The contribution of SWAN & NPS in understanding the decline of sea otters in Southwest Alaska

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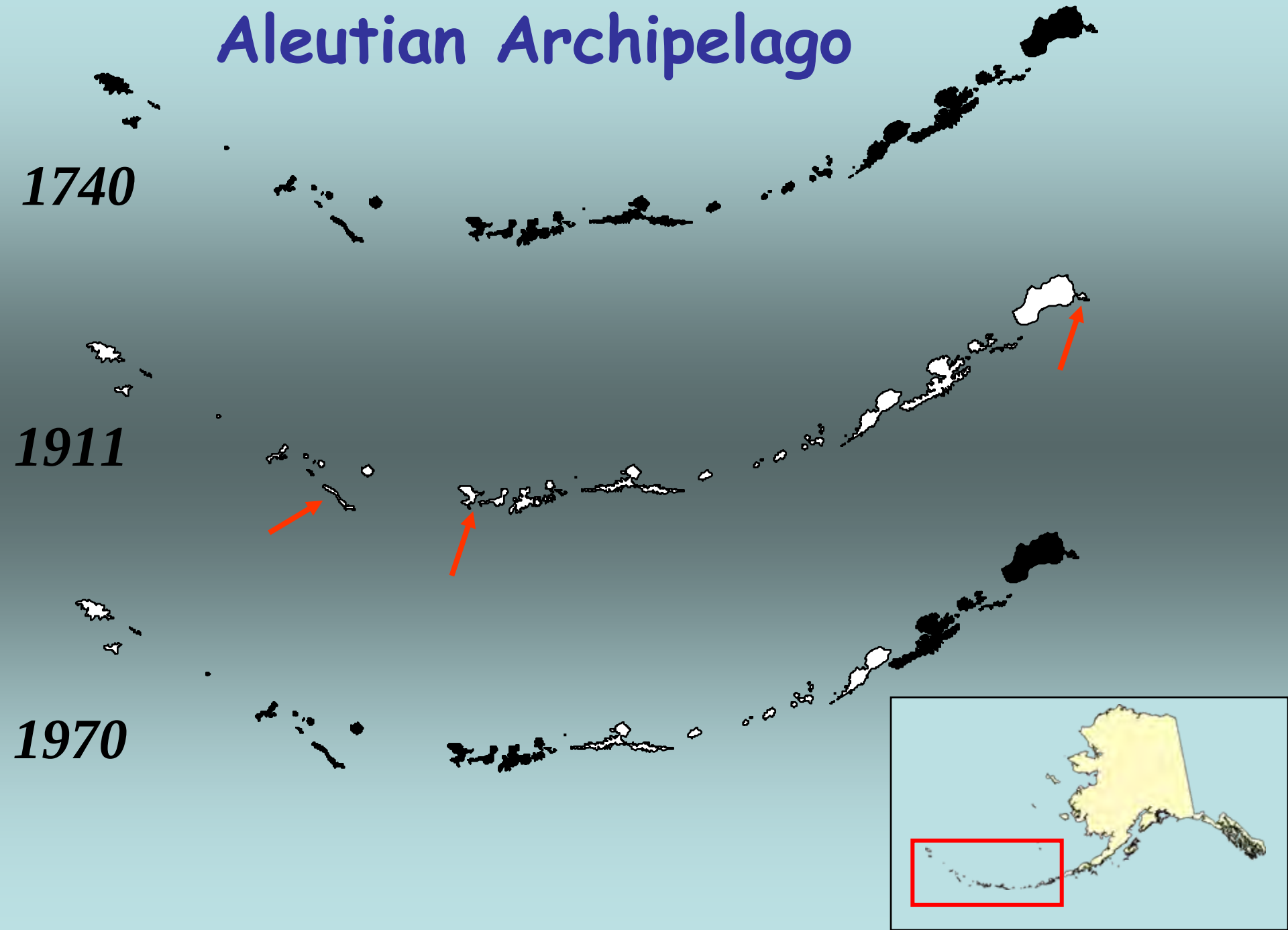
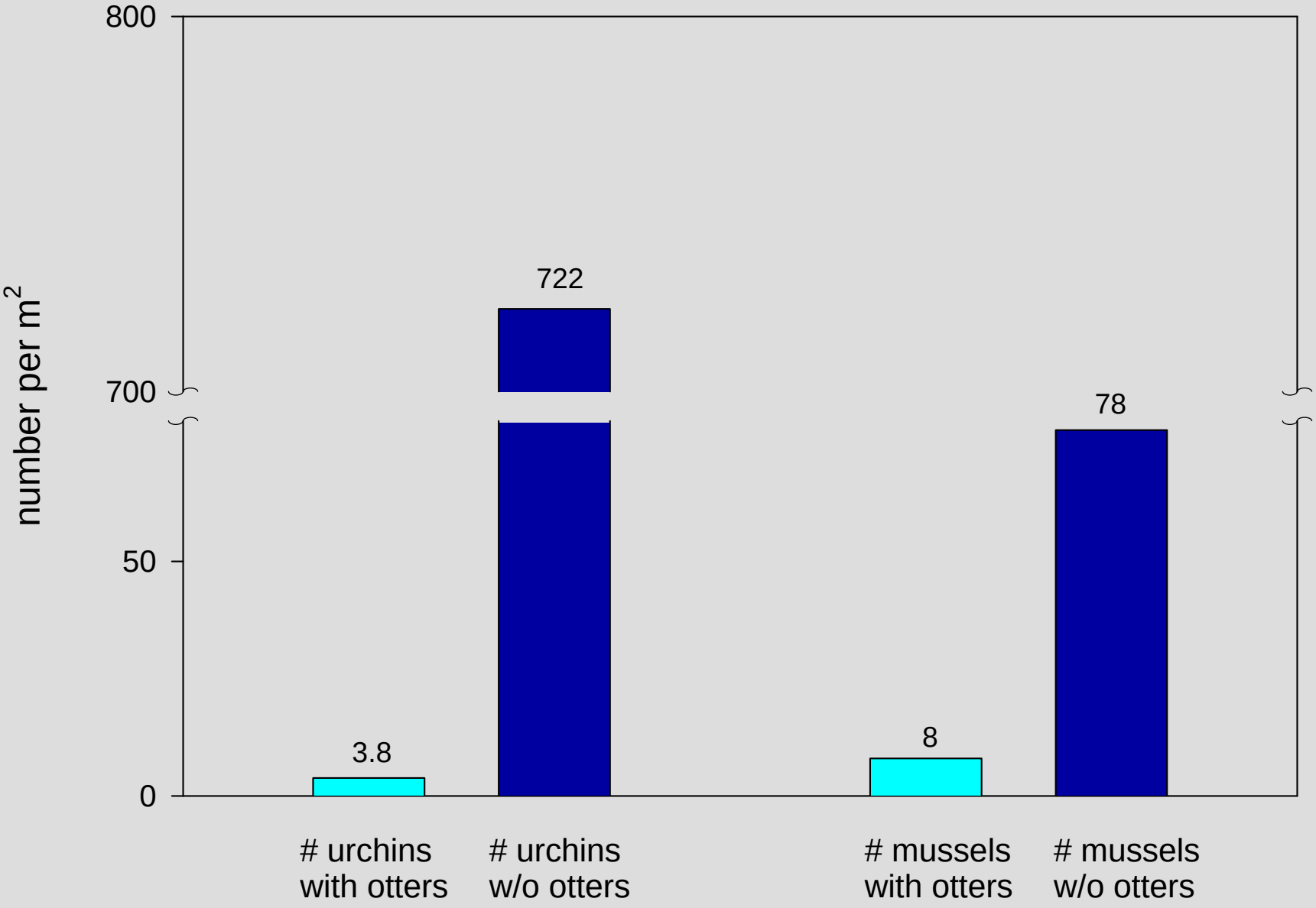
Outline

