

Engaging Youth in Wildlife Research: Using Coverboards to Inventory and Monitor Salamanders in Great Smoky Mountains National Park

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Abstract: Coverboards are being used more frequently as an efficient method to inventory and monitor terrestrial salamanders. In summer 2006, we established a study to inventory and monitor salamanders at Great Smoky Mountains Institute at Tremont, a residential environmental learning center located in Great Smoky Mountains National Park, Tennessee. Our goals were to: 1) compare the effectiveness of two different types of coverboards in attracting salamanders; 2) compare salamander diversity and abundance between hardwood and eastern hemlock (*Tsuga canadensis*) forests; 3) establish a long-term salamander monitoring project; and 4) create a wildlife research project that engages children and adult volunteers as citizen scientists. We selected two hardwood and two eastern hemlock sites. We established five rows of eight coverboards, for a total of 40 coverboards per site. We used two types of coverboards: 1) 30.5- × 30.5- × 2.5-cm squares of untreated eastern white pine (*Pinus strobus*), the size recommended by the Patuxent Wildlife Research Center's Terrestrial Salamander Monitoring Program; and 2) ~30.5-cm diameter × 5-cm tree "cookies" cut from recently-downed hardwood trees. The starting point of the first transect and board type was randomly selected; thereafter, boards were placed 6 m apart in an alternating checkerboard pattern. We checked coverboards approximately six weeks after being set. We used Oakton Mini-IR temperature sensors to determine surface temperature under each coverboard. Surface moisture beneath the boards was estimated by using a qualitative scale: 1 = dry; 2 = some moisture present on surface; 3 = surface and soil moist to touch. We made 48 site visits and captured a total of 49 salamanders in 1,899 board checks from August 2006 to August 2007. Tree "cookies" harbored nearly four times as many salamanders ($n = 39$ or 0.054 salamanders/board) than square coverboards ($n = 10$ or 0.014 salamanders/board). Hardwood sites had more salamanders occupying coverboards ($n = 44$ or 0.052 salamanders/board) than sites dominated by eastern hemlock ($n = 5$ or 0.009 salamanders/board). The most common species of salamander were the southern redback salamander (*Plethodon serratus*) ($n = 30$), southern zigzag salamander (*P. ventralis*) ($n = 8$), and northern slimy salamander (*P. glutinosus*) ($n = 5$). Surface temperature under tree "cookies" was lower ($\bar{x} = 15.1^\circ\text{C}$) than square boards ($\bar{x} = 15.7^\circ\text{C}$). Surface moisture beneath tree "cookies" was higher ($\bar{x} = 2.22$) than under square boards ($\bar{x} = 1.72$). Eastern hemlock sites were infested with the hemlock wooly adelgid (*Adelges tsugae*), an exotic pest that causes the trees to eventually die. Higher surface moisture levels under tree "cookies" likely provided microclimate conditions more suitable for salamanders than conditions under the square boards. We found more salamanders beneath coverboards at our hardwood sites, a pattern found in other studies as well. More than 450 elementary, middle, and high school students from 12 different schools assisted in collecting data for this study from August 2006–August 2007. We will continue the study to assess long-term trends in salamander populations at Tremont and hope to expand the study to other sites at Great Smoky Mountains National Park. The project has been an effective tool for students to learn about salamander ecology and the scientific method.

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