

# Integrated Inventories in Mammalogy

## Traditional

Specimen-based Field Inventories  
& Other sources

Tissues

Parasites

## Non-Traditional

Unvouchered Studies

Ancillary Data

# Integrated Archives— Why, What, and How?

- Temporally Deep
- Geographically Broad, Site Intensive
- Geo-referenced
- Multiple Datasets tied to central voucher specimen
  - Frozen Materials for Molecular Biology
  - Parasites tied to Hosts
- Searchable Web-based Databases

Significant questions (& educational themes) are centered on our ability to assess change.

- Climate change
- Habitat conversion
- Pollutants
- Emerging pathogens & disease
- Introduction of exotics
- Loss of biotic diversity



Baseline or historic information is crucial to documenting changing environments

# Museum Specimens – Establish Historic Conditions

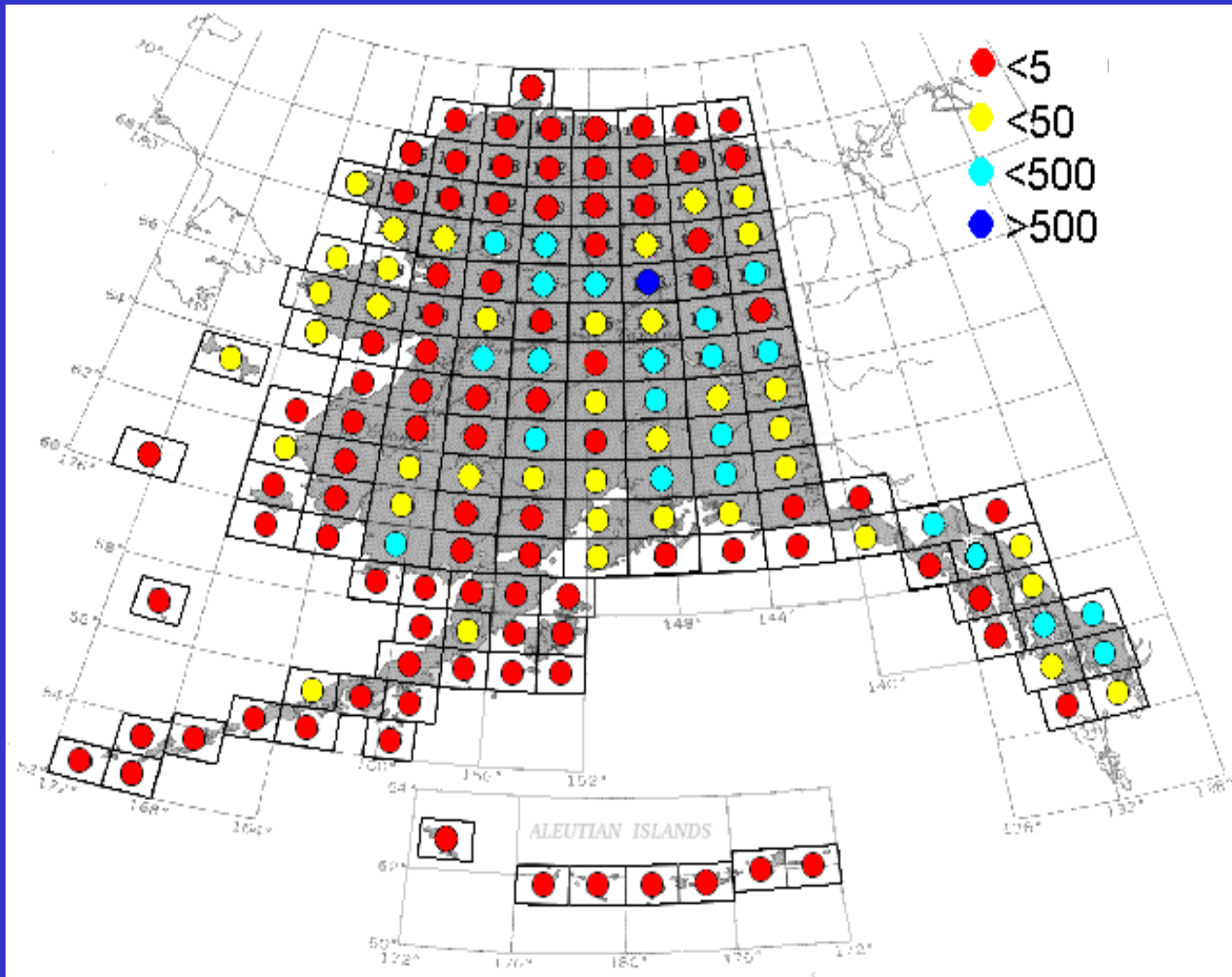
- **Parasite and disease screening**
  - Emergent diseases
  - Historical/baseline infection rates
  - Identifying new hosts or pathogens
- **Stable-isotope ratios and ecology**
  - predator/prey
  - seasonal diet shifts
  - primary productivity
- **Toxins**
  - mercury, POPs
- **Genetic relationships**
  - among individuals, populations, species



