

T4.3 POST-GLACIAL COLONIZATION BY ANIMALS

As with the flora, the pre-glacial fauna of Nova Scotia is believed to have been essentially similar to that of the present day. The successive glaciations completely obliterated animals from the area now above sea level, but it is believed that refugia existed, seaward of the terminal moraines of the ice sheet, along the edge of the continental shelf. As the climate warmed during the post-glacial hypsithermal period, the subarctic tundra began to be colonized by boreal forest. However, this was set back for a period of about 200 years by a sudden cooling event. Many species had to begin colonization again and eventually a warm-temperate fauna was established which included some "southern" or continental species, such as Blanding's Turtle, Ribbon Snake, the freshwater snail *Menetus dilatatus*, the quahog *Mercenaria mercenaria* and the oyster *Crassostrea virginica*. A second cooling event, in historic times (1150 to 1860 AD), was the "Little Ice Age." Many southern species were affected at this time, either being reduced to isolated populations in the south of the province (e.g., Southern Flying Squirrel) or lost completely for a time (e.g., White-tailed Deer).

The routes by which animals could colonize Nova Scotia are shown in Figures T4.3.1 and T4.3.2.

LAND AND FRESHWATER FAUNA

The Chignecto Isthmus (Unit 53)

This has existed continuously since the end of the last glaciation but was more substantial when the sea level was lower. As the climate warmed, species were able to migrate freely from the continent. Some salt-tolerant species could move from one river system to another due to the fresh water on the coast that was coming from the melting ice sheet. Species diversity of freshwater fish decreases with distance into Nova Scotia from the landbridge. A similar pattern for freshwater mussels has also been reported. More than half of the sixty-two terrestrial snail and slug species migrated to Nova Scotia across the land bridge during the hypsithermal period.¹ The recent establishment of coyote in Nova Scotia demonstrates that this migration route is still active.

Coastal-plain Refugia

Limited refugia were believed to have existed along the continental shelf and were occupied by arctic and boreal plants and animals during the ice age. Modern geological evidence does not fully support the theory that refugia existed along the edge of the

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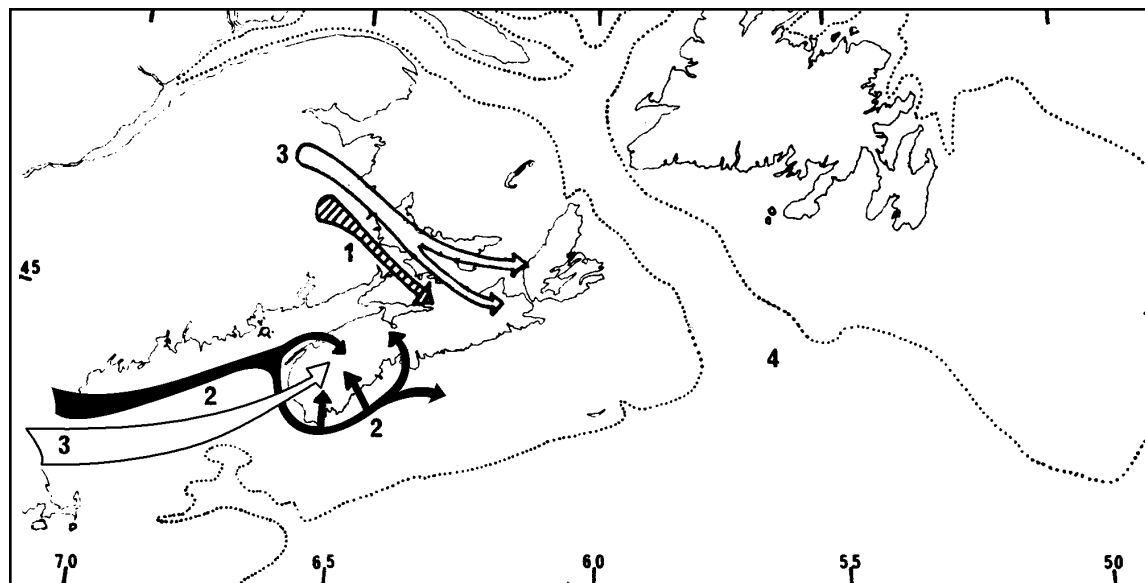


