River Restoration

Note: The intent of this section is not to provide full details of a very complex topic, but to introduce the idea, along with some of the basic techniques being used.

Through the years rivers have been abused through poor logging practices, agricultural abuses and in some cases overfishing. All of these can affect the quality of habitat for young fish, spawning beds, and the ability of Atlantic salmon to migrate through a river system. For trout, many of the same issues apply, especially destruction of habitat.

For Atlantic salmon, the single most important key to restoration may be increasing the numbers returning from the ocean. However, stream habitat restoration remains the most important action we can take to secure the future of both Atlantic salmon and natural trout species in our rivers, streams and lakes.

A PEI river in trouble. It is filled with silt, making life for Atlantic salmon and trout difficult. Changes in agriculture are needed to eliminate such heavy loads of silt, to restore this river to health.

Improving a Human-impacted Stream

A variety of techniques can be employed to improve stream habitat, and to rectify errors of the past. Basically, the intent is to have cool water, sufficient depth for travel and living, and as little silt in the water as possible.

Here are some techniques used:

Digger Logs

Small to medium sized logs placed in streams to create plunge pools. They are intended for small streams only.

Digger Log being placed in a stream

Rock sills – create through scouring a pool downstream from the rock where current flow is too strong for digger logs.

Wing deflectors – shuttles water back and forth, causing scouring. In Nova Scotia and other areas, streams have been widened due to logging, or other reasons

Creating Pools – Pools are required in river systems to provide spawning areas in the lower sections, locations for other salmonids, and resting areas for adults in migration upstream. They can be especially important for survival during times of extremely low water.

Plantings – By planting dogwood, willow species, hardwood saplings and grasses can stabilize a bank that has been subject to erosion or the effects of livestock.

Creating Barriers to Livestock – Cows and other livestock can literally eat away the plant life that reduces erosion along streams. In addition, the can cause siltation, along with increase "bad" nutrient loading through defecating directly into the stream. Many conservation groups work in cooperation with farmers to build fencing that keep livestock a few feet/metres away from the stream. Replanting is also a help.

Gabions – These are rock filled cribs created from wire mesh, that can utilize small rocks, in order to reduce erosion along a section of river.

Rock rip-rap – Large rocks are used for riverbank stabilization and reduction of erosion and silt entering the river in many areas, instead of the gabions mentioned above.

Riffle Creation and the reduction of Hanging Culverts – At times roads have been built in such a way that a culvert's lower end is too far above the stream for Atlantic salmon to continue migration. In some cases this can be rectified by rebuilding the culvert so that it is lower. The problem can also be addressed

Boulder clusters – Placing a group of boulders in a stream or river, to provide shelter for juveniles, and resting area for adults in migration.

Wing Deflector – a triangle-shaped device which extends from the bank and used to direct current towards the middle of the river.

If paired, they will direct current towards the middle. If staggered, they will redefine the stream channel to counteract poor land use practices.

Breaching Driftwood Barriers – In this case it is dismantling something,instead of building it. If an accummulation of driftwood actually block a stream, there may be a need to dismantle it to allow travel of fish along the stream.

Constructed Pool

How Can Farmers Help Restore Salmon Streams?

1. *Keep livestock away from stream edges*
2. *Allow stream edges to regrow, or even encourage it with grasses, shrubs or tree plantings.*
3. *Maintain a buffer zone in crop agriculture and undertake any other measures neededto stop pesticide runoff.*
4. *If new land is being cleared, be very careful to maintain an effective tree buffer zone.*
5. *Work with your area salmon, trout and watershed groups in order to safeguard the future of streams for all.*

Stream enhancement by stocking fry or parr

At one time this was considered to be a positive action, but the science of Atlantic salmon has shown that there are deficiencies. Often the young fish are imprinted on a hatchery, or are adapted to a life of receiving pellets as food, rather than chasing down wild prey. If genetically they are not from a particular river, they are unlikely to be fully able to deal with the particular combination of river conditions and ocean migration route required.

Nevertheless one technique especially has had some success in restoring wild Atlantic salmon:

Satellite Rearing Tanks –

The tank is located on the edge of the stream, and juvenile Atlantic salmon raised are genetically of that particular stream. The water comes from a pipe in the river upstream, and gravity provides the only pump action required. The young fish are accustomed to the stream water from the beginning.

Tom Moffatt/ASF

An ASF biologist monitors a smolt wheel that catches them on their journey to the sea. They are measured, a scale taken, and then sent on their way.

Is there a problem with Satellite Rearing Tanks?

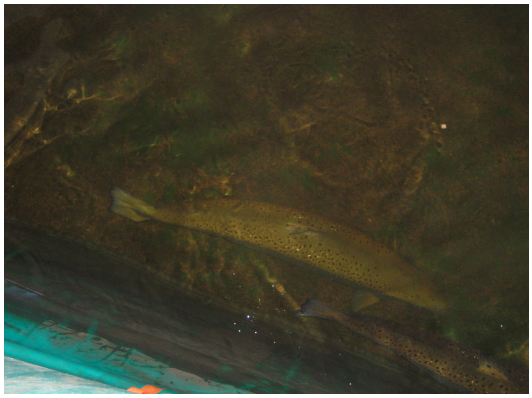
While this technique can work, it does not get around the issue that the fry or parr raised in the tank are accustomed to a tank existence where they are fed, and where predation is not a factor.

Tour of the MSA Salmon Hatchery - South Esk

MSA CONSERVATION 60th ANNIVERSARY 1953-2013

MSA CONSERVATION MIRAMICHI SALMON ASSOCIATION, INC.

http://www.miramichisalmon.ca/



Atlantic Salmon and Migration

Each river has its own characteristic "run" of Atlantic salmon. In some rivers the salmon arrive early, while in others the run does not begin until autumn. Yet other rivers may have both spring and fall runs of Atlantic salmon. Some see the run heaviest in July, and then taper off.