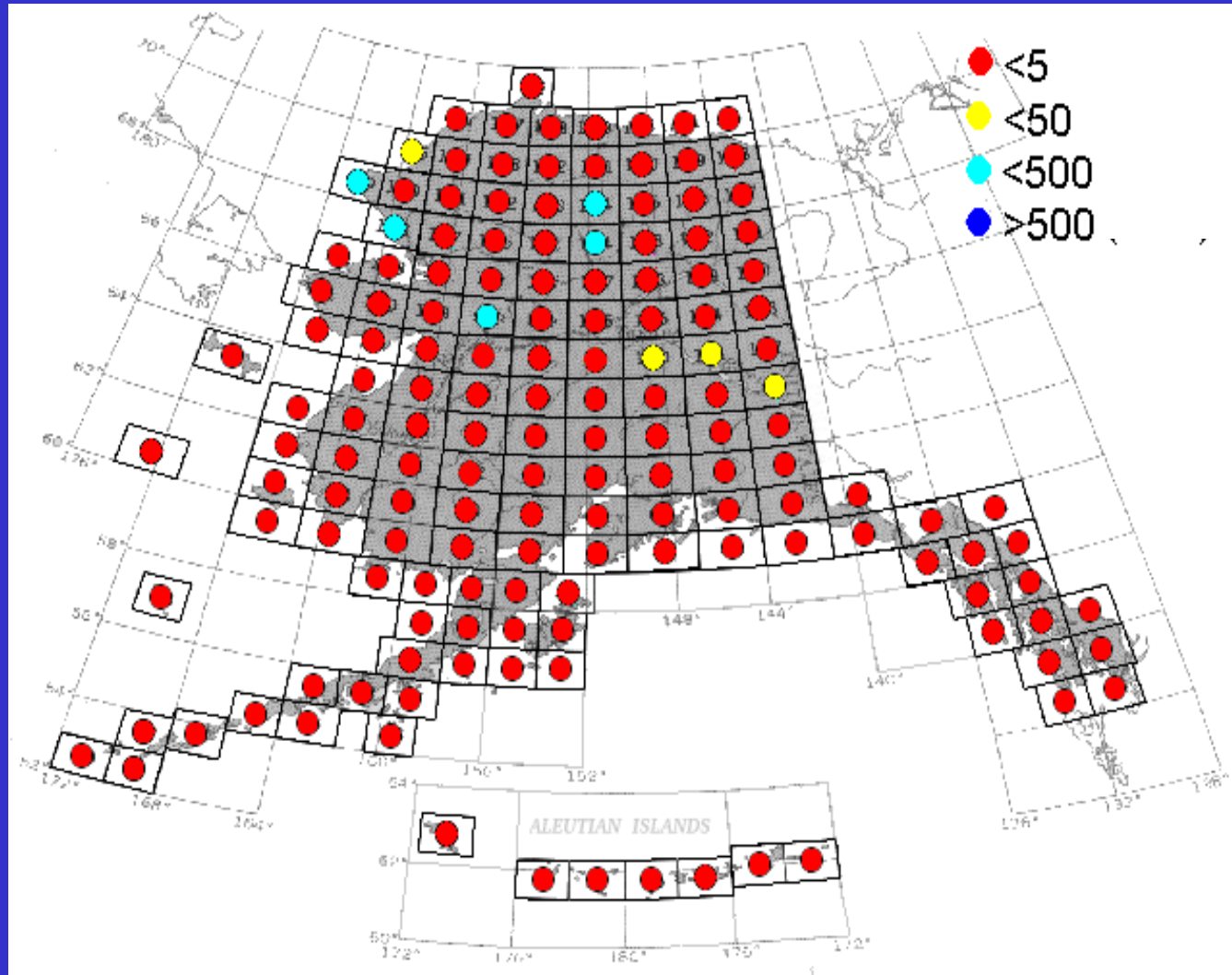
# Collection Coverage

Are existing collections adequate for the bigger issues (research questions or use in educational exercises)?

