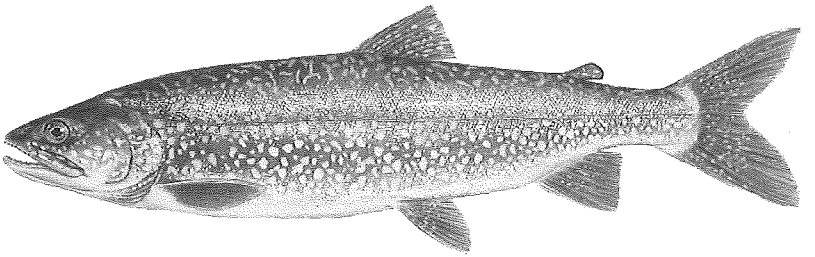
Maine Department of Inland Fisheries and Wildlife

Lee E. Perry, Commissioner

Fisheries Research & Management Report 2001



Caring for Maine's Outdoor Future

Ken Warner, Editor

SPORT FISH RESTORATION

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COOPERATIVE

STATE  **FEDERAL**

PROJECT

This report has been funded in part by the Federal Aid in Sport Fish Restoration Program. This is a cooperative effort involving federal and state government agencies. The program is designed to increase sport fishing and boating opportunites through the wise investment of anglers' and boaters' tax dollars in state sport fishery projects. This program, which was funded in 1950, was named the Dingell-Johnson Act in recognition of the congressmen who spearheaded this effort. In 1984 this act was amended through the Wallop-Breaux Amendment (also named for the congressional sponsors) and provided a threefold increase in Federal monies for sportfish restoration, aquatic education, and motorboat access.

The program is an outstanding example of a "user pays-user benefits", or "user fee" program. In this case, anglers and boaters are the users. Briefly, anglers and boaters are responsible for payment of fishing tackle excise taxes, motorboat fuel taxes, and import duties on tackle and boats. These monies are collected by the sport fishing industry, deposited in the Department of Treasury, and are allocated the year following collection to state fishery agencies for sport fisheries and boating access projects. Generally, each project must be evaluated and approved by the U.S. Fish and Wildlife Service (USFWS). The benefits provided by these projects to users complete the cycle between "user pays - user benefits".

Introduction

This is the second in an annual series of Fishing Research and Management reports, including a summary of major management activities in each of our seven Fishery Management Regions. Reports are presented in a popular writing style for easier public understanding.

Summaries of some of our more specific studies are also included. Lake studies include those on Rangeley, Richardsons, and Mooselookmeguntic. River studies include the Cupsuptic and the Androscoggin fish health survey. Important studies on brook trout genetics and effects of regulations round out the summaries.

Some insight into the 15-year Long Range Fisheries Plans is also presented. We plan to present more detail in the next Annual Report.

Maine's Fish Culture Program will also be discussed in that report.

We welcome suggestions for improvement. Please let us know your reactions to this report and whether you find if of interest.

- Kendall Warner
Research and Management Supervisor

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Sebago Lake Region (A)

Landlocked Salmon

Regional fisheries staff had a busy fall season sampling landlocked salmon waters to access age, growth, and condition. Sampling was conducted primarily with trap nets. However, Sebago Lake fish were at the fish trap during the annual Jordan River egg taking operation, and the Kezar Lake sample was obtained by electrofishing two of the tributaries. In addition, we attempted to collect salmon data for Auburn Lake, but the spawning run was over by the time we finished our other sampling. A brief summary of last fall's sampling results is provided below (Table 1).

Table 1 . Summary of fall landlocked salmon sampling, 2000

Lake Name	Average Length (in.)	Average Weight (lbs.)	Largest Salmon (lbs.)
Sebago L.	17.8	1.7	3.2
Thompson L.	18.5	2.1	3.7
Crystal L. (Harrison)	16.7	1.7	3.4
Peabody P.	19.0	2.7	4.3
Little Ossipee L.	21.5	4.0	6.9
Panther P.	15.9	1.2	2.9
Kezar L.	20.6	3.8	7.0

In general, the salmon observed this season appeared to be in good condition. Following are a few highlights from some of our popular salmon waters.

Kezar Lake (Lovell) A complete winter clerk survey was conducted at Kezar Lake, because low numbers of landlocked salmon in the catch have us concerned about the salmon fishing. Netting studies last summer and electrofishing studies last fall also indicated low abundance of landlocked salmon, but the few salmon present are in exceptional condition. Salmon in the 7-8 pound class have been caught. As a result, we have identified Kezar Lake to be included in a select group of waters throughout the state where we will attempt to restore the high quality salmon fishery. Lake trout are very abundant and growing well, and may be contributing to the problem of low salmon abundance by competing with the salmon. Lake trout stocking has been discontinued for 2001 and 2002 while we continue to evaluate the current situation. We expect to resume stocking lake trout in 2003, but perhaps at a lower rate.

Thompson Lake (Oxford) Trapnetting results indicate good numbers of salmon in the 2 pound range, and anglers should expect relatively good spring salmon fishing for 2001. However, their growth and condition was

lower than it has been in recent years. Consequently, we plan to reduce the stocking rate by one third and will reassess salmon condition in the fall of 2001.

Peabody Pond (Sebago) Good smelt runs the last few years has resulted in good growth and condition, and several fish caught during our sampling exceeded 4 pounds. Spring fishing for salmon in 2001 is expected to be a good bet, but the number of salmon available is limited by the small size of the pond.

Moose Pond (Bridgton) Fall sampling by the Department of Environmental Protection indicates good numbers of fish ranging in length from 15-23 inches. This pond should produce some excellent winter and spring salmon action for 2001.

Little Ossipee Lake (Waterboro) Salmon also looked good on this water, but their abundance was relatively low. Fall netting data indicate that heavy harvest during the winter season may limit the number of salmon available during the openwater season, and we have scheduled a winter clerk survey to evaluate the situation further before making any stocking or regulation changes.

Sebago Lake Fishery Management Update

Although 5 and 6 pound fish were missing from the catch, Sebago anglers were rewarded with fast paced salmon action this summer. Fish in the 1.5 to 2.5-pound range made up the bulk of the catch, and there were a few 3-4 pound salmon taken. A high percentage of sublegal salmon in the 14 to16-inch range were also caught. Cooler water temperatures made it possible for anglers to catch salmon on the surface all summer, and it was not unusual to see a dozen boats every morning in August trolling flies between the Northwest River and the shoals. The average length and weight of the salmon caught this summer (19 inches, 1.9 lbs) was down considerably from 1999, but about average for Maine's salmon waters. Anglers released 53% of the legal salmon caught.

The lake trout fishing continues to exceed all expectations (Table 2). Although total angler use for Sebago was down nearly 20%, lake trout catch remained high, and anglers harvested more lakers than ever. Several lakers in the 15-20 pound range are taken every year, and occasionally fish in excess of 20 pounds are caught.

Table 2. Catch (kept + released) of legal salmon and lake trout at Sebago (summers)

Year	# Anglers	Salmon Catch	Lake Trout Catch
1998	32,494	4,874	17,002
1999	33,000	13,320	13,396
2000	26,443	7,977	16,086

We had hoped for a better smelt run in the spring than we observed. As a result, several million smelt eggs were stocked into the lake in hopes of speeding up the smelt recovery. The same will be done in the spring of 2001. In addition, the salmon stocking was reduced to 4000 fish last spring, and will remain at 4000 or fewer until the smelt population improves. Additionally, biologists will discuss the possibility of further liberalizations in the lake trout regulations.

Lake Trout

Kezar Lake (Lovell) Winter and summer fishing for lake trout at Kezar Lake has been exceptional for the past year. Fast fishing for 2 to 5 pound lake trout can be expected, and occasionally lakers in the 8-pound range are taken. Lake trout stocking will be discontinued for a year or two in an effort to improve the catch of landlocked salmon. Lake trout stocking will resume in a couple years and we expect the good lake trout fishing to continue and the average size of the lake trout to increase.

Auburn Lake (Auburn) Netting operations this summer at Auburn Lake indicated a very healthy, fast growing lake trout population. The lake trout in the sample averaged over 20 inches and 3 pounds, with a few fish tipping the scales at nearly 8 pounds. Each year anglers catch a few fish over 10 pounds.

Thompson Lake (Oxford) Winter fishing for lake trout was relatively good and anglers commonly caught lakers in the 14 to 24-inch range. Anglers took advantage of the new regulation changes on lake trout by harvesting fish in the 14 to 18-inch range, and the ability to use live bait attracted many anglers who had stopped fishing Thompson. Although the opportunity exists to catch lakers in the summer, the fishery is lightly utilized at this time due to a preference for salmon fishing and better lake trout fishing opportunities nearby.

Brown Trout

Early season fishing for sea-run browns at the Ogunquit River in Ogunquit and the Mousam River in Wells was exceptional. The ice disappeared from the estuaries in early March and the good fishing began immediately. Most anglers were using either flies or artificial lures,

and catches of 10-15 fish per day were not uncommon. Caddis hatches were observed on both rivers in March and many anglers were very successful using dry flies. Most fish were in the 13-15 inch range though several larger fish were caught. By May, most of the fish had dispersed throughout the estuaries and the stripers had arrived. The fishing slows down at this time, although we received many reports of browns up to 20 inches taken while fishing for stripers. During the summer, an 11-pound brown was taken at the Ogunquit River.

Fall fishing was off somewhat from recent years, but fishing was still considered fair. Twelve to fifteen-inch brown were common and occasionally browns up to 22 inches were caught. Browns were again stocked in the fall at the Mousam and the Ogunquit Rivers, and also at the Webhannet River in Wells. Thus far, we have not received many reports from anglers on the Webhannet. Next year we expect to stock the Salmon Falls River in addition to the Ogunquit and the Mousam.

Stream fishing on our inland waters continues to provide patient anglers with a rewarding challenge. While most browns caught by anglers range between 9 and 12 inches long; a number of our better streams have produced browns exceeding 16 inches long. The following streams are known to produce larger-size browns: Little Androscoggin River (Reach between Welchville Dam in Oxford and Upper Barkers Dam in Auburn), Pleasant River (Windham), Little Ossipee River (Newfield), and the Shepards River (Brownfield).

Browns stocked in southern Maine lakes have demonstrated an ability to evade anglers and grow to large size, even in the presence and strong fishing pressure. Most of our brown trout lakes are stocked in late fall with legal-size, 12 to 14 inch fish that not only make an immediate contribution to the fishery, but also are best suited to withstand competition from an abundance of warmwater fish that typically occur in most brown trout waters. Many, if not most of the state's largest brown trout are caught annually in Region A, including the 1996 state record 23 ½ pounder caught in Square Pond (Acton). Past sampling suggests that many Region A lakes managed for brown trout are capable of producing 3 to 6 pounders and the following waters continue to boast a reputation for producing larger browns: Range Ponds (Poland), Square Pond (Acton), Little Sebago Lake (Windham), Long Lake (Naples), Kennebunk Pond (Lyman), and Worthly Pond (Peru).

Brook Trout

Region A brook trout fishing may not compare to some of the Northern Regions, but there is still plenty of opportunity to catch stocked and wild brookies. Over 175,000 brook trout were stocked into Region A waters in the year 2000 (Table 3). Over 50% of the fish stocked were legal sized at the time of stocking and provide good early season angling during the summer and winter seasons. In the summer of 2000, we sampled several of our fall fingerling stocked brook trout waters and most of these ponds had good numbers of fish in the 8-10 inch range. In addition, angler reports and sampling efforts indicated that a few of our better trout ponds produced a handful of brookies in the 14-17 inch range.

Table 3. Region A Brook Trout Stocking, 2000.

Age Class	Typical Size Range (inches)	Number Stocked
Fry	< 3	58,000
Fall Fingerling	6-8	27,585
Advanced Fall Fingerling	8-10	10,000
Spring Yearlings	8-12	76,575
Fall Yearlings	10-14	2,835
Adults	>15	130

Most of Region A's wild brook trout fishing, with the exception of a few small ponds in York County and beaver impoundments, occurs in small-to-medium-size streams located throughout the Region. Many of our streams actually support good numbers of brook trout in the 4-8 inch size range and produce a limited number of bigger-size brookies up to around 12 inches.

Rainbow Trout

In the fall of 1997, the MDIFW established a committee to investigate the possibility of initiating a rainbow trout stocking program. The committee determined that rainbow trout have produced good results in other states, and they may provide some advantages over other stocked species, particularly brook and brown trout. An experimental stocking program and a follow-up evaluation project was then formulated to evaluate the relative performance of the three species, which would be stocked into a limited number of waters within southern and central Maine. Rainbow trout eggs arrived from the Erwin National Fish Hatchery in December of 1999, and they exhibited excellent growth during the year 2000. Approximately 10,000 rainbows will be stocked into study waters with equal numbers of either brook or brown trout in the spring of 2001. Rainbows and browns will be stocked into four southern Maine rivers and five lakes for comparative evaluations. In addition, we will be conducting rainbow-brook

trout comparisons in four southern Maine ponds. Annual stockings and follow-up investigations are expected to continue for a 5-year period.

