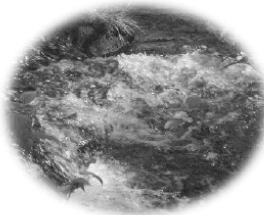


Words to Help You Understand Currents



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.

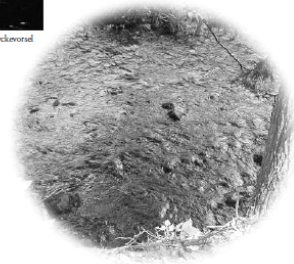
Undercut: An area where the bank overhangs the water, is another good place to look for trout. Undercuts are usually formed on the outside of a curve, where fast moving water cuts the channel more deeply than it does on the inside. There is usually a nice, deep lie at the bottom of the channel.



Gilbert van Rieckevoort

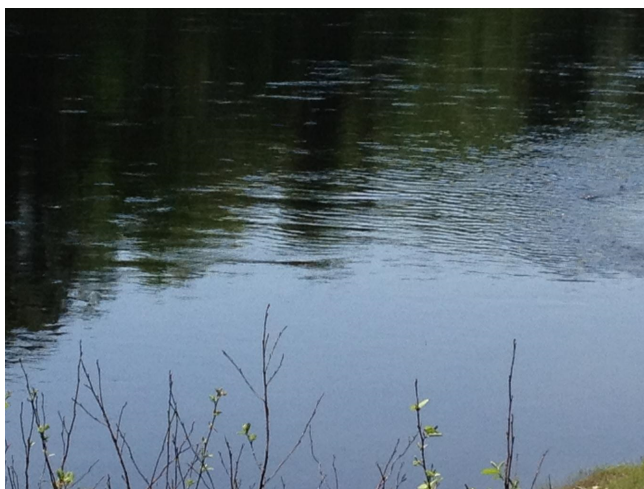
Pools are wide, deep sections of water. Salmon usually rest in the slow water at the bottom of the pool. They tend to feed at the head or tail of the pool, because there is a constriction there to funnel food items together.

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



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...

NOTES - Healthy Rivers.pdf

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.

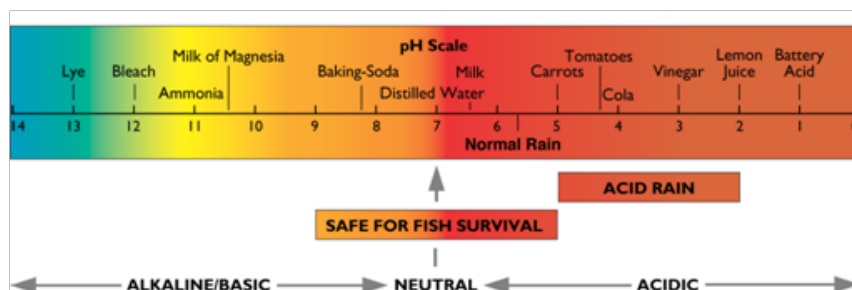
A few things to keep in mind:

- 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.

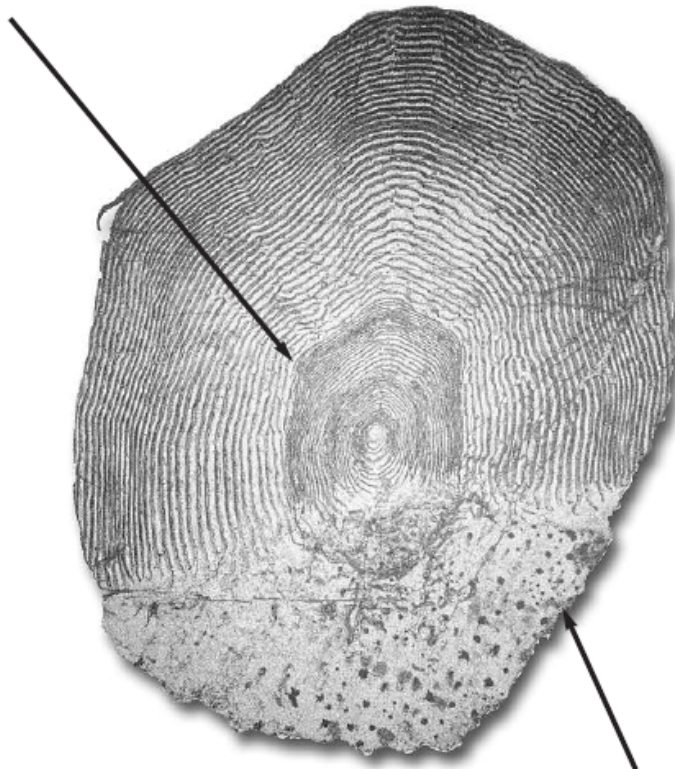


READING A SALMON SCALE

Have You Read Any Good Salmon Lately?

