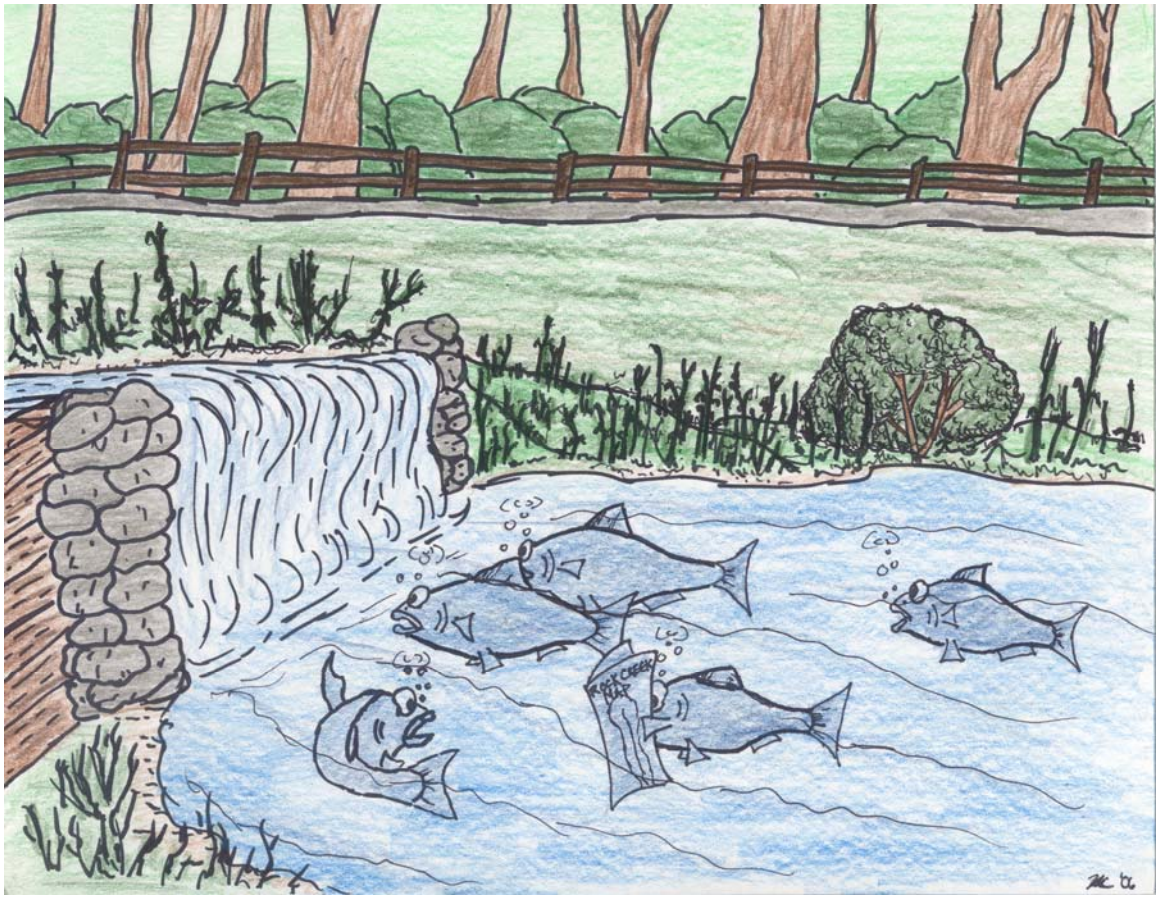
Herring Highway

A Study of a New Fish Passage for River Herring
at Rock Creek National Park



Field Study Data Collection Guide

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I. Student Census of Fish in Rock Creek

I-A
Use a Seine Net to Catch Fish

1. Find two members of the group who are equipped with chest waders and a net. Make one of them the “inside” person and one of them the “outside” person.

2. Find a place in the creek, about ten meters long, with a good amount of flowing water and few things to snag the net on.

3. Keep the “inside” person just barely in the water at the upstream end of the ten meter stretch with one pole end of the seine net. Walk the “outside” person out towards the middle of the creek with the other pole until you have nearly the entire length of the seine net stretched between them perpendicular to shore.

4. When both partners are ready to begin, the “outside” person quickly moves around the “inside” person, walking faster than the current of the water is flowing, until he is parallel with the “inside” person and the shoreline. As the “outside” person is moving they have to remember to keep the bottom of their net at the bottom of the creek, so they should "bounce" the pole along the bottom, tapping the rocks and mud as they go. All the “inside” person has to do during this time is also try to keep the end of the pole at the bottom and move slightly downstream to keep up with the “outside” person, as required.