Splake

In 1999 all 12 Region A splake waters were assessed to evaluate growth, age class distribution, and relative abundance. This assessment effort was briefly described in last years annual report and was undertaken, in part, to determine why splake performance has been somewhat inconsistent from year to year on some waters. In addition a more careful assessment of habitat suitability and public access was also undertaken. As a result of the work completed in 1999, splake stocking will be suspended at Highland Lake (Windham) and Trout Pond (Stoneham) in the year 2001. In addition, because of an unexpected shortage, Trout Pond was also not stocked with splake in 2000. The shortage also resulted in no splake being stocked in Shagg Pond (Sumner), Keewaydin Lake (Stoneham), Canton Lake (Canton), Stanley Pond (Hiram), and Colcord Pond (Porter) during the year 2000. Additional study recommendations to modify splake stocking rates will be implemented in 2001 (Table 4). Splake stocking rates will be reduced on four waters where growth and condition was sub-optimal, but survival and relative abundance was good.

Table 4. Splake stocking changes on Region A waters.

Increase	Decrease	Same	Discontinue
Tricky Pond	Keewaydin Lake	Shagg Pond	Highland Lake
Stanley Pond	Canton Lake	Indian Pond	Trout Pond
Colcord Pond	Bear Pond		
	North Pond		
	Bryant Pond		

Stocking rates will be increased on three waters where growth and condition was very good, but survival and relative abundance was lower than expected. Existing stocking rates were deemed appropriate at Shagg Pond (Sumner) and Indian Pond (Woodstock). In addition to stocking rate revisions, Governor Hill Hatchery has made considerable progress in producing larger size spring yearling splake that are expected to experience increased post-stocking survival, due to reduced predation. These larger spring yearlings will become available in 2001. In addition to improved size at stocking, the splake will be stocked out earlier in May when surface water temperatures are cooler and the incidence of bass predation is likely to be less. In late May, hatchery water temperatures are typically 50º F, and pond surface temperatures in southern Maine are often in the mid 60's. This temperature differential increases the potential for mortality associated with thermal shock. This possible source of

mortality will be significantly reduced under the planned stocking schedule. All the changes outlined above will be implemented over the next several years and the effectiveness of these changes will be re-evaluated no earlier than 2003.

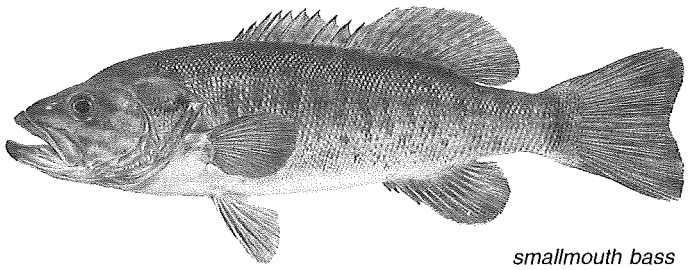
Bass

Region A continues work with the other Fisheries Management Regions in a coordinated effort to address statewide bass management needs in Maine. There are two ongoing statewide bass research projects designed to:

(1) Understand the relationship between bass size at the end of their first growing season, overwinter mortality, and year class strength; and

(2) evaluate the effectiveness of the 12-inch minimum length limit that was adopted in 1992.

In addition to projects of statewide focus, bass information will also be collected in 2001 to address Regional Management needs. Baseline information will be gathered from bass populations associated with several hydroelectric impoundments on the Saco River. Information of bass age and growth, as well as population size structure will provide a basis to evaluate possible future changes associated with hydro-project operations and ongoing efforts to restore migratory fish species to the Saco River watershed.



smallmouth bass

Noteworthy Fish From the Region

Each year there are many noteworthy fish caught in the Sebago Region. The following is a sample of fish caught during the year 2000.

Angler	Lake	Species	Size in Pounds
Ernest Bisco	Sebago Lake	Lake Trout	19.7
Barry Desrochers	Sebago Lake	Lake Trout	17.5
Barry Desrochers	Sebago Lake	Lake Trout	19.0
Phil Jackson	Sebago Lake	Lake Trout	17.6
Walter McKenney	Sebago Lake	Lake Trout	19.0
Donald Alan	Moose Pond	Largemouth Bass	7.0
Harvey Wheeler	Moose Pond	Largemouth Bass	9.0
Bruce Allen	Long Lake	Brown Trout	8.8
Robert Lavertu	Square Pond	Brown Trout	6.5
Joey Saucier	unnamed	Brown Trout	7.2
Robert Menard	Thomas Pond	Pickerel	5.1
Jeffrey Cote	Thomas Pond	Pickerel	5.3
Dean Belanger	Sebago Lake	Black Crappie	2.9
Peter Windrush	Trickey Pond	Landlocked Salmon	4.3

Special Projects

Pond Reclamation Update

Broken Bridge and Crocker Ponds, located in the White Mountain National Forest, were reclaimed in the fall. These ponds were treated with rotenone to eradicate abundant populations of trout competitors including brown bullheads, golden shiners, pumpkinseed sunfish, and chain pickerel. In the past, Broken Bridge has demonstrated the potential to produce quality brook trout and we are excited about the prospects of rebuilding this fishery. Both ponds will be restocked with 10-inch brook trout in the spring of 2001.

Live Smelt and Smelt Egg Transfers

Over the past 4 years we have been stocking live smelts on an experimental basis to create new smelt populations. In the past, the Fishery Division has had good success using smelt eggs, but the commercial dealers on the "Smelt Working Group" urged us to revisit the use of live smelt transfers in an experimental program. Our goal is to create new smelt populations, which could then serve as donor sources for future smelt transfers. Live smelt have been stocked for 4 years into Ingall's Pond (Foster's Pond) in Bridgton and recent sampling efforts show a very low population of smelts. Smelt stocking at Ingall's Pond has now been discontinued, although the smelt runs will be monitored for a

few years. Next spring we intend to stock Bunganut Pond in Lyman for the same purpose. Without the contribution of time, equipment and expertise from Bruce Steeves, bait dealer, live smelt introductions into Region A waters would not have been possible.

Hydroacoustics Sampling

A few years ago, the MDIFW received an Outdoor Heritage Grant to purchase hydroacoustics equipment (a high-tech, ultra-sensitive fish finder) for monitoring smelt populations on important landlocked salmon waters around the State. This new equipment should allow biologists to enumerate smelt numbers and biomass for trend monitoring on a limited number of lakes. In the past, smelt population monitoring was largely done by studying landlocked salmon growth and condition, as well as, annual observations of smelt spawning runs. Spring spawning run information is often anecdotal, non-quantitative, and ineffective on lakes where the smelt spawn in large tributaries or along the shoreline. Salmon growth and condition is an excellent indicator of smelt abundance. However, there is often a substantial lag time before a noticeable growth change occurs, which can delay corrective actions and recovery of the forage base.

In September, regional staff spent approximately one week preparing for and conducting hydroacoustic surveys on Sebago and Thompson Lakes. We sampled a total of three nights, which consisted of 14 transects (41.7 miles) on Sebago and 8 transects (9.2 miles) on Thompson. Region A started the time-consuming process of editing and analyzing the data files during the later part of the year.

Public Access

Public boat access continues to be a high priority management issue in Region A. Our attention is not only directed at the development of new public launch sites, but also addressing problems that threaten traditional access that are under private ownership. Below is a brief list of some of noteworthy initiatives:

Sebago Lake: A new double-wide launch ramp and associated parking was constructed at "Raymond Beach", located adjacent to Route 302 in Raymond. This facility will certainly be one of the busiest access sites in the state, both summer and winter.

Square Pond: After many years of controversy, the Square Pond boat access site was completed in July. With the availability of public boat access we have resumed our brown trout stocking and management program.

Trickey Pond: A new public boat ramp was completed last fall at Trickey Pond in Naples. The launch ramp is located on Route 114 and was developed to be a low impact facility that will provide much needed access (summer and winter) to this beautiful trout and salmon water.

Rachel Carson Refuges: The US Fish and Wildlife Service is prepared to announce the opening of several angling sites on these refuges. We've worked very hard to open these few waters and still feel there is a lot more work required to provide anglers an adequate opportunity to fish these federal lands.

Thompson Lake: A parcel of land located in Potash Cove has been purchased for the development of a state public boat launch. Final design plans are being prepared, including plans for environmental review.

Saco River: Angler access has been recently restricted below two hydroelectric projects (Skelton & Hiram Projects) that are owned and operated by Florida Power and Light (FPL). FPL instituted the restrictions due to concerns of vandalism and other mischief. We are currently engaged in discussions to restore a reasonable level of angler access at these sites.

Environmental

Region A reviews a considerable volume of permit applications for the Department of Environmental Protection and Land use Regulatory Commission, in addition to a plethora of requests from environmental consultants seeking fishery resource and potential impact information. Region A fisheries staff is also responsible for preparing review comments and making recommendations to state and federal agencies involved in the relicensing of hydroelectric projects. There are currently six hydroelectric projects undergoing various stages of relicensing in Region A. All six projects are located on the Presumpscot River, including an Eel Weir Project which is located at the outlet of Sebago Lake. Our involvement in the hydro review process has focused on efforts to enhance fishery resources and recreational opportunities on the river and associated impoundments. The following are a few key fisheries issue areas that are being considered at all six projects:

(1) Need to establish suitable minimum flows below each project to support stocking and management programs;

(2) Need to provide safe, permanent angler foot access below projects that is consistent with fisheries management goals and objectives;

(3) Need to provide safe and permanent provisions for boat access to project head ponds, consistent with fisheries management goals and objectives;

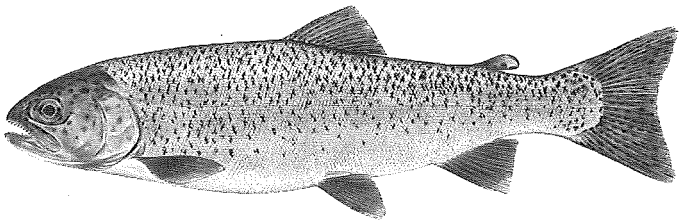
(4) Need to establish a water level management plan to protect shoreline spawners;

(5) Need to establish fish passage that is consistent with fisheries management goals and objectives.

During the relicensing process, we have worked very closely with our sister resource agencies (Atlantic Salmon Commission, Maine Department of Marine Resources) and have prepared a joint agency document that outlines the state's fisheries management goals for the entire Presumpscot River. This consensus based document provides clear guidance regarding the future management of fishery resources in the Presumpscot River.

We have also participated in the Saco River Coordinating Committee, which is a formal work group comprised of state and federal agencies, Florida Power and Light, and other non-governmental interest groups. The work group shares the responsibility for overseeing the implementation of fish passage and other restorative measures designed to enhance migratory species of fish. The forum also provides an opportunity to address areas of potential conflict resulting between restoration activities and resident fishery management.

- Francis Brautigam



rainbow trout

Belgrade Lakes Region (B)

During the first three months of 2000, fisheries biologists were busy interviewing anglers and collecting information on their catch while conducting sport fishing surveys on some of our Region's ice fishing waters. Surveys were conducted on Great Pond, Messalonskee Lake, Wassookeag Lake, Androscoggin Lake, and Parker Pond. The information collected during the surveys includes counts of anglers, the duration of their trip, lengths and weights of fish caught, and notes of fins clipped. When analyzed, this information provides insight into numbers of hatchery and wild fish in the catch, biological condition of fish (i.e. their age, growth, and condition), and helps us to assess whether existing regulations are working properly.

Winter fishing activity has been on the decline in Central Maine for over a decade, with use dropping from a high of 1.48 anglers/acre in 1987 to 0.64 anglers/acre in 2000. This figure is based on a sample of 14 lakes around the Region. It appears that the decrease in winter fishing is slowing or stopping in recent years. Based on a group of 26 surveyed lakes, use remained fairly stable from 1999 (0.41 anglers/acre) to 2000 (0.42 anglers/acre). The historic decrease may be due to anglers spending more time fishing for warmwater fish on waters outside our survey list. Additionally, anglers may be enjoying other winter pastimes, including snowmobiling or skiing.

Winter creel survey work at Parker Pond continued in 2000, adding to and updating the information on landlocked salmon collected in 1999. Winter creel survey work was undertaken to supplement the data available from fall trapnetting conducted in previous years. Information from all sources indicated a chronic growth problem in Parker's salmon over several years and salmon stocking was temporarily suspended for a number of years after the 1998 stocking. Salmon forage primarily on smelt, and poor salmon growth can often be attributed to low production. Our goal was to reduce salmon numbers and allow the smelt population to recover.