For a river of interest to you:

- Learn about the characteristics of the river's particular run
- Learn about the conservation needs for salmon on that particular river
- Learn how to read those stretches of a particular river that are of interest to you.

How Do Salmon and Trout Navigate?

In rivers they likely use their keen sense of smell, along with some visual clues. In the ocean, it is speculated that salmon may used polarized light and have a built-in magnetic compass.

It has been established scientifically that rainbow trout do have microscopic magnetic compass structures in their olfactory bulb organs. Their 'compass' consists of several granules of magnetite iron fused together, creating a form of needle. The pressure from the needle on cell structures gives the rainbow trout the sense of direction. This research was conducted at the University of Aukland, New Zealand.

How Does a Salmon Jump?

Atlantic salmon sense upwellings below a waterfall or rapids (see sidefact opposite). They will then move towards the bottom. When they feel ready for the effort, they accelerate to more than 20 mph in the upwelling area.

This allows wild Atlantic salmon to leap waterfalls as high as 12 feet (3.5m) high.

Since the direction of the Atlantic salmon's leap is not always in exactly the right direction, they may need to make several attempts at leaping an obstacle.

Magnificent Migrations

Wild Atlantic salmon have several strategies for survival:

- *Travel to productive ocean feeding grounds*: Many Atlantic salmon runs head to waters off Greenland and Labrador once they reach the ocean. In Europe, salmon make a similar journey, some to Greenland waters, others to feeding grounds near the Faroe Islands.
- *Remain inshore, and return to spawn sooner*: Most grilse probably do not travel as far as Greenland waters, and return to their original river after a single winter at sea.
- *Remain in freshwater:* Landlocked Atlantic salmon are the same species, but tend to remain smaller, and most do not travel to the ocean. Instead they use a lake or river as a feeding ground, then ascend streams in order to spawn.

Atlantic Salmon - Where the Rivers Are...

While it can be generally said that Atlantic salmon live in rivers from the Connecticut to Labrador, and up the St. Lawrence as far as Lake Ontario, they no longer live in all the rivers they once inhabited.

Below is an over view of the rivers where Atlantic salmon are presently found.

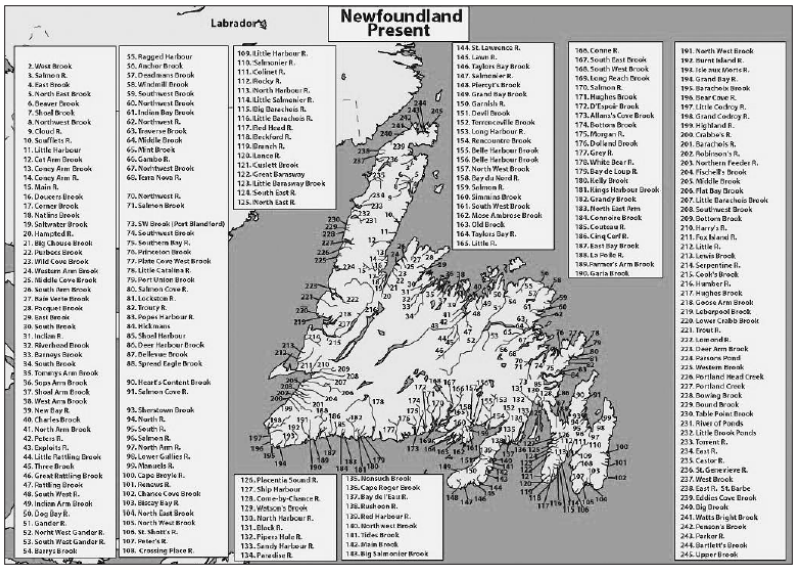
Newfoundland

Newfoundland offers ideal habitat for Atlantic salmon. It has a large number of rivers of medium length with large uninhabited areas on the rivers' upper reaches. However, 5 rivers have lost their salmon populations.

In the mid1990's, the range of Atlantic salmon in Newfoundland was substantially increased by opening large amounts of suitable habitat in four rivers - Torrent (223), Exploits (43), Terra Nova (68), and Rocky (42) Rivers.

Newfoundland's rivers are also known for their waterfalls, and places such as Big Falls on the Humber, in the southwest, are wonderful locations for watching Atlantic salmon leap.

It is likely that Newfoundland's rivers were the first New World salmon rivers to be fished by Europeans, but no solid evidence exists for this.



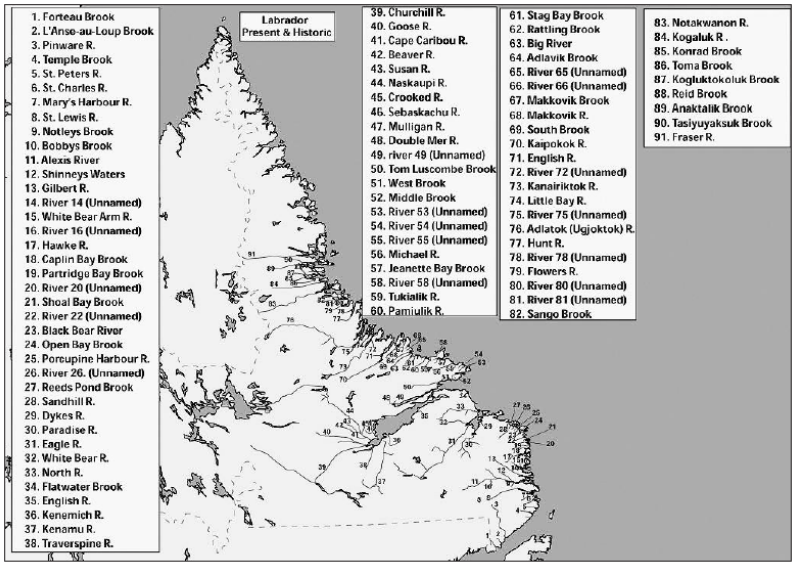
LABRADOR

Labrador, along with Ungava Bay in Québec, represents the most northerly area in North America for Atlantic salmon. The Fraser River (# 91 on the map) is considered to be the most northern Atlantic salmon river in Labrador, although Dr. Rex Porter-Department of Fisheries and Oceans, St. John's, Newfoundland-reports that DFO Fisheries Officers have observed salmon occasionally in a few rivers above the Fraser, as far as the North River which is about a third of the way between the Fraser River and Cape Chidley (the northern tip of Labrador). Cold hardy, anadromous Arctic Char, however, are found as far as Cape Chidley in all northern Labrador rivers.

