

Habitat conservation for stream amphibians in a managed forest landscape.

Investigators: Michael J. Adams, U.S. Geologic Survey Forest and Rangeland Ecosystems Science Center, and John P. Hayes and Niels Leuthold, OSU Department of Forest Science.

Multiple studies have examined the effects of timber harvest on headwater stream amphibians in the Pacific Northwest. Published work on the effects of timber management on stream amphibians has often been contradictory in nature. Some of the apparent discrepancies are related to methodological differences (e.g. time scale studied, site locations), but many of the conflicting results have been difficult to reconcile and have led to ambiguity in how to manage effectively timber harvests to minimize potential impacts on stream amphibian populations. Stream amphibian studies have generally been limited to stream amphibians. Data on hydrology, insect distribution, and fish distribution are rarely included in these analyses. The Hinkle Creek Paired Watershed Study provides a unique opportunity to combine data from multiple fields to help understand the impact of forest management on stream amphibians and the whole stream system.

Initial Progress

A preliminary survey of the Hinkle Creek drainage was conducted in August of 2003 with support from USGS FRESC. The survey helped to determine the stream amphibian species present and the structure and layout of the Hinkle Creek basin. The Hinkle Creek drainage appears to fall between of the ranges of the Cascade and the southern torrent salamanders (*Rhyacotriton cascadae* and *Rhyacotriton variegatus*), and no torrent salamanders were detected during the initial amphibian surveys. The Pacific giant salamander (*Dicamptodon tenebrosus*) was abundant in many of the stream segments surveyed and appears to be relatively widespread in the Hinkle Creek drainage. Tailed frog (*Ascaphus truei*) adults and tadpoles were not found in any of the stream surveys. In 2002, the fish survey crews have a record of a tailed frog observed in a 50-foot section of stream, but an initial hand survey in the same area failed to detect any tailed frogs. Additionally, one Dunn's salamander (*Plethodon dunni*), one rough-skinned

newt (*Taricha granulosa*), and a few red-legged frogs (*Rana aurora*) were observed outside of transects.

Methods

A large number of small sites are being used to look at the distribution and abundance of stream amphibians within the Hinkle Creek watershed. Each stream was split into segments that occur between major tributaries on the stream. Three sites are systematically placed within each of these segments at equidistant locations. Each site spans the width of the stream and is approximately one meter in length. Each site is netted at the downstream and upstream end and is then surveyed by hand. Repeat surveys are being conducted at each site to help account for sites where individuals may be present, but are not detected (MacKenzie et al. 2002). Repeat surveys are conducted 10 minutes after the end of the previous pass, or 10 minutes after the release of captured individuals if this occurs after the end of the survey. To minimize the impact of a survey on the subsequent resampling of the site, a light touch method is being used on each pass.

Preliminary Results

A total of 92 segments were identified for sampling in the Hinkle Creek watershed. Headwater segments less than 500 meters in length were dropped from consideration, because early surveys found they were dry, leaving 48 segments to be sampled. Nine of the 48 stream segments were dropped from the sampling due to lack of water, or short segment lengths that made it impossible to place three sample sites on the segment. Two people were hired to assist with the fieldwork during the summer of 2004. A total of 114 sites were visited and 108 of these sites were sampled (Figure 1). Six sites were located in dry areas or areas that could not be sampled and no surveys took place at these sites.

Almost all of the captures were Pacific giant salamanders, but one larval torrent salamander, and two tailed frog adults were captured. The aquatic insect crew reported catching two tailed frog larvae in a sample. Our sampling in the same area did not find any tailed frog larvae. A few red-legged frogs, Dunn's salamanders and rough skinned newts near transects were observed. Torrent salamanders and tailed frogs appear to be rare in the Hinkle Creek watershed, and an analysis of these species is unlikely.

The sampling data (Figure 1) indicates that Pacific giant salamanders are widely distributed in the Hinkle Creek basin. The pattern of Pacific giant salamander presence suggests that they were rarely found in the extreme headwater sections of stream, but were fairly widespread in the lower sections of stream. Overall, Pacific giant salamanders were found at 54% of the sampled sites. If only one survey had been conducted at each site, Pacific giant salamanders would only have been detected at 46% of the sites. Initial analysis indicates that detection probability was approximately 80% on each survey. After three surveys the probability of detecting Pacific giant salamanders at a site, if present, would be greater than 99%, while after two surveys it would be approximately 96%. This data suggests the value in performing multiple surveys on each site to increase confidence that sites with no detections are truly unoccupied. If only one survey were conducted per site, changes in the apparent occupancy rate would be confounded with our ability to detect Pacific giant salamanders successfully.