While several of Parker's tributaries may be used for smelt spawning when smelt are very abundant, one tributary stream serves as the major spawning site in most years of moderate smelt abundance. Smelt spawning in Parker Pond suffered after a flood damaged the primary spawning stream several years ago. Surveys of recent spawning runs have suggested that smelt abundance is similar to historic averages, and not at an extremely high level. Our biologists have been working to improve the smelt population in Parker Pond by supplementing the run with eggs from other waters. Eggs have been placed in several of the

tributaries, suspended out in the lake to hatch (perhaps evading predators), and relocated within the lake in efforts to increase smelt abundance.

Increased stocking of both spring yearling and adult brook trout was implemented to provide fishing opportunity for coldwater gamefish during the course of smelt and salmon recovery. Salmon stocking may be suspended for as long as 3 consecutive years to aid in smelt recovery. Monitoring of salmon, smelt, and brook trout will continue in the interim, and salmon stocking will be re-initiated when conditions in the lake warrant their re-introduction.

In addition to the smelt work at Parker Pond, smelt egg transfers were made to Wassookeag Lake in Dexter. Wassookeag Lake offers anglers a togue fishery sustained by natural reproduction, as well as fisheries for stocked landlocked salmon and brook trout. Restrictive togue regulations include a 20-inch minimum size and one fish per day bag limit. This set of regulations (adopted in 1993) is designed to protect the togue until they have had some chance to reproduce, as our data has shown that the majority of the lake trout were not sexually mature until they had attained 21 inches in length.

Winter creel survey data from Wassookeag in 1993 indicated that 31% of lake trout caught were sub-legal (<20 inches). The results of our 2000 winter survey show that 69% of togue caught were sub-legal, with most of those falling between 18 and 20 inches. Similarly, the 1993 catch rate for all togue was 0.15 fish/angler while the 2000 rate is 0.25 fish/angler. With increases in both sub-legal and all lake trout caught, lake trout numbers appear to be on the increase. Creel survey will continue at Wassookeag in the winter of 2001, and the additional information will be used to evaluate the current regulations strategy. Changes in the togue regulations may be warranted to curb togue population growth. Landlocked salmon stocking in Wassookeag is currently at a fairly conservative rate, about 0.5 salmon/acre. Salmon are stocked at a lower rate than in some other regional waters due to the presence of the togue in Wassookeag Lake. The togue will also feed on the lake's smelt, which are the primary forage for the salmon.

Landlocked salmon fishing in Long Pond, Belgrade, has traditionally been a Region B gem. In recent years, landlocks have been struggling in Long Pond. Fall trapnetting has revealed a decrease in salmon numbers over the last 5 years, while the percentage of salmon bearing scars has increased in recent years. A creel survey of the open water fishing season was conducted during 2000 at Long Pond, with anglers interviewed at the boat launch and at several bank fishing sites. The catch of landlocks was

extremely low, supporting what anglers and our trapnetting have been suggesting: the salmon population is down in Long Pond. The primary cause of the decline in the salmon population in Long Pond is thought to be direct predation on salmon by northern pike, a non-native fish species introduced illegally into the Belgrades in the 1970's. Pike can grow to large sizes, well in excess of 20 pounds, and are highly piscivorous (fish eaters). The scars found on the salmon have been attributed to pike bite wounds.

Beginning in 2001, we will switch from stocking a spring yearling salmon (typically 8 – 10 inches) to a fall yearling salmon (12 – 14 inches). While the size of the salmon may aid in their survival, the practice of stocking in the fall may have some positive impact as well. The survival, growth, and return to the angler of the fall yearling salmon will be monitored through fall trap netting and creel survey work. Adjustments in the number of salmon stocked annually may be necessary to achieve the desired fishery.

Introductions of non-native fish to a lake or river can have serious, permanent impacts on the resident fish populations, and may involve interactions between species of fish and other aquatic animals that could never have been imagined prior to the introduction. Moving live fish to new bodies of water is illegal in Maine, a rule that is designed to protect our resident fish and their aquatic home from unknown dangers from new species. While there is little doubt that some illegal fish introductions are done on purpose by misinformed anglers trying to "improve" the fishing, many other unintentional means can have the same devastating effect of introducing new species. Releasing unwanted, live aquarium fish or dumping bait buckets full of live baitfish into our waters can introduce new fish species where they have not ever been previously. These practices are to be avoided, and a little caution in how we handle live fish can prevent permanent changes and lost fishery resources that can plague us and future generations for years to come. List of fish species recently introduced into new waters would include: black crappie, northern pike, landlocked alewife, and walleye. If you have knowledge of an illegal fish introduction, please call our Maine Warden Service and, through your action, make a statement about your commitment to our fisheries future by standing up for our resources and lawful anglers.

Additional fall trapnetting was conducted at Great Pond, Androscoggin Lake, and Kimball and Egypt Ponds. Regional work also included numerous stream habitat and fisheries surveys, work on bass populations, and fisheries input on environmentally sensitive construction projects around the Region.

- James F. Stahlnecker

Grand Lakes Region (C)

Biologists working on Tunk Lake reported some very good togue fishing in the winter of 2000. The average-size laker at Tunk measured 22.6 inches and weighed 3.3 pounds. The catch rate of legal lake trout per angler trip was exceptional. This catch rate results from a higher length limit of 23 inches that was adopted in 1992 to promote increased spawning and holdover of larger fish. This increased protection boosted the production of wild lake trout to a point where competition for smelt between landlocked salmon and lake trout exceeded the lake's carrying capacity for predators. Accordingly, we reverted back to the general law length limit of 18 inches starting January 1st, 2000 in order to promote more harvest. As the lake trout population increased and stockpiled, landlocked salmon growth and condition suffered from lack of smelt. We responded by transferring smelt eggs into the lake and stocking fewer salmon, which resulted in very slow salmon fishing.

At Alligator Lake, the winter catch rate for large legal salmon (i.e. > 20 inches) was satisfactory for a lake with this type of slot limit. Anglers released a significant proportion (35%) of salmon over 20 inches; those kept averaged 21.3 inches and 3.1 lbs. The largest salmon measured was an age 5 stocked fish weighing 4 lbs., and the largest brook trout checked was a wild age 4 fish weighing 2.1 lbs.

Trapnetting at Alligator in the fall yielded a sample of 78 salmon with wild salmon comprising 20 % of the catch. Hatchery age 3+ fish, the indicator year class, averaged 20.8 inches long and 3 lbs, 10 oz in weight. In all, 16 fish weighed $\geq$ 4 lbs. and were in excellent condition. We continue to see a significant percentage of wild salmon in our trap-net catch. Electro-fishing surveys in the outlet cove and outlet revealed numerous young salmon. These young salmon are produced in the outlet cove just above the old dam, and after emerging from the gravel some remain in the outlet cove while most others drift down into Alligator Stream. A rough population estimate calculated in the summer, indicated that about 600 young-of-the-year salmon inhabited the Alligator Stream reach between the lake and the Stud Mill Road. We feel that most of these young salmon are migrating up into the lake as 6 month olds or at age one. This behavior, which may be related to the lack of suitable parr habitat in the outlet, seems to be site specific and uncommon.

Our annual spring sport fishery survey at West Grand Lake revealed the salmon fishing to be one of the slowest on record. Catch rate was .17 legal salmon per angler trip in May and June, with salmon averaging 18 inches long and 1.9 pounds in weight. Conversely, lake trout anglers

experienced very good fishing with lakers averaging 21 inches and 3 pounds.

Salmon fishing in Grand Lake Stream was excellent. Voluntary record keepers reported catches averaging 3 to 4 legal salmon per angler trip from the spring through to fall. Brook trout were also well represented in the catch, a product of an additional stocking of 900 fish over and above the usual 400. The terrific fishing resulted from cooler water temperatures and a screen that was placed in the fishway at the West Grand Lake dam. The blockage was put in to prevent landlocked alewives from migrating into the lake, and competing with smelts, which are the critically important forage base for salmon and togue. Landlocked alewives were illegally introduced into East Grand Lake and unfortunately, now occur as far south in the drainage as Woodland Flowage, Grand Falls Flowage, and Big Lake.

In the fall, personnel from the Grand Lake Stream Hatchery trapnetted 900 salmon from West Grand Lake to procure eggs for the State's stocking programs. Biologists examined a random sub-sample of 100 fish, 50 males and 50 females that averaged 17.9 inches and 2.1 pounds. Age III+ salmon, the indicated year class, averaged 19 inches and weighed 2.6 pounds. Average growth rate, size, and condition of these fish were among the best ever recorded.

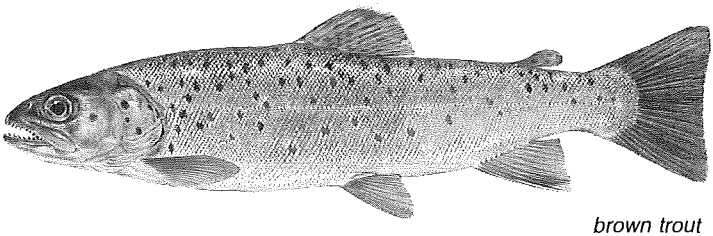
As a result of a string of hot, dry summers that occurred from1994 to 1999, smallmouth bass populations in eastern Maine lakes increased, producing improved fishing. Warm lake temperatures allow bass fry to feed, grow, and survive better, producing strong year classes for the future. The better condition these fry are in coming off their first summer's growth, the more that will survive their first winter living. In Maine, when water temperatures go below 50º, smallmouth bass become mostly dormant and rely on their fat reserves to survive. In eastern Maine, water temperatures remain below 50º F from October through May, the so-called "starvation period" for bass. This period lasts approximately 190 days.

At Long Pond on Mount Desert Island, our annual trapnetting produced a catch of 34 salmon, which exhibited improved growth and condition. This is attributed to decreased stocking rates in previous years, which allowed the smelt population to recover. Age III+ salmon averaged 18.3 inches in length and 2 lbs 4 ounces in weight. Wild salmon comprised 6 percent of the catch. The two largest fish weighed 3.8 pounds apiece.

At Branch Lake in Ellsworth, biologists continued to work with personnel from the Department of Conservation to construct a public boat launch on DOC's property located on the lower lake. The traditional Hanson's Landing boat launch site was closed in the fall of 1999. DOC and IF&W encountered strong opposition on the proposal from many of the camp owners, Ellsworth residents, and the City of Ellsworth's municipal officials. Without a new launch site providing satisfactory boat access for the public, termination of the lake's salmon stocking program is likely to occur. Although the lake would continue to provide a fishery for wild togue, numerous anglers would be disappointed over the demise of the salmon fishery on this popular Downeast water.

Fisheries personnel have also been looking for options for boat launches at Jacob-Buck Pond in Bucksport, Bog Lake in Northfield, and Walker Pond in Brooksville, as well as trying to re-establish access at Craig Pond in Orland. We are also evaluating a site along the East Machias River below Route 9 for canoe access. In the future it is anticipated that the Department will provide a new parking area at Little Falls on Grand Lake Stream for better angler parking.

- Gregory A. Burr



brown trout

Rangeley Lakes Region (D)

The Rangeley Lake Region encompasses an area of 4,232 square miles in western Maine and includes 347 Great Ponds with a total surface area of 109,730 acres. It also includes over 4,800 miles of rivers and streams in the Androscoggin River and Kennebec River drainages.

In 2000, over 196,000 brook trout were stocked into 91 lakes and ponds (26,807 acres) and eight rivers and streams (153 miles) in the region to provide or supplement fisheries. Also, 9,325 landlocked salmon were stocked into 10 waters (38,788 acres) and 33,650 brown trout were stocked into 10 waters (3,950 acres and 198 miles). Splake introductions continued at Lufkin Pond (Phillips), Mt. Blue Pond (Avon), Oaks Pond (Skowhegan), Wentworth Pond (Solon), and Wyman Lake (Moscow). A total of 14,746 splake were stocked into six waters (4,160 acres). Stocking methods include airplane, truck, boat, and backpack.

Winter sport fishing surveys were conducted on four of the Region's lakes during the winter of 2000, including: Clearwater Pond (Industry), Embden Pond (Embden), Hancock Pond (Embden), and Spencer Lake (Hobbstown Twp.). We interviewed 1,163 anglers over the 3-month season. Catch rates for both salmon and lake trout were above average at most lakes, but angler use was slightly below normal.

In the spring, smelt eggs were transferred to Lincoln Pond (Parkertown Twp.), Mt. Blue Pond (Avon), Oaks Pond (Skowhegan), Pleasant Pond (Caratunk), and Wentworth Pond (Solon) to augment forage for various salmonids. New hydroacoustics equipment was used on Rangeley Lake to measure smelt abundance.