The vast majority of the rivers in Labrador still lie in a pristine state, due mainly to the remoteness and low population density, which may account, in part, for the fact that Labrador is the only area in North America where no river - at least from the Fraser southward - has ever lost its salmon.

Another possible factor for the success of salmon in Labrador is the proximity of the feeding grounds off West Greenland (for 2 sea-year salmon), and the Labrador Sea (for 1 sea-year, i.e. grilse), resulting in fewer risks for migrating salmon. There is, however, a counterbalancing factor of juvenile salmon in northern Labradors requiring several summers of growth before they become smolt to begin the all-important migration to the sea.

Of the 91 rivers shown for Labrador, 28 are scheduled for salmon angling.



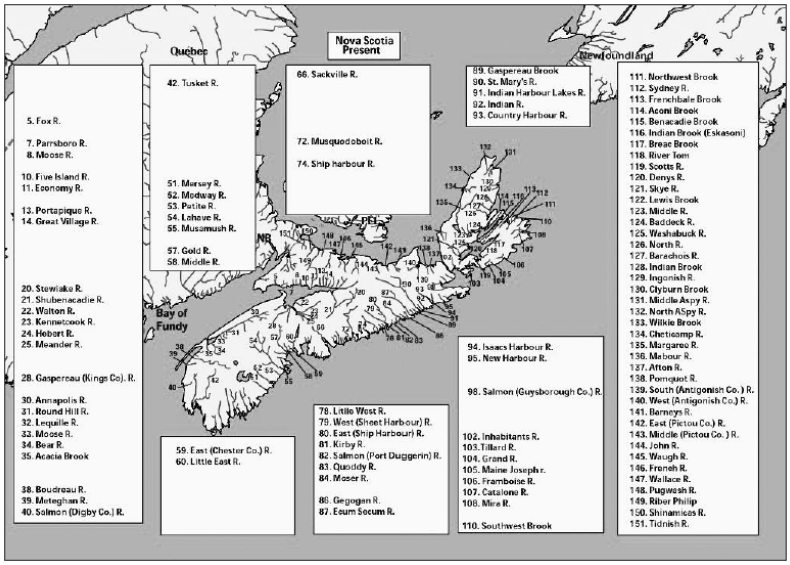
Nova Scotia

Nova Scotia's salmon rivers are generally short, rather than being part of long, and are without the complex watersheds found in many New Brunswick river systems.

Particular issues overshadow Nova Scotia salmon rivers. No other region, not even Lake Ontario and the upper part of the St.Lawrence River, where all its original salmon rivers lost their salmon, can match the 52 rivers in Nova Scotia whose salmon stocks were extirpated, mainly due to acid rain, an environmentally negative factor unique to Nova Scotia. Only three of of Nova Scotia's salmon rivers have been restored.

In the Inner Bay of Fundy many rivers have been declared endangered, and surveys have shown wild Atlantic salmon have entirely disappeared from some of these. As for New Brunswick's Inner Bay of Fundy runs, these salmon do not stray far beyond the Bay of Fundy instead of migrating long distances to Labrador or Greenland waters as do Outer Bay of Fundy salmon.

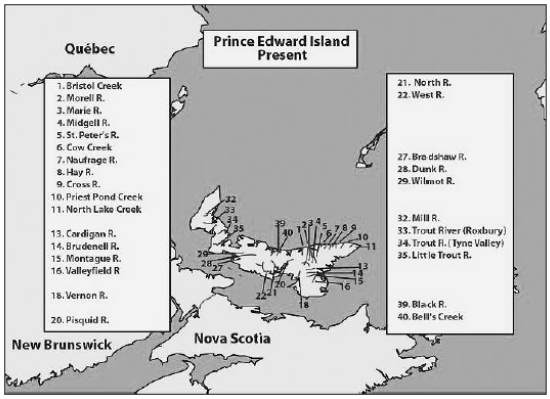
Salmon runs in the north of the province, in rivers exiting to the Gulf of St. Lawrence, are generally healthy, examples being the Margaree in Cape Breton, and River Philip on the mainland, not far from the NB border.



Prince Edward Island

Prince Edward Island has a large number of short rivers supporting modest Atlantic salmon populations. A recent survey by the University of Prince Edward Island shows that many rivers thought to be devoid of salmon actually have modest populations of juvenile salmon, and potentially these salmon populations could increase significantly. Currently only the Morell, Dunk and West Rivers have enough salmon to support angling.

PEI is the most agricultural province in eastern Canada, and pesticide and soil runoff impact many rivers. Two million tons of soil enter the rivers annually, and since 1994 there have been two dozen fishkills due to pesticide runoff. Bringing these problems under control has the potential for greatly increasing the number of wild Atlantic salmon in PEI rivers.



