

Tadpole Density Estimation Protocol

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Quantifying how many animals we observe in a given place can be useful for estimating population size, occupancy and detection probabilities, or tracking habitat use over time.

While there are quite a few methods for occupancy estimation, some of the simplest field methods are Visual Encounter Surveys (VES), and Dip-netting Sampling (DS).

Important caveats include a need to sample all microhabitats so species with limited distributions will not be missed. In addition, we also need to keep the timing of the survey in mind, some species will be more active and observable during different periods, so recording the time of day is crucial.

Dipnet Sampling

While there are no specific rules for how many dip-net sweeps to take, there have been several papers which assessed how much variability in estimates of a population may shift with differing number of samples (see Jung et al. 2002, Sanders et al. 2015, Iwai 2017). Following Heyer et al. 1994, establish a pre-determined number of sweeps per site, and ensure equal numbers of sweeps are conducted by all parties with nets.

To estimate densities of larvae, quantify how much water volume is sampled with each sweep. This can be split into multiple groups (e.g., 10 sweeps at 1/4 of the frame, 20 sweeps at 3/4 of the frame), but should be recorded to then determine volume. In addition, use the same sweep length across all sweeps, ideally 1m, but this can be adjusted as needed. These data can then be used to calculate the total volume and area sampled to estimate the relative density of species.

For montane ponds/lakes with shallow margins, one application may be as follows: - Select a littoral reach that is representative of a habitat or habitat types. - Conduct 60 sweeps equally interspersed across the survey reach and count how many species and abundances of species in each sweep. - Record and calculate the total volume of area that has been surveyed using dipnets. - Estimate the relative density of a given species by calculating the total observed number of tadpoles over the total volume sampled.

This approach could be split into samples or estimates for specific macrohabitat types or vegetation types (which could also be quantified using random samples of quadrats that identify habitat type, cover, vegetation, etc at a given site or reach).

Materials

- **D-Net/Dipnet** Different mesh sizes should be considered depending on the stage/size of tadpole being sampled. Aquarium dipnets are good for smaller habitats with shallower water and are typically 10-15cm wide.
- **Measuring Tape** A 50-100m tape is useful for delineating habitats.
- **Quadrat** Easy to make, use a 1 m square, can subdivide into 0.25 grid (4 squares), use pvc if preferred, but anything will do.

Literature

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