**	**10**	**4**	**4**	**0**	**0**

In an attempt to gather additional information on the low passage effectiveness, 10 American shad were radio tagged, released at the Cataract fishlift, and tracked manually for two weeks in June of 2000 (see Table 3). In short, the ten shad swam a circuit that ran from the East Channel forebay up past Jubilee Park and to the Spring Island fishway. Although nine of the ten-tagged fish made appearances at the Spring Island fishlock, and two at the Bradbury fishlock, radio telemetry data indicated that shad spent most of their time between the East Channel forebay and the upper end of Jubilee Park. It did not appear that shad were "holding up" in any particular location for long periods of time. All Spring Island gates were closed during the tracking period and no fish passed through the open Bradbury gate.

In an attempt to gather additional information on the low passage effectiveness, daily surveys were conducted to look for American shad around the entire headpond from the Cataract dam up to the Springs and Bradbury dams. On very few occasions were American shad observed schooling in this area but were occasionally seen near the fish lock entrance or near the Jubilee park area.

On June11, 2000, an additional underwater camera was added at the entrance of the fishway in an attempt to help establish whether the shad were entering and leaving the fishway entrance, or not finding the entrance at all. The results were similar to those encountered in 1999. On a few occasions, small schools of 2 to 5 shad were observed entering and very quickly leaving the fishway entrance, however, the number of shad observed was only a small percentage of 410 shad contained in the Cataract headpond area. It was also evident in the timing of entrance/exit movements, that these fish were not even passing into the trap area of the fish lock.

A shad fallback study was conducted at the Cataract East and West Channel fishways in 1999 to identify if fallback contributed to the low fish lock passage rates observed in 1998. This study consisted of tagging 247 American shad and releasing them into the Cataract headpond to observe whether the fish were falling back into the tailrace and being captured in the fishway for a second time. None of the 247 tagged American shad were recaptured at the

TABLE 3

2000 SHAD TAGGING DATA

Tag #	14-Jun	15-Jun .	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun
114	forebay	forebay	forebay	forebay	forebay	forebay	forebay	not found
124	"	"	forebay	forebay	above jubilee	beside jubilee	si	si
135	"	"	above jubilee	forebay	forebay	beside jubilee	forebay	si
145	"	"	forebay	forebay	forebay	forebay	forebay	near jubilee
155	"	jubilee park	above jubilee	above jubilee	above jubilee	si	bradbury	near jubilee
164	"	between ec and jubilee	forebay	forebay	forebay	forebay	forebay	forebay
174	"	forebay	forebay	above jubilee	above jubilee	si	above jubilee	beside jubilee
185	"	between ec and jubilee	forebay	above jubilee	above jubilee	above jubilee	si	si
193	Dead							
205	"	jubilee park	above jubilee	close to si	above jubilee	below bradbury	beside jubilee	beside jubilee

Tag #	22-Jun	23-Jun	24-Jun	26-Jun	27-Jun	29-Jun	2-Jul	6-Jul
114	forebay	forebay	forebay	forebay	forebay		forebay	forebay
124	si	si	si	above jubilee	forebay	jubilee area	forebay	si
135	forebay	si	forebay	above jubilee	forebay	forebay	forebay	forebay
145	dropout							
155	around jubilee	si	bradbury	si	jubilee area	jubilee area	forebay	forebay
164	forebay	si	forebay	forebay	forebay	forebay	not found	not found
174	si	si	si	above jubilee	forebay	forebay	forebay	forebay
185	around jubilee	si	si	si	jubilee area	jubilee area	forebay	forebay
193			retagged forebay	si	jubilee area	forebay	forebay	forebay
205	around jubilee	si	si	above jubilee	si	forebay	forebay	forebay

Tag #	11-Jul	18-Jul	28-Jul					
114	forebay	tailrace						
124	forebay	si	forebay					
135	believed out	tailrace						
145		tailrace						
155	forebay	forebay	forebay					
164	believed out	tailrace						
174	believed out	not found						
185	forebay	forebay	forebay					
193	si	si	forebay					
205	forebay	tailrace						

si = Spring Island
ec = East Channel

Cataract East or West Channel fishways. It does not appear that fallback is a contributing factor for the low shad passage rates at Springs and Bradbury fish locks.

3.3 Atlantic Salmon - Springs

In 2000 a total of 36 Atlantic salmon was passed through the Cataract East and West Channel fishways during the evaluation studies for the Springs and Bradbury fish locks. Three of these fish passed through the Springs dam fish lock. As in previous years, it was theorized that most salmon passed through open gates at Springs or Bradbury dams or over the dam's flashboards during spill conditions. Atlantic salmon redd surveys conducted in the fall of 2000 found 16 salmon redds in the Skelton tailrace area confirming FPLEs' theory.

4.0 Bradbury Dam Fish Lock - River Herring, American Shad, and Atlantic Salmon Information

In 2000 the Bradbury dam fish lock was opened on May 11 and ran without major operational problems until October 27 when it was closed for the season. Fish lock cycle time was adjusted daily and ranged from every 30 minutes to twice a day. It appeared that when river herring were in the area, a one half hour to one hour cycle time captured the most fish. Occasionally fishway personnel would observe the video monitor directly as a cycle was occurring, and other times the underwater video camera would record every cycle and was reviewed at the end of every day.

The Bradbury dam fish lock was closed on June 2 and June 5 when the water was lowered to replaced the flashboards at the West Channel, Springs and Bradbury dams.

4.1 River Herring - Bradbury

In 2000, approximately 5,429 river herring were passed at the East and West Channel fishways during the evaluation studies for the Springs and Bradbury fish locks. Of the 5,429 river herring passed at the East and West Channel fishways, the under water camera

TABLE 4

DAILY AND MONTHLY TOTALS OF ATLANTIC SALMON
ASCENDING THE SPRINGS FISH LOCK 1997-2000

	JUNE				JULY				AUGUST			
	1997	1998	1999	2000	1997	1998	1999	2000	1997	1998	1999	2000
1									1			
2												
3												
4												
5									1			
6			1									
7												
8			1									
9	*											
10												
11			1									
12												
13				1								
14												
15												
16			1									
17	1											
18												
19	1											
20	1											
21												
22												
23												
24				1								
25			1	1	1							
26												
27												
28												
29												
30												
31												
TOTAL	3	0	5	3	1	0	0	0	2	0	0	0

1997 SPRINGS TOTAL = 6
1998 SPRINGS TOTAL = 0
1999 SPRINGS TOTAL = 5
2000 SPRINGS TOTAL = 3

* FIRST DAY OF OPERATION

documented 339 (6%) passing through the Bradbury dam fish lock (see Table 5). During the 1997, 1998 and 1999 seasons, 0%, 6% and 8% respectively, used the Bradbury fish lock

Regarding the significant difference in passage numbers between the two fish locks, it is theorized that because the Spring Island gates are used on a limited basis during the migration season, their flow does not compete with the Springs fish lock attraction flow. This situation allows fish to find the flow from the fish lock. On the other hand, the Bradbury gate is operated during the entire migration season because it is the gate that is used to supply water to the Cataract station. The flow from this gate competes with the Bradbury fish lock flow.

4.2 American Shad – Bradbury

In 2000, approximately 410 American shad were passed at the East and West Channel fishways during evaluation studies for the Springs and Bradbury fish locks. Of these 410 shad passed at the Cataract fishways, 4 (1%) passed at the Bradbury fishway. As discussed in the 1997, 1998, and 1999 Springs and Bradbury reports, this absence of fish could be attributed to: flows through the Springs and Bradbury gates which compete with fish lock flows; natural fish passage through the Spring Island gates; behavioral problems such as inadequate imprinting to upriver locations or not enough fish in the study area; or mechanical and flow problems associated with fish lock operations.

On June 11, 2000 the underwater video camera was moved from the fishway exit to the fishway entrance in attempt to help establish whether the shad were entering and leaving the fishway entrance, or not finding the entrance at all. The results were similar to those encountered at the Springs fishway. Only seven shad were seen on the camera and it was also evident in the timing of entrance/exit movements, that these fish were not even passing into the trap area of the fish lock.

TABLE 5

DAILY AND MONTHLY TOTALS OF RIVER HERRING ASCENDING THE BRADBURY FISH LOCK 1997-2000

	MAY				JUNE			
	1997	1998	1999	2000	1997	1998	1999	2000
1							51	
2						6	139	
3							25	
4							4	44
5							34	
6							6	
7							18	23
8							23	110
9							18	14
10							54	2
11			19	44		1	**	3
12				38			**	9
13							**	
14							**	
15							**	8
16		99	288				**	1
17		31	28				**	7
18		19	111					
19		15	147					
20			*					
21			*					
22			*					
23		1	*					
24		10	*					
25			*					
26		19	*	37				
27			*					
28			*					
29			*					
30		10	*					
31			*					
TOTAL	0	204	593	119	0	7	372	220

1997 TOTAL = 0
1998 TOTAL = 211
1999 TOTAL = 965
2000 TOTAL = 339

* SHUT DOWN TO REPAIR GATE OPERATOR
** CAMERA NOT OPERATING

Note: 25% correction factor on river herring daily passage numbers is taken into account

4.3 Atlantic Salmon - Bradbury

In 2000 a total of 36 Atlantic salmon was passed through the Cataract East and West Channel fishways during the evaluation studies for the Springs and Bradbury fish locks. Four of these fish passed through the Bradbury dam fish lock. As in previous years, it was theorized that most salmon passed through open gates at Springs or Bradbury dams or over the dam's flashboards during spill conditions. Atlantic salmon redd surveys conducted in the fall of 2000 found 16 salmon redds in the Skelton tailrace area confirming FPLEs' theory.

5.0 2001 Fishway Operations

The Springs and Bradbury fish locks will be operated in 2001 with the benefit of experience and insight gained in 1997, 1998, 1999 and 2000. General operational plans are summarized below.

1.) Allow the first 500 American shad and 15,000 river herring migrating through the Cataract fishways free passage (do not lift and sort or handle) into the Cataract headpond to be used as evaluation species for Springs and Bradbury fishlock studies and evaluation species for the new Skelton fishway studies.

2.) Utilize four underwater cameras simultaneously to observe American shad behavior in and around the fish locks in an attempt to gather information on fish lock effectiveness.

3.) Document gate settings and associated flows through the Springs and Bradbury Dams during the fish migration period.

3.) Use the deep gate adjacent to the Springs lock entrance to provide a continuous attraction flow throughout the fish migration period.

4.) Illuminate the fish lock entrances in an attempt to attract fish into the fish lock trap area.

TABLE 6

DAILY AND MONTHLY TOTALS OF ATLANTIC SALMON ASCENDING THE BRADBURY FISH LOCK 1997-2000

	JUNE				SEPTEMBER				OCTOBER			
	1997	1998	1999	2000	1997	1998	1999	2000	1997	1998	1999	2000
1												
2	*											
3			1									
4		1										
5							1					
6		1										
7		1										
8												
9		1										
10												
11												
12												
13												
14				1								
15												
16	2											
17						1						
18				2								
19			2									
20											1	
21			1									
22			1									
23			1									
24												
25				1								
26			1									
27												
28												
29			1									
30												
31												
TOTAL	2	4	8	4	0	1	1	0	0	0	1	0

1997 BRADBURY TOTAL = 2
1998 BRADBURY TOTAL = 5
1999 BRADBURY TOTAL = 10
2000 BRADBURY TOTAL = 4

* FIRST DAY OF OPERATION

5.) Collect additional velocity measures throughout each fish lock, in the area immediately downstream of the fish locks, and along the face of the dams.

6.) Obtain Maine Energy Recovery Corporation (MERC) temperature data for the thermal river effluent and river reach upstream and downstream of the diffuser pipe.

7.) Video record normal fish lock operations, and any test runs for later review.

8.) Explore possible changes in flow release patterns at the Springs and Bradbury dams that would facilitate better fish passage.

ATTACHMENT 1

SPRINGS AND BRADBURY GATE OPENINGS FOR MAY OF 2000

SPRINGS

	DEEP GATE	#1	#2	#3	BOARDS
1	6	7	7	7	20'
2	2.6	7	7	7	20'
3	1.7	7	7	7	20'
4	1.7	7	7	7	20'
5	1.7	7	7	7	20'
6	1.7	7	7	7	20'
7	1.7	7	7	7	20'
8	1.7		7	7	20'
9	1.7		7	7	20'
10	1.7		7	7	20'
11	1.7		7	7	20'
12	6		7	7	20'
13	6		7	7	20'
14	6		7	7	20'
15	6		7	7	20'
16	6		7	7	20'
17	6		7	7	20'
18	6		7	7	20'
19	6		7	7	20'
20	1		3.5	7	20'
21	1		3.5	7	20'
22	1			7	20'
23	1			7	20'
24	1			7	20'
25	3.4			7	20'
26	4.2			7	20'
27	5.1			7	20'
28	5.1			7	20'
29	5.1			7	20'
30	2.4			7	20'

BRADBURY

GATE	BOARDS
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'
10	30'

ATTACHMENT 1

SPRINGS AND BRADBURY GATE OPENINGS FOR JUNE OF 2000

SPRINGS

	DEEP GATE	#1	#2	#3	BOARDS
1	2.4			7	20'
2	6	3.5		7	20'
3	2.7	7	3.5		
4	1.8	7	3.5		
5	4.8	7			
6	3.8	7			
7	3.4	7			
8	1.8	7			
9	1.8	7			
10	2.7	3.5			
11	1				
12	1				
13	3.6				
14	2.4				
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

BRADBURY

GATE	BOARDS
10	30'
8	30'
9.9	
4.6	
9.8	
9.8	
9.8	
9.8	
9.8	
9.9	
9.8	
9.8	
9.8	
8.8	
8.8	
8.4	
6.3	
5.1	
8.8	
9.8	
8.4	
7.6	
6.7	
5.6	
6.5	
7.2	
8.5	
6	
5.7	
6.9	

ATTACHMENT 2

SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

MAY

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	*	*	*	*	*
2	*	*	*	*	*
3	*	*	*	*	*
4	*	*	*	*	*
5	*	*	*	*	*
6	*	*	*	*	*
7	*	*	*	*	*
8	*	*	*	*	*
9	16.9	15.2	2414	2068	11.1
10	16.7	15.4	2447	2125	7.8
11	16	15.6	2446	2147	10.6
12	15.7	15	2896	2218	9.4
13	14	14.4	2970	2235	10.6
14	13.6	13.3	2970	2395	13.9
15	13.5	12.7	2896	2394	10.6
16	15.2	13.7	2797	2330	10
17	14.7	13.7	2731	2732	13.3
18	14.9	13.9	2731	2615	13.3
19	15.1	14.3	2632	2223	8.9
20	15.3	14	1996	2938	8.3
21	15.3	14.3	1831	2608	11.1
22	14.6	13.9	1397	2940	13.3
23	14.5	13.3	1717	3206	12.8
24	14.6	13.4	1570	3072	10
25	14.6	13.1	1856	3369	14.4
26	14.1	13.9	1956	3159	16.1
27	14.6	13.9	2048	3289	15
28	14.6	14.3	1796	3025	13.9
29	15.5	14.7	1830	2926	11.7
30	15.7	15.1	1530	2770	10.6
31	16.2	15.4	1530	2377	11.7
AVG	**15**	**14.2**	**2217**	**2659**	**11.7**

