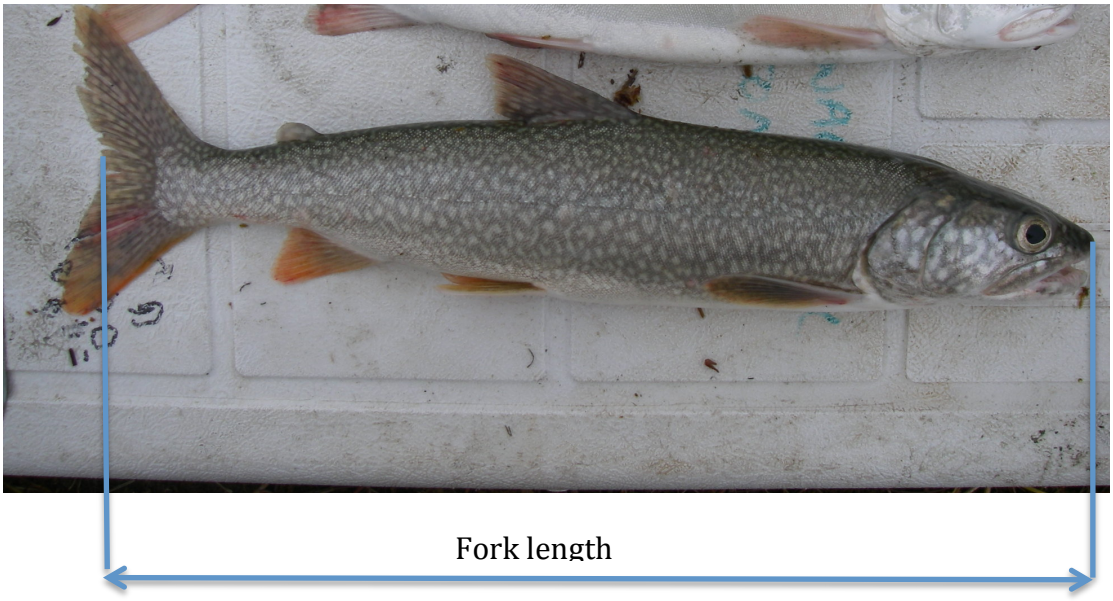
Procedures for processing fish

1. As soon as the fish is captured, write down on your data sheet where and how it was captured, the date, GPS location, and species. Take a picture(s) of the fish and of your GPS. Keep the fish as cool as possible.
2. When you get back to where you will be processing the fish, prepare your work space:
    a. Set up a garbage bag or can for waste.
    b. If you have long hair, tie it back. Human hair can contaminate your sample.
    c. Pre-label any sampling bags and vials with the date, capture location, fish number, species of fish, what you have in the bag (e.g., liver, muscle) and what you want analyzed. Make sure you write the fish number down on the back side of the bag as well – sometimes marker can rub off.
    d. While wearing latex or nitrile gloves, prepare the cutting station you will be using by either taping down saran wrap or scrubbing and rinsing a glass or plastic cutting board.
    e. Wash all of the tools you will be using with a mild detergent, rinse with water 3 times, rinse with vinegar, and then rinse three more times with water. Make sure you are wearing gloves when you do this. Place the clean tools down on your saran wrap or cutting board.
3. Measure the fish's fork length using a measuring tape or fish board. Record the length on your sample form in centimeters. Take a picture of the whole fish and make a note in your photo log and on the fish sample sheet.



