Rossman et al. (1996) reported that the Common Garter Snake (Thamnophis sirtalis Linnaeus, 1758) was arguably the best-studied snake in the world. Thamnophis sirtalis is believed to consist of several independently evolving lineages (Crother et al., 2017), including a clade centred in Maritime Canada (Rye. 2000). However, DeGraaf and Rudis (1983) noted that there was little information available on the life history of the Maritime subspecies, T. s. pallidulus Allen, 1899, a form reported to range throughout the Maritime Provinces of Canada, westward to the U.S. state of New Hampshire, northward to James Bay, Quebec, and eastward along the north shore of the Gulf of St. Lawrence (Bleakney, 1959). Gorham (1970) reported that in New Brunswick T. sirtalis hibernates in rocks, under ledges, and in soil, as well as in other dry situations where the frost does not penetrate, but this information was probably derived from generalized information for the species in the literature. Gilhen (1984), in a comprehensive account of the amphibians and reptiles of Nova Scotia, provided no information on hibernation sites for T. s. pallidulus.

To the best of my knowledge, there are no reports of hibernacula specific to T. s. pallidulus from anywhere in Maritime Canada. I here report four observations from New Brunswick (Canada) of multiple T. s. pallidulus over-wintering in cold springs, as well as observations of single, live snakes present under ice in shallow, spring-fed waters. Correspondence and images additional to those presented here have been archived with the herpetological collections of the New Brunswick Museum (NBM).

### Results

**Observation 1.**—In the late autumn (October–November) of 1989, Don Blyth stopped at a cold-spring well on McCloud Hill, York County, New Brunswick (46.0246°N, 66.6916°W). Seeking to clear what he thought were sticks from the well, he pulled a Maritime Garter Snake from the water. Closer examination revealed an additional six snakes, including one mostly concealed in the pipe delivering water to the well. Among the seven snakes one was much larger than the remaining six.

**Observation 2.**—On or about 13 November 2000, Brian Bubar observed five Maritime Garter Snakes in a covered cold spring well used as a source of drinking water at Penniac, York County, New Brunswick (46.0347°N, 66.5715°W). There was also a frog hibernating at the bottom of the well. Four of the snakes were either partially or completely submerged in the water, with two of them entwined. The fifth snake rested on the top of a post that supported the well lid. One of the snakes was noticeably larger than the others. In December 2000 Bubar re-visited the well and found a ball of snakes entwined beneath the water in the well. Two of the snakes had their heads protruding from the ball and extending above the water. Bubar also reported that about 20 years previously, when hunting in the Penniac area in October–November, he had also observed a single snake in another cold spring.

**Observation 3.**—On 26 December 2012 Line Losier observed and photographed (Fig. 1A) a single Maritime Garter Snake under ice in a presumably spring-fed pool of 15–20 cm depth that drained into a nearby river at Cormier Village, Westmorland County, New Brunswick (46.1716°N, 64.3527°W). Although Losier reported that the snake was moving slowly, it was clearly alive.

**Observation 4.**—On 1 January 2015 Ian Campbell observed and photographed (Fig. 1B,C) a single...
Figure 1. Two instances of Maritime Garter snakes (*Thamnophis sirtalis pallidulus*) observed under ice. (A) An individual observed on 26 December 2012 in a pool of 15–20 cm depth. The pool drains into a nearby river at Cormier Village, Westmorland County, New Brunswick, Canada. (B) An individual observed on 1 January 2015 in 15–25 cm of water in a small stream at Douglas, York County, New Brunswick, Canada. Note the snow cover in the background and the position of the snake relative to the shore. (C) Close-up of the individual in (B). Photographs by Line Losier (A) and Ian Campbell (B, C).
Maritime Garter Snake under ice in 15–25 cm of water in a 1.2 m diameter, spring-fed forest stream at Douglas, York County, New Brunswick (45.9822°N, 66.7278°W). The site was about 30 m from the stream source and the snake was estimated to measure 550–600 cm in total length. Slow movement of the snake confirmed that it was alive. A frog was also observed at the site under the ice. The snake was no longer visible the following day.

Discussion

Prolonged submergence during dormancy by snakes has been reported previously (Constanzo, 1986). While Observations 1 and 2 would seem to represent examples of over-wintering sites selected by T. s. pallidulus, Observations 3 and 4, where snakes were exposed and readily visible, may represent snakes that had moved from adjacent, concealed, aquatic sites (i.e., under bottom detritus, among rocks). Thamnophis sirtalis ranges farther north than any other snake in the western hemisphere (Rossman et al., 1986) and it has evolved a number of adaptations to northern climates (Aleksiuk, 1976), most notably the ability to super-cool to −5.5°C and to withstand periods of freezing for up to 3 h (Storey, 1990; Churchill and Storey, 1992). Hibernation in T. s. sirtalis has been well studied; typically snakes of the genus Thamnophis congregate in dry underground sites (Gregory, 1982), but the species is known to hibernate in aquatic circumstances, including in old wells and submerged crayfish burrows (Carpenter, 1953; Constanzo, 1986; Most et al., 2013). In fact, Constanzo (1989) found that T. s. sirtalis had a much higher survival rate when over-wintering submerged in water.

While it seems unlikely that the observations reported here represent typical hibernation circumstances for T. s. pallidulus in New Brunswick (particularly the single snakes observed in the open under ice), the selection of aquatic overwintering sites would seem to confer an advantage to overwintering snakes in the region. Since the availability of hibernacula for snakes may be a limiting resource (Constanzo, 1986), it is worth noting that these observations provide an example of the wildlife value of forest cold-springs, a habitat that has received little attention in a province where industrial forestry predominates.

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References


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