* DATA NOT AVAILABLE

ATTACHMENT 2

SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

JUNE

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	17	16.1	3027	1862	20.6
2	19.4	18.3	3728	1490	18.3
3	18	17.4	2043	1866	16.7
4	16.9	17.7	1933	1912	12.8
5	16.4	17.8	1655	2148	13.3
6	18.8	17.6	1390	2054	11.1
7	18.7	17.3	1362	1960	14.4
8	18.1	17.1	1368	1960	13.9
9	17.8	16.8	1368	2054	20.6
10	18.6	16.8	871	2054	15.6
11	18.3	16.9	166	2242	11.1
12	17.9	16.4	166	2148	10.6
13	17.8	16.8	396	2054	11.7
14	18.4	17.7	69	1960	13.9
15	18.3	17.7	0	2069	14.4
16	19.5	18.8	52	1965	21.1
17	21.2	20.6	49	2147	24.4
18	19.1	18.5	57	2063	17.2
19	19.6	18.9	50	2088	17.8
20	20	19.2	71	1994	18.9
21	20.2	19	93	2014	19.4
22	21.4	20.3	55	2268	23.9
23	21.7	20.7	54	2272	21.7
24	21.7	21	44	2148	18.9
25	22.7	20.7	46	2242	19.4
26	23.5	21.5	59	2148	22.8
27	23.6	22	59	2148	24.4
28	23.9	22.3	57	2242	20
29	24.1	22.6	64	2054	21.1
30	24.2	22.8	61	2054	18.9
31					
AVG	**19.9**	**18.9**	**680**	**2056**	**17.6**

* DATA NOT AVAILABLE

ATTACHMENT 2

SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

JULY

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	24	22.7	352	1844	19.4
2	24.4	24.2	440	1840	20.6
3	25	24	287	1840	23.3
4	25.7	23.9	82	2020	22.2
5	25.3	24	207	1935	18.9
6	25	23.8	342	2028	18.3
7	25.2	23.8	378	1926	19.4
8	24.6	23.2	300	1930	18.9
9	23.3	23.1	93	1925	17.8
10	22.8	23.4	421	1924	21.1
11	24.4	23.5	352	1569	20
12	24.7	23.6	232	1844	21.7
13	24.2	23.5	248	1840	22.8
14	24.8	23.6	212	1837	22.2
15	24.5	23.5	364	1926	19.4
16	24	22.7	369	1927	17.2
17	24.2	21.9	408	1935	18.3
18	24	22.4	536	2040	19.4
19	24.1	21.9	511	1858	18.3
20	*	21.1	*	2043	16.7
21	*	21	*	1952	17.8
22	*	21	*	2045	20
23	*	21	*	2127	19.4
24	*	21.1	*	2141	19.4
25	*	21.4	*	1958	20
26	*	21.4	*	2042	17.8
27	*	21.2	*	1954	17.2
28	*	21.1	*	1859	21.1
29	*	21.3	*	2037	21.7
30	*	21.6	*	2224	18.9
31	*	21.2	*	2047	17.8
AVG	24.4	22.5	323	1949	19.6

* DATA NOT AVAILABLE

ATTACHMENT 2

SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

AUGUST

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	22.6	21.2	189	2060	16.1
2	22.6	21	274	2181	20
3	22.8	21.1	558	2161	24.4
4	22.8	21.2	284	2057	21.7
5	22.5	21.2	276	2059	20
6	22.1	21.4	274	1963	20
7	23	21.3	290	2147	21.7
8	22.9	21.9	209	2142	24.4
9	23.9	22.4	211	2053	23.3
10	23.6	22.4	356	2151	22.8
11	24	22.9	286	2153	20
12	23.9	23	212	1987	18.9
13	23.6	22.3	255	1974	18.9
14	23.5	22.2	318	2053	18.3
15	23	21.6	203	2250	20.6
16	23.5	21.9	284	1982	20
17	23.4	22	368	1987	17.2
18	22.9	21.6	327	2106	15
19	23.6	22	362	2056	18.9
20	23.3	22.8	387	1965	16.7
21	22.8	21.7	392	1969	17.8
22	23.2	22	392	2047	18.9
23	22.6	21.5	412	2020	18.9
24	22.4	22.1	454	2113	20.6
25	21.1	20.1	499	1878	19.4
26	23	21.5	456	1966	20.6
27	23	21.8	445	1825	21.1
28	23.3	22.1	423	1879	18.3
29	22.8	22.3	408	1994	17.2
30	22.7	*	499	*	18.3
31	23	*	423	*	22.2
AVG	23	21.8	346	2041	19.7

*DATA NOT AVAILABLE

ATTACHMENT 2

SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

SEPTEMBER

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	23.6	*	271	*	26.7
2	23.3	*	237	*	20.6
3	23.5	*	317	*	17.8
4	22.7	*	172	*	16.7
5	23.5	20.6	222	1854	13.3
6	21.8	19.9	189	872	12.2
7	22	20	316	1193	13.3
8	21.5	19.7	241	2131	18.9
9	22.8	20.4	172	2220	21.1
10	22.6	20.4	186	1093	17.8
11	22.5	20.8	253	2200	15
12	22.7	21	182	2115	20
13	22.3	21.1	212	2300	18.9
14	22.5	21	263	1536	15.6
15	22.2	20.8	377	1533	16.1
16	21.6	19.9	314	2289	14.4
17	20.1	18.1	202	2030	13.3
18	20.4	19	430	1858	17.8
19	21	19.6	264	2139	16.7
20	20.7	19.3	428	2228	21.7
21	20.9	19.5	375	2139	19.4
22	20.5	19.1	198	1853	15
23	20	18.6	198	1938	14.4
24	20	18.5	252	1847	15
25	19.2	18	236	1931	10.6
26	19	17.8	289	1838	10.6
27	16.3	17.2	121	1933	11.1
28	12.4	17.1	311	1843	7.8
29	16.4	16.2	310	1938	6.1
30	15.5	16	272	1433	10.6
31					
AVG	**20.8**	**19.2**	**260**	**1857**	**15.1**

* DATA NOT AVAILABLE

ATTACHMENT 2

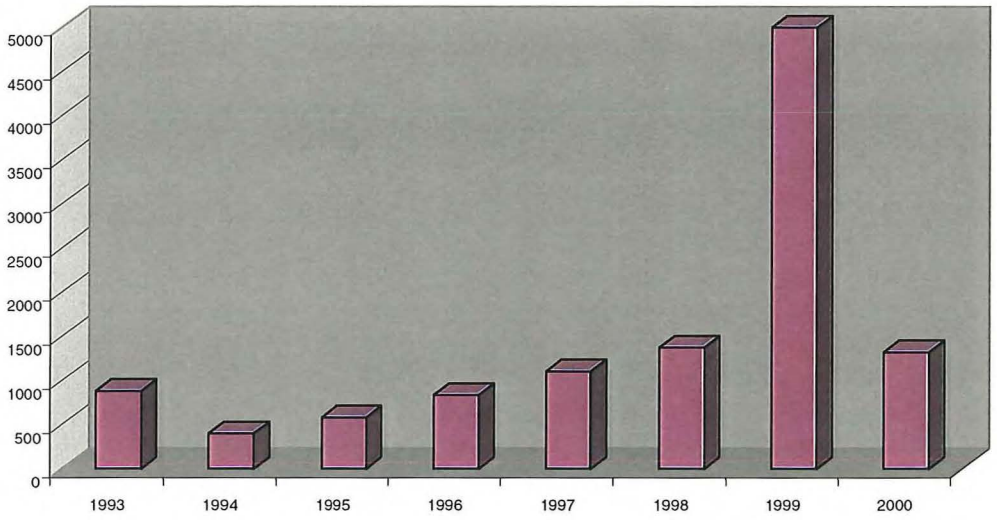
SPRINGS AND BRADBURY
WATER AND AIR TEMPERATURE AND FLOW DATA 2000

OCTOBER

	WATER TEMP C		FLOW THROUGH DAM CFS		AIR TEMP
DAY	SPRINGS	BRADBURY	SPRINGS	BRADBURY	C
1	16.1	15.7	472	1850	11.7
2	15.2	15.1	307	1843	12.2
3	17.5	16.3	307	1933	17.2
4	*	*	*	*	15
5	*	*	*	*	10.6
6	16.6	15.3	317	1804	9.4
7	16.2	15.2	222	1142	10
8	15.6	14.5	384	1517	7.2
9	15.2	13.9	405	1404	3.9
10	14.2	13.1	499	2057	5.6
11	13.9	12.9	536	2346	10
12	13.7	12.7	507	2169	10
13	13.5	12.5	486	2169	12.8
14	13.7	12.6	501	2165	18.9
15	13.7	12.6	522	2153	14.4
16	13.1	12.4	485	2153	4.4
17	12.1	12	498	2166	5.6
18	12.3	12	516	2053	8.9
19	12.4	11.5	527	2053	11.1
20	12.5	11.5	510	2131	8.9
21	12.5	11.5	491	2132	14.4
22	12.2	11.4	485	2035	6.7
23	11.7	10.9	473	2039	4.4
24	11.9	11	525	2135	7.8
25	11.6	10.8	472	2037	11.1
26	11.8	10.8	454	2132	12.8
27	11.6	10.8	449	1944	11.7
28	11.5	10.4	500	2029	7.2
29	10.3	9.3	519	2029	1.7
30	9.5	8.5	543	2031	4.4
31	9.8	*	475	*	6.1
AVG	**12.3**	**12.4**	**462**	**1988**	**9.5**

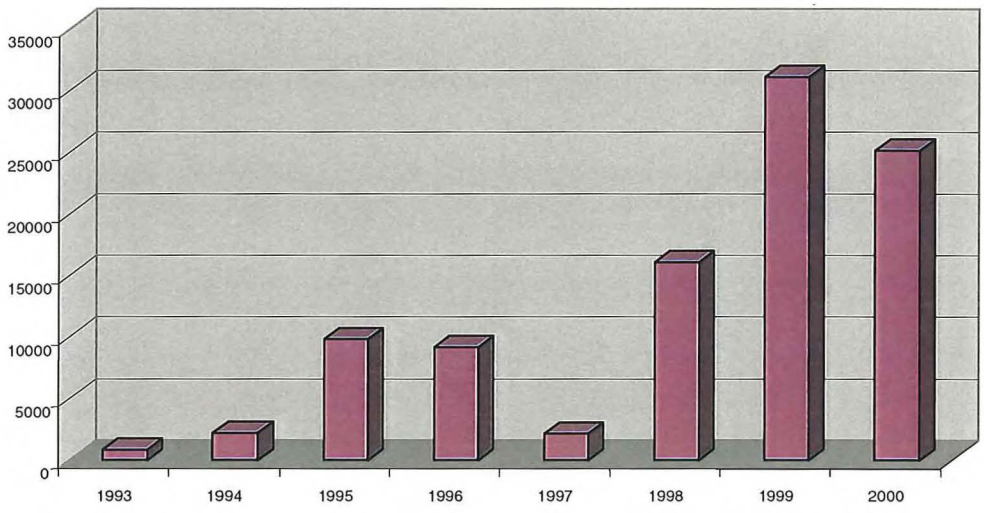
* DATA NOT AVAILABLE

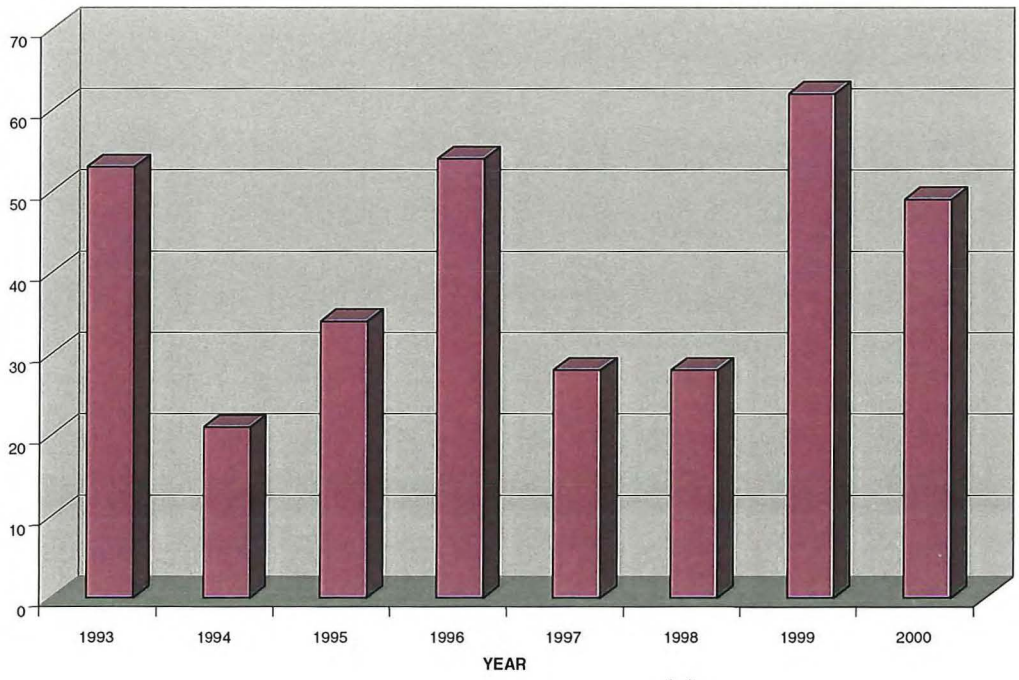
ATTACHMENT 2. Graphs of Anadromous Fish Counts in the Saco River, 1983-2000