- Sea otter history & ecology
- The SW AK decline and cause(s)
- Study design to quantify spatial extent and similarity of cause
- Preliminary conclusions

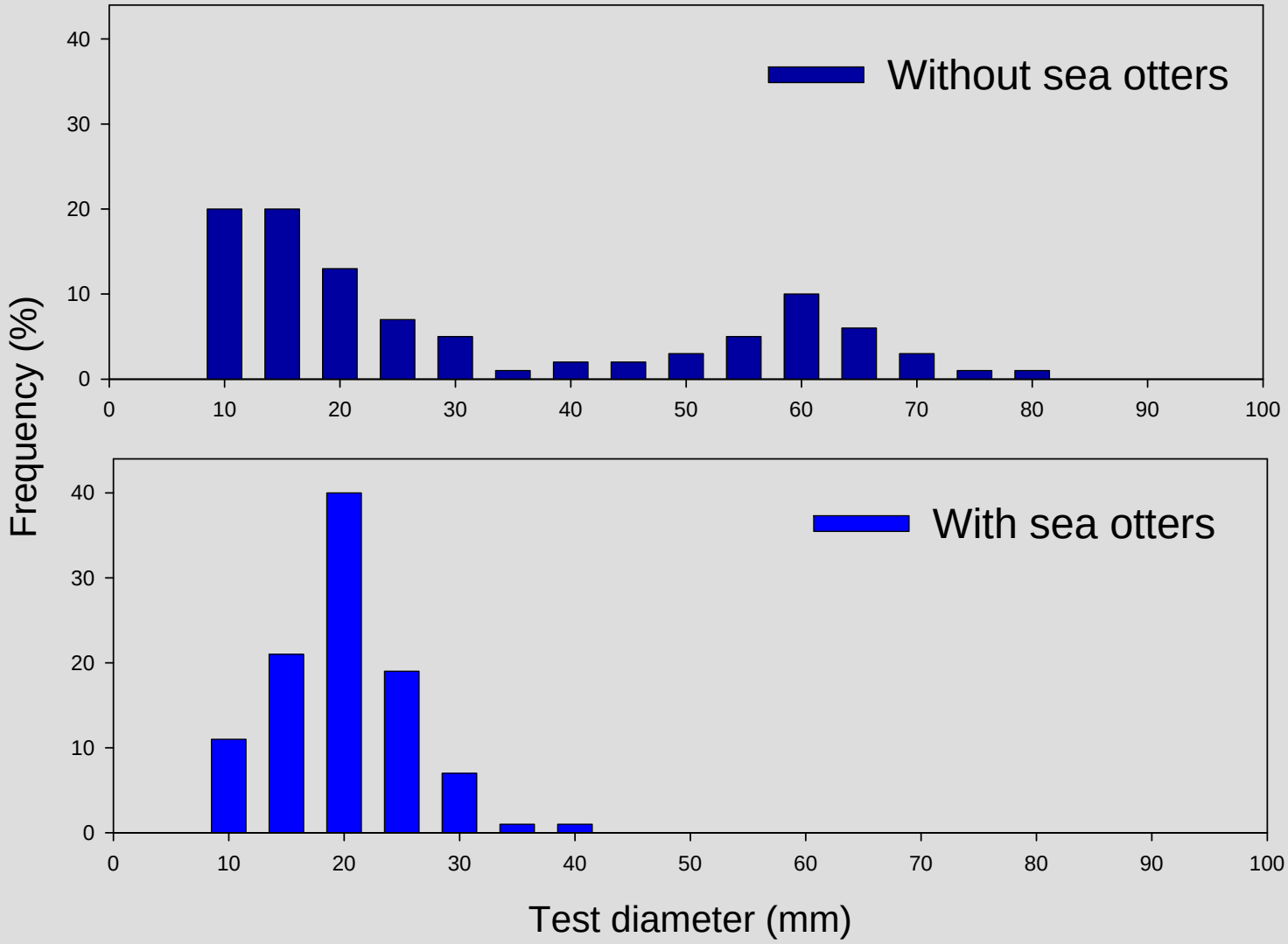
Aleutian Archipelago



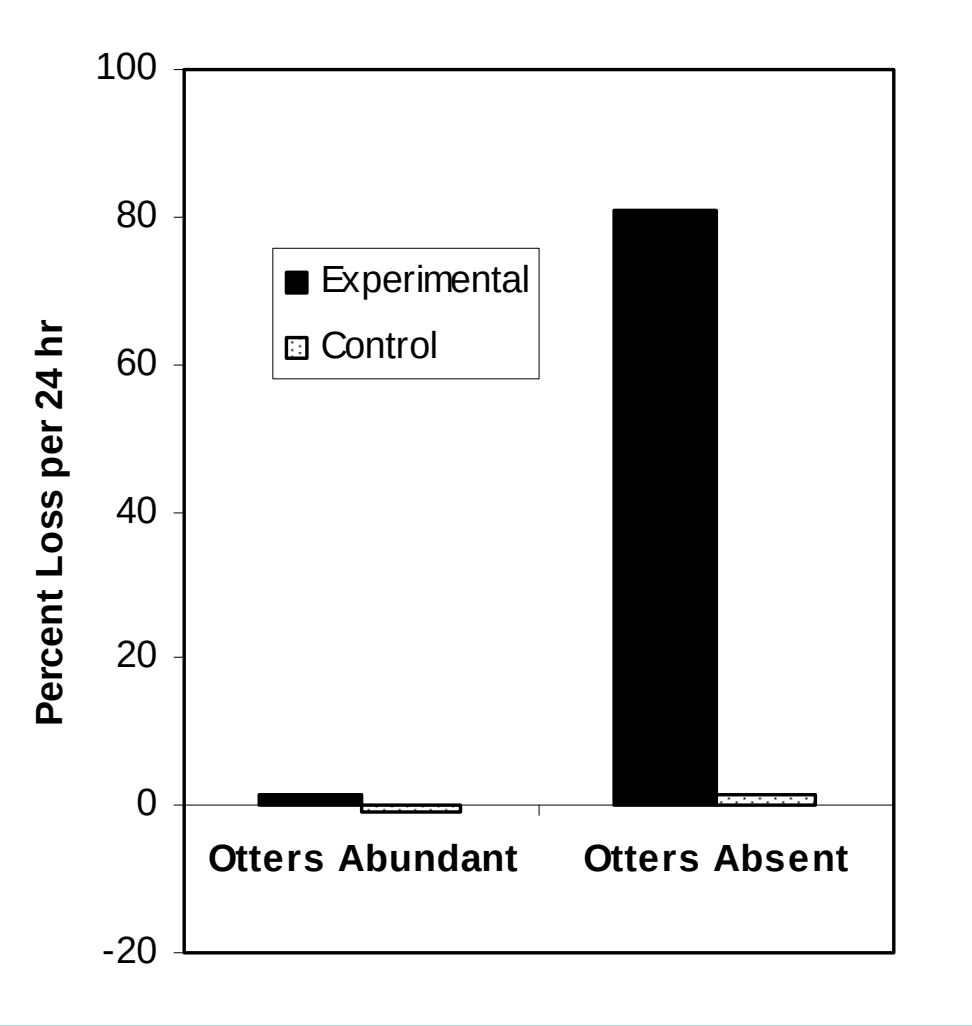
Densities of mussels and urchins in the presence (Amchitka) and absence (Shemya) of sea otters (from Estes and Palmisano 1974)



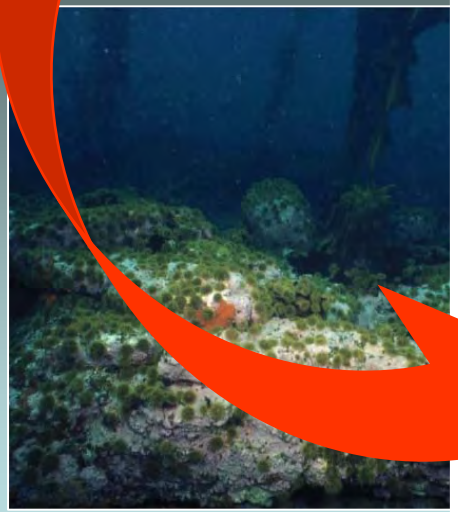
Sea urchin sizes at Attu Island with and without sea otters (from Estes and Duggins 1995)



