

Alaska Ecosystems Program
National Marine Mammal Laboratory

Steller sea lion

2006 Overview
2007 Research Plans

Steller sea lion field work

2006

-
- **May: Vital rates/food habits**
 - Two brand resight/scat sampling trips (EAI, E&CGOA)
 - **June: Aerial Nonpup survey**
 - **Incomplete**; late, poor weather
 - **July: Demographic/behavioral observations**
 - Missed early-mid breeding season at Marmot
 - **Cancelled** Ugamak Island field work
 - **CANCELLED**
 - Breeding season rookery work in W Aleutians-E Gulf
 - Juvenile/adult captures to study foraging behavior

Vital Rates Estimation

Pup Branding Program

- Objectives

- Survival and reproductive rates by age and area

- Marmot Island (Western Stock)

- 1987-88: 751 pups

- Forrester Island (Eastern Stock)

- 1994-95: 799 pups

- Since 2000, approximately 5,800 pups have been branded

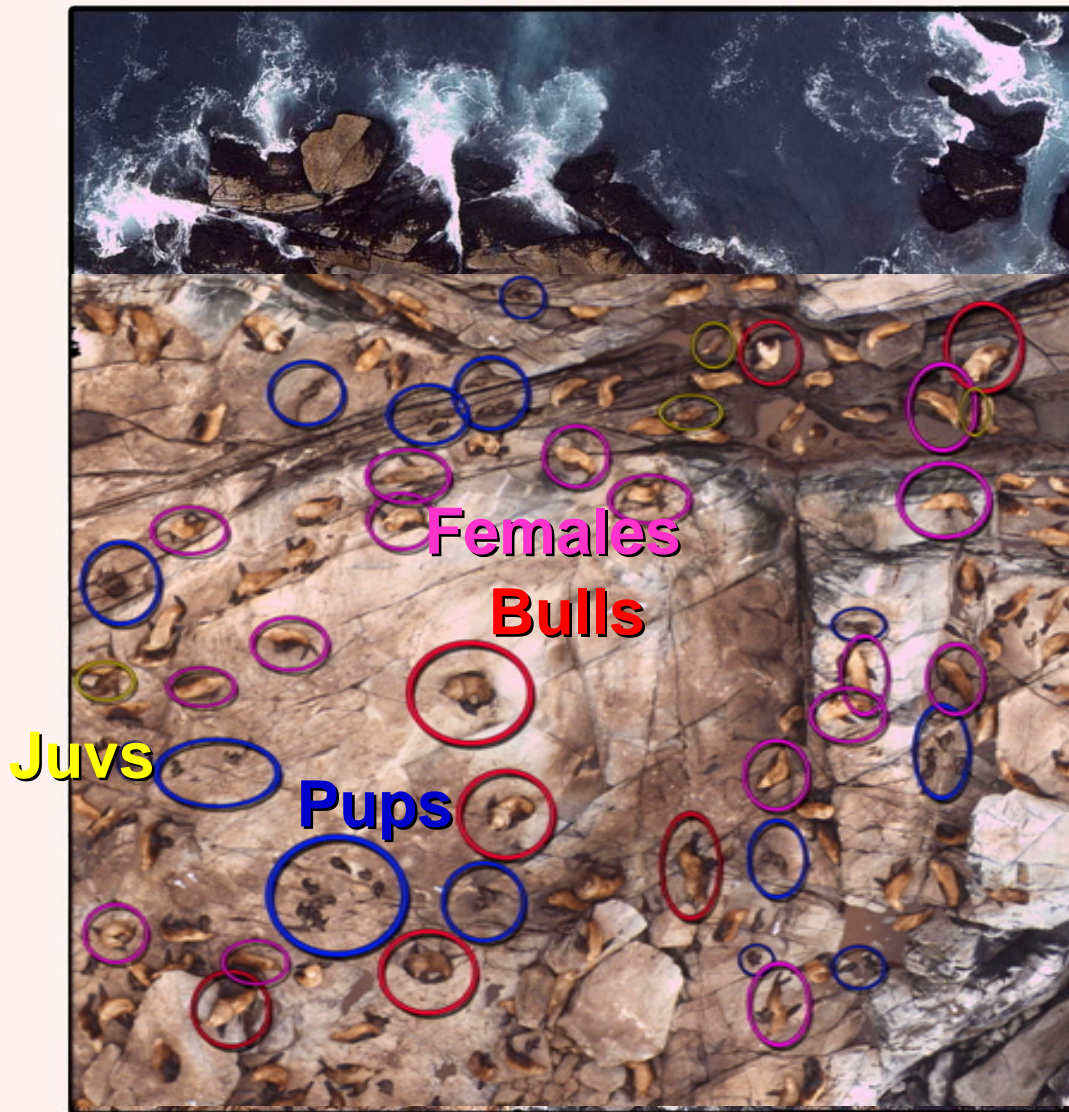
- Eastern 2,600

- Western 1,500

- Asian 1,700

A179 Resighted 17 May 2004
At Ugamak, ~ 1 year old

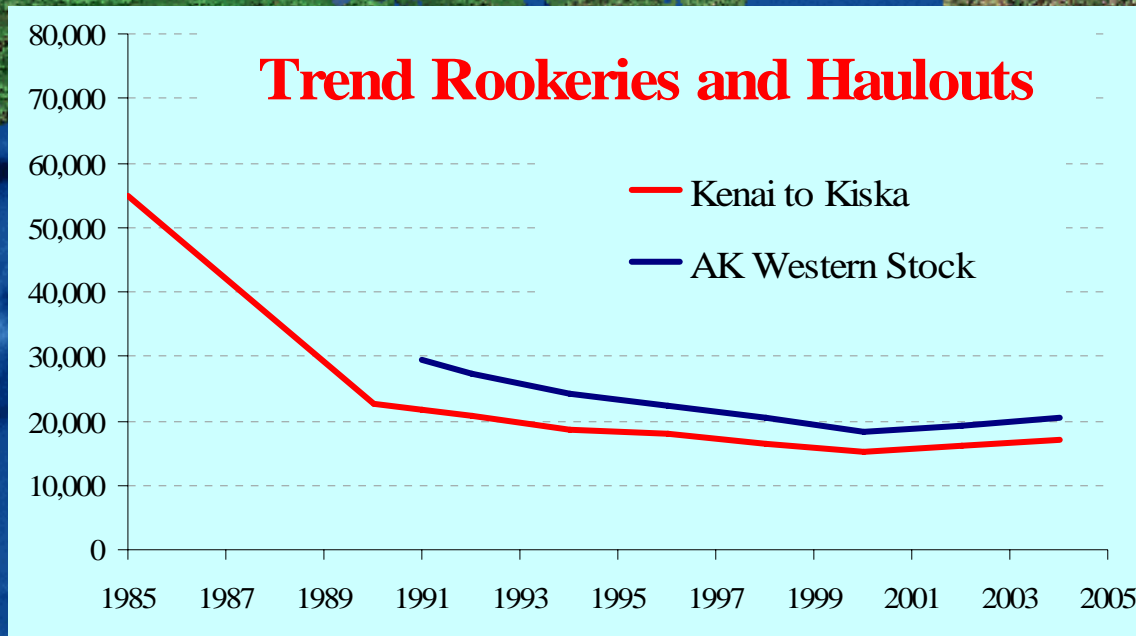
ATKINS ISLAND



- Medium-format images
- Size-Age classes
- Age Structure
- Proportion juvenile
- Female-pup ratios
- First completed in 2004

Blue = Pup Pink = Adult Female Red = Bull
Yellow = Juvenile Orange = Sub Adult Male

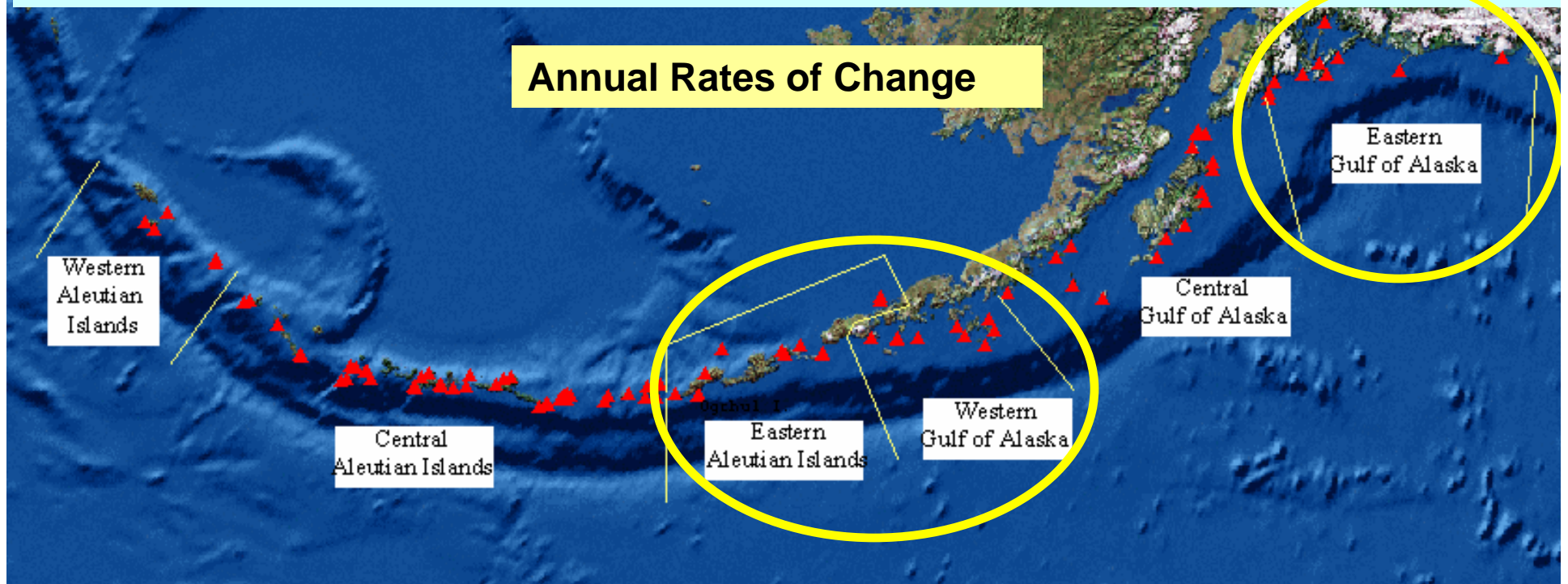
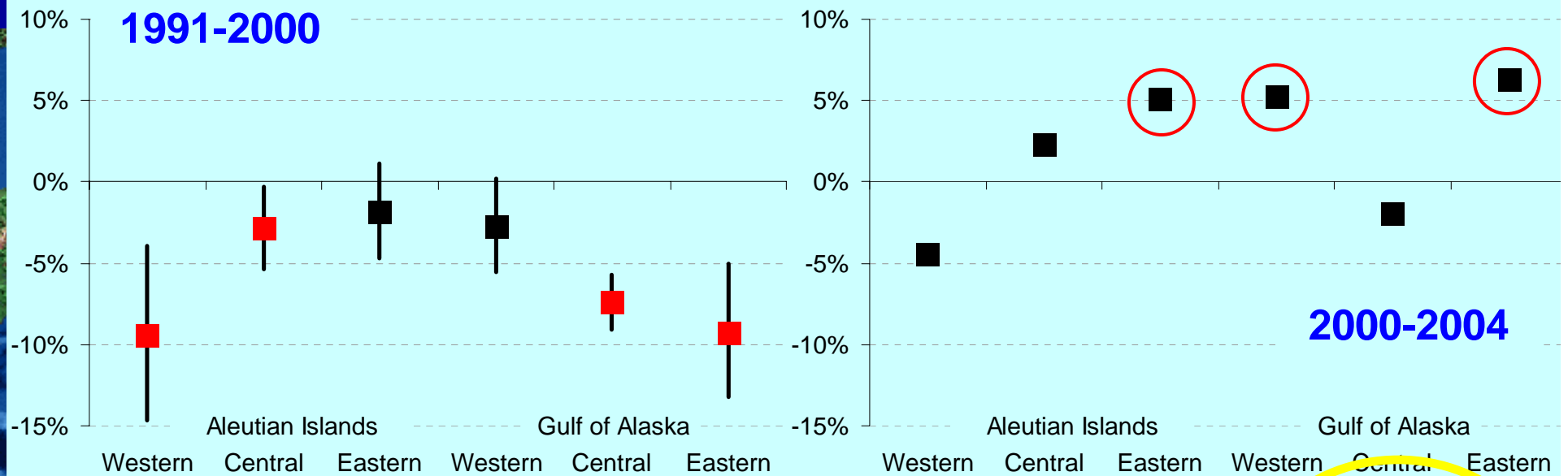
Non-Pup Steller Sea Lion Counts



