



Feeding Behavior and Aquatic Habitat Use by Oregon Spotted Frogs (*Rana pretiosa*) in Central Oregon

Author(s): Christopher A. Pearl, Jay Bowerman and Donnie Knight

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- NUSSBAUM RA. 1969. A nest site of the Olympic salamander, *Rhyacotriton olympicus* (Gaige). *Herpetologica* 25:277–278.
- NUSSBAUM RA, TAIT CK. 1977. Aspects of the life history and ecology of the Olympic salamander *Rhyacotriton olympicus* (Gaige). *American Midland Naturalist* 98:176–199.
- PLATTS WS, MEGAHAN WF, MINSHALL GW. 1983. Methods for evaluating stream, riparian, and biotic conditions. Ogden, UT: USDA Forest Service. General Technical Report INT-138. 70 p.
- RUNDIO DE, OLSON DH. 2001. Palatability of southern torrent salamander (*Rhyacotriton variegatus*) larvae to Pacific giant salamander (*Dicamptodon tenebrosus*) larvae. *Journal of Herpetology* 35:133–136.
- RUSSELL KR, GONYAW AA, STROM JD, DIEMER KE, MURK KC. 2002. Three new nests of the Columbia torrent salamander, *Rhyacotriton kezeri*, in Oregon with observations of nesting behavior. *Northwestern Naturalist* 83:19–22.
- USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, 1700 Bayview Drive, Arcata, California 95521 USA. Present address (NEK): Department of Environmental and Forest Biology, 350 Illick Hall, State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13210 USA, nekarrak@syr.edu. Submitted 28 July 2004, accepted 30 September 2004. Corresponding Editor: RL Hoffman.

FEEDING BEHAVIOR AND AQUATIC HABITAT USE BY OREGON SPOTTED FROGS (*RANA PRETIOSA*) IN CENTRAL OREGON

CHRISTOPHER A PEARL, JAY BOWERMAN, AND DONNIE KNIGHT

Key words: Oregon spotted frog, *Rana pretiosa*, aquatic, behavior, feeding, habitat, vegetation, Deschutes County, Oregon

The Oregon spotted frog (*Rana pretiosa*) historically inhabited still-water wetlands from southwestern British Columbia through western Washington and Oregon into northeastern California (McAllister and others 1993; Green and others 1996; Hayes 1997). Recent surveys suggest that this species no longer occurs in 70 to 90% of its historic range (McAllister and others 1993; Hayes 1997; Pearl and Hayes 2005). Data on many aspects of its ecology and habitat use remain sparse. For example, Oregon spotted frogs frequent heavily vegetated wetlands (Watson and others 2003; Pearl and Hayes 2005), but mechanisms for this association are not well understood.

Published information on feeding behavior and use of vegetated microhabitats is also limited. Licht (1986) analyzed the diet of Oregon spotted frogs at a lowland site in British Columbia, and concluded that feeding occurred predominately in aquatic locations. Pearl and

Hayes (2002) described ambush behavior of adult Oregon spotted frogs when feeding on juvenile western toads (*Bufo boreas*) along margins of montane ponds. Here, we describe feeding behavior and use of vegetated aquatic habitats by Oregon spotted frogs at 2 constructed ponds in Deschutes County, central Oregon. Dilman Pond A is located approximately 1.5 km downstream of Wickiup Reservoir (elevation 1303 m): it is approximately 5 m × 15 m (0.01 ha) with maximum depth of 2 m. Lake Aspen (elevation 1265 m) is in Sunriver, 30 km downstream of Dilman Pond A near the Deschutes River. Lake Aspen is about 300 m × 200 m (2.5 ha) with a maximum depth of 3 m. Both sites are within the upper Deschutes River watershed, which is the core of the extant range of the Oregon spotted frog (Hayes 1997; Pearl and Hayes 2005).