# Specimens of *Myodes* (*Clethrionomys*) per USGS Quad (15,000 km<sup>2</sup>)

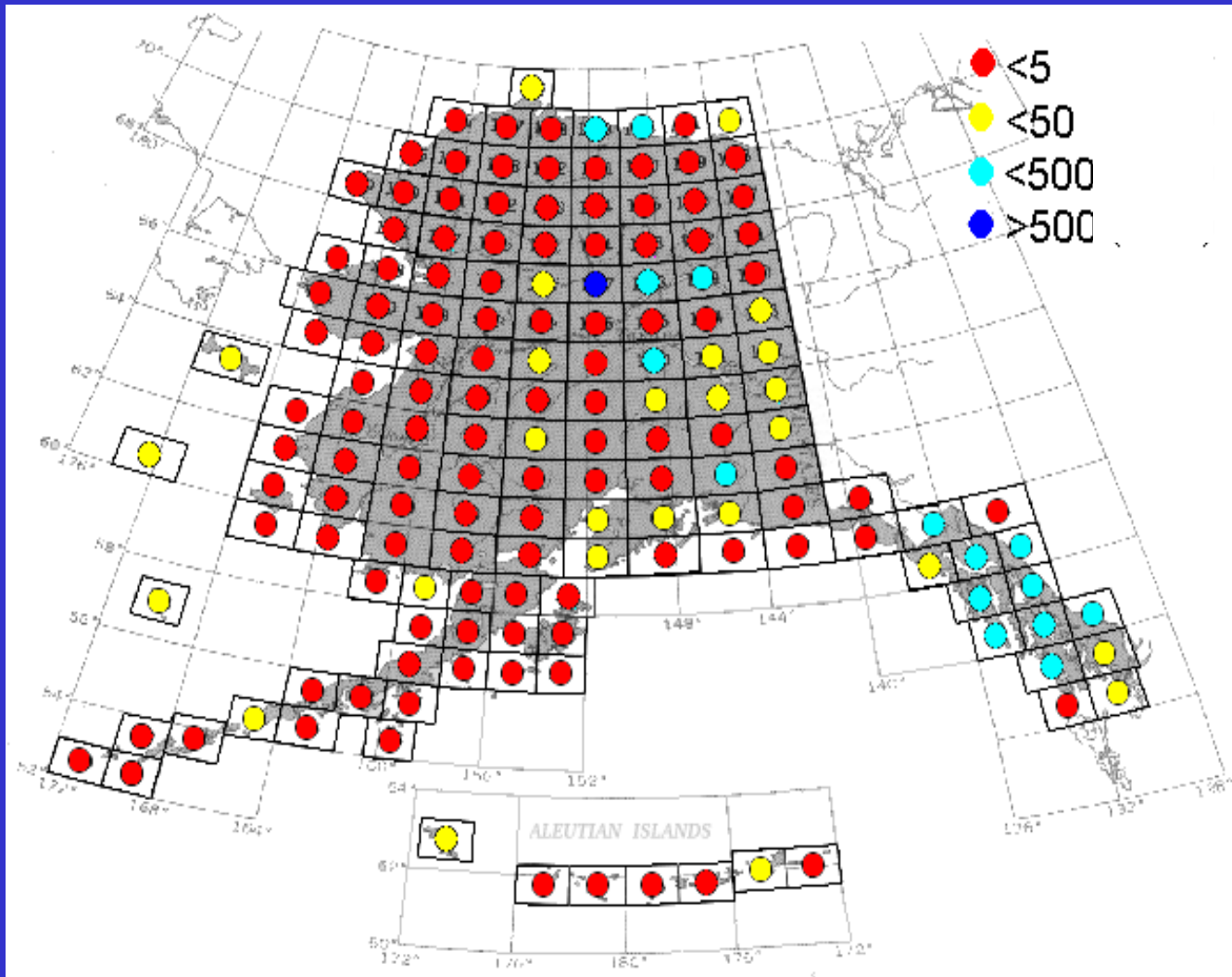


