Changes in Ecological Communities Following Introduction of the Red-backed Vole

tech-nol-o-ogy [Gk. technologia]
2b. a scientific method of achieving a practicle purpose

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Newfoundland Setting

- island – natural barriers to dispersal
- ca. 48,000 km^2
- Ecologically depauperate
- 14 native mammals
  - & 14 introduced over last 150 years
- primarily boreal forests; highly naturally fragmented

Native Meadow vole

(*only one historically)*

(prey base)

Masked shrew – 1950's

Deer mouse – 1960's

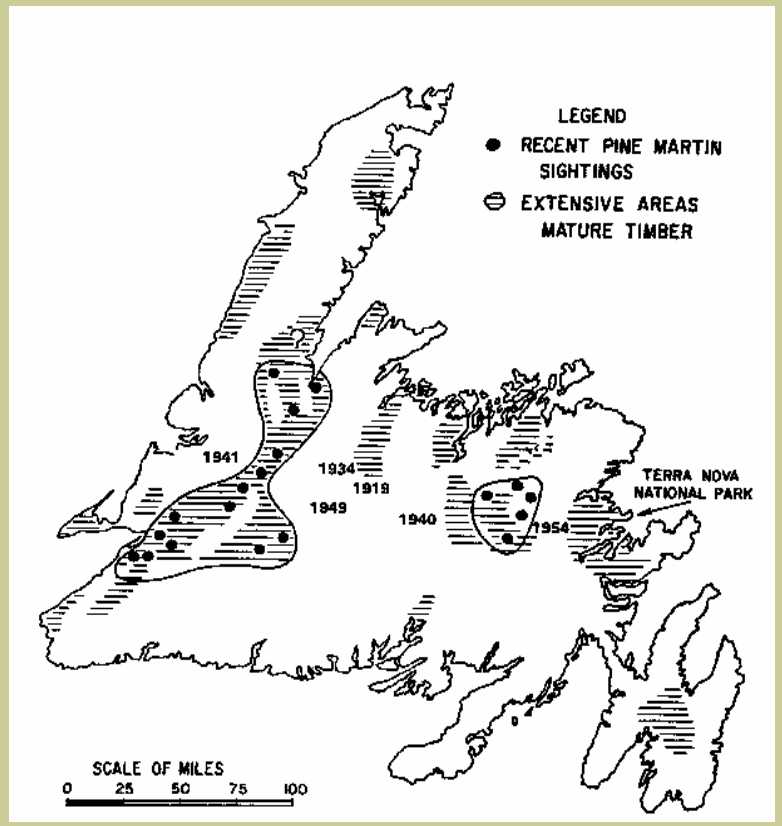
Introductions

- Nova Scotia beginning in 1864 – open season by 1879
- Harvest 500,000 - 2 M hares per season
- Significant snaring pressure

- Nova Scotia in 1878
- New Brunswick in 1904
- Presently 150,000 +

History of Decline

- *"Common"* - 1768
- *"Getting scarce"* - 1842
- "*Few / decidedly scare*" - 1913
- 1934 - season closed
- 1986 – Threatened (COSEWIC)
- 1996 – Endangered (COSEWIC)



