# Note

# River Otter (*Lontra canadensis*) Killed by Wolves (*Canis lupus*) during Winter in Northern Minnesota

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Few accounts exist of Gray Wolves (*Canis lupus*) killing small sympatric mammalian predators. In January 2017, we observed a River Otter (*Lontra canadensis*) that had been killed by wolves on the ice in Voyageurs National Park, Minnesota. This is one of only a few documented instances of wolves killing otters.

Key Words: River Otter; Gray Wolf; predation; kill site; Minnesota; *Canis lupus; Lontra canadensis*

Gray Wolves (*Canis lupus*) predominantly hunt, kill, and consume ungulates and small mammalian prey, such as beavers (*Castor* spp.) and hares (*Lepus* spp.; Mech *et al*. 2015; Gable *et al*. 2016; Newsome *et al*. 2016). Wolves will also kill medium to large sympatric predators, such as bears (*Ursus* spp.), Cougars (*Puma concolor*), and Coyotes (*Canis latrans*) possibly to eliminate competition for resources (Rogers and Mech 1981; Ballard *et al*. 2003; Berger *et al*. 2008). However, there are anecdotal accounts of wolves killing small sympatric mammalian predators (primarily mustelids) with whom they do not directly compete (White *et al*. 2002; Palacios and Mech 2010). Such accounts are rare, but they provide information about causes of natural mortality in small predator populations as well as the effect of wolves as predators on small predator communities (Ballard *et al.* 2003).

On 30 January 2017, we found a River Otter (*Lontra canadensis*) carcass on the ice near the southern shore of Rainy Lake in Voyageurs National Park, Minnesota (48°30′N, 93°50′W). The otter carcass was frozen and had not been consumed, but appeared to have been killed recently. Several wolf tracks were present in the snow around the carcass, and we found no evidence of other predators nearby; we could not determine how many wolves were involved because of the concentration of tracks. We followed the wolf tracks, drag marks (presumably from the wolves moving the carcass), and general disturbance in the snow (i.e., snow packed down from wolves) from the otter carcass to where the encounter appeared to have started (~15 m from the carcass). We did not find any blood or hair in this area, which is not surprising given the cause of death (see below) and that wolves did not consume the carcass. We also could not determine the activities of either the wolves or otter before the encounter, for example, whether a chase had occurred, because of the trampled snow. The beginning of the encounter was not near any visible opening in the ice, and we suspect the otter was likely moving across the frozen lake when wolves found and killed it. When searching this area, we also found a recent (< 3 days) wolf-killed White-tailed Deer (*Odocoileus virginianus*) < 1.5 km from the location of the otter carcass. Wolves had consumed most of the deer carcass.

We conducted a field necropsy of the otter carcass to determine cause of death. We did not see any visible external injuries except for two 1-cm holes on the back right leg and anus where we assume birds had picked at the carcass. Once we removed the hide, we found severe hemorrhaging and trauma on the right side of the abdomen and rib cage, confirming that these wounds occurred while the otter was alive. We found two puncture wounds on the abdomen which were about 4 cm apart — roughly the spread of wolf canines, 3.5–5.0 cm (Elbroch 2006) — and several ribs had been crushed. We also found two puncture wounds in the hide that corresponded to the puncture wounds on the abdomen. In addition, the proximal portion of the cranium (parietal, temporal, and occipital bones) had been crushed and there was a laceration/puncture wound (3 cm × 2 cm), which had not been visible during external examination, on the right proximal side of the cranium. However, we are unsure whether this wound was from a wolf canine entering from the outside or from shattered skull bone puncturing the muscle tissue from the inside. We found no other evidence of injury and concluded that the otter likely died from blunt force trauma because its cranium and rib cage were crushed.

Based on necropsy results and wolf sign at the otter carcass, we are confident that wolves killed the otter. Wolves are likely the only predator during winter in Voyageurs National Park that possess the bite strength necessary to crush an otter skull. Few reports exist of wolves killing otters even though the two are sympatric throughout much of northern North America (Mech and

Boitani 2010; Serfass *et al*. 2015). For example, Stenlund (1955) stated that he occasionally found wolf-killed otters in northern Minnesota during the winter, but provided no additional information about these kills. Furthermore, previous work in Voyageurs National Park documented a radio-tagged otter that was killed and partly consumed by a wolf in early September (Route and Peterson 1991). How frequently wolves kill otters is unknown, as the natural mortality of River Otters is not well documented or understood (Gorman *et al*. 2008). Interestingly, otter fur has not been found in any of the > 4000 wolf scats collected in Voyageurs National Park during intensive wolf diet studies conducted from 1988 to 1989 (Gogan *et al*. 2004) and from 2012 to 2016 (Chenaux-Ibrahim 2015; Gable *et al.* 2017; Voyageurs National Park, unpublished data). However, if wolves do not consume otters after killing them, as we observed, then scat-based wolf diet estimates would not reflect the frequency of wolf predation on otters.

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