# *Alces* and *Rangifer* combined





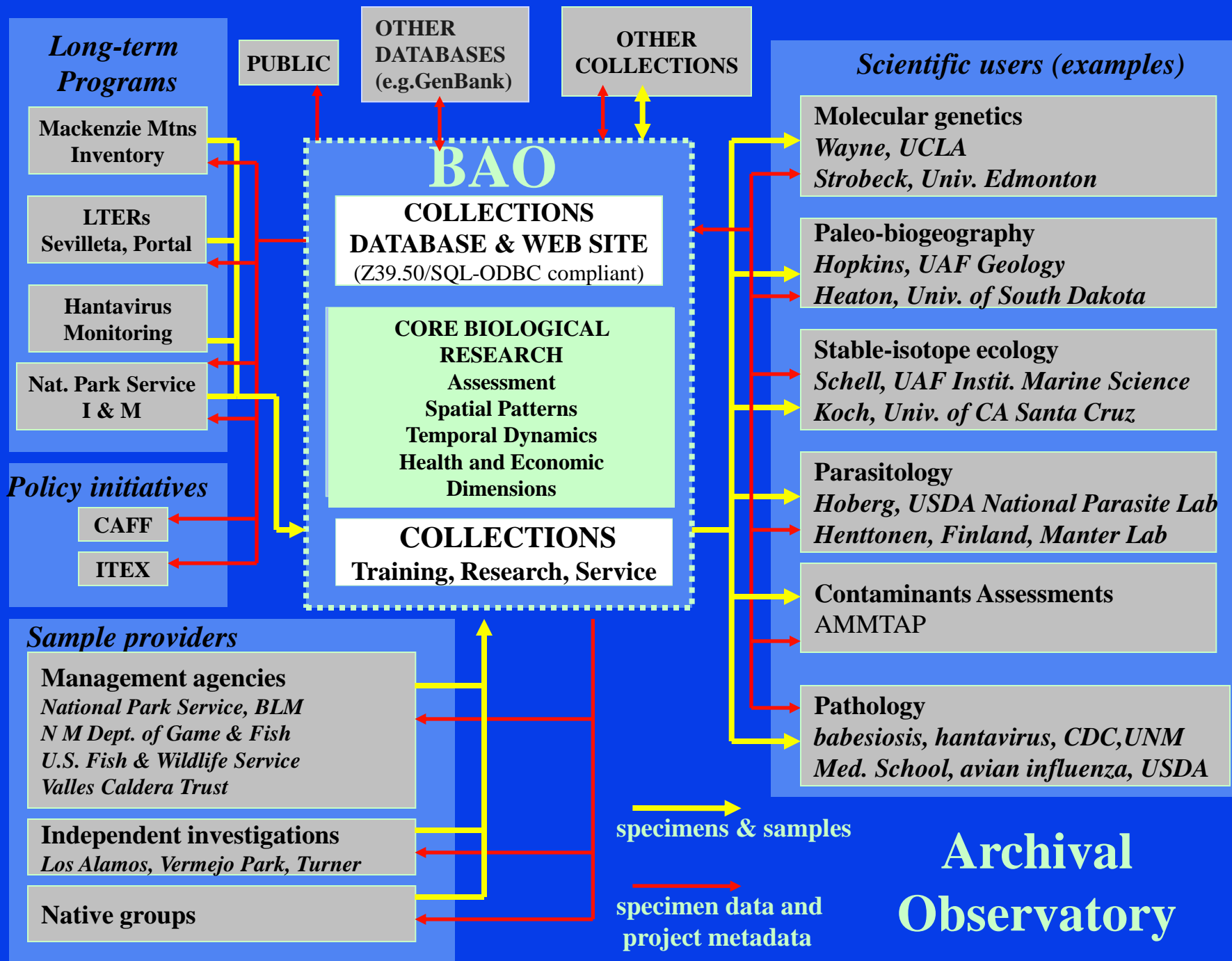
# All Mammals for one year (1997)