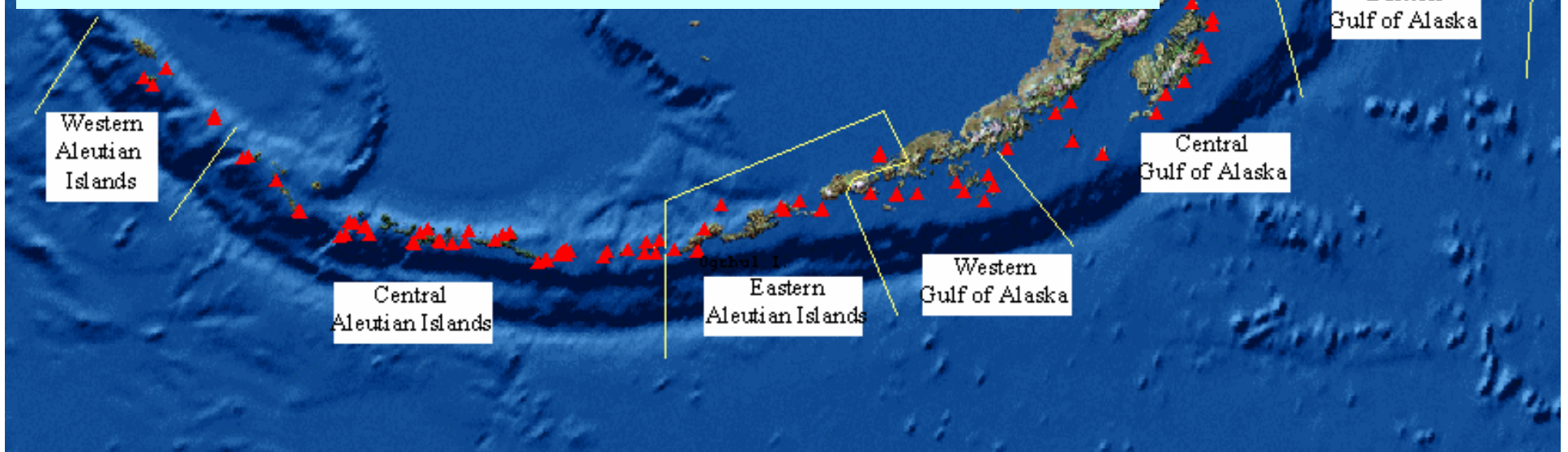
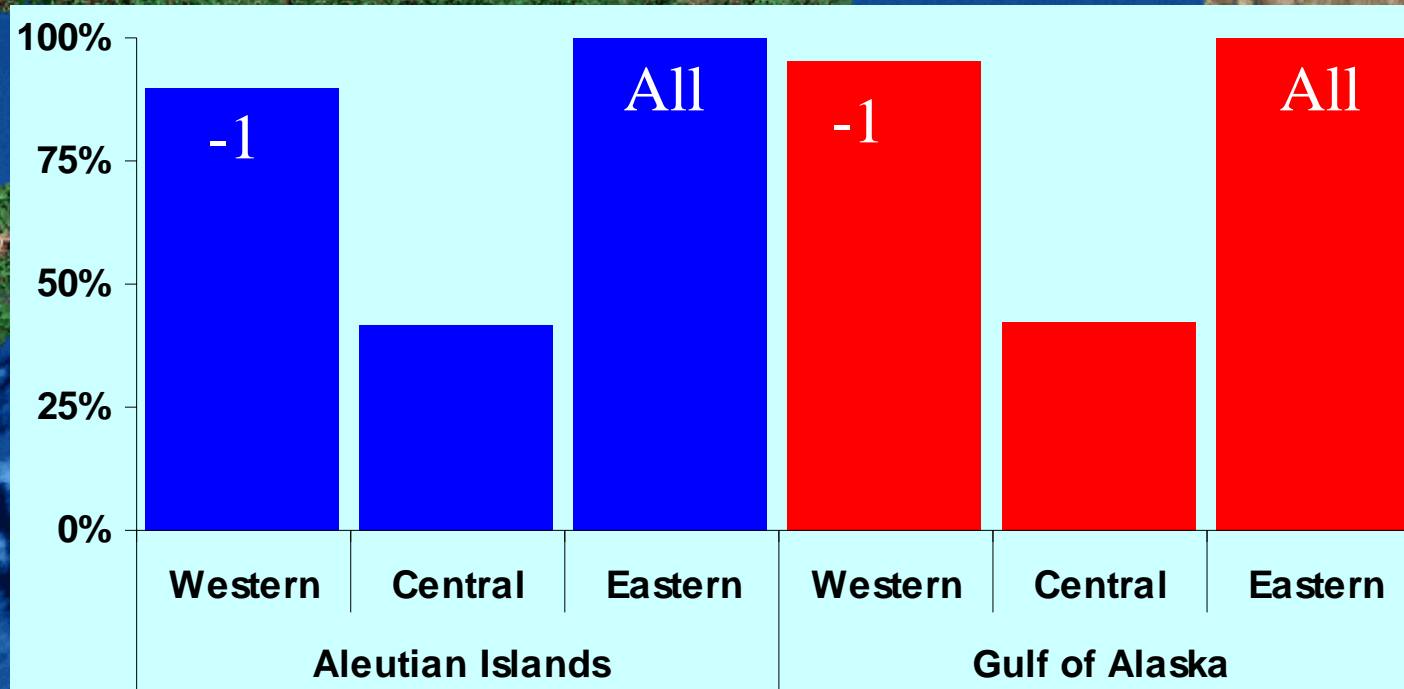
Kenai - Kiska

AK Western Stock

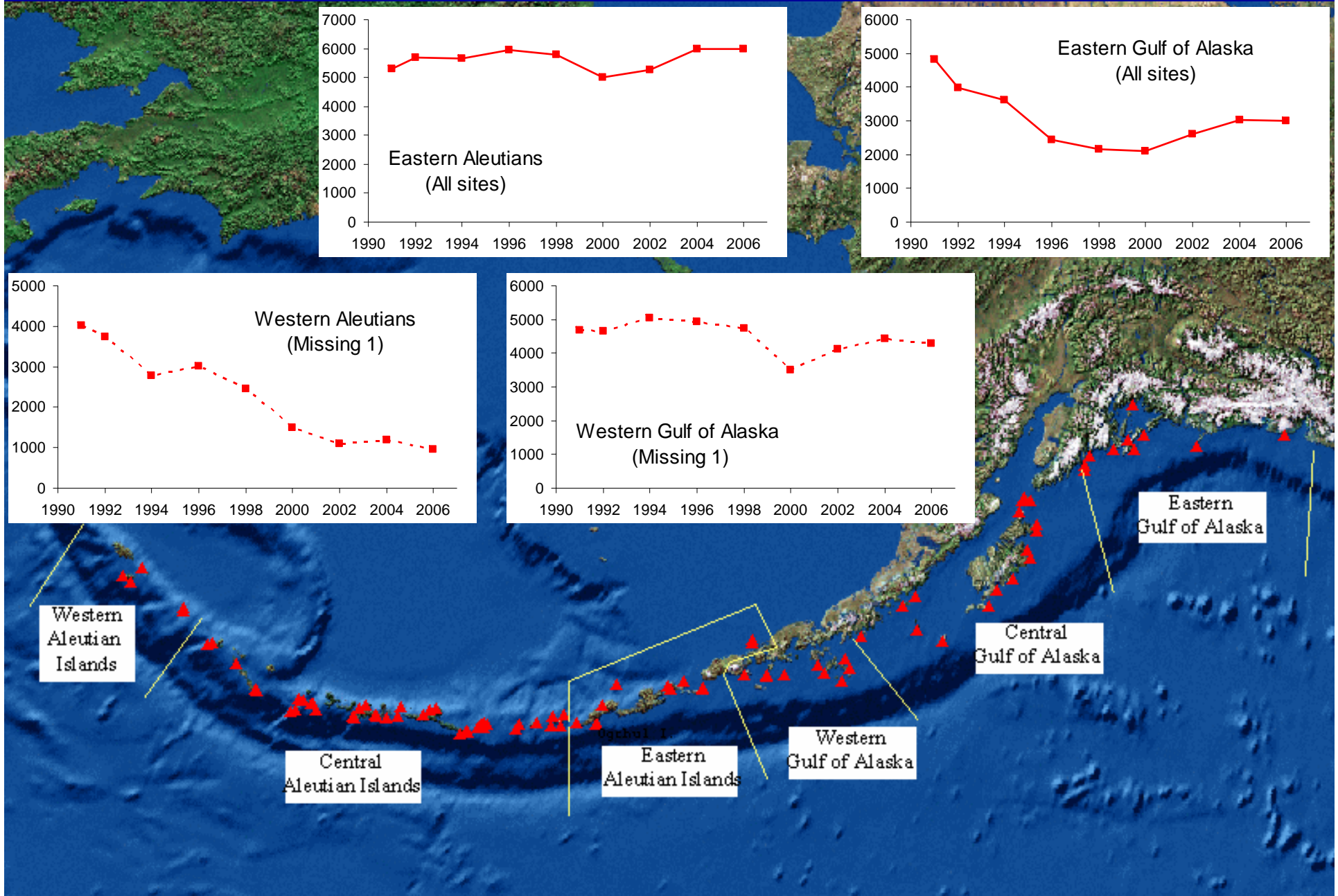
Western Non-Pup Steller Sea Lion Counts in Alaska



2006 Aerial Survey: % of Trend Sites Photographed by Region

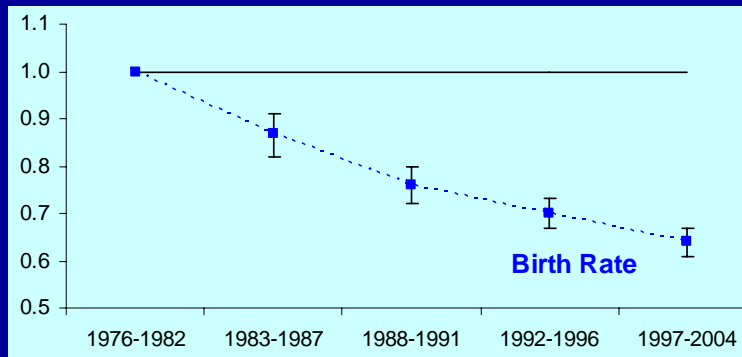
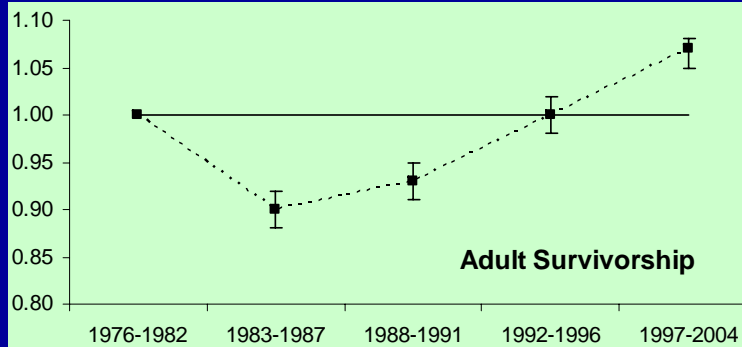
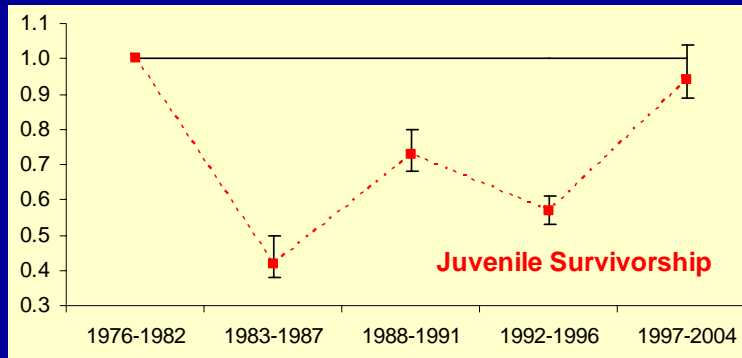


Non-Pups at Trend Sites by Region



Central Gulf of Alaska Survivorship and Natality

- Modeling using Pup/Non-pup Counts and Size Distribution on Haulouts (update of Holmes and York 2003)



- 1 = mid-1970s rates; all other rates relative to period when population stable

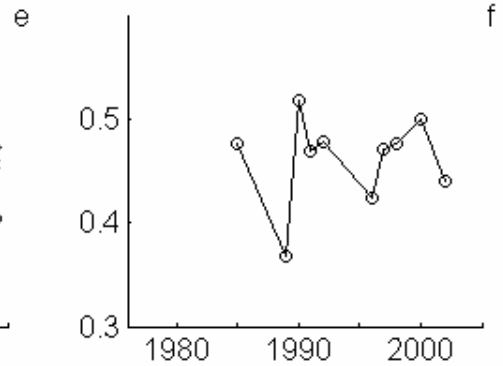
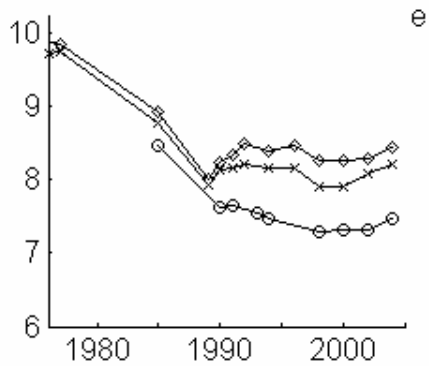
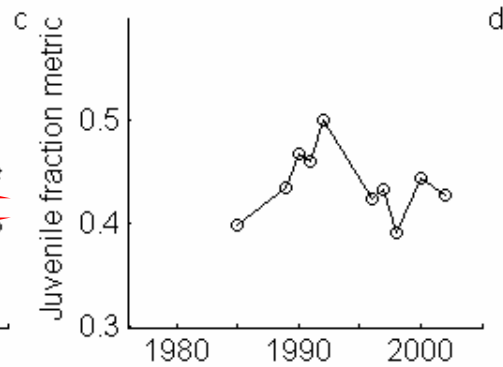
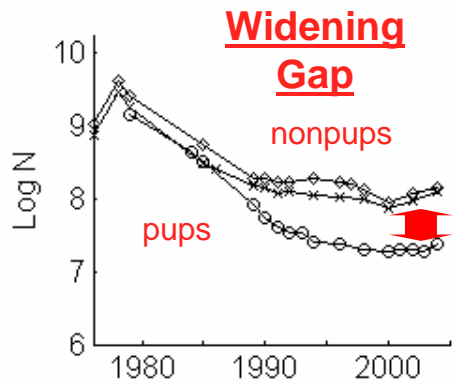
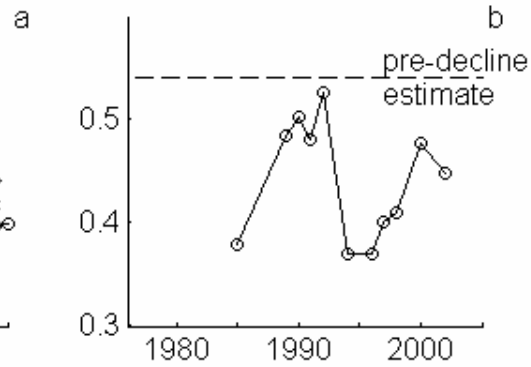
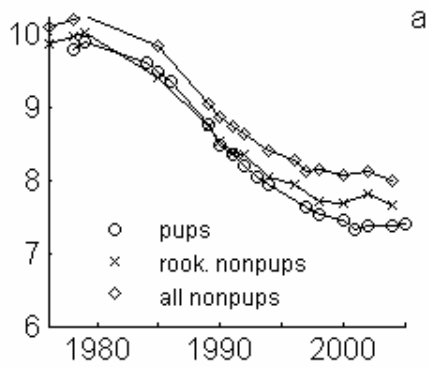
- Juvenile survivorship has increased considerably after large initial decline

- Adult survivorship rebounded

- However, birth rate (female pups per female) has steadily eroded and currently only 64% of 1970s rate

