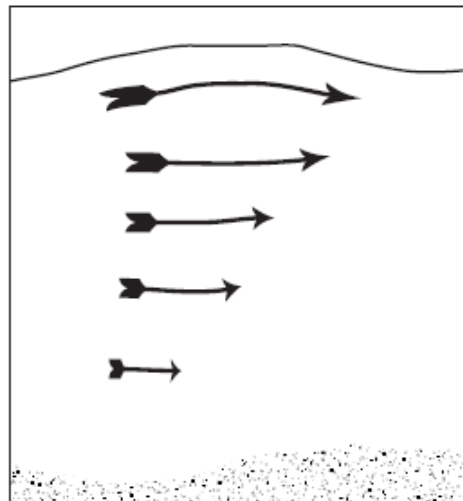


Get To Know the Flow — Puzzling out Currents

Learning the basic rules about water flow will help you understand a stream. It will help you understand where food accumulates, where salmon and trout swim, and where they will lie quietly, using the least energy.

- While water tries to flow smoothly, the stream edge and bottom cause resistance. This makes water currents fastest near the surface, and away from the edges of the stream.
- Turns in a streambed, obstructions such as boulders or trees all help to break up the stream's currents into many different currents. As they flow downstream, over time they will eventually merge. New obstacles almost always continue to break up this even flow into more swirling currents.



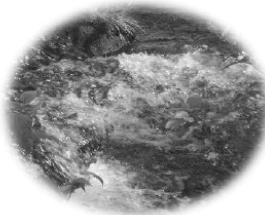
First rule: Currents are likely to flow faster near the surface than near the bottom of a stream.

What is a Current Seam?

A **current seam** occurs where two different current speeds meet and run alongside each other for a while before merging into one (see page 51). Current seams offer ideal places for fish to rest and have access to a variety of food. Trout will lie in the slower water, taking advantage of the fact that food dislodged or pushed along by the faster water will be swept by them. Salmon in migration upstream do not eat, but will still take advantage of these areas to reduce energy use.

It would take more effort, and hence burn more precious calories, to fight the current and chase after a meal. Unless competition is fierce, a fish—especially a large fish—will seek out the easiest, most economical way to eat. In moving water, feeding fish will usually lie facing upstream where there is shelter from the moving water and the current will bring dinner within easy reach.

Words to Help You Understand Currents



Eddy: A submerged boulder or log is the first place most anglers learn to look for fish. The obstruction slows down water and creates an eddy, a slow, swirling area on the downstream side.

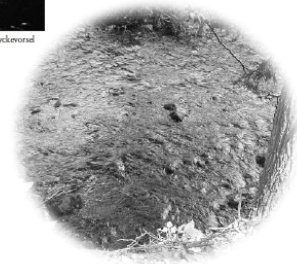
Undercut: An area where the bank overhangs the water, is another good place to look for trout. Undercuts are usually formed on the outside of a curve, where fast moving water cuts the channel more deeply than it does on the inside. There is usually a nice, deep lie at the bottom of the channel.



Gilbert van Ryckeborsel

Pools are wide, deep sections of water. Salmon usually rest in the slow water at the bottom of the pool. They tend to feed at the head or tail of the pool, because there is a constriction there to funnel food items together.

