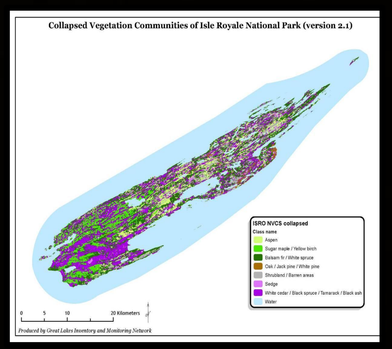
Canada Lynx Restoration at Isle Royale National Park: A Feasibility Study.

The Objectives:

- Document the historic status of lynx and their extirpation.
- Assess the carrying capacity of the island and the viability of a reintroduced population.



The Study Area:

- Isle Royale is a 541 km^2 island in Western Lake Superior.
- The island is about 22 km from the Ontario/Minnesota shoreline.
- The island and surrounding waters and islands comprise Isle Royale National Park.
- The island is wilderness with all visitation from spring-fall.
- Island is famous for a 50-year wolf-moose predator-prey study.
- Canada lynx are absent from the island.

The Background:

- Originally a boreal forest with caribou and lynx the largest animals.
- 1830-1940: Settlement, mining, logging, fur-harvesting, fishing.
- 1900s: Coyotes colonize island.
- 1909: Moose colonize island.
- 1920s: Caribou extirpated.
- 1930s: Lynx extirpated.
- 1930s: Moose irruption. Severe starvation and habitat degradation.
- 1936: About 20% of the island burns.
- 1940: Designated a national park. Hunting and trapping prohibited.
- 1949: Wolves colonize island.
- 1950s: Coyotes extirpated.
- 1960s-80s: Sporadic lynx reports every 7-11 years; likely immigrants.

Why Did Lynx Disappear:

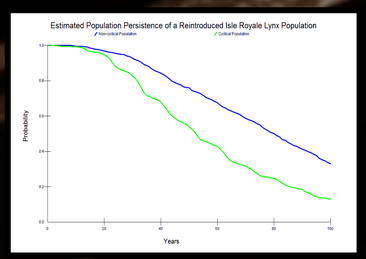
- Habitat degradation due to moose over-browsing (causing a decrease in snowshoe hares) and competition with coyotes were likely contributing factors, but over-harvest was likely the primary cause. Population viability models indicate a < 1% chance of surviving the historic harvest rates from the 1900-1930s (see below).

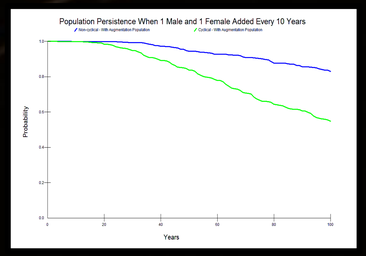
How Many Lynx Can Isle Royale Support:

- Historically, forty-eight lynx were harvested in winter of 1903-04, 67 in 1916-17, and 25 in 1930s, suggesting maybe 70 lynx or more. However, significant habitat changes have occurred since then.
- Home ranges cores from Minnesota mainland (Moen and Windels 2009) extrapolate to 33 lynx on the island.
- Minnesota densities of 3 lynx per 100 km^2 (Moen 2008) extrapolates to 16 lynx on the island.
- Snowshoe hare pellet surveys in 2011 extrapolate to 44 lynx, the most reliable estimate.

Population Persistence:

- We used Vortex to conduct a population viability analysis (PVA).
- Assuming the island can support 44 lynx, and using Minnesota demographic data, the population has only a 33% chance of surviving 100 years, less if one assumes a cyclic hare population.
- If we assume immigration of 2 lynx every 10 years the population has a 83% chance of survival.



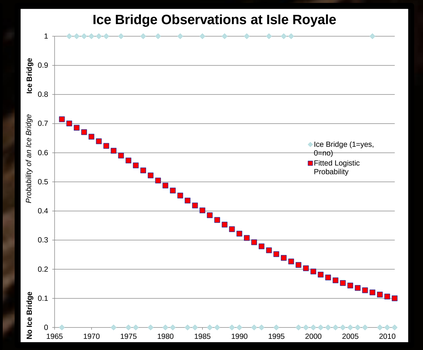


Our Model of Lynx Ecology at Isle Royale:

- We believe that due to the island's size lynx were never self-sustaining; however, they persisted because of lynx immigration across an ice bridge to the mainland, most frequently during the 8-11 year population peaks in the lynx cycle. The immigrants brought new animals and genetics to the Isle Royale lynx population.

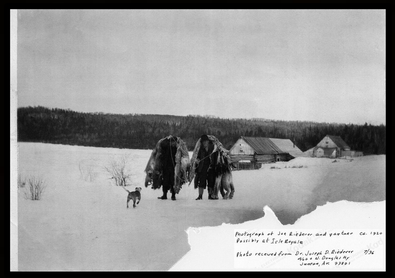
The Current Dilemma:

- The frequency of ice bridges between the island and mainland has decreased in the past several decades.
- Without augmentation a reintroduced lynx population may not be sustainable.



The Summary:

Isle Royale National Park is an island park in western Lake Superior, about 22 km from the Ontario/Minnesota shoreline. The park contains 541 km^2 of boreal forest and is best known for its wolf and moose populations. Canada lynx were historically present on the island, but have been essentially absent since the 1930s. The first half of the 20th century was a time of dramatic change on Isle Royale as lynx and caribou disappeared, coyotes briefly appeared, and wolves, moose, and red fox appeared. The changing mammal community and habitat may have contributed to the disappearance of lynx, but the primary cause is almost certainly human over-harvest. Forty-eight lynx were harvested in 1903-04, 67 in 1916-17, and 25 in the 1930s. Assuming a historic carrying capacity of 75 lynx, a Population Viability Analysis (PVA) indicated that the population had less than a 1% chance of surviving 100 years under comparable harvests. Mainland lynx studies and snowshoe hare pellet surveys on the island suggest the island can currently support 15-50 lynx. A PVA of a reintroduced lynx population showed a 33% chance of persistence for 100 years, less if one assumes a cyclic population. However, when 2 lynx are added every 10 years persistence increased to 83%. We suggest that the island lynx population was historically maintained by lynx crossing an ice bridge from the mainland, most frequently at the peak of the 8-11 year lynx cycle in Ontario. However, the probability of an ice bridge forming has declined from 0.7 in 1965 to 0.1 in 2010, likely due to climate change. Therefore, periodic anthropogenic augmentation may be necessary to sustain a population. The park has not yet make a decision regarding reintroduction.



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