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Evidence of River Otter (*Lontra canadensis*) recolonization of Prince Edward Island, Canada

Garry Gregory[1,*], Rosemary Curley[2], and Cornelya F.C. Klütsch[3]

[1]Department of Environment, Energy, and Climate Action, Fish and Wildlife Division, P.O. Box 2000 Charlottetown, Prince Edward Island C1A 7N8 Canada
[2]9 Harland View Drive, Stratford, Prince Edward Island C1B 1W2 Canada
[3]Norwegian Institute of Bioeconomy Research, Division of Environment and Natural Resources, N-1431 Ås, Norway
[*]Corresponding author: ggregory@gov.pe.ca

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Abstract

River Otter (*Lontra canadensis*) was extirpated from Prince Edward Island (PEI) in the early 1900s as a result of habitat loss and overexploitation. Although there were isolated and sporadic occurrences in PEI coastal and inland waters pre-1975, only anecdotal reports of tracks or sightings of the species had been documented in the 21st century, until an adult male otter was captured in a beaver trap in 2016. Since then, seven additional individuals have been collected opportunistically or as by-catch of beaver trapping, including an adult female and a kit (juvenile). Camera traps have also revealed what appears to be a family group in central PEI. A growing body of evidence strongly suggests a resident River Otter population on PEI. The island is separated from the mainland by the Northumberland Strait, which has a minimum width of 13 km of salt water. River Otters have naturally recolonized PEI by dispersing across the Northumberland Strait.

Key words: River Otter; *Lontra canadensis*; Prince Edward Island; breeding; dispersal

Introduction

River Otter (*Lontra canadensis*) is native to Prince Edward Island (PEI; Sobey 2007). Two River Otters killed in Pisquid, Queens County, in 1898 (Jenkins 1901) were apparently the last recorded in the province until 1951 when an otter pelt was shipped from PEI to auction (Park 1971). Jenkins stated that 35–45 years earlier (ca. 1858), he had ordinarily seen otter sign, but by 1898 that was unusual. Shortly afterward he saw two otter pelts in a Charlottetown store and concluded that the otter was "nearly extinct" (Jenkins 1901: 40). At that time, 70% of PEI was cleared of forest (Glen 1997; Loo and Ives 2003) and a fisheries inspector two decades earlier had described the rivers as running "for miles … denuded of trees" (Curley 2016: 118). Sobey (2007: 388) suggested "after 1890" as an extirpation date for otter in PEI (we suggest "after 1898") and ascribed its loss to unregulated trapping, settler indifference to its decline, and habitat loss. Cameron's brief reconnoiter of PEI in 1952 and field season in 1954 for the National Museum of Canada closely followed the marketing of the single pelt in 1951, and he regarded the otter as still present, based on conversation with Chief Game Warden Spurgeon Jenkins (Cameron 1958). In the early 1970s, a dead otter was retrieved from an eel trap at Seal River near Cardigan, Kings County (Curley *et al.* 2019a). Since 2012, there have been several credible reports of observations of otters or their tracks in PEI. Here, we provide physical evidence of recolonization of PEI by River Otters and discuss how they might have arrived on the island.

Methods

We compiled records of River Otter carcasses submitted to government wildlife officials or photographs obtained from remote camera traps. There is no open season for otter on PEI; thus, trappers surrender the carcasses to wildlife officials. We recorded dates and locations of collection and total length (cm) and mass (kg) for all carcasses. We extracted canine teeth for aging by cementum annuli (Stephenson 1977) at a commercial laboratory (Matson's Laboratory, Manhattan, Montana, USA). Tissue samples from the quadriceps muscle of three River Otters were sent to Trent University, Peterborough, Ontario, Canada for DNA analysis to assess relatedness of the specimens. The samples were amplified at 11 microsatellite loci (Beheler *et al.* 2004, 2005; Mowry *et al.* 2011) and the laboratory procedures are described in

detail in Klütsch and Thomas (2018). The software package GeneMarker v.1.91 (Soft Genetics LLC, State College, Pennsylvania, USA) was used to determine allele sizes, which were subsequently used to conduct population genetic statistical analysis. The software ML-Relate (Kalinowski *et al.* 2006) was then used to determine whether the three individuals were related to each other (i.e., potentially a dispersing family group) using a pairwise maximum-likelihood test and a likelihood ratio test with 10 000 simulations. We measured local distances within PEI and between PEI and neighbouring provinces using the PEI 2010 Corporate Land Use Inventory, captured at a 1:17 500 scale (PEICLUI 2010).

Results and Discussion

From 2016 to 2020, seven River Otters were incidentally trapped in sets for American Beaver (*Castor canadensis*) and Muskrat (*Ondatra zibethicus*). An additional River Otter was found dead on a beach. Data for these eight otter specimens are summarized in Table 1 and their locations mapped in Figure 1.