4. Weigh the fish in grams, and record it on your data sheet.

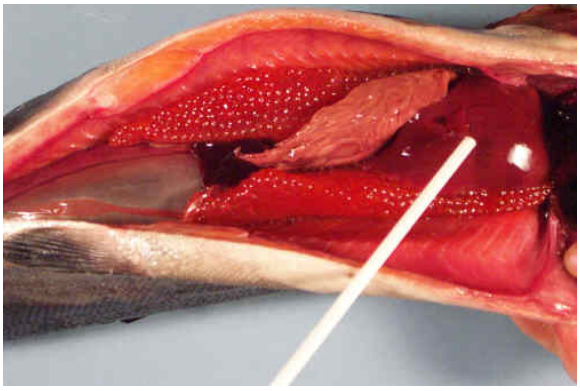
5. If you notice anything unusual on the outside of the fish (for example, tumours), note it on a separate data sheet called 'fish tumours and lesions.'
6. Before you started your processing, you will have decided what you are going to sample for. Feel free to skip any steps below if they are not relevant.
7. If the fish you are sampling is a trout or another fish with small scales, use sidecutters or very sharp scissors take a clip of the first three rays of its pelvic fin, and place this in the ageing envelope. If the fish you are sampling has large scales, like a whitefish, scrape some scales off with your fillet knife and put these in the ageing envelope.
8. Using a fillet knife or scalpel, collect a sample of muscle tissue. The sample should be taken close to the dorsal fin, and should not be taken from below the fish's mid-line. You can either leave the skin on or take it off.

Photos taken from: http://www.popstoolkit.com/sops/methods/fish.aspx

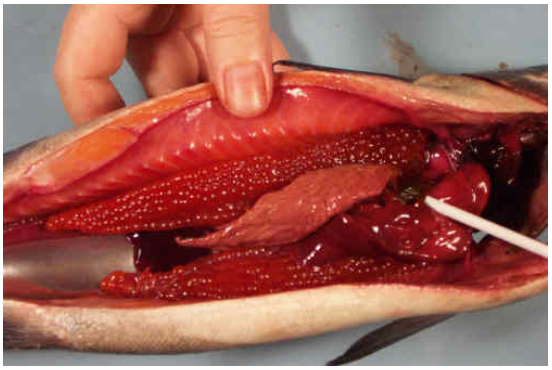
9. Carefully place the muscle sample in your pre-labelled bag. Keep the sample cool until it can be frozen.

Photos taken from: http://www.popstoolkit.com/sops/methods/fish.aspx

10. Open the fish up by slicing its belly, just as if you were going to clean it. Find the liver and turn it over so that you can see either an empy sac or a sac filled with liquid (it is usually yellow or green-looking). This is the gall bladder and the liquid inside is bile. Being very careful not to break it, remove the gallbladder and place it into a pre-labelled small vial (cryovial). Record the colour of the gall bladder liquid and freeze the vial as soon as possible. It is easier to remove the gall bladder if you use a pair of hemostats (look like scissors, but with clamps on the end) to clamp the bladder shut first, and then cut above when your clamp is.



Liver

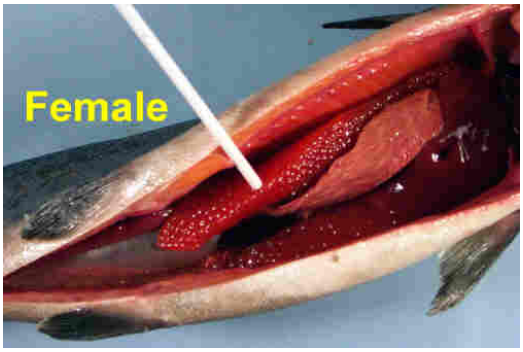


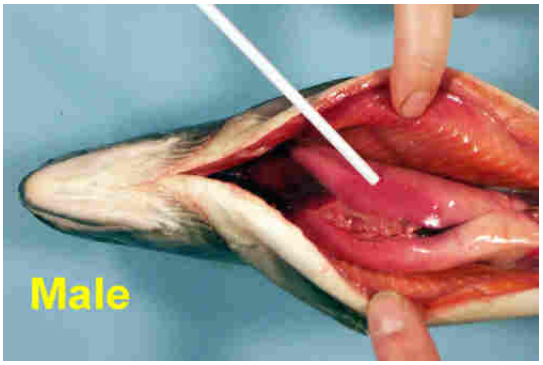
Liver turned over with gall bladder showing (white pointer)