New Brunswick

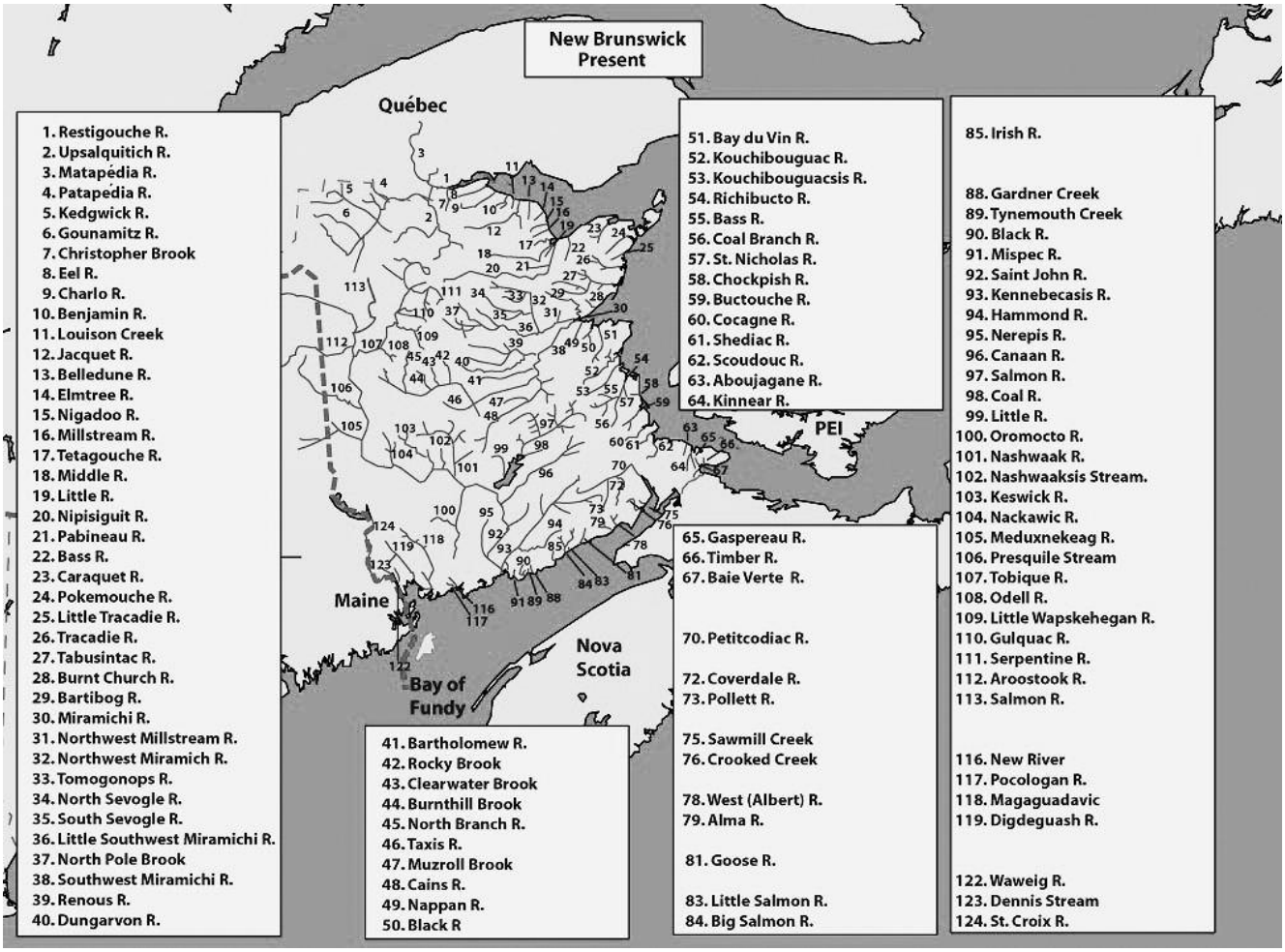
In general all rivers connected to the Bay of Fundy have critically low populations of salmon, particularly the Inner Bay of Fundy rivers (rivers occurring clockwise, east of the St. John River, ending with the Annapolis River in Nova Scotia). Thirty-two of these rivers have been declared endangered with respect to their salmon populations by COSEWIC (Committee on the Status of Endangered Wildlife in Canada), of which 10 are in New Brunswick. A special case of a salmon river in trouble is the Petitcodiac River (#70 in map), the fourth most productive New Brunswick salmon river in the 1950s, whose salmon run has been almost extirpated by tidal gates installed at the river's mouth.

Recent research indicates that salmon from the Inner Bay of Fundy rivers migrate no further than the Gulf of Maine, if even that far, before returning to spawn.

Outer Bay of Fundy rivers such as the St. John, Magaguadavic, and St. Croix have seen a critical decline in numbers since 1990.

Rivers exiting into the Gulf of St. Lawrence are in somewhat better shape than those in the Bay of Fundy. The Miramichi River is capable of producing more Atlantic salmon than any other river in North America. The Restigouche is noted for its large salmon which spend two, sometimes more, years at sea before returning to spawn.

While 17 rivers lost their salmon, in only three - the St. Croix, Aroostook and the Nipisiguit - have salmon runs been restored.