5. When the “outside” person has come around the “inside” person and both are an equal distance from the shore, they should simultaneously scoop the bottom of the net out of the water, lifting up any caught fish in the process. Do not scoop too fast or you might flip the fish out of the net.

6. With the fish now caught you should get them into the bucket as quickly as possible.

I–B
Move Fish to a Bucket

1. The top priority at this stage is to securely catch the fish, insuring that we move them as carefully as possible in order to avoid injuring or traumatizing them.

2. Do not touch the fish with dry hands! Make sure the students’ hands are wet before they ever handle fish! The fish have oils that protect their scales, touching them with dry hands strips these oils making the fish vulnerable!

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I. I. Student Census of Fish in Rock Creek, *continued*

I-B
Move Fish to a Bucket
continued

3. Fill one bucket full of water from the stream.
4. If the fish is lying on the net, you, demonstrating for the students, can position one hand, palm open, right next to fish and use your other hand to either tug on the net or lightly slap the bottom of the net to "flip" the fish into your open hand.
5. With the fish lying in your hand, you can carry it quickly to the bucket. Repeat until all fish are safely in the bucket. At no time in this process do you squeeze the fish, or even run your hand over it, which could injure its gills, fins, or scales.
6. Once the fish are in the bucket and they are safe, finish your collection and identify and count them as quickly as possible.

I-C
Identifying and Counting the Fish

1. Fill all four small aquariums with water from the bucket of fish. If extra water is needed to fill the aquariums, then get it from the stream.
2. Use the small dip nets to transfer the fish from the bucket to the aquariums. Try to distribute the fish evenly between the aquariums.
3. The students should then use the fish key to identify all of the fish they caught.
4. If they are not absolutely sure about an ID, they should ask you, the ranger. Familiarize yourself with the key and the fish.
5. If there are one or two individual fish that you can't seem to ID to your satisfaction, it is ok to write “# unknown fish,” but only as a last resort.

I-D
Releasing the Fish

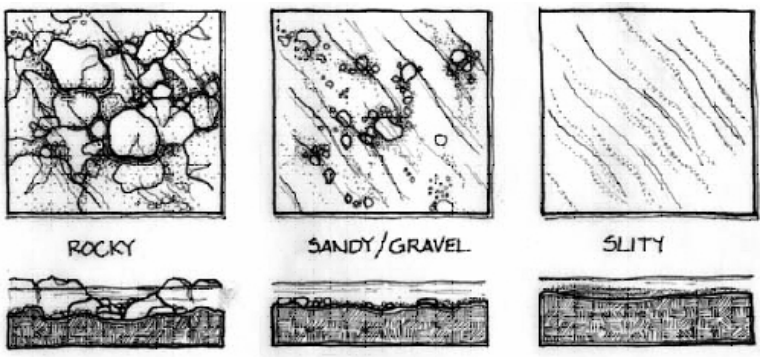
1. Once the students have identified the fish you should return them to the creek as quickly as possible.
2. Just dumping them into the creek could hurt them by causing them to hit the bottom or collide with rocks, so instead you should gently ease the aquariums into a section of relatively still water and allow the fish to swim out and away.

II. Habitat Assessment

II-A
Stream Bottom Substrate

Ask students to look at and reach into the water and feel the creek bed.

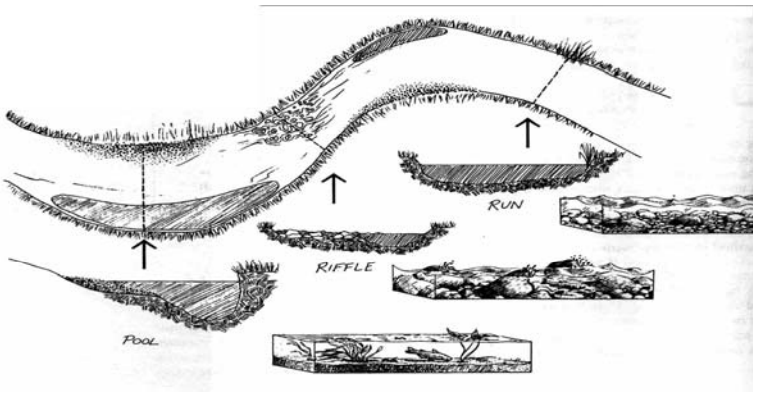
- If it is mostly rock, have them circle “rocky.”
- If it is a mixture of rock and sand/silt/mud, have them circle “sandy/gravel.”
- If it is mostly sand/silt/mud, have them circle “silty.”



