

# THE CONTRIBUTION OF WORKING FORESTS AND THE FORESTS AND FISH ADAPTIVE MANAGEMENT PROGRAM IN SUSTAINING ECOSYSTEMS FOR AMPHIBIAN ASSEMBLAGES IN THE PACIFIC NORTHWEST



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## INTRODUCTION

Washington State has over 14 million acres of forestland and is the second largest lumber producer in the nation. Much of this forestland (40%) is private and state-owned and covered under the Forests and Fish Habitat Conservation Plan (HCP). This HCP, a collaborative effort between federal, state, tribal, and county governments, conservations groups, and forest landowners, was designed to:

- comply with the federal Endangered Species Act for all fish species and 7 species of stream-associated amphibians (Figure 1);
- support a harvestable supply of salmon;
- meet Clean Water Act requirements; and
- maintain the viability of the timber industry.

Unique to the Forests and Fish HCP was the development of a Cooperative Monitoring, Evaluation, and Research (CMER) Committee-advised Adaptive Management Program. This program promotes studies to evaluate and improve forest practices for the protection of public resources consistent with other HCP goals. We have been conducting amphibian-related research on managed lands in western Washington as part of this program since 2000 (Figure 2).



**Figure 1.** Seven stream-associated amphibian species are protected under the Washington State Forests and Fish HCP. Protected species include: **a)** Coastal and Rocky Mountain Tailed Frog (*Ascaphus*); **b)** Columbia, Cascade, and Olympic Torrent Salamanders (*Rhyacotriton*); and **c)** Dunn's and Van Dyke's Salamanders (*Plethodon*). **d)** Coastal and Cope's Giant Salamanders are not protected under the HCP, but are stream-associated and common to the study area (*Dicamptodon*).

## OBJECTIVES

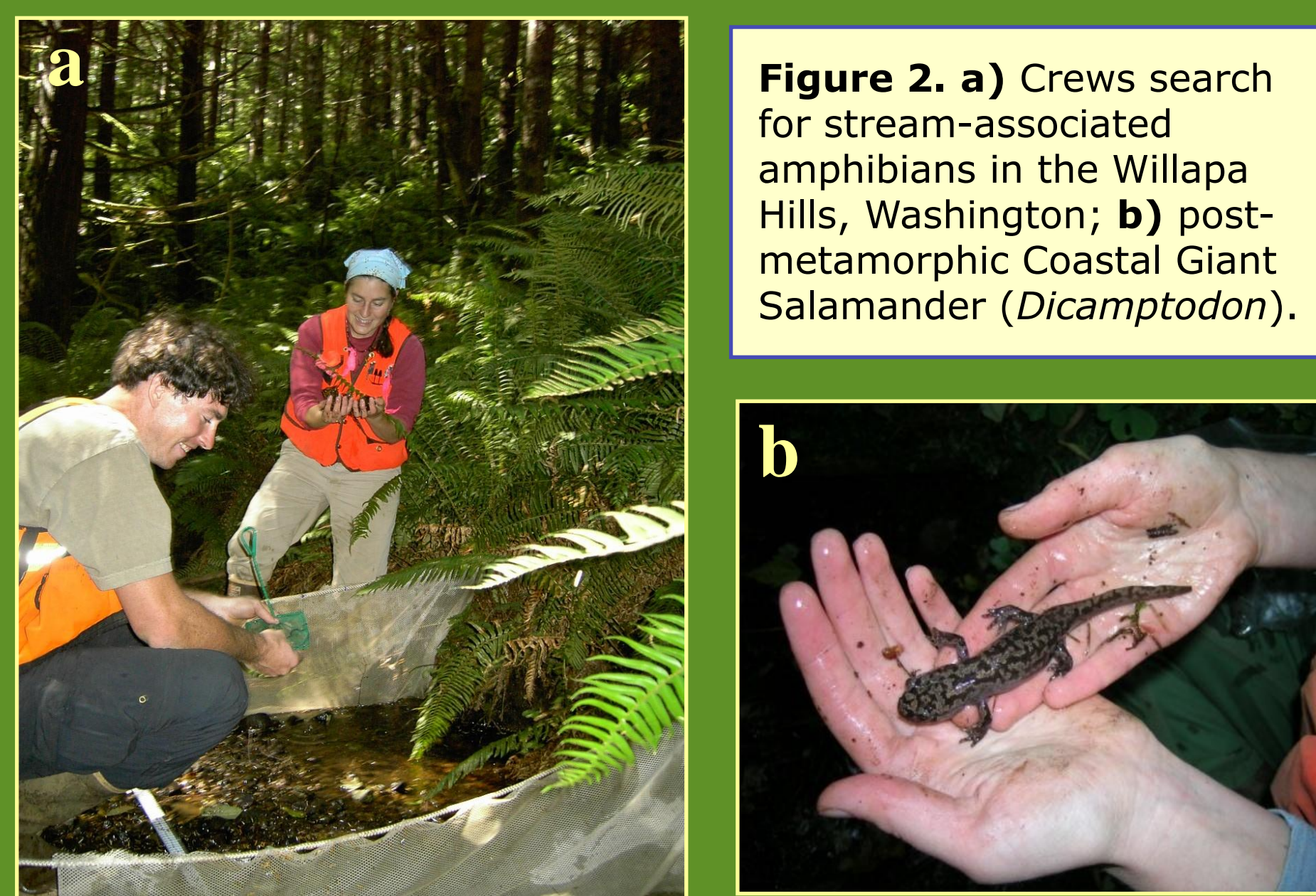
Our overarching objectives are to address the efficacy of current forest practices, and where consistent with other HCP goals, improve forest practices for protection of amphibians. We present here a description and some preliminary results from several ongoing studies.