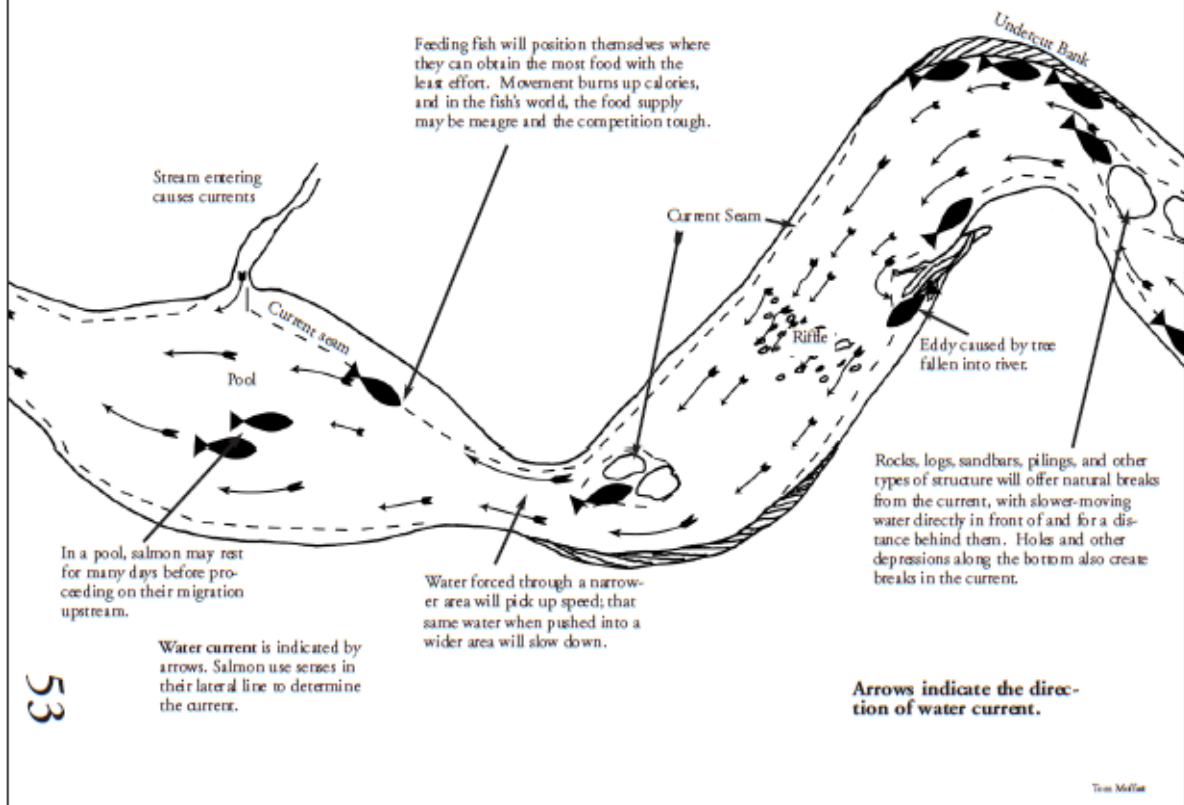
Riffle: An area where friction breaks up a stretch of water. Riffles are usually caused by beds of small to medium sized boulders.



A STREAM AT A GLANCE

In a moving column of water, the fastest-flowing water is in the surface layer, with the current slowing as depth increases.

Feeding fish will position themselves where they can obtain the most food with the least effort. Movement burns up calories, and in the fish's world, the food supply may be meagre and the competition tough.



Stream entering causes currents

Current seam

Pool

Current Seam

Riffle

Undercut Bank

Eddy caused by tree fallen into river

In a pool, salmon may rest for many days before proceeding on their migration upstream.

Water forced through a narrower area will pick up speed; that same water when pushed into a wider area will slow down.

Rocks, logs, sandbars, pilings, and other types of structure will offer natural breaks from the current, with slower-moving water directly in front of and for a distance behind them. Holes and other depressions along the bottom also create breaks in the current.

Water current is indicated by arrows. Salmon use senses in their lateral line to determine the current.

Arrows indicate the direction of water current.

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Tom Mullan

Clues to Look for in Streamside Exploration:

1. Direction of stream flow
2. Disturbance of the surface to give hints on water speed, stream bottom unevenness
3. Speed of stream flow in different stream areas, and where eddies and other areas of calm water exist
4. Stream curvature, that affects current speed
5. Riffle areas
6. Where is it likely that side streams or springs flow into the stretch of stream or river.
7. Imagine the ways in which higher water flows and levels, and lower water flows and levels, will impact the stream bottom. That may help in planning other trips to the stream.



HERE IS WHAT A RIVER NEEDS TO GIVE TO A SALMON OR TROUT...

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Oxygen

- *Fish will thrive in oxygen-rich waters.* Most animals cannot exist long without a supply of oxygen
- Wave action, riffles, wind, and green plants all help dissolve oxygen into the water.
- Stagnant, very warm, weed-choked water tends to have less oxygen and, as a result, fewer life forms than cool, clean, moving water.
- **Indicators** - an abundance of riffles in a stream, bright green healthy plants in a pond, or a rich variety of readily seen life forms all indicate a healthy body of water.



Mayfly nymph

illustrations by J. O. Pennanen



Caddisfly nymph

Food

- *A healthy population of fish will exist only where there is a good food supply.*
- Some species have definite dietary preferences and are built to capture and eat a particular type of forage in a specific manner that is easiest for them.
- The main food items of interest to the fly fisher are baitfish of all sizes and shapes;
crustaceans, such as crayfish and shrimp
aquatic creatures such as leeches and frogs, as well as insects like mayflies and stoneflies
terrestrial creatures that fall in the watersomewhat, such as worms, caterpillars, and mice, plus insects such as grasshoppers and crickets
miscellaneous items such as eggs, mulberries, etc.