The scales of a fish are like a book; they tell a story. Information about how old a fish is, where it has lived, and if it has been eating well can be gathered from its scale.

left for ocean as 2 year old smolt



Returned from ocean as a grilse (1 year at sea).

In figure __, the rings that form around the centre or core of each scale represents stages in either fresh or saltwater. The most widespread method of aging salmon parr and adults involves collecting scales. When clean and undamaged, scales show progressive growth rings similar to the rings on a tree. As the salmon grows, new growth rings are laid down in the scale as it gets bigger. The scales with their growth rings can be magnified in order to accurately reveal the life history of an individual salmon.

During the growth of salmon, ridges (or rings) are formed around the centre of the scale (also known as the focus or nucleus). It has been determined that these rings are found in proportion to the growth of the fish.

It is from these groupings that we can analyze the growth rates and ages of salmon. The wide-spaced rings are summer growth, while narrowly-spaced rings are winter growth. While growth is usually determined by temperature and amount of food intake, these terms indicate increased food and growth in summer periods and a decrease in growth during winter when temperatures are colder and food is less abundant.

Does Scale Sampling Harm the Salmon?

An advantage of scale sampling is that scales can be removed without harming the fish. Scale samples are regularly collected from the brood stock of an enhancement project and from fish collected during stream surveys and recreational fishery surveys.



Salmon scales

The examination of an adult salmon scale reveals 2 distinct parts which can be defined as:

1. River life: the period spent in freshwater up to last river annulus. Salmon parr populations in different areas experience a very wide range of environmental conditions and thus exhibit large differences in patterns and rates of growth. The mean age at which salmon smoltify, therefore, varies from between 1 and 2 years in some southern populations in Europe and North America to 7 years in Labrador and northern Norway.

2. Sea life: the period from the onset of sea growth; it may include time spent in freshwater as an adult.



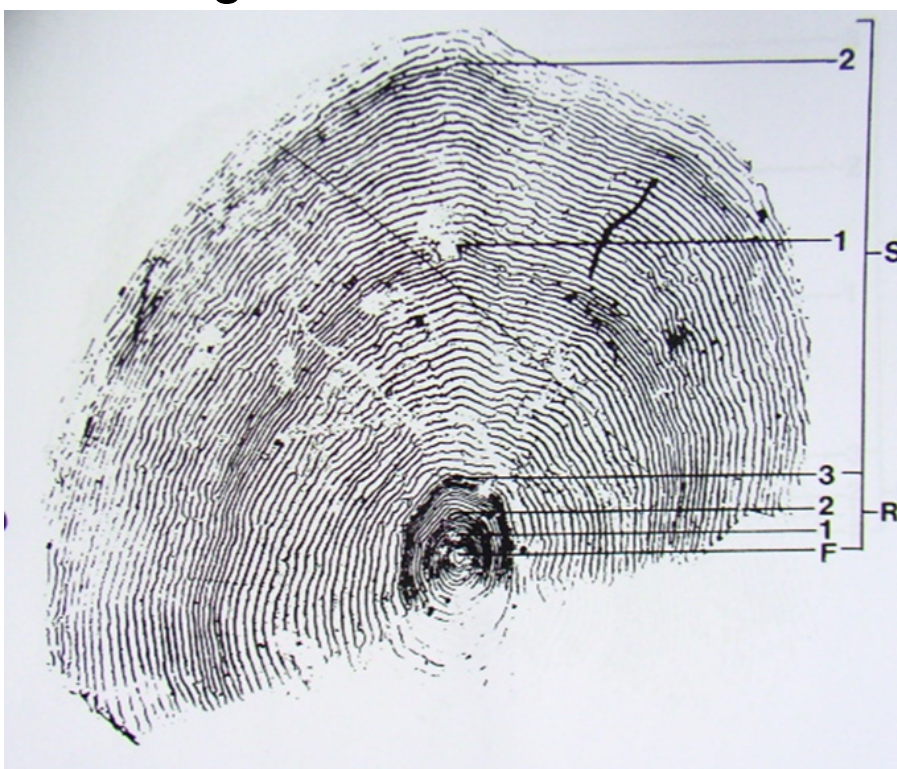
An Atlantic salmon's scales tell the story of its life - and even its ancestry and place of birth.

Growth rings on the scales tell the story of the salmon's growth, when it moved to salt water, and its return to fresh water after time at sea. The scales can tell us how many times the salmon has spawned, and can indicate the age.

Even growth rings can be an indication of Atlantic salmon raised in captivity, and whether the fish is an escaped farm-raised aquaculture salmon.

DNA, that can be extracted from the scales, can determine the relationship of that particular salmon to other groups of salmon, and ultimately can tell us from which stream, and even which section of stream the salmon came.