Photos taken from: http://www.pskf.ca/sd and cryovial.com

Cryovial

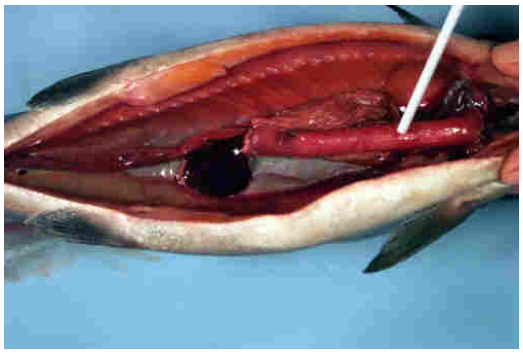
11. Once the gall bladder is empty, carefully remove the liver by either squeezing and ripping the very tip of it with your fingertips, or by gently slicing it off with a scalpel. Make sure that no bits of the liver are left inside. If they are, take them out. Weigh the liver and record the weight in grams in your data sheet.
12. Carefully place the liver sample in a pre-labelled bag. Keep the sample cool until it can be frozen.
13. Determine if the fish is a male or female, if possible. If the fish is a female close to spawning, take out the eggs, weigh them in grams, and record the weight on your data sheet.





Photos taken from: http://www.pskf.ca/sd/

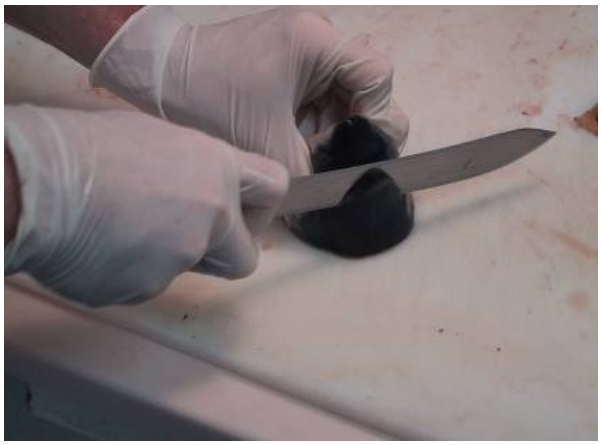
14. Open the fish's stomach, and record how full it is in your fish sampling form. If you want, you can record the stomach contents in the 'comments' section. If you want to take a stomach contents sample, place the entire stomach, or just the contents, into a pre-labelled bag.



Photos taken from: http://www.pskf.ca/sd/

15. If you see anything that is unusual either on the fish or inside the fish, take photos, make notes in the comments section of your data sheet, and carefully document the fish number, where it was caught, how it was caught, and what species it is. You should also fill out a fish lesions form.

16. Remove the otoliths (ear bones) of the fish. A trained technician can use either otoliths, fin rays, or scales to age fish, but otoliths are often the best. There are several ways to remove otoliths; we are illustrating one here. Note that this does take some practice.
    a. First, remove the head.
    b. Starting at the top of the eyes, use a fillet knife to cut through tissue and bone to expose the brain cavity. Remove any excess tissue that is preventing you from seeing into the brain cavity.



Photos taken from: http://tagotoweb.adfg.state.ak.us/OTO/Files/PortSamplingGuide.pdf

    c. Remove the otoliths from separate cavities on the right and left side of the brain.