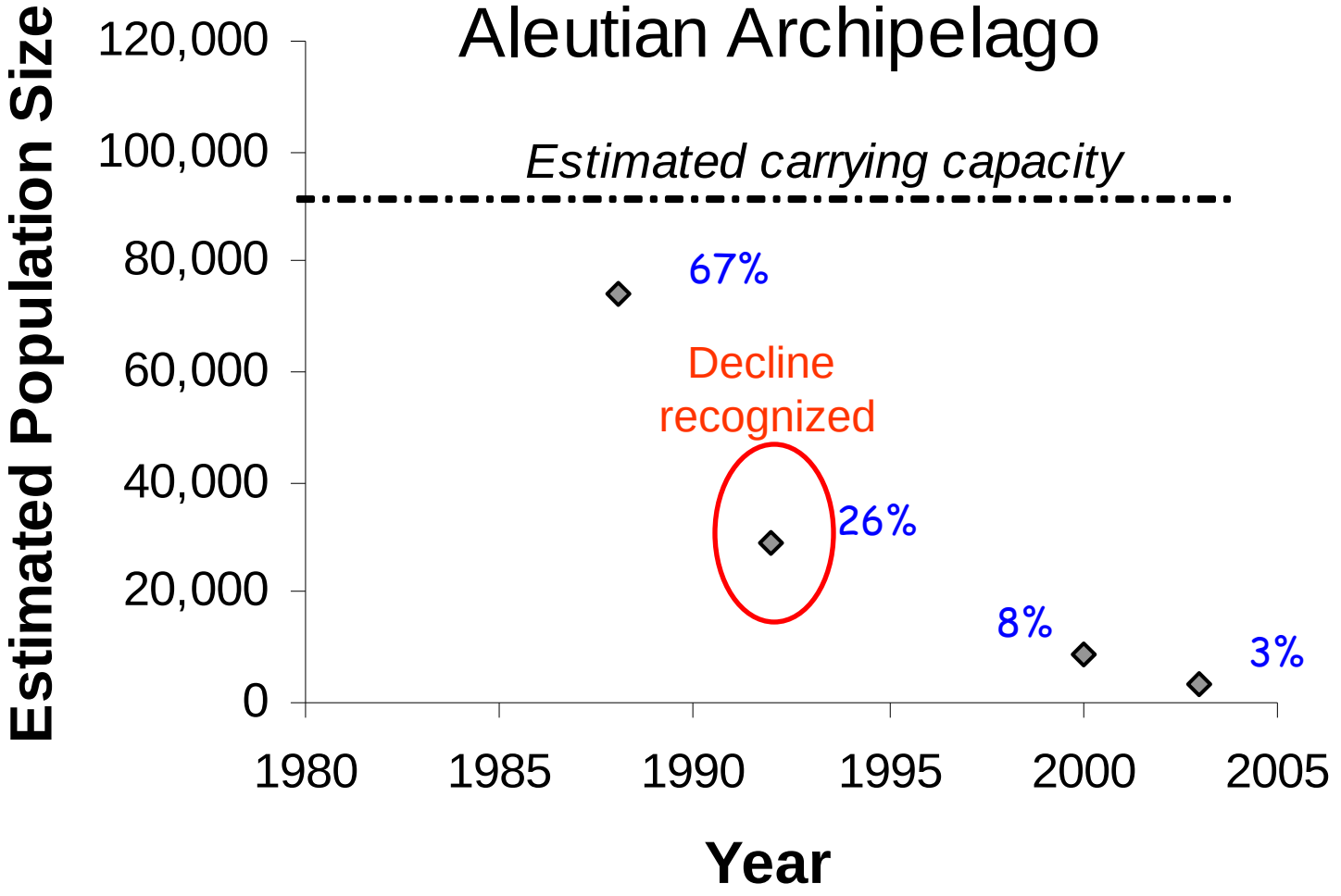
In situ urchin grazing

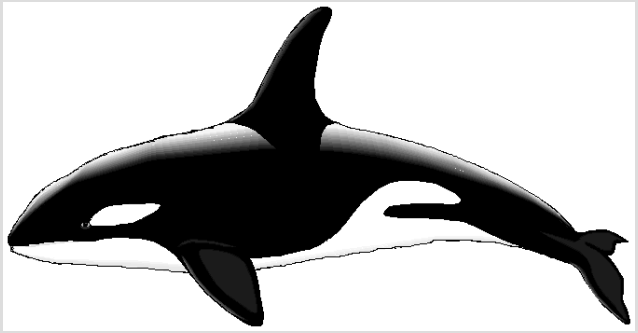


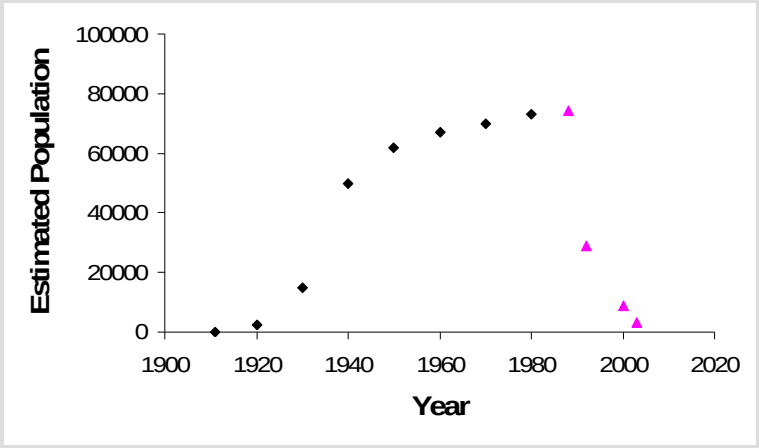
Sea otters as "Keystone" Predators



SW Alaska Sea Otter Decline



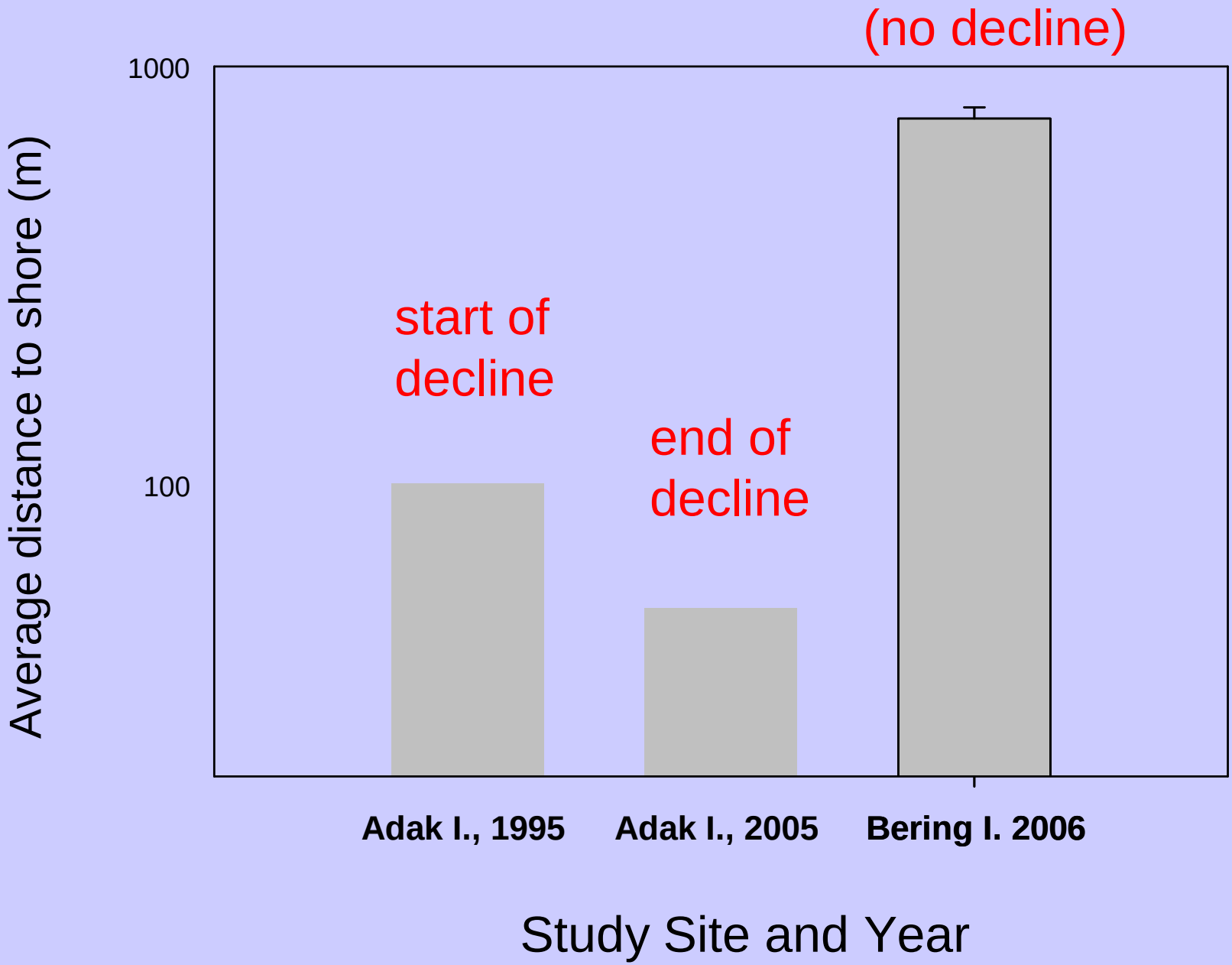


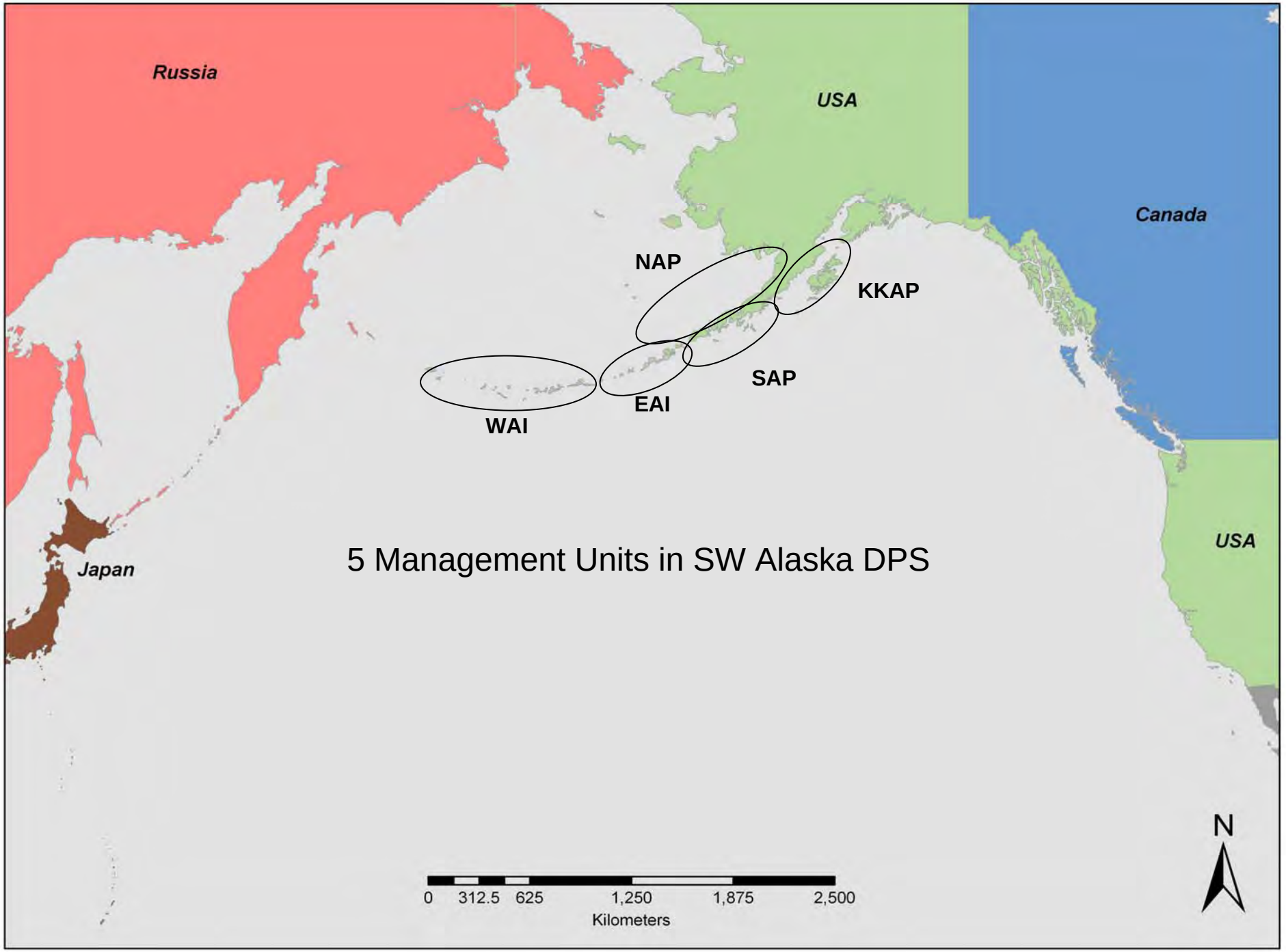


Leading hypothesis, based on:

1. Increased killer whale attack rate;
