AS011 – Fish and Amphibian Database, HJ Andrews Experimental Forest

Below are detailed protocols used for collection of aquatic vertebrate data.

Overall, backpack electroshocking to sample aquatic vertebrates used two methods: mark-recapture and depletion sampling. The sampling was conducted by several groups over time. All sampling involved placing block nets at the upper and lower extent of the study reach, then electroshocking and capture of individuals. Individuals were anesthetized before weighing and measuring of their length and allowed to recover fully before being released in the stream. Data were entered into digital format from field data sheets and quality checked using length/weight graphs.

STREAM TEAM sampling was consistently mark-recapture electroshocking with an upstream and downstream pass. This method involved two days of sampling using a single electroshocker and capture with multiple dip netters. On Day 1, all individuals that were captured during shocking, using one pass up then one pass down, were weighed, measured and marked then released. On Day 2, the same area was resampled using same effort for one pass up and one pass down and all individuals captured, measured, weighed and those with marks noted, then released.

Stream Team Sampling protocols:

DAY1 - Marking

1. Place block nets at the upstream and downstream ends in a 70-100 m reach to prevent fish emigration or immigration. Flag each reach at the upstream and downstream ends (take a photograph of each end and record the geographic position using a GPS). Make sure bottom lines of net have contact with stream bottom across entire net. Secure the bottom lines of the net with cobble to produce a temporary (1-day) vertebrate barrier.
2. Record time of start and end as well as the electroshocker settings.
3. Perform a single upstream electroshocking-pass followed by a downstream pass (one person with backpack electroshocker and two netters). Keep the same fishing effort during all surveys and across reaches.
4. Keep all captured vertebrates (trout, sculpin, frogs, tailed frogs, and salamanders) in buckets with bubblers. Use the SCALER protocol to anesthetize individuals (MS-222) and measure length (fork and total length for CT, and vent and total length for PGS) to the nearest millimeter and weight to the nearest tenth of a gram. Note lifestage-developmental stage for tailed frogs and measure total body length (not including legs). Record all the data for individual vertebrates on the datasheets. Indicate the name of the site, GPS coordinates and MARK-RECAPTURE DAY 1 at the head of the first page.
5. All captured vertebrates should be marked (fishes: fin clip from the dorsal tip of the caudal fin; salamanders: tail fin clip; tailed frogs tadpoles: tail fin clip; tailed frog adults: longest toe on hind leg clipped).
6. After electroshocking has been completed, and individuals have recovered in buckets of fresh water and release one or two at a time throughout the length of the reach to facilitate random mixing with other vertebrates that were not captured.

7. Leave the block nets in overnight at the reach.

DAY 2 - Recapture

1. After 18-24-hrs, revisit site. Indicate the name of the site, date, and MARK-RECAPTURE DAY 2 at the head of the first page.
2. Repeat the procedure detailed for DAY 1 - only steps 2 & 3 and measure and weigh those not marked. IMPORTANT! When handling individuals check for marks and identify those that were previously marked ("Recap" or "R") in the spreadsheet as well their length.
3. Allow individuals time to recover and release them back to the reach.
4. Measure length of reach. Every 5meters, measure the width of wetted channel, record 5 water depths across the channel at that transect, and record maximum water depth at that transect.
5. Prepare tracer -slug release with salt and EC meters (See database zzz). Do not walk in the 30 m reach of channel while slug is passing through.
6. GPS location of nets and take out block nets while waiting for the slug.
7. At HQ, scan notebooks and datasheets and upload to HJA computer.

PENALUNA-SCALER depletion sampling:

We surveyed aquatic vertebrates of fishes and amphibians using 2-pass depletion backpack electrofishing at the beginning and end of the ~40 day field experiment in each reach. Generally, we used two backpack electroshockers, two shocking netters, and a kick seine netter (to catch animals that got pushed or rolled downstream in the current). Here, in this database, we only include data from the initial sampling time data, and note direction of pass. For each individual, we measured length (total length and additionally vent length for amphibians) and weight (g) of each individual aquatic vertebrate that was captured. Data were entered from data sheets and quality checked using length/weight graphs. SCALER study reaches are also included in Andrews SCALER database.