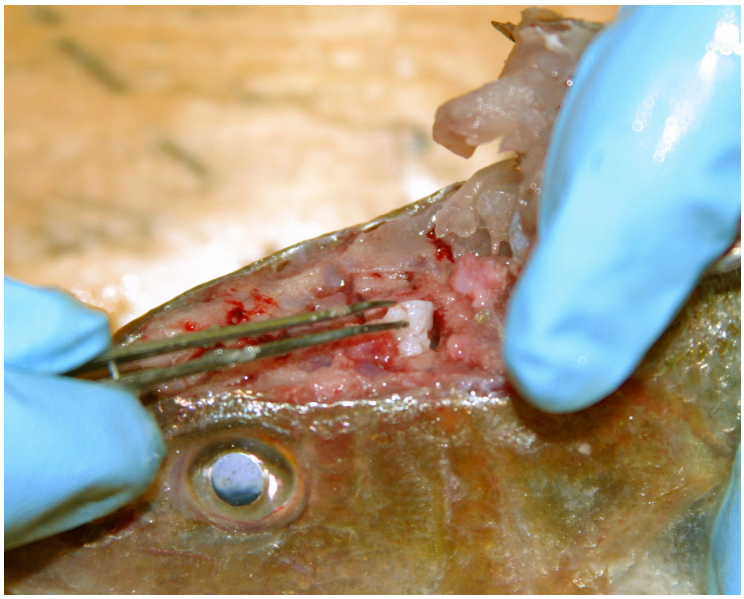
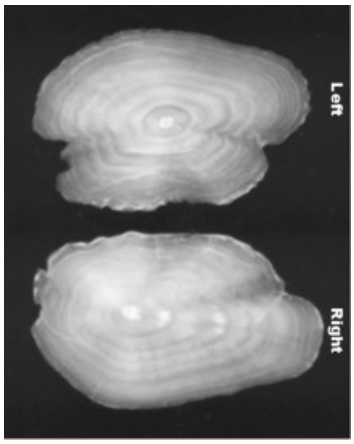


Photo taken from:
http://www.odu.edu/sci/cqfe/Outreach/Woodrow%20Wilson%20Science%20Club/Elements/

d. They will be very small, and should look something like this:

Photo taken from: http://www.faomedsudmed.org/images/events_pict/otolith.jpg



e. Place each otolith on your glove as you take it out, and use a finger on your other hand to gently remove the fluid and sac that surrounds the otolith. Once it is dry, put it in a labeled ageing envelope.

17. Using the table below, find a second ageing structure to take from your fish.

Family Common Name	**Structure**	**Comments**
Yellow Perch	First three dorsal spines, opercles, or scales	Spines are more precise for older fish
Walleye	Pectoral fin rays, dorsal spines, or scales	Scales are not useful for old or slow-growing fish
Burbot	Pectoral fin rays	Otoliths really are the best structure for burbut
Whitefishes and Ciscoes	First four pectoral fin rays or scales	
Suckers	Opercle, pectoral fin rays, or scales	Only opercles or otoliths for older fish
Trout, char, grayling, and all minnows	First four pectoral fin rays or scales	Scales are very poor indicators of age for trout
Northern pike	Pectoral fin rays, cleithrum, or scales	
Goldeye	Scales, opercle	
Inconnu	Pelvic fin rays	

a. Dorsal spines

For dead fish, start near the head and use a pair of side cutters to remove the first 3 spines from the dorsal fin. Cut as close to the fish's body as possible (see below). If the fish is going to be released live, carefully take the third spine while being careful not to draw blood or rip the fish's flesh. Place the spine(s) in a pre-labelled ageing envelope.

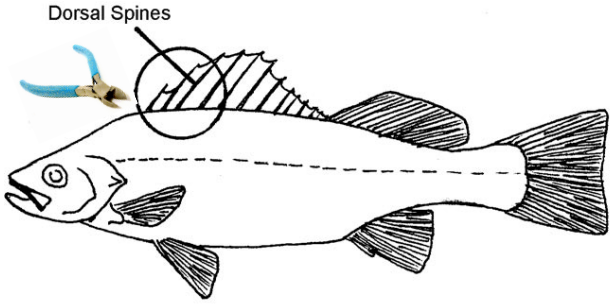
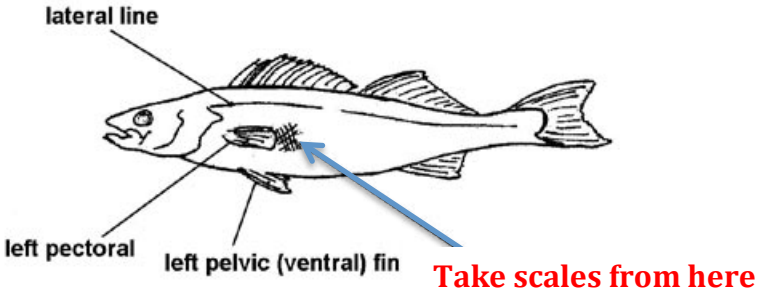