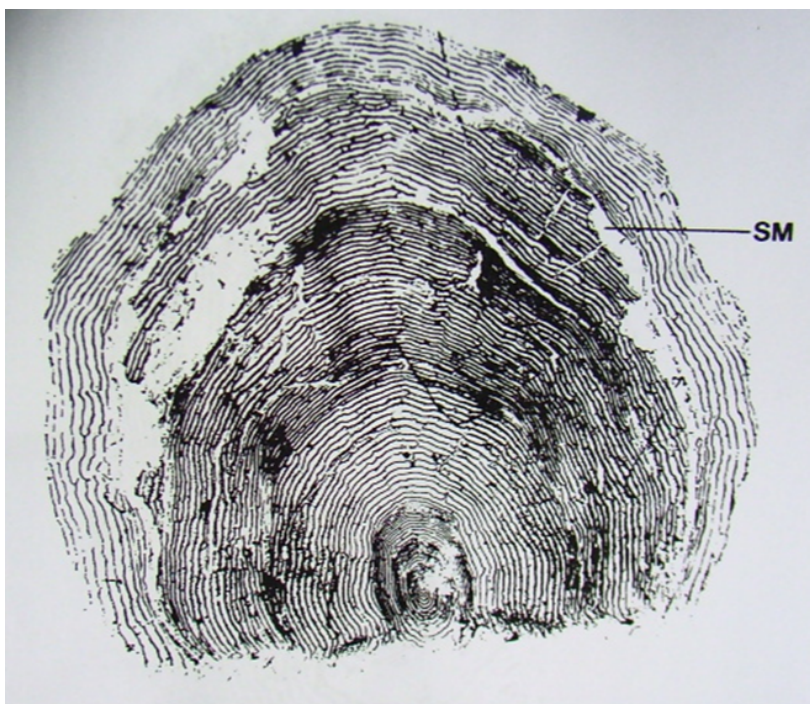
EXAMPLE: Age 3.2 +

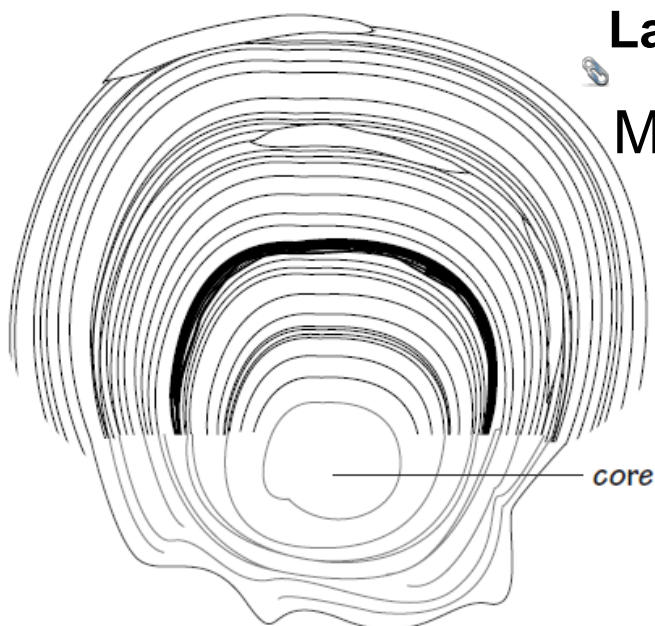


EXAMPLE: Age 3.3+



EXAMPLE: Age ? with a Spawning Mark





Lab - Label The Scale.pdf

MUST BE PASSED IN!

The scales of a fish are like a book. They tell a story. They tell how old the fish is, where it has lived and if it has been eating well. Now scales can be used as a source of DNA to find out how closely individual Atlantic salmon are related, and even whether they are from the same stream or not.

Find the **core** or centre of the scale (it's not in the middle!). This has been labeled on the diagram. The first rings form when the fish is in its early stages. If the water is warm and there's lots of food, the fish will grow well. The rings will be spaced far apart. This is summer growth. Label this section of the scale.

Next are some **rings** that are very close together. These grow during the fish's first winter. The water is cold and there's little food. The fish doesn't grow very much and the rings are close together. This is winter growth. Label this section on the diagram. At this stage, the fish was a year old.

The fish then spends another year in freshwater. Can you find the summer and winter growth rings for the second year? Label these sections second summer and second winter.

Following the second winter, the fish feeds heavily and then starts its journey to sea. At this stage it is called a smolt. It goes through some major changes and the scales show a dark band. Find the smolt mark and label it.

The fish then spends its first summer at sea. There is lots of food and it eats and grows well. The growth rings are far apart. Can you find these? Label their first summer at sea.

This is followed by a winter at sea when the fish is not eating well and the rings are closer together. Find these rings and label them first winter at sea.

The fish then returns to freshwater to spawn. During this time it doesn't feed and the scales develop special marks or scars. They look like blank spots on the scale. Label these spawning scars.

The fish spends the winter in freshwater and then returns to sea the next spring. After another summer and winter at sea, it comes back to freshwater to spawn again. Label second summer at sea, second winter at sea, and second spawning scars.

Attachments

Lab - Reading a Salmon Scale.doc

Lab - Label The Scale.pdf

NOTES - Healthy Rivers.pdf