2. Population stability in refuge habitats
3. Absence of stranded carcasses
4. Feasibility analyses based on energetics and demographic modeling
5. Various inconsistencies in evidence for alternative hypotheses
    1. food
    2. disease
    3. harvest

But most of this evidence comes from C/W Aleutians


(no decline)
1000
100
Average distance to shore (m)
start of decline
end of decline
Adak I., 1995
Adak I., 2005
Bering I. 2006
Study Site and Year


Russia
USA
Canada
NAP
KKAP
SAP
EAI
WAI
Japan
USA
5 Management Units in SW Alaska DPS
0 312.5 625 1,250 1,875 2,500
Kilometers
N

Current Project Goals

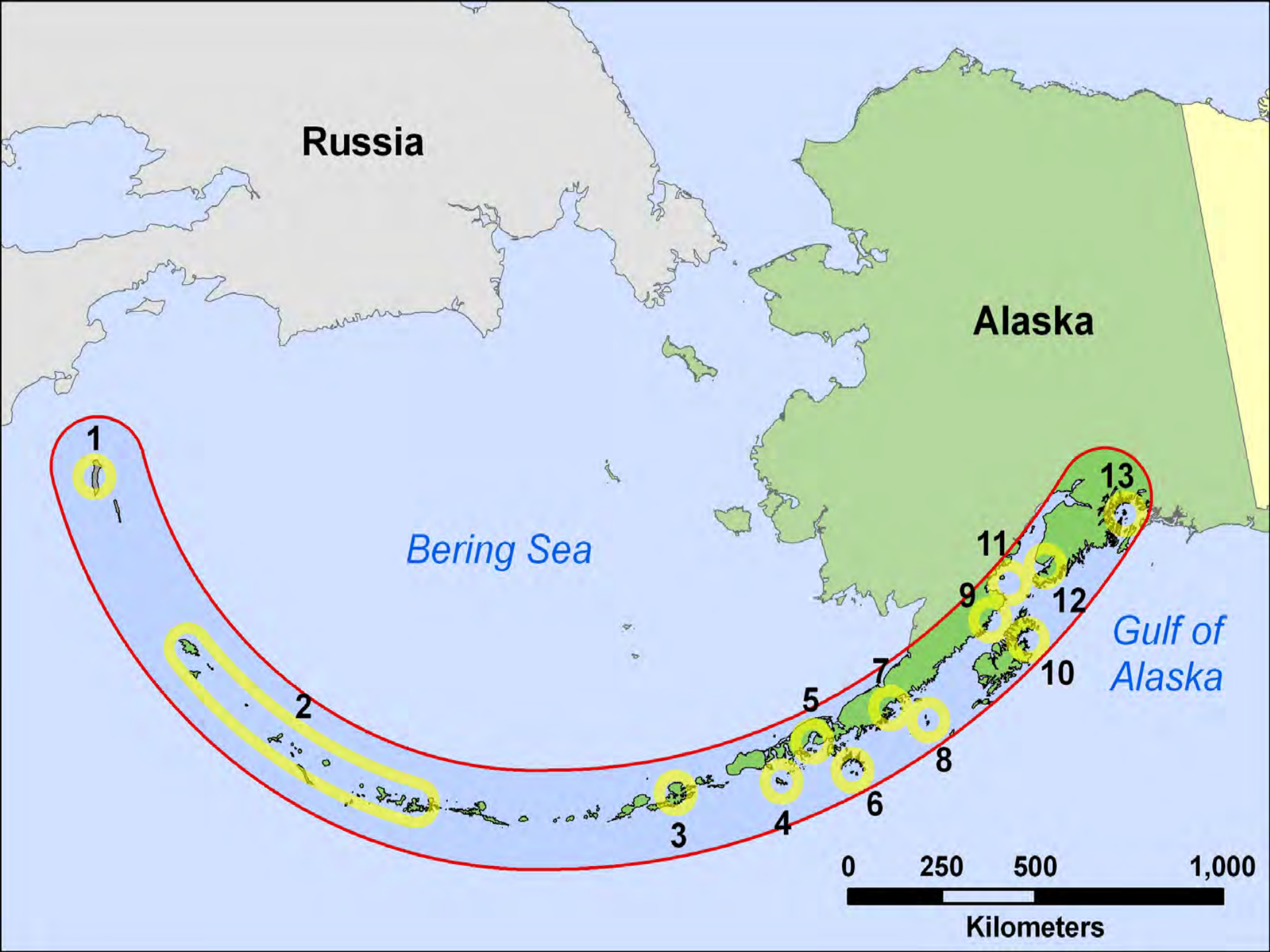
To define the geographical range, causes, and consequences of the sea otter population collapse in southwest Alaska