A new public access site was opened along the Androscoggin River in Hanover, part of a continuing effort to provide legal access to all public waters in the Region. Considerable time was expended on developing two new access sites on the Sandy River. Several sites on the Kennebec River, Pease Pond (Wilton) and Hancock Pond (Embden) were also evaluated.

A creel survey with aerial angler counts was conducted at Rangeley Lake. An estimated 13,472 anglers fished the 6,000 acre lake harvesting an estimated 2,075 salmon and 296 brook trout. Anglers report releasing 72% of legal salmon caught. The average size of the salmon kept was 19.2 inches and 2.5 pounds.

The Fishery Division's electrofishing boat, which was recently modified to enhance its effectiveness in Maine's sterile, low-conductance waters, is rapidly becoming an important tool for sampling salmonids in large rivers and bass in lakes. Consequently, competition for the boat's services has increased substantially among Regional staff, making it difficult for all Regions to achieve sampling objectives on a timely basis. Funding for an additional electrofishing boat is being sought.

Region D staff utilized this gear to evaluate salmonid populations on two reaches of the Kennebec River in Solon and Madison. River sampling is conducted at night, in swift current over cobble/rubble substrate in less than 3 feet of water, an - "interesting", yet effective means of sampling fish. In the summer of 2001 we intend to repeat our sampling of the Solon reach on the Kennebec. In addition, we'll work the Kennebec River below Wyman Dam in Bingham and the Androscoggin River above Bethel.

A systematic survey of the Region's bass waters continued in 2000 at Fellows Pond (Chesterville), Locke Pond (Chesterville), and Sandy Pond (Embden). Samples were obtained from the Chesterville ponds using the Division's electrofishing boat. Sandy Pond was evaluated with SCUBA gear. Barker Pond (Cornville) was also surveyed with SCUBA gear to evaluate a recent largemouth bass introduction. In the fall, young smallmouth bass were sampled from Ellis Pond (Roxbury) as part of a statewide study designed to assess summer temperature effects on first-year bass growth and over-winter survival.

We continued our stream survey program by surveying the 13-mile long Upper Magalloway River in northern Oxford County. This survey was accomplished in 3 days with the assistance of 22 volunteers and several Department personnel. We walked and canoed the entire river, stopping frequently to take measurements of brook trout and salmon habitat. Separate crews determined population, age structure and abundance.

We also took measurements to determine river stability. In the Upper Magalloway, as in other rivers we have surveyed, we are discovering that river degradation caused by log driving dams and by log driving itself are still evident many years after this practice has ceased. In the nearby Cupsuptic River, we are working to restore brook trout pools that were destroyed by log driving. The process and results of this river survey program were reported in the Spring 2001 issue of *MAINE Fish and Wildlife* magazine.

Fish population and water quality evaluations were conducted on 18 Regional waters. Age and growth information collected assists in determining stocking rates and fishing regulations. The new wild brook trout strains in the hatchery system (Kennebago and Sourdnahunk) were evaluated in these surveys and showed that older age fish (over 2 years) represented 31% of the fish sampled. In earlier studies, older fish represented less than 1% of the catch of domestic strains. Kennebago strain brook trout were also found to be significantly longer and heavier than the Sourdnahunk strain.

Throughout the year, 98 volunteers reported information on their fishing trips from 63 lakes and ponds and 25 rivers and streams. They reported when, where, and how long they fished as well as the number and lengths of the fish they caught. Voluntary data were also collected with creel survey boxes set up along the upper Androscoggin River and at Spring Lake (T3 R4 BKP WKR).

Brook trout population estimates were obtained by trapnetting from McIntire Pond (New Sharon) and Surplus Pond (Andover North Surplus). Age and growth data from salmon and brook trout were collected with trap nets from Aziscohos Lake, Long Pond (Beaver Mountain Lake) and Rangeley Lake.

An ongoing survey to locate lake trout spawning areas in the Region continued in the fall of 2000. Likely spawning habitat in Pleasant Pond (Caratunk) and the Richardson Lakes was inspected for lake trout eggs using SCUBA equipment.

Office work is necessary to analyze all the information that has been collected. Scales are aged, stomach contents are examined, and fish lengths and weights are summarized. After the data have been interpreted, they are filed away for future use. Statewide Species Plans for brook trout and salmon were also begun.

- David J. Howatt

Moosehead Lake Region (E)

The Moosehead Lake Fishery Management Region encompasses an inland area of 4,525 square miles along the Canadian border in west central Maine. The Region is larger than the states of Rhode Island and Delaware – combined! It includes approximately 4,200 miles of rivers and streams that comprise the headwaters of the Kennebec, Penobscot, and St. John Rivers. It includes 625 lakes and ponds 10 acres or larger in size plus another 655 ponds less than 10 acres in size – with more total surface acres than can be found in 16 other states!

Three fishery biologists plan, implement, and evaluate the fisheries management programs for all of the Region's waters. During 2000, they recruited six temporary workers on a seasonal basis to assist in the fieldwork required to fulfill the regional work objectives. Assessing aquatic habitat, fish populations, and the fishing in the Moosehead Region comprised approximately two-thirds of the work effort during the past year.

With so much water in the Region, and only 6 months of open water available for fieldwork, the 2000 field season was busy as usual. From May through August, 39 waters with splake, lake trout, and brook trout were sampled by gillnetting to determine the relative abundance of these species, as well as their age and growth characteristics, their condition, and their food habits. The 39 surveys included 24 waters stocked with brook trout, where stocking rates were evaluated to ensure the best growth possible. The various strains of trout stocked in these waters were assessed, as was the effectiveness of fishing regulations at allowing survival to older ages and larger sizes.

From June through August, the fishway in Moosehead Lake's East Outlet dam was trapped to monitor the movement of salmon and brook trout upstream into Moosehead Lake. In the 51 days that the trap was operated, 76 brook trout and 1,111 salmon were examined as they passed upstream from the East Outlet into Moosehead. Our checks of the trap proved to be a popular attraction for both anglers and visitors on the dam.

During late July and August, 15 ponds and two streams were surveyed to determine their physical, chemical, and biological characteristics as well as their potential. Fishery management recommendations are based on the findings of these surveys.

In the early spring and again in the fall, when water temperatures were coolest and most conducive to fish movement along the shore, eight wild brook trout ponds were trapnetted to estimate trout abundance and size class structure, to determine the age and growth of these wild trout, and to evaluate the effectiveness of existing regulations at conserving them. In October, five additional waters were trapnetted to evaluate survival, age and growth, and the condition of stocked salmon and splake.

Our best source of information about the fishing in the Region is the anglers themselves, so sport fishery surveys were essential to collect information on the use, catch, and harvest at the region's waters. In clerk surveys, Department personnel actively seek out and interview anglers. Because they are labor intensive, only a limited number of waters can be surveyed in any one season. In 2000, winter clerk surveys were conducted on Piper Pond, Big Wood Pond, Sebec Lake, and Moosehead Lake, and summer clerk surveys were conducted on Sebec Lake and Moosehead Lake. Information on 2,539 days of ice fishing, and 3,146 days of open water fishing was recorded in these surveys.

One of the most commonly asked questions is "What can I do as a volunteer to help the Fish and Wildlife Department?" For fisheries the answer is simple – provide detailed and accurate information on the results of your fishing. This information helps us to evaluate the status of fish populations, the success of stocking programs, and the effectiveness of regulations. In the Moosehead Region, we encourage volunteer assistance through a record booklet program, through records maintained at sporting camps, and through box surveys located at access points to many Regional waters.

Last year anglers who kept record booklets for us reported results from 440 days of ice fishing on 26 Regional waters. During the open water season volunteer record keepers reported results from 2,455 days of fishing on 88 lakes and ponds plus 21 rivers and streams. Sporting camp records provided information on another 457 days of fishing on 16 lakes and ponds, and in our voluntary box/card surveys anglers reported 2,611 days of fishing on 21 lakes and ponds and four rivers. In a region with so many waters, it is apparent that if we had to rely only on the information we could collect in our clerk surveys, we would not know very much about the fishing throughout the Region. Therefore we greatly appreciate and value very highly the voluntary contributions from the anglers who fish our waters. And, more volunteers are always welcome!

In 2000, the balance of the time in the Moosehead Region was divided among other jobs outlined in the Fishery Division's Operational Plan. Resource protection and enhancement activities involved reviewing and

commenting on proposals to alter the environment. The Fish and Wildlife Department owns and operates the dam at the outlet of First Roach Pond, and the fisheries in the Roach River and First Roach Pond as well as the desires of 100+ First Roach Pond camp owners required considerable attention to both stream and lake level management there. Acquiring, developing, and maintaining public access also received considerable attention to ensure the public's rights to access public waters.

In 2000, the balance of the time in the Moosehead Region was divided among other, somewhat less glamorous jobs outlined in the Fishery Division's operational plan. Resource protection and enhancement activities involved reviewing and commenting on habitat alteration proposals that were submitted to either LURC or DEP. Lake level management was a concern at First Roach Pond, where the Fish and Wildlife Department owns and operates the dam at the outlet. Maintaining appropriate flows for the fisheries in the Roach River and at the same time attempting to accommodate the desires of 100+ First Roach Pond camp owners required a considerable amount of time and many trips to the dam for gate adjustments. Acquiring, developing, and maintaining public access to waters in the region also received considerable attention to insure the public's rights to access for boating and fishing.

Although the Moosehead Region is best noted for its wild fisheries, each year more than 170,000 salmonids are stocked where habitat conditions limit natural reproduction. Regional biologists prepared requests for the salmonids to be stocked in the coming years. Stocking requests included species, strain, age, size, number, time, location, and stocking methods. The need for special marks for follow-up evaluation was determined, and fish were marked at the hatcheries. Assistance with stocking was provided to hatchery personnel as required. Up to date records of all stocking were maintained in the Regional office.

Coordination and administration responsibilities involved the remaining work performed in the Moosehead Region in 2000. All routine tasks essential to the day-to-day administration of the Regional office were completed as required, and scheduled Fishery Division meetings were attended. In addition to their Regional responsibilities, the three Moosehead Region biologists also serve as the principal investigators for the Fisheries Division's statewide lake trout, burbot, and splake plans. In that capacity they compiled statewide data summaries required for species assessments and management plan updates which occur every 5 years.

- Paul R. Johnson

Penobscot Region (F)

Region F continues an aggressive program of providing quality fishing opportunities for a wide range of angler preferences. The Region contains about 360 lakes and ponds 10 acres or larger in size which total over 191,000 acres. Salmon are found in 55 waters totaling 131,609 acres of which 21 waters (103,341 acres) were stocked with 41,310 salmon. Brook trout are present in 196 waters (40,176 acres), and 60,981 trout were stocked in 52 waters (32,400 acres). There are 20 waters with lake trout (81,000 acres) and three of these (32,000 acres) were stocked with 7,260 lake trout. Three lakes are being stocked in alternate years and the total number of fish stocked in these lakes over the 2-year period is 16,500 fish. The purpose of the low stocking rates for lake trout is to develop a fishery for fewer-but-larger fish. Our three splake waters consist (6,084 acres) were stocked with 10,339 splake. Nicatous Lake, our only brown trout water (5,165 acres), was stocked with 3,000 brown trout.

Smallmouth bass are not stocked and the populations are managed through natural reproduction and regulations to provide a fishery that is consistent with the productive capacity of each body of water. There is an active program to evaluate bass populations and habitat. Study waters include the Penobscot River, South Branch Lake, Nicatous Lake, Pleasant Pond in Island Falls, Hot Brook Lakes, and Grand Lake Seboeis. Monitoring the recovery of the smallmouth bass population in Spednic Lake is continuing on an annual basis. Results have shown a slow-but-steady recovery of the bass population.

Other bass studies include electrofishing to capture young-of-the-year bass to determine the average size after the first season of growth. This information is used to predict the rate of survival of this age group the first winter. We also have temperature reorders deployed in several bass waters monitoring the temperature changes in the lakes throughout the open water months.

Illegal introductions of bass continue to occur in the Region. The most recent have occurred in Upper Cold Stream and Cold Stream Ponds. Introductions jeopardize coldwater fisheries and make it difficult, if not impossible, to continue brook trout management in affected waters.

Largemouth bass and landlocked alewife are recent illegal introductions in the Penobscot Region. Largemouth bass were first found in Stump Pond in the Cambolasse Stream drainage in Lincoln. The bass have moved into Cambolasse and Long Pond. They have yet to be found in the

Penobscot River but will eventually spread and take up residence there. Landlocked alewives are present in East Grand Lake. We are now presently keeping a close eye on the lake's fisheries. These species may have a negative effect on the smelt population; effect on the fishery to date is unknown.