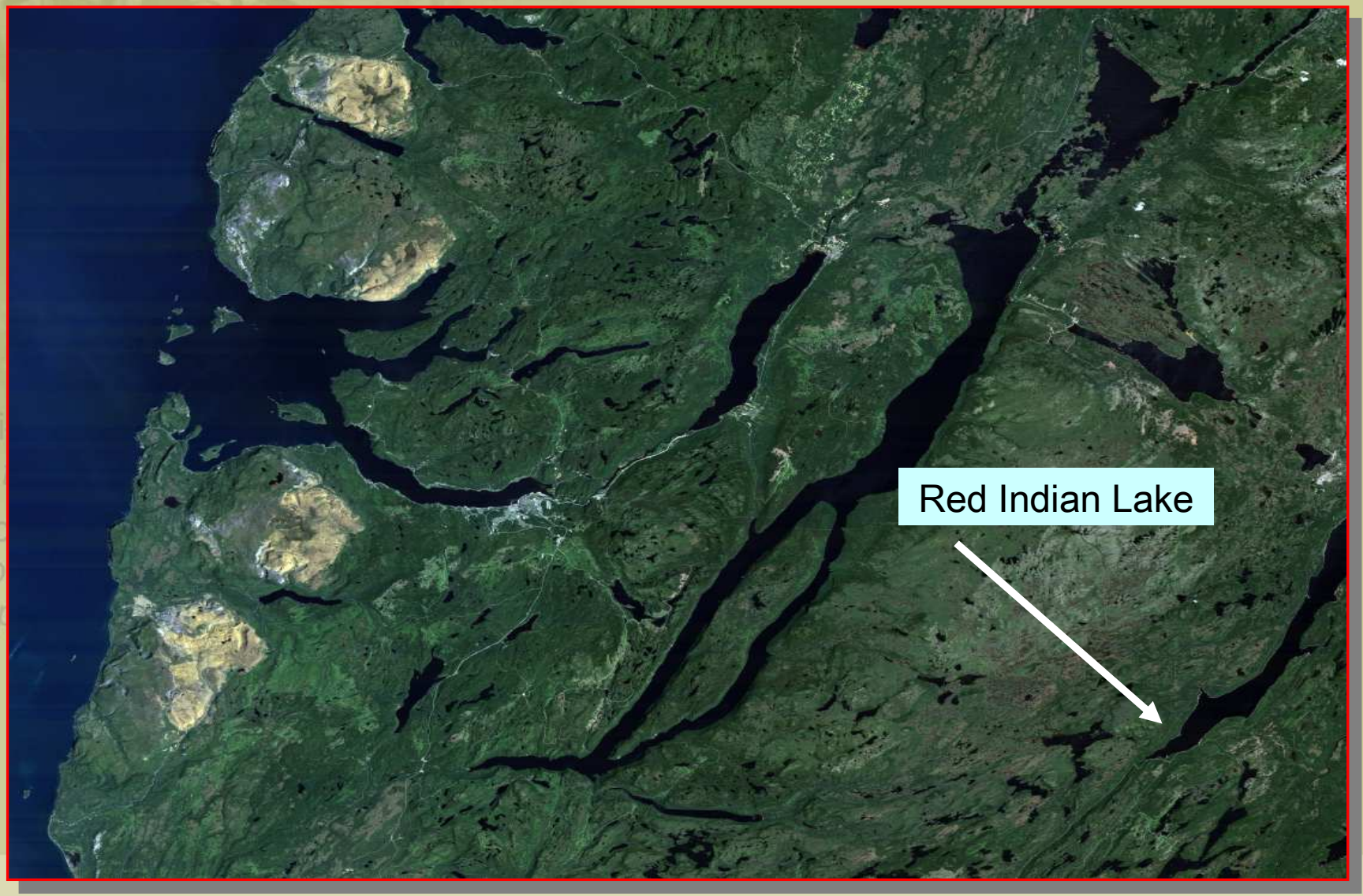
Old Growth and Prey

"…management plans must recognize the constraints imposed by the available prey resource." (Sturtevant and Bissonette 1995)

*" …. In Newfoundland, marten are more closely tied to mature forests than in some other parts of north America, primarily due to limited availability of prey" (**Bissonette et al. 1997**)*

