

Simplified Steps for Salamander Monitoring

Step-by-Step Procedure for Locating and Running A Coverboard Plot

by Robert Fernandes

STEPS FOR SALAMANDER MONITORING

Use coverboard plots to monitor trends in terrestrial salamanders. Coverboards are merely pieces of wood left on the forest floor for salamanders to hide (and be counted) under. Below is a guide to help you choose a monitoring site and collect some data. For further information, you can review the more detailed protocol.

Pre-Monitoring Steps

At this point, (i.e. before any monitoring begins) it is necessary for you to take a few preliminary steps:

Identification. Learn how to identify the terrestrial salamanders located in your region. The easiest way is to use a Reptile and Amphibian field guide (which can be bought at a bookstore or borrowed from a local library), or by looking on the Internet for amphibian identification websites. Here are a few examples:

www.npwrc.usgs.gov/narcam/idguide/specieid.htm

www.cortland.edu/herp/

Target Species. Here is a list of species that have been known to exist regularly and consistently under coverboards. This should not be construed as a definitive list of species, rather one taken from the literature and personal experience. Ambystomas and stream-side salamanders also occur periodically under terrestrial cover objects, but do so only irregularly.

Scouting. Potential monitoring sites should be scouted to determine if populations of any of the salamander species are present. With only a few exceptions, these salamanders only occur in wooded areas. Scout for salamanders by turning over logs in spring or late fall (when they are most likely to be found). While any wooded area with salamanders is appropriate to set up a monitoring plot, there are two types that we are especially interested in:

Ancient or Old-growth Sites. In particular, those sites that have had little disturbance due to cutting, grazing, plowing, or other major human disturbance. These sites act as reservoirs of plant and animal populations, and they represent something of a natural control for comparison with other sites. If you have questions regarding whether a

particular site does, or does not qualify as ancient-growth, please contact Sam Droege at frog@usgs.gov or (301) 497-5840.

Disturbed Sites. At the other end of the spectrum are sites where salamander populations are or are likely to become stressed. Such sites could include fragmented woodlands, urban/suburban sites, forest management sites and grazed woodlands. Sites could be established prior to an impact, during the impact, or in the aftermath of these changes. As a general rule, the situation with the most potential is one where the monitoring can begin well before a disturbance takes place.

Type of Coverboards. Generally, untreated wood is the preferred material for coverboards. Best is green, fresh-cut lumber that has NOT been treated with any chemicals to prevent rot, termites etc. Any chemicals in the wood can potentially leach into the soil and be absorbed by the salamanders. Untreated wood can be purchased directly from saw mills, lumber yards or local farm supply stores. The size of each board should be uniform. The preferred size is 12 x 12 inches or, four 6 x 6 inch pieces placed together work well, as do two 2 x 10 inch pieces. Very large boards should not be used as the soil will dry out underneath. Whichever size you choose, the boards should be consistent throughout the plot, and the same dimensions must continue to be used from that point even after the originals rot away.

Transect or Array? The coverboards are best placed in a line transect (row) to cover the greatest area, (which can be adjusted to fit topography). However, if site space is limited then an array (grid) will work equally well. Below is an example of each type of plot, where 'x' designates the location of a coverboard.

4 x 5 Array	Line Transect
x x x x	x
x x x x	x
x x x x	x
x x x x	x
x x x x	x

Number of Coverboards. Enough so that salamander counts average 10 or more per check (during the season of peak abundance of salamanders). A rough estimate of this number can be made by scouting a prospective area during the appropriate season and counting the proportion of natural cover objects with salamanders under them. Double this proportion and use that number to estimate the number of coverboards to put in place. For example, if you found that 1 out of 10 natural cover objects had a salamander under it during your scouting runs, then you would want 50 coverboards in your array or transect. Another way to approach the problem is to put 100 boards out in a suspected low salamander density area, 50 at moderate densities, and 25 at high densities.

Installing a Coverboard. When installing a cover board, the leaf litter should be removed, the soil leveled, and the board placed so its entire surface is in contact with the earth. Boards that are not in contact with the earth are not attractive to salamanders.

Minimum Distance. The minimum distance between coverboards should be roughly 18 feet (approximately 6 meters (m)).

Numbering. Each location should be marked and numbered with a flag, label or similar object.

Optimal Conditions For Finding Salamanders Under Coverboards. Recognize the optimal environmental salamander conditions in your area. The highest surface densities are usually found in early spring and late fall (until the first hard freeze), but may vary according to your region. Generally, high air moisture, calm wind conditions, high soil and litter moisture, and low (but above freezing) temperatures are the optimal conditions that prompt salamanders to move from their soil retreats to under coverboards. If those time periods are not known, then you can check your coverboards weekly or bi-weekly.

Monitoring Steps

When optimal environmental conditions allow, monitoring can begin. It is advisable to have a few Ziploc bags and a marker handy.

Checking. Each coverboard is raised, and any salamanders found underneath should be placed in a moistened (not a lot of water, as they can drown) Ziploc bag and that flag location should be marked on the bag. The simplest way to moisten the bag is with a couple of sprays from a plant mister.

Capturing. It is sometimes easier to grab a handful of litter/dirt along with the salamander than to try and capture the salamander by its "waist." Do NOT grab the creature by the tail, as their tails break easily as a defense mechanism. If the tail does break, it can seriously lessen the salamander's chance for survival.

Identifying. Each salamander should be identified according to species. This is why learning the species is necessary prior to monitoring. It should be mentioned that some species have color variations (i.e. the northern redback salamander has a red stripe as well as a "leadback", speckled black variation) and this should also be noted.

Measuring. After all coverboards have been checked, measure the salamanders using a small ruler graduated in millimeters (mm). They can be kept in the bags and gently straightened out to facilitate measuring.

Recording. Record the snout-vent length as well as the total length. The vent is located at the hind legs and on larger specimens is easily noticeable, but on smaller specimens, closer inspection may be necessary. Keep in mind that this measurement is more important for age-class verification purposes than total length. A field guide can be referenced for a more accurate description of this measurement.

Data Sheet. All information should be recorded on the data sheets (examples will be available for downloading), and then enter the data onto the website. Always keep a copy of the data in your files.

Releasing. When all the salamanders have been measured, return them to the coverboard where they were found. In order to prevent crushing the salamanders with the board, place each one beside its respective board and gently "persuade" it to go back underneath.

Post-Monitoring Steps

Once all the necessary information has been gathered, the participants are asked to post their results on the World Wide Web through our registration and data entry site.

If you have any questions regarding any aspect of The Terrestrial Salamander Monitoring Program, contact the project coordinator, Dan Lantz at dlantz@minn.net or 612-578-8070, Sam Droege at frog@usgs.gov.

Contacts and Further Information

The sun, too, shines into cesspools and is not polluted.
-Diogenes Laertius: Lib. vi. sect. 63.

To register your monitoring site, get information about volunteering, or help with database programming contact:

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To discuss the fine points of salamander monitoring, monitoring philosophy, or building with natural materials contact:

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