Pups and NonPups

Juvenile Fraction

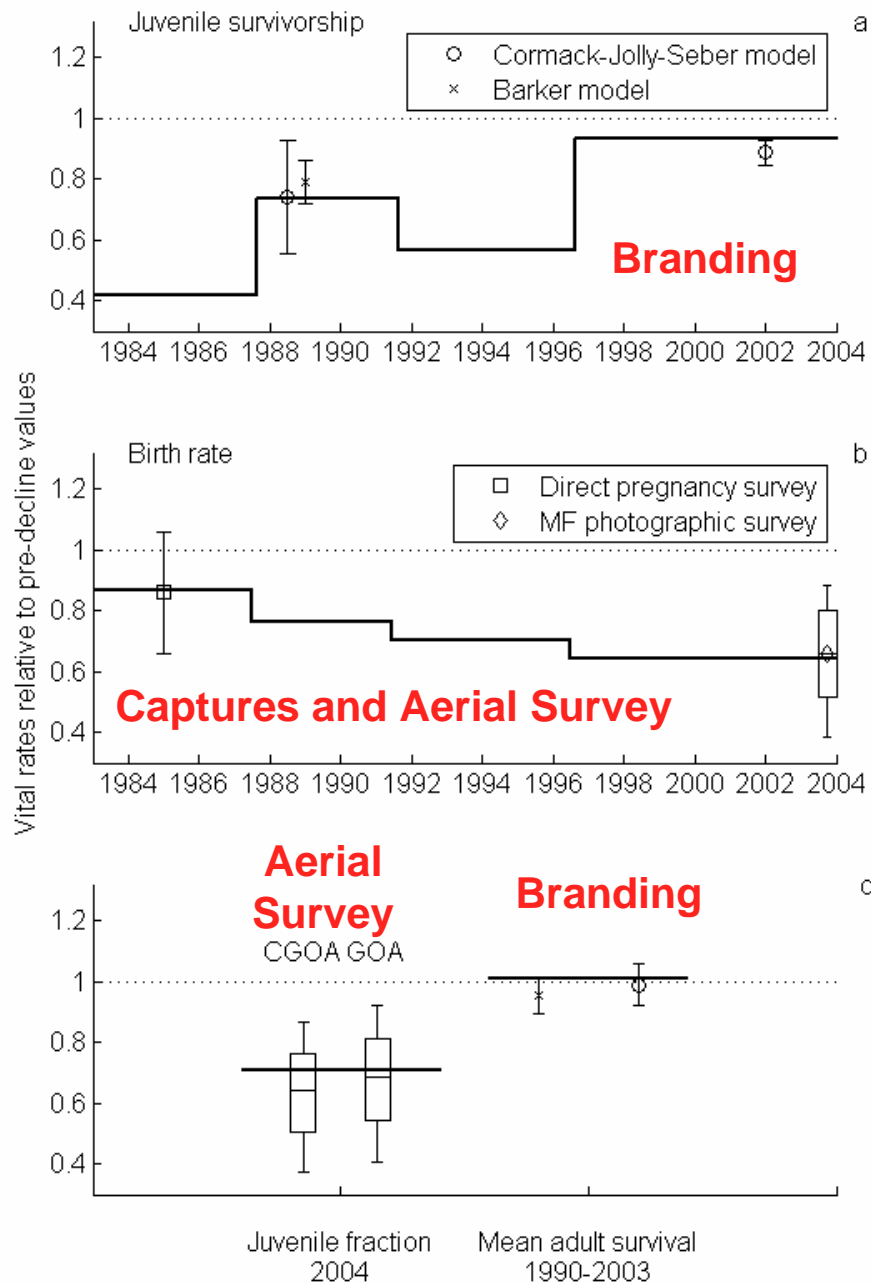


Central Gulf of Alaska

Western Gulf of Alaska

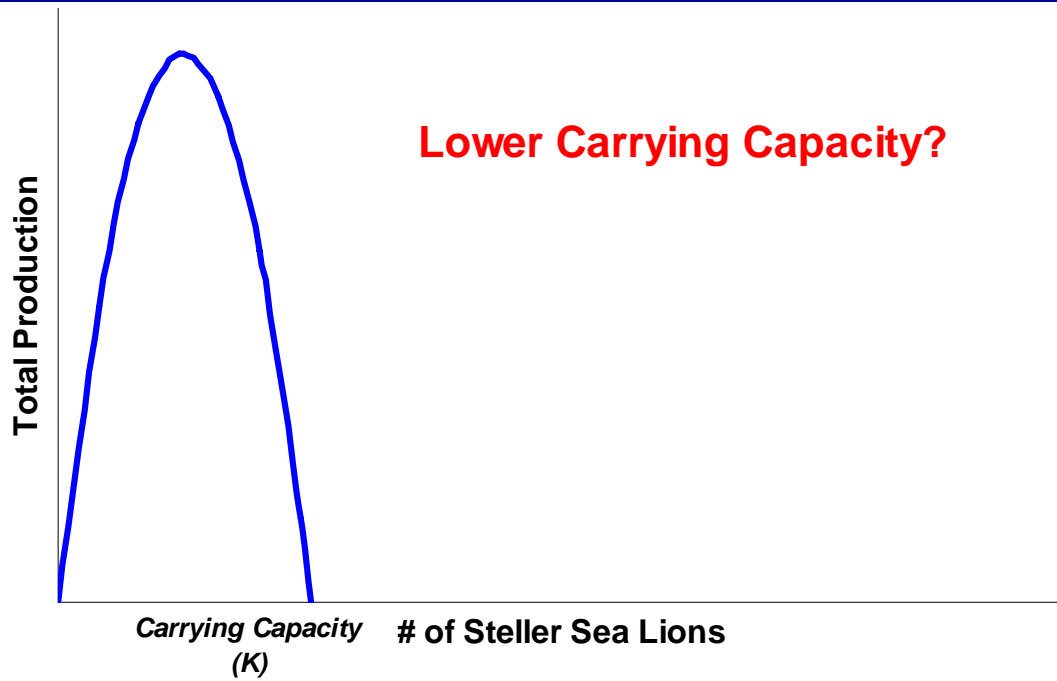
Eastern Aleutians

Comparison of Model Results with Independent Field Data



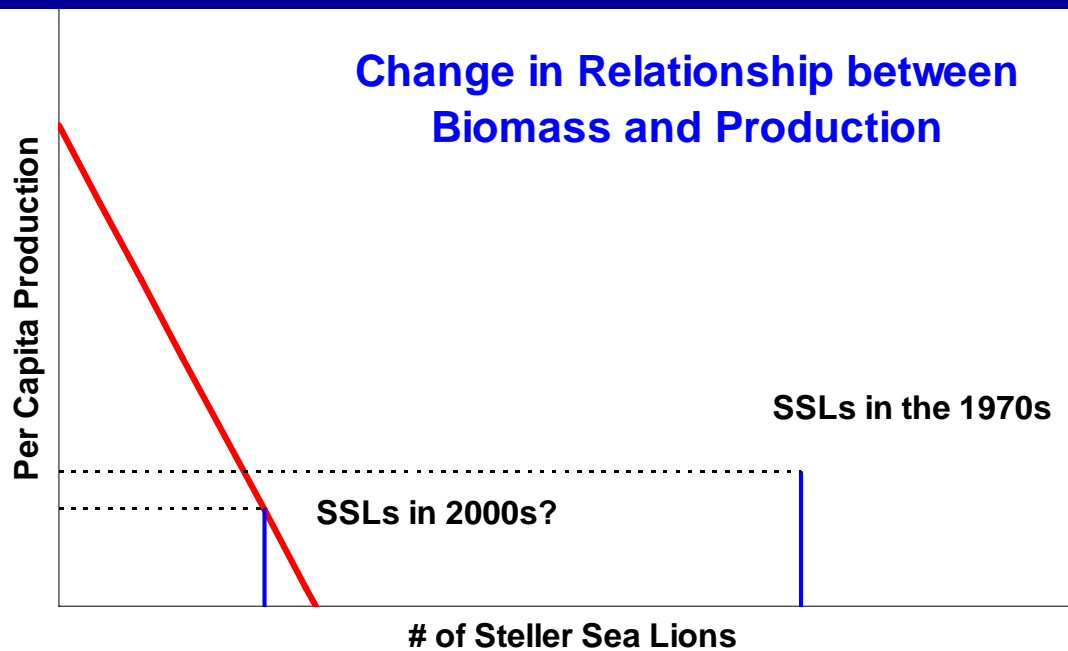
- Model results strongly agree with independent field data
- 1987-88 and 2000+ Brand Survival
- Late-term pregnancy rates from 1985-86 captures on Marmot
- Age structure from 2004 aerial survey

Fisheries 101: Schaefer Production Model



Questions:

- 1) Is K for SSLs lower?
- 2) Why?
- 3) Why does K appear to be unchanged for lower trophic levels (e.g., fish)?



Steller sea lion field work we **WILL** do in 2007

- **Aerial Non-Pup Survey: 8-30 June**
- **Vital rates: Survival and Natality**
 - **May – August: Marmot & Ugamak field camps**
 - **June - July: Central/Eastern Gulf cruise**
 - **August: East Aleutians cruise**

Steller sea lion field work we **WANT** to do in 2007

- Pup condition (EGOA-WAI)
 - June-July: Aleutian and GOA cruises
- Food Habits collections
- Foraging behavior
 - Juvenile/Adult (Kodiak peninsula)
 - late Sep-early Oct
 - At-sea captures
 - late Oct-early Nov



**Alaska Ecosystems Program
National Marine Mammal Laboratory**

Northern fur seal

**2006 Overview
2007 Research Plans**

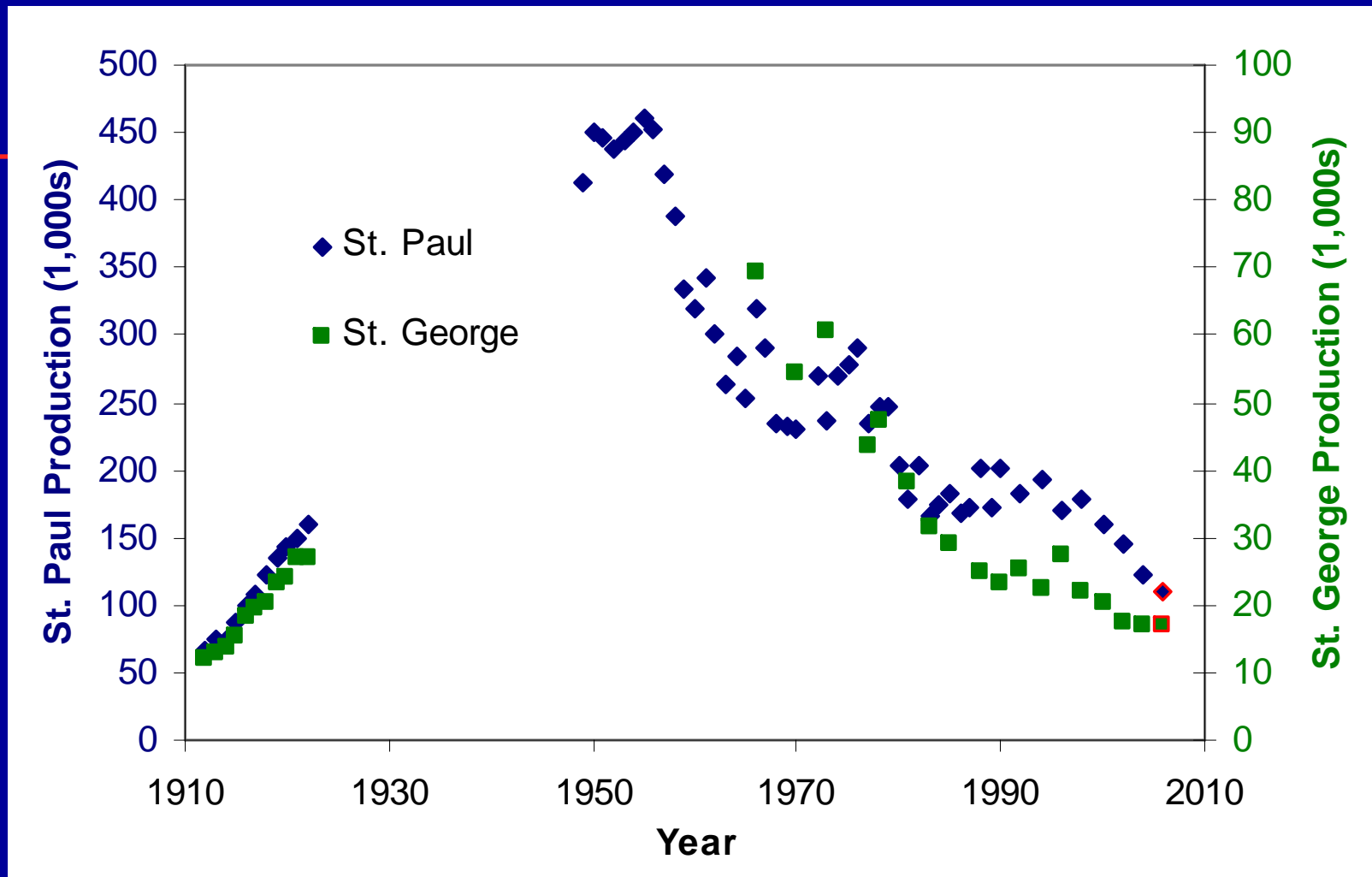


Northern fur seal research

2006

- **Population assessment**
 - Bull and pup counts (Pribilof Islands)
- **Diet habits**
 - Rookery scat collections
- **Foraging behavior**
 - Consequences of female foraging strategies
 - NPRB/NMML funded, Springer/Iverson/Ream
- **Winter migration**
 - Pup/juvenile telemetry (NRC-Lea)