Endless Lake is our Region's latest splake water. This new introduction took place in the fall of 2000, bringing our splake lake total to three. Seboeis Lake and Lower Togue Pond continue to provide good action for anglers.

Little Round Pond (Lincoln) was reclaimed in 1999 and stocked with brook trout the following spring. Due to the marsh-type shoreline we did not get a complete kill. However, the rough fish numbers were reduced significantly, allowing the 3,279 brook trout stocked to grow well and produce some very good fishing this spring.

Regional personnel spent the months of January, February, and March of 2001 conducting sport fishery surveys on several waters that are open to ice fishing. These included the Pemadumcook Chain of Lakes, West Lake, Nicatous Lake, Pleasant Lake (Island Falls), and Cold Stream Pond. Anglers were counted and interviewed to obtain catch information. Fish were measured and weighed. Data collected are used to assist in evaluating regulation effectiveness, assess contribution of hatchery fish to the sport fishery, and to determine condition of game fish being caught.

Fish population evaluations by gill netting and concurrent water quality analysis are a very important component of fisheries management in the Region. The information obtained is used in many fisheries management processes. Age and growth information will help determine stocking rates in stocked waters and appropriate length and bag limits in non-stocked waters. Water quality analysis is used to determine the feasibility of stocking. In 2000, fishery evaluations were done on Nicatous, Sabao, Mattagamon, Upper and Lower Sysladobsis, and Pemadumcook Lakes, as well as Titcomb, Crystal, Loon, Trout, Jerry and Weir Ponds.

Trapnetting is another important population sampling process. Trapnets permit the collection of data over a longer period of time. The fish captured can be released back into the water sampled. Trapnets are, however, most effective during the fall season. In 2000, salmon evaluations were conducted on East Grand, Scraggly, and West Lake. Brook trout evaluations were done on Sourdnahunk and Tomah Lakes. A brown trout evaluation was completed on Nicatous, as well as splake evaluation on Lower Togue Pond.

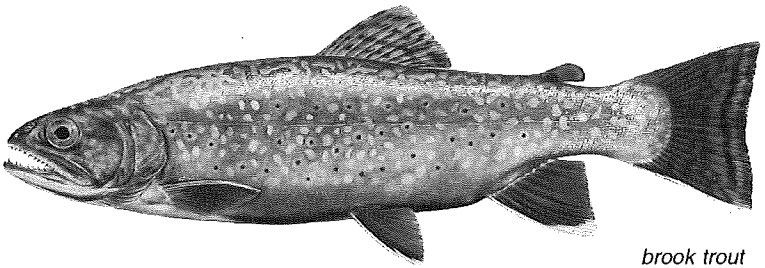
A river survey was done on the West Branch of the Pleasant River. Data gathered included fishery habitat, stream flows, species present and a measurement of the stream miles. This also allows us to identify designated reaches of river and observe stream channel changes.

Hydroacoustics work was done on Cold Stream, East Grand, and Schoodic lakes. With hydroacoustics, we are able to assess smelt populations. The data are being analyzed with a report expected soon.

Temperature recording units were placed in Sourdnahunk Stream, Houston Brook, Piscataquis River, West Branch of the Pleasant River, East Branch of the Penobscot, Pleasant Pond, Nicatous, and South Branch Lake. These units gather temperature data throughout the summer. This provides us with data to help with the management of both warm and coldwater sport fish.

Kids fishing waters have increased to six. These waters are stocked on an annual basis with spring yearling brook trout. Rocky Brook (Lincoln), Mattagodus Stream (Springfield), and Pickerel Pond (T32 MD) are restricted to kids under 16 years of age. Rock Crusher Pond (Island Falls), Giles Pond (Patten), and O'Rourke Pond (Sherman) are stocked in conjunction with the "Hooked On Fishing" program.

- Brian R. Campbell



brook trout

Fish River Lakes Region (G)

Season-long ice fishing sport fishery surveys were conducted on several area waters to assist Regional personnel in evaluating existing regulations, provide data on the condition of fish in the harvest, and determine the level of contribution of the hatchery cohort (where present) to the fishery. The waters surveyed were Carr Pond, Portage, St. Froid, Long, Cross, Square, and Eagle Lakes of the Fish River Chain; Drews, Nickerson, Spaulding, and Cochrane Lakes in the Meduxnekeag River drainage.

During the fall of 2000, Fishery Division personnel, along with the help of several volunteers, chemically reclaimed Little Pillsbury Pond, T8 R11, Piscataquis County. Little Pillsbury Pond was an excellent candidate for reclamation, and we believe we will achieve our objective of eliminating the species that compete with brook trout. The Department will stock catchable-size trout in the spring of 2001 to provide immediate fishing. Then, we will revert to a fall stocking program using fingerling brook trout. Annual stocking may not be necessary in the future as the stocked trout may use available spawning habitat.

Smelt egg transfers were again made to bolster smelt populations. Transfers were made to the following Regional waters: Eagle Lake in the Fish River Chain, Fish River Lake, Millinocket Lake, Millimagassett Lake, and Drews Lake. These transfers should improve growth rates of the coldwater fish species present as well as improve the hook and line sport fisheries.

The Department purchased 33.1 acres of land around Nadeau Lake with the purpose of providing a public access location for angling and boating. Acquisition of this parcel was critical to our management plan, as little or no management activity by IF&W could occur on this or any water without public access. IF&W's development of this parcel in conjunction with restoration of Nadeau Lake's historic water level will provide a new trout pond fishery in Eastern Aroostook County where few trout ponds exist.

Volunteers from local Fish and Game Clubs assisted with a water temperature mapping project for the Aroostook River Drainage. Volunteers moved temperature recording devices among selected tributaries of the Aroostook River. Regional personnel maintained recording devices in the mainstem of the river. These data will provide a baseline for documenting changes in water temperatures within the drainage over extended periods of time.

A brook trout population estimate was completed on Black Lake (51 acres) in Fort Kent using fall trapnetting. The average size of trout taken was 13.3 inches in length and 1.1 pounds in weight. The population of trout greater than 10 inches was estimated at 278 with a range of 210-350 trout. We are pleased with the condition of the trout population in Black Lake as it compares favorably with other quality trout ponds in Aroostook County.

Long, Square, and Eagle Lakes of the Fish River Chain were trapnetted to provide information on relative abundance, growth, and condition of stocked and wild salmonid populations. Based on the catches of trout and salmon at these lakes, management actions have been successful. In terms of both numbers and size quality of these fish, anglers in 2001 can look forward to an excellent fishing season.

Crescent Pond Togue Transfer

Crescent Pond, T9R15 Piscataquis County, has a surface area of 320 acres with excellent water quality for togue at all depths. As togue lakes go, this is relatively small, but it has had a fishery supported by an indigenous togue population. Angler complaints on togue fishing corroborated with sampling by the Fishery Division indicates an extremely low population of togue. SCUBA operations last summer supported our theory that the lake had very marginal togue spawning habitat. Liberal bag and length limits prior to 1992 are likely to have contributed to the decline of this wild togue fishery.

Fishery biologists concluded that it was doubtful that the togue population would recover without adding fish to the lake. Because we have no record of the lake being stocked with togue, we did not want to introduce juvenile togue of another strain from our state hatcheries. Our alternative was to transfer mature togue from Allagash Lake which is just downstream of Crescent Pond. The intent is to have these fish spawn in Crescent Pond on the best spawning substrate that we had located.

In early October, biologists from the Ashland office captured 170 sexually ripe togue at Allagash Lake. These fish were flown to Crescent Pond in stocking tanks mounted on floats of Warden Service aircraft and were released over the designated shoal. Prior to release, the fish were identified with an adipose fin clip for future identification. Fisheries personnel will sample Crescent Pond in 2-4 years to see if these togue have successfully spawned and we are getting recruitment of juvenile togue to the population.

- David J. Basley

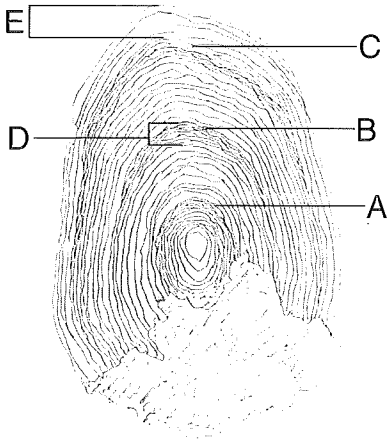
How Biologists Measure the Age of a Fish

Fishery biologists collect a wide variety of data with which to manage the inland fishery resources of the state. Some of these data include length and weight, use estimates, growth rates, stocking rates, water quality, age of individual fish, and age structure of the population.

Telling the age of stocked fish poses little problem. Before stocking, hatchery fish are marked by fin clipping at the hatchery where the fish was raised. The fins clipped are done following a marking schedule. When hatchery fish are seen in a creel survey, the marks are noted giving managers a very good indication of growth and age.

Wild fish, not having clipped fins, are aged by their scales. Scale samples are taken in the field and later read at the Regional offices. These samples are collected the entire year during all aspects of routine fishery work.

Scale reading relies upon the fact that fish grow more and faster in the summer than in the winter. When a scale is viewed with a microscope, we see areas of summer growth and winter growth. The area on a scale that indicates the end of an entire year's growth is called the annulus and by counting these you can determine the age of the fish.



The scale of a wild Aroostook River landlocked salmon.

A) end of the first year of growth, annulus I;
B) end of the second year of growth, annulus II;
C) end of the third year of growth, annulus III;
D) fall and winter growth;
E) spring and summer growth until June 13 when this scale sample was taken. Salmon was 10 inches long.

Androscoggin River Fish Health Survey

(New Hampshire to Rumford Falls)

Eleven groups of 30 sentinel splake *Salvelinus hybrid* and one group of 30 rainbow trout *Oncorhynchus mykiss* were placed in live cages in the Androscoggin River between Gilead, ME and Rumford, ME in an attempt to identify the presence of Infectious Pancreatic Necrosis virus (IPNV) in the river system. The sentinel fish were taken from fish lots previously testing negative for IPNV and other salmonid diseases of regulatory concern and exposed to feral fish and waters of the Androscoggin River for a period of two weeks. After two weeks, the fish were removed from the cages, necropsied, and tested for IPNV and other salmonid diseases. No IPNV or other salmonid pathogen was recovered from the sentinel fish. No IPNV was found in feral fish collected during the project. If IPNV is infecting feral fish in the Androscoggin River between Gilead, ME and Bethel, ME, it is prevalent at a level below the detectible limit of this sentinel fish technique.

This study also supports the findings of Boucher (1997), indicating that late summer water temperatures may be too warm for brook trout. Three groups of sentinel splake perished during the study. Temperature and dissolved oxygen levels indicated that the riverine habitat had become unsuitable for brook trout.

- G. Russell Danner MS, DVM
- Matthew Young

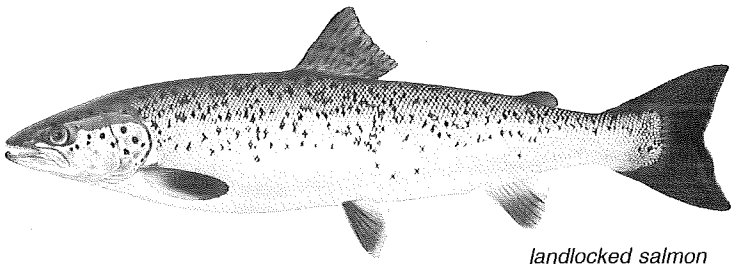
Rangeley Lake Fishery Management

Rangeley Lake, located in Western Maine's Franklin County, provides an exceptional fishery for landlocked salmon. This 6,000-acre lake has a one-salmon daily bag limit, and is closed to ice fishing. The fishery is primarily dependent on annual stockings, though wild fish make up a substantial portion of the catch.

The salmon population was monitored by annual fall trapnettings at the Outlet by a clerk angler survey in 2000, and by annual voluntary angler surveys. Salmon growth rates were variable at Rangeley Lake through most of the 1990's but increased dramatically in 1999 and 2000. Improved growth is attributed to the reduced salmon stocking rate which resulted in a large supply of smelt, the primary forage species. The clerk surveys indicated an increase in the percent of anglers successful in catching a legal-size salmon from 15 in 1986 to 20 in 1995 and to 30 in 2000. The average length of angled salmon also increased, from 17.2 inches in 1986 to 19.2 inches in 2000; corresponding weights increased from 2.2 lb to 2.5 lb for the same 2 years. Wild salmon accounted for about a third of the catch by anglers and by trapnetting at the Outlet. The harvest of hatchery-reared salmon was composed of age II+ and VI+ year-old fish; that for wild salmon was ages IV+ to VI+. An estimated 13,472 anglers harvested 2,075 salmon, weighing a total of 5,188 lb, from Rangeley Lake in 2000.