# Challenges for Museums

- Collections need to..
  - Grow
    - Large sample sizes, well distributed over time and space
  - Integrate Multiple Data Sets
    - standard specimens & frozen tissues
    - parasites and hosts
  - Implement Protocols to Facilitate Material Availability
    - Networks for connecting managers, scientists, general public
    - Cyberinfrastructure for Informatics (GIS, GenBank)
  - Integrate into Education & Train Future Investigators
  - Support Cutting Edge Research
  - Respond to Societal Needs



# Field Expeditions in SE Alaska



- Voucher
- Tissues (frozen)
- Ectoparasites
- Endoparasites
- Feces



# Significant Habitat Loss

Across the Tongass or on an Island by Island Basis?



Admiralty  
Island



Etolin Island



Long Island 1987

# A Potential Lab in Ecology

## Inventory Results 1990-2009

- From 22 islands to 123 islands with specimens
- Documented Additional Species for Region
  - Fisher, heather vole (glacial relict?)
- *Island records*
  - *S. monticolus* NOT on Baranof or Chichagof
  - Confirmed *Zapus hudsonius* on Revilla
  - *Sorex palustris* on Wrangell Island, etc
- *With these data can begin to assess relationships of presence, absence, island size and distance = traditional island biogeography*

# Shift to Island Centered Management

- Insularity
  - Increased Divergence
  - Centers of Endemism
  - Increased Probability of Extinction
- Introductions
- Disease
- Habitat Modification & Commercial Harvests

# Management Concerns

- Extinction
- Connectivity and Fragmentation
- Species Introductions
- Habitat Manipulation
- Over Harvesting
- Disease