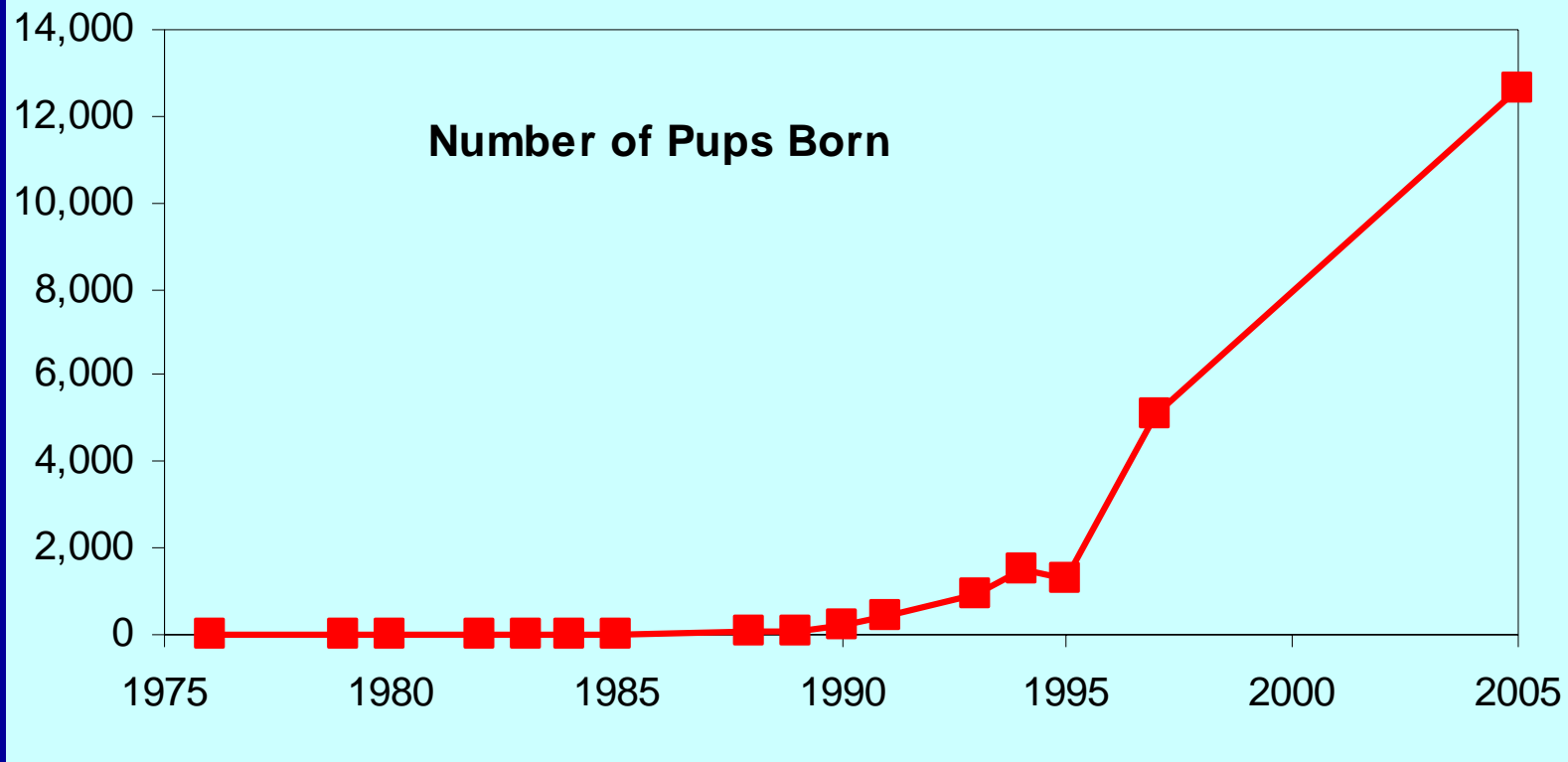
St. Paul fur seal pup production



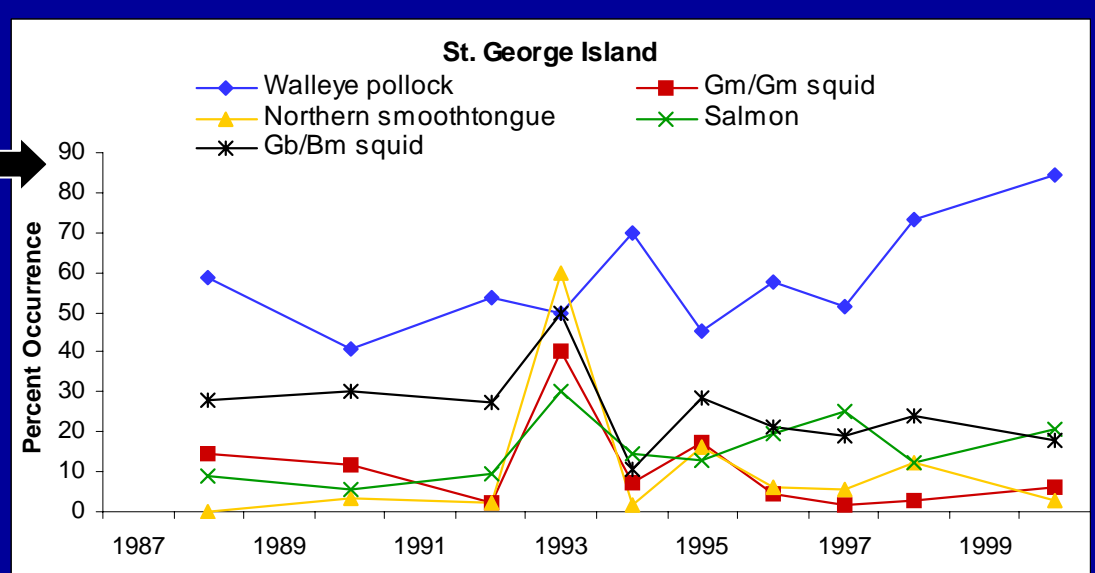
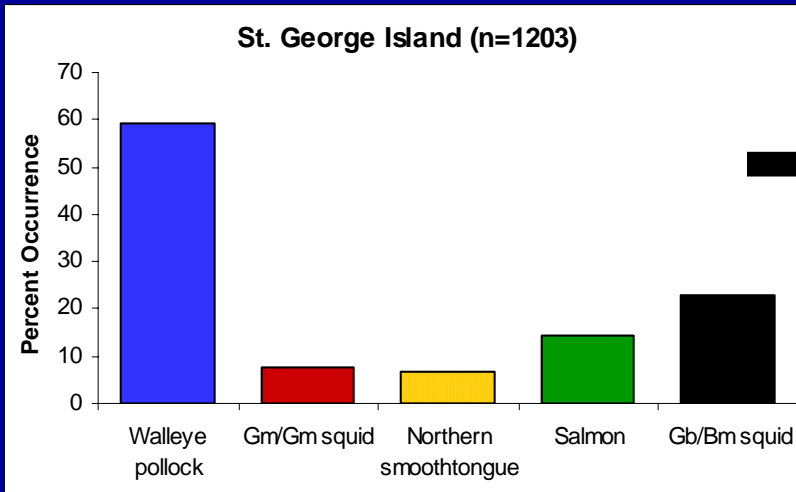
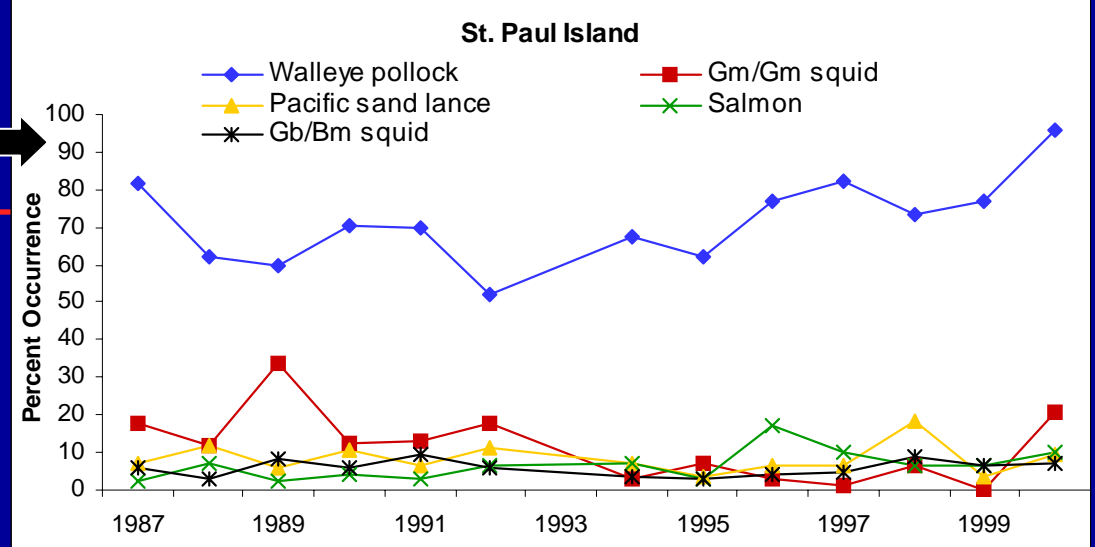
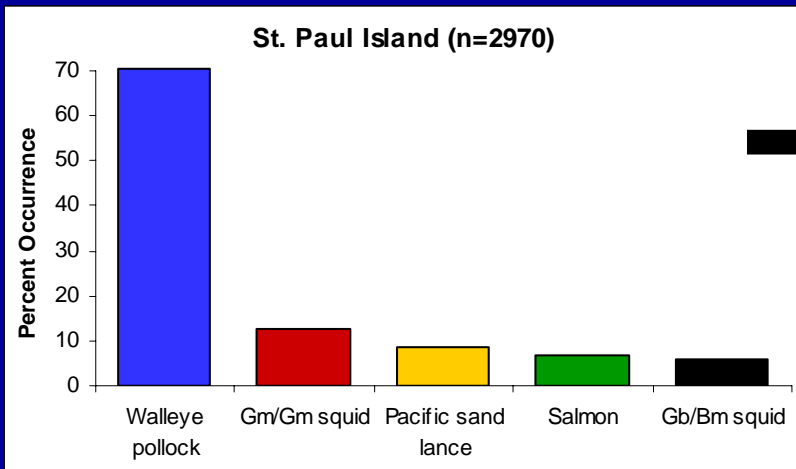
2006 St. Paul : 109,937 = 10.5% less than 2004

St. George: 17,070 = 1.2% greater than 2004

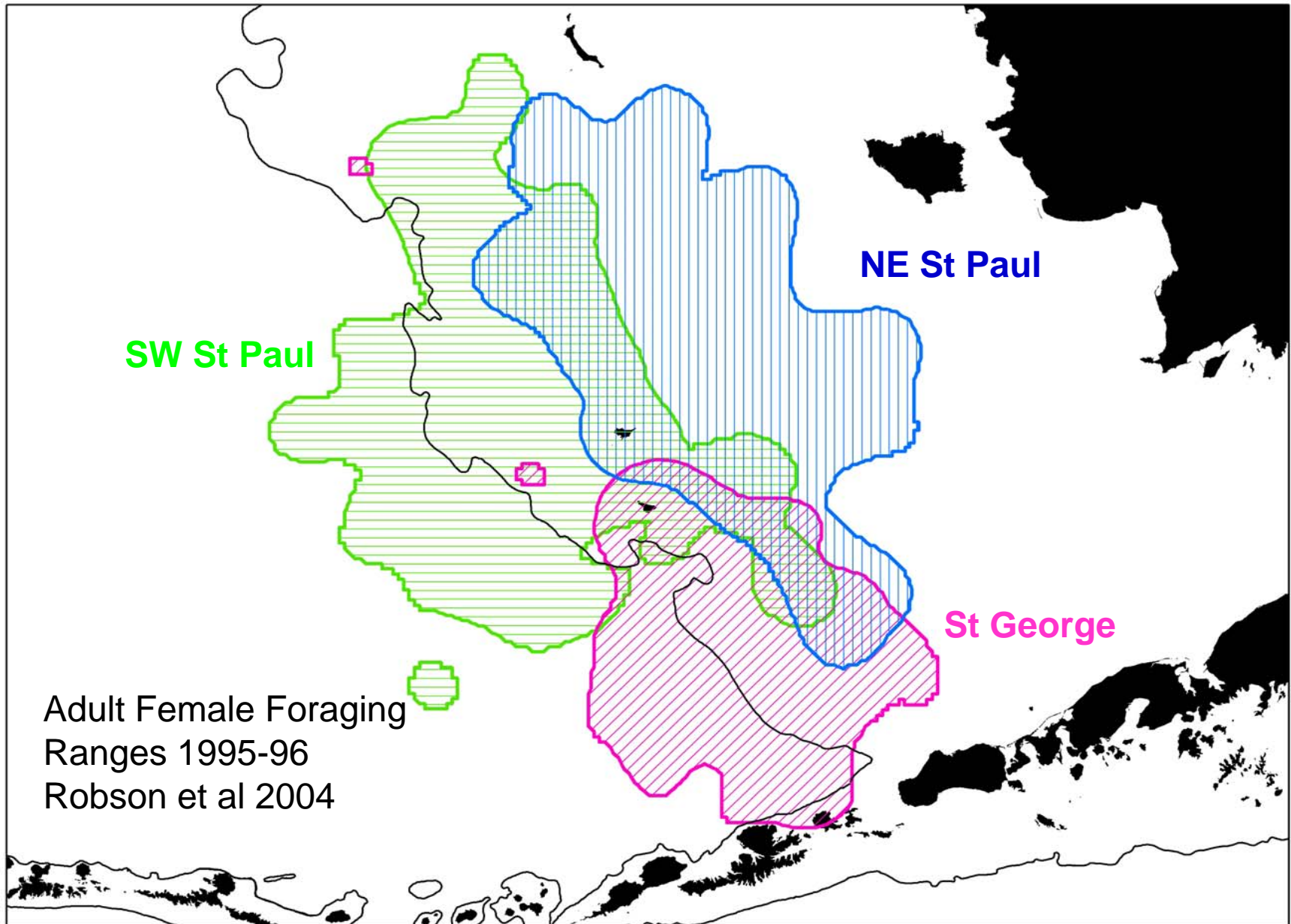
Bogoslof Island Pup Production



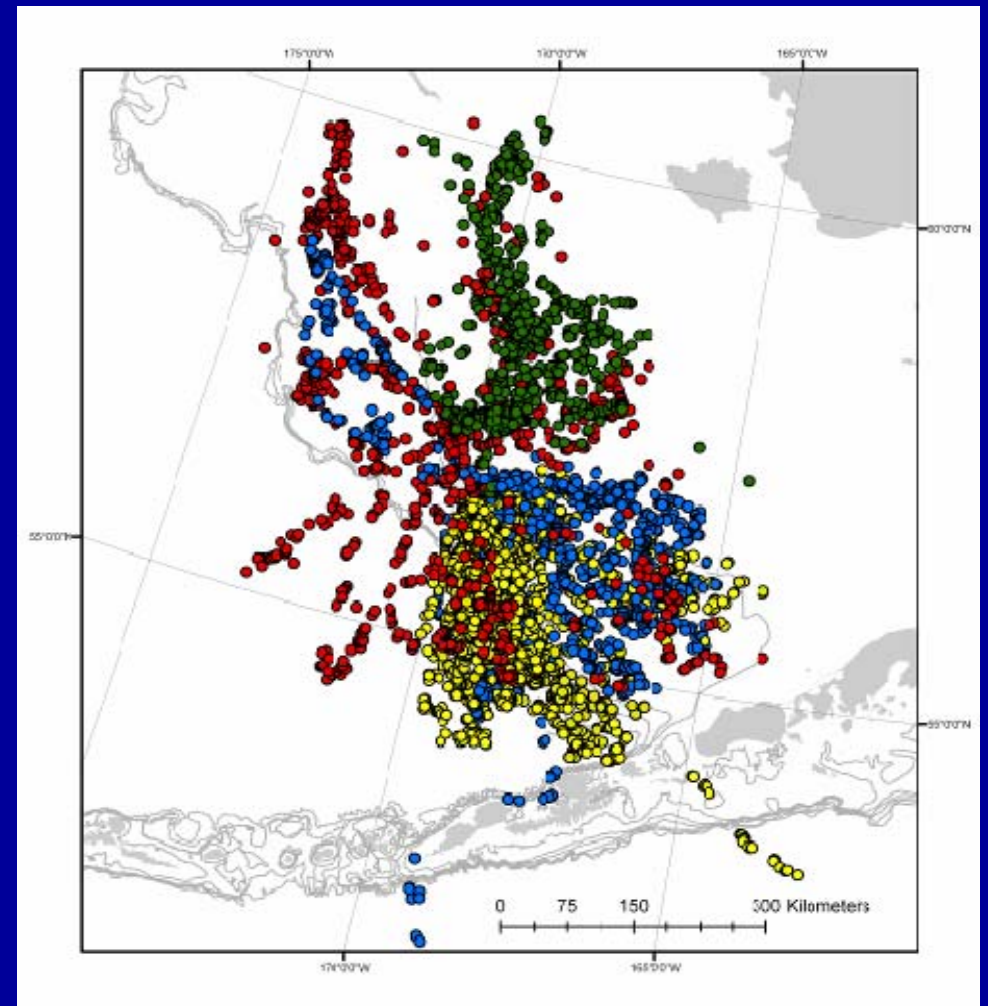
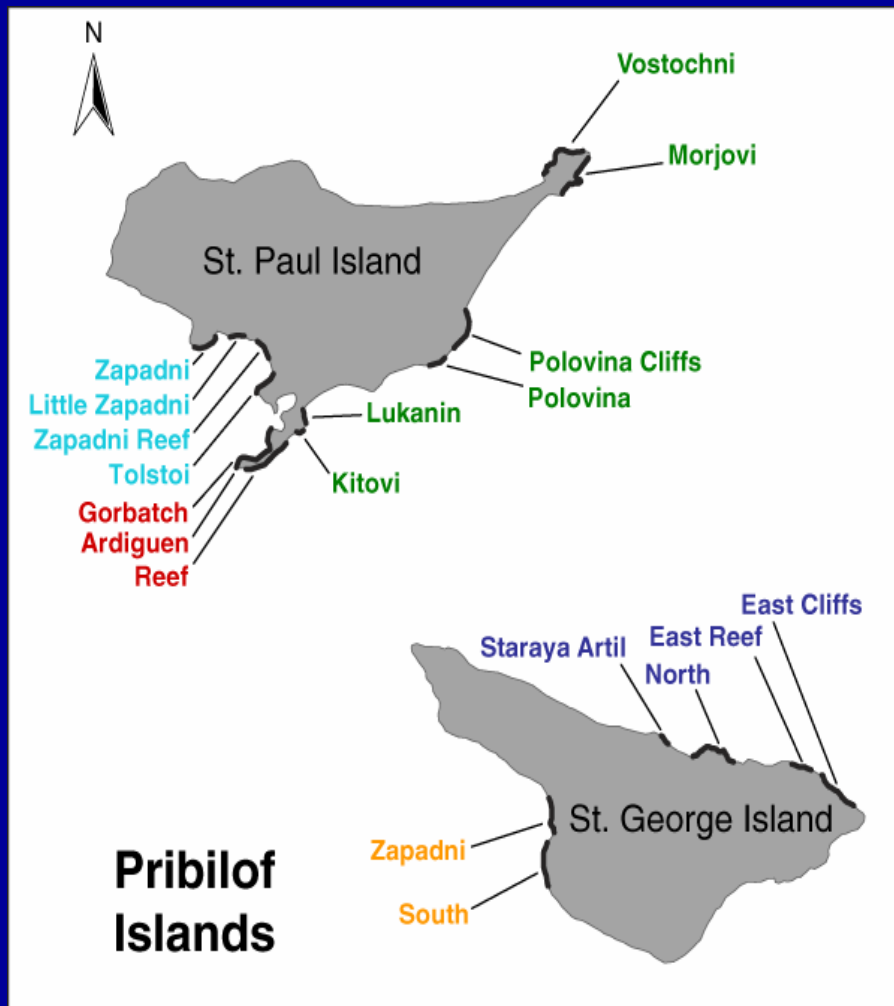
Top five fur seal prey (August-September 1887 - 2000)