Image modified from Scott and Crossman 1973 in Mann 2004

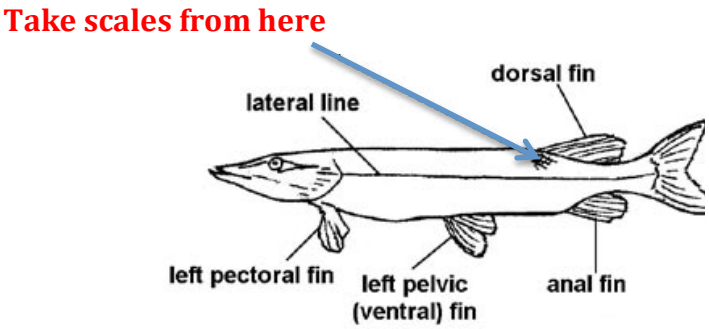
b. Scales

Collect scales from the left side of the body. Areas to collect scales from are shown in the diagrams below. Scrape the area that you are going to collect scales from with a fillet knife to remove dirt and mucus. Wipe the knife clean, and scrape again to remove 6-10 scales. Carefully wipe the scales off of the knife into a pre-labeled ageing envelope. Make sure you do not remove scales from any areas where wounds are present.

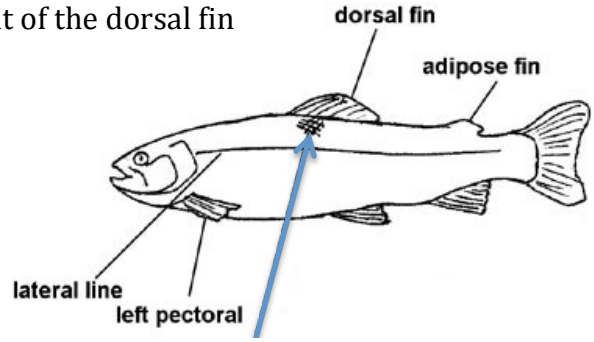
On **walleye** and **yellow perch**, remove scales below the lateral line and behind the pectoral fin



On **northern pike,** remove scales above the lateral line right in front of the dorsal fin



On all fish except walleye, yellow perch, and northern pike, remove scales above the lateral line and directly below the front of the dorsal fin