Spring-yearling and older brook trout were stocked in relatively small numbers at Rangeley Lake in years of abundant forage in an effort to provide angling diversity. The number of trout sampled in the clerk survey indicated that these fish held over to older ages and provided substantial returns to anglers.

- Forrest R. Bonney



landlocked salmon

Comparative Performance of Two Genetic Groups of Stocked Brook Trout in Maine Lakes

The performance of two genetic groups of hatchery-reared brook trout was studied in eight Maine lakes from 1998 to 2000. These groups are being developed to replace the older domestic strains which, due to inbreeding, exhibited high mortality rates prior to hatch-out, and were short-lived in the wild. Paired stockings of Kennebago and Sourdnahunk fish, identified by different fin clips, were evaluated for catch rates, growth rates, and fall abundance. Anglers fished the study ponds at an average rate of 29 angler trips/acre/season, kept 0.14 fish/angler, and caught a legal-size brook trout for every 3.7 hours of fishing. The estimated harvest was equally comprised of Kennebago and Sourdnahunk fish. Older (age II+ and III+ fish) accounted for 31% of the Kennebago and 25% of the Sourdnahunk harvest. Because older fish were heavier, Kennebago fish provided a harvest of 1.39 lb/acre, compared to 0.83 lb/acre for the Sourdnahunk fish. Population estimates, determined for only the three ponds with low interspecific competition, averaged 11 brook trout/acre, or 5.0 lb/acre. Older-age fish represented 17% of the number and 27% of the weight of the population. There was no difference in the incidence of hooking injuries between the Kennebago and Sourdnahunk fish. However, the Kennebago fish were more abundant, were larger than the Sourdnahunk fish, and matured at an earlier age. There were differences in growth rates among ponds. Age II+ fish of both groups had a higher rate of hooking injuries than age I+ fish. Fish from a pond with an artificial-lures-only regulation also had significantly more hooking injuries than those from a pond with a fly-fishing-only regulation. Fish with hooking injuries were less robust than those without hooking injuries. For ponds with a similar number of competing fish species, older-age fish of the Kennebago and Sourdnahunk strains represented 33.5% of those captures, compared to only 4.3% for the domestic strains evaluated in an earlier study. To date, the new strains have higher hatching rates in our fish culture facilities and better survival rates to older age than the domestic strains in the wild. This study is scheduled to be continued one more year.

- Forrest R. Bonney

Annual Update of Winter Fishing Activity in Central Maine

Regional fishery personnel conduct annual winter sport fish surveys to assess management programs of individual waters. The waters selected for surveys during the 2001 season were lakes stocked with coldwater fish species. These waters included Androscoggin Lake, Parker Pond, Wassookeag Lake, Great Pond and Messalonskee Lake. The later two lakes were also surveyed to gather information on the northern pike fishery due to its increased popularity with anglers.

Estimated angler use on two of the surveyed lakes remained consistent with previous years, while the remaining three lakes experienced a decline in the number of people fishing. The most dramatic reduction was approximately 35% observed at Messalonskee Lake despite the increased fishing pressure during the annual one-day pike fishing derby. This single day derby accounted for 14% of the total winter angling effort.

The annual stocking of brown trout at Androscoggin Lake was reduced by one-half in 1998 to evaluate the fishery at a reduced rate. Preliminary results indicate this lower rate dramatically decreased the number of age two brown trout in the catch, while the number of older, larger fish remained fairly stable.

Annual stockings of salmon were replaced with brook trout stockings at Parker Pond when salmon exhibited poor growth. The winter survey indicates the brook trout are beginning to provide a sport fishery. The number of anglers catching a legal brook trout increased from 2% in 2000 to 7% during the 2001 season.

Wassookeag Lake was surveyed to evaluate the annual salmon stockings and the effects of the increased numbers of wild lake trout. Restrictive regulations to protect the wild lake trout were imposed in 1993. Apparently, this regulation has been so effective in increasing the number of lake trout that a less restrictive regulation may have to be promulgated. This large lake trout population is probably a major factor for the low smelt population, which in turn has contributed to the slow salmon growth, as salmon are so dependant on smelts.

Although 3-year classes of splake were reported at Messalonskee Lake, the catch rate dropped by one-half from the previous winter survey. Growth of splake continues to be considered good with the condition factor increasing to 0.86 for the 2001 season. The northern pike fishing improved from the 2000 winter survey in both the number of fish caught and the size quality of those fish.

Fishing at Great Pond was considerably slower for both brown trout and northern pike, catch rates for these two species dropped to 0.007 and 0.01 respectively. This slow fishing coupled with poor ice conditions are believed to be the reason fishing pressure was down by nearly 18%.

- James S. Lucas

Richardson Lakes Salmonid Management*

The Richardson Lakes support stocked fisheries for landlocked salmon, lake trout and brook trout. Angler surveys were conducted in 1998 and 1999 to evaluate the status of the fishery prior to implementation of proposed changes in the water use regime by Union Water Power Company. Estimates of total angler use and harvest were also made in 1998. Salmon growth rates had been stable from 1986-91, but declined in succeeding years, prompting a reduction in the salmon stocking rate in an effort to restore the abundance of smelt, the primary forage species. Efforts to close Mill and Metallak Brooks to smelt dipping effective 1996 were unsuccessful. There was a 76% decrease in angler use from 1996 to 1998, attributed to dissatisfaction with smaller salmon and the reduced catch rate resulting from a lower stocking rate. The 1999 angler survey indicated an improvement in salmon growth rates and a decrease in the proportion of sublegal salmon in the catch, presumably in response to the reduced stocking rate. There was also an increase in the salmon catch rate in 1999 despite the lower stocking rate. Lake trout and brook trout, which are not as dependent on smelt as forage, grew at acceptable rates over the survey period, and lake trout in particular provided an attractive fishery for large fish. Lake trout stocking has been terminated, however, pending evidence that natural reproduction can be controlled through water drawdown manipulation. We will continue to stock salmon at a reduced rate in an effort to further increase smelt abundance. Additional angler surveys are scheduled at the Richardson Lakes every third year, beginning in the year 2002.

*Interim Summary Report No.00-6 (1998-99)

- Forrest R. Bonney

Cupsuptic River Survey*

The Cupsuptic River, a tributary to Mooselookmeguntic Lake in the Rangeley chain of lakes in Western Maine, provides habitat for wild brook trout (*Salvelinus fontinalis*) and, to a lesser extent, landlocked salmon (*Salmo salar*). The lower portion of the river serves as spawning and nursery habitat for Mooselookmeguntic Lake's salmonid population. The Cupsuptic River is 19.3 miles long and has a drainage area of 62.5 square miles. A more detailed description of the river is presented in Interim Summary Report No. 1 (Bonney et. al. 1998).

Degradation of the river resulting from timber harvesting operations conducted in the 1960's prompted a request by the Rangeley Guide's Sportsmen's Association for the Department of Inland Fisheries and Wildlife (DIFW) to assess the feasibility of habitat restoration. In a collaborative project, DIFW and the Guides surveyed the river in 1997. In addition to documenting degraded areas, we conducted a complete biological survey of fisheries habitat, which allowed quantification of the river's value as fishery habitat. Results of the river survey were reported in Interim Summary Report No. 1. Since the initial survey, the following work has been accomplished:

- Macroinvertebrate sampling conducted at river mile 8.7 in 1998 confirmed that the Cupsuptic River's water quality is excellent.
- Detailed stream measurements were made at six transect sites in 1999 to confirm stream classifications and to assess river stability.
- In 1998, the Environmental Science class at Rangeley High School dredged in excess of 10 cubic yards of sediment from a filled-in-pool in an effort to increase water volume and therefore restore adult brook trout habitat. The subsequent refilling of the pool as a result of sediment transport has prompted further efforts – scheduled for the summer of 2000 – to reduce sediment transport or to remove it through flow manipulation.
- Additional brook trout population estimates were made in 1999 to obtain abundance estimates by steam classification.
- A season-long angler survey conducted on the lower 7.4 miles of the river in 1998 indicated that a total of 484 anglers (69 anglers/mi) fished the river. They caught and released 430 brook trout (61/mi), which averaged 160 mm (6.3 in) in length.

*Interim Summary Report No. 00-4 (1998-1999)

- Forrest R. Bonney

Mooselookmeguntic Lake Salmonid Management*

Mooselookmeguntic Lake is the largest of the Rangeley Chain of Lakes and supports sport fisheries for wild landlocked salmon and brook trout. These fisheries have been monitored by creel surveys and aerial angler counts since 1981. Fishing pressure at Mooselookmeguntic Lake remained remarkably stable from 1981 to 1995 at about 10,000 angler trips per year, then declined to 6,000 angler trips in 1998. This level of use is within the normal range for large Maine lakes.

The catch of legal-size salmon (14 inches and longer) has varied from 2,700 in 1981 to 8,800 in 1995. However, the actual number of salmon harvested (kept) was much less – varying from 1,500 in 1999 to 3,161 in 1995 – because anglers released a substantial proportion of their catch. They released 11% of their catch of legal salmon in 1981, 27% in 1986, and an average of 60% from 1995 to 1999. The average length of salmon harvested during the period has ranged from 16 to18 inches; the average weight has ranged from 1.7 to 2 lb. Salmon caught in 1999 averaged among the largest at 18 inches in length and 2.0 lb in weight. The percent sublegal fish in the catch, an indirect measure of spawning success, ranged from 50% in 1986 to 71% in 1991, but exhibited no upward or downward trend.

Unlike that of salmon, the catch and harvest rates of legal-size brook trout varied considerably from 1981 to 1999. Harvest estimates ranged from about 900 trout in 1981 to about 1,800 in 1986. As with salmon, anglers released an increasing proportion of their legal catch of brook trout. In 1981, anglers released only 5% of legal trout. By 1994 and 1995, about 35% of legal trout were released.

There is evidence that salmon and brook trout growth has declined moderately. A new salmon regulation, effective in 2000, is intended to increase salmon growth by encouraging the harvest of more fish between the lengths of 14 and 18 inches.

*Progress Report No.00-2 (1995-1999)

- Forrest R. Bonney

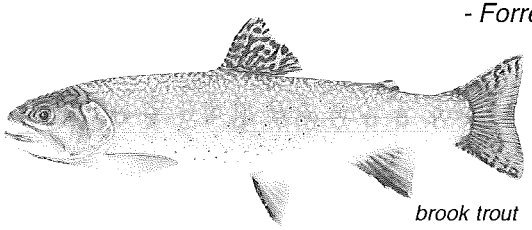
Evaluating Regulations Imposed on Wild Brook Trout Lakes to Restore Age and Size Quality*

Twenty-two Maine lakes with wild brook trout populations were studied from1994 to 2000 to gather biological information for statewide averages and to evaluate the effectiveness of new, restrictive regulations imposed on 474 of Maine's 1,103 brook trout lakes in 1996. Over the 7-year period, nine creel surveys were conducted and 49 population estimates were made by fishery biologists in the Rangeley, Moosehead, Penobscot, and Fish River Lakes Regions. These studies revealed that anglers fish wild brook trout ponds at an average rate of two angler trips/acre (meaning that a 20-acre pond would be fished at an average rate of 40 angler days/year); they harvest an average of 1.0 brook trout weighing 0.6 lb/acre annually (or 20 trout weighing a total of 12 lb from a 20-acre pond), which represents 17% of the total number of legal size trout available.

Although the new regulations resulted in a reduction in the number of brook trout harvested, there was an improvement in their size and age structure. The average size of the trout caught increased from 11.3 to 12.7 inches (a 12.4% increase) after restrictive regulations were imposed. For waters with low-to-moderate regulations, the proportion of trout age III+ and older was 22.3%, but for those with high-to-severe regulations, the proportion increased to 24.9%. The most dramatic difference, however, was for those waters with severe regulations. For this group, 43.7% of the brook trout were age III+ or older, indicating that the imposition of very restrictive regulations on selected waters result in a significant increase in the proportion of older fish. The increase in the number of legal-size brook trout resulted in better fishing, as the brook trout catch rate doubled from 0.6 to 1.1 trout per angler and the average time to catch a legal-size trout declined from 7 to 3 hours after the new regulations went into effect. It is recommended that this study be continued on a periodic basis to determine whether additional changes in brook trout population structures accrue with time.

*Progress Report No. 01-2 (1994-2000)

- Forrest R. Bonney



brook trout

Landlocked Salmon Life History

The landlocked salmon (Salmo salar) is one of Maine's most highly prized sport fishes. A recent survey showed landlocked salmon are sought by more anglers than any other freshwater sportfish, except brook trout. Among the landlocked salmon's many positive attributes as a sport fish are its high catchabilty, its outstanding sporting qualities, its relatively great longevity, its good growth potential, and the ease with which it can be cultured in hatcheries. These factors, along with its tolerance of a moderately wide range of habitat conditions, make the landocked salmon highly responsive to intensive management.