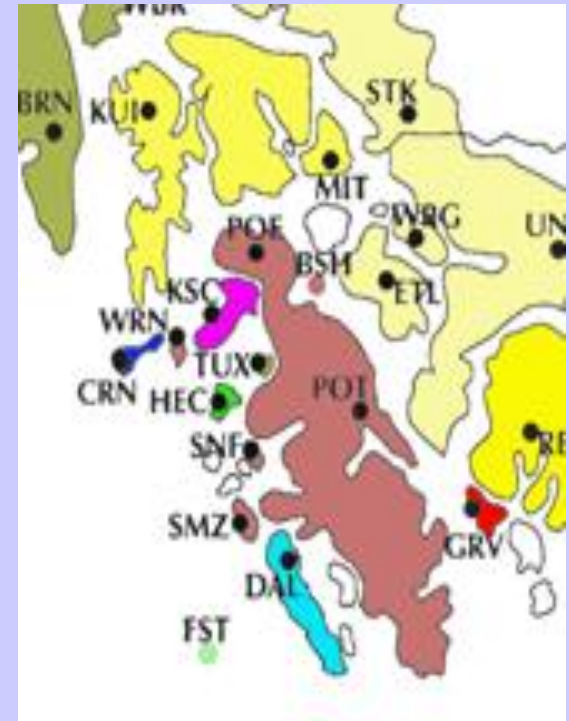
# Hotspots of Diversity



**Last Glacial**



**Logged  
Areas**



**Unique Lineages**