New Brunswick
Present
Québec
PEI
Maine
Nova
Scotia
Bay of
Fundy
1. Restigouche R.
2. Upsalquitich R.
3. Matapédia R.
4. Patapédia R.
5. Kedgwick R.
6. Gounamitz R.
7. Christopher Brook
8. Eel R.
9. Charlo R.
10. Benjamin R.
11. Louison Creek
12. Jacquet R.
13. Belledune R.
14. Elmtree R.
15. Nigadoo R.
16. Millstream R.
17. Tetagouche R.
18. Middle R.
19. Little R.
20. Nipisiguit R.
21. Pabineau R.
22. Bass R.
23. Caraquet R.
24. Pokemouche R.
25. Little Tracadie R.
26. Tracadie R.
27. Tabusintac R.
28. Burnt Church R.
29. Bartibog R.
30. Miramichi R.
31. Northwest Millstream R.
32. Northwest Miramich R.
33. Tomogonops R.
34. North Sevogle R.
35. South Sevogle R.
36. Little Southwest Miramichi R.
37. North Pole Brook
38. Southwest Miramichi R.
39. Renous R.
40. Dungarvon R.
41. Bartholomew R.
42. Rocky Brook
43. Clearwater Brook
44. Burnthill Brook
45. North Branch R.
46. Taxis R.
47. Muzroll Brook
48. Cains R.
49. Nappan R.
50. Black R
51. Bay du Vin R.
52. Kouchibouguac R.
53. Kouchibouguacsis R.
54. Richibucto R.
55. Bass R.
56. Coal Branch R.
57. St. Nicholas R.
58. Chockpish R.
59. Buctouche R.
60. Cocagne R.
61. Shediac R.
62. Scoudouc R.
63. Aboujagane R.
64. Kinnear R.
65. Gaspereau R.
66. Timber R.
67. Baie Verte R.
70. Petitcodiac R.
72. Coverdale R.
73. Pollett R.
75. Sawmill Creek
76. Crooked Creek
78. West (Albert) R.
79. Alma R.
81. Goose R.
83. Little Salmon R.
84. Big Salmon R.
85. Irish R.
88. Gardner Creek
89. Tynemouth Creek
90. Black R.
91. Mispec R.
92. Saint John R.
93. Kennebecasis R.
94. Hammond R.
95. Nerepis R.
96. Canaan R.
97. Salmon R.
98. Coal R.
99. Little R.
100. Oromocto R.
101. Nashwaak R.
102. Nashwaaksis Stream.
103. Keswick R.
104. Nackawic R.
105. Meduxnekeag R.
106. Presquile Stream
107. Tobique R.
108. Odell R.
109. Little Wapskehegan R.
110. Gulquac R.
111. Serpentine R.
112. Aroostook R.
113. Salmon R.
116. New River
117. Pocologan R.
118. Magaguadavic
119. Digdeguash R.
122. Waweig R.
123. Dennis Stream
124. St. Croix R.

NB River Maps...

Let's Take a Tour of the Miramichi River System...

Google Earth - Miramichi River System

New England

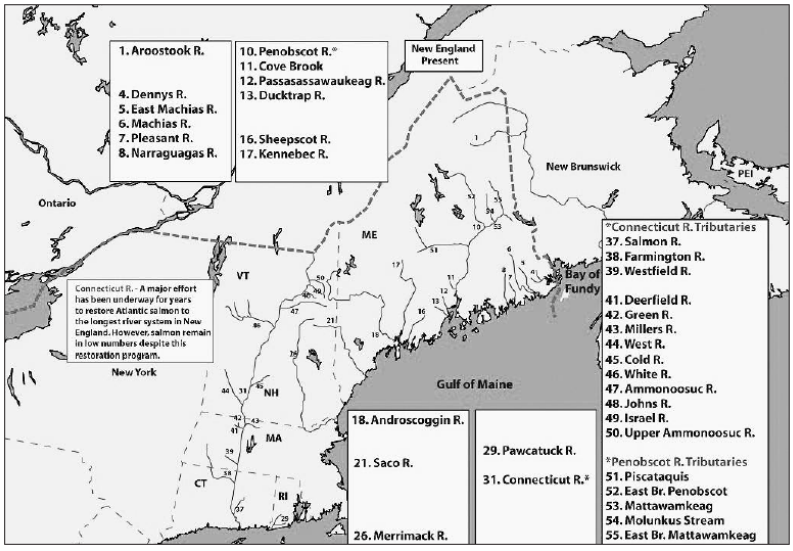
Salmon populations are in grave difficulty in New England's rivers. New England has a number of long and complex river systems, including the Kennebec, Penobscot, Merrimack and Connecticut. In southern New England, major restoration efforts remain on the Connecticut and Merrimack River systems.

In eight - all in Maine - Sheepscot, Ducktrap, Cove Brook, Pleasant, Narraguagus, Machias, East Machias and Dennys - the salmon are considered still wild (i.e. genetically correspond to historic populations). The populations of these rivers have been declared endangered by the U.S. Federal Government. In the other rivers, stocking of hatchery fish has kept salmon swimming in the rivers, but still at critically low levels.

The greatest remaining Atlantic salmon river in New England is the Penobscot. While numbers have been dropping, the run is still significant. Alas, many dams form barriers to salmon migration on the Penobscot and other New England rivers, and have had a devastating effect on populations.

In New England, many of the rivers have seen their salmon populations extirpated, and relatively few have seen some degree of restoration for those populations.

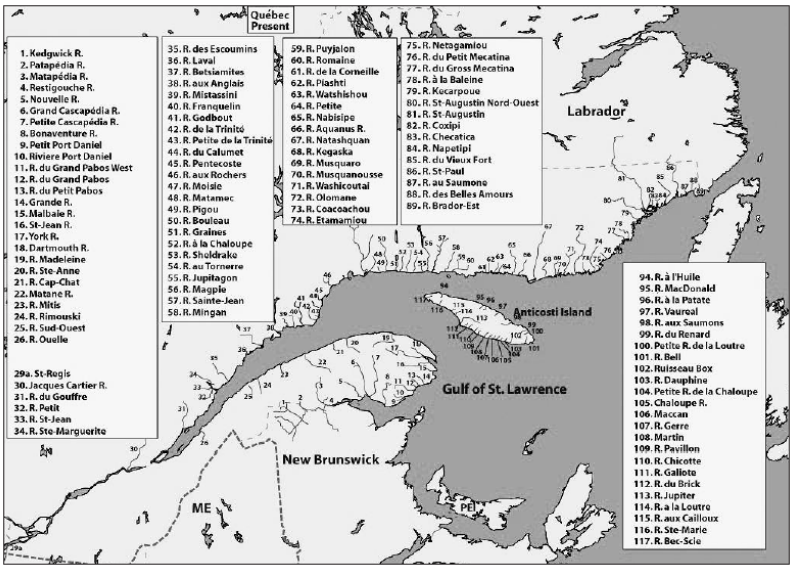
Note that in Maine, all angling for sea-run Atlantic salmon is closed. Angling for landlocked salmon is permitted in some lakes and rivers.