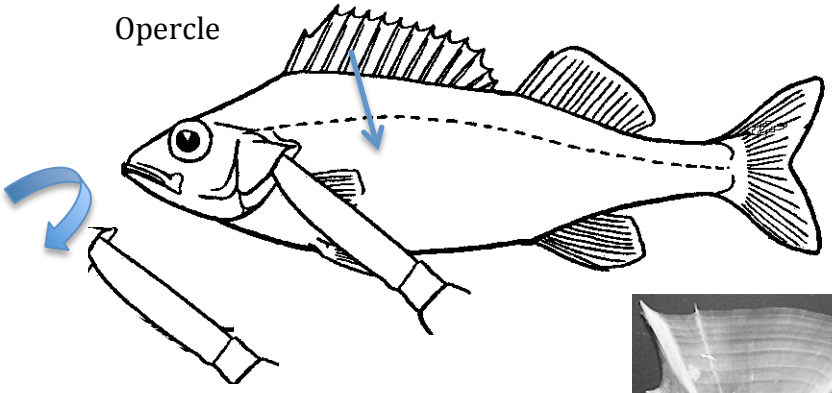


Images modified from Mann 2004

c. Opercles

For some species, the opercle bone is an excellent ageing structure. To remove an opercle (there are 2, one on each side of the fish), slip a fillet knife or a scalpel under the back edge of the bone. Make sure you don't lift up the sub-opercle, which is directly beneath. Scrape the knife or scalpel down until you get the belly end of the opercle bone. Twist the scalpel or knife to life up the bone, and then grip it with your fingers. Continue twisting and pull away from the fish – the opercle should release. Remove all flesh and muscle before placing the opercle in the envelope. Once you get good at this, you can remove the skin and muscle while ripping the bone off of the fish. To do this, grip the bottom of the bone, flip it up over itself, and then pull to remove the skin. The bone will also release.

Images taken and modified from Mann 2004

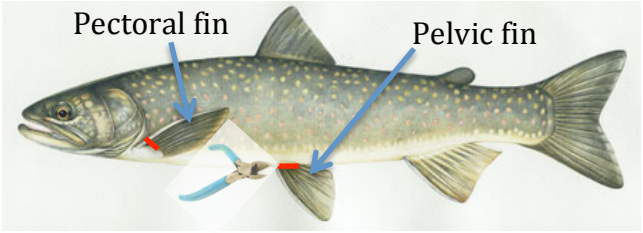


Opercle, cleaned of skin and muscle

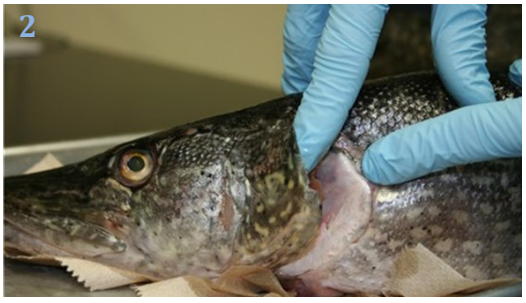
d. Fin rays

To remove fin rays, lift and extend the fin that you wish to sample. Starting at the end with the longest rays, place sidecutters against the body of the fish and snip through 3-4 rays with a pair of sidecutters. Snip as close to the body as possible without drawing any blood. Grip the snipped rays at the base and tear upward to remove them from the rest of the fin. Place the fin rays in wax paper before placing them in a pre-labeled ageing envelope. If you will be releasing the fish live, make sure not to remove the whole fin.

Image modified from http://www.pc.gc.c



e. Cleithrum
Hold the pike with the left side up. Lift up the cover over the gills. You should now be able to see the cleithrum. Push you thumb between the cleithrum and all of the tissue, flesh, and muscle. Run your thumb up and down between the cleithrum and flesh to separate it. Once it is separated, grab the top tip of the cleithrum and pull it away from the fish's body and toward the head. Be careful not to break the part of the cleithum that is under the jaw. If you think the cleithrum is going to break, use a knife to finish the separation. Remove any extra flesh before placing the cleithrum in a pre-labeled ageing envelope.



http://www.vtfishandwildlife.com/images/pike

17. Once you have everything you need from your fish, dispose of the carcass and all paper towel, saran wrap, etc. Wash all tools, and take the garbage to an incinerator or to a dump site as soon as possible. Make sure all samples are in the freezer, except the ageing structures. Contact Erin Kelly at ENR for the correct procedures on how to submit your data and where to send your samples. Erin_Kelly@gov.nt.ca

References

1) Environment Canada. 2011. Metal Mining Environmental Effects Monitoring (EEM) Technical Guidance Document. Ottawa, ON.

2) Mann, S.E. 2004. Collection techniques for fish ageing structures Northwest Region. Ont. Min. Natur. Resour., Northwest Sci. & Info. Thunder Bay, ON. NWSI Technical Report TR-73 Revised. 18 pp. + append.