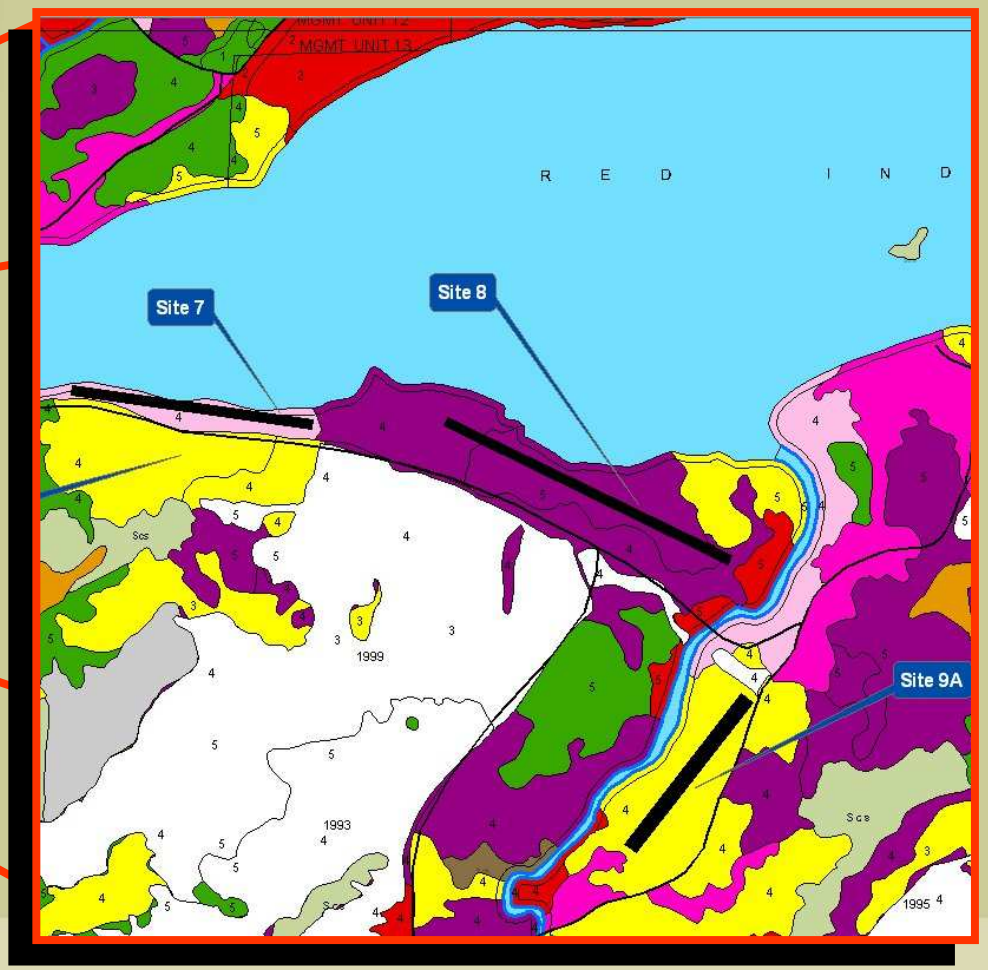
*" …. Hence the depauperate food base has had a defining influence on marten habitat selection and appears to account for differences in habitat selection in Newfoundland compared to Maine." (**Bissonette et al. 1997**)*

Study Area (1999-2007)