American Shad

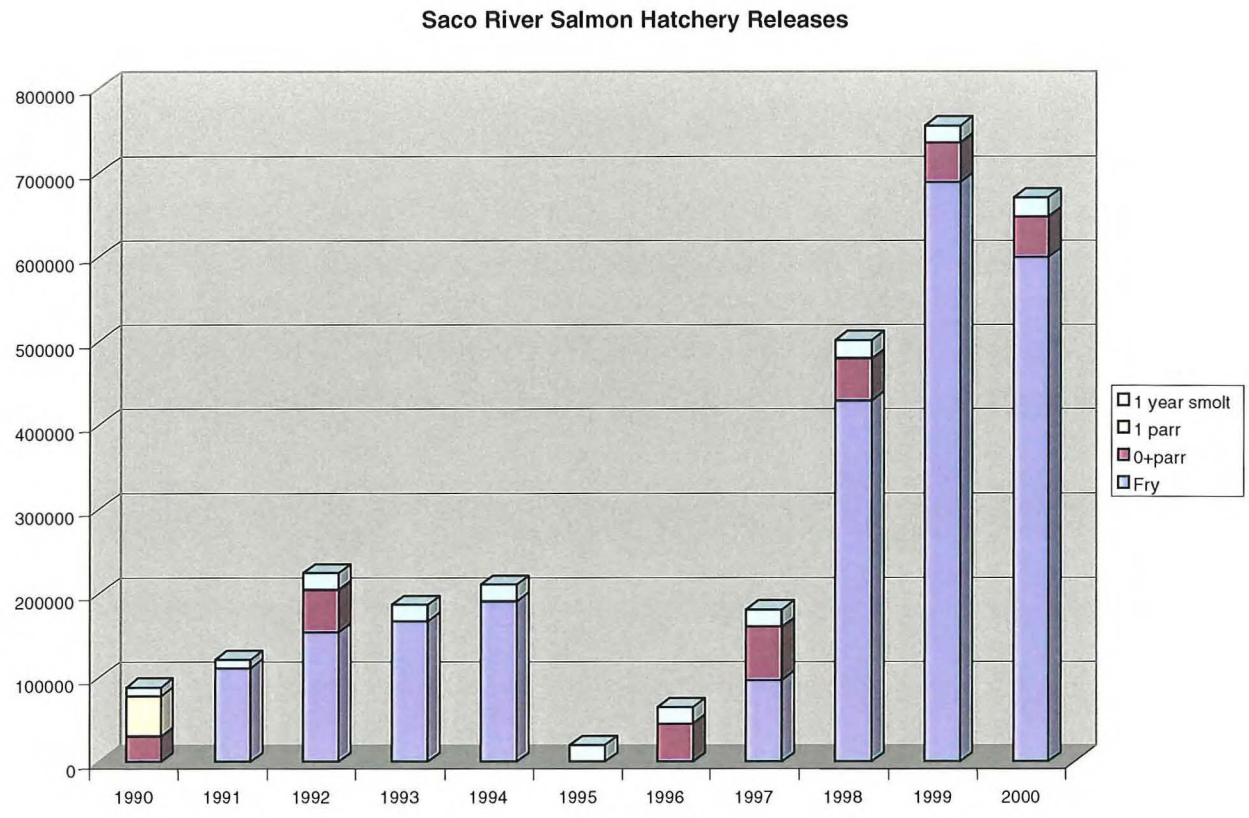
River Herring





Atlantic Salmon

ATTACHMENT 3. Graph of Releases of Hatchery-Reared Atlantic Salmon, 1982-2000



ATTACHMENT 4. Releases of Trout, American Shad and Salmon into the Saco River

1990 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1990	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	2,715		
1990	NHF&G	BKT	2 year		Bartlett,Conway Hart's Location	225		
1990	NHF&G	BNT	1		Bartlett,Conway Hart's Location	1,380		
1990	MDIFW	BNT	SY	mainstem		10,600		
1990	MDIFW	BKT	SY	mainstem		5,600		
1990	MDIFW	BNT	SY	Little Ossipee R.		2,700		
1990	MDIFW	BNT	FY	Little Ossipee R.		700		
1990	MDIFW	BKT	SY	Little Ossipee R.		2,500		
1990	MDIFW	BKT	SY	Ossipee R.		1,330		
4/18/90	CBNFH	ATS	1smolt	Mainstem	Route 5 Bridge	3,330	427.0	LVclip
4/20/90	CBNFH	ATS	1smolt	Mainstem	Route 5 Bridge	7,293	935.0	Lvclip
5/16/90	CBNFH	ATS	1parr	Ossipee	Kezar Falls	12,800	400.0	
5/16/90	CBNFH	ATS	1parr	Ossipee	Kezar Falls	12,800	400.0	
5/17/90	CBNFH	ATS	1parr	Mainstem	Limington	10,270	395.0	
5/18/90	CBNFH	ATS	1parr	Mainstem	Limington	9,100	350.0	
5/22/90	CBNFH	ATS	1parr	Little C ssipee		2,860	110.0	
10/17/90	GLNFH	ATS	0+parr	Mainstem	Limington	10,010	258.0	
10/17/90	GLNFH	ATS	0+parr	Little Ossipee		5,160	133.0	
10/17/90	GLNFH	ATS	0+parr	Ossipee	Porter	7,534	182.0	
10/17/90	GLNFH	ATS	0+parr	Ossipee	Hiram	7,411	191.0	

SY = Spring yearling; FY = Fall yearling; FING = Fingerling

Summaries	Numbers Stocked	Pounds Stocked	Fish per pound
BKT stocked	**12,370**		
BNT stocked	**15,380**		
ATS stocked	**88,568**	**3,781**	**n/a**
1smolt	10,623	1,362	7.80
1parr	47,830	1,655	28.90
0+parr	30,115	764	39.42

1991 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1991	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	2,215		
1991	NHF&G	BKT	2 year		Bartlett,Conway Hart's Location	30		
1991	NHF&G	BNT	1		Bartlett,Conway Hart's Location	1,120		
1991	MDIFW	BNT	SY	mainstem		11,900		
1991	MDIFW	BKT	SY	mainstem		3,300		
1991	MDIFW	BNT	SY	Little Ossipee R.		1,800		
1991	MDIFW	BKT	SY	Little Ossipee R.		2,500		
1991	MDIFW	BKT	SY	Ossipee R.		2,000		
4/16/91	GLNFH	ATS	1smolt	Mainstem	Biddeford	4,910	682.0	RVclip
4/16/91	GLNFH	ATS	1smolt	Mainstem	Dayton, below dam	5,410	751.0	RVclip
5/29/91	Kennebec Aquaculture	ATS	ffry	Shepherds River	Brownfield	12,000	16.0	
5/29/91	Kennebec Aquaculture	ATS	ffry	Ossipee	Kezar Falls	39,000	53.0	
6/20/91	New England Fish Farming	ATS	ffry	mainstem	Brownfield	40,000	148.0	
6/20/91	New England Fish Farming	ATS	ffry	Cold River	Fryeburg (Swan Falls)	20,000	74.0	

Summaries	Fish stocked	Pounds stocked	Fish per pound
BKT stocked	**10,045**		
BNT stocked	**14,820**		
ATS stocked	**121,320**	**1,724**	**n/a**
1 smolt	10,320	1,433	7.20
ffry	111,000	291	381.44

1992 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1992	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	2,798		
1992	NHF&G	BNT	1 year		Bartlett,Conway Hart's Location	788		
1992	MDIFW	BNT	FY	mainstem		1,500		
1992	MDIFW	BNT	SY	mainstem		4,500		
1992	MDIFW	BKT	SY	mainstem		5,600		
1992	MDIFW	BNT	SY	Little Ossipee R.		1,800		
1992	MDIFW	BKT	SY	Little Ossipee R.		2,900		
1992	MDIFW	BKT	SY	Ossipee R.		2,000		
4/1/92	CBNFH	ATS	1smolt	Mainstem	Dayton, below dam	9,045	932.0	
4/1/92	CBNFH	ATS	1parr	mainstem	Dayton, below dam	425	18.0	
4/1/92	CBNFH	ATS	1smolt	mainstem	Dayton, below dam	10,803	969.0	
5/20/92	Saco River Hatchery	ATS	ffry	mainstem	Hiram	153,600	51.0	
9/25/92	GLNFH	ATS	0+parr	Mainstem	E. Brownfield	22,372	547.0	
9/25/92	GLNFH	ATS	0+parr	Mainstem	Fryeburg	27,834	549.0	

Summaries	Number Stocked	Pounds Stocked	Fish per pound
BKT stocked	***13,298***		
BNT stocked	***8,588***		
ATS Stocked	***273,860***	***3,066***	***n/a***
1smolt	19,848	1,901	10.4
1parr	425	18	23.6
0+parr	50,206	1,096	45.8
ffry	153,600	51	3,011.8

1993 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1993	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	2,000		
1993	NHF&G	BKT	2 year		Bartlett,Conway Hart's Location	30		
1993	NHF&G	BNT	1		Bartlett,Conway Hart's Location	3,062		
1993	MDIFW	BNT	FY	mainstem		1,950		
1993	MDIFW	BKT	SY	mainstem		3,100		
1993	MDIFW	BNT	SY	Little Ossipee R.		1,800		
1993	MDIFW	BKT	SY	Little Ossipee R.		2,900		
1993	MDIFW	BKT	SY	Ossipee R.		2,100		
4/14/93	GLNFH	ATS	1smolt	mainstem	Route 5 bridge	14,209	1,893.0	LVclip
4/14/93	GLNFH	ATS	1smolt	mainstem	Route 5 bridge	5,844	779.0	
5/20/93	Saco River Hatchery	ATS	ffry	mainstem	Hiram	166,500	67.0	

Summaries	Number Stocked	Pounds Stocked	Fish per Pound
BKT stocked	***10,130***		
BNT stocked	***6,812***		
ATS stocked	***186,553***	***2,739***	***n/a***
1 smolt	20,053	2,672	299.3
ffry	166,500	67	2,485.1

1994 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1994	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	4,950		
1994	NHF&G	BKT	2 year		Bartlett,Conway Hart's Location	10		
1994	NHF&G	BNT	1		Bartlett,Conway Hart's Location	2,770		
1994	MDIFW	BNT	SY	mainstem		11,900		
1994	MDIFW	BNT	FY	mainstem		1,800		
1994	MDIFW	BKT	SY	mainstem		3,100		
1994	MDIFW	BNT	SY	Little Ossipee R.		1,300		
1994	MDIFW	BKT	SY	Little Ossipee R.		1,000		
1994	MDIFW	BNT	FY	Ossipee R.		500		
1994	MDIFW	BKT	SY	Ossipee R.		1,500		
4/15/94	GLNFH	ATS	1smolt	mainstem	Route 5 bridge	20,000	3,205.0	RVclip
5/9/94	Saco River Hatchery	ATS	ffry	Ossipee River	Hiram	190,354	76.0	

Summaries	Number stocked	Pounds Stocked	Fish per Pound
BKT stocked	***10,560***		
BNT stocked	***18,270***		
ATS stocked	***210,354***	***3,281***	***n/a***
1 smolt	20,000	3,205	6.2
ffry	190,354	76	2,504.7

1995 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	Number Stocked	Pounds stocked	Marks/Comments
1995	NHF&G	BKT	1 year		Bartlett,Conway Hart's Location	10,175		
1995	NHF&G	BNT	fingerling		Bartlett,Conway Hart's Location	1,600		
1995	NHF&G	BNT	1		Bartlett,Conway Hart's Location	750		
1995	MDIFW	BNT	SY	mainstem		1,300		
1995	MDIFW	BKT	SY	mainstem		900		
1995	MDIFW	BNT	SY	Little Ossipee R.		2,800		
1995	MDIFW	BKT	SY	Little Ossipee R.		1,100		
1995	MDIFW	BNT	SY	Ossipee R.		2,000		
1995	MDIFW	BKT	SY	Ossipee R.		1,850		
4/13/95	GLNFH	ATS	1smolt	Mainstem	Route 5 bridge	19,676	3,345.0	

Summaries	Number stocked	Pounds stocked	Fish per pound
BKT stocked	***14,025***		
BNT stocked	***8,450***		
ATS stocked	***19,676***	***3,345***	***n/a***
1smolt	19,676	3,345	5.9

1996 Saco River Stocking

4/22/96	GLNFH	ATS	1smolt	Saco River	Rte 5 Bridge	20,000	3,651.0	RVclip
10/10/96	GLNFH	ATS	0+parr	Saco River	Hiram	15,229	358.0	
10/10/96	GLNFH	ATS	0+parr	Saco River	E. Limington (Rips)	14,875	350.0	
10/10/96	GLNFH	ATS	0+parr	Saco River	Steep Falls	14,875	350.0	
1996	NHF&G	BKT	1	Swift River	Albany	3,400	1,550.0	
1996	NHF&G	BKT	2	Swift River	Albany	275	278.0	
1996	NHF&G	RBT	1	Swift River	Albany	500	510.0	
1996	NHF&G	BKT	1	Swift River	Conway	800	367.0	
1996	NHF&G	RBT	1	Swift River	Conway	250	255.0	
1996	NHF&G	BKT	1	Swift River	Livermore	1,000	435.0	
1996	NHF&G	BKT	1	Swift River	Tamworth	385	201.3	
1996	NHF&G	BKT	2	Swift River	Tamworth	100	99.0	
1996	NHF&G	BKT	1	Saco River	Bartlett	1,350	608.0	
1996	NHF&G	BKT	2	Saco River	Bartlett	300	280.0	
1996	NHF&G	BNT	1	Saco River	Bartlett	1,600	480.0	
1996	NHF&G	RBT	1	Saco River	Bartlett	400	417.9	
1996	NHF&G	BKT	1	Saco River	Conway	2,752	1,266.0	
1996	NHF&G	BKT	2	Saco River	Conway	374	350.0	
1996	NHF&G	BNT	1	Saco River	Conway	2,200	638.0	
1996	NHF&G	RBT	1	Saco River	Conway	710	742.5	
1996	NHF&G	BKT	1	Saco River	Harts Location	1,500	635.0	
1996	NHF&G	BKT	2	Saco River	Harts Location	125	126.0	
1996	NHF&G	BKT	1	E. Branch Saco River	Bartlett	300	150.0	
1996	NHF&G	BKT	FING	E. Branch Saco River	Bartlett	200	107.0	
1996	NHF&G	BKT	1	E. Branch Saco River	Jackson	700	364.0	
1996	NHF&G	BKT	1	Ellis River	Bartlett	1,000	438.0	
1996	NHF&G	BKT	2	Ellis River	Bartlett	150	140.0	
1996	NHF&G	RBT	1	Ellis River	Bartlett	100	103.0	
1996	NHF&G	BKT	1	Ellis River	Jackson	1,000	445.0	
1996	NHF&G	BKT	2	Ellis River	Jackson	150	130.0	
1996	NHF&G	RBT	1	Ellis River	Jackson	200	206.3	
1996	NHF&G	BKT	1	Ellis River	Pinkhams Grant	400	146.0	
1996	MDIFW	BKT	SY	Saco River	Barr Mills/Dayton/Cornish	700		
1996	MDIFW	BKT	SY	Saco River	Hiram	250		
1996	MDIFW	BKT	SY	Saco River	Steep Falls	250		
1996	MDIFW	BKT	SY	Saco River	Fryburg	200		
1996	MDIFW	BNT	SY	Saco River	Hiram	300		
1996	MDIFW	BNT	SY	Saco River	West Buxton	200		
1996	MDIFW	BNT	SY	Saco River	Baldwin/Cornish	300		
1996	MDIFW	BNT	SY	Saco River	Steep Falls	300		
1996	MDIFW	BNT	SY	Saco River	Dayton	500		
1996	MDIFW	BNT	SY	Saco River	Bar Mills	200		
1996	MDIFW	BKT	SY	Little Ossipee River	Limerick	700		
1996	MDIFW	BKT	SY	Little Ossipee River	Newfield/Shapleigh	400		
1996	MDIFW	BNT	FF	Little Ossipee River	Newfield	1,900		
1996	MDIFW	BNT	SY	Little Ossipee River	Limerick/Newfield/Shapleigh	1,800		
1996	MDIFW	BKT	SY	Ossipee River	Kezar Falls/Cornish	1,500		
1996	MDIFW	BNT	SY	Ossipee River	Kezar Falls/Cornish	2,000		
1996	MDIFW	BNT	FF	Ossipee River	Kezar Falls/Cornish	500		