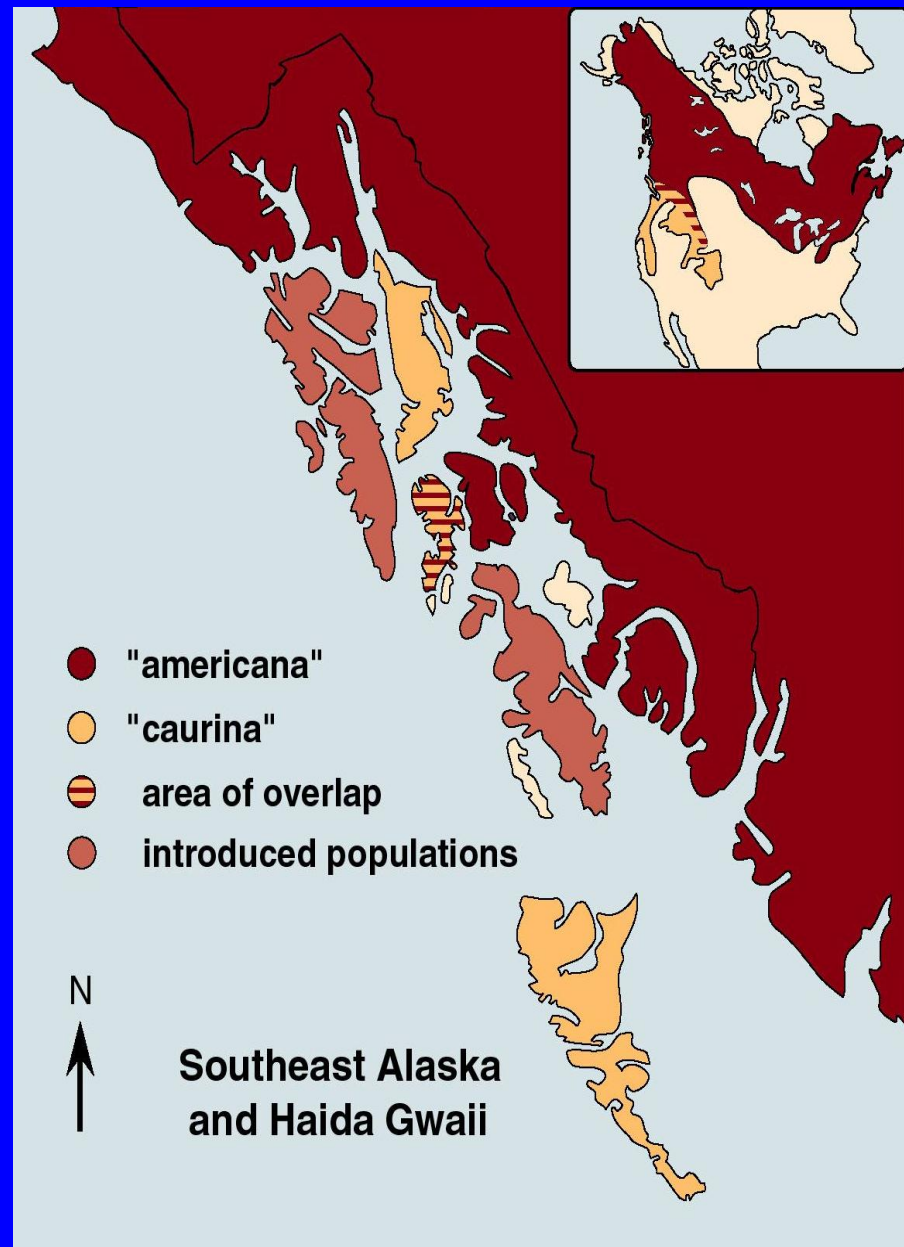
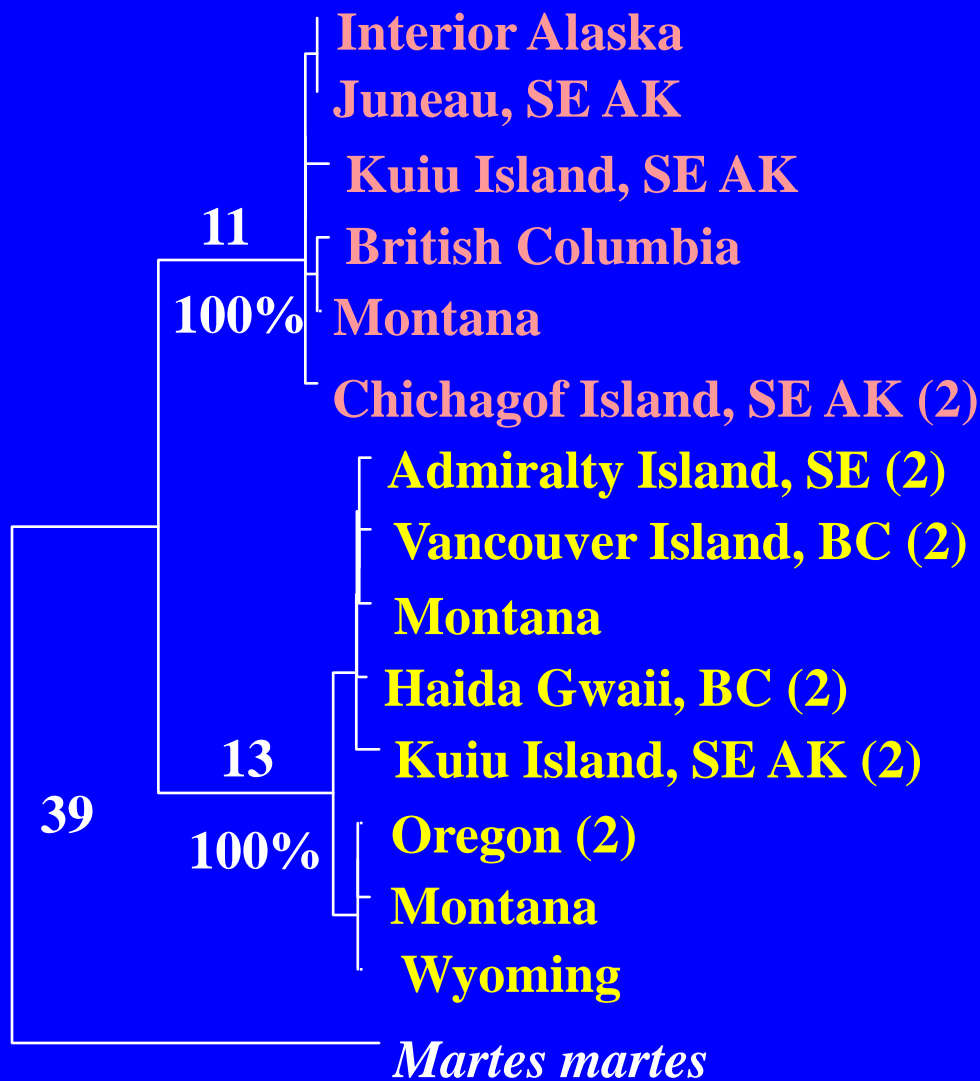
(Keen's Mouse, also Flying Squirrel, Ermine, spruce grouse)