RIL Small Mammal Survey

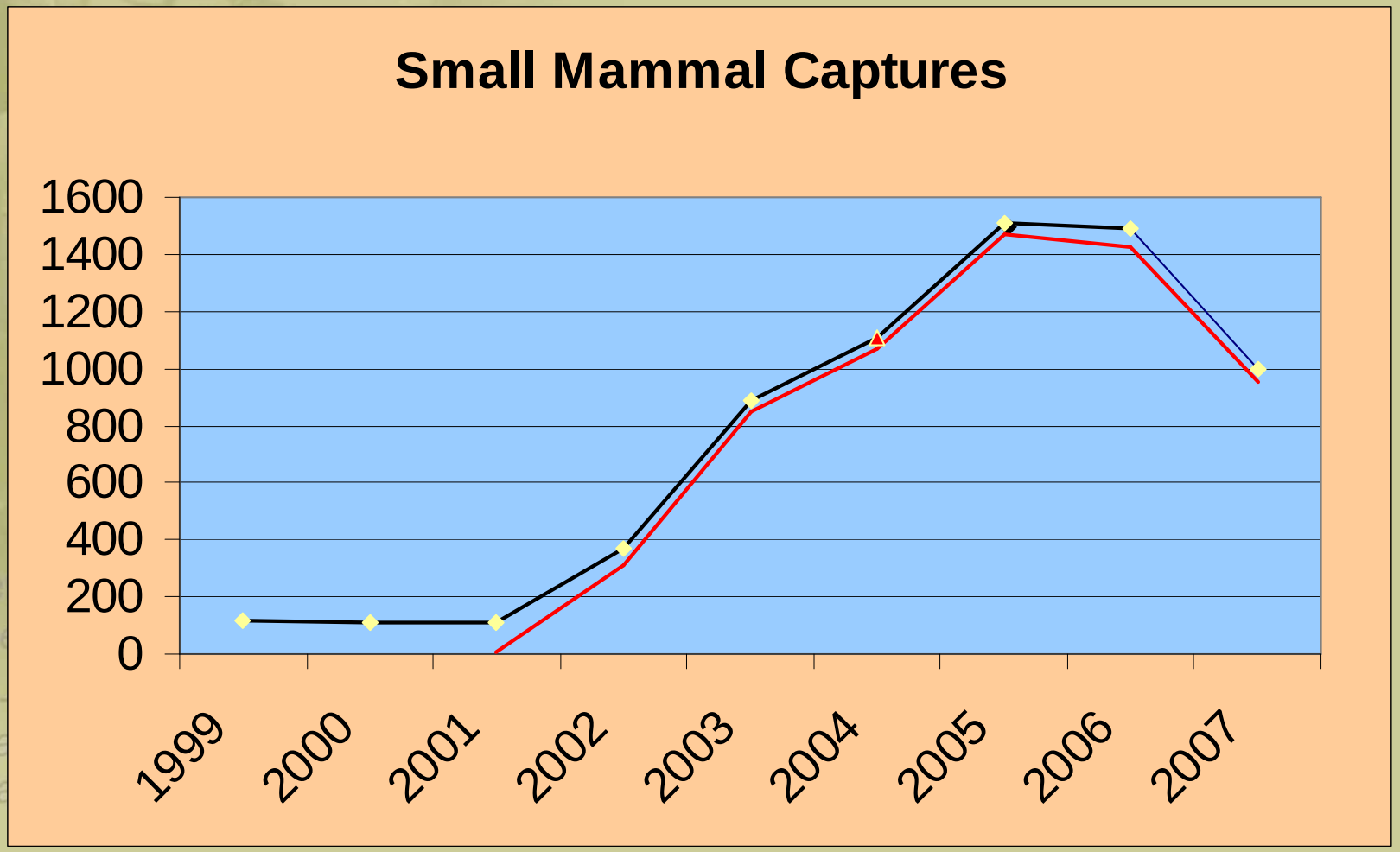
- **20 sites sampled annually**
  - **(some changes in site location)**
- **100 snap traps per line x 3 nights**
- **300 trap nites / site (6000 total)**
- **Habitat specific prey availability**



Baseline

	Small Mammal Species			
Year	**M. Vole**	**D. Mouse**	**Shrew**	**RB Vole**
1999	39	52	25	
2000	10	3	96	
2001	34	33	34	9

Small Mammal Captures (1999-2007)



16X increase in small mammal biomass; RBV dominating samples

Unknown Ecological Consequences

- Significant increase in small mammal biomass
  - prey base for higher tropic levels
  - Potential impact on carnivore ecology (e.g., marten, fox, weasel)
    - Spatial requirements
    - Intraguild predation
- Unknown impact on seed utilization / seed dispersal
  - Changing plant regeneration patterns
- Interspecific competition with native M. Vole
  - Endemic subspecies (*M. pennsylvanicus terraenovae)*
  - *Niche displacement - competitive exclusion*

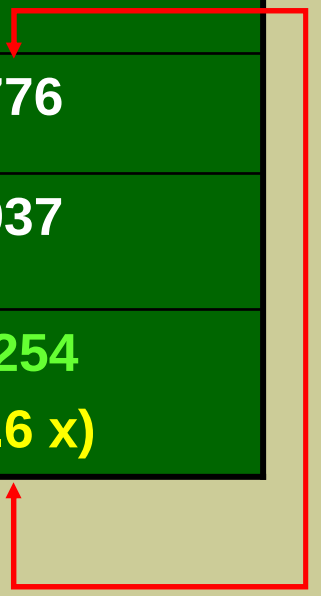
NF Marten

- *Genetically distinct subspecies*
- *Morphologically large*
- *Unique habitat use & spatial requirements*
- *Changing Ecological Setting* & hence selection pressures
- Direct & indirect effects