Summaries	Numbers Stocked	Pounds Stocked	Fish per Pound
BKT stocked	***20,261***		
BNT stocked	***11,800***		
RBT stocked	***2,160***		
ATS stocked	***64,979***	***4,709***	
1 smolt	20,000	3,651	5.48
0+parr	44,979	1,058	42.51

1997 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stoc	Release Location	No. stocked	Lbs. stocked
1997	NHF&G	BKT	1	Ellis River	Pinkhams Grant	400	120.5
1997	NHF&G	RBT	1	Ellis River	Bartlett	1,400	472.5
1997	NHF&G	BKT	1	Ellis River	Jackson	2,000	708.5
1997	NHF&G	RBT	1	Ellis River	Jackson	350	292.0
1997	NHF&G	BKT	2	Ellis River	Jackson	85	102.0
1997	NHF&G	RBT	1	Ossipee Lake	Freedom	250	179.0
1997	NHF&G	LLS	1	Ossipee Lake	Freedom	1,000	173.0
1997	NHF&G	BKT	1	Saco River	Bartlett	2,635	775.3
1997	NHF&G	BKT	2	Saco River	Bartlett	300	390.0
1997	NHF&G	BNT	1	Saco River	Bartlett	750	234.5
1997	NHF&G	BKT	1	Saco River	Conway	2,000	582.8
1997	NHF&G	BKT	2	Saco River	Conway	165	179.0
1997	NHF&G	RBT	1	Saco River	Conway	300	250.0
1997	NHF&G	BNT	1	Saco River	Conway	1,250	391.0
1997	NHF&G	BKT	1	Saco River	Hart's Location	1,000	271.0
1997	NHF&G	BKT	2	Saco River	Hart's Location	100	141.0
1997	NHF&G	BKT	1	E.Branch Saco	Bartlett	700	285.7
1997	NHF&G	BKT	1	E.Branch Saco	Jackson	700	285.7
1997	NHF&G	BKT	1	Swift River	Albany	3,125	841.5
1997	NHF&G	BKT	2	Swift River	Albany	300	312.0
1997	NHF&G	BKT	1	Swift River	Livermore	500	123.0
1997	NHF&G	BNT	1	Swift River	Conway	200	62.5
1997	NHF&G	BKT	1	Swift River	Tamworth	300	153.7
1997	NHF&G	RBT	1	Swift River	Tamworth	340	234.5
1997	NHF&G	BKT	1	Little Swift River	Tamworth	440	133.3
1997	NHF&G	BKT	1	Saco Lake	Carroll	750	242.5
1997	NHF&G	BKT	2	Saco Lake	Carroll	100	63.6
1997	Saco River Hatchery	ATS	fry	Doug Hill Brook		5,000	2
1997	Saco River Hatchery	ATS	fry	Strout Brook		5,000	2
1997	Saco River Hatchery	ATS	fry	Pease Brook		10,000	4
1997	Saco River Hatchery	ATS	fry	Pugsley Brook		10,000	4
1997	Saco River Hatchery	ATS	fry	Back Brook		10,000	4
1997	Saco River Hatchery	ATS	fry	Shepards River		35,000	14
1997	Saco River Hatchery	ATS	fry	Ten Mile River		20,000	8
1997	Saco River Hatchery	ATS	fry	Ossippee	Cornish Station	428	0.16
1997	Saco River Hatchery	ATS	fry	Little Ossippee		578	0.22
1997	Saco River Hatchery	ATS	fry	Saco	Hiram	190	0.07
1997	Saco River Hatchery	ATS	fry	Ossippee	Cornish	573	0.22
1997	GLNFH	ATS	0+parr	Saco	Cornish Station	11,884	300
1997	GLNFH	ATS	0+parr	Saco	Below Hiram Dam	12,808	300
1997	GLNFH	ATS	0+parr	Saco	Steep Falls	5,679	130
1997	GLNFH	ATS	0+parr	Saco	Limington Rips Rt	15,078	473
1997	GLNFH	ATS	0+parr	Ossippee River	Kezar Falls	17,863	473
1997	GLNFH	ATS	1smolt	Saco	Rte. 5 Bridge	8,018	1,256.0
1997	GLNFH	ATS	1smolt	Saco	Rte 5 Bridge	11,982	1,795.0
1997	GLNFH	ATS	1smolt	Saco	Bonny Eagle Proje	150	3.8
1997	GLNFH	ATS	1smolt	Saco	Saco	87	2.2
1997	MDIFW	BKT	SY	Saco	Rt 11 xing - Stand	200	
1997	MDIFW	BKT	SY	Saco	Below Dam - Hira	200	
1997	MDIFW	BKT	SY	Saco	Swan Falls - Fryel	150	
1997	MDIFW	BKT	SY	Saco	Below Skelton Da	200	
1997	MDIFW	BKT	SY	Saco	Below Dam - Hira	200	
1997	MDIFW	BKT	SY	Saco	Rt 11 xing - Stand	200	
1997	MDIFW	BNT	FY	Saco	Below Dam - Hira	300	
1997	MDIFW	BNT	FY	Saco	Rte 117 xing - Bal	300	
1997	MDIFW	BNT	FY	Saco	Steep Falls - Rt 1	300	
1997	MDIFW	BNT	FY	Saco	Below W.Buxton c	200	
1997	MDIFW	BNT	FY	Saco	Below Bar Mills da	200	
1997	MDIFW	BNT	FY	Saco	Below Skelton dar	500	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Newfield	200	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Clarks Bridge Rd.	300	
1997	MDIFW	BNT	SY	Little Ossipee Rive	MDIFW mgmt are	500	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Rt 5 xing - Limeric	400	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Rt. 11 xing- Limer	500	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Clarks Bridge Rd.	125	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Off Foss Rd-Lime	150	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Clarks Bridge Rd.	125	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Bridge St. xing - N	100	

1997 Saco River Stocking (Cont)

1997	MDIFW	BKT	SY	Little Ossipee Rive	MDIFW mgmt are	100	
1997	MDIFW	BKT	SY	Little Ossipee Rive	Off Foss Rd-Lime	150	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Off Foss Rd near	500	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Bridge St. xing -N	500	
1997	MDIFW	BNT	SY	Little Ossipee Rive	mouth of Davis Bk	500	
1997	MDIFW	BNT	SY	Little Ossipee Rive	Old Rt 11 xing - S	500	
1997	MDIFW	BNT	SY	Little Ossipee Rive	E. Range Rd-Lime	400	
1997	MDIFW	BNT	SY	Ossipee River	S. Hiram Rd. xing	800	
1997	MDIFW	BNT	SY	Ossipee River	Dirt Rd off S. Hira	800	
1997	MDIFW	BKT	SY	Ossipee River	S. Hiram Rd. xing	400	
1997	MDIFW	BKT	SY	Ossipee River	Dirt Rd. off S. Hira	200	
1997	MDIFW	BKT	SY	Ossipee River	S. Hiram Rd. xing	200	
1997	MDIFW	BKT	SY	Ossipee River	Dirt Rd. off S Hira	400	
1997	MDIFW	BKT	SY	Ossipee River	Dirt Rd. off S Hira	200	
1997	MDIFW	BKT	SY	Ossipee River	S. Hiram Rd xing	200	
1997	MDIFW	BNT	FY	Ossipee River	Sacopee HS -Hira	500	
1997	MDIFW	BNT	Adult	Ossipee River	Hiram	40	

Summaries	Numbers Stocked	Pounds Stocked	Fish per Pound
BKT Stocked	19,300		
BNT Stocked	10,240		
LLS Stocked	1,000	173.00	5.78
fry	96,769	38.67	2,502.43
1smolt	20,150	3,054.80	6.60
0+parr	63,312	1,676.00	37.78
ATS Stocked	180,231	4,769.47	n/a
RBT Stocked	2,640	1,428.00	1.85

1998 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	No. Stocked	Marks/Comments
1998	MDIFW	BKT	SY	Saco	Swan Falls	300	
1998	MDIFW	BKT	SY	Saco	Below Skelton Dam	400	
1998	MDIFW	BKT	SY	Saco	Below Dam	400	
1998	MDIFW	BKT	SY	Saco	Rte 11 crossing	400	
1998	MDIFW	BNT	FY	Saco	Below Hiram Dam	300	
1998	MDIFW	BNT	FY	Saco	Rte 117 crossing	300	
1998	MDIFW	BNT	FY	Saco	Rte 11 crossing	300	
1998	MDIFW	BNT	FY	Saco	Below W. Buxton dam	200	
1998	MDIFW	BNT	FY	Saco	Below Bar Mill dam	200	
1998	MDIFW	BNT	FY	Saco	Below Skelton dam	500	
1998	MDIFW	BNT	SY	Saco	Below Bonny Eagle dam	1,000	
1998	MDIFW	BNT	SY	Little Ossipee River	Clarks Bridge Rd. Crossing	300	
1998	MDIFW	BNT	SY	Little Ossipee River	MDIFW Mgmt. Area	500	
1998	MDIFW	BKT	SY	Little Ossipee River	Clarks Bridge Rd. Crossing	300	
1998	MDIFW	BKT	SY	Little Ossipee River	Off Foss Road	300	
1998	MDIFW	BKT	SY	Little Ossipee River	Bridge Street crossing	200	
1998	MDIFW	BKT	SY	Little Ossipee River	MDIFW Mgmt. Area	200	
1998	MDIFW	BNT	SY	Little Ossipee River	Off Foss Road near Pendexter	500	
1998	MDIFW	BNT	SY	Little Ossipee River	Bridge Street crossing	500	
1998	MDIFW	BNT	SY	Little Ossipee River	at mouth of Davis Brook	500	
1998	MDIFW	BNT	SY	Little Ossipee River	Old Rte. 11 crossing	500	
1998	MDIFW	BNT	SY	Ossipee River	South Hiram Rd. Crossing	800	
1998	MDIFW	BNT	SY	Ossipee River	Dirt Rd. Off South Hiram Rd.	800	
1998	MDIFW	BKT	SY	Ossipee River	South Hiram Rd. Crossing	800	
1998	MDIFW	BKT	SY	Ossipee River	Dirt Rd. Off South Hiram Rd.	800	
1998	MDIFW	BNT	FY	Ossipee River	Sacopee High School	500	
1998	MDIFW	BNT	AD	Ossipee River		40	
1998	DMR	AMS	fry	Saco	Below Bar Mills dam	503,730	
1998	DMR	AMS	Spent Adult	Saco	Below Cataract Dam	50	0076851-77; 0077955-75; 0080054-56*
1998	GLNFH	ATS	1smolt	Saco	Rte 5 Bridge	21,318	
1998	SRSC	ATS	ffry	Shepards	Rte 5	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Back of River Rd. Steel Bridge	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Main st. Forks	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	County Rd. Bridge	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Center Rd access	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Above bridge Center rd.	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Eaton Ctr. Rd. Bridge	5,000	domestics
1998	SRSC	ATS	ffry	Shepards	Billy Brook; Billy Rd. Bridge	7,500	domestics
1998	SRSC	ATS	ffry	Shepards	Quint Brook	7,500	domestics
1998	SRSC	ATS	ffry	Hancock Brook	Wards Hill Road Bridge	15,000	domestics
1998	SRSC	ATS	ffry	Hancock Brook	Sebago Rd. Bridge	2,500	domestics
1998	SRSC	ATS	ffry	Hancock Brook	Barker Pond Outlet	5,000	domestics
1998	SRSC	ATS	ffry	Hancock Brook	Sebago Rd. Access	6,200	domestics
1998	SRSC	ATS	ffry	Little Ossipee River	Black Brook	5,000	domestics
1998	SRSC	ATS	ffry	Little Ossipee River	Hill Road	5,000	domestics
1998	SRSC	ATS	ffry	Little Ossipee River	Eider Mill Brook, Rt. 11 xing	10,000	domestics
1998	SRSC	ATS	ffry	Little Ossipee River	Hamlin Brook	5,000	domestics
1998	SRSC	ATS	ffry	Little Ossipee River	Hardscrabble Rd. Access	25,000	domestics
1998	SRSC	ATS	ffry	Big Ossipee River	Ossipee, Kezar Falls hydro	20,000	domestics
1998	SRSC	ATS	ffry	Big Ossipee River	Ossipee, Hydro to S. Hiram Br.	200,000	domestics
1998	SRSC	ATS	ffry	Big Ossipee River	Ossipee, So. Hiram Br. To confl.	50,000	domestics
1998	SRSC	ATS	ffry	Saco	conf. Big Ossipee to Rt. 5 bridge	30,000	domestics
1998	GLNFH	ATS	0+parr	Saco	Limington Rips	27,815	
1998	GLNFH	ATS	0+parr	Saco	Skelton Dam	22,185	
1998	NHF&G	BNT	1	Davis Pond	Madison	120	
1998	NHF&G	RBT	1	Davis Pond	Madison	200	
1998	NHF&G	BKT	1	Ellis River	Pinkhams Grant	450	
1998	NHF&G	RBT	1	Ellis River	Bartlett	300	
1998	NHF&G	BKT	1	Ellis River	Jackson	1,600	
1998	NHF&G	RBT	1	Ellis River	Jackson	200	
1998	NHF&G	BKT	1	E.B. Saco River	Bartlett	1,500	
1998	NHF&G	BKT	1	Little Swift River	Tamworth	550	
1998	NHF&G	RBT	1	Ossipee River	Freedom	1,500	
1998	NHF&G	LLS	1	Ossipee River	Freedom	1,000	
1998	NHF&G	BKT	2	Saco Lake	Carroll	200	
1998	NHF&G	BKT	1	Saco Lake	Carroll	1,710	
1998	NHF&G	BKT	3+	Saco Lake	Carroll	63	brood
1998	NHF&G	BNT	1	Saco	Bartlett	900	