II-B
Stream Habitat Type

Ask students to look at the stream reach where the seines are being run.

- If the area is deep with slow moving or circular moving water, have the students circle “pool”.
- If the area has water moving swiftly in one direction without riffles or rapids, have the students circle “run”.
- If the area is swift moving shallow water with lots of riffles and/or rapids, have the students circle “riffle”.



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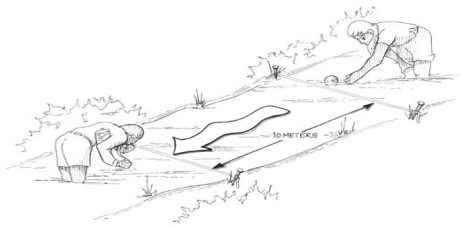
II. Habitat Assessment, *continued*

II-C Stream Channel Width and Depth

1. Three students in chest waders are needed to complete this. They will need, a tape measure, and a meter stick.
2. Send one with chest waders carefully to the other side of the creek to measure the width.
3. Record the width on the data sheet.
4. Divide the width by four so that you have three evenly spaced increments along the measuring tape to use the meter stick to measure depth. For example, if the width is 12m, then 12 ÷ 4 = 3, so you would take the depth measurements at 3m, 6m, and 9m. Do not take a measurement at 0m or 12m; the depth at this location should be 0 because you are standing on the bank. If the width was 15m, then you would take depth measurements in increments of 3.75m: 3.75m, 7.5m, and 11.25m.
5. Record the depths on the data sheet, and find their average.

II-D Stream Speed and Stream Flow

1. Use the measuring tape to measure a ten meter stream reach near where the seines are being run, parallel to the stream bank.
2. Have one student stand at the upstream end of the ten meter stretch and release a floating stick.
3. When floating object crosses the 0m mark of the measuring tape, start timing object with a stopwatch.
4. Stop timing when floating object crosses 10m mark of measuring tape.
5. Record the time, in seconds, on the data sheet. Repeat the process three times and get an average time.
6. To get the flow, plug the numbers from stream width, depth, and speed into the flow equation on the data sheet. Be sure to keep all the measurements in meters and the time in seconds.



III. Water Quality Analysis

III-A Water Temperature

1. Ask students take out the blue plastic thermometer from the LaMotte kits.
2. Tell the students to go down to the creek and submerge the thermometer for 90 seconds.
3. After 90 seconds, the students should remove the thermometer and read the temperature. Have them record this on the data sheet.

III-B Dissolved Oxygen and pH

1. The instructions for these tests are attached at the end of this document and are inside the LaMotte test kits.
2. Practice these tests and familiarize yourself with the test instructions to be able to guide students and answer their questions.

s*pecific instructions continued on next page*

Measuring Dissolved Oxygen

Instructions for the LaMotte Field-Test Kit

Fill the glass bottle with your water sample, being sure to fill it completely. Cap it while the bottle is still underwater. You should be able to turn the capped bottle upside down and not see any air bubbles.

Remove the cap from the water sample bottle. You will be adding chemicals to a very full bottle, and it may overflow slightly.

Immediately add 8 drops of manganous sulfate to the water sample.

Then, immediately add 8 drops of alkaline potassium iodide azide to the water sample

Recap the bottle and shake to mix.
Set the sample bottle down and let the precipitate (cloudiness) form.

When the precipitate settles below the top of the bottle, add one level spoon of sulfamic acid powder to the water

Measuring spoon for sulfamic acid powder

Recap the sample bottle and gently shake until the precipitate has totally dissolved. The solution will be clear yellow to orange. The water sample is now "fixed," meaning that air will not affect it.

You will now begin the titration, which means adding a chemical drop by drop, swirling to mix after each addition, until the desired color change has occurred.
Fill the glass titration tube to the 20 mL line with the fixed water sample. Cap the titration tube.

Insert the titrator into the plug in the top of the sodium thiosulfate titrating solution. Fill the titrator with the sodium thiosulfate solution by turning the bottle upside down and slowly pulling the plunger of the titrator until the bottom of the plunger is even with the zero mark of the titrator scale. Make sure there are no air bubbles in the titrator.

Without moving the plunger, insert the titrator tip into the opening of the glass titration tube cap.

