

Fish Survey Protocol

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Research objective

- Long term monitoring of fish populations
- Describe habitat use of migratory fish and year-round resident fish species
- Document seasonal and annual changes in fish populations in freshwater systems

Volunteer Roles:

Volunteers must be willing to hike, swim, wade in waist-high water, and handle fish.

Seine handlers

Fish collectors

Time Keeper

Data recorder

For the River, you will need a minimum of 4 volunteers, but there is no maximum. For the creeks more than 8 people (for the Beaver Pond more than 5) becomes unmanageable.

Methodology Overview

Fish are caught by dip net (streams, beaver pond), short seine (streams, pond) and 10 m seine (river). Typically about 100 fish are caught in the streams and around 200 in the river. The length is recorded for the first 20 individuals caught of each species. Subtotals by sex are kept for fish with easily distinguished male and female characteristics (e.g. mummichog, banded killifish, mosquitofish), measuring the first twenty of each sex. After the first twenty have been measured, just the count of number caught is recorded.

The survey is postponed if it is raining or has rained within 8 hours since trying to catch fish in the rain has proven to be unsuccessful.

Methodology Detail

Streams

Place the small seine across the stream to block any fish fleeing downstream to escape the dip nets. Make sure the seine is on the bottom of the stream and extends across the width of the stream.

Proceed upstream with the dip nets. Be sure to sample in grassy areas, undercut banks, shady areas near logs and in the deeper sections of the stream.

Transfer fish from the dip nets to the buckets after each sweep of the net.

After surveying a reasonable section of stream or after there are enough fish in the buckets, “process” the fish. (See below)

River

The 10 meter seine is used for this site. The seine is started perpendicular to the shore. The end on shore stays fixed and the outer end pivots towards shore. It is important to keep the bottom of the seine on the river bottom. Move the seine so the top of the pole is lagging the bottom (this will tend to send the fish towards the top of the net, not the bottom where they could escape more easily). Move the seine as quickly as possible towards shore. When the seine approaches the shore line, the remaining people stomp in the water/grass to chase fish back into the seine. They then lift the seine with the bottom edge leading to catch the fish in the net. Fish are then scooped up with wet hands to transfer them to the buckets. If a fish is caught in the net, it is usually possible to free the fish by pushing it through head first. Do not push it out towards the tail.

While seining, another person records the length of the seine and the amount of time it takes for the seine to go from the starting to ending position.

Beaver Pond/Otter Point

This is actually two surveys done consecutively. The survey starts at the Otter Point board walk, and continues up the channel towards the beaver dam. This tidal portion is recorded on the Otter Point data sheet. The portion above the dam is recorded on the Beaver Pond data sheet.

Waterproof paper for the data sheets is essential for this survey. The fish identification key can be awkward to use in the pond and can be skipped if sufficient identification expertise is available. Due to the deeper water (about shoulder deep in the pond), catching fish is more difficult at this location. No attempt is made in this location to measure the length of the fish. There is no channel to block, so the short seine can be used to sweep up fish. The dip nets are also used. The dip nets are most effective as a quick jab than a slow sweep. A yellow basin or other floating container can be helpful for holding materials at this location. The fish viewer is not used (would sink and get lost) but a small plastic aquarium can be useful for distinguishing similar species.

During sign up for this survey, participants should be warned about the water depth. A full change of clothes and a towel are certainly needed. Vegetation near the dam can be thorny so long pants may be beneficial. This survey is generally not suitable for children.

Processing the Fish (Identification, Measurement and Release)

Fish become stressed when handled. Minimize how often you touch any one fish, and minimize how often you transfer fish between steps.

Step 1. Waiting to be processed. When the buckets are filled with fish, transfer the fish to a basin. You can carefully pour the water and fish into a small aquarium net—place your hand under the net to support the fish.

Step 2. Identification. Remove a single fish and transfer to a small aquarium filled with well water or into the viewing chamber filled with river or stream water.

