

exists when counting adult Piping Plovers outside a census window as our observations indicate not all birds retain the same mate or beach in a nesting season.

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Documents Cited (marked * in text)

Boates, J. S., P. Austin-Smith, G. Dickie, R. Williams, and D. Sam. 1994. Nova Scotia Piping Plover Atlas. Unpublished Nova Scotia Department of Natural Resources report. 86 pages.

Literature Cited

Bottitta, G. E., A. M. Cole, and B. Lapin. 1997. Piping Plovers produce two broods. *Wilson Bulletin* 109: 337-339.

Cairns, W. E. 1977. Breeding biology of the piping plover in southern Nova Scotia. M.Sc. thesis, Dalhousie University, Halifax. 115 pages.

Cairns, W. E. 1982. Biology and behavior of breeding Piping Plovers. *Wilson Bulletin* 94: 531-545.

Haig, S. M. 1987. The population biology and life history patterns of the piping plover. Ph.D. dissertation, University of North Dakota, Grand Forks. 121 pages.

Haig, S. M. 1992. Piping Plover. Pages 1-18 in *The Birds of North America* (2). Edited by A. Poole, P. Stettenheim,

and F. Gill. The Academy of Natural Sciences, Philadelphia; The American Ornithologists' Union, Washington, D.C.

Haig, S. M., and L. W. Oring. 1988. Mate, site, and territory fidelity in Piping Plovers. *Auk* 105: 268-277.

Loefering, J. P. 1992. Piping Plover breeding biology, foraging ecology and behavior on Assateague Island National Seashore, Maryland. M.S. thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

MacIvor, L. H. 1990. Population dynamics, breeding ecology, and management of Piping Plovers on outer Cape Cod, Massachusetts. M.S. thesis, University of Massachusetts, Amherst, Massachusetts.

Oring, L. W. 1982. Avian mating systems. Pages 1-92 in *Avian Biology*. Volume VI. Edited by D. S. Farner and J. R. King. Academic Press, Inc., New York.

Oring, L. W., and M. L. Knudson. 1973. Monogamy and polyandry in the spotted sandpiper. *Living Bird* 11: 59-73.

Strauss, E. 1990. Reproductive success, life history patterns, and behavioral variation in a population of Piping Plover subjected to human disturbance. Ph.D. dissertation, Tufts University, Boston, Massachusetts.

Weller, M. W. 1957. An automatic nest-trap for waterfowl. *Journal of Wildlife Management* 21: 456-458.

Whyte, A. J. 1985. Breeding ecology of the Piping Plover (*Charadrius melodus*) in central Saskatchewan. M.Sc. thesis, University of Saskatchewan, Saskatoon, Saskatchewan.

Wilcox, L. 1959. A twenty year banding study of the Piping Plover. *Auk* 76: 129-152.

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American Dipper, *Cinclus mexicanus*, Preys Upon Larval Tailed Frogs, *Ascaphus truei*

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The American Dipper (*Cinclus mexicanus*) is an aquatic songbird that inhabits fast-flowing mountain streams in western North America. Although dippers are known to feed primarily on aquatic invertebrates, they will also eat juvenile fish and salmon eggs when available. In 2002, while monitoring and photographing nesting activities of the American dipper, we observed and photographed adult dippers capturing Tailed Frog (*Ascaphus truei*) tadpoles and feeding them to their young. This note is intended to document a rarely observed occurrence and identify interactions between two relatively uncommon species.

Key Words: American Dipper, *Cinclus mexicanus*, Tailed Frog, *Ascaphus truei*, feeding, Chilliwack River, British Columbia.

American Dippers (*Cinclus mexicanus*) are North America's only truly aquatic songbirds occupying mountain streams of western North America from Alaska south to Mexico (Kingery 1996). Dippers are known to feed almost exclusively on in stream fauna, diving underwater and probing among the rocks for

benthic invertebrates and small fish (salmon and trout) as well as fish eggs (Kingery 1996). To our knowledge, there have been no previous records in the literature of dippers feeding on amphibians. However, while studying and photographing American Dippers in southwestern British Columbia, we observed dippers



FIGURE 1. Adult American Dipper delivering Tailed Frog tadpole to nestlings at a nest under a logging road bridge on Tamihi Creek, British Columbia, in June 2002. Photograph by Roberta Olenick.

on several occasions feeding on Tailed Frog (*Ascaphus truei*) larvae.

Field work on the American Dipper was conducted in the Chilliwack River watershed located in the Cascade Mountains of southwestern British Columbia, Canada. While observing dipper nests in June and July 2002, we noted at least two different pairs of American Dippers, attending separate nests on Tamihi Creek, a tributary of the Chilliwack River (49.02 N, 121.50 W,

elevation 545 m) feeding Tailed Frog tadpoles to their young. Roberta Olenick photographed those dippers delivering Tailed Frog tadpoles to nestlings or fledglings at each nest site (Figures 1 and 2).

On one occasion, an adult dipper captured a very large Tailed Frog tadpole (estimated length 5-6 cm) and attempted to feed it to one of its fledglings. The fledgling dipper struggled to swallow the large prey item without success. Several times, the adult dipper retrieved the tadpole, knocked it vigorously against a rock and manipulated the large wide head in its bill. Eventually, after several minutes of handling by the adult, the fledgling dipper managed to swallow the large tadpole whole.