Gently depress the titrator plunger to add **<u>1 drop</u>.** Swirl to mix.

Carefully remove the titrator without disturbing the plunger and add 8 drops of starch indicator solution.

Replace the cap on the glass titration tube and swirl. The sample should be bluish gray.

Without moving the plunger, continue titration one drop at a time until the sample is colorless. (If you hold a piece of white paper behind the sample, it will be easier for you to tell when it's clear.)

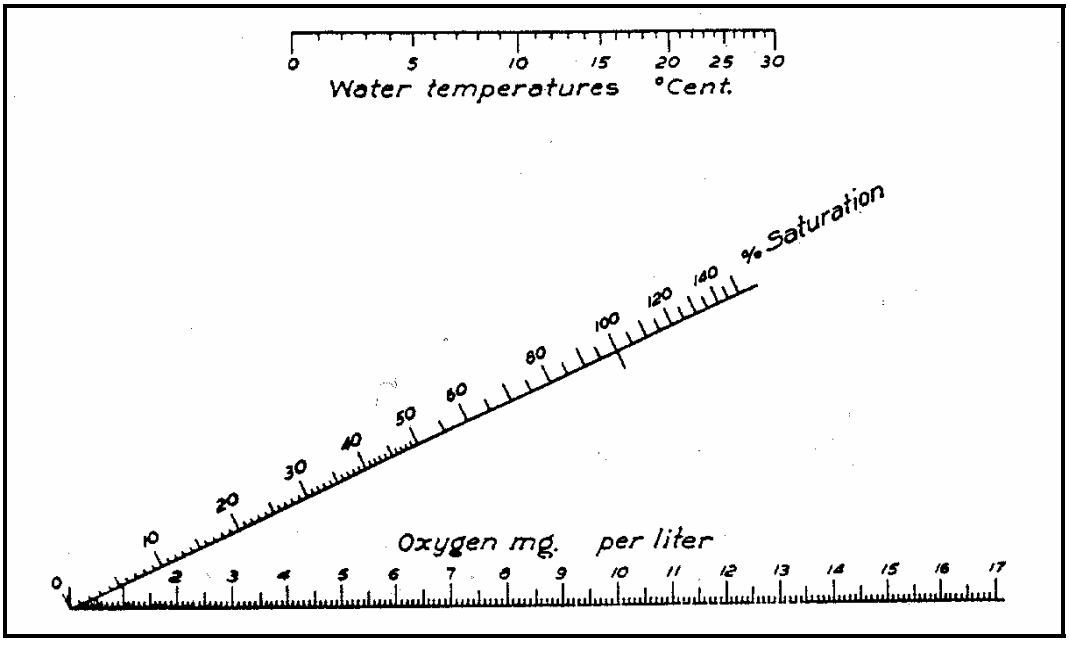
Read and record the amount of titrant used by reading the amount where the titrator tip meets the scale. Each small division on the scale equals 0.2 ppm. This number equals the mg/L of dissolved oxygen in the sample.

Record the temperature of the water where you collected your sample in ^{o} Celsius.

Determine the maximum percent dissolved oxygen by using the graph below:

- Find the water temperature value on the top scale.
- Find the DO reading in mg/L on the bottom scale.
- Draw a line between these two points.
- Where the line crosses the sloping saturation scale is the maximum DO percentage.

Maximum Percent Dissolved Oxygen at Various Water Temperatures



Determining pH

Instructions for the LaMotte Field-Test Kit

Make sure you have all the equipment and reagents needed.

1 bottle Wide Range pH Indicator solution
1 test tube with cap
2 wide-range pH comparators

PART 1 - SAMPLE COLLECTION

1. Rinse the test tube with some of the water from the test site.
2. Fill the test tube to the line with the sample water.
3. The sample should be tested quickly because changes in temperature can affect pH values.

PART 2 – ADDING REAGENTS

1. Locate the Wide Range Indicator in your kit.
2. Uncap the Wide Range Indicator.
3. Invert the Wide Range Indicator over the test tube with the water sample.
4. Add 10 drops of Wide Range Indicator to the water sample.
5. Cap the test tube and mix by shaking.
6. Cap the Wide Range Indicator and return it to the kit.

PART 3 – READING RESULTS

1. Get the two Comparators from the kit.
2. Put the sample test tube into the Comparator with colors closest to the sample color.
3. Hold the Comparator up so that you can find the color your sample is closest to, but don't use direct sunlight or an unevenly lit background. Match the sample color to a standard color.
4. Record the number of the matching standard as pH.