Figure T4.3.1: Post-glacial colonization of Nova Scotia by land and freshwater animals. 1: Chignecto land bridge; 2: continental shelf refugia; 3: aerial migration and transportation. Species were also introduced through direct and indirect importation by Europeans (post 1000 AD).

continental shelf for the duration of the ice age. However, botanists and entomologists consider the existence of such refugia to be essential to an explanation of the present-day distributions of arctic and boreal species in Nova Scotia and Newfoundland.² As the climate warmed and the ice withdrew, these species were able to colonize the new land, but they have since been limited in their distribution by rising sea level. They now occur largely along the cooler Atlantic coastline, where competition from temperate species is reduced. Coastal-plain refugia are not an explanation for the occurrence of southern or continental species such as the Atlantic Whitefish and freshwater isopod *Caecidotea communis*. These are more likely to have spread northwards along a more extensive coastal margin as the climate improved. Their current disjunct populations are probably a result of climatic change or habitat loss.

Aerial Migration and Transportation

Most flying animals experience few physical barriers and thus were able to colonize Nova Scotia as soon as climate and habitats were suitable. Birds, bats and flying insects are the groups best able to follow this route, and present distribution patterns (with modification due to climate and habitat change) have probably been established for a long time. Flying animals are known to transport sessile animals, such as pea clams (*Pisidium* spp.), and are important agents in their distribution.

In the last 100 years twenty-eight species of birds are known to have established populations in Nova Scotia.³ This is due to the creation of more favourable habitat and/or to climatic changes.

Introductions

The contemporary fauna also includes an introduced component of growing significance originating from other parts of North America, Europe, South America and Asia. The direct or indirect importation of species by Europeans may go back as far as 1000 years. Initial introductions came with cultivated plants and ships' ballast, and some species experienced rapid spreading with land clearance and agriculture. This type of introduction has caused widespread displacement of native species. Introduced species may be found in natural habitats, however they are more common in disturbed areas.

MARINE FAUNA

The marine fauna was originally arctic/boreal in nature, associated with the predominately cool water-temperatures of the area. However, species with more southerly affinities have colonized the area in the past. Following the last glaciation, warm water (18°C) more characteristic of areas south of Cape Cod extended northwards in coastal areas into the Bay of Fundy, the continental shelf and the southern Gulf of St. Lawrence (Region 900).⁴ This enabled

