

Range expansion of Fisher (*Pekania pennanti*) in Nova Scotia

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Abstract

Fisher (*Pekania pennanti*) is a medium-sized mesocarnivore that typically occupies mature hardwood and softwood forest where its preferred prey is abundant. In Nova Scotia, Fisher populations are reported as restricted to the mainland; they have been absent from Cape Breton Island for the past 50–80 years. A record of a Fisher on Cape Breton Island in February 2002 prompted us to collate and analyze other records of Cape Breton Island sightings of the species from that date to May 2021. Based on reported sightings, we conclude that Fisher has extended its range from mainland Nova Scotia, apparently crossing the Strait of Canso, and that a breeding population now exists on Cape Breton Island and is expanding. We also comment on possible negative interactions between this expanding Fisher population and the provincially Endangered American Marten (*Martes americana*) population on the island.

Key words: Fisher; *Pekania pennanti*; range expansion; American Marten; *Martes americana*; extirpation; trail cameras; snow tracking; ice bridge; causeway; Maritime Canada

Introduction

In the northeastern United States and mainland Canada, Fisher (*Pekania pennanti*) prefers mature conifer, hardwood, and mixed-wood forests where medium-sized mammalian prey, such as Snowshoe Hare (*Lepus americanus*), Red Squirrel (*Tamias hudsonicus*), and Porcupine (*Erethizon dorsatum*), are abundant (Buskirk and Powell 1994; Powell and Zielinski 1994). Fisher is a mesocarnivore with an estimated historical range in eastern Canada before ca. 1600 that included mainland Nova Scotia and adjacent Cape Breton Island (CBI; Gibilisco 1994).

Cape Breton Island has been separated from mainland Nova Scotia since 8000–6000 years before present (BP), following glacio-isostatic, eustatic, and hydro-isostatic processes associated with the retreat of the Laurentide Ice Sheet ~12 000 years BP (Shaw *et al.* 2002, 2006). The island's land-mass slopes upward from the south to the north from sea level to a maximum elevation of 535 m on the northern plateau. Higher elevations are dominated by heathlands, stunted Balsam Fir (*Abies balsamea*

(L.) Miller), spruce (*Picea* spp. A. Dietrich), tree and shrub swamps, and expansive bogs. Mid-elevations are extensively vegetated with shade tolerant Yellow Birch (*Betula alleghaniensis* Britton), Sugar Maple (*Acer saccharum* Marshall), and American Beech (*Fagus grandifolia* Ehrhart) while low-lying elevations have shade tolerant hardwoods in addition to Black Spruce (*Picea mariana* (Miller) Britton, Sterns & Poggenburgh), White Spruce (*Picea glauca* (Moench) Voss), White Pine (*Pinus strobus* L.), Balsam Fir, Red Maple (*Acer rubrum* L.), and White Ash (*Fraxinus americana* L.; all from Neily *et al.* 2017). The Canso Causeway, completed in 1955, joins CBI to the mainland across the point of narrowest width (~1 km) of the Strait of Canso. Power and Gilhen (2018: 9) described the causeway as a “busy thoroughfare” bounded by industrial lands. Its construction has impeded currents, thereby facilitating development of an ice bridge across the strait in winter (Power *et al.* 2015).

The historical presence of Fisher on both the mainland of Nova Scotia and CBI is confirmed by

the Fisher pelts sent annually to the European market between 1783 and 1853 (Gwyn 2003) with pelts specifically from CBI listed (Gwyn 2003: 74). However, by the mid-19th century, Gilpin (1867: 10) felt that the Fisher, always uncommon in Nova Scotia, was “rapidly becoming extinct in our province” and harvested animals were primarily sourced from Cumberland County in the northeast of the mainland adjacent to the New Brunswick border. Smith (1940) noted the lack of reports of Fishers since 1922 and Rand (1944) concluded the species was extirpated from the province. Fisher declines and extirpations elsewhere in North America have been attributed to over-trapping and habitat loss caused by logging (Powell and Zielinski 1994; Strickland 1994) and long-term climate warming (Krohn 2012).