## METHODS

Our focal study (Type N Study) addresses the efficacy of the riparian management prescription for headwater streams on private and state-owned forestlands. We screened ~36,000 headwater basins to obtain 18 suitable streams to which one of four harvest treatments would be applied. Treatments include 0%, 50%, and 100% buffer, along with reference basins where no harvest occurs (Figure 3). The BACI (before- and after-treatment control impact) design will enable us to distinguish treatment-specific responses among stream-associated amphibians. We have completed pre-treatment sampling and expect to complete post-treatment sampling in 2011.

A second study currently underway examines differences in amphibian response to different levels of riparian shading as a result of harvest. Both this and the focal study are designed to assess stream-breeding amphibians (*Ascaphus*, *Rhyacotriton*, and *Dicamptodon*).

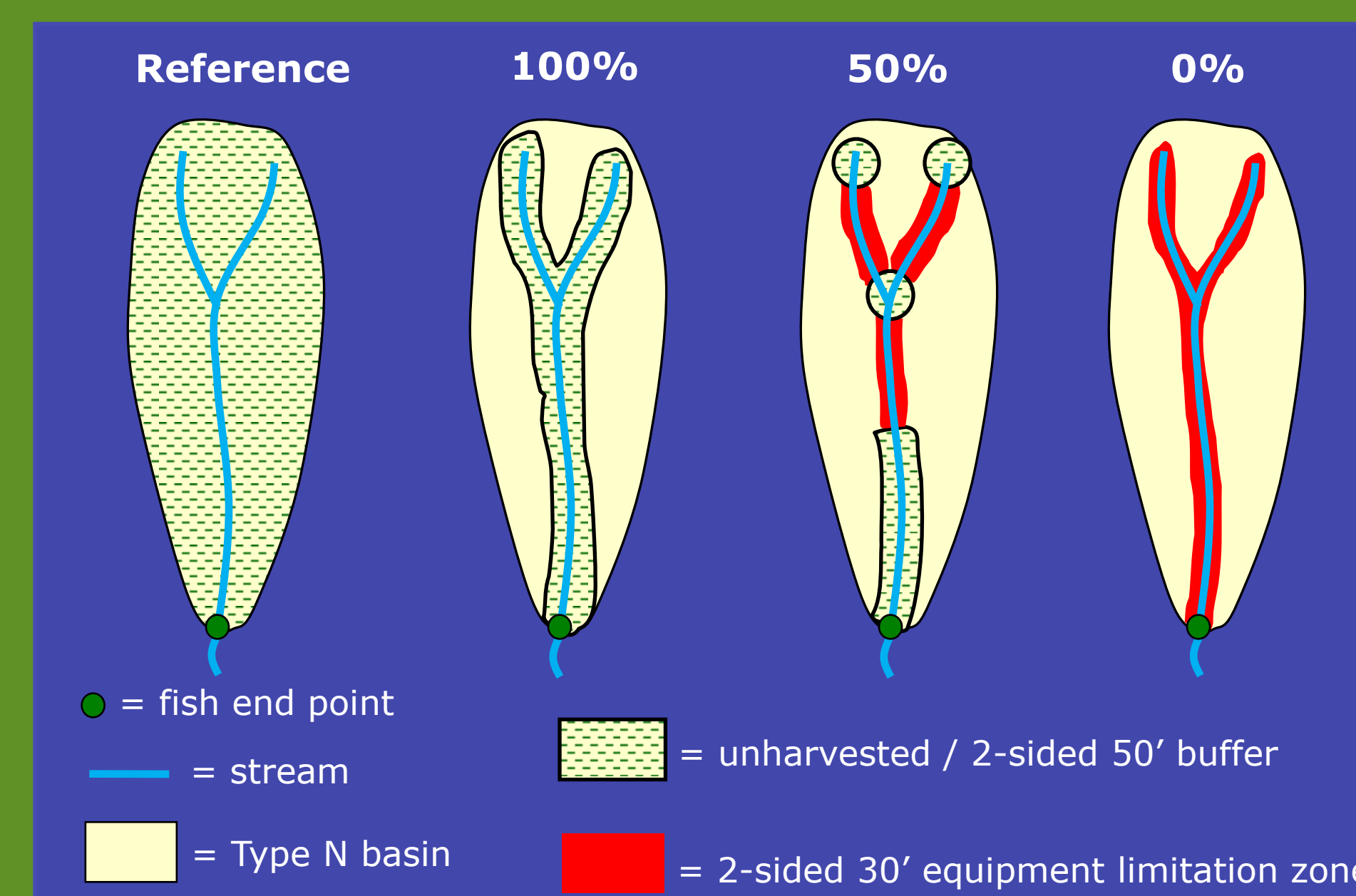
A third study (Dunn's Study), completed in 2003, addressed stream use by the two *Plethodon* species covered by the Forests and Fish HCP. Dunn's and Van Dyke's Salamanders are stream-associated, but breed on land. We intensively sampled 10 2-m wide belts oriented perpendicular to the stream axes at each of 19 streams during April-June 2001 and 2003. Individual belts were up to 68 m (223 ft) long.