1998 Saco River Stocking (Cont)

1998	NHF&G	RBT	1	Saco	Bartlett	200
1998	NHF&G	BKT	1	Saco	Bartlett	3,050
1998	NHF&G	BKT	2	Saco	Bartlett	150
1998	NHF&G	BNT	1	Saco	Conway	2,150
1998	NHF&G	BKT	1	Saco	Conway	2,500
1998	NHF&G	BKT	2	Saco	Conway	150
1998	NHF&G	RBT	1	Saco	Conway	550
1998	NHF&G	BKT	1	Saco	Harts Location	1,750
1998	NHF&G	BKT	2	Saco	Harts Location	25
1998	NHF&G	BKT	1	Slippery Brook	Chatham	250
1998	NHF&G	BKT	1	Swift River	Albany	4,510
1998	NHF&G	BKT	1	Swift River	Tamworth	1,090
1998	NHF&G	BKT	1	Wildcat River	Jackson	1,300
1998	NHF&G	BKT	1	Willey House Pond	Harts Location	155

* these are floy tags

Summaries	Number stocked
BKT Stocked	25,103
BNT Stocked	10,910
ffry	428,700
1smolt	21,318
0+ parr	50,000
ATS Stocked	500,018
LLS Stocked	1,000
RBT Stocked	2,950
American Shad stocked	
fry	503,730
Adult	50
AMS Stocked	503,780

1999 Saco River Stocking

Stocking Year	Source	Species Stocked	Age/Size	Sub-Drainage Stocked	Release Location	No. Stocked	Marks/Comments
1999	SRSC	ATS	fry	Reach I, Saco	Moors Brook	3,000	57 F
1999	SRSC	ATS	fry	Reach II, Saco	Deep Brook	14,700	
1999	SRSC	ATS	fry	Reach II, Saco	Swans Pond Brook	18,400	57 F
1999	SRSC	ATS	fry	Reach II, Saco	Stackpole Creek	23,600	54 F
1999	SRSC	ATS	fry	Reach II, Saco	Haines Meadow Brook	7,000	58 F
1999	SRSC	ATS	fry	Reach II, Saco	Buzzell Road Brook	14,000	57 F
1999	SRSC	ATS	fry	Reach II, Saco	Cold Water Brook	4,200	48 F
1999	SRSC	ATS	fry	Reach II, Saco	Berry Brook	17,200	57 F
1999	SRSC	ATS	fry	Reach II, Saco	Red Brook	32,000	60 F
1999	SRSC	ATS	fry	Reach III, Saco	Cooks Brook	10,400	
1999	SRSC	ATS	fry	Reach III, Saco	Locke Brook	2,800	58 F
1999	SRSC	ATS	fry	Reach III, Saco	Junkins Brook	3,200	58 F
1999	SRSC	ATS	fry	Reach III, Saco	Killick Brook	13,200	
1999	SRSC	ATS	fry	Reach IV, Little Ossipee	Little Ossipee River	28,000	56 F
1999	SRSC	ATS	fry	Reach IV, Little Ossipee	Hamlin Brook	4,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Strout Brook	7,000	58 F
1999	SRSC	ATS	fry	Reach IV, Saco	Tucker Brook	4,000	58 F
1999	SRSC	ATS	fry	Reach IV, Saco	Quaker Brook	4,000	56 F
1999	SRSC	ATS	fry	Reach IV, Saco	Pigeon Brook	13,000	56 F
1999	SRSC	ATS	fry	Reach IV, Saco	Back Brook	12,000	56 F
1999	SRSC	ATS	fry	Reach IV, Saco	Pugsley Brook	13,000	55 F
1999	SRSC	ATS	fry	Reach IV, Saco	Breakneck Brook	21,000	55 F
1999	SRSC	ATS	fry	Reach IV, Saco	Dug Hill Brook	18,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Pine Hill Brook	4,000	
1999	SRSC	ATS	fry	Reach IV, Big Ossipee	Watchic Pond Brook	4,000	
1999	SRSC	ATS	fry	Reach IV, Big Ossipee	Big Ossipee	215,000	57 F
1999	SRSC	ATS	fry	Reach IV, Big Ossipee	Ridlon Brook	5,000	
1999	SRSC	ATS	fry	Reach IV, Big Ossipee	Wadworth Brook	20,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Plains Pond Brook	1,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Clay Pit Brook	3,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Pendexter Brook	15,000	
1999	SRSC	ATS	fry	Reach IV, Saco	Mudgett Meadow Brook	12,000	
1999	SRSC	ATS	fry	Reach V, Saco	Hancock Brook	8,000	56 F
1999	SRSC	ATS	fry	Reach V, Saco	Mill Brook	7,000	
1999	SRSC	ATS	fry	Reach V, Saco	Ten Mile Brook	18,000	
1999	SRSC	ATS	fry	Reach V, Saco	Shepards River Area	81,000	55 F
1999	SRSC	ATS	fry	Reach V, Saco	Bull Ring Brook	4,000	
1999	FF	ATS	fry	Little Ossipee	Hiram	182	6/8/1999 (Kennebunk Middle School)
1999	FF	ATS	fry	Little Ossipee	Hiram	100	6/8/99 (Harrison Middle School)
1999	FF	ATS	fry	Swan Pond Brook	Saco	121	6/9/99 (C.K. Burns School)
1999	FF	ATS	fry	Swan Pond Brook	Saco	185	5/18/1999 (St. James School)
1999	FF	ATS	fry	Little Ossipee	Hiram	119	6/10/99 (Saco Sweetser Children's)
1999	FF	ATS	fry	Little Ossipee	Hiram	127	6/10/99 (Windham Sweetser Childrens)
1999	FF	ATS	fry	Limington Rips	Limington	249	5/28/99 (Windham Primary
1999	FF	ATS	fry	Little Ossipee	Hiram	300	5/18/1999 (Congin School)
1999	Adopt A Salmon	ATS	fry	Swan Pond Brook	Saco	454	6/2/99 (Village Elementary School)
1999	FF	ATS	fry	Little Ossipee	Hiram	289	6/3/99 (King Middle School)
1999	FF	ATS	fry	Swan Pond Brook	Saco	271	5/25/99 (Central School)
1999	FF	ATS	fry	Swan Pond Brook	Saco	202	5/18/99 (Lunt School)
1999	FF	ATS	fry	Swan Pond Brook	Saco	286	5/19/99 (Frank Brown School)
1999	Adopt A Salmon	ATS	fry	Swan Pond Brook	Saco	300	6/14/99 (Coastal Ridge Elementary)
1999	GLNFH	ATS	0 + parr	Saco	East Limington Rips	4,766	10/5/99
1999	GLNFH	ATS	0 + parr	Saco	Steep Falls	8,316	10/5/99
1999	GLNFH	ATS	0 + parr	Saco	Cornish Station	6,878	10/5/99
1999	GLNFH	ATS	0 + parr	Big Ossipee	Cornish Station	9,384	10/5/99
1999	GLNFH	ATS	0 + parr	Big Ossipee	Kezar Falls	17,636	10/5/99
1999	GLNFH	ATS	1 smolt	Saco	Rte. 5 Bridge	19,779	4/19/99
1999	MDIFW	BNT	FY	Saco	Below Hiram dam	300	10/7/99
1999	MDIFW	BNT	FY	Saco	Below West Buxton dam	200	10/7/99
1999	MDIFW	BNT	FY	Saco	Below Bar Mills dam	200	10/7/99
1999	MDIFW	BNT	FY	Saco	Below Skelton dam	500	10/7/99
1999	MDIFW	BNT	FY	Saco	Rte. 117 Xing	300	10/6/99
1999	MDIFW	BNT	FY	Saco	Rte. 11 Xing	300	10/6/99
1999	MDIFW	BKT	SY	Saco	Swan Falls	150	6/2/99
1999	MDIFW	BKT	SY	Saco	Below Skelton Dam	200	6/2/99
1999	MDIFW	BKT	SY	Saco	Below Dam	200	6/2/99
1999	MDIFW	BKT	SY	Saco	Rte. 11 Xing	200	6/2/99
1999	MDIFW	BKT	SY	Saco	Rte. 11 Xing	200	5/6/99

1999 Saco River Stocking (Cont)

1999	MDIFW	BKT	SY	Saco	Below Dam	200	5/6/99
1999	MDIFW	BKT	SY	Saco	Swan Falls	150	5/6/99
1999	MDIFW	BKT	SY	Saco	Below Skelton Dam	200	5/6/99
1999	MDIFW	BNT	SY	Saco	Bonney Eagle by-pass	500	4/12/99
1999	MDIFW	BKT	SY	Reach IV,Big Ossipee		200	5/6/99
1999	MDIFW	BKT	SY	Reach IV,Big Ossipee	Dirt Rd. off South Hiram Rd.	200	5/6/99
1999	MDIFW	BNT	SY	Reach IV,Big Ossipee	Dirt Rd. off South Hiram Rd.	800	5/13/99
1999	MDIFW	BNT	SY	Reach IV,Big Ossipee	South Hiram Rd. Xing	800	5/13/99
1999	MDIFW	BKT	SY	Reach IV,Big Ossipee	Dirt Rd. off South Hiram Rd.	200	6/2/99
1999	MDIFW	BKT	SY	Reach IV,Big Ossipee	South Hiram Rd. Xing	400	6/2/99
1999	MDIFW	BKT	SY	Reach IV,Big Ossipee	Dirt Rd. off South Hiram Rd.	200	6/2/99
1999	MDIFW	BNT	FY	Reach IV,Big Ossipee	South Hiram Rd. Xing	500	10/18/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Clarks Bridge Rd. Xing	150	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	MDIFW Mgmt. Area	250	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Off Foss Rd. near Pendexter Bk	250	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Bridge Street Xing	250	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	@ mouth of Davis Bk.	250	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Old Rte. 11 Xing	250	4/14/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Clarks Bridge Rd. Xing	150	5/4/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	MDIFW Mgmt. Area	250	5/4/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Off Foss Rd. near Pendexter Bk	250	5/4/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Bridge Street Xing	250	5/4/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	@ mouth of Davis Bk.	250	5/4/99
1999	MDIFW	BNT	SY	Reach IV, Little Ossipee	Old Rte. 11 Xing	250	5/4/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Clarks Bridge Rd. Xing	125	5/6/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Off Foss Rd.	150	5/6/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Bridge Street Xing	100	5/6/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	MDIFW Mgmt. area	100	5/6/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Off Foss Rd.	150	5/6/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Clarks Bridge Rd. Xing	125	6/2/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	Bridge Street Xing	100	6/2/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee	MDIFW Mgmt. area	100	6/2/99
1999	MDIFW	BKT	SY	Reach IV, Little Ossipee		400	6/2/99
1999	MDMR	AMS	fry	Reach III, Saco	Below Bar Mills Dam	21,354	7/19/99
1999	MDMR	AMS	fry	Reach III, Saco	Below Bar Mills Dam	81534	7/26/99
1999	MDMR	AMS	fry	Reach III, Saco	Below Bar Mills Dam	48886	8/10/99
1999	NHF&G	BNT	1		Davis Pond	100	
1999	NHF&G	RBT	1		Davis Pond	200	
1999	NHF&G	BKT	1		Ellis River	1235	
1999	NHF&G	BKT	2		Ellis River	175	
1999	NHF&G	BKT	3		Ellis River	100	
1999	NHF&G	BKT	FING		Ellis River	600	Surplus
1999	NHF&G	RBT	1		Ellis River	200	
1999	NHF&G	BKT	1		Ellis River	1050	
1999	NHF&G	BKT	2		Ellis River	195	
1999	NHF&G	BKT	3		Ellis River	50	
1999	NHF&G	BKT	FING		Ellis River	1086	Surplus
1999	NHF&G	BKT	1		Ellis River	1050	
1999	NHF&G	BKT	2		Ellis River	195	
1999	NHF&G	BKT	3		Ellis River	50	
1999	NHF&G	BKT	FING		Ellis River	1086	Surplus
1999	NHF&G	LLS	1		Ossipee Lake	1000	
1999	NHF&G	RBT	1		Ossipee Lake	1500	
1999	NHF&G	BKT	1		Saco Lake	1000	
1999	NHF&G	BKT	2		Saco Lake	100	
1999	NHF&G	BNT	1		Saco River	400	
1999	NHF&G	BKT	1		Saco River	1900	
1999	NHF&G	BKT	1		Saco River	400	Surplus
1999	NHF&G	BKT	2		Saco River	150	
1999	NHF&G	BKT	2		Saco River	40	Surplus
1999	NHF&G	BKT	3		Saco River	100	
1999	NHF&G	BKT	FING		Saco River	1686	Surplus
1999	NHF&G	BKT	1		Wildcat Pond	150	

1999 Saco River Stocking (Cont)

Summary	
	Number stocked
BKT Stocked	**16448**
BNT Stocked	**7700**
Atlantic Salmon Stocked	
fry	687,885
0 + parr	46,980
1 smolt	20,079
ATS Stocked	**773,964**
RBT Stocked	1,900
LLS	1,000
American Shad Stocked	
fry	151,774
AMS Stocked	**151,774**