Reintroductions, augmentations, improved regulatory practices, and increased forest cover have facilitated the recovery of Fisher across much of its former range in eastern North America (Gibilisco 1994; Powell and Zielinski 1994; Proulx *et al.* 2004; Powell *et al.* 2012). Efforts have been made to re-establish the species within its former range, e.g., on mainland Nova Scotia where reintroduction programs occurred in 1947–1948 (Bensen 1959; sourced from ranch stock) and 1963–1966 (Dodds and Martell 1971; sourced from wild-caught Maine stock), with one translocation program occurring in 1993–1995 (Potter 2002; sourced from local stock). However, there have been no re-introductions of Fisher into CBI (M.S. O’Brien pers. comm. 10 December 2021).

Potter (2002) described the distribution of Fisher in Nova Scotia using harvest locations from 1981 to 1999. During that period, the species was largely confined to two geographically separate populations in eastern (Cumberland, Colchester, Pictou, and Antigonish) and western (Queens, Annapolis, and Digby) counties of mainland Nova Scotia. The eastern mainland population was reported to extend from the New Brunswick–Nova Scotia border region to the Strait of Canso, with no records from CBI. The first suggestion of re-establishment of Fisher on CBI occurred on 10 February 2002 when an adult male was incidentally caught in a legally set Eastern Coyote (*Canis latrans* var.) snare; this Fisher is now a taxidermy mount residing at the Nova Scotia Department of Natural Resources and Renewables (NSDNRR) office in Whycocomagh, Nova Scotia. To better understand recent Fisher re-establishment and expansion on CBI, we report records of Fishers on CBI from that first capture in 2002 to May 2021. This is the first report of Fishers on CBI since extirpation of the species on the Island 50–80 years ago.

Methods

Geo-referenced occurrences for Fishers were obtained from the Biodiversity Investigation Reporting (BIR) system of the NSDNRR for 1999–2021. Since 1999, this has been the principal data-entry and reporting system used internally by the NSDNRR to capture and manage wildlife occurrences reported by staff and the public. Records for Fishers on CBI were extracted from the BIR system up to 20 May 2021 and combined with additional species sighting records on file with regional NSDNRR biologists. Fisher occurrence records were also consolidated from NSDNRR staff-conducted predator and prey snow-track surveys employing a road-intercept approach between January and March along 23 transects each 5 km long totalling 1030 km (2005–2020) and 225 transects each a minimum 1 km long totalling 244 km (2013–2015) distant from a road edge among natural and actively managed forest stands. Finally, images from motion-triggered trail cameras (multiple brands) baited with American Beaver (*Castor canadensis*) carcasses at 277 sites established by NSDNRR between 2012 and 2020 in Inverness and Victoria Counties were reviewed for the presence of Fishers. All Fisher locations were converted to an ArcMap shapefile (ArcGIS Desktop, release 10.8.1; Esri, Redlands, California, USA) and spatially joined with elevation data and binned into 100-m classes.

Results and Discussion

The review of available data sources provided 131 occurrence records for Fishers on CBI (Figure 1). Among these, 77% were documented by photographic evidence ($n = 66$; Figure 2), dead or caught in snares (18), tracks (14), and three were sightings by NSDNRR staff. The remaining 23% were sightings reported by the public and determined to be valid following investigation by NSDNRR staff based on description of the animal and situation in which it occurred.

Although there are few records of Fishers in and north of Cape Breton Highlands National Park (Figure 1a), the abundance of records south of the park boundary likely reflects the relatively higher survey effort in that area. With only two records of Fishers on the eastern side of CBI, in Cape Breton and Richmond Counties, Fisher re-establishment and expansion appears to have largely occurred in Inverness and Victoria Counties at this time.