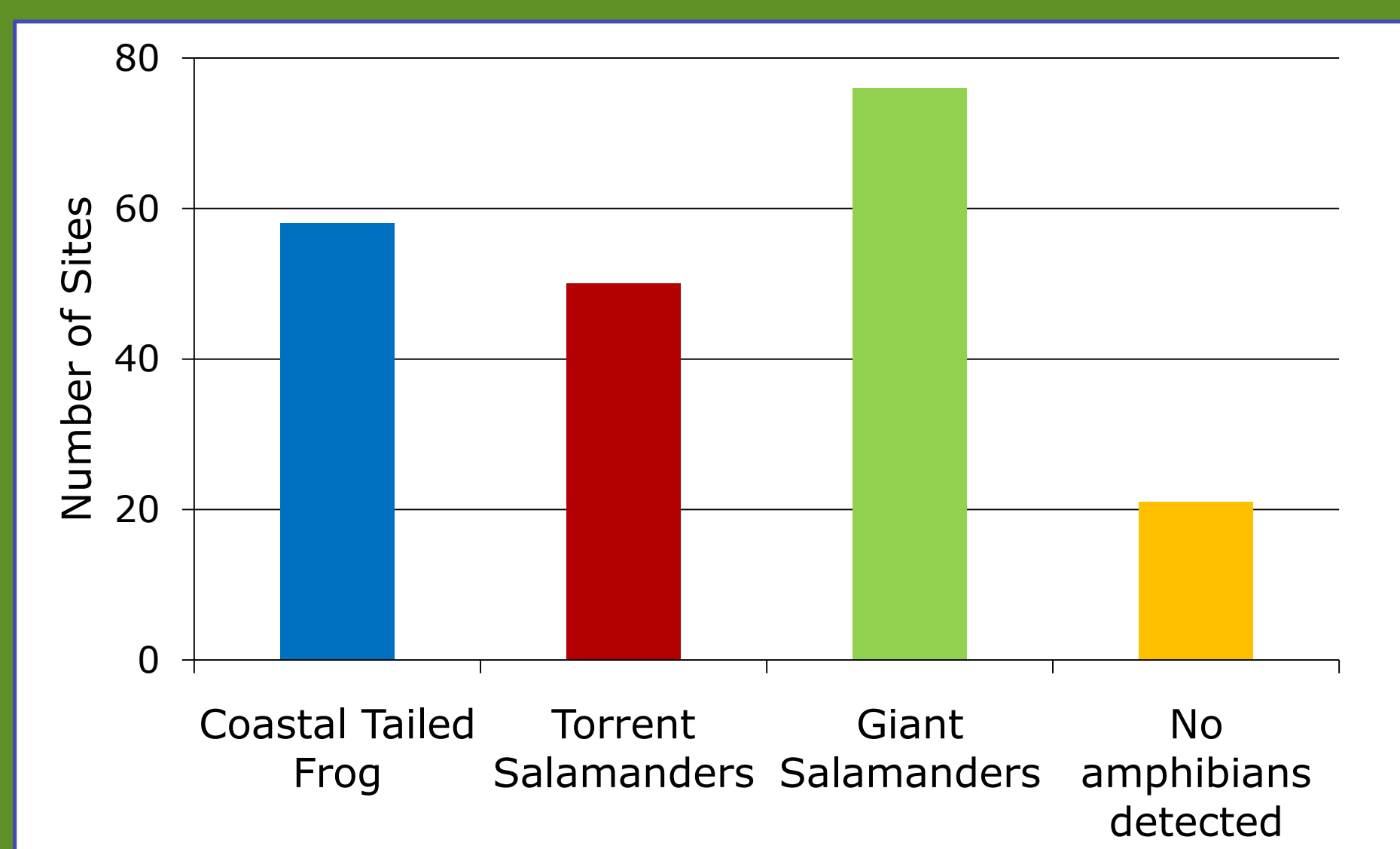
**Figure 2. a)** Crews search for stream-associated amphibians in the Willapa Hills, Washington; **b)** post-metamorphic Coastal Giant Salamander (*Dicamptodon*).