Damselfly adult



Caddisfly adult



Mayfly adult



Dragonfly nymph

Shelter

- *In the more confined quarters of lakes, streams, rivers, or inshore habitat, fish will usually be found confidently but cautiously feeding somewhere near an area that will provide them sanctuary if threatened.*
- On streams and lakes, this protection will come in the form of undercut banks, deadfalls (trees that have fallen into the water), weed beds, sharp drop-offs, or rock ledges.

Comfort

- *A single body of water is likely to have a variety of temperature readings.*
- Fish will choose an area in which to feed that is within a preferred temperature range.
- Freshwater fish are usually classified into either coldwater or warmwater categories.
- Shallow water can change temperature quickly. Sun, wind, cooler evenings, and tide changes all can have a dramatic effect on water temperature in a short time.
- Deeper water will tend to be cooler and maintain a steady temperature longer.
- Temperature will also be affected by the existence of springs, inlets, power plant discharges, dam releases, and currents.

Water: Temperatures and Levels

Temperature

How warm or how cold the water happens to be on a particular day will affect whether or not a fish will choose to take a fly. In summer, when temperatures reach an excessive level, it is a good idea to choose to fish earlier in the day or in a location that would be cooler for the fish. Similarly, when temperatures are colder, fish will tend to "slow down", particularly in the early morning and late in the day. Fish do not seem to become active until mid-morning to early afternoon.

To become a knowledgeable angler, therefore, is more than being able to cast your line well; it is necessary to read water, and the natural conditions that are present.

It is a good idea to carry a thermometer as part of your fishing gear. If you are unsure whether you should fish on a particularly hot (or cold) day, take a temperature of the water, just to be sure. Water warmer than 23 degrees Celsius is dangerous for salmon, as any excessive energy bursts can leave them at a higher risk of post-release mortality.

Dr. Bruce Tufts, Atlantic Salmon Journal, Summer 2002

Water Levels

During certain times of the year, some rivers will experience lower or higher than normal levels. It is important to recognize when a river's levels are not at the optimum, as this will affect angling.

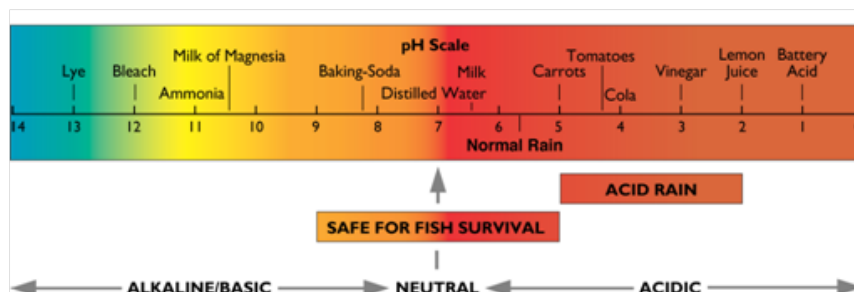
A few things to keep in mind:

- Salmon will most likely not take a fly when water levels are excessively high; salmon begin to take again when the water begins to drop and they start to hold in pools and runs;
- A salmon will likely take a fly better in shallow to moderate water (2-8 ft) versus deep pools
- If water levels are excessively low, it is probable that salmon will likely be held in pools or runs that have adequate depths.

Bruce Boudreau
<http://members.attcanada.ca/~salmon/primer8.htm>

The pH Scale

The pH Scale: The color distribution of the chart represents the indicator colors of pHdrion paper that is used to determine the pH of liquids.



Helping a Salmon on its Way

Water flow upstream and downstream past dams is especially important to migrating wild Atlantic salmon. **Fish ladders** are built to provide them an artificial flow upstream. **Downstream passage** through a tube, something like a waterslide, is used to assist their movement towards the ocean.