All microsatellite loci amplified properly and resulted in complete genotype profiles. The first three River Otters were likely not closely related as the maximum-likelihood function in ML-Relate retrieved highest pairwise likelihood values for the "unrelated" category, consistent with findings in coastal populations that siblings may not disperse together (Blundell *et al.* 2002). The relationship of these individuals to those subsequently collected is unknown. In addition, in specific hypothesis testing using a likelihood ratio test of all possible pairwise sample comparisons, the hypothesis that the individuals were unrelated was considerably more supported than alternative relationships (i.e., half siblings, full siblings, and parent-offspring); however, we cannot statistically reject the hypothesis that two of the individuals are either half or full siblings with this second test. Ages of 1, 1, and 4 years were assigned to the first three River Otters. The skewed sex ratio of collected specimens (7:1 males [M] to females [F]) can be expected with a small sample size; males and females disperse at equal rates from natal areas but males exhibit greater breeding dispersal (Blundell *et al.* 2002). Over 6000 adult carcasses in New Brunswick samples showed a sex ratio approaching 1.13 M:1 F (Cumberland and DeVink 2017). The distances between capture locations on PEI ranged from 6.2 to 137.5 km (mean 51 km, SD 41 km), but three of the first four specimens were caught within 16.4 km of each other in two Kings County watersheds.

Reports of River Otter observations from the public have increased in recent years, but the discovery of a dead juvenile in Darnley Basin on 23 June 2019 (Table 1) confirms that there is a resident population in PEI. Additional confirmation of a reproducing population comes from a photograph of an adult River Otter with what appears to be two juveniles, taken by a camera trap on 23 July 2021 at a north shore coastal pond (46.53106°N, 63.54217°W).

River Otter may have first colonized PEI via a land connection that was in place from 9500 to 5000 years ago across what is now Northumberland Strait (Kranck 1972; Shaw *et al.* 2002). The island is now accessible to River Otter by water or ice. Although they must swim continuously to stay above water (Larivière and Walton 1998), River Otter are exceptional colonizers of islands and are included in depauperate mammalian faunas of Newfoundland and Anticosti Island, Quebec, both in the Gulf of St Lawrence (Cameron 1958).

In coastal Alaska, fewer River Otter females than males disperse, but they frequently move further than dispersing males, over 90 km in one case. River Otters of both sexes crossed 13 km or more of open ocean (Blundell *et al.* 2002), matching the shortest distance across the Northumberland Strait to PEI from New Brunswick or Nova Scotia. Otter dispersal from Nova Scotia could also be facilitated by island hopping 7.5 km to Pictou Island in the mouth of the strait and then navigating 16 km to PEI. The shortest

Table 1. Description of eight River Otter (*Lontra canadensis*) specimens trapped or found dead on Prince Edward Island, Canada.

Specimen location (county)	Date found	Sex	Age	Total length, cm	Mass, kg
Cardigan River (Kings)	15 Nov. 2016	M	4 years	126	10.76
Morell River (Kings)	14 Mar. 2017	M	1 year	129	11.77
Miminegash River (Prince)	12 Jun. 2017	M	1 year	147	11.2
Morell River (Kings)	8 Nov. 2017	F	Adult	108	7.27
Trout River (Prince)	22 Jun. 2019	M	Adult	124	8.84
Darnley Basin (Prince)	23 Jun. 2019	M	Juvenile	65	—*
Southwest River (Prince)	23 Dec. 2020	M	Adult	125	13.2
Southwest River (Prince)	23 Dec. 2020	M	Adult	121	11.8

*Carcass was scavenged.