*Sinclair et al., 1994; 1996, Antonelis et al., 1997
Gudmundson et al. 2006, Zeppelin and Ream 2006*



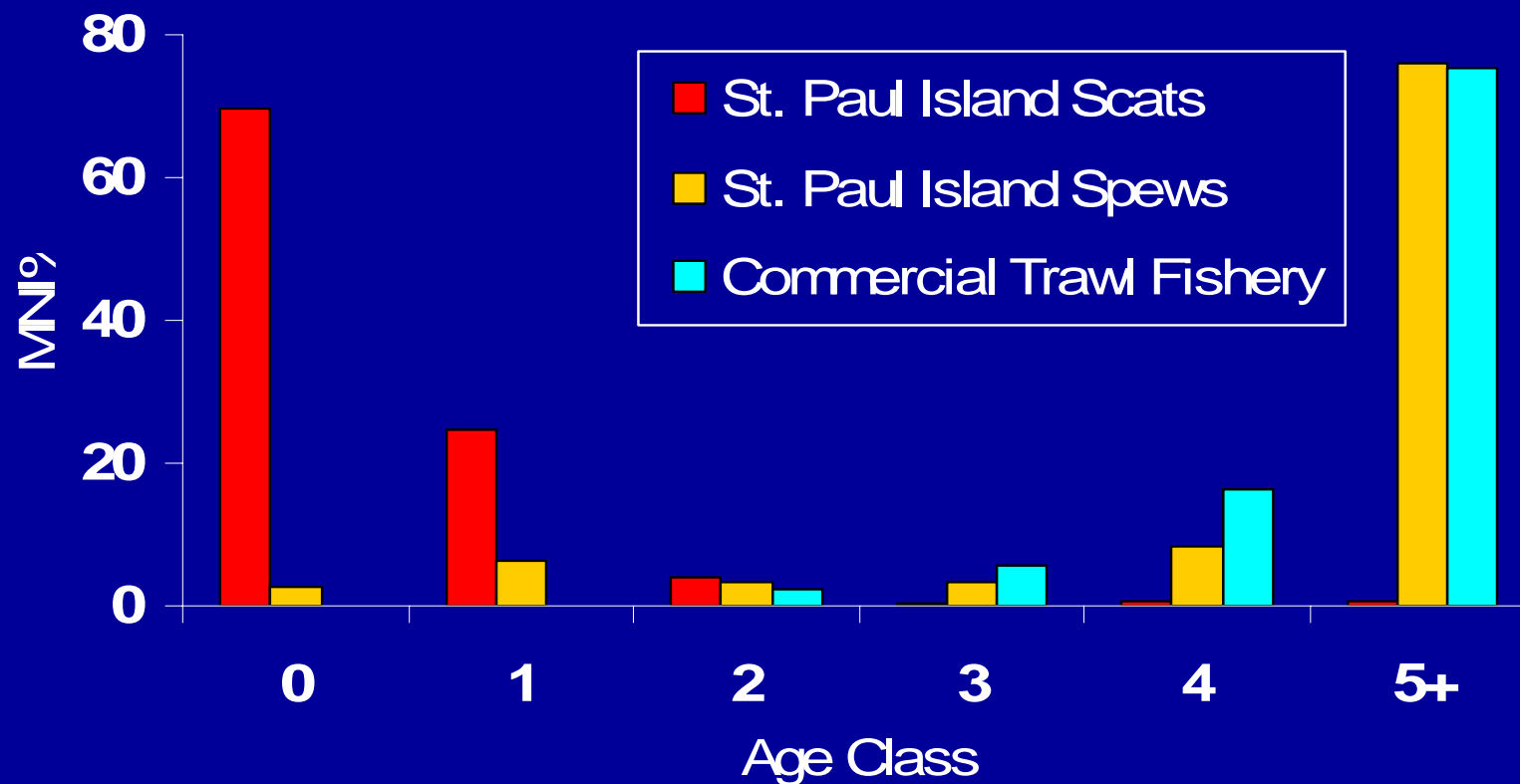
Rookery complexes classified by 1987-2000 diet and telemetry data suggest unique foraging habitats



Zeppelin and Ream, 2006, J. Zoology

Call et al. In Press, Deep Sea Research II

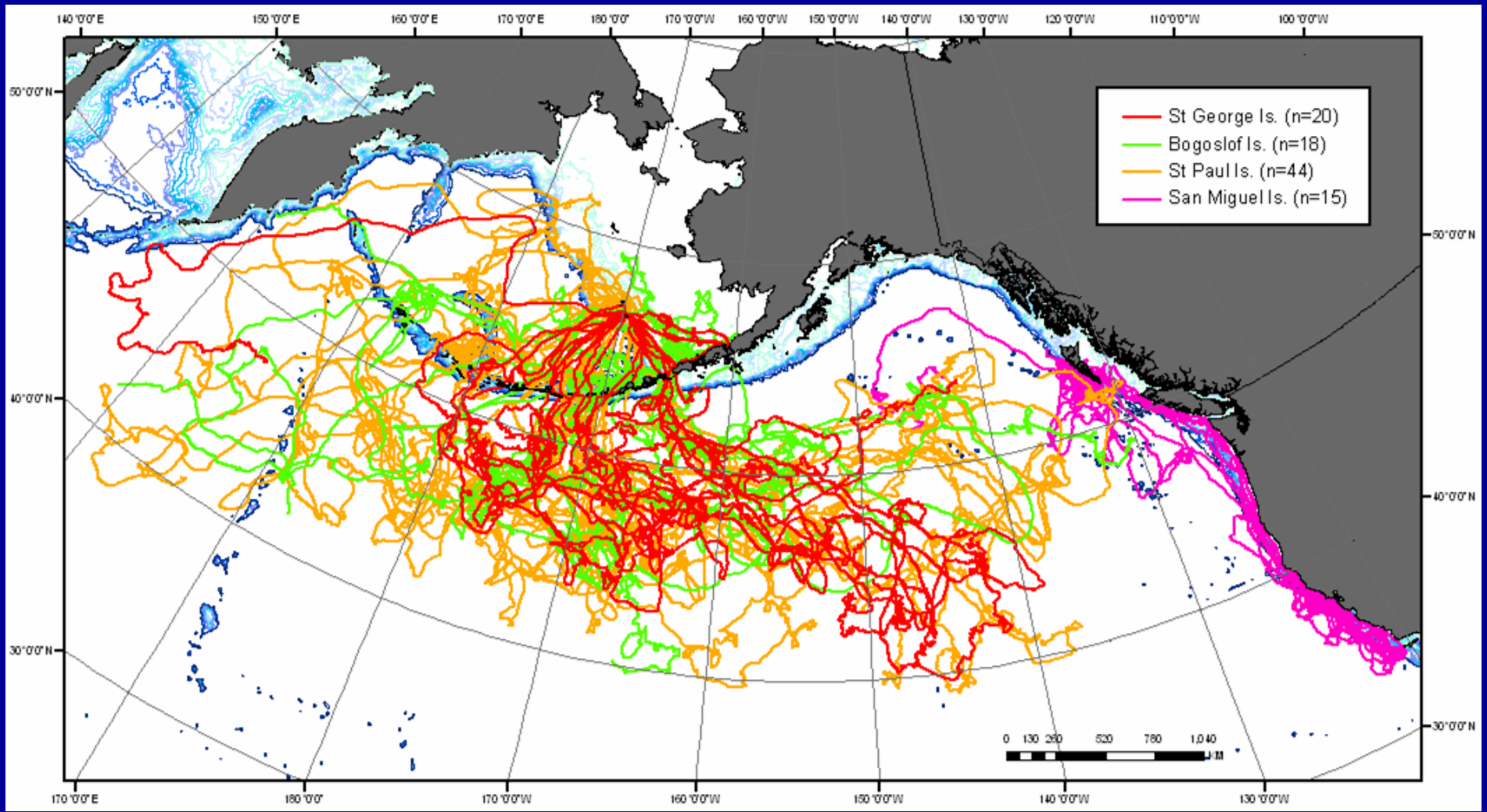
Comparison of pollock age classes found in fur seal scats and spewings, and caught by the commercial trawl fishery



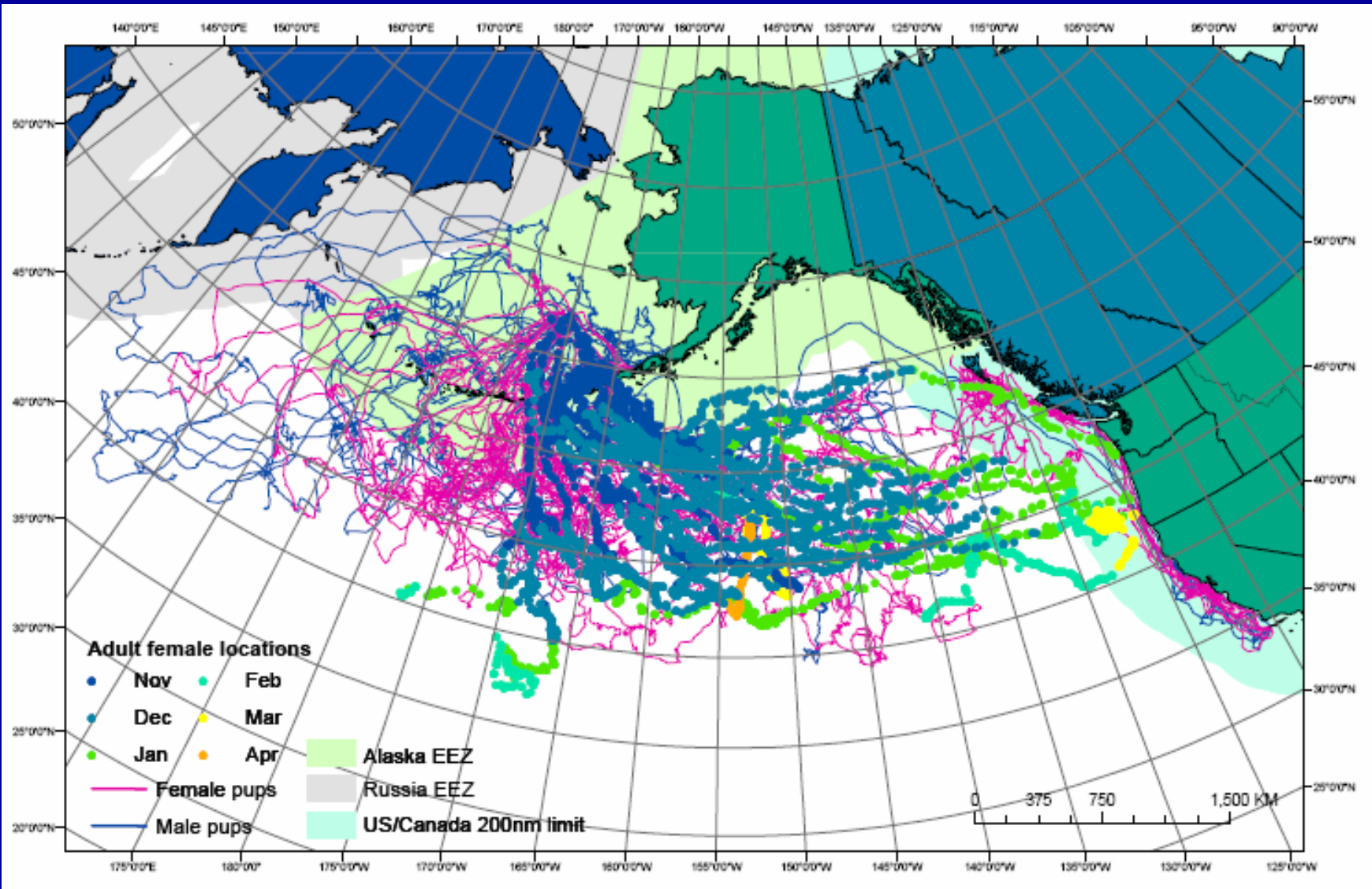
Gudmundson *et al.*, 2006, *Fisheries Bulletin* 104:445-455

Tracks of 97 northern fur seal pups

Nov 2005 – August 2006



Winter Distribution of Northern Fur Seals by Age Class and Gender



Consequences of fur seal foraging strategies: interannual variability

Alison Banks, Alan Springer, Sara Iverson,
Rolf Ream, Jeremy Sterling, and Brian Fadely