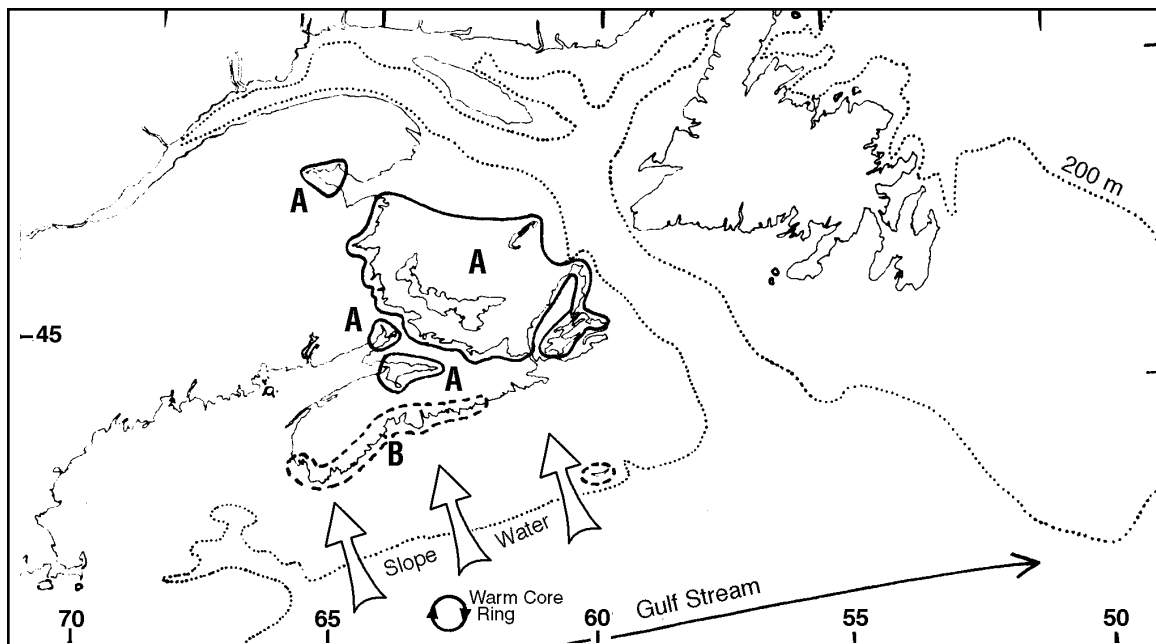


Figure T4.3.2: Post-glacial colonization of Nova Scotia coasts by marine organisms. Key:— A: Main areas of present-day warm-water species established during hypsithermal. B: Areas of warm-water species established during hypsithermal, and currently, in part, maintained or enriched through slope-water exchange.

warm-water species (“oyster-bed fauna”) to colonize these areas. As the climate subsequently cooled, areas occupied by the warm-water fauna became isolated. The fauna of Minas Basin and the southern Gulf of St. Lawrence were separated and now differ in character. Warm-water species along the Atlantic coast (Region 800/Unit 911) are isolated in sheltered bays, where temperatures rise sufficiently in summer to permit reproduction. The former warm-water fauna around Sable Island is now largely extinct. Populations of many species are disjunct and are now separated from main populations further south by hundreds of kilometres, e.g., the Boring Clam, *Barnea truncata*, and Lady Crab, *Ovalipes ocellatus*.

The southern Atlantic coast of Nova Scotia (Unit 931e, South Shore and parts of the Eastern Shore) are periodically subjected to incursions of warm water from the continental shelf. This water is partly derived from the Gulf Stream and includes the larvae and adults of marine animals which normally occur further south. During summer the larvae arriving in this way may undergo metamorphosis and become noticeable as part of the fauna of bays and estuaries. Warm-water incursions also bring pelagic species, e.g., Portuguese Man-of-war and animals associated with *Sargassum* weed. These animals rarely survive or reproduce, as a result of low winter temperatures. However, populations could become established following some climatic improvement or local warming of water through industrial activity.



Associated Topics

T3.3 Glaciation, Deglaciation and Sea-level Changes, T3.5 Offshore Bottom Characteristics, T4.1 Post-glacial Climatic Change, T4.2 Post-glacial Colonization by Plants, T6.1 Ocean Currents, T11.1–T11.18 Animals, T12.11 Animals and Resources

Associated Habitats

H1.1–H1.2 Offshore, H2.1–H2.6 Coastal, H3.1–H3.6 Freshwater, H4.1–H4.4 Freshwater Wetlands, H5.1–H5.5 Terrestrial Unforested, H6.1–H6.3 Terrestrial Forests

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- 3 Erskine, A.J. (1992) *Atlas of Breeding Birds of the Maritime Provinces*. Nimbus Publishing and the Nova Scotia Museum, Halifax.
- 4 Bousfield, E.L., and M.L.H. Thomas (1975) “Post-glacial changes in the distribution of littoral marine invertebrates in the Canadian Atlantic Region.” In *Environmental Changes in the Maritimes*. Nova Scotia Institute of Science, Halifax.

Additional Reading

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