Although the distribution of all records by elevation suggests a preponderance of Fisher occurrence between sea level and 100 m (Figure 3), many of these sightings were reported by private citizens to NSDNRR staff and documented in the BIR. The relatively recent return of Fishers to CBI and the novelty

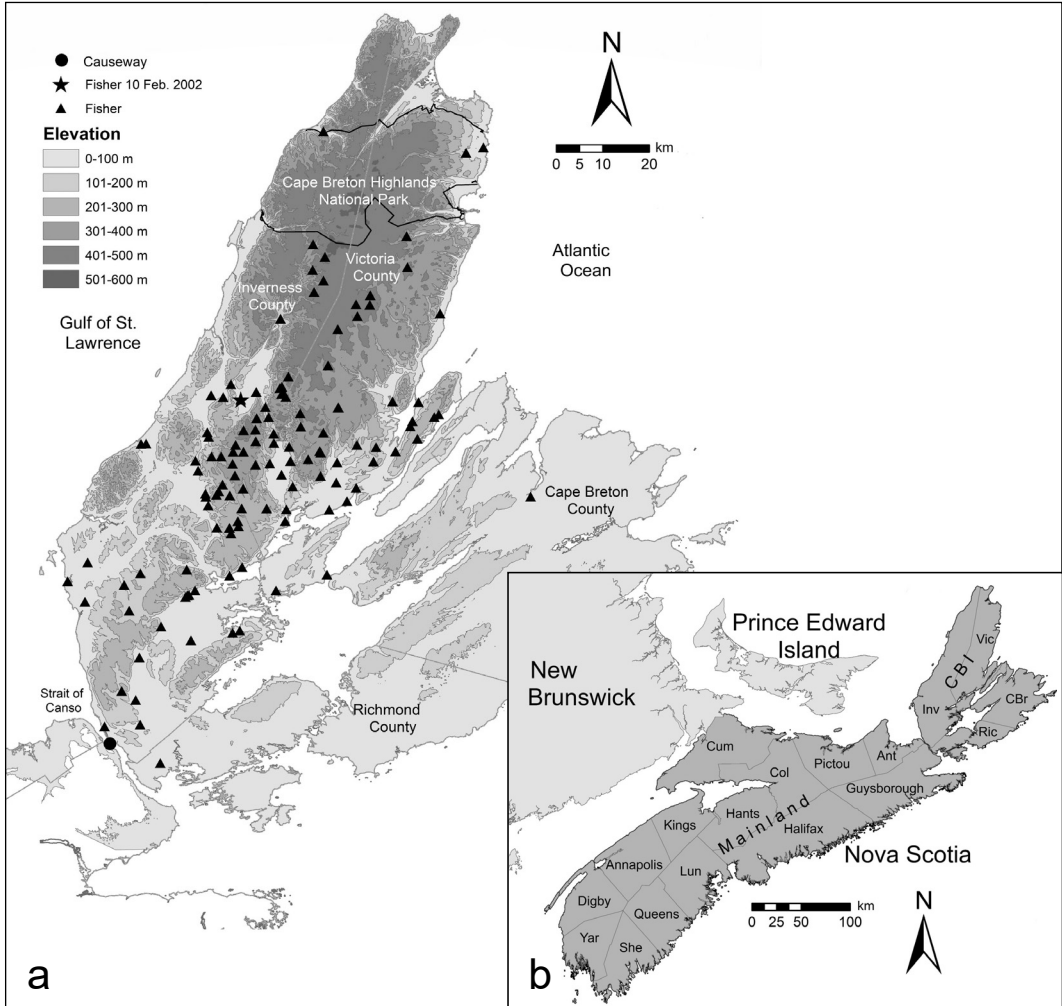


FIGURE 1. a. The distribution of Fisher (*Pekania pennanti*) occurrence records since 2002 on Cape Breton Island, Nova Scotia, Canada. b. County map for mainland Nova Scotia and Cape Breton Island (CBI) relative to New Brunswick and Prince Edward Island: Antigonish (Ant), Cape Breton (CBr), Colchester (Col), Cumberland (Cum), Inverness (Inv), Lunenburg (Lun), Richmond (Ric), Shelburne (She), Victoria (Vic), and Yarmouth (Yar).

of sighting the animal may stimulate reporting by residents, who reside predominately at lower elevations.