2000 Saco River Stocking

Stocking Year	Stocking Date	Source	Species Stocked	Lifestage	Sub-Drainage Stocked	Release Location	No. Stocked
2000	5/12/00	SRSC	ats	ffry	Swan Pond Brk	Buzzel Brk South St	5000
2000	5/12/00	SRSC	ats	ffry	Swan Pond Brk	Rte 35, Goodwin Mills below dam	10000
2000	5/12/00	SRSC	ats	ffry	Cold Water Brk	Buzzell Rd	3000
2000	5/12/00	SRSC	ats	ffry	Berry Brk	Hollis Rd	5000
2000	5/12/00	SRSC	ats	ffry	Red Brk	Hollis Rd	40000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Behind Little Red School House	3000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Below Lower Dam	10000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Intown Kezar Falls, above bridge	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Rte 25 upstream of Claypit Brk	4000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Rte 25 across from Eastmans store	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Rte 25 across from mailbox #381	3000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Blue trailer site, below covered bridge	10000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Mouth of and downstream of Mill Brook	3000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Jim Hadlock property	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Big Bend Rapids 0.5 miles from ME/NH border	10000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Rte 25 dwnstrm from ME/NH border	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Wedgewood Brk Rte 25 bridge	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Wedgewood Brk. Pendexter Rd	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Little River Behind Wendy's Seafood	4000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Wadsworth Brk South Hiram Rd	4000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Wadsworth Brk Rick Kennedy property	2000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Ridlon Brk Below Dowel Mill Dam	3000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Claypit Brk. Colcord Pond Rd	1000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Mill Brk. Porter Store	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	Mill Brk. Below Bickford Pond Dam	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	South River Pratt Rd	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	South River Demars Rd	5000
2000	5/12/00	SRSC	ats	ffry	Big Ossipee	South River Middle Rd	5000
2000	5/12/00	SRSC	ats	ffry	Saco	Hancock Brk. Sebago Rd at old bridge crossing	3000
2000	5/12/00	SRSC	ats	ffry	Saco	Breakneck Brk Crawford Rd bridge crossing	5000
2000	5/12/00	SRSC	ats	ffry	Saco	Pugsley Brk Rte 25	19250
2000	5/12/00	SRSC	ats	ffry	Saco	Dug Hill Brk. Rte 113 bridge crossing	2000
2000	5/12/00	SRSC	ats	ffry	Saco	Back Brk. Rte 25 bridge crossing to Hanscom School Rd	11000
2000	5/12/00	SRSC	ats	ffry	Saco	Pigeon Brk. River Rd bridge crossing	3000
2000	5/13/00	SRSC	ats	ffry	Saco	Ten Mile River Notch Rd	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Shepherds River Main St. downstream from Billy Brk	20000
2000	5/13/00	SRSC	ats	ffry	Shepherds River	Billy Brk. Main St. & Merrill Corner Rd	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Stackpole Creek Simpson Rd at stone bridge	8000
2000	5/13/00	SRSC	ats	ffry	Saco	Cooks Brk. Rte 35	4000
2000	5/13/00	SRSC	ats	ffry	Saco	Cooks Brk. Hollis Rd	2400
2000	5/13/00	SRSC	ats	ffry	Saco	Red Brk. Hollis Rd	1000
2000	5/13/00	SRSC	ats	ffry	Saco	Red Brk. Rte 5	1000
2000	5/13/00	SRSC	ats	ffry	Saco	Locke Brk. Bear Hill Rd	3000
2000	5/13/00	SRSC	ats	ffry	Saco	Cold Water Brk. Buzzell Rd	1000
2000	5/13/00	SRSC	ats	ffry	Saco	Deep Brk. Rte 112	2400
2000	5/13/00	SRSC	ats	ffry	Saco	Deep Brk. Rte 5	4000
2000	5/13/00	SRSC	ats	ffry	Saco	Cold Water Brk. Buzzell Rd (Ham's Farm)	2000
2000	5/13/00	SRSC	ats	ffry	Saco	Cold Water Brk Buzzell Rd (Charles Corner)	1200
2000	5/13/00	SRSC	ats	ffry	Saco	Cold Water Brk. Buzzell Rd (Smith Pasture)	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Cold Water Brk. Buzzell Rd (Clint's House)	2000
2000	5/13/00	SRSC	ats	ffry	Saco	Mainstem at Buzzell Road Rapids	4000
2000	5/13/00	SRSC	ats	ffry	Saco	Locke Brk Rte 117	1000
2000	5/13/00	SRSC	ats	ffry	Little Ossipee	Hardscrabble Rd	30000
2000	5/13/00	SRSC	ats	ffry	Little Ossipee	Black Brk. Boothby Rd	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Josies Brk. Saco Rd bridge crossing (?)	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Josies Brk Rte 25 (?)	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Killick Brk. Downstream from Killick Pond	20000
2000	5/13/00	SRSC	ats	ffry	Saco	Watchic Brk. Manchester Rd (?)	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Mill Pond Brk, ?	2000
2000	5/13/00	SRSC	ats	ffry	Saco	Mill Pond Brk, ?	2000
2000	5/13/00	SRSC	ats	ffry	Little Ossipee	Hamlin Brk. Rte 25	2000
2000	5/13/00	SRSC	ats	ffry	Big Ossipee	By canoe: Kezar Falls to Cornish	111720
2000	6/2/00	SRSC	ats	ffry	Saco	Swan Pond Brk Rte 35, Goodwin Mills below dam	3000
2000	5/13/00	SRSC	ats	ffry	Saco	Red Brk, ?	10000
2000	5/13/00	SRSC	ats	ffry	Saco	Red Brk, ?	10000
2000	5/12/00	SRSC	ats	ffry	Saco	Red Brk, Union Falls Rd	10000
2000	5/12/00	SRSC	ats	ffry	Saco	Swan Pond Brk, Wadlin Rd	5000

2000 Saco River Stocking (Cont)

2000	5/13/00	SRSC	ats	ffry	Saco	Swan Pond Brk, South St	5000
2000	5/13/00	SRSC	ats	ffry	Saco	Shepherds River County Rd off River Rd	11000
2000	5/13/00	SRSC	ats	ffry	Saco	Shepherds River Eaton Center Rd	30000
2000	5/13/00	SRSC	ats	ffry	Saco	Ten Mile River Rte 160	5000
2000	5/10/00	SRSC	ats	ffry	Saco	Hancock Brk, Wards Hill Rd bridge crossing	9625
2000	5/10/00	SRSC	ats	ffry	Saco	Breakneck Brk. Weeman Rd bridge crossing	5000
2000	5/10/00	SRSC	ats	ffry	Saco	Breakneck Brk Douglas Hill Rd bridge cossing	5125
2000	5/10/00	SRSC	ats	ffry	Saco	Dug Hill Brk Black Rd bridge crossing	4000
2000	5/12/00	SRSC	ats	ffry	Saco	Pigeon Hill Brk. Rte 113 road crossing	2500
2000	5/12/00	SRSC	ats	ffry	Saco	Back Brk Hanscom School Rd bridge crossing	5500
2000	19-Apr-00	GLNFH	ats	1smolt	Saco	rte 5 bridge	8186
2000	19-Apr-00	GLNFH	ats	1smolt	Saco	rte 5 bridge	4193
2000	19-Apr-00	GLNFH	ats	1smolt	Saco	rte 5 bridge	10243
2000	27-Sep-00	GLNFH	ats	0+parr	Big Ossipee	Kezar Falls (accidental stocking above dam)	24111
2000	27-Sep-00	GLNFH	ats	0+parr	Saco	Hiram Dam	24111
2000	10/23/00	MDIFW	BNT	FY	Saco	Below Hiram dam	150
2000	10/23/00	MDIFW	BNT	FY	Saco	Rte. 117 Xing	150
2000	10/23/00	MDIFW	BNT	FY	Saco	Rte. 11 Xing	150
2000	10/23/00	MDIFW	BNT	FY	Saco	Below West Buxton dam	100
2000	10/23/00	MDIFW	BNT	FY	Saco	Below Bar Mills dam	100
2000	10/23/00	MDIFW	BNT	FY	Saco	Below Skelton dam	250
2000	5/26/00	MDIFW	BNT	SY	Saco	Bonney Eagle by-pass	250
2000	5/25/00	MDIFW	BKT	SY	Saco	Swan Falls	150
2000	5/25/00	MDIFW	BKT	SY	Saco	Below Skelton Dam	200
2000	5/25/00	MDIFW	BKT	SY	Saco	Below Dam	200
2000	5/25/00	MDIFW	BKT	SY	Saco	Rte. 11 Xing	200
2000	5/25/00	MDIFW	BKT	SY	Saco	Bonney Eagle by-pass	500
2000	5/4/00	MDIFW	BKT	SY	Saco	Rte. 11 Xing	200
2000	5/4/00	MDIFW	BKT	SY	Saco	Below Dam	200
2000	5/4/00	MDIFW	BKT	SY	Saco	Swan Falls	150
2000	5/4/00	MDIFW	BKT	SY	Saco	Below Skelton Dam	200
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Big Ossipee	Sacopee High School	300
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Big Ossipee	Dirt Rd. off South Hiram Rd.	300
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Big Ossipee	South Hiram Rd. Xing	300
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Big Ossipee	Dirt Rd. off South Hiram Rd.	300
2000	5/30/00	MDIFW	BNT	SY	Reach IV, Big Ossipee	South Hiram Rd. Xing	800
2000	5/30/00	MDIFW	BNT	SY	Reach IV, Big Ossipee	South Hiram Rd. Xing	800
2000	10/23/00	MDIFW	BNT	FY	Reach IV, Big Ossipee	Dirt Rd. off South Hiram Rd.	250
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Clarks Bridge Rd. Xing	125
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Off Foss Rd.	150
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Bridge Street Xing	100
2000	5/25/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	MDIFW Mgmt. area	100
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Clarks Bridge Rd. Xing	150
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	MDIFW Mgmt. Area	250
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Foss Rd. near Pendex. Bk.	250
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Bridge Street Xing	250
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	@ mouth of Davis Bk.	250
2000	5/23/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Old Rte. 11 Xing	250
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Clarks Bridge Rd. Xing	125
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Off Foss Rd.	150
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	Bridge Street Xing	100
2000	5/4/00	MDIFW	BKT	SY	Reach IV, Little Ossipe	MDIFW Mgmt. area	100
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Clarks Bridge Rd. Xing	150
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	MDIFW Mgmt. Area	250
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Foss Rd. near Pendex. Bk.	250
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Bridge Street Xing	250
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	@ mouth of Davis Bk.	250
2000	4/20/00	MDIFW	BNT	SY	Reach IV, Little Ossipe	Old Rte. 11 Xing	250
2000	7/10/00	MDMR	AMS	fry	Reach III, Saco River	Below Bar Mills Dam	259,090
						Summary	

2000 Saco River Stocking (Cont)

2000	NHF&G	BNT	1		Davis Pond	120
2000	NHF&G	RBT	1		Davis Pond	100
2000	NHF&G	BKT	1		Ellis River	1200
2000	NHF&G	BKT	2		Ellis River	125
2000	NHF&G	RBT	1		Ellis River	900
2000	NHF&G	BKT	1		Ellis River	1500
2000	NHF&G	BKT	2		Ellis River	150
2000	NHF&G	RBT	1		Ellis River	900
2000	NHF&G	BKT	1		Ellis River	400
2000	NHF&G	LLS	1		Ossipee Lake	969
2000	NHF&G	RBT	1		Ossipee Lake	2000
2000	NHF&G	BKT	1		Slippery Brook	400
2000	NHF&G	BKT	1		Saco Lake	1000
2000	NHF&G	BKT	2		Saco Lake	100
2000	NHF&G	BNT	1		Saco River	1000
2000	NHF&G	BKT	1		Saco River	2440
2000	NHF&G	BKT	2		Saco River	175
2000	NHF&G	RBT	1		Saco River	200
2000	NHF&G	BNT	1		Saco River	1650
2000	NHF&G	BKT	1		Saco River	4160
2000	NHF&G	BKT	2		Saco River	325
2000	NHF&G	RBT	1		Saco River	400
2000	NHF&G	BKT	1		Saco River	200
2000	NHF&G	BKT	2		Saco River	75
2000	NHF&G	BKT	1		Saco River, East Branch	650
2000	NHF&G	BKT	1		Saco River, East Branch	750
2000		BKT	1		Wildcat River	2300
2000		BKT	1		Wildcat Pond	150

Summary	
Saco River Stocking Summary -2000	
Atlantic salmon	**Number Stocked**
fry	598720
0+parr	48222
1smolt	22622
Brook trout	20250
Brown trout	8570
Rainbow trout	4500
Landlocked salmon	969
American shad	
fry	259,090

Saco River Salmon Club Hatchery
P.O. Box 115, Saco ME 04072
Web address: http://www.sacosalmon.org/
Phone: 207-282-6085

Background: The Saco River Salmon Club was established in 1980 as a club with a vision. The members started to work with state representatives to appropriate funds for hatchery construction, as well as find a suitable site. The Bar Mills site was located in 1990; modifications to the existing structure were started. During the fall of 1992, the SRSC received its first allotment of eggs, and with these 200,000-eyed eggs, the SRSC was spawned. The club received eggs for the next four years, increasing its capacity to 500,000. The Saco River Salmon Club moved into its new location at the Marble Head boat launch in 1997, following its completion by SRSC members. In the fall of 1997, the club received 100,000-eyed eggs to start up the new hatchery. Everything went well and the club has increased its capacity ever since. In 1998, it received 500,000 eggs to reach full capacity. New modifications to the hatchery in 1999 increased eyed egg incubation space to 1.2 million and trough-rearing space has allowed the club to start feeding the fry before they are stocked out. During the summer of 1999, the SRSC installed an oxygen injection system at the hatchery, increasing the capacity to feed 750,000 Atlantic salmon fry. The SRSC successfully stocked over 600,000 feeding fry in 1999 and 2000.

Hatchery Specifications: The Saco River Salmon Club Hatchery is a recirculating facility that operates at 120gpm flows. The water is monitored daily for chemical composition as well as oxygen levels and temperature. Water temperature is controlled by chilling units; the flow is supplied by pumps that are backed up with a generator. Water is purified through sand filtration and ultra violet sterilization. Ammonia is controlled through zeolite filters as well as biological filtration. Exchange of pure water can be controlled by four 4000-gallon holding tanks. Additional pure water can be supplied by a well on site that has a 7gpm exchange capability; city water can also be dechlorinated to allow a 5gpm exchange. Feeding troughs have become fully automated with the addition of feeders.

Hatchery Production Goals and Request for Eggs: The Saco River Salmon Club is formally requesting that 750,000 eyed-eggs be allocated to the production of feeding fry for the SRSC to raise and stock into the Saco River and its tributaries. These numbers take into consideration the current production levels at the GLNFH and the fish production goals set by the SRSC. These target numbers are requested over the next four years, at which time the club would like to increase them to further fulfill the restoration goals of the Saco River effort. These goals could be further refined through cooperation with Inland Fish & Wildlife, the Atlantic Salmon Commission, and the U.S. Fish & Wildlife Service.

Any further questions or ideas are welcome. Contact David Bean, Fisheries Biologist, Craig Brook NFH at 207- 469-2803 or Mark Woodruff, President SRSC, at 207-929-5300.

SACO RIVER SALMON CLUB HATCHERY

Four-Year Plan

- Operate a recirculating hatchery that annually raises 700,000 to 750,000 Atlantic salmon fry to be stocked in the Saco River watershed. This will be accomplished by:
  - Recruiting additional volunteers from the existing membership role and new members.
  - Financing an annual operating budget of approximately $20,000 through business donations and membership dues.
  - Maintaining or purchasing hatchery equipment with funding from grants, business donations, membership dues.
  - Compiling a technical manual that describes how to operate the hatchery in the event of an emergency.
- Conduct habitat surveys to identify suitable locations to release fry.
- Sample the health and survival of fry by electrofishing the stocking sites under study by the US Fish & Wildlife Service.
- Establish a learning partnership with the University of New England's aquaculture program.
- Continue to assist the Atlantic Salmon Federation's Fish Friends Program with incubators in local elementary schools.
- Annually evaluate the restoration program with the Maine Atlantic Salmon Commission, Maine Department of Inland Fisheries & Wildlife, and US Fish & Wildlife Service to develop future stocking densities and upstream passage facilities.

Five- to Ten-Year Plan

- Increase the number of fry raised in the hatchery to 1.2 million. This is contingent upon increasing active participation of membership, expanding the size of the hatchery within the existing building footprint, and enlarging the feeding trough capacity.
- Computerize the monitoring and chemical control of the hatchery's water system.
- Pay back the construction loan from Biddeford-Saco Savings and Loan Institution.