## RESULTS

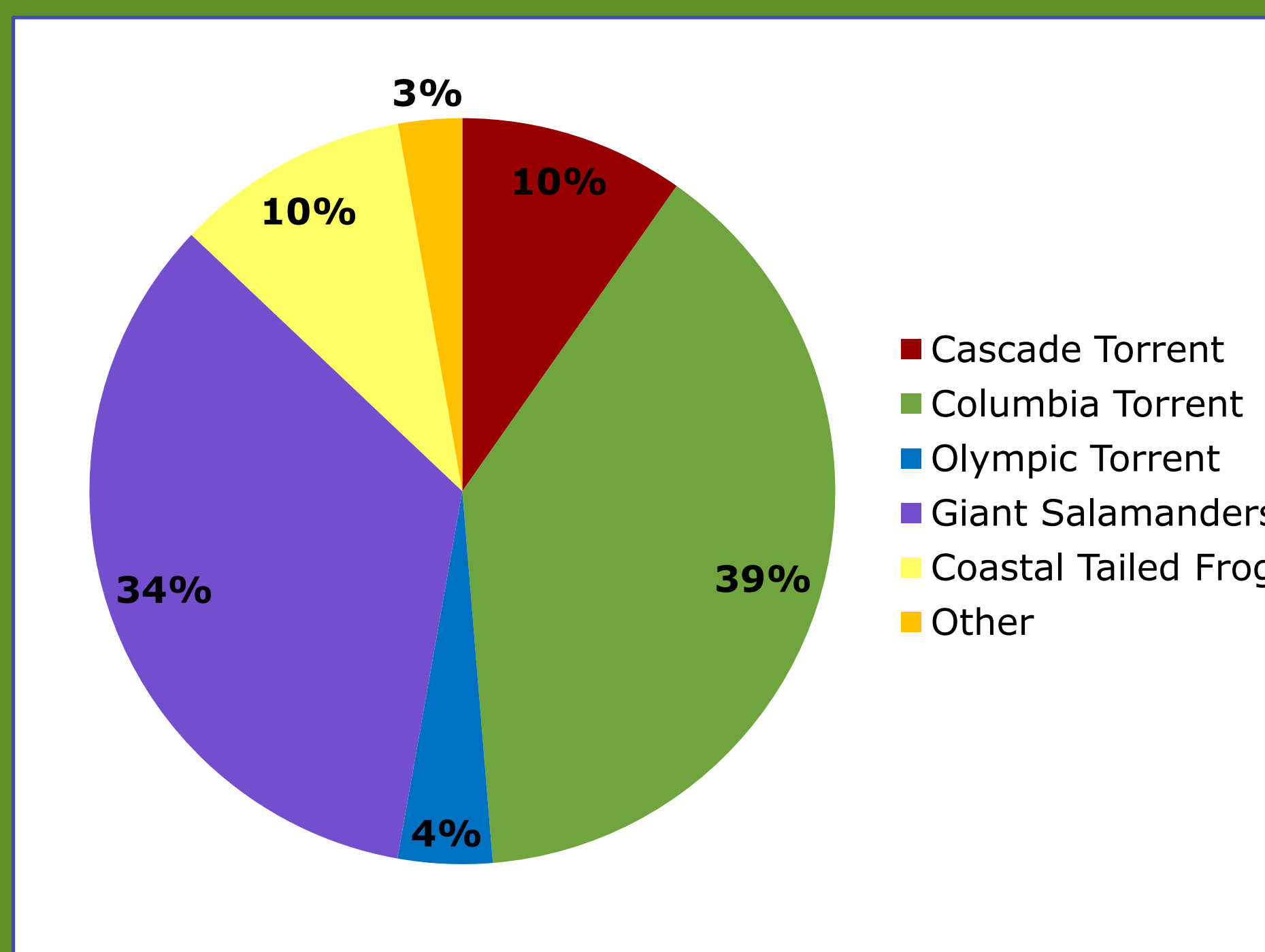
During site selection for our focal study in 2005, 115 basins were sampled for stream-breeding amphibians. Of these, 94 (82%) had at least one species present (Figure 4). Site selection resulted in the inclusion of 18 study basins in which over 12,000 amphibian detections representing 17 species of a possible 27 species known in Washington State were recorded during pre-treatment sampling (2006-2008). Most of these detections (97%) were stream-breeding species (Figure 5). Results from the Dunn's Study found that most (89%) Dunn's Salamanders (*Plethodon dunni*) were within 15 m (50 ft) of the stream channel (Figure 6). The Forests and Fish HCP requires 2-sided 50-ft wide riparian buffers along 50% of the length of headwater streams.