The unidentified fish is placed in the fish viewer. Put enough water in the viewer for the fish to not get stuck.

The fish key is based on easily observed characteristics – the number of dorsal fins and the shape of the tail, as opposed to more technical distinctions commonly used in other keys.

Identify the fish to species and proceed to Step 3. Once the group becomes familiar with the common fish, it is not necessary to put each fish in the viewer, this will minimize stress on the animal.

Step 3. Measuring. Transfer fish to the measuring board. When removing the fish from the viewer, pour the fish out on the long side of the viewer. (It would appear to be neater to pour over the short end, but it usually does not succeed.) The plastic channel on the square ends of the viewer tend to trap fish if you pour in that direction.

Several species (e.g. inland silverside, shad, bay anchovy) are sensitive and do not survive for long after collection. Try to identify and release them as soon as possible. To minimize stress on these fish, do not measure their length.

The first twenty fish of each species are measured in the measuring tray. It is usually easiest to position the fish with head in the corner of the tray. The fish is measured from the tip of the snout to the end of the tail. With enough water, the fish is relatively calm (at least not flipping around), but with too much water, it may try to swim around. Experiment with the water quantity as you gain experience.

Once twenty fish of one species are measured, you may skip Step 3 for that species and just record the total number caught.

Step 4. Waiting to be released. After identification, the fish is placed in a basin or bucket to be released. When fish are released, be sure to release fish in a location where they will not be caught again as sampling continues.

Equipment List

Select quantities appropriate for the group size.

- Jug Bay Fish Key (all pages) -- multiple copies
- Fish Key for specific location (Two Run, Patuxent River)
- Clipboard with fish data sheet (water proof paper!) and pencil
- Fish Viewer
- Small aquarium (for identification)
- Fish measuring tray
- Jug for water (well water for identification)
- Dip nets (streams and pond)
- Small (1 meter) seine (streams and pond)
- 10 meter seine (Patuxent River).
- Buckets for fish as they are caught (2-3 for stream, 4+ for river)
- Small nets for removing fish from the buckets.
- Basins (yellow plastic dish pans) to hold fish being identified (1-2 for stream or pond, 4 for the river)
- Clear plastic aquarium (if desired for temporary holding of interesting fish)
- First Aid kit
- Cell phone in case of emergency

(The 10 m seine, a fish viewer and some containers are usually kept at the river farm building)

Scheduling

Patuxent River sampling in June usually coincides with the Johns Hopkins field class. Avoid scheduling around low tide because the muddy bottom at that time is within the seining area instead of being further offshore. However, DNR Fisheries¹ suggests not surveying until July to observe full species diversity. For example, during the 2008 season, many shad were found in July that were not seen in June.

The beaver pond is sampled in August to give the water as much time as possible to warm up. Since the initial part of this sample is from Otter Point, this is best done around low tide unless the event is advertised as “swim with the fishes.”

Two Run Creek is sampled twice, once in spring and once in fall.

Pindell Creek should be sampled once a year in the fall.

Galloway Creek should be sampled once in summer or fall.

¹ Informal conversation during Otter Point Creek fish training, June 2008. Their surveys do not start until July for this reason.

Jug Bay Fish Survey

- Before starting be sure to wash your hands to remove all traces of insect repellent or sun screen. These chemicals will injure the fish
- To move fish by hand, make sure your hands are wet, and scoop up the fish.
- Place the capture bucket over the seine in case a fish jumps out or you miss the bucket when placing fish.
- Keep the seine bottom on the bottom of the stream/river.
- The Fish Identification Guide identifies fish first by the number of dorsal (top) fins and then the shape of the tail (rounded/broom-shaped or forked).



Seine in position to sweep to the right.



End of seine sweep. Note bottom edge of seine (on left) has been lifted..



Seine coming ashore. The two people on the right had been stomping to chase fish into the net and are now pulling the bottom of the net along the bottom of the river to keep fish from escaping and then pulling it up as the person on left who has pulled the seine through the water makes the pole horizontal.