On 7 August 2003, we observed as many as 12 adult Oregon spotted frogs simultaneously at the surface in Dilman Pond A. These frogs were in typical basking positions: eyes above water with body partially submerged, on or

among floating vegetation mats consisting mainly of algae and bladderwort (*Utricularia* sp.). One individual (undetermined gender; approximately 60 mm snout-urostyle length [SUL]) visually oriented toward an adult dragonfly (Libellulidae) that was ovipositing on the water surface approximately 1 m away. The frog submerged and swam in a direct path at a depth of 10 to 20 cm before surfacing approximately 10 cm from the dragonfly and making an unsuccessful lunging attempt to capture it.

Also in Dilman Pond A, we observed 2 feeding episodes by an adult female Oregon spotted frog (68 mm SUL) basking in a vegetation mat near a metal staff gauge (width 6.5 cm). From a partially submerged position, this frog lunged at and captured an adult damselfly (Coenagrionidae) at rest on the staff gauge approximately 6 cm above the pond surface. This frog later approached a damselfly that was ovipositing near the gauge on the side opposite the frog by slowly crawling across the vegetation mat with only its eyes above water. The frog appeared to remain concealed from the damselfly by the gauge during the entire approach. After reaching the staff gauge, the frog lunged around the gauge and captured the damselfly.

Later in the afternoon, we observed 2 more adult Oregon spotted frogs use a similar, slow, semi-submerged crawl through vegetation to approach ovipositing damselflies. The smaller individual (undetermined gender, approximately 55 mm SUL) captured its prey. The larger frog (male, 60 mm SUL) was unsuccessful in its capture attempt.

On 2 and 4 August 2003, we observed 3 adult Oregon spotted frogs use similar semi-submerged crawling and submerged swimming to approach newly metamorphosed western toads at Lake Aspen. These frogs were basking and feeding in a 5 m × 30 m bed of waterweed (*Elodea canadensis*) and duckweed (*Lemna* sp. and *Spirodela* sp.). Two basking females (both 76 mm SUL) visually oriented and slowly crawled toward individual toadlets that were moving across the surface of the vegetation. One frog completed its approach and captured the toadlet. The 2nd frog, upon having its approach obstructed by thick vegetation, submerged, swam approximately 0.5 m and surfaced within 10 cm of the toadlet. The frog successfully captured the toadlet. The 3rd frog

(male, 54 mm SUL) was initially approximately 1 m and facing approximately 90° away from a moving toadlet. The frog submerged without 1st orienting toward the prey and surfaced within 20 cm of the toadlet. When the toadlet moved again, the frog lunged completely out of the water and captured it.

Juvenile and metamorphic western toads and adult Odonata (dragonflies and damselflies) are known prey of Oregon spotted frogs (Licht 1986; Pearl and Hayes 2002). Many odonates, particularly damselflies, oviposit among aquatic vegetation (Voshell and Simmons 1978; Corbet 1980). This type of oviposition behavior makes odonates vulnerable to predation by Oregon spotted frogs that commonly bask and hunt in floating and emergent vegetation. Our observations are consistent with the conclusions of Licht (1986) that Oregon spotted frogs frequently feed from aquatic positions, even when taking prey that are often considered 'terrestrial' when found in stomach contents.

Our observations add to those reported from montane sites by Pearl and Hayes (2002), and suggest that both sexes of Oregon spotted frogs use a repertoire of ambush behaviors to capture prey. In addition to sit-and-wait tactics, Oregon spotted frogs employ directed crawling and sub-surface swimming in vegetation mats, and may be able to use vertical structure to block direct observation by prey. Floating or shallow subsurface vegetation appears to allow Oregon spotted frogs to effectively use ambush behaviors in habitats with high prey availability. We suspect that these off-shore vegetation mats also offer basking habitat that is less accessible to some terrestrial predators. Habitat types that offer this combination of attributes may be particularly valuable for Oregon spotted frogs in high-elevation sites where the summer active season is limited. Experimental research is needed to determine specific links between Oregon spotted frog behavior and wetland habitat types. A better understanding of these linkages should assist in restoration of wetlands that are important for the persistence of Oregon spotted frog populations.