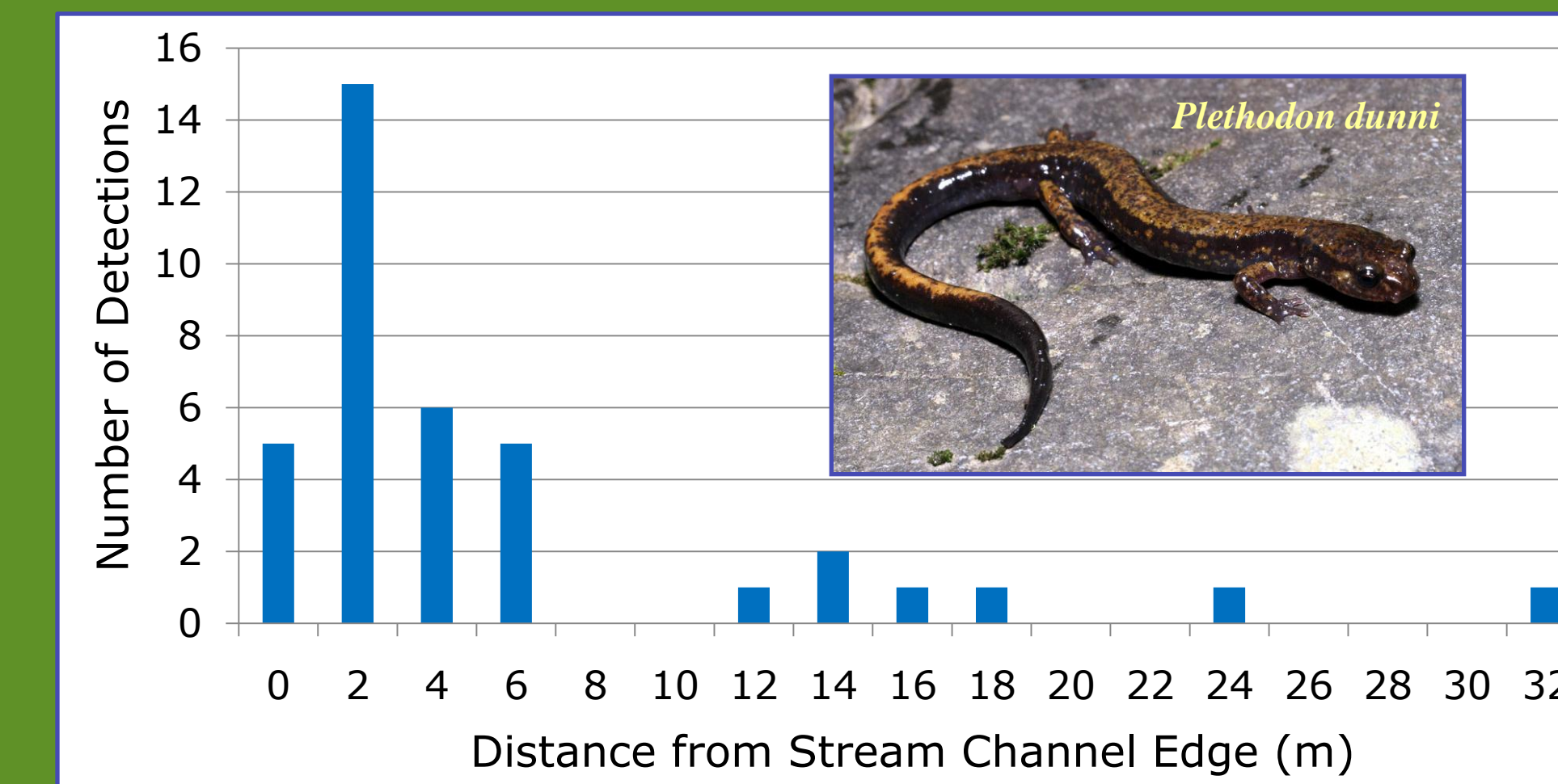
**Figure 3.** Four alternative buffer treatments tested in the Type N Study: an unharvested reference basin, 100% stream length buffered, 50% stream length buffered (a Forests and Fish HCP prescribed buffer), and 0% stream length buffered.



**Figure 4.** Numbers of basins in which stream-breeding amphibian taxa were detected during Type N Study site selection in 2005 (N = 115).



**Figure 5.** Percent detections by amphibian species during pre-treatment surveys of the Type N Study 2006-2008 (N = 12,087).



**Figure 6.** Number of Dunn's Salamanders detected as a function of distance from stream channel edge (N = 38) during the Dunn's Study.

## DISCUSSION

We have learned a great deal about the ecology of stream-associated amphibians on managed forestlands as a result of the Forests and Fish Adaptive Management Program. Though we have much to learn, we are encouraged by the persistence and relative abundance of amphibians in these managed forests for two reasons: 1) many of these forests have been managed for over 100 years and have experienced multiple harvest rotations, and 2) forest practices have improved dramatically over the last 20 years, most recently and substantively due to the Forests and Fish HCP.

Studies like these that are supported by the Forests and Fish Adaptive Management Program are critical to understanding how to best meet the immediate needs for wood fiber while protecting the long-term legacy of the Pacific Northwest. Adaptive Management helps keep working forests working by evaluating the impacts of timber management activities on ecosystem function, and allowing policy makers to adjust management regulations to meet multiple resource goals.

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