ATTACHMENT 5

Department of Marine Resources
Activity Summaries - 2000

American Shad, River Herring, American Eels

Maine Department of Marine Resources
2000 Saco River Summary Report

The Saco River, the sixth largest river in the State of Maine, originates in the White Mountains of New Hampshire and has a drainage area of 1,703 square miles. This is the eighth consecutive year of the operation of fish passage facilities on the Saco River at the head-of-tide in Biddeford and Saco, Maine. Fish passages were constructed at the Cataract Project's four dams by Central Maine Power Company as part of federal relicensing requirements to expedite the restoration of American shad, river herring, and Atlantic salmon to the Saco River. Collection and counting facilities at the Cataract Project are now staffed by personnel from Florida Power and Light (FPL), the current owner of the project. Annual program activities are developed and coordinated through the Saco River Co-ordinating Committee, which consists of FPL, state and federal fisheries agencies, and participating nongovernmental organizations.

American Shad and River Herring. The 2000 adult returns of American shad were the third highest on record and returns of river herring were the second highest on record since the Cataract Project fishways became operational in 1993 (Table 1). A total of 1,323 American shad and 25,136 river herring were captured at Cataract and passed into the headpond or trucked upriver. Of the total number of shad and river herring ascending the Saco, 79% and 92% respectively, utilized the East Channel fish lift.

For the third consecutive year, FPL staff collected American shad broodstock from the Saco River for transfer by DMR staff to the Waldoboro shad hatchery. A total of 144 American shad were collected on three dates (Table 2) and transferred to the hatchery; only one fish died in transit. Approximately 259,090 fry from the broodstock were released on July 10 into the Saco River immediately below the Bar Mills Dam. To date, 914,594 fry have been stocked in the Saco River (Table 3). Based on data from other rivers, DMR expects these fry will result in 2,286 adult returns. Of the 143 Saco brood fish held at the hatchery, 58 (41%) died. The remaining 85 fish, which had been treated with formalin, were not released for human health reasons; they were instead sacrificed for biological samples.

American Eel. American eel management on the Saco River is guided by the *"State of Maine American Eel (Anguilla rostrata) Species Management Plan"* (November, 1996), prepared by the Departments of Marine Resources and Inland Fisheries & Wildlife, and the Atlantic States Marine Fisheries Commission's *American Eel Fisheries Management Plan*. The plans contain nearly identical goals that are:

1) To maintain and enhance the abundance of American eels in inland and coastal waters of Maine to contribute to the viability of the American eel spawning population; and
2) To provide sustainable recreational and commercial fisheries for American eels.

The plans also contain similar objectives that are:

1) To maintain or enhance American eel abundance in all watersheds where eels now occur;
2) To restore American eels to all waters where they had historical presence, but may now be absent; and
3) To provide adequate upstream passage and escapement to inland waters for elvers and eels as well as adequate downstream passage and escapement to the ocean of prespawning adult eels.

In response to concerns about overharvesting, emergency legislation was passed in 1999 to limit entry into the elver (juvenile eel) fishery and reduce the amount of gear available to each harvester. This legislation will ensure that a sizable population of eels will be available to migrate into Maine's rivers and coastal streams in the future.

Current research and management initiatives underway by the DMR and IF&W are designed to improve knowledge of the life history, behavior, habitat requirements, and fisheries for American eel. As information becomes available, management measures will be implemented on the Saco and other rivers to achieve the goals and objectives of the two management plans.

Table 1A. Use of Fish Passage by American Shad at the Cataract Project, Saco River

Year	Grand Total	West Channel Fishway					East Channel Fish Lift					
		May	June	July	Sub Total	%	May	June	July	August	Sub Total	%
1993	882	0	3	3	6	0.7	0	731	144	1	876	99.3
1994	399	0	2	2	4	1.0	0	297	98	0	395	99.0
1995	580	1	8	0	9	1.6	79	437	55	0	571	98.4
1996	837	0	22	5	27	3.2	2	446	351	11	810	96.8
1997	1,104	0	34	1	35	3.2	0	740	277	52	1,069	96.8
1998	1,374	2	2	0	4	0.3	575	668	127	0	1,370	99.7
1999	4,994	439	21	0	460	9.2	682	3,489	363	0	4,534	90.8
2000	1,323	0	271	3	274	20.7	0	871	178	0	1,049	79.3

Table 1B. Use of Fish Passage by River Herring (Alewife & Blueback Herring) at the Cataract Project, Saco River

Year	Grand Total	West Channel Fishway					East Channel Fish Lift				
		May	June	July	Sub Total	%	May	June	July	Sub Total	%
1993	831	0	1	0	1	0.1	0	778	52	830	99.9
1994	2,204	89	191	0	280	12.5	1,647	313	0	1,960	87.5
1995	9,820	2,867	49	0	2,916	29.7	5,021	1,883	0	6,904	70.3
1996	9,162	69	78	0	147	1.6	3,514	5,501	0	9,015	98.4
1997	2,137	0	285	0	285	13.3	1,114	734	4	1,852	86.7
1998	16,078	208	1,061	0	1,269	7.9	14,705	104	0	14,809	92.1
1999	31,070	10,950	963	0	11,913	38.3	17,991	1,166	0	19,157	31.7
2000	25,136	519	1,505	0	2,024	8.1	4,008	19,104	0	23,112	91.9

Table 2. Collection of American Shad Broodstock from the Saco River - 2000

Date	Number collected
June 12	81
June 30	41
July 21	22

Table 3. Annual Collection and Stocking of American Shad in the Saco River

Year	Number Broodstock Collected	Number Fry Released	Release Location
1998	178	503,730	Below Bar Mills
1999	401	151,774	Below Bar Mills
2000	144	259,090	Below Bar Mills
Total	**723**	**914,594**	

ATTACHMENT 6. Relative Utilization of Fishways

Use of Fish Passage by American Shad at the Cataract Project, Saco River

Year	Grand Total	West Channel Fishway					East Channel Fish Lift					
		May	June	July	Sub Total	%	May	June	July	August	Sub Total	%
1993	882	0	3	3	6	0.7	0	731	144	1	876	99.3
1994	399	0	2	2	4	1.0	0	297	98	0	395	99.0
1995	580	1	8	0	9	1.6	79	437	55	0	571	98.4
1996	837	0	22	5	27	3.2	2	446	351	11	810	96.8
1997	1,104	0	34	1	35	3.2	0	740	277	52	1,069	96.8
1998	1,374	2	2	0	4	0.3	575	668	127	0	1,370	99.7
1999	4,994	439	21	0	460	9.2	682	3,489	363	0	4,534	90.8
2000	1,323	0	271	3	274	20.7	0	871	178	0	1,049	79.3

Use of Fish Passage by River Herring (Alewife and Blueback Herring) at the Cataract Project, Saco River

Year	Grand Total	West Channel Fishway					East Channel Fish Lift				
		May	June	July	Sub Total	%	May	June	July	Sub Total	%
1993	831	0	1	0	1	0.1	0	778	52	830	99.9
1994	2,204	89	191	0	280	12.5	1,647	313	0	1,960	87.5
1995	9,820	2,867	49	0	2,916	29.7	5,021	1,883	0	6,904	70.3
1996	9,162	69	78	0	147	1.6	3,514	5,501	0	9,015	98.4
1997	2,137	0	285	0	285	13.3	1,114	734	4	1,852	86.7
1998	16,078	208	1,061	0	1,269	7.9	14,705	104	0	14,809	92.1
1999	31,070	10,950	963	0	11,913	38.3	17,991	1,166	0	19,157	31.7
2000	25,136	519	1,505	0	2,024	8.1	4,008	19,104	0	23,112	91.9

Use of Fish Passage by Atlantic Salmon at the Cataract Project, Saco River

Year	Grand Total	West Channel Fishway							
		May	June	July	August	September	October	Total	%
1993	53	0	5	7	1	14	11	38	71.7
1994	21	0	3	1	6	6	0	16	76.2
1995	34	1	10	1	0	3	1	16	47.1
1996	54	2	14	2	2	0	1	21	38.9
1997	28	0	6	3	1	1	1	12	42.9
1998	28	0	5	10	0	2	0	17	60.7
1999	66	6	23	3	4	2	4	42	63.6
2000	50	2	10	2	3	1	2	20	40.0

Year	Grand Total	East Channel Fish Lift							
		May	June	July	August	September	October	Total	%
1993	53	0	9	6	0	0	0	15	28.3
1994	21	0	5	0	0	0	0	5	23.8
1995	34	3	8	0	0	5	2	18	52.9
1996	54	0	23	8	1	0	1	33	61.1
1997	28	1	10	4	0	1	0	16	57.1
1998	28	0	6	5	0	0	0	11	39.3
1999	66	1	22	0	1	0	0	24	36.4
2000	50	1	21	7	0	1	0	30	60.0

ATTACHMENT 7. Electrofishing Activity Summary

		YOY Population estimate				Parr Population estimate	
		1997	1999	2000		1999	2000
Back River		12	59	14		3	11
Shepards River		5	8	7		1	3
Breackneck Stream			188	88		1	49
Pugsley Stream		17	29	19		2	18
Red Brook				8			12
Linscott Stream		4					

ATTACHMENT 8. Saco River – 2000 Water Temperatures and DO's

CATARACT
EAST AND WEST CHANNEL
WATER, AIR TEMPERATURE AND SACO RIVER FLOW DATA 2000

	EAST WATER TEMP C		WEST WATER TEMP C		TOTAL SACO RIVER FLOW	AIR TEMP C
DAY	MIN.	MAX.	MIN.	MAX.	CFS	AVG
5/1/00	*	*	*	*	6450	6.1
5/2/00	*	*	*	*	5870	10
5/3/00	*	*	*	*	5520	7.2
5/4/00	*	*	*	*	5200	10.6
5/5/00	*	*	*	*	4910	18.3
5/6/00	*	*	*	*	4420	13.3
5/7/00	*	*	*	*	4280	16.7
5/8/00	*	*	*	*	4270	18.9
5/9/00	*	*	*	*	4370	11.1
5/10/00	*	*	*	*	4620	7.8
5/11/00	*	*	*	*	5220	10.6
5/12/00	*	*	*	*	6010	9.4
5/13/00	*	*	*	*	6030	10.6
5/14/00	*	*	*	*	6130	13.9
5/15/00	*	*	*	*	5990	10.6
5/16/00	*	*	12.4	13	5540	10
5/17/00	*	*	12	13.4	5260	13.3
5/18/00	*	*	12.9	13	5010	13.3
5/19/00	*	*	12.5	13	4850	8.9
5/20/00	*	*	13.2	13.5	4660	8.3
5/21/00	*	*	12.5	12.9	4590	11.1
5/22/00	13.7	14.3	12.5	13.3	4340	13.3
5/23/00	13.3	14.8	12	14.8	4000	12.8
5/24/00	13.9	14.1	13.8	14.1	4060	10
5/25/00	14	14.4	13.8	14.1	4730	14.4
5/26/00	13.8	14.8	13.8	15.2	4680	16.1

5/27/00	14.2	15.3	14.2	15.7	4610	15
5/28/00	14.7	15.4	14.7	15.5	4510	13.9
5/29/00	15	15.7	14.9	16	4340	11.7
5/30/00	15.3	16.6	15	16.9	3790	10.6
5/31/00	15.6	17	15.6	17.2	3410	11.7
6/1/00	16.3	17.1	16.4	18	3300	20.6
6/2/00	16.9	17.9	17.2	18.3	3200	18.3
6/3/00	17.6	18.5	17.8	19.2	3230	16.7
6/4/00	18.2	18.9	18.4	19	2640	12.8
6/5/00	12.3	18.8	13.6	18.9	2410	13.3
6/6/00	18.1	18.9	17.9	18.7	2310	11.1
6/7/00	17.7	18.4	17.5	18.6	3030	14.4
6/8/00	17.8	18.3	17.8	18.4	2740	13.9
6/9/00	17.1	18	17.8	18.4	2620	20.6
6/10/00	17.4	18.3	17.8	18.6	2530	15.6
6/11/00	17.2	17.7	17.3	18	2460	11.1
6/12/00	17.2	17.5	17.4	17.6	2490	10.6
6/13/00	17.5	17.9	17.3	18.2	2220	11.7
6/14/00	17.6	17.8	17.8	17.9	2140	13.9
6/15/00	17.6	17.8	17.7	17.9	2050	14.4
6/16/00	17.4	18.5	17.4	19	1870	21.1
6/17/00	18.7	19.2	18.9	19.9	1830	24.4
6/18/00	18.5	19	18.9	19.5	2020	17.2
6/19/00	18.1	18.8	18.2	19	2150	17.8
6/20/00	18.5	19.5	18.7	19.9	1950	18.9
6/21/00	19.6	20	19.6	20.6	1900	19.4
6/22/00	19.9	21	19.8	21.3	1860	23.9
6/23/00	20.8	21.6	21	22.2	1680	21.7
6/24/00	21.3	22.2	21.3	22.4	1640	18.9
6/25/00	21.3	22.3	21.6	22.1	1710	19.4
6/26/00	22	22.7	21.4	22.4	1730	22.8
6/27/00	22.4	23.1	22.5	23.2	1690	24.4
6/28/00	22.8	23.8	22.7	23.6	1550	20
6/29/00	22.9	24.2	23	23.6	1590	21.1
6/30/00	23.2	24.3	23.3	24.2	1480	18.9
7/1/00	23.1	24.4	23.7	24.8	1520	19.4
7/2/00	23.7	24.9	24.1	25.4	1400	20.6
7/3/00	23.9	25.3	24.7	25.2	1520	23.3
7/4/00	24.4	25.3	24.7	25.7	1470	22.2
7/5/00	24.7	25.4	25	25.8	1460	18.9
7/6/00	24.3	25.4	24.7	25.6	1178	18.3
7/7/00	24.4	25.3	24.9	25.1	1125	19.4
7/8/00	24.1	24.8	24.5	25.1	1070	18.9
7/9/00	24	24.5	24.2	25.2	904	17.8
7/10/00	24.1	24.7	24.5	25.7	1218	21.1
7/11/00	24	25	24.3	25.3	1068	20
7/12/00	24	25.1	24.4	25.9	957	21.7
7/13/00	24.2	25	24.9	25.7	1044	22.8
7/14/00	24.1	25.1	24.6	25.7	937	22.2
7/15/00	24.3	24.9	25	25.5	979	19.4