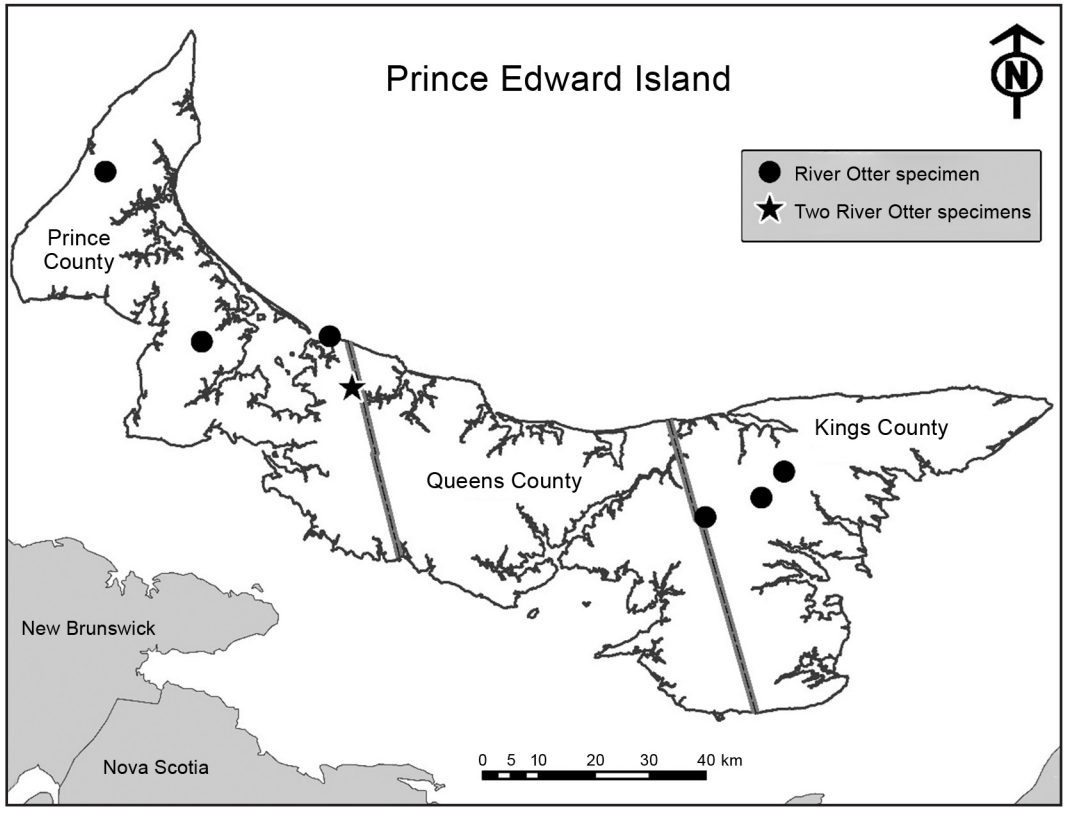

FIGURE 1. Locations of specimens of River Otter (*Lontra canadensis*) trapped or found dead in Prince Edward Island, Canada, 2016–2020.

distance from New Brunswick to the western shore of PEI is ~22 km.

River Otters prefer travelling on ice to overland travel and will bound and slide at speed over long distances (Larivière and Walton 1998); however, travel underwater via undulatory propulsion is most efficient (Fish 1994). On average, ice cover in the southern Gulf of St Lawrence extends from January until break-up at the end of March (Bajzak *et al.* 2011), coincidental with the onset of dispersal in young otters in April and May (Larivière and Walton 1998). A combination of travel over ice and swimming is also a possible otter route to PEI. Viable source populations are located in adjacent New Brunswick and Nova Scotia (Scott and Hebda 2004; Gallant *et al.* 2009; Cumberland and DeVink 2017). Source populations are currently stable to increasing in neighbouring Nova Scotia (G. Parsons pers. comm. 11 April 2023) and stable in New Brunswick (J. Cormier pers. comm. 13 March 2023); in the United States, there has been a significant expansion in populations since they were last assessed in 1997 (Roberts *et al.* 2020).

We suggest that the two 20th century reports of otters (Jenkins 1901; Park 1971) reveal sporadic River Otter dispersal from neighbouring New Brunswick or Nova Scotia, ending as failed colonization attempts. Currently, River Otter numbers appear to be increasing in PEI, and 21st century improvements in PEI habitat may have increased their survival. PEI is 44% forested and there are 3279 km of marine coastline (Davies 2011). Beginning in 2000, streams were protected with a 10-m vegetated riparian buffer zone on agricultural land (Statutes of Prince Edward Island 1999), and in 2008 the buffer was extended to 15 m (Statutes of Prince Edward Island 2008). Otter presence in PEI likely indicates that suitable habitat is present, and otters are widely distributed although the central portion of the province is known to have fewer wetlands including beaver dams (Curley *et al.* 2019b) and, thus, may support fewer River Otters. The human desire to maintain beaver populations at moderate levels in accordance with a beaver policy (Anonymous 2011) may influence otter survival. River Otters have an affinity for beaver dams (Gallant *et al.* 2009), and the susceptibility of otters to

traps set within dams (Gorman *et al.* 2008) may make it difficult for them to establish or maintain a resident population. The provincial wildlife agency has developed best-management practices to avoid bycatch of River Otters from beaver trapping and may consider area-specific regulatory changes to achieve this outcome while maintaining beavers at appropriate densities.

Author Contributions

Writing – Original Draft: R.C.; Writing – Review & Editing: R.C., C.K., and G.G.; Conceptualization: G.G.; Investigation: G.G., C.K., and R.C.; Methodology: G.G. and C.K.; Formal Analysis: G.G. and C.K.; Funding Acquisition: G.G.

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