QUEBEC - SOUTH

Roaring salmon rivers of the North Shore, crystal-clear emerald green rivers in the Gaspé, and historic rivers of the St. Lawrence South Shore fished since the 1600s, show the array and diversity of salmon rivers in Québec.

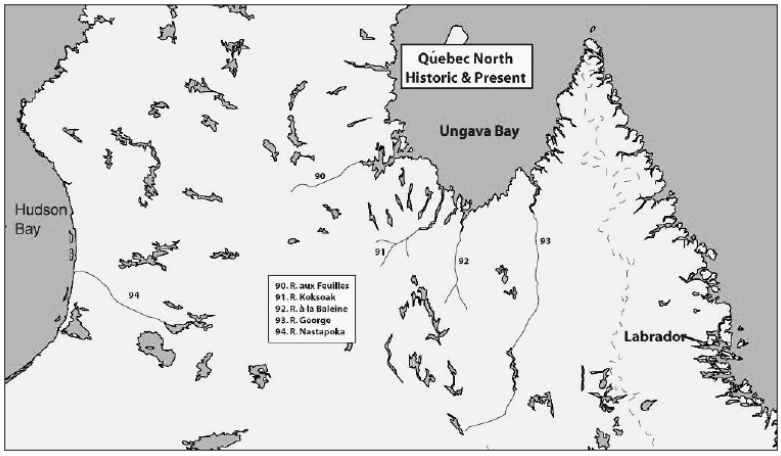
While some Québec rivers are meeting spawning targets, not all is well. Five rivers branching from the upper portions of the St. Lawrence lost their salmon runs, some more than a century ago. In only one, the Jacques Cartier, was the salmon run restored. Hydro dams continue to be barriers to migration upstream and down on many other rivers. The St-Francis River, emptying into the St. Lawrence just downriver from Montreal, is thought to have been the most "upstream" St. Lawrence tributary to have had truly anadromous, i.e. sea-run, salmon.



QUEBEC - NORTH

Being in a comparatively cold climate with a short summer season, it may take Atlantic salmon parr up to eight years before they become smolt and migrate to sea. In addition, some populations of these Atlantic salmon, such as in the Koksoak (#91) and the Nastapoka (see below), consist of some fish which spend the summer in the estuary like sea trout, and others which are truly anadromous, migrating to feeding grounds off west Greenland.

Note: Shown in the lower left corner on this map is another far northern river, the Nastapoka, about half way up the east coast of Hudson Bay, which has Atlantic salmon.



Ontario & New York

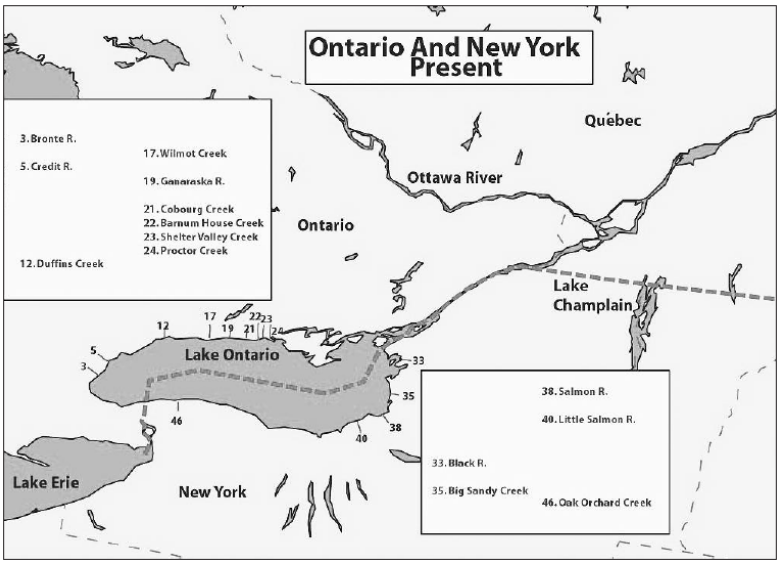
Up until probably the late 1700's, rivers flowing into Lake Ontario supported an extremely large population of Atlantic salmon. These runs, however, were very susceptible to the destruction of migration routes upstream and down by dams. By the 1880s few salmon were left.

Did some of these Atlantic salmon migrate down the St. Lawrence to the Atlantic Ocean? The available evidence - a few scale samples from museum specimens - suggests not. Lake Ontario apparently served as the "ocean".

Atlantic salmon could not pass, of course, the impenetrable barrier presented by Niagara Falls. Thus they were not found in the upper Great Lakes.

Recently there have been major efforts to restore Atlantic salmon to their ancestral streams around Lake Ontario, and presently they are found in 11 streams in Ontario and New York. Unfortunately introduced salmonids from the West Coast appear to be interfering with such restoration efforts by competing for habitat, food, and spawning sites.

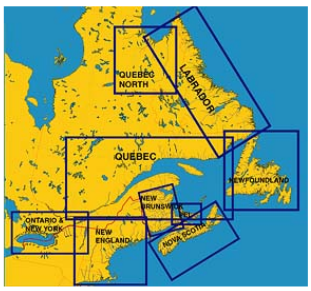
It would be a major success to reintroduce Atlantic salmon into the Lake Ontario rivers on a self-sustaining basis, but it will be a difficult goal to reach.