Description

Our freshwater salmon originated from the sea-run Atlantic salmon through gradual physiological adaptation to the lake environment and not by physical "landlocking" as its name would imply. Landlocked salmon are structurally identical and similar in appearance to sea-run Atlantic salmon. Distinguishing characteristics of salmon are their deeply forked tail, their usual silvery color as adults, and the presence of X-shaped marks on their dorsal and lateral surfaces. Males in spawning condition exhibit the characteristic hooked jaw, or kype, and become darker; spawning females become very silvery with distended abdomens. Spawned-out salmon often become gaunt and dark and are referred to as "racers" or "black salmon". Young salmon are slender and have several pigmented vertical bars, called parr marks, with each separated by a single red spot. Just prior to migrating from streams to lake environments, parr marks fade considerably and the fish become silvery. Salmon are referred to as smolts during this life stage.

Distribution

In eastern North America, landlocked salmon are native to lakes in Maine, New Brunswick, and Nova Scotia. Known in Canada as ouananiche, salmon are also distributed in more remote areas of Quebec, Labrador, and Newfoundland. Salmon were formerly present in Lake Ontario and Lake Champlain, and freshwater forms of Atlantic salmon are native to several waters in Scandinavia and western Russia. Early fish culturists attempted to introduce landlocked salmon to virtually every state in the United States and throughout the world. Most of these early introductions failed, but some fisheries presently exist in New Hampshire, Vermont, Massachusetts, and New York.

Prior to 1868, landlocked salmon populations occurred in only four river basins in Maine: the St. Croix, including West Grand Lake in Washington County; the Union, including Green Lake in Hancock County; the Penobscot, including Sebec Lake in Piscataquis County; and the

Presumpscot, including Sebago Lake in Cumberland County. By 1900, the salmon's range was extended considerably through numerous introductions by fish-culturists. In suitable waters with adequate conditions for reproduction, salmon survived and reproduced naturally. Introductions in less suitable habitat often met with failure or only temporary success. As hatchery facilities increased, more suitable waters with inadequate natural reproduction were maintained by periodic stocking. More recent successful introductions have been maintained by regular plantings of hatchery-reared fish. Landlocked salmon are now present in at least one lake in every Maine County. Maine supports that largest sport fishery for this species in the world.

Habitat Requirements

The classical picture of salmon habitat is a large, deep, clear lake with rocky shores, cool well-oxygenated water in its depths, an abundance of smelts, and fed by a swiftly flowing stream with a gravelly bottom. Indeed, Maine's best salmon fisheries occur in lakes with large volumes of deep water that remain less than 50°F during the critical summer period and where dissolved oxygen levels remain above 8 parts per million, and our best wild fisheries are in lakes that have large inlet or outlet streams with abundant spawning and rearing habitat. These lakes do, in fact, represent ideal salmon habitat, but recent research has shown that salmon can tolerate somewhat more "marginal" conditions. Experimental stockings have established salmon populations that thrive, grow rapidly, and provide a good fishery in lakes with cold water in their depths but with slight oxygen deficiencies, or in those with similar temperatures from top to bottom where summer temperatures may reach the mid-70's F, provided smelts are abundant for forage. However, optimum development of salmon fisheries, including management for certain types of fisheries such as those emphasizing "trophy-size" fish, can only be achieved in lakes with excellent habitat and where competition for food (smelts) and space from other species is negligible.

Reproduction

Landlocked salmon spawn during the period from mid-October to late November. Salmon prefer lake outlets or large inlets for spawning, but where these are lacking they may utilize lake shoals or small inlets, though annual production from these areas is generally very low. Females select sites where the water is accelerating and there is good percolation of water through gravel or rubble substrate. Eggs are buried from 4 to 12 inches deep and remain there until hatching early the following spring. The young salmon remain in the gravel for about 6 weeks during which time they are nourished by nutritive material in their yolk sacs. Upon emergence from the gravel, young salmon spend from 1 to 4 years in a stream environment prior to migrating to a lake. Recent studies in Maine

show most salmon (about 75%) spend 2 years as stream dwellers. Salmon smolts emigrate into lakes during both spring and fall, but major movement appears to be in the spring.

The age at which salmon reach sexual maturity varies considerably. In self-sustaining populations most males spawn first at ages 3 and 4, although some precocious males spawn at ages 1 and 2. Females usually spawn first at ages 4 and 5. Spawning runs of wild salmon may be composed of fish ranging in age from 1 to 10, but 3, 4, and 5-year old individuals make up the bulk of most runs. Landlocked salmon are repeat spawners, but most of the fish observed on spawning runs are maiden fish spawning for the first time. Salmon may spawn in consecutive or alternate years, some may spawn in consecutive years then skip a year, and some may skip 2 or 3 years between spawnings.

Food Habits

The diet of young salmon consists of a variety of invertebrates. Fish become an increasingly important part of the diet when salmon reach a length of about 12 inches. Rainbow smelts are the principal forage species for salmon in Maine lakes. Without adequate numbers of smelts, salmon growth and condition can become poor, markedly reducing their value as a sportfish. Therefore, maintaining adequate numbers of smelts for forage is the most important element of salmon management in Maine.

Insects and other invertebrates are the second most important food items utilized by adult salmon. Fish other than smelts are frequently consumed but their contribution is usually minor. Minnows, sticklebacks, white perch, and yellow perch are the most frequently consumed fish other than smelts.

Age and Growth

Landlocked salmon are among Maine's longest-lived sportfishes. While most salmon harvested by anglers are from 2 to 5 years old, older fish are frequently observed. Populations sustained by natural reproduction often have more older-age fish than those supported by stocking; wild salmon usually exhibit slower growth than do hatchery salmon, so they are recruited to legal size and harvested 1 or 2 years later. The oldest salmon on record in Maine was age 13.

There are large variations in salmon growth rates between lakes and in the same lake from year-to-year. These differences are largely attributable to variations in smelt abundance, which in turn is influenced by many factors, some which are not fully understood. However, recent studies in Maine clearly show that salmon growth rates, and consequently the size

of fish available to anglers, is best in lakes with excellent water quality that do not have significant populations of other smelt predators, particularly lake trout. The origin of salmon in given lakes, be they hatchery fish or from natural recruitment, often determines that population's growth and size characteristics. Hatchery fish generally provide fisheries with higher size quality than do naturally reared fish because the number of smelt predators can be strictly controlled. Therefore, precise management for particular types of fisheries is best achieved with hatchery stocks rather than wild stocks.

- Dave Boucher

Landlocked Salmon Management History

The challenge offered by the landlocked salmon as a sport fish has been most fully recognized within the past 100 years. Reports by the early Commissioners praised the sporting qualities of salmon and urged their propagation and distribution in Maine waters. However, only a minority of enthusiastic anglers benefited from the early sport fishery. During this early period, poachers reportedly accounted for large numbers of salmon, especially during their spawning runs in tributaries. Many of the early sport fisheries were of exceptionally high quality either in "fast" action or for large fish. Even then, however, not all fish were "trophy" sized. Some lakes (e.g. Sebago) had an early reputation for producing larger fish in the 3 to 10 pound class, but other lakes seldom produced salmon over 1 to 3 pounds. For example, a report in 1868 cited catch records from West Grand Lake in 1856-58, where 1,641 salmon were caught in 2,367 hours, for an average catch per hour of 0.69 salmon. The fish, however, averaged only 1.4 pounds in weight.

Accessibility to salmon waters gradually improved beginning near the turn of the century, first through improved railroad transportation, and later as a result of improved automotive transportation and better road networks. Logging operations, using more advanced equipment, increased accessibility to more and more salmon waters, especially after World War II. With these improvements in access, an increasing number of anglers began to take advantage of opportunities for salmon angling, and the salmon soon became one of Maine's most sought-after fish. Coincident with improved access and increased fishing effort, our Department's lake inventories revealed additional potential salmon waters that could provide fisheries through introductions. Successful introductions were made in many waters resulting in increased fishing opportunity and use by anglers.

While use of the salmon sport fishing resource has been aided significantly by improved mechanical equipment and road networks, certain other conditions tended to reduce opportunity for use.

Beginning with the early battles against abuse by poachers, fishing regulations became more and more restrictive with increasing numbers of anglers using the salmon resource. Over-restriction sometimes resulted from efforts of anglers and legislators who became concerned, and even alarmed, that our salmon populations might be over-exploited. Types of regulation restrictions most often imposed were: closure to ice fishing, shortening open water seasons, closure of specific areas, restrictions in types of angling gear, reduced bag limits, and increased length limits.

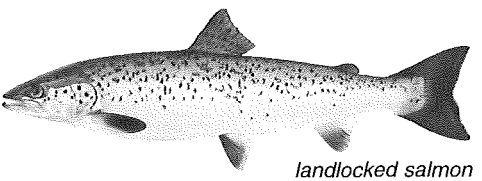
Although improved physical access has generally occurred, permitting higher angler-use of salmon, in some cases this situation has only been temporary. This has been true where logging roads permitted access to some waters, but when operations were completed, roads were often abandoned and no longer passable to conventional vehicles used by most anglers.

With an increasing human population and generally improved access, fishing camps and summer cottages began to proliferate the shores of many salmon lakes, often leaving no opportunity for public access by other anglers. Opportunity for use by the general angling public was also restricted by chaining of roads in wild lands by some large landowners and posting of some access roads by small landowners in more populated areas.

In some lakes, opportunity for use of the salmon resource has been reduced because salmon management is no longer feasible for some reason. Poor fishing, resulting from poor salmon survival, sometimes occurred because of introduction or increases in predator or competitor species.

These changes in distribution, abundance, fishing pressure, and opportunity for use by anglers, along with broader knowledge of habitat requirements and life history, have all contributed to the present status of salmon as one of Maine's most important freshwater sport fishes.

- Dave Boucher



landlocked salmon

Brook Trout Life History

The brook trout (Salvelinus fontinalis) has historically been the most abundant and ubiquitous coldwater game fish occurring in Maine and remains so today despite reductions in brook trout habitat that have occurred since settlement of the state by Europeans began. The brook trout's basic requirements are cool, well-oxygenated water and suitable spawning, nursery, and adult habitat. As long as water temperatures do not exceed about 68° F for extended periods and oxygen levels remain at 5 ppm or greater, brook trout can usually survive and grow. Brook trout may spend part or all of their lives in habitats ranging from the smallest brook to the largest of lakes, provided that the habitat is suitable and competition from other fish is not excessive. In addition, they are capable of spending the adult portion of their lives in marine or brackish waters, and populations of brook trout are found in some of Maine's estuaries. The species is extremely vulnerable to the effects of predation and competition from other fishes, particularly in the first year or two of life. After attaining a length of about 10 inches, however, trout will feed heavily on other small fishes. There is evidence that larger brook trout may be very effective predators on their own young in certain circumstances. In waters where forage fish are not available to adult trout, they are still capable of good growth rates on a diet of invertebrates if the habitat is productive.

Brook trout are capable of extremely diverse growth rates, which are primarily dependent on such environmental factors as water temperature and food abundance. A five-year-old brook trout may weigh less than two ounces in waters with poor growth conditions. At the other extreme, a trout of the same age may weigh four or five pounds if growth conditions are ideal. Brook trout are generally short-lived, with relatively few survivors beyond three years of age. A few individuals may attain ages of four to six years, but rarely more. For stocked populations, the life span is typically even shorter, with few individuals surviving beyond two years. However, recent efforts to extend the life span of hatchery-reared brook trout through the rearing of eggs taken from wild fish have been successful, and progeny of these fish have lived to age four to date.

Brook trout normally spawn in the flowing waters of brooks or streams in the fall, usually late September to November. In Maine, spawning occurs the earliest in high-elevation waters. Water moving through the gravel prevents the buried eggs from freezing and provides them with oxygen. Shore spawning is successful in some ponds where spring-water inflows occur in gravelly shallows. Survival of shore-spawned trout may be poor if protective cover for emerging fry is not available. Smelt are especially voracious predators of brook trout fry under these conditions. Brook trout

eggs hatch in the early spring after over-wintering in the gravel substrate. Young fish use cover for protection from predators and move to the deeper water that serves as adult habitat when they attain greater size.

Brook trout are highly catchable and their numbers are therefore easily reduced by overfishing, especially in the smaller ponds and in streams that have easy angler access. They are, however, very resilient in good habitat, and their numbers can quickly rebound to former abundance under adequate regulatory protection. Furthermore, recent studies indicate that Maine's wild brook trout populations have not been genetically compromised due to excessive harvest by angling of the older mature fish.