# Integrated Host-Parasite Approach

- Is SE AK a unique biogeographic unit?
- Are their concordant patterns of differentiation across organisms (i.e., signal of common history)?
- Are we managing at the right scale?
- Are there species of conservation concern?
- What special problems does an archipelago create for management?
- Can this complex landscape be simplified?

*Martes americana*  
cytochrome b (1140 bp)

N = 680



# *Soboliphyme baturini*

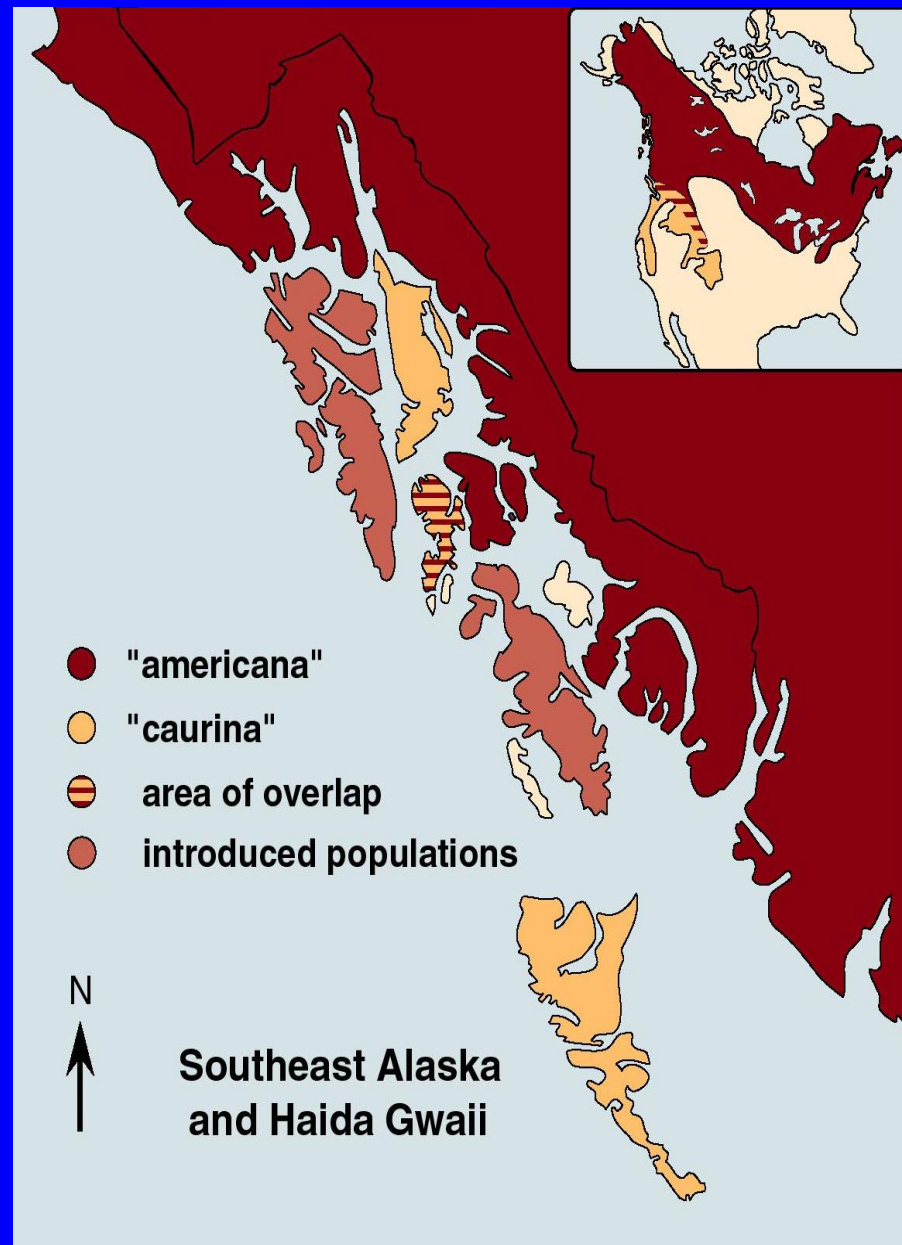
- Stomach nematode Parasite of Mustelids
- Adult Length: 2-4 cm
- Intensity: 3-5 per stomach, Up to 200
- Pathology not fully explored
  - Anemia
  - Ulcers
  - No known cases reported from humans





*Martes americana*  
cytochrome b (1140 bp)

N = 680



# Challenges for Mammal Inventories

- Fully Develop Methods For Depth and Breadth
  - Time and Space
  - Inventories (across taxa, share logistics)
  - Sample size
- Population Level Analyses
  - Connectivity and Fragmentation
  - Wildlife Pathogens and Disease
- Comparative Studies
  - How do we integrate across other taxa?

# **Non-traditional mammal data (from a museum point of view)**

- 1. Unvouchered specimens**
- 2. Valuable “ancillary” data**





# Unvouchered specimens occur for at least two reasons:

1. **Research questions**  
(behavior, ecology, demography)
2. **Regulatory constraints**  
(conservation, politics)



# Use of ancillary data is increasing:

1. Research  
(e.g., Grinnell project)
2. Education  
(e.g., Aim-UP! project)



# Types of unvouchered data:

1. **Species ID**
2. **Capture locality**
3. **Standard measurements**  
(e.g., sex, weight)



(e.g., capture-mark-recapture studies)

# Types of unvouchered data:

1. Tissue samples
2. Telemetry fixes
3. Behavioral records  
(e.g., coded observations)



(e.g., observational studies)

# Special data concerns:

- 1. Repeated records per individual**
- 2. Small spatial scales**