Atlantic Salmon in North America

Historically, Atlantic salmon occurred in abundance in eastern North America: in Canada from Ontario eastward, and in the United States in all the New England states, and the State of New York. In all, **875 rivers** had healthy populations of wild salmon, historically. Currently the number of Atlantic salmon rivers is down to **747** with populations reduced in size - substantially so in most cases.

This set of maps traces the fate of North America's Atlantic salmon rivers.



For detailed examination, it has been necessary to divide the salmon's natural range in North America into smaller areas. Because of its size, Québec has been further subdivided into two regions, north and south.

The salmon rivers have been categorized as follows:

HISTORIC - Originally had Atlantic salmon

EXTIRPATED - Original salmon population is lost

RESTORED - Atlantic salmon are now re-established in rivers which had lost their populations

PRESENT - Rivers currently having wild Atlantic salmon populations

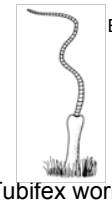
ENDANGERED - Rivers whose Atlantic salmon populations have been officially declared endangered; applies only to rivers in New England (Maine) , New Brunswick and Nova Scotia

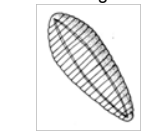
Smolts abound: Making Atlantic salmon spawn in upstream habitat paying dividends

By John Holyoke, BDN Staff
Posted May 19, 2014, at 10:32 a.m.

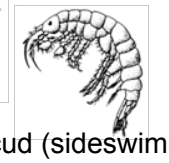
Prev | Next 1 of 19

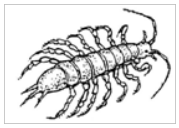
Macroinvertebrates...


Tubifex worm


Bloodsucking leech


Crayfish


Planaria (free-living flatworm)

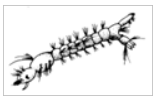

Aquatic sowbug

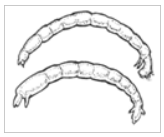
Scud (sideswimmer)

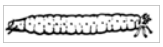

Water flea


Fisher spider


Water mite


Mosquito larva

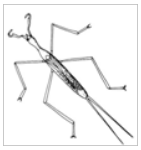

Midge fly larvae

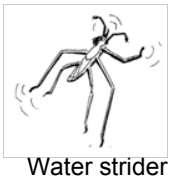

Crane fly larva


Backswimmer


Black fly larva

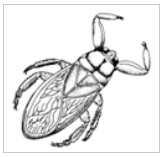

Water boatman

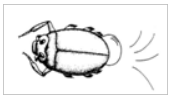

Water scorpion


Water strider


Predaceous diving beetle and larva


Dragonfly nymph

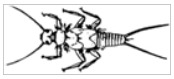

Giant water bug

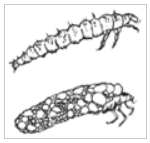

Whirligig beetle

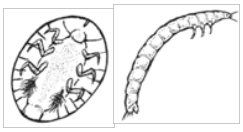

Hellgrammite (dobsonfly larva)

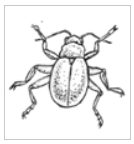

Damselfly nymph


Mayfly nymph


Stonefly nymph


Caddisfly larvae (out and in case)


Water penny (bottom)


Riffle larva and beetle

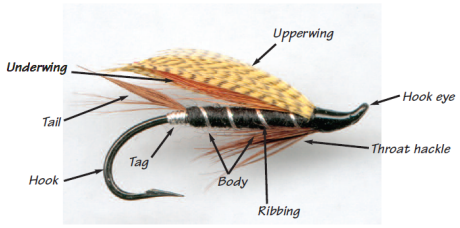

Gilled snail

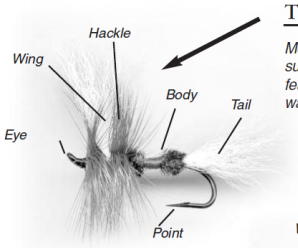

Mussel
Clam


Pouch snail

A First Glance at Flies

This guide later looks at flies in detail. But below are two examples, Royal Wulff (upper left) and a Silver Down-easter (lower right) that might serve as an introduction. Flies vary in their features, the particular way in which they interact with the water, and the materials they are made of.



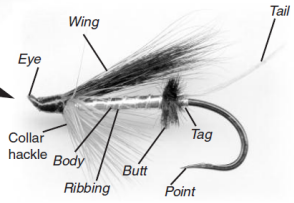


The Royal Wulff, a dry fly

Meant to remain on the stream's surface, it is small and light, with features that will help it ride on the water.

The Silver Down-easter, a wet fly

Designed to glide downwards into the current's flow, it is somewhat heavier and built over a larger hook.



FLY TYPES - A Primer

Fly Type	What they are	Materials	Water Conditions	What they are imitating
DRY FLY	Flies that float on the surface Tied on thin wire hooks with buoyant materials	Classics made with hackle or hair wing. Also "hair bodies" (deer hair)	Low Water	Can be aquatic terrestrial or attractor
WET FLY	Used under the surface Tied on heavier hooks	Made with soft hackle or hair wing. Classics are bucktails streamers, and nymphs	High Water	Can be aquatic, terrestrial or attractor

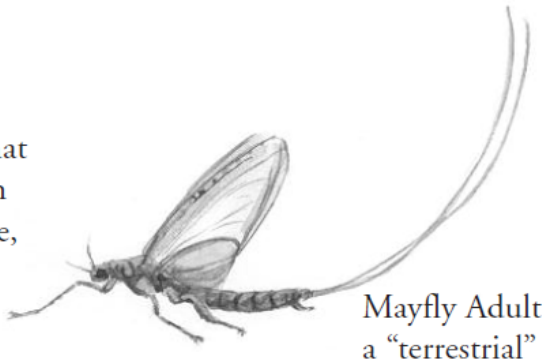
Aquatics

These flies imitate insects, baitfish, nymphs, crayfish, or other life forms that live in the water.

