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CHAPTER 7: AMPHIBIAN CONSERVATION

7.1 Introduction

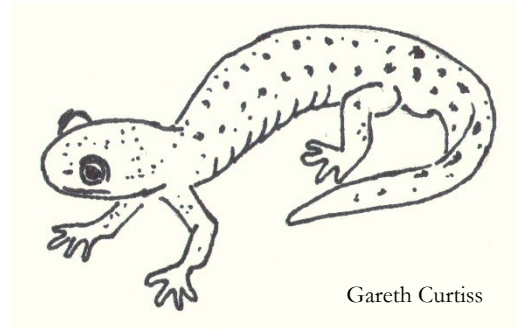
The Authors were able to reach agreement regarding protections for five stream-dwelling amphibian species sufficient to support coverage under a Habitat Conservation Plan (HCP). These species are: Columbia torrent salamander (*Rhyacotriton kezeri*), Southern torrent salamander (*Rhyacotriton variegatus*), Coastal giant salamander (*Dicamptodon tenebrosus*), Cope's giant salamander (*Dicamptodon copei*), and Coastal tailed frog (*Ascaphus truei*). In Western Oregon forests, these species are stream-obligates during early development (eggs and larvae). Upon metamorphosis, they can occur in or along streams and use riparian and upland forests for foraging, dispersal, overwintering and aestivation. However, in some cases, mature life forms of giant salamanders remain in streams for their entire lives ("neoteny").

At the time of the PFA agreements, these species had the following status:

- Columbia torrent salamander: Under review for listing under Federal Endangered Species Act, Oregon Sensitive, ORBIC 4, IUCN near threatened;
- Southern torrent salamander: Oregon Sensitive, ORBIC 4;

- Coastal giant salamander: No special status designations;
- Cope's giant salamander: Oregon Sensitive, Special Status/Sensitive Species; ORBIC 2 (Imperiled); and
- Coastal tailed frog: Oregon Sensitive, ORBIC 4.

The Authors considered issues related to riparian buffers, connectivity, roads, culverts, and water quality and temperature that informed the approach of this Chapter. The Authors also considered other approaches to protection of stream-dwelling amphibians, including the draft Western Oregon Forest Habitat Conservation Plan and the Washington Forest Practices Habitat Conservation Plan. This Chapter is not intended to be a comprehensive literature review of the variable response of amphibians to disturbance.



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At watershed scales, stream-dwelling amphibian habitat includes streams that occur higher up in the stream network than federally protected fish species and therefore, protections and management approaches focused on fish are not necessarily sufficient to protect stream-dwelling amphibians. Coastal giant salamanders and Coastal tailed frogs can co-occur in reaches with fish, but the entire assembly of stream-dwelling amphibians also frequently relies on non-fish-bearing headwater streams. As a result, specific strategies to avoid, minimize, or mitigate impacts to stream-dwelling amphibians are largely absent under the current Oregon Forest Practices Act and related regulations.

Stream habitat for tailed frogs, torrent salamanders, and giant salamanders includes cool, clear surface water flow with instream microhabitat complexity, such as coarse stream substrates with interstitial spaces. Yet, the heterogeneity of small headwater streams warrants recognition relative to these species' occurrences. More specifically, Coastal tailed frogs and Coastal giant salamanders are more often associated with perennial stream reaches with larger substrates and more down wood, and torrent salamanders have been found in smaller waters with smaller substrates, less down wood, and spatially intermittent streamflow patterns (Olson and Weaver, 2007; Thompson et al., 2018). After larval metamorphosis, many stream-breeding amphibians also are found within upland forests and have been trapped to 400 meters upslope of streams (Olson et al., 2007). The Authors have differing opinions regarding the conclusion that genetic analyses documented broader landscape-scale dispersal patterns in the following studies (Coastal tailed frog recolonization of Mount St. Helens post-eruption: Spear et al., 2012; torrent salamanders in the Oregon Coast Range: Emel et al., 2019).

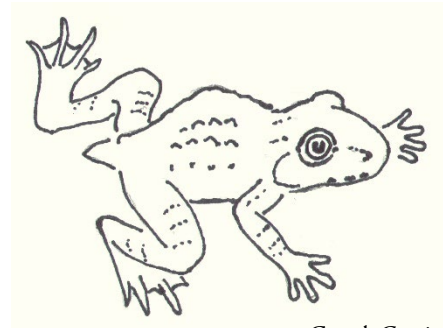
Stream-dwelling amphibians are also found within upland forests of the Pacific Northwest, with older-forest associations of these species supporting risks of historical forest management practices (Blaustein et al., 1995). For example, Pollett et al. (2010) found Coastal tailed frog and Cascade torrent salamander densities were 2-7 times lower in streams within managed forests than in streams in unharvested forests.

There is often variability in responses of stream-dwelling amphibians to disturbance. Existing uncertainties around responses of stream-dwelling amphibians to the collective disturbances associated with forest management prescriptions in Oregon is confounded by the variability in the contexts of individual studies, including a lack of studies that explicitly test contemporary treatments while controlling for high variability in landscape and site conditions (Schmidt and Garroway, 2021; Martin et al., 2021). Martin et al. (2021) evaluated the relationship between riparian buffering regimes, stream temperatures, and stream-associated amphibians and found no evidence to support that abundance of amphibian populations are positively correlated with larger buffers.