- *National Science Foundation* (Estes & Konar)
- *North Pacific Research Board* (Bodkin and Estes)
- *National Park Service* (SWAN)
- *Fish and Wildlife Service* (grant to ASLC)
- *USGS*
- *Monterey Bay Aquarium*
- *Alaska Sealife Center*

Study Design

A comparative spatial analysis across the Pacific rim, from Prince William Sound to Bering Island

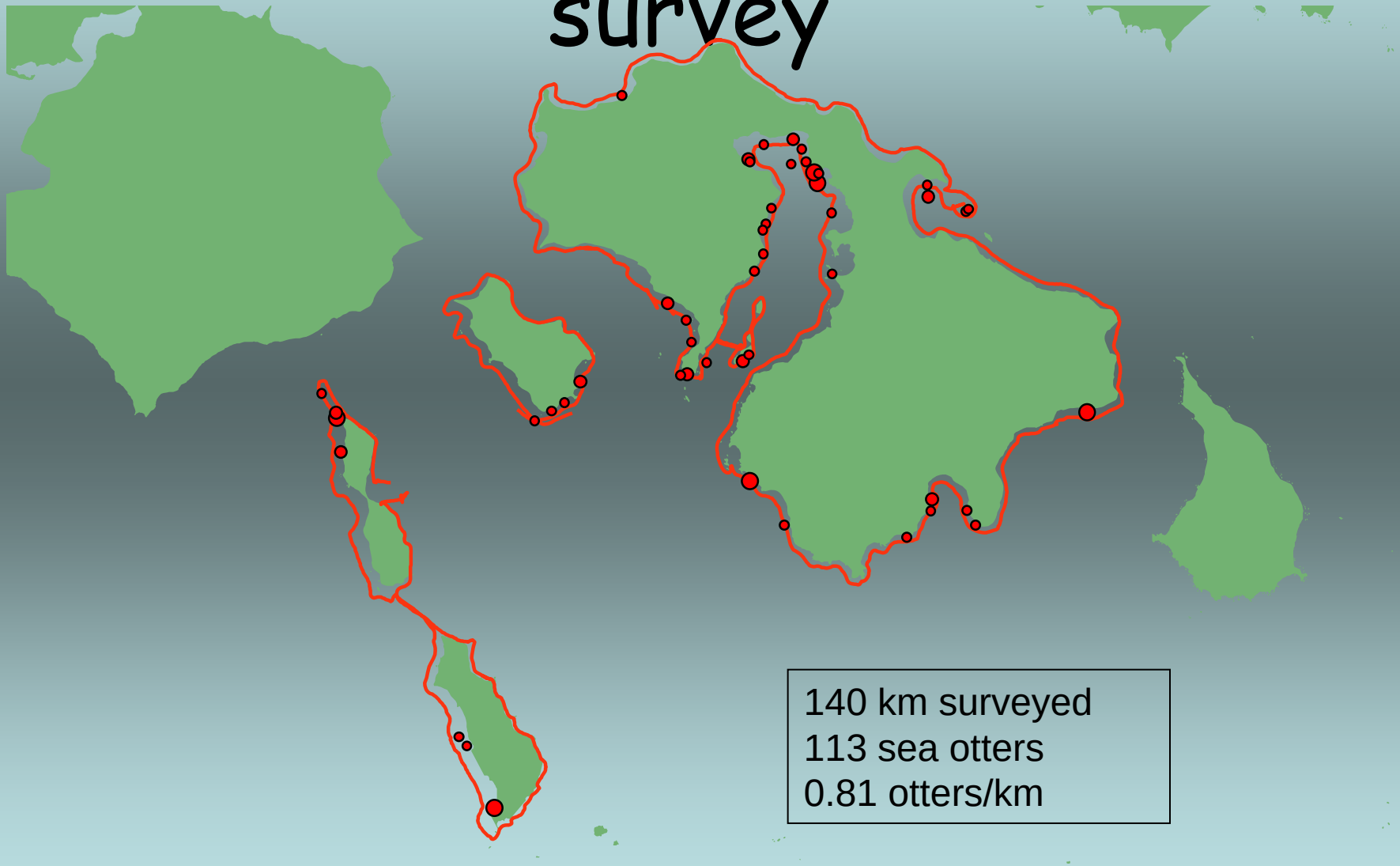
Contrast sites within the region of the decline with those beyond it