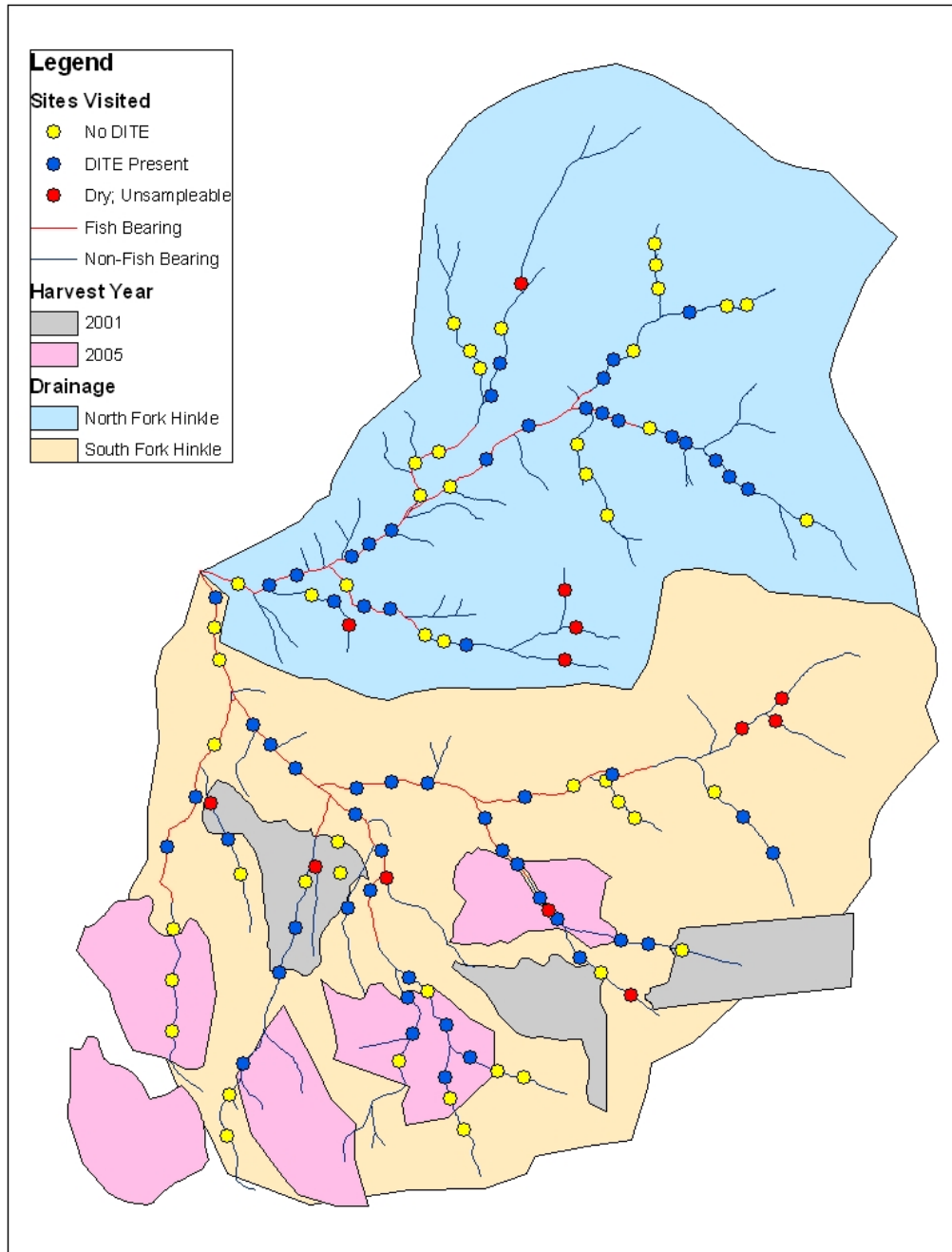


Figure 1: Presence of pacific giant salamanders (DITE – *Dicamptodon tenebrosus*) in stream amphibian sites sampled during the summer of 2004.

MacKenzie, D.I., J.D. Nichols, G.B. Lachman, S. Droege, J.A. Royle, and C.A. Langtimm. (2002). Estimating site occupancy rates when detection probabilities are less than one. *Ecology* 83: 2248–2255.