WARREN depletion sampling involved one, two or three equal-effort passes to sample fish and salamanders from each reach. Frogs were not sampled. Stream reaches were blocked on both ends with nets to ensure a closed population during multiple-pass depletion sampling.

Sampling Methods:

1) Block nests are deployed at the upstream and downstream end of each reach to prevent fish and salamander emigration or immigration.
2) Preform an upstream electroshocking pass (Pass 1). One person operated the electroshocker while two netters captured fish and salamanders. Each pass is just in the upstream direction.

3) All fish and salamanders from Pass 1 are kept in aerated containers and the containers are labeled as “Pass 1”.
4) Preform another upstream electroshocking pass (Pass 2) with the same sampling effort as Pass 1. All individuals captured during Pass 2 are kept in separate containers labeled as “Pass 2”.
5) Preform another upstream electroshocking pass (Pass 3) with the same sampling effort as Pass 1 and Pass 2. All individuals captured during Pass 3 are kept in separate containers labeled as “Pass 3”.
6) If the number of fish captured in Pass 3 is not at least half or less of the number of individuals captured in Pass 2, an additional, fourth pass is conducted.
7) All captured trout and salamanders were anesthetized using Aqui-S clove oil and measured to the nearest millimeter (total length for trout and both total length and snout-vent-length for salamanders), and weighed to the nearest 0.1 g. Record the site, date, each fish/salamander length, weight, and the pass it was captured on.
8) After measuring and weighing is completed and individuals are recovered in buckets of fresh water, individuals are released one or two at a time throughout the length of the reach to facilitate random mixing with other vertebrates that were not captured.
9) Measure length of reach. Every 5 meters, measure the width of wetted channel as well as width of bankfull channel.
10) Block nets are removed.
11) At HQ, scan/take pictures of notebooks and datasheets and upload to HJA computer.

WARREN mark recapture involved two days of sampling using electroshocking and capture with dip nets. On Day 1 all individuals that were observed during shocking were captured, weighed, measured and marked then released. On Day 2, the same area was resampled and individuals (re)captured, measured, marks noted, and released.

DAY1 - Marking

1. Place block nets at the upstream and downstream ends in a 70-100 m reach to prevent fish emigration or immigration. Make sure bottom lines of net have contact with stream bottom across entire net. Secure the bottom lines of the net with cobble to produce a temporary (1-day) vertebrate barrier.
2. Perform a single upstream electroshocking-pass (one person with backpack electroshocker and two netters). Keep the same fishing effort during all surveys and across reaches. Keep all captured vertebrates (trout, sculpin, tailed frogs, and salamanders) in buckets or coolers with bubblers. All captured trout and salamanders are anesthetized using Aqui-S clove oil and measured to the nearest millimeter (total length for trout and both total length and snout-vent-length for salamanders), and weighed to the nearest 0.1 g.

3. Record the site, date, MARK-RECAPTURE DAY 1, and the length and weight of each fish/salamander length.
4. All captured vertebrates should be marked (fishes: fin clip from the dorsal tip of the caudal fin; salamanders: tail fin clip; tailed frogs tadpoles: tail fin clip; tailed frog adults: longest toe on hind leg clipped).
5. After electroshocking has been completed, and individuals have recovered in buckets of fresh water, release one or two at a time throughout the length of the reach to facilitate random mixing with other vertebrates that were not captured.
6. Leave the block nets in overnight at the reach.

DAY 2 - Recapture

7. After 18-24-hrs, revisit site. Indicate the name of the site, date, and MARK-RECAPTURE DAY 2 at the head of the first page.
8. Repeat the procedure detailed for DAY 1 - only steps 2 & 3 (measure only length this time). IMPORTANT! When handling individuals check for marks and identify those that were previously marked ("Recap" or "R") in the spreadsheet as well their length. No need to reweigh.
9. Allow individuals time to recover and release them back to the reach.
10. Measure length of reach. Every 5 meters, measure the width of wetted channel as well as width of bankfull channel.
11. At HQ, scan/take pictures of notebooks and datasheets and upload to HJA computer.