Russia
Alaska
Bering Sea
Gulf of Alaska
1
2
3
4
5
6
7
8
9
10
11
12
13
0
250
500
1,000
Kilometers

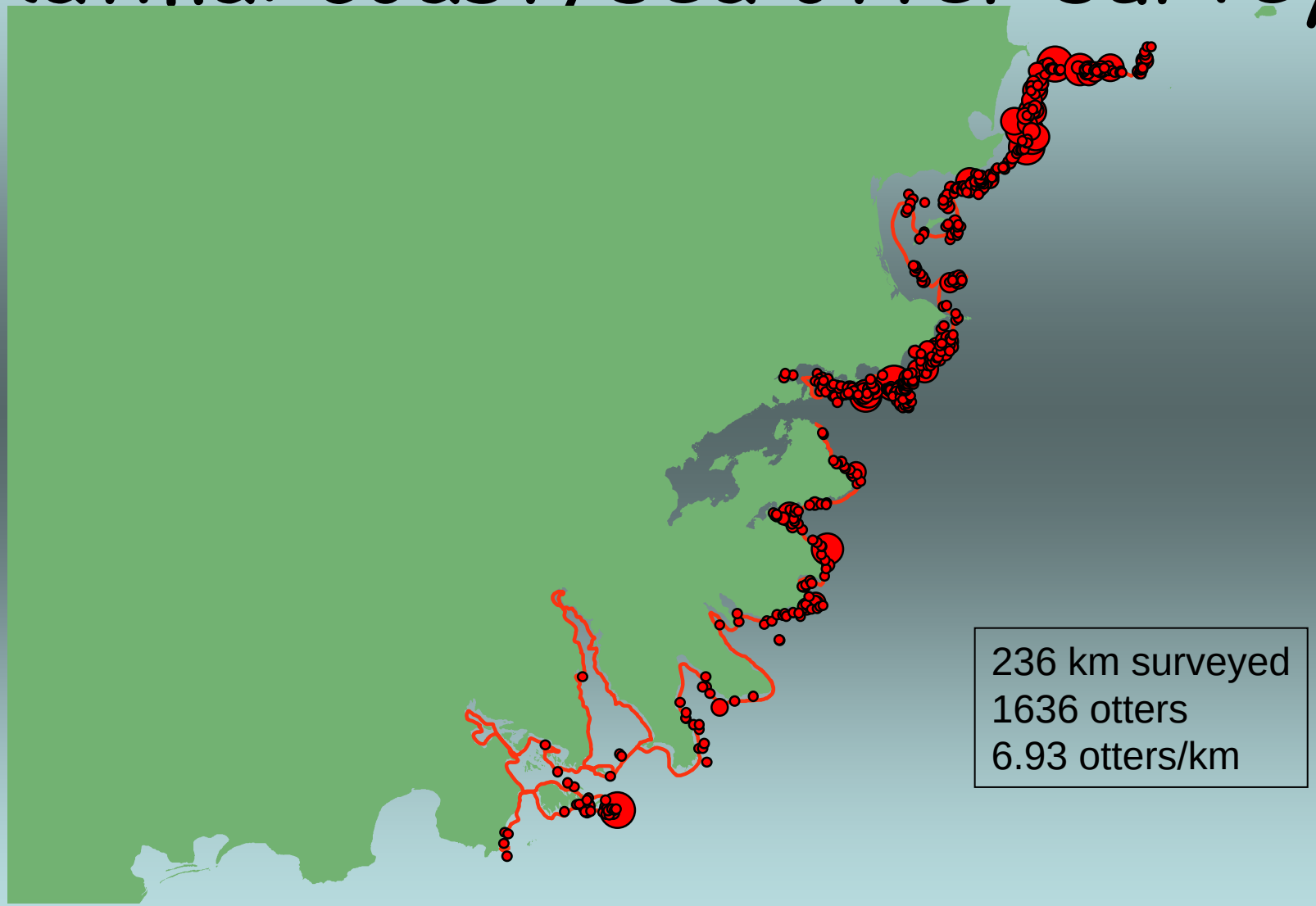
Measurements at each site

- Population density/habitat use
- Diet and foraging behavior
- Net rate of energy gain/time budgets
- Carcass deposition rate
- Prey availability and reef community structure (kelps and urchins)
- Sea otter body condition and health profiles (2009)

Pavlov Islands, sea otter survey



Katmai coast, sea otter survey



Preliminary Findings

- Densities ~ 8 x's lower SW of Katmai
- Distribution of animals consistent throughout areas of low density
- Few carcasses SW of Katmai, abundant at Katmai
- Prey not apparently limiting factor
- Kelp forests dominant at Katmai

Thank you for your attention!