

- retifer*. Copeia 1988: 740-746.
- Coad, Brian W., H. Waszczuk, and I. Labignan.** 1995. Encyclopedia of Canadian Fishes. Canadian Museum of Nature, Ottawa, and Canadian Sportfishing Productions, Waterdown, Ontario. viii + 928 pages
- Hubbs, C. L., and K. F. Lagler.** 1964. Fishes of the Great Lakes Region. The University of Michigan Press, Ann Arbor. xv + 213 pages
- pheric Administration, NMFS (National Marine Fisheries Service) Circular 422: v + 152 pages
- Springer, S., and V. Sadowsky.** 1970. Subspecies of the western Atlantic cat shark, *Scyliorhinus retifer*. Proceedings of the Biological Society of Washington 83: 83-98.

Received 31 August 2001
Accepted 2 January 2004

First Record of Mink Frog, *Rana septentrionalis*, from Insular Newfoundland

IAN G. WARKENTIN¹, CHRISTINE E. CAMPBELL¹, KRISTIN G. POWELL^{1,2} and TINA D. LEONARD^{1,2}

¹Environmental Science, Sir Wilfred Grenfell College, Memorial University of Newfoundland Corner Brook Newfoundland A2H 6P9 Canada

²Department of Biology, Acadia University, Wolfville Nova Scotia B4P 2R6 Canada

Warkentin, Ian G., Christine E. Campbell, Kristin G. Powell, and Tina D. Leonard. 2003. First record of the Mink Frog (*Rana septentrionalis*) from insular Newfoundland. Canadian Field-Naturalist, 117(3): 477-478.

Two populations of the Mink Frog (*Rana septentrionalis*) were identified near Corner Brook Newfoundland during wider surveys for anurans on the west coast of the island. This brings to six the number of anuran species which are known to have been introduced to insular Newfoundland, with four known to be currently extant.

Key Words: Mink Frog, *Rana septentrionalis*, Newfoundland, introduced species.

The anuran fauna of insular Newfoundland is the result of intentional human introductions. The Green Frog (*Rana clamitans*) arrived about 150 years ago through its presumed accidental transport in shipments of hay from Nova Scotia to the St. John's area (Maret 1867; Johansen 1926). Between 1960 and 1966, Buckle (1971) systematically introduced the Northern Leopard Frog (*Rana pipiens*), Wood Frog (*R. sylvatica*), Chorus Frog (*Pseudacris triseriata*) and American Toad (*Bufo americanus*) to various locations in western Newfoundland. These anuran populations have since undergone extensive change. Both the Northern Leopard Frog and Chorus Frog apparently have disappeared (Maunder 1997), but populations of the other three species are now well established and are expanding throughout the western portion of the island (Maunder 1997; Powell 2002). The Green Frog remains the sole occupant of eastern portions of the island (Maunder 1997). Here we report the discovery on the west coast of the island of another introduced anuran, the Mink Frog (*Rana septentrionalis*).

Field work was conducted in summer 2001 to assess the distribution of anuran populations in three regions along the west coast of Newfoundland – the Codroy Valley in the southwestern corner of the island, the Deer Lake-Stephenville region in west central Newfoundland, and Gros Morne National Park on the west coast of the island at the base of the Great Northern Peninsula. American Toads were heard at numerous locations in all three regions, Wood Frogs were heard throughout the Deer Lake-Stephenville region, while

Green Frogs were heard throughout the Deer Lake-Stephenville and Codroy Valley regions and at one location in Gros Morne National Park (Powell 2002). We encountered Mink Frogs at one site in the Deer Lake-Stephenville region. Located along the Ring Road of Corner Brook, 4.8 km west of the Trans Canada Highway (48° 55.61'N, 57° 57.11'W; all positions determined using a Garmin® GPS model 12 XL, Olathe Kansas, USA), the site consists of a shallow pond approximately 60 m long by 10 m at its widest point. The presence of the frogs was initially detected during daylight hours on 30 May 2001 and on a return visit later that day in excess of 30 Mink Frogs were counted in a 10 m² area on one end of the pond. Additionally, Powell (2002) found 25 Mink Frog tadpoles along a 10-m stretch of pond shoreline at this site on 30 June 2001. Although Mink Frog adults are considered by some to strongly resemble the appearance of Green Frogs at the northern end of their range (Conant and Collins 1991), there are several distinctive features of *R. septentrionalis* including the mink-like smell, spotting pattern on the legs, the extent of dorsolateral ridges, and the extreme webbing on the toes of the hind feet (Schueler 1975; Conant and Collins 1991). In combination, these characteristics enabled us to distinguish Mink Frog adults from morphologically similar Green Frogs. Voucher specimens were collected and deposited at the Provincial Museum of Newfoundland and Labrador in St. John's, Newfoundland (Provincial Museum catalogue numbers NFM HE-119 and NFM HE-120). Species identification was confirmed through night-