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LITERATURE CITED

- CORBET PS. 1980. Biology of Odonata. Annual Review of Entomology 25:189–217.
- GREEN DM, SHARBEL TF, KEARSLEY J, KAISER H. 1996. Postglacial range fluctuation, genetic subdivision and speciation in the western North American spotted frog complex *Rana pretiosa*. Evolution 50: 374–390.
- *HAYES MP. 1997. Status of the Oregon spotted frog (*Rana pretiosa sensu stricto*) in the Deschutes Basin and selected other systems in Oregon and northeastern California with a rangewide synopsis of the species' status. Unpublished report prepared for the Nature Conservancy, Portland, OR. 57 p. + Appendices. Available from U. S. Fish and Wildlife Service, 26000 SE 98th Avenue, Portland, OR 97266.
- LICHT LE. 1986. Food and feeding behavior of sympatric red-legged frogs, *Rana aurora*, and spotted frogs, *Rana pretiosa*, in southwestern British Columbia. Canadian Field Naturalist 100:22–31.
- MCALLISTER KR, LEONARD WP, STORM RM. 1993. Spotted frog (*Rana pretiosa*) surveys in the Puget Trough of Washington, 1989–1991. Northwestern Naturalist 74:10–15.
- PEARL CA, HAYES MP. 2002. Predation by Oregon spotted frogs (*Rana pretiosa*) on western toads (*Bufo boreas*) in Oregon. American Midland Naturalist 147:145–152.
- PEARL CA, HAYES MP. 2005. *Rana pretiosa*, Oregon spotted frog. In: Lannoo MJ, editor. Status and conservation of U. S. Amphibians. University of California Press, Berkeley, CA. In press.
- VOSHELL JR JR, SIMMONS GM JR. 1978. The Odonata of a new reservoir in the southeastern United States. Odonatologica 7:67–76.
- WATSON JW, MCALLISTER KR, PIERCE DJ. 2003. Home ranges, movements, and habitat selection of Oregon Spotted Frogs (*Rana pretiosa*). Journal of Herpetology 37:292–300.
- USGS Forest and Rangeland Ecosystem Science Center, 3200 SW Jefferson Way, Corvallis, Oregon 97331 USA; christopher_pearl@usgs.gov (CAP); Sunriver Nature Center, PO Box 3533, Sunriver, Oregon 97707 USA (JB); 900 Boone Dr., Troy, Ohio 45373 USA (DK). Submitted 1 December 2003, accepted 8 November 2004. Corresponding Editor: MJ Rochelle.

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PREDATION ON RED TREE VOLES BY OWLS AND DIURNAL RAPTORS

SCOTT A GRAHAM AND GERALD W MIRES

Key words: red tree vole, *Arborimus longicaudus*, northern spotted owl, *Strix occidentalis caurina*, northern pygmy owl, *Glaucidium gnoma*, red-tailed hawk, *Buteo jamaicensis*, diurnal raptors, predation

The red tree vole (*Arborimus longicaudus*) is an arboreal microtine rodent endemic to the coniferous forests of western Oregon and northwestern California (Hayes 1996). Six species have been identified as predators of red tree voles, including the northern spotted owl (*Strix occidentalis caurina*; Maser 1965a, 1965b; Forsman and others 1984), saw-whet owl (*Aegolius acadicus*; Forsman and Maser 1970), long-eared

owl (*Asio otus*; Reynolds 1970), Steller's jay (*Cyanocitta stelleri*; Howell 1926), ringtail (*Bassariscus astutus*; Alexander and others 1994), and weasels (*Mustela* sp.; J Swingle, Oregon State University, Corvallis, OR, pers. comm.). Other species may feed on tree voles, but this has not been documented in the literature.

Probably the best known predator of red tree voles is the northern spotted owl. Based on studies of prey in regurgitated pellets, Barrows (1980) and Forsman and others (1984) found that the frequency of occurrence of tree voles ranged from 20 to 50% for spotted owls in northern California and southwest Oregon, respectively. Although Forsman and others