Mayfly Nymph - an "aquatic"

Terrestrials

These flies imitate creatures that live on land and end up as fish food in the water, such as mice, beetles, or ants.



Mayfly Adult - a "terrestrial"

Attractors

These flies imitate nothing in the natural world but still catch fish. Salmon flies are good examples.

Fly-tying – Getting to Know an Art Form

Tying on your own fly and then casting it into the water and presenting it to a fish is a powerful experience that creates a memory that lasts a lifetime. The first time you drift one of your own flies in the proper fashion and have a fish choose to take it is a true turning point for the beginning fly-fisher.

Many long-time anglers can probably retell the story (in vivid detail) of the first time they cast their fly and caught a fish on it.

In Roman Empire times, techniques were already being developed, describing various materials to place on the hook, "The hook is wrapped with a piece of purple colored wool, to which is attached two plumes from the beard of a rooster which looks like wax in colour."

There has been a shift in types of materials used to tie flies. For example, African Jungle Cock was commonly used to tie colorful flies, but has since become an endangered species. Tiers are now moving towards using readily accessible feathers, such as rooster, deer hair, and other mammal hair.

Fly-tying can be an absorbing art form on its own; many people tie flies for the sheer enjoyment of it.

Flies are also a vehicle to gaining an understanding of water levels, flows, time of day etc.

In the beginning, the fly imitated insects, crustaceans and freshwater creatures, now, however, this is not necessarily so. Some flies can be very ornate (some flies contain as many as 32 different "ingredients") and may not imitate

Bomber – fly tied by Dan Traer

Why do Atlantic Salmon Take a Fly?

When adult Atlantic salmon return from the sea, they stop eating food. Yet salmon anglers are very aware that they will lunge at a passing fly on the end of a line.

Why? No one really knows.

It is speculated that the behaviour reflects irritability on the part of the Atlantic salmon. Alternatively, some say it is behaviour left-over from the salmon's earlier life in both freshwater and the ocean.

Trout do feed in freshwater, naturally, so it is much less surprising that they streak towards an object resembling a small insect or other creature.

FLY HISTORY -

Dame Juliana Berners and the 15th Century Fly

The earliest known detailed account of fly tying comes from The *Treatyse of Fysshynge wyth an Angle* written by this fascinating woman in the mid 1400s.

In this manuscript she describes in detail a dozen flies. They are even called "The Twelve" perhaps indicating they were the standard for the time. For the Wasp Fly shown, it reads:

"The waspe flye, the body of blacke wull & lappid abowte wt yellow threde: the wings of the bosarde."

True Beginnings

Starting in the mid-1600s there were a few detailed descriptions of fly materials and tying. But it was a slow process. The 5th edition of Izaak Walton's *The Compleat Angler* that appeared in 1676 has a wonderful description of 65 flies with their dressings. As the modern fly rod, reel and leader evolved through the 18th century, so to did the fly evolve, with questions raised by Richard Bowlker in 1744 on the true abilities of more recent fly designs.

The 19th Century Renaissance

The invention of the dry fly that went with the shift to upstream fly casting revolutionized fly fishing, and by 1886 there were books on the "Science" of flies related to their entomology. Since that time the fly tying literature has expanded enormously, describing simple flies, ornate flies, flies that truly resemble insects and flies from the imagination.

The Fly-tying Bench

From palaces to cabins and tents on a stream, fly tying has held the imagination of those who have loved moving waters. This image of a fly-tying bench from the *Atlantic Salmon Journal* was taken a half century ago somewhere near the Nashwaak River. Were the flies being tyed different from now?

Atlantic Salmon Federation
April 15

What does ASF mean to you? That's the question we put to 9-year old Julian Furlaga. Julian recently attended an ASF fundraising dinner in Moncton, NB where he became fast friends with ASF President Bill Taylor (the pair are pictured below). Julian donated one if his amazing flies for the Moncton auction which helped to raise nearly $300! Way to go Julian! Here is the letter he wrote to ASF recently: "My Name is Julian Furlaga I live in New Brunswick Canada and I am 9 years old. I tied my first fly at the Dieppe Fly Fishing Forum in 2012. Since then I am a member of the Dieppe Fly Tying Club, which is where I learned to tie many different flies over the last 2 years. Maybe a year ago I started to tie Classic Salmon Flies which is now my passion. I am very lucky to be surrounded by some of the best fly tyers in the world who live here in the Maritimes. I have been very lucky to be able to sit with them and have them teach me Classic Fly tying. I love the challenge of tying Classic Flies and the beauty of them. I would like to Thank all the local tyers and from around the world who have helped and supported me. My good friend Davie McPhail in Scotland for making all the awesome videos that helped me get started tying. Thank you to Jerome Molly for teaching me my favorite fly the Black Dog which was donated to the ASF to raise funds for saving the salmon in the rivers. Most of all a special Thank you to Bryant Freeman my good friend who I spend many days with at his shop learning to tie many different flies allowing me to go through his stuff and use it. I am lucky to have my Dad who takes the time to take me everywhere and get me things I need to tie my flies and to my Mom for putting up with my fur feathers and hooks all over the house. I would like to Thank the Atlantic Salmon Federation for the hard work they do to protect the salmon and their habitat around the world so that we may enjoy fishing for them for many years to come. Thank you Julian."

Lab - Reading a Salmon Scale.doc

PART A - Read the background information
[TODAY]

PART B - Label sections with given diagram

[MUST BE PASSED IN]

PART C - Age determination on given scales

[TRY IN LAB ON THURSDAY]

Attachments

Lab - Reading a Salmon Scale.doc

My Places.kmz