Brook Trout Management History

This species has always served as a food fish, and systematic exploitation of Maine's brook trout populations as a sports fish began in the latter 1800's, when sporting camps flourished by catering to sportsmen in search of superior fishing for brook trout and other gamefish common to the state. Records of the period mention trophy trout of two to six pounds fairly regularly, and a few fish ranged to nine pounds. It appears, however, that where large fish were caught they were not abundant. High numerical catches were of sizes comparable to present-day standards. Angling pressure was relatively light, compared to current standards, well into the early 1900's. As the number of anglers increased and more backcountry roads were constructed, angling pressure increased over the years to current levels.

Nearly all of the State's inland waters were originally suited for brook trout. This situation began to change as timber harvesting became increasingly widespread in the 1800's, accompanied by increases in human population growth, industrialization, and agriculture. Forestry practices such as dam and road construction, river drives of raw wood, and harvesting along shoreline riparian zones led to the destruction of trout habitat. More recently, the indiscriminate use of large mechanized equipment has resulted in the degradation of brook trout habitat through erosion, siltation, and the loss of cover and habitat. Similar losses occurred early in the State's history through widespread clearing for agricultural purposes, especially in the southern and central portions of the state. Loss of habitat as a result of industrial pollution increased in the nineteenth century and continued well into the twentieth century. Efforts to reduce industrial and municipal pollution have resulted in improved water quality and restoration of habitat in some of the major rivers. The imposition of environmental regulations designed to protect natural resources

have also resulted in added protection of brook trout habitat in the commercial woodlands of the state. Some forestry companies have voluntarily exceeded regulatory standards in order to protect fisheries resources; indeed, in recent years some commercial landowners have shown a desire to partner with the Department to restore degraded fisheries habitat.

Scientific brook trout management began with the formation of the Fisheries Research and Management Division in 1951. Prior to this date, the Department's Commissioners authorized occasional management activities, including stockings. The earliest scientific evaluation of brook trout populations in Maine was conducted by William C. Kendall of the Bureau of Fisheries, U.S. Dept of Commerce, in 1918. His report - specific to the Rangeley Lakes area in western Maine - discussed the physical features and species composition and abundance of these important brook trout waters. In addition, Dr. Kendall compiled records of brook trout harvests from previous documents dating back to the mid-1800's in which individuals weighing up to 12.5 lb. were recorded. The first systematic fishery survey of statewide significance was conducted by Gerald P. Cooper, Assistant Professor of Zoology at the University of Maine. In a series of reports published from 1940-45, Dr. Cooper and his colleagues reported findings on the fisheries of the Rangeley Chain of Lakes, the lower Androscoggin and Kennebec drainage systems, Moosehead Lake, and Haymock Lake. Of particular value for brook trout management were the age and growth data for lightly exploited populations.

Programs to systematically survey brook trout habitat and conduct research projects to provide guidance for the statewide management of this species were implemented soon after the Fisheries Division was established. These research projects included several investigations into the life history of lake and stream populations of both wild and stocked populations.

Efforts to intensively manage the brook trout sports fishery increased with angler use and concern for the welfare of the species. Increasingly restrictive regulations - in the form of bag limits, minimum length limits, and gear restrictions - have been imposed over the years. The first fly-fishing-only restrictions were imposed on individual waters in the Rangeley and Moosehead areas near the turn of the twentieth century. However, there was no general-law bag limit on trout as late as 1910. At that time there was a 25-pound limit and a 5-inch minimum length limit. As of 1920 there was a 25-trout limit, a 15-pound limit, and a 6-inch minimum length limit. The bag limit for brook trout in lakes has been gradually reduced from 25 fish in 1950 to the current limits of 5 in north-

ern Maine and 2 in southern Maine. In addition, categories of standardized special regulations, including bag and length limits, were implemented in 1996 to account for the variability in growth rates among trout waters and to standardize special brook trout regulations, thereby simplifying a confusing array of special regulations.

Hatchery-reared fish are used to provide a fishery where adult habitat is present but spawning and/or nursery habitat are lacking. Artificial propagation has played a significant role in the management of Maine's brook trout for many years. The first state fish hatchery was constructed in 1895 following a decade of private efforts to hatch and stock trout fry. With the development of additional public hatcheries and rearing stations and the improvement of transportation systems, brook trout stocking gradually increased throughout the state and reached an annual level of one million fish, but has since declined to approximately 600,000 fish per year as a result of improved fish quality and stocking techniques. Today the majority of Maine's brook trout are stocked on a biological basis at the recommendation of fishery managers. The size of the fish at stocking is determined by the quantity and quality of the habitat and the extent of competition from other fish species. A small portion of the brook trout stocking is done on a non-biological or "put-and-take" basis. In these situations, catchable-size trout are typically stocked in waters near population centers to provide immediate angling opportunity with little expectation of holdover due to habitat limitations. Special regulations are frequently imposed on stocked brook trout waters to assure survival of fish to maturity and escapement to larger sizes. Stocking rates, determined from a policy developed by fishery managers, take into account water size, quality, competition, and angler use.

In the 1990's the Department undertook a program to improve its brook trout brood stock. New strains are being developed from wild fish with the goal of producing progeny that retain wild-fish characteristics including greater longevity. Because these strains may grow and behave differently from the more domesticated strains previously stocked, future adjustments in stocking rates may be necessary. Comparative performance studies of the Kennebago and Sourdnahunk strains is currently being conducted; results to date indicate that the longevity of both new strains far exceeds that of the older, domestic strains. However, the new strains grow at a slower rate and there is concern on the part of some managers that they will not provide the size quality that anglers of stocked waters have become accustomed to. To that end, a study involving performance evaluation of paired stockings of the wild and domestic strains has been proposed.

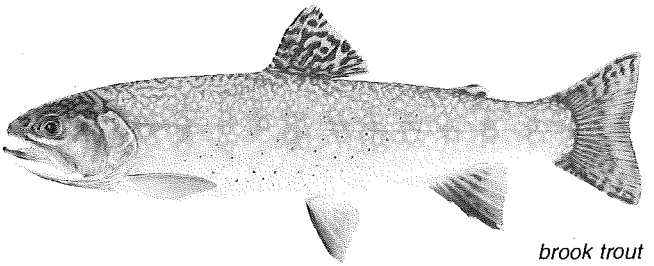
The removal of introduced competing warmwater fish species from trout waters by means of chemical reclamation began in 1939. Since that time, about 140 trout ponds have been reclaimed, usually with good – if temporary - results. Due to the expense of the chemical and changing public sentiment, the reclamation program is currently conducted at a modest level. Reclamation remains an especially valuable tool in eradicating illegally introduced fish species before they spread throughout drainages.

The introduction and spread of competing fish species has had substantial impact on the quantity and quality of Maine's brook trout resource. The chain pickerel, a voracious predator, was introduced to Maine in 1818 and by 1850 was well established in many trout waters. More recently, northern pike and muskellunge have been introduced into several drainages where they continue to expand their range. The smallmouth bass had reached its approximate current distribution by the early 1900's, but continues to be illegally introduced into new drainages; the rate of illegal bass introductions has increased in recent decades, and is a source of concern for brook trout fisheries. White perch and yellow perch, both severe competitors with brook trout, became widespread during the late 1800's. These species remain an active threat, as exemplified by their invasion of the Moosehead Lake drainage, the Rangeley Lakes, and the Fish River Chain of Lakes by yellow perch in the 1950's and 1960's. The often inadvertent spread of white suckers and a number of minnow species caused still further loss, and remains a chronic problem to this day because of their extensive use as live bait. Introductions of smelts, landlocked salmon, and lake trout were made into many waters that originally harbored only brook trout, but the extent of their effect on trout remains unknown.

Maine's wild brook trout populations are recognized for their genetic and aesthetic values and efforts to protect them through the imposition of special regulations have recently been expanded. Department policy now formalizes past Fishery Division guidelines by preventing the stocking of hatchery-reared fish in waters with thriving wild populations unless these waters have previously been stocked. In the 1990's the Department initiated studies to determine the abundance, longevity, rates of harvest, and genetic variability of wild trout populations. More recently, detailed stream surveys have been conducted in an effort to more accurately determine the relationship between stream habitat types and brook trout abundance. It is anticipated that these efforts will be continued into the future to gain additional information. Wild trout populations, once largely taken for granted, are now recognized for their biological, economic, and aesthetic value.

Over the past 50 years, significant advances in knowledge and management expertise have been made relating to Maine's brook trout populations. This knowledge enabled sound and rational management programs for brook trout under historical levels of angler use. However, increasing angler demand for and utilization of brook trout, coupled with stagnant or decreasing funding levels for management (notably, staffing reductions of the Fishery Division's research biologists), are necessitating innovative approaches to brook trout management. For example, the Fishery Division recently developed a set of standardized regulations intended to prevent overharvest, protect genetically important older wild fish, and increase the carry-over of a portion of stocked fish to larger sizes. In the absence of pure research, brook trout data are also being consolidated on computerized statewide databases, which will be used to monitor trends in the fishery. Finally, the Department recognizes and supports the evolving angler ethic regarding the voluntary release of legal-size fish. These changing attitudes, together with the preservation of habitat through reasonable environmental regulations and intensive management efforts, bode well for the brook trout's future.

- Forrest Bonney



brook trout

Ethics are what we do when no one else is watching.

Maine is a very unique place. You can be completely alone in the wild, practicing ethical behavior and no one may be there to notice. However, the landowner as well as the hunters and anglers that follow you, will appreciate it greatly. Your ethical behavior contributes significantly to Maine's sporting future, and it encourages landowners to keep important habitat property available for all to enjoy.

So remember, always respect the rights of landowners and please ...

ASK FIRST

We urge all hunters and anglers to *Supersport* their license. The fee is only $15.00 and all proceeds fund the Maine Department of Inland Fisheries & Wildlife's vital Landowner Relations Program. Thus far, this program has helped prevent the posting of over *63,000 acres* of private land. If you have already purchased your license, you may still become a *Supersport* at anytime.

Ask your local license agent or sport shop about *Supersport* when buying your license or visit our website at:

www.mefishwildlife.com

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As a *Supersport* you will receive discounts with our numerous retail partners, half-price subscriptions, and a *Supersport* decal.

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Cost of the lifetime license for residents:

Age Group	Fishing	Hunting	Combination Hunting/Fishing
Applicants 5 years of age and under	$150	$150	$250
Applicants 6-15 years of age	$300	$300	$500
Applicants 65 years of age	$50	$50	$80
Applicants 66 years of age	$40	$40	$64
Applicants 67 years of age	$30	$30	$48
Applicants 68 years of age	$20	$20	$32
Applicants 69 years of age	$10	$10	$16
Applicants 70 years of age and over	$8	$8	

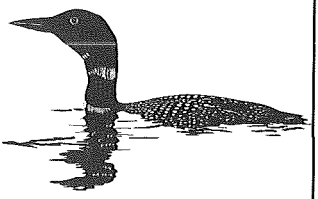
For more information call:

207-287-8000

MAINE
DEPT. OF INLAND FISHERIES AND WILDLIFE

Caring for Maine's Outdoor Future

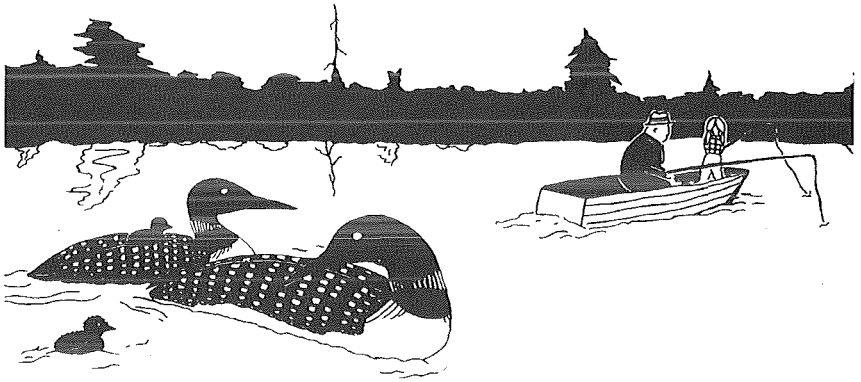
LOONS & LEAD DON'T MIX



Lead tackle is deadly to waterbirds!

Lead sinkers & jigs cause fatal lead poisoning in loons and other waterfowl.

Lead ingestion is the #1 killer of loons in Maine, but any waterbird can die from swallowing just one lead sinker or jig!



YOU CAN:

Use steel, tin, bismuth or plastic instead.
Ask local tackle shops to stock alternatives.
Properly dispose of old lead sinkers and jigs.

Maine Department of Inland Fisheries and Wildlife