Fisher re-establishment on CBI likely occurred via juveniles/subadults dispersing from natal areas on the mainland to seek unoccupied territories. The February 2002 record of a Fisher on CBI, at 46.3°N, 61.03°W (Figure 1a), is ~80 km north of the Canso causeway between mainland Nova Scotia and CBI. The Strait of Canso is 1 km wide at its narrowest point and periodically freezes north of the causeway. This would facilitate immigration to CBI following population expansion on the mainland from aforementioned earlier releases (Potter 2002). The narrowing of this strait is considered by Scott and Hebda (2004)

as the probable route of invasion of several other mesocarnivores onto CBI including Bobcat (*Lynx rufus*) and Eastern Coyote. Instances of long-distance (i.e., 30–60 km) juvenile dispersal by Fishers from natal areas have been noted by others (e.g., Leonard 1980; Arthur *et al.* 1993; Aubry *et al.* 2004), supporting juvenile dispersal as a possible source of Fisher re-establishment on CBI. This implies that the Fisher captured as an adult may have been present before 2002 and only detected that year. Also, the male captured in February 2002 could have had an established home territory, suggesting the species was present in low numbers on CBI before 2002. Regardless, Fishers have re-established and expanded from sea level



FIGURE 2. Fisher (*Pekania pennanti*) captured on a Nova Scotia Department of Natural Resources and Renewables (NSDNRR) trail camera on 1 April 2018 (0713) at 46.18°N, 60.85°W, 301–350 m above sea level. Photo: NSDNRR.

to >400 m elevation across Inverness and Victoria Counties on the western side of CBI.

The re-establishment of Fisher on CBI has implications for another small CBI meso-carnivore. American Marten (*Martes americana*) was released on CBI during an augmentation program (2007–2011) to restore the provincially Endangered local population of this species (Nova Scotia American Marten Recovery Team 2006). Re-establishment or expansion of Fisher, a competitor and predator of marten, has been implicated in declines in marten populations

(Krohn *et al.* 1997; Fisher *et al.* 2013; Manlick *et al.* 2017; Suffice *et al.* 2017, 2020). Competition among predators can affect species recovery efforts (Stoskopf 2012; Hamel *et al.* 2013) and could compromise the ability of American Marten to re-establish a sustainable breeding population on CBI. The impacts of the re-establishment and expansion of a CBI Fisher population on American Marten on CBI warrants investigation.

The Strait of Canso may be an important filter for several species, especially those in which populations are expanding in Nova Scotia in response to climate change. Populations of temperate–boreal mammals, such as Fisher, American Marten, and Moose (*Alces americanus*) are predicted to shift northward as temperature and snow conditions change (Murray *et al.* 2006; Krohn 2012; Lawler *et al.* 2012; Weiskopf *et al.* 2019). Historically, the ability of these species to cross the Strait of Canso to CBI was restricted by the lack of a causeway and no winter ice formation. Moose and American Marten, which had both been almost extirpated from CBI by the early 1900s and 1980s respectively, were re-established by human re-introduction and augmentation programs (Benson and Dodds 1977; Nova Scotia American Marten Recovery Team 2006). For other species, including Fisher, the periodic formation of an ice corridor after the causeway was built in 1955 appears to have facilitated

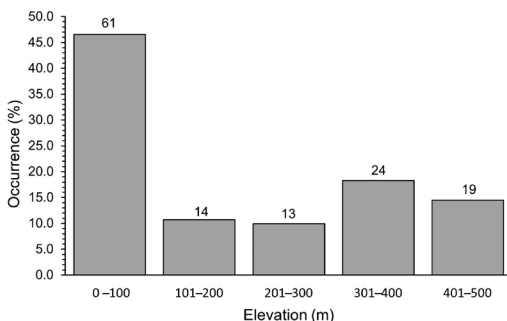


FIGURE 3. The occurrence of 131 Fisher (*Pekania pennanti*) observations by elevation since 2002 on Cape Breton Island, Nova Scotia, Canada. The number of observations per elevation category is shown above the bar.

immigration to the island. However, such an ephemeral wildlife corridor may become more sporadic as ice formation is predicted to decrease along coastal areas of the Maritimes in a warming climate (Mudryk *et al.* 2018).

Author Contributions

Writing – Original Draft: G.R.M.; Writing – Review & Editing: G.R.M., L.I.D., G.H.W., and G.J.F.; Conceptualization: G.R.M., L.I.D., and G.J.F.; Investigation: G.R.M., L.I.D., and G.H.W.; Formal Analysis: G.R.M.; Funding Acquisition: G.R.M. and L.I.D.

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