Angling restrictions are commonly applied to areas near dams and near these important migrational passages

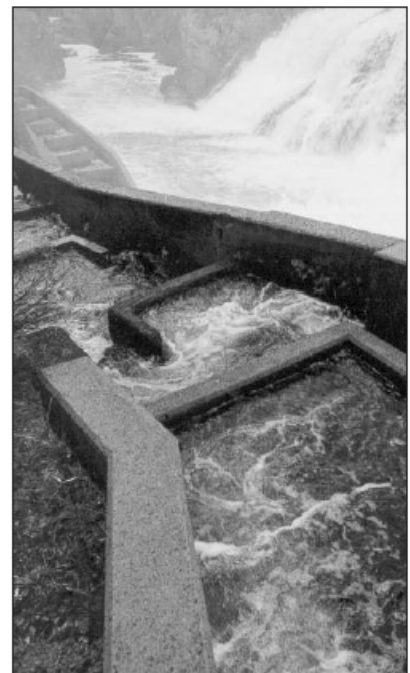
Fish ladders

Fish ladders are built with low barriers coming out into the water flow to slow it down, and provide a way for Atlantic salmon to actually gain height around the dam. It is important that the flow be sufficient to attract the salmon to the entrance of the fish ladder. Fish ladders need to be maintained, and repaired from time to time.

Downstream passage

Downstream passage needs to have sufficient flow to attract the wild Atlantic salmon. If smolt or adult salmon are instead attracted to the flow passing through the hydro-electric dam turbines, there is a high likelihood of their not surviving.

An extra hazard is that sometimes sticks or even logs can become wedged in the downstream passage. It needs to be checked.



Fish Ladder

Tom Moffatt/ASF

Atlantic Salmon Federation
Fédération de Saumon Atlantique

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ASF in Greenland

READ ARTICLE

- 1 ASF in Greenland
- 2 ASF RiverNotes - 8 Nov 2019
- 3 Chris Verbiski named 2019 Lee Wulff Award winner

AN UPDATE ON THE GREENLAND SALMON CONSERVATION AGREEMENT AND SATELLITE TRACKING IN THE ARCTIC

ASF in Greenland

CONTACT: NCRABBE@ASF.CA
Sep 27, 2019



The Atlantic Salmon Federation (ASF) is a world-leading science and advocacy organization dedicated to conserving and restoring wild Atlantic salmon.

State of Populations

There are 17 distinct populations of wild Atlantic salmon in North America, including 16 in Canada and one in the United States. Populations are determined by genetic analysis and wild Atlantic salmon from different regions demonstrate unique life histories and characteristics.

Update: Three smallmouth bass caught in Southwest Miramichi

CONTACT: NCRABBE@ASF.CA
Sep 3, 2019



VEAZIE DAM ON PENOBSCOT COMING DOWN - BREACHING CELEBRATED JULY 22



A milestone was reached on July 22 with the breaching of the Veazie Dam, lowermost obstruction for Atlantic salmon and other migratory species. This dam's removal has been the work of more than a dozen years, with ASF playing an important role.

[Read more](#) ▶

[Watch Video of Breaching of Dam](#) Click here ▶



 BS - Penobscot River Restoration Project

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, they 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 accumulation of driftwood actually block a stream, there may be a need to dismantle it to allow travel of fish along the stream.

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 needed to 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.



Constructed Pool

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.



Is there a problem with Satellite Rearing Tanks?

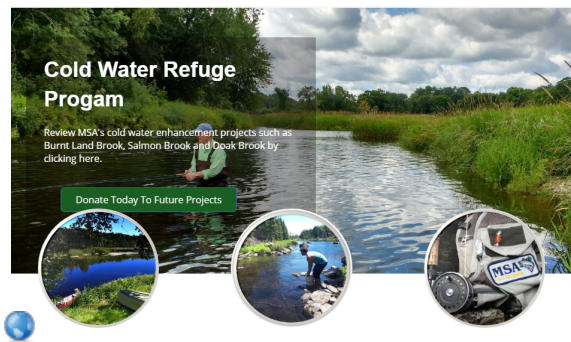
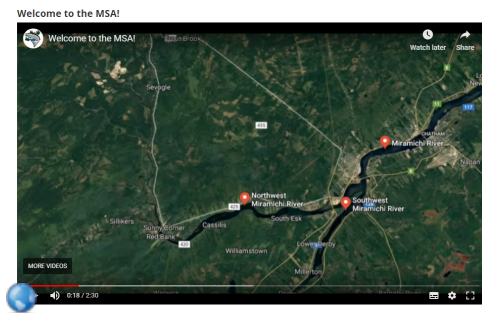
While this technique can work, it does not get around the issue that the fry or parr raised in the tank are accustomed to a tank existence where they are fed, and where predation is not a factor.



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.

Tour of the MSA Salmon Hatchery - South Esk



Attachments

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