2b. a scientific method of achieving a practicle purpose

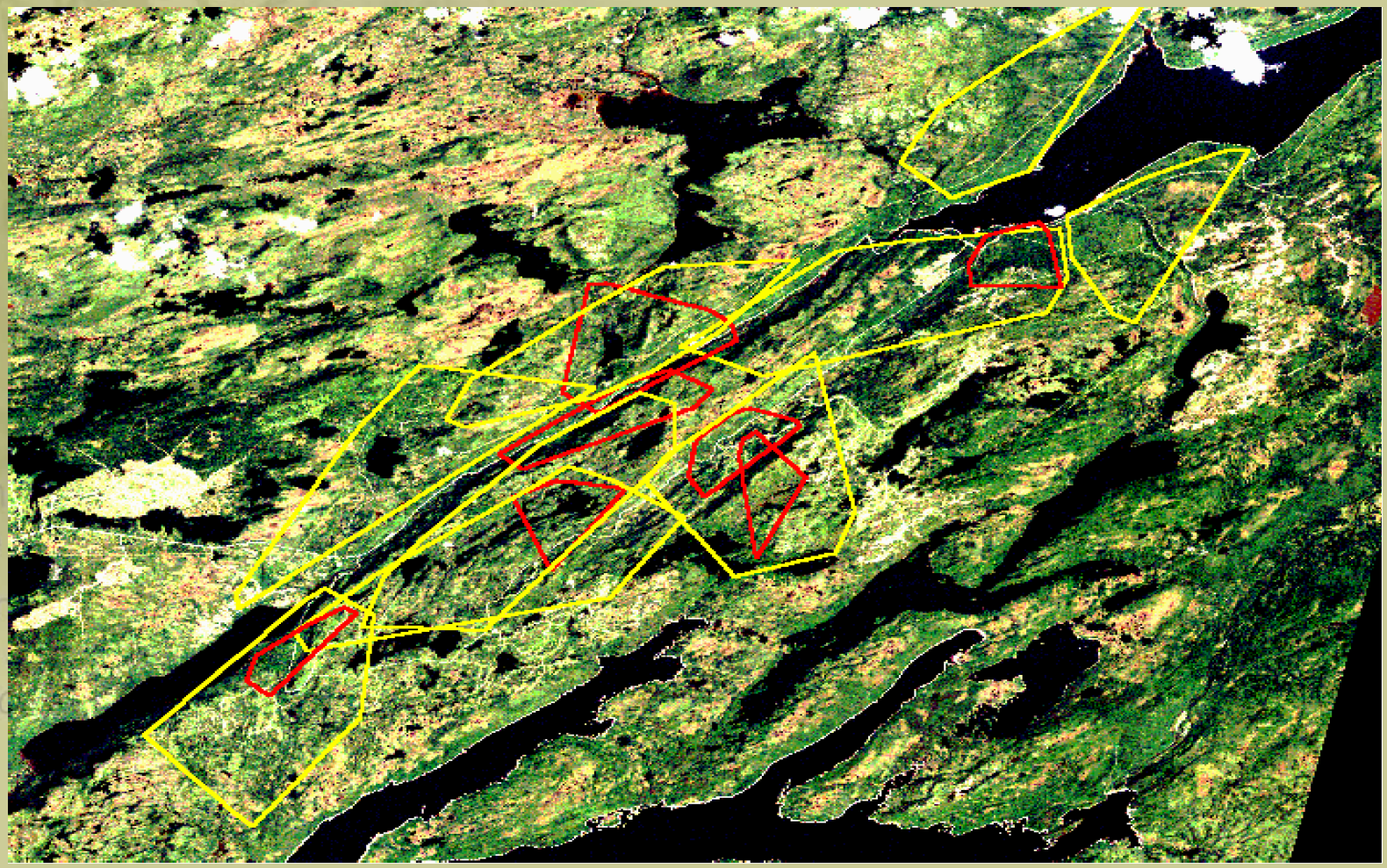
Specifics - Ecological Setting

	Average Male Home Range (km^2)	Average Male Weight (grams)
Maine	**4.04**	**776**
Quebec	**7.4**	**937**
Newfoundland	**30.8 (7.6 x)**	**1254 (1.6 x)**



Spatial Requirements

(home range size evolved as function of prey biomass, habitat structure & fragmentation



Conclusions

- RBV are now well established on the island of NF
- Have documented significant changes in small mammal biomass on study site over last 9 years
- Expect significant direct and indirect effects on
    - small mammal community structure
        - predator ecology & predator interactions
- Introduction will likely effect in some unknown way the status of other island endemics