time calling surveys. At 2300 h on 14 and 15 June 2001, sufficient individuals were heard to constitute a chorus of indistinguishable, overlapping calls (calling index of 3 based on the Frogwatch USA Program; www.mp2pwr.usgs.gov/NAAMP/protocol/definition_s.html#index). These frogs were calling from a location about 50 m across the pond from the original position where they were seen during the day on 30 May 2001. Again, on the night of 21 June 2001, Mink Frogs were heard calling from this site (4 individuals) as well as at a location 1600 m further west (48° 55.70'N, 57° 58.34' W) where two individuals were heard calling from a stream which runs through a fen beside the Ring Road. Earlier that day (1330 h) full choruses of Mink Frogs were heard at both of these sites.

Subsequently, and apart from our regular survey sites identified for the larger study, Mink Frogs also were heard calling at four locations along the Cook's Brook drainage on the nights of 18 and 21 June 2001: (1) at the inflow of Cook's Brook into the southern end of Big Cook's Pond (3 individuals heard on 21 June; 48° 51.75'N, 58° 4.81'W), (2) at the outflow of Cook's Brook from Little Cook's Pond (4 individuals heard 18 June, 1 individual 21 June; 48° 53.51'N, 58° 3.69'W), (3) along Cook's Brook about 900 m downstream from Little Cook's Pond (6 Mink Frogs and 4 Green Frogs on 18 June, 2 Mink Frogs on 21 June; 48° 53.78'N, 58° 3.26'W), and (4) a small pond (5 m across) near where Burnt Creek empties into Cook's Brook and 6.3 km from the Big Cook's Pond site (2 mink frogs heard on 18 June; 48° 54.93'N, 58° 3.34'W). American Toads were heard at all locations along Cook's Brook. This area along Cook's Brook is about 8 km distant from the Corner Brook Ring Road sites in an adjacent drainage, suggesting the possibility of at least two initial release sites, or release and subsequent translocation.

Mink Frogs were not detected at the other 29 of our 30 survey sites in the Deer Lake-Stephenville region, nor at any of the 60 sites in the Codroy Valley and Gros Morne National Park. All sites for the more extensive survey were visited on three occasions (7-16 May, 28 May – 6 June, 28 June – 6 July 2001) both during the day for egg mass and tadpole surveys and during the night for calling surveys. Previous searches (Maunder 1983, 1997) did not detect Mink Frogs on

the island. Together, these data suggest that the release of Mink Frogs may have been recent. While source populations for past acknowledged introductions of anurans to the west coast of the island were from southern Ontario (Buckle 1971), it is possible that Mink Frogs may have been introduced from native populations in Labrador. When questioned, no members of the local community admitted to introducing this additional species.

Acknowledgments

Funding was provided to Kristin Powell through a University Internship in Environmental Science sponsored by Gros Morne National Park and the Gros Morne Co-operating Association; additional support came from Sir Wilfred Grenfell College through the Environmental Science Study and Travel Grants program and a Summer Undergraduate Research Award. Voucher specimens were collected under permit issued by Leah Soper of the Newfoundland and Labrador Department of Forest Resources and Agrifoods; John Maunder provided the catalogue numbers from the Provincial Museum.

Literature Cited

- Buckle, J.** 1971. A recent introduction of frogs to Newfoundland. *Canadian Field-Naturalist* 85: 72-74.
- Conant, R.** and **J. T. Collins.** 1991. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Company, Boston.
- Johansen, F.** 1926. Occurrences of frogs on Anticosti Island and Newfoundland. *Canadian Field-Naturalist* 40: 16.
- Maret, E.** 1867. Frogs on Newfoundland. *Proceedings of the Nova Scotian Institute of Science* 1: 6.
- Maunder, J. E.** 1983. Amphibians of the Province of Newfoundland. *Canadian Field-Naturalist* 97: 33-46.
- Maunder, J. E.** 1997. Amphibians of Newfoundland and Labrador: status changes since 1983. *Herpetological Conservation* 1: 93-99.
- Powell, K. G.** 2002. Watersheds and water quality as determinants of anuran distribution in western Newfoundland. B.Sc. Honours thesis, Memorial University of Newfoundland, Corner Brook Newfoundland. 65 pages.
- Schueler, F. W.** 1975. Geographic variation in the size of *Rana septentrionalis* in Quebec, Ontario, and Manitoba. *Journal of Herpetology* 9: 177-185.

Received 30 July 2001

Accepted 1 April 2004