Due to the late publication of Olson and Ares (2022) during the course of the negotiations, not all of the Authors were able to review and evaluate this work. In a western Oregon study initiated in 1994 with a before-after-control-impact design across 8 sites and 54 stream reaches, Olson and Ares (2022) reported support for decadal lag-time effects on stream amphibians of buffer widths with upland thinning. Both Coastal giant salamanders and torrent salamanders were found in higher densities in streams with a one potential-tree height riparian buffer compared to narrower buffers, and torrent salamanders had associations with streams in unthinned control units as well.

In a western Oregon study, Olson and Burton (2014) reported reduced densities of *Rhyacotriton spp.* in stream reaches with the narrowest buffer they examined (6 m wide on each side of streams) with two sequential entries of upland secondary-forest thinning. The Authors have differing opinions on the conclusion that the data in this study supported the use of the wider buffers that they examined in their study, a minimum of 15 m wide on each side of streams, to retain sensitive headwater stream amphibians.

In a second comprehensive before-after-control-impact (BACI) study of riparian buffers in hard rock lithology in western Washington, McIntyre et al. (2021) found riparian buffers adjacent to non-fish-bearing perennial stream buffers of second growth timber were important for tailed frogs, but no demographic effects were found for torrent and giant salamanders. This study emphasizes the importance of reviewing changes to salamander populations over an extended time period, as impacts may not manifest in the years immediately following harvest.



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However, when genetic analysis was applied over the same time period, evidence was not found for any population level effects for Coastal tailed frogs or any amphibian species following the harvest prescriptions (Spear et al., 2019). Though interpretations of these results differ, these results support the fact that there is often variability in responses of amphibians to disturbance (Schmidt and Garroway, 2021) and the different response parameters and their time elements may warrant consideration.

The uncertainties surrounding amphibian population characteristics, distribution, productivity, survival, and abundance, as well as the variable response of amphibians to disturbance informed the approach of the Authors established in this Report. These uncertainties underpin the decision to prioritize research under the adaptive management process to ensure that the efficacy of protection strategies will be evaluated and adjusted as needed in a timely manner.

7.2 Goals

The goal of riparian management practices and other conservation measures described in this section is to protect and conserve stream and riparian habitats important for all life stages of Columbia (*Rhyacotriton kezeri*) and Southern (*R. variegatus*) torrent salamanders, Coastal (*Dicamptodon tenebrosus*) and Cope's (*Dicamptodon copei*) giant salamanders, and Coastal tailed frog (*Ascaphus truei*).

7.3 PFA Commitments

7.3.1 25-Year Term for Coverage of Amphibians Under HCP

The Authors agree to support a 25-year term for coverage for the following stream dwelling amphibians under a Habitat Conservation Plan (HCP):

- Columbia torrent salamander (*Rhyacotriton kezeri*)
- Southern torrent salamander (*Rhyacotriton variegatus*)
- Coastal giant salamander (*Dicamptodon tenebrosus*)
- Cope's giant salamander (*Dicamptodon copei*)
- Coastal tailed frog (*Ascaphus truei*)

7.3.2 No Agreement on Cascade Torrent Salamander

This agreement will not cover Cascade torrent salamander (*Rhyacotriton cascadae*).

7.3.3 Conservation Measures to Support Protection of Stream-Dwelling Amphibians

Conservation measures to support the protection of stream-dwelling amphibians include riparian prescriptions that protect fish and non-fish-bearing streams as identified in Chapter 2 of this Report. That Chapter includes conservation measures for seasonal and perennial streams that provide important habitats for stream-dwelling amphibians. Additional protections for seeps, springs, and stream-associated wetlands are established in Chapter 2.

Additional conservation measures to conserve stream-dwelling amphibians include:

- a. The Slope Retention Areas, Designated Debris-Flow Traversal Areas, and Stream Adjacent Failure prescriptions which are identified in Chapter 3.
- b. The wetland protections, including the 2:1 replacement for filling or draining wetlands, identified in Chapter 4.
- c. The updated culvert design standards identified in Chapter 4.
- d. The reduction of fine sediment through the hydrologic disconnection of roadside conveyance systems from streams as identified in Chapter 4.

7.3.4 Adaptive Management

Uncertainty exists around amphibian population characteristics, distribution, productivity, survival, and abundance. A robust effectiveness monitoring plan as part of an adaptive management program will be used to better understand the relationship between forest management and covered

amphibian species. To support this program, it is recommended that \$1.5 million be initially applied to research through the first funding cycle of the adaptive management program to better understand how riparian and unstable slope protections of at least the current and proposed rules for private forestland impact persistence of populations. The Authors agree that the \$1.5 million will be used to fund an initial study and that ongoing research over appropriate intervals of time beyond this initial study will be necessary to understand research outcomes over long periods of time. The priority species for monitoring will be the Columbia and Southern torrent salamanders. With consideration to funding constraints and other priorities, this research could also include other species covered by the HCP. Additionally, it could include Cascade torrent salamanders, which are not covered by the HCP.

7.4 Revised Rules in Conformance with PFA Commitments

The conservation measures summarized in Section 8.3.3 will be promulgated into rule consistent with those Chapters.

7.5 Literature Cited

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