7/16/00	23.2	24.6	23.7	24.3	1195	17.2
7/17/00	22.6	23.1	22.9	23.6	2620	18.3
7/18/00	22.9	23.4	23.3	23.6	3160	19.4
7/19/00	22.1	23.2	22.3	23.2	3410	18.3
7/20/00	21.3	22.5	21.6	22.9	3090	16.7
7/21/00	21.1	22.4	21.3	22.7	2670	17.8
7/22/00	21.2	22.3	21.9	22.4	2140	20
7/23/00	21.8	22.4	22	22.9	1990	19.4
7/24/00	21.6	22.3	21.8	22.9	1770	19.4
7/25/00	22.2	22.6	22.4	23.1	1460	20
7/26/00	22.2	22.6	22.4	22.8	1250	17.8
7/27/00	21.6	22.4	21.8	22.1	1940	17.2
7/28/00	21.3	22.4	21.5	22.5	1600	21.1
7/29/00	22.2	23.2	22.5	23.5	1500	21.7
7/30/00	22.3	23.1	22.6	23.1	1890	18.9
7/31/00	21.9	22.3	22.1	22.4	2060	17.8
8/1/00	21.8	22	22	22.1	2480	16.1
8/2/00	21.8	22.1	*	*	2290	20
8/3/00	21.5	22.1	*	*	1920	24.4
8/4/00	21.9	22.3	22	22.8	1830	21.7
8/5/00	21.8	22.2	22.4	22.6	1710	20
8/6/00	21.8	22.5	22.2	23	1470	20
8/7/00	22.1	22.6	22.4	23	1530	21.7
8/8/00	22	23.6	22.4	23.5	1450	24.4
8/9/00	22.6	24.7	23.6	24.2	1330	23.3
8/10/00	22.7	24	23.2	24.8	1400	22.8
8/11/00	23.1	23.8	24	24.6	1370	20
8/12/00	23.3	23.7	23.9	24.6	1300	18.9
8/13/00	23.3	23.4	23.4	23.7	1195	18.9
8/14/00	*	*	22.9	23.4	1420	18.3
8/15/00	*	*	22.9	23.1	1320	20.6
8/16/00	*	*	22.8	23.5	1550	20
8/17/00	*	*	22.8	23.5	1500	17.2
8/18/00	*	*	22.7	23.2	1350	15
8/19/00	*	*	22.6	23.4	1290	18.9
8/20/00	*	*	22.5	22.9	1279	16.7
8/21/00	23	23.1	21.9	22.9	1196	17.8
8/22/00	22.2	23	22.2	23.4	1161	18.9
8/23/00	22.1	22.3	*	*	1105	18.9
8/24/00	22	22.6	22.3	23.1	1031	20.6
8/25/00	21.8	23	22.2	23.3	1124	19.4
8/26/00	22.4	23.1	22.9	23.9	1029	20.6
8/27/00	22.5	22.8	22.9	23.5	1081	21.1
8/28/00	22.6	23.1	23.3	23.8	979	18.3
8/29/00	22.5	23	23.3	23.6	973	17.2
8/30/00	22.3	22.8	22.6	23.3	940	18.3
8/31/00	22.3	22.8	23	23.9	934	22.2
9/1/00	*	*	23.9	24.2	897	26.7
9/2/00	*	*	*	*	882	20.6
9/3/00	*	*	*	*	883	17.8

9/4/00	*	*	*	*	913	16.7
9/5/00	21.4	22.3	*	*	926	13.3
9/6/00	21.4	21.7	21.8	22.2	912	12.2
9/7/00	21.1	21.9	*	*	854	13.3
9/8/00	21.1	22.1	*	*	773	18.9
9/9/00	21.8	22.6	*	*	734	21.1
9/10/00	22	22.6	*	*	732	17.8
9/11/00	22.3	22.7	22.4	23.2	731	15
9/12/00	22.2	22.6	22.4	23.1	739	20
9/13/00	21.9	22.6	22.8	23.2	776	18.9
9/14/00	22	22.6	22.4	23.3	763	15.6
9/15/00	21.7	22.4	21.7	22.5	794	16.1
9/16/00	20.7	21.6	20.9	21.3	965	14.4
9/17/00	19.9	21	20	20.5	1360	13.3
9/18/00	19.8	20.7	20	21	1310	17.8
9/19/00	20.4	21	20.6	21.4	1203	16.7
9/20/00	20.2	20.8	20.8	20.9	1310	21.7
9/21/00	20.3	20.7	20.7	21	1294	19.4
9/22/00	19.7	20.1	19.9	20.2	1118	15
9/23/00	19.4	19.7	19.4	19.8	925	14.4
9/24/00	19.4	19.5	19.3	19.8	936	15
9/25/00	19	19.3	19.2	19.6	856	10.6
9/26/00	18.6	19	18.6	19	796	10.6
9/27/00	18	18.7	18.1	19	848	11.1
9/28/00	18	18.6	17.7	18.5	818	7.8
9/29/00	17.5	17.9	17.1	18.1	813	6.1
9/30/00	17.1	17.5	16.1	18	751	10.6
10/1/00	16.7	17.4	16.7	17.7	757	11.7
10/2/00	17.1	17.7	17.3	17.7	744	12.2
10/3/00	17.2	18.1	17.6	18.1	749	17.2
10/4/00	17.5	17.7	17.5	18	732	15
10/5/00	17	17.4	16.8	17.4	746	10.6
10/6/00	16.2	16.9	16.1	16.6	866	9.4
10/7/00	16.1	16.5	15.9	16.5	1060	10
10/8/00	15.7	16.2	15.6	16.2	990	7.2
10/9/00	14.8	15.5	14.4	15.2	1047	3.9
10/10/00	14.1	14.9	*	*	1420	5.6
10/11/00	13.6	14	13.3	14	1460	10
10/12/00	13.4	14.1	13.1	14.1	1410	10
10/13/00	13.2	14	13.2	14.1	1380	12.8
10/14/00	13.2	14.1	13.3	14.3	1360	18.9
10/15/00	13.5	14.1	13.9	14.3	1284	14.4
10/16/00	6.7	13.7	12.1	13	1320	4.4
10/17/00	6.2	10	12.1	12.5	1225	5.6
10/18/00	9.9	11	11.9	12.3	1360	8.9
10/19/00	10.9	12.6	12	12.6	1590	11.1
10/20/00	12.2	12.9	11.7	12.7	1570	8.9
10/21/00	12.3	12.7	12.1	12.9	1550	14.4
10/22/00	12	12.5	11.7	12.6	1430	6.7
10/23/00	11.5	12.2	11.7	12.2	1410	4.4

10/24/00	10.5	12	11.6	12.2	1310	7.8
10/25/00	8.7	11.8	11.5	12.1	1320	11.1
10/26/00	9.9	14.3	11.8	12.2	1244	12.8
10/27/00	10.5	14.1	11.9	12.1	1197	11.7
10/28/00	10.9	13.2	11	12.2	1056	7.2
10/29/00	*	*	9.6	10.3	1018	1.7
10/30/00	*	*	9.4	9.6	1013	4.4
10/31/00	*	*	9.6	9.9	1039	6.1

ATTACHMENT 9. Comparison of Saco River with Other Rivers

AMERICAN SHAD, RIVER HERRING AND ATLANTIC SALMON NUMBERS IN EAST COAST RIVERS

1983 - 2000

	SUSQUEHANNA RIVER, PA CONOWINGO DAM			CONNECTICUT RIVER, MA HOLYOKE DAM				MERRIMACK RIVER, MA LAWRENCE DAM			SACO RIVER, ME CATARACT DAM			ANDROSCOGGIN RIVER, ME BRUNSWICK DAM			PENOBSCOT RIVER, ME VEAZIE DAM		
Year	Shad	R. Herr.		Shad #1	Shad #2	R. Herr.	Salmon	Shad	R. Herr.	Salmon	Shad	R. Herr.	Salmon	Shad	R. Herr.	Salmon	Shad	R. Herr.	Salmon
1983	413	567		1,574,460	528,185	454,242	25	5,629	4,700	114	--	--	1	2	601	20	X	X	799
1984	167	337		1,231,110	500,000	480,000	66	5,497	1,800	115	--	--	2	1	2,650	94	X	X	1,451
1985	1,546	7,142		727,560	480,000	630,000	285	12,793	23,000	213	--	--	60	0	23,895	25	X	X	3,020
1986	5,195	9,149		748,440	350,000	520,000	280	18,173	16,000	103	--	--	37	0	35,471	80	X	X	4,125
1987	7,667	6,218		587,520	280,000	360,000	208	16,909	77,000	139	--	--	40	0	63,523	27	X	X	2,341
1988	5,146	15,244		647,640	200,000	340,000	72	12,359	361,000	65	--	--	38	0	74,341	14	X	X	2,688
1989	8,218	5,500		979,440	350,000	290,000	80	7,875	388,000	84	--	--	19	0	100,895	19	X	X	2,752
1990	15,719	10,083		816,480	360,000	390,000	188	6,013	254,000	248	--	--	73	0	95,574	185	X	X	2,953

1991 +	27,229	31,737	1,195,920	520,000	410,000	152	16,098	379,000	332	--	--	4	0	77,511	21	X	X	1,578
1992	25,721	38,509	1,628,039	720,000	310,000	370	20,796	102,000	199	--	--	--	0	45,050	15	X	X	2,233
1993	13,546	9,198	749,227	340,000	103,000	169	8,599	14,000	61	877	831	53	0	5,202	44	X	X	1,650
1994	32,330	2,926	325,558	180,800	31,766	263	4,349	89,000	21	399	2,224	21	1	19,190	25	X	X	1,042
1995	61,650	103,438	303,973	190,295	112,136	151	13,857	33,425	34	587	9,820	34	3	31,329	16	X	X	1,342
1996	37,100	3,000	553,000	276,289	56,300	260	11,322	51	76	837	9,163	54	2	10,198	38	X	X	2,045
1997	103,870	376,146	659,500	299,448	63,945	199	22,586	403	71	1,104	2,130	28	2	5,540	1	X	X	1,355
1998	46,481	6,248	642,890	311,704	11,170	298	27,891	1,632	123	1,374	15,581	28	5	25,177	4	X	X	1,210
1999	79,370	140,980	475,095	196,549	2,760	153	56,465	7,898	190	4,629	31,070	62	87	8,909	6	X	X	969
2000	153,546	14,965	427,381	225,042	10,587	52	72,571	23,587	85	1,323	25,136	50	88	9,151	4	X	X	532

+ Conowingo East Lift began operating in 1991.
Shad #1 = estimated numbers entering the river
Shad #2 = Holyoke fish lift count

The new Saco River fishways were not operational until 1993. The West Channel trap was not operational until 1992.
X = No effective mechanism to count clupeids at Veazie

ATTACHMENT 10. Electrofishing Data for Saco River Tributaries

Evaluation of the spring 2000 fry stocking of more than 615,000 fish was completed on August 16,17 & 18, 2000 by U.S. Fish & Wildlife Fisheries Biologist David Bean, assisted by Florida Power and Light Company Biologist Matt Leblanc and Technicians Dan Breed and Tim Arienti. Members from the SRSC and ASC Biologist Greg Mackey also assisted with collecting data for this year's survey.

The method of evaluation was standard electrofishing techniques using blocking seines at each end of the site to eliminate immigration and emigration of targeted species. Data was collected using the standard three run depletion technique. All salmonid data was taken and will be used interagency in cooperation with Inland Fisheries & Wildlife.

The electrofishing survey was conducted within small stream habitat, where pool and riffle gradation is present; some of the sites were duplicated from previous years. The sites that are in the survey are very typical of the salmon habitat throughout the drainage and were chosen during the initial survey of several streams in the drainage. The SRSC would like to further the survey to include temperature profiles for these study sites and plans to purchase remote temperature monitors for this purpose.

This year's data contains parr collection totals that will be used to calculate parr population estimates. These estimates will help with future fry stocking management for the tributaries of the Saco River. The preliminary data collected shows good survival of young-of-the-year salmon (YOY) as well as good numbers of parr in these sites. Coordination between IF&W, ASC, SRSC and USF&WS is increasing and additional new survey sites will be added. These future sites will address some of the key issues of concern. Preliminary data is summarized and population estimates are contained in Table 1.

Site 1: Back Brook, Baldwin, Whales Back Rd.

Temperature 56 f

1.5 units salmon habitat - Salmon (YOY):	16	Mean length: 64mm	Range: 57-69 mm
		Mean wgt: 2.4g	Range: 1.7-2.7g
Parr:	11	Mean length: 100mm	Range: 88-120mm
		Mean wgt: 9.5g	Range: 6.7-14.1g

Site 2: Pugsley Brook, Cornish, Rte 25, Old Bridge

Temperature 55 f

1.0 units salmon habitat - Salmon (YOY):	16	Mean length: 63mm	Range: 48-65mm
		Mean wgt: 2.3g	Range: 1.8-3.8g
Parr:	15	Mean length: 123mm	Range: 95-55mm
		Mean wgt. 29.6g	Range: 6.9-35.9g

Site 3: Shepards River, Brownfield, West Main St., Bridge Crossing

Temperature 56 f

1.7 units salmon habitat - Salmon (YOY):	6	Mean length: 67.5mm	Range: 60-76mm
		Mean wgt: 2.9g	Range: 1.8-4.1g
Parr:	3	Mean length: 140mm	Range: 123-157mm
		Mean wgt: 26.5g	Range: 18.5-36.9g

Site 4: Breakneck Brook, Baldwin, Weeman Rd., Bridge Crossing Site
Temperature 57 f

1.8 units salmon habitat - Salmon (YOY):	80	Mean length: 63mm	Range 55-70mm
		Mean wgt: 2.5g	Range 2.2-2.6g
Parr:	48	Mean length: 110mm	Range 90-131mm
		Mean wgt: 12.2g	Range 6.2-20g

Site 5: Red Brook, Dayton, Dyer Rd., Old Dam Site
Temperature 68 f

.55 units salmon habitat - Salmon (YOY):	8	Mean length: 61mm	Range 53-67mm
		Mean wgt: 2.6g	Range 1.4-2.8g
Parr:	7	Mean length: 118mm	Range 95-152mm
		Mean wgt: 14.2g	Range 7.6-33.5g

Table 1: YOY Parr
Densities of Salmon Per Unit of Habitat

	1997	1999	2000	1999	2000
Back River	17	39.5	9.5	2	7.5
Shepards	4	5	4	.6	2
Breakneck		103	48	.5	26
Pugsley	23	27	18	2	17
Red Brook			15		21
Linscott	4.5				

All electrofishing data collected for the tributaries of the Saco River is represented as population estimates shown in Table 1. Population estimates are based on the number of fish per unit of habitat; these totals show the population within the site that was sampled. The data indicates an increase in parr densities in 2000, a reflection of the established fry that survived over winter to become parr. The data for 1998 is not present due to the limited number of fish collected (N=3) and may be attributed to the extreme flooding following the spring stocking. Sample sites were duplicated over the three-year period to help establish baseline fry densities to later determine survival to parr.