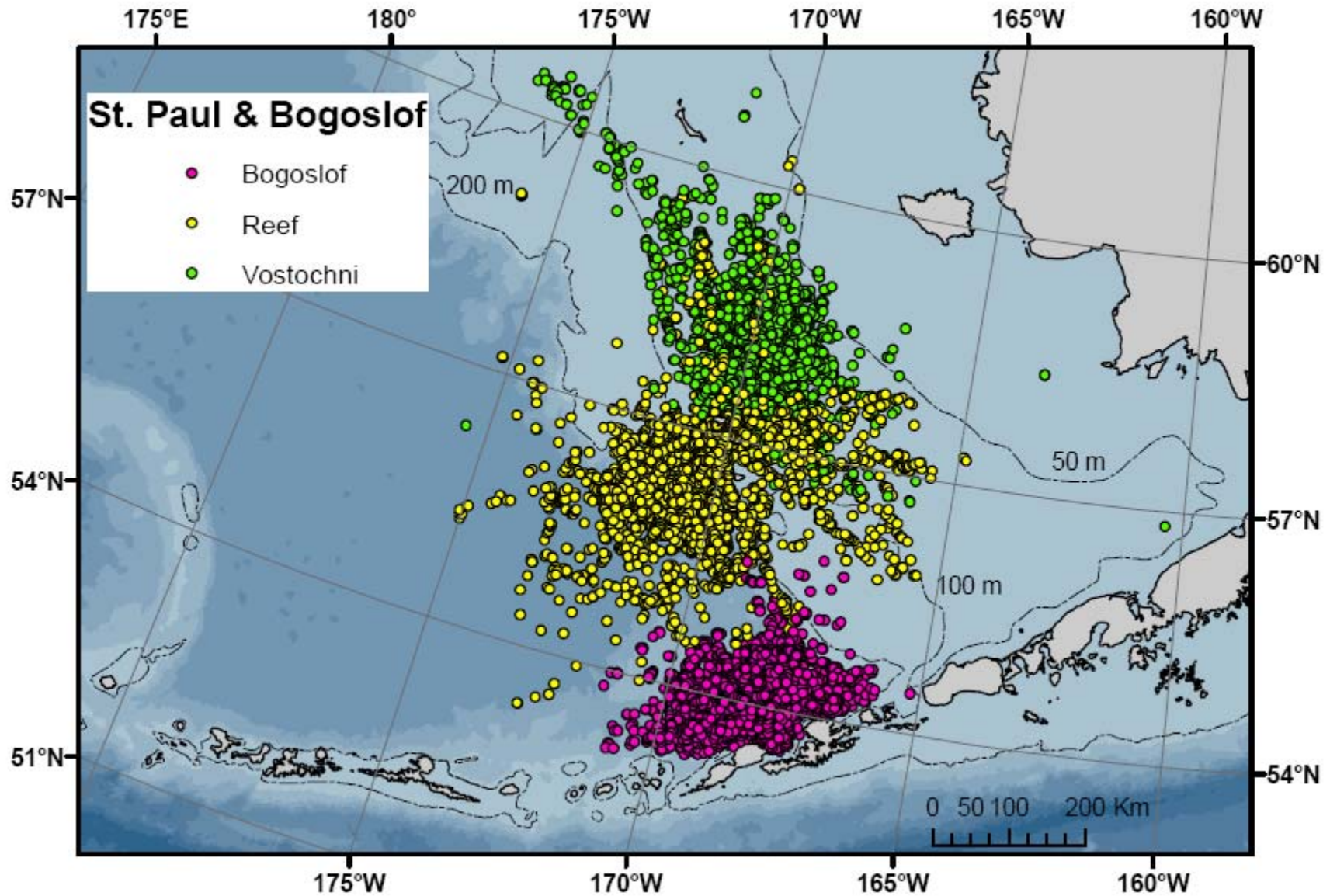


Project Objectives

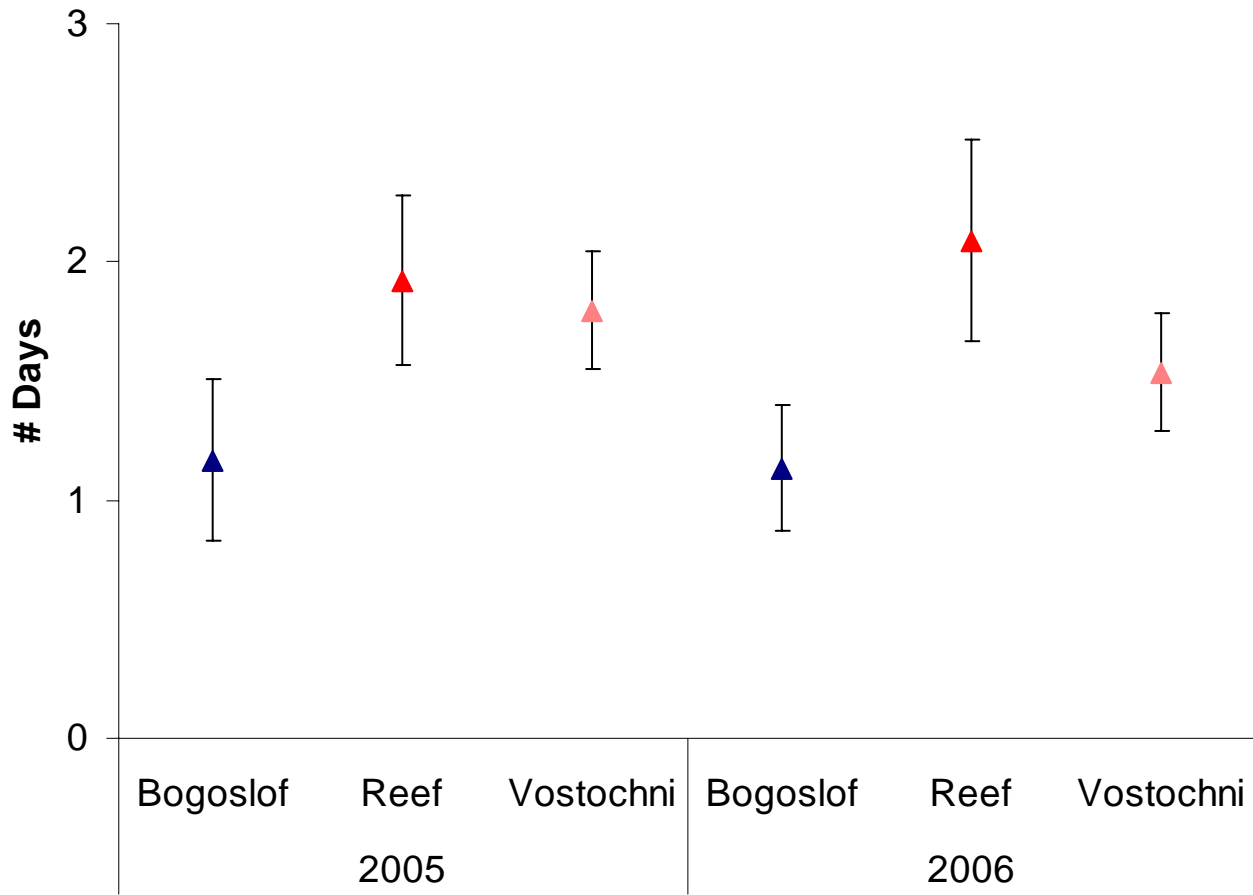
1. To evaluate female foraging strategies at two contrasting rookeries in the Bering sea and assess the consequences to females and their pups.
2. To assess the importance of the Bering Sea compared to the North Pacific.



Summer foraging locations



Shore Duration



Shore Duration

Mean Maximum foraging trip distance

Bogoslof 125.8 days

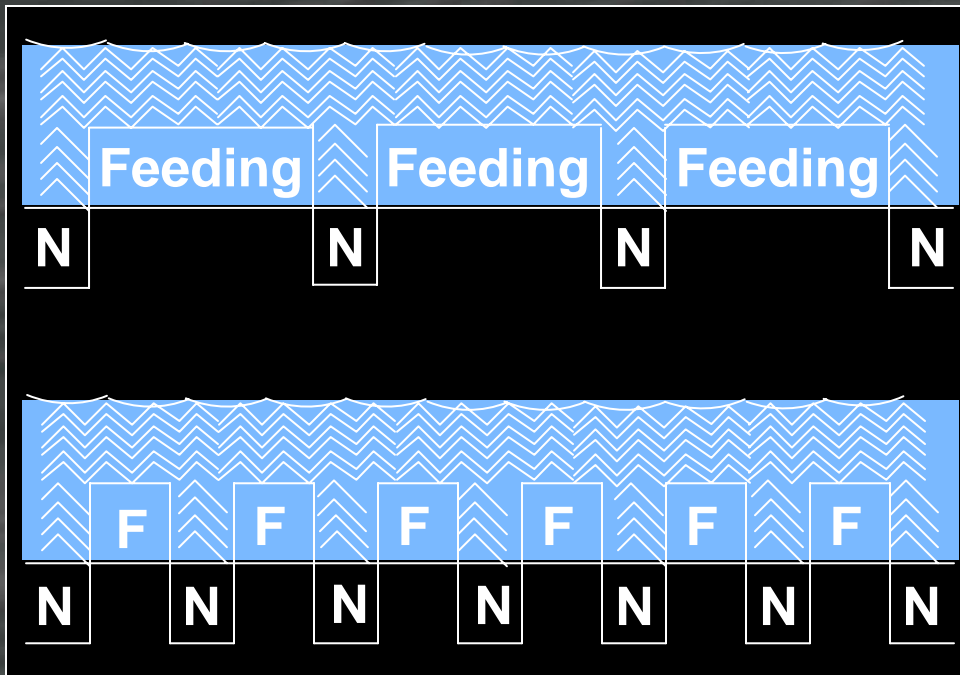
Bogoslof 139.5 km

Vostochni 157.9 days

St Paul 293.4 km

Reef 200.3 days





St. Paul

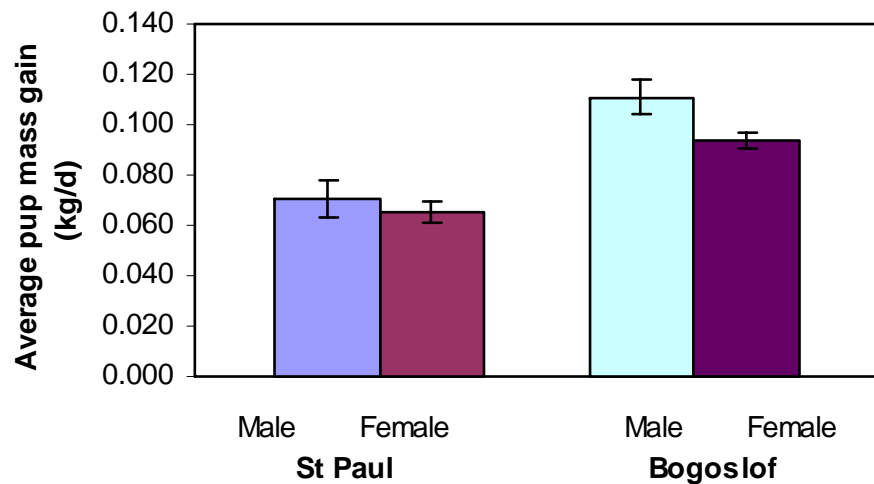
Bogoslof

- St. Paul pups fast for longer periods
- Bogoslof pups are fed more often

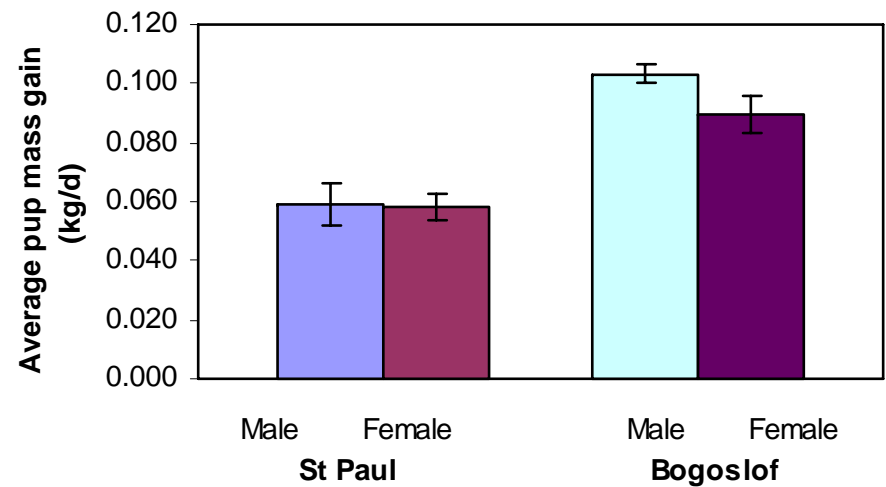


Pup mass gain

2005



2006



- Bogoslof Island pups gained significantly more mass per day
- Gender difference on Bogoslof but not on St. Paul

Northern fur seal research

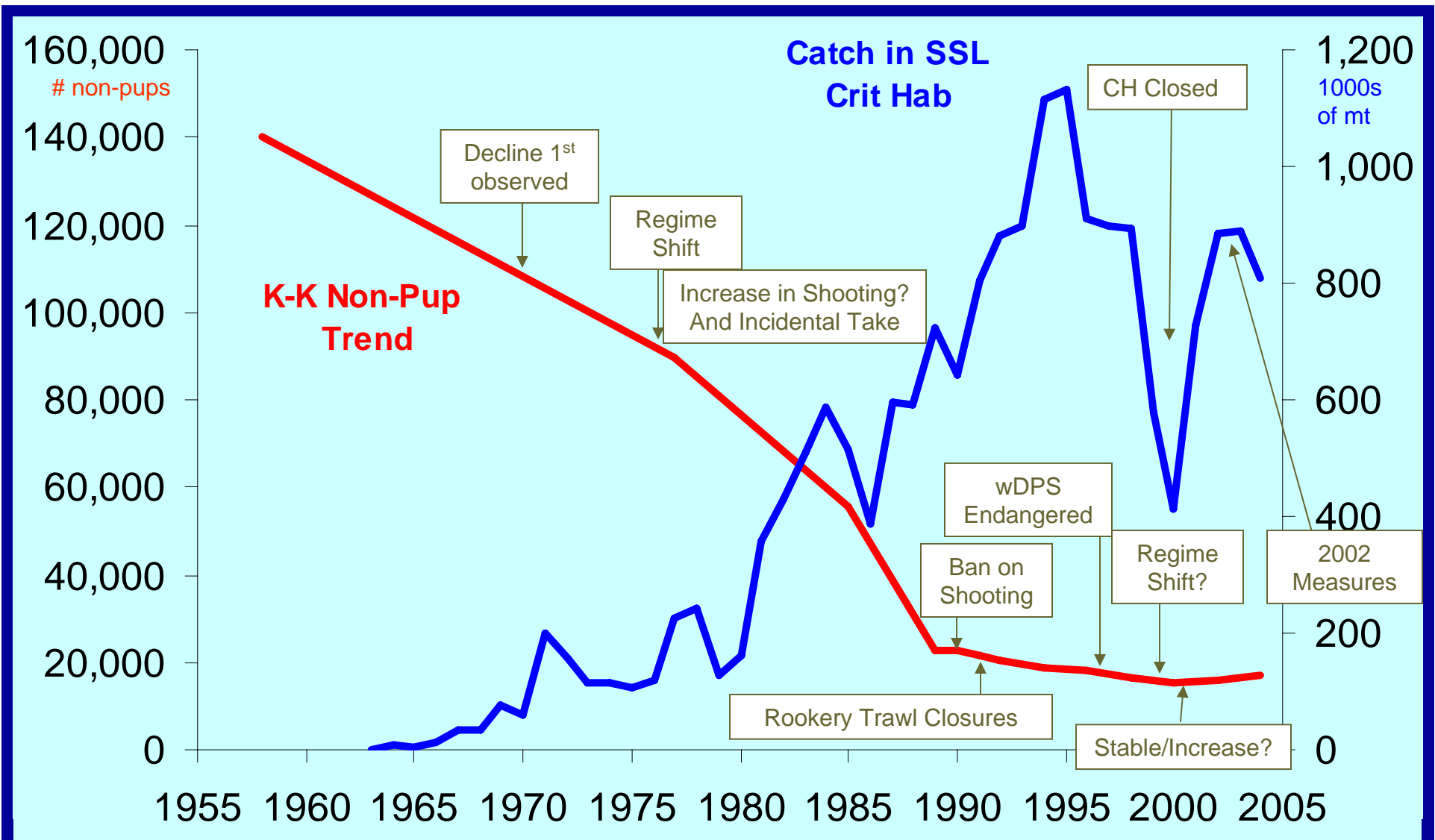
2007

- **Population assessment**
 - Pribilof Island bull counts, Jul 8-16
 - Bogoslof pup count, ~Aug 8-15
- **Foraging behavior**
 - St. Paul maternal trip tracking, Aug 15-25
 - St. Paul adult female foraging, late Sep
 - Stomach temperature pill test (NRC)
- **Winter migration**
 - Pribilof pups, juveniles, adults, mid-Oct – early-Nov
- **Vital rates**
 - St Paul pilot tagging study, mid-Oct – early-Nov





Extra SSL slides



Fisheries:

----- Foreign ----- JV -----

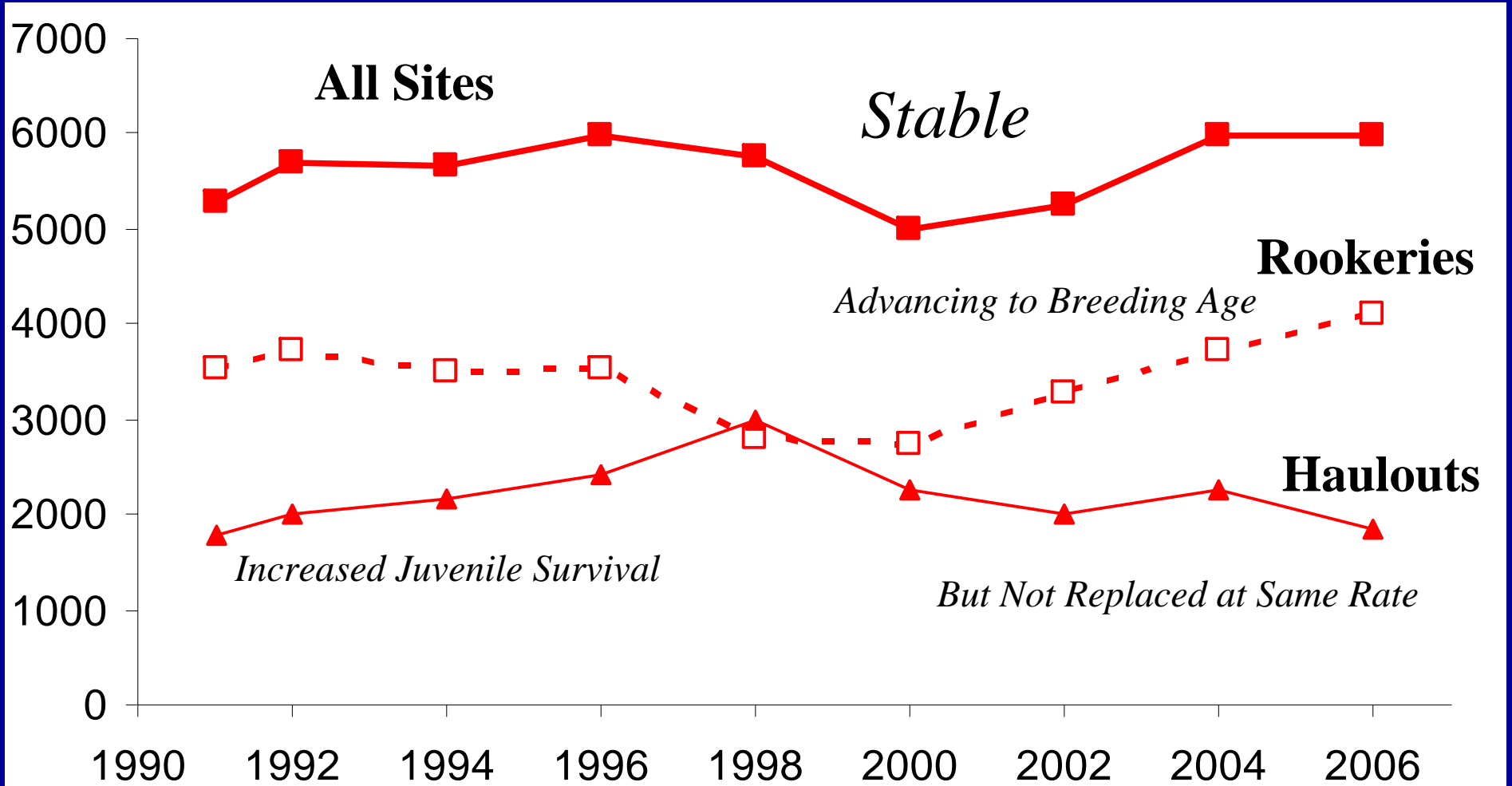
Domestic Changes in Steller Sea Lion Vital Rates

- Juvenile Survival
- Adult Survival
- Natality

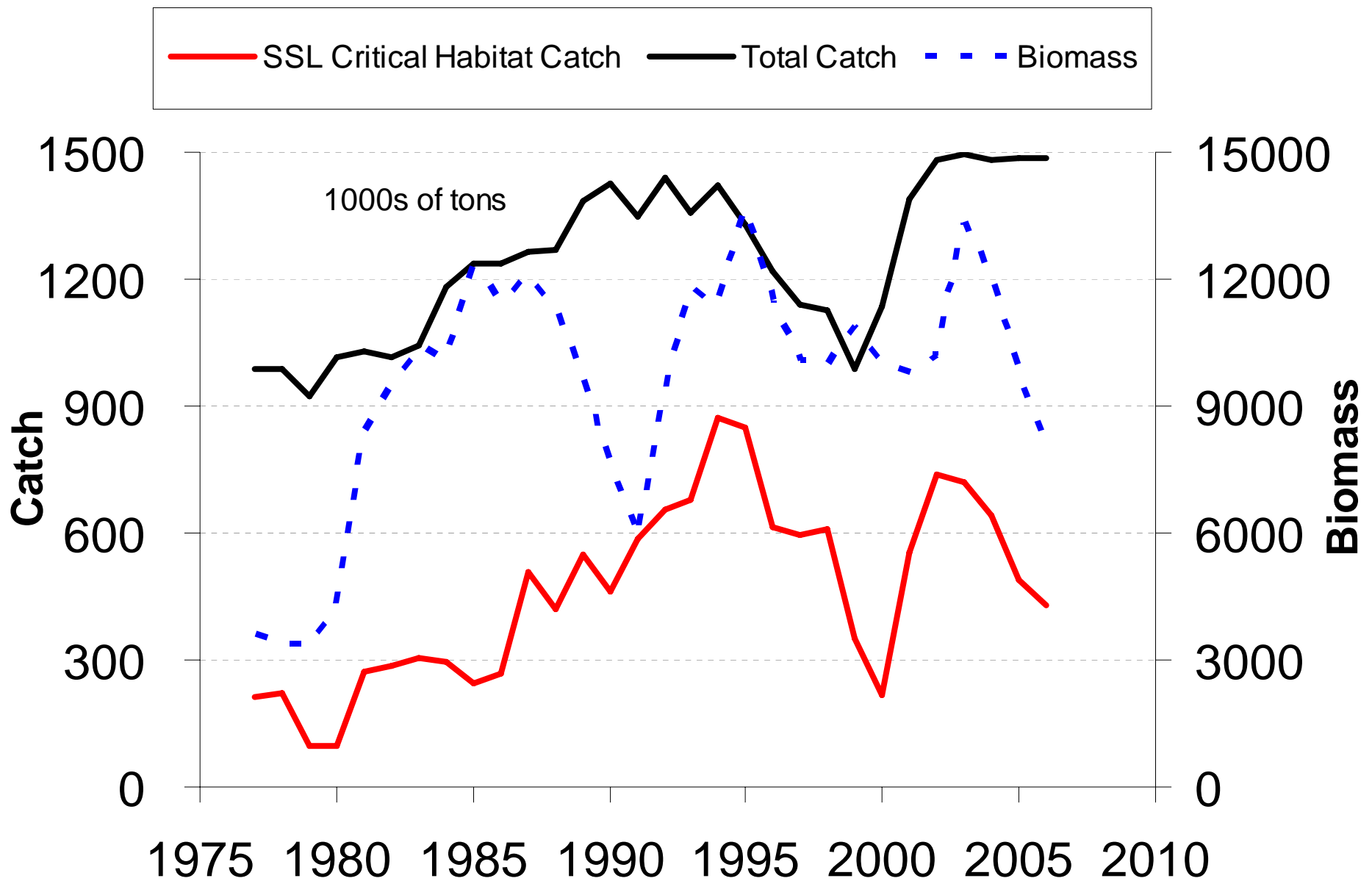
-- Large Reduction ----- Improvement

-- Small Reduction ----- Improvement

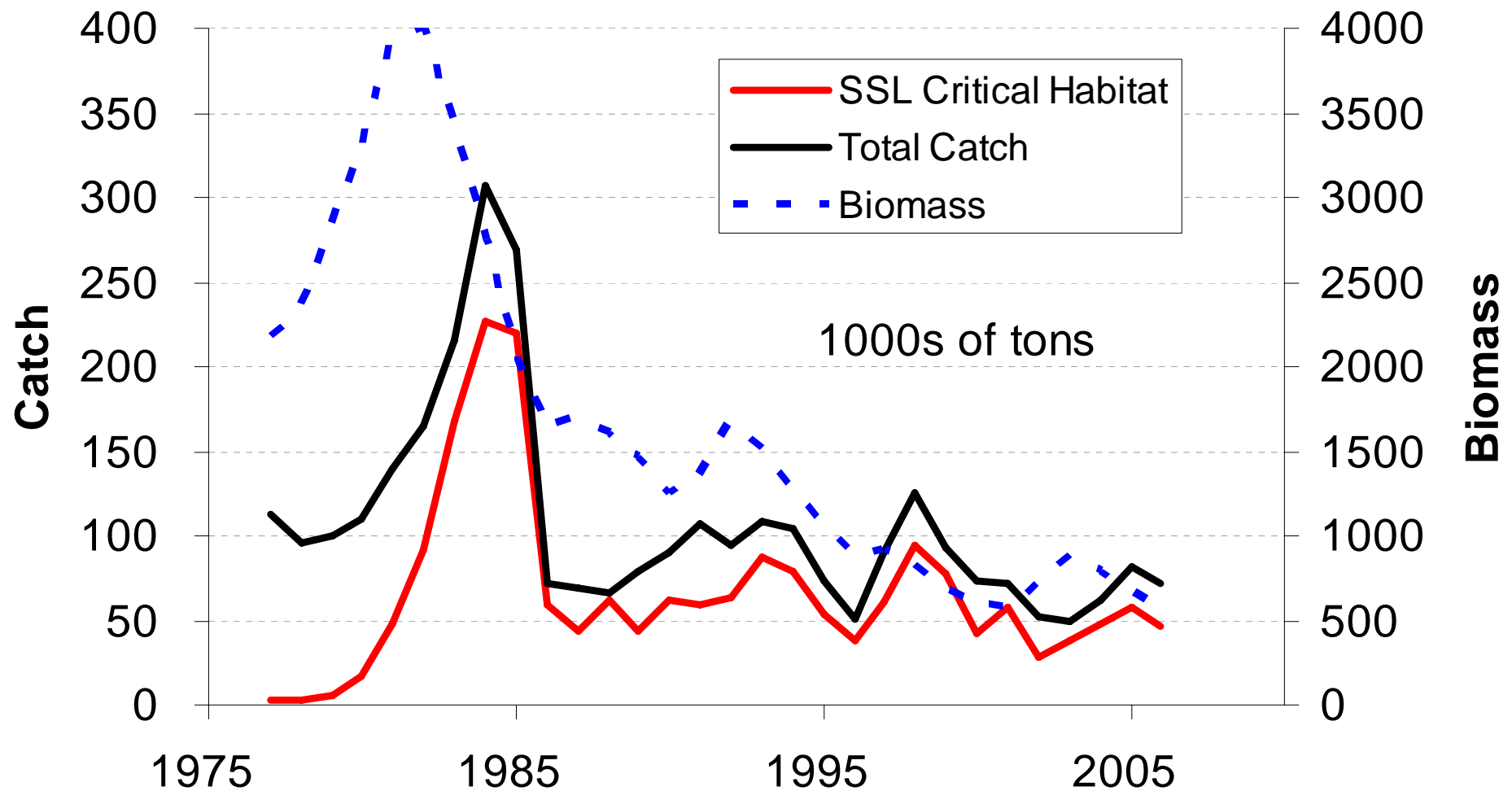
EAI: Rookery vs. Haulout Trend Sites



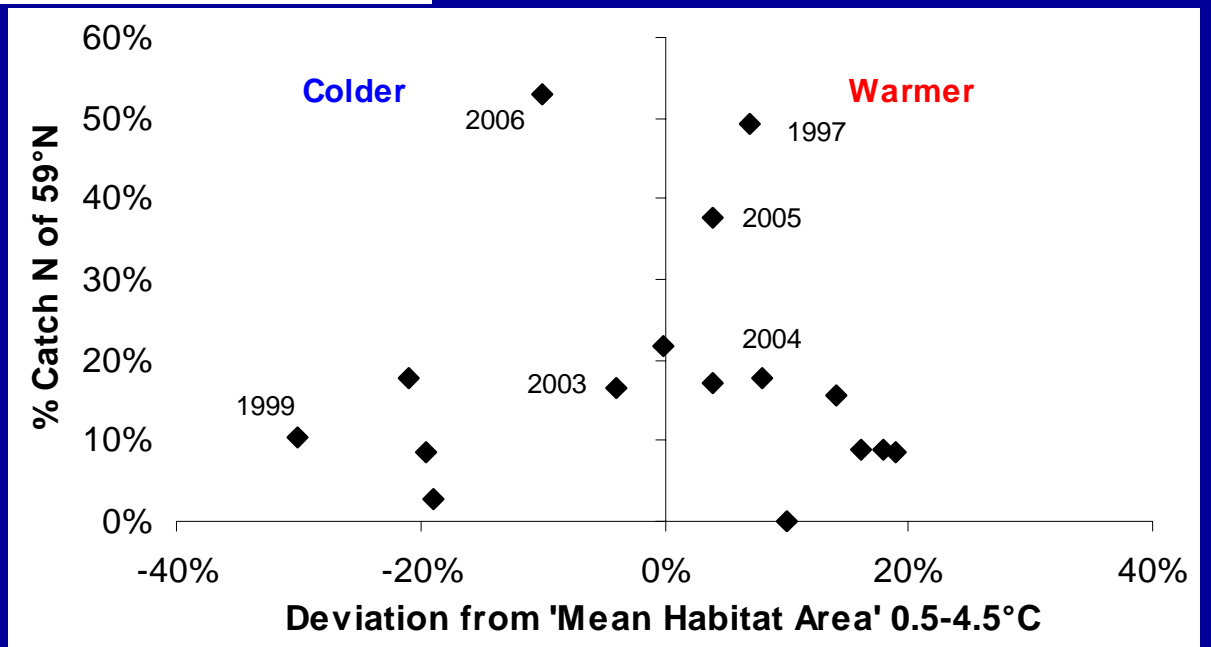
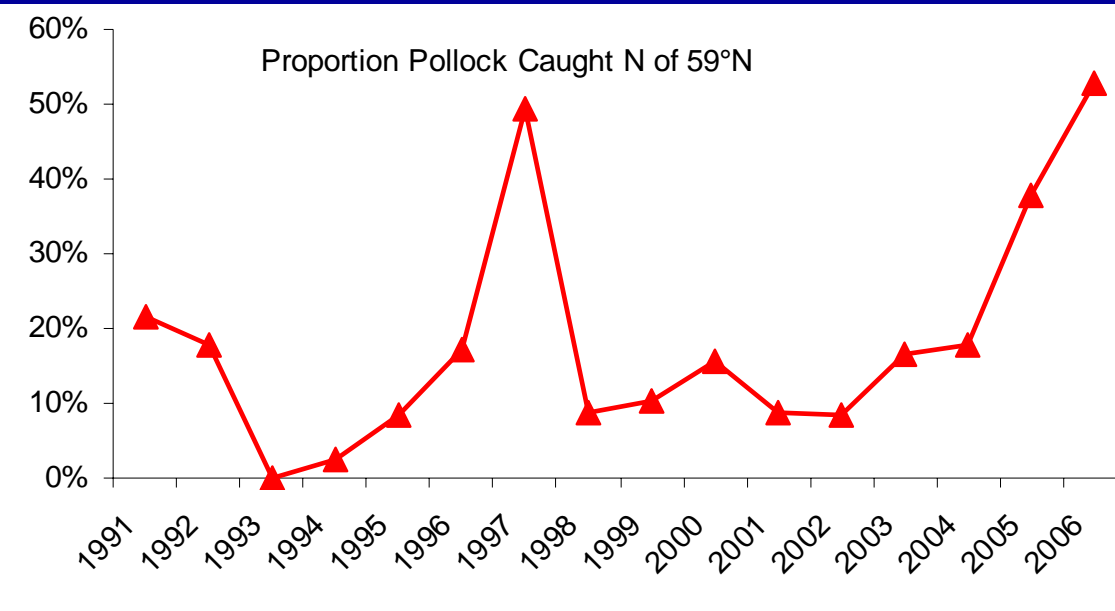
Catch and Biomass of BSAI Pollock

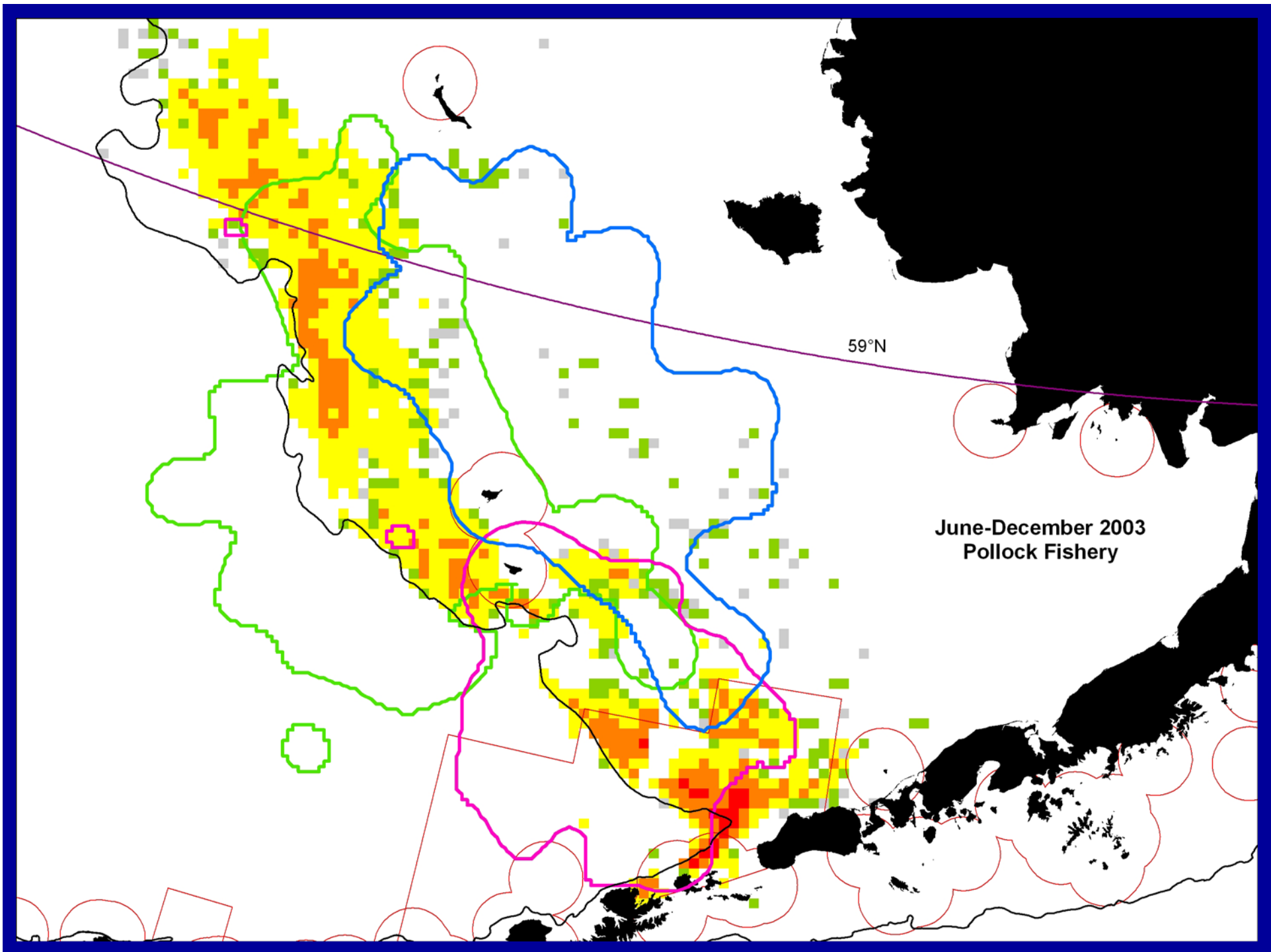


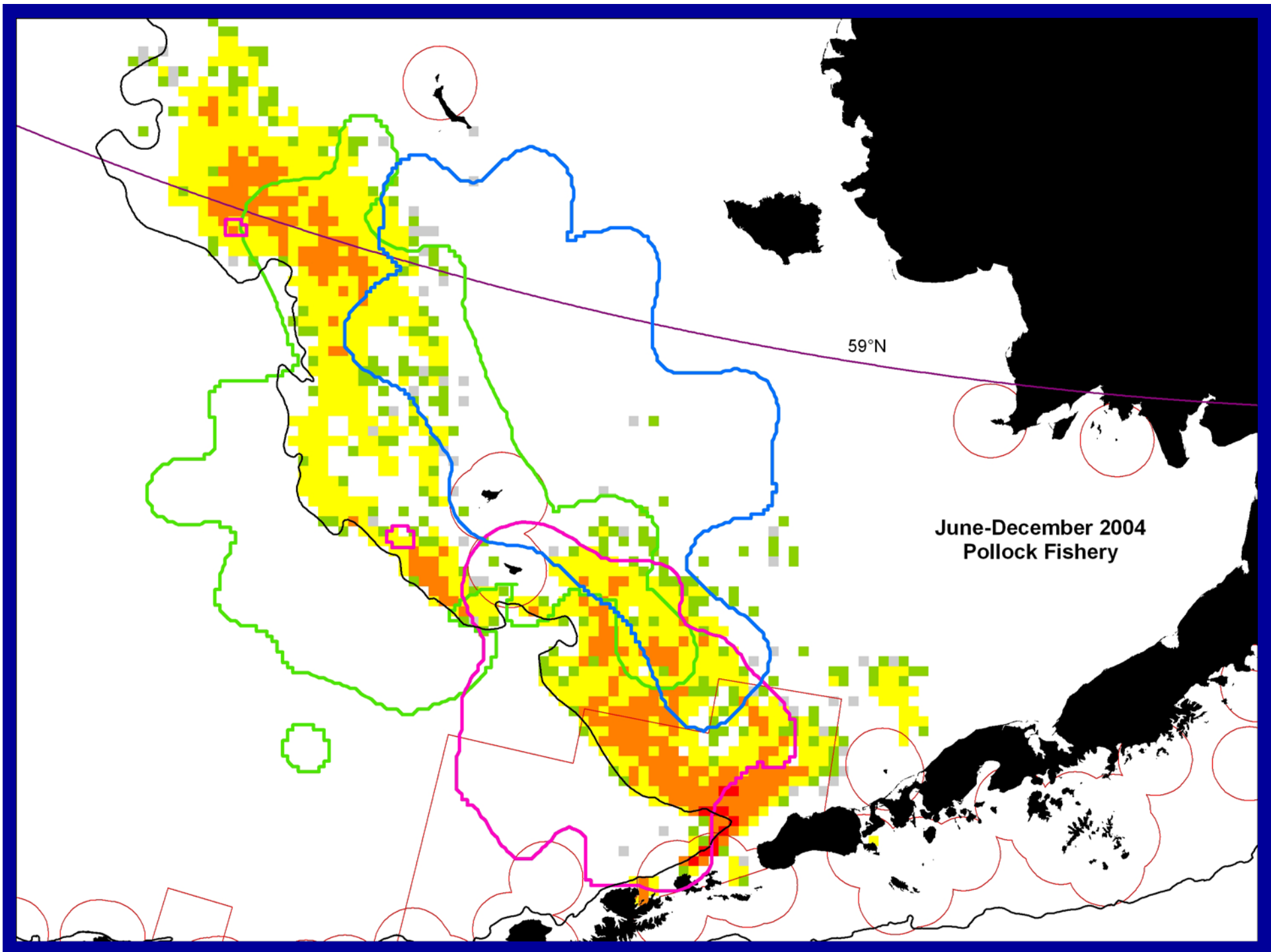
Catch and Biomass of GOA Pollock

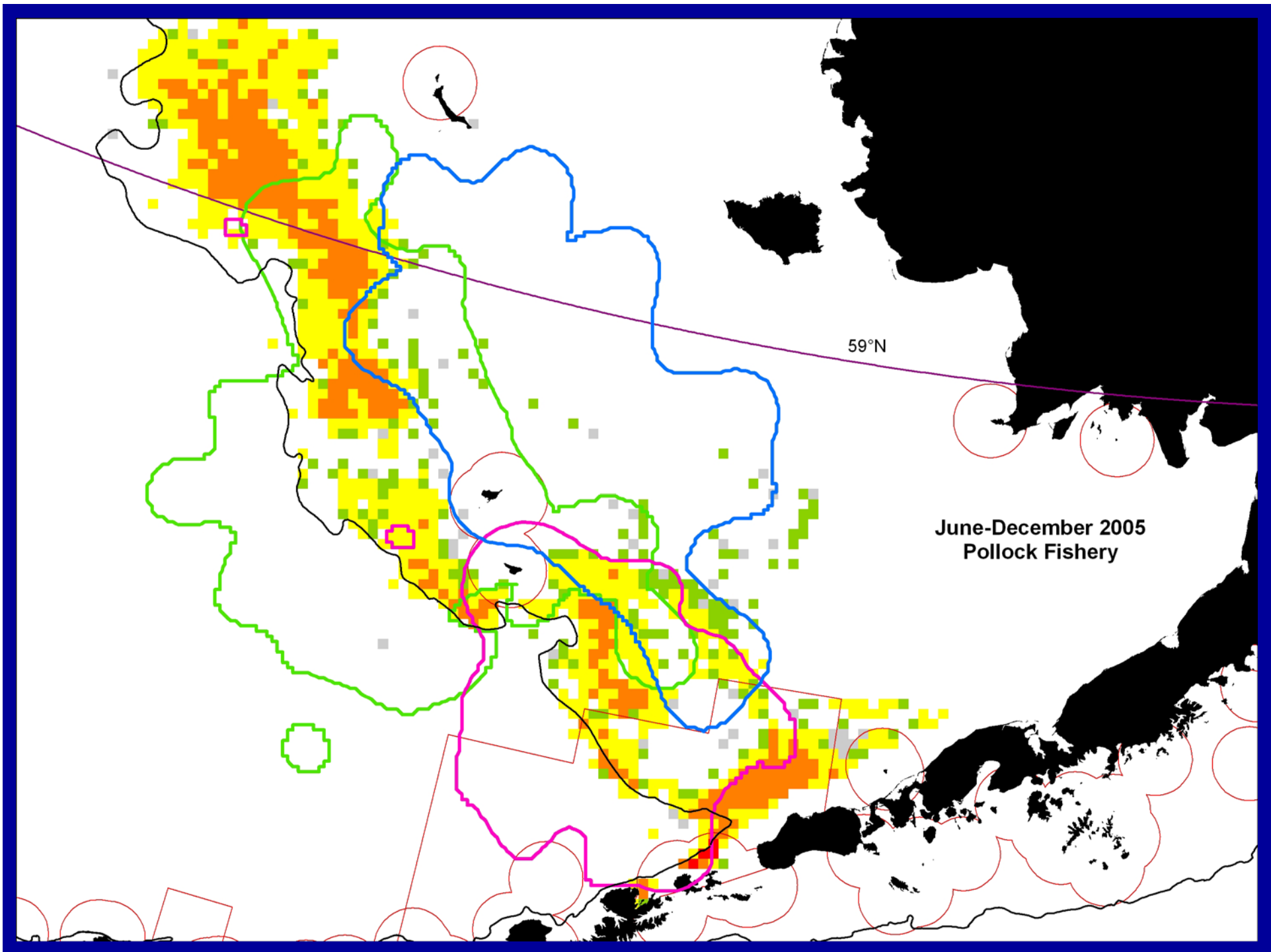