During routine annual benthic invertebrate collections in April 1999-2002, we infrequently captured Tailed Frog tadpoles in our Surber samplers using kick-sampling procedures. Larval Tailed Frogs have a distinct round mouth, well adapted to use as suction onto the surface of in stream rocks, making them relatively easy to identify. Tailed Frog larvae were found on several tributaries of the Chilliwack River including Tamihi Creek, Borden Creek, and Chipmunk Creek. It is worth noting that all of these creeks have present or past logging activity which is thought to limit the presence and abundance of Tailed Frogs through increased water temperatures and siltation (Nussbaum et al. 1983). No other similar species of amphibians occupy fast flowing stream habitat in our study area.

There are few known predators of *Ascaphus truei*. Tailed Frog tadpoles have been identified as impor-



FIGURE 2: Adult American Dipper delivering Tailed Frog tadpole to newly fledged dipper on Tamihi Creek, British Columbia in July 2002. Photograph by Roberta Olenick.

tant prey for larval Pacific Giant (*Dicamptodon ensatus*) and Cope's salamanders (*Dicamptodon copei*) and Red-legged Frogs (*Rana aurora*) (Bury 1968; Jones and Raphael 1998). Observations of garter snakes (*Thamnophis* spp.) (Karraker 2001) and Cutthroat Trout (*Salmo clarki*) depredating Tailed Frogs have also been previously reported (Daugherty and Sheldon 1982). We found only one instance in the literature where American Dippers were cited as being a potential predator of Tailed Frogs, in Butler Creek, Montana (Daugherty and Sheldon 1982). However, it was not clear whether those authors actually observed dippers feeding on Tailed Frogs. Given that the Tailed Frog is a provincially blue-listed (vulnerable) species in British Columbia and of special concern in the national COSEWIC listing, documentation of these rare observations is important.

Tailed Frogs are endemic to the Pacific Northwest. They range from British Columbia south to California, occupying western mountain streams and humid forests throughout a 15-20 year lifespan (Daugherty and Sheldon 1982). Larvae take from 1 to 4 years to metamorphose into adults in cool fast streams (Bull and Carter 1996). Their distribution directly overlaps that of the American Dipper, which occupies the same habitat and geographic range. Both species are considered sensitive to environmental impacts in mountain-

ous watersheds from anthropogenic sources (Nussbaum et al. 1983, Kingery 1996). Given that these two species occupy the same habitat and geographic range, American Dipper predation of Tailed Frogs may be more widespread than previously acknowledged.

Literature Cited

- Bull, E. L., and B. E. Carter.** 1996. Tailed Frogs: Distribution, ecology, and association with timber harvest in northeastern Oregon. United States Forest Service Research Paper 497: 1-12.
- Bury, R. B.** 1968. The distribution of *Ascaphus truei* in California. *Herpetologica* 24: 39-46.
- Daugherty, C. H., and A. L. Sheldon.** 1982. Age determination, growth, and life history of a Montana population of the tailed frog. *Herpetologica* 38: 461-468.
- Jones, L. and M. Raphael.** 1998. *Ascaphus truei* (Tailed Frog) predation. *Herpetological Review* 29: 39.
- Karraker, N. E.** 2001. *Ascaphus truei* predation. *Herpetological Review* 32: 100.
- Kingery, H. E.** 1996. American Dipper (*Cinclus mexicanus*). The birds of North America (229): 1-28. Edited by A. Poole and F. Gill. The Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, D.C.
- Nussbaum, R. A., E. D. Brodie, and R. M. Storm.** 1983. Reptiles and amphibians of the Pacific Northwest. University Press of Idaho, Moscow, Idaho.

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Piping Plover, *Charadrius melodus*, egg viability after seawater immersion

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Four observed nest histories indicate Piping Plover eggs are able to survive immersion in seawater, but little is known regarding their hardiness. As Piping Plover nests are often exposed to tidal flooding, their eggs may be relatively resistant to inundation by seawater. Therefore, we suggest that replacing eggs recently flooded or washed out of nests is a viable option for the recovery of individual nests.

Key Words: Piping Plover, *Charadrius melodus melodus*, flooding, high tide, hatching success, viability, Prince Edward Island, Nova Scotia.

The Atlantic Coast population of Piping Plover (*Charadrius melodus melodus*) is listed as *Endangered* in Canada and *Threatened* in the United States (Goossen et al. 2002; U.S. Fish and Wildlife Service 1996). Nesting Atlantic coast Piping Plovers prefer flat coastal beaches with sand and pebble substrate (Boyne and Amirault 1999; Burger 1987; Cairns and McLaren 1980). The male scrapes a shallow depression in the substrate between the mean high water mark and the edge of adjacent dunes or vegetation (Burger

1987; Cairns 1982; Haig 1992). The young hatch after approximately 28 days and leave the nest within hours of hatching (Cairns 1982; Haig 1992). Nesting areas are often flooded by storm-induced overwashes (Cairns and McLaren 1980) and high water levels destroy many plover nests each season (Sylvester 1991).

Four cases in which flooded Piping Plover eggs remained viable were documented during the course of regular monitoring at Prince Edward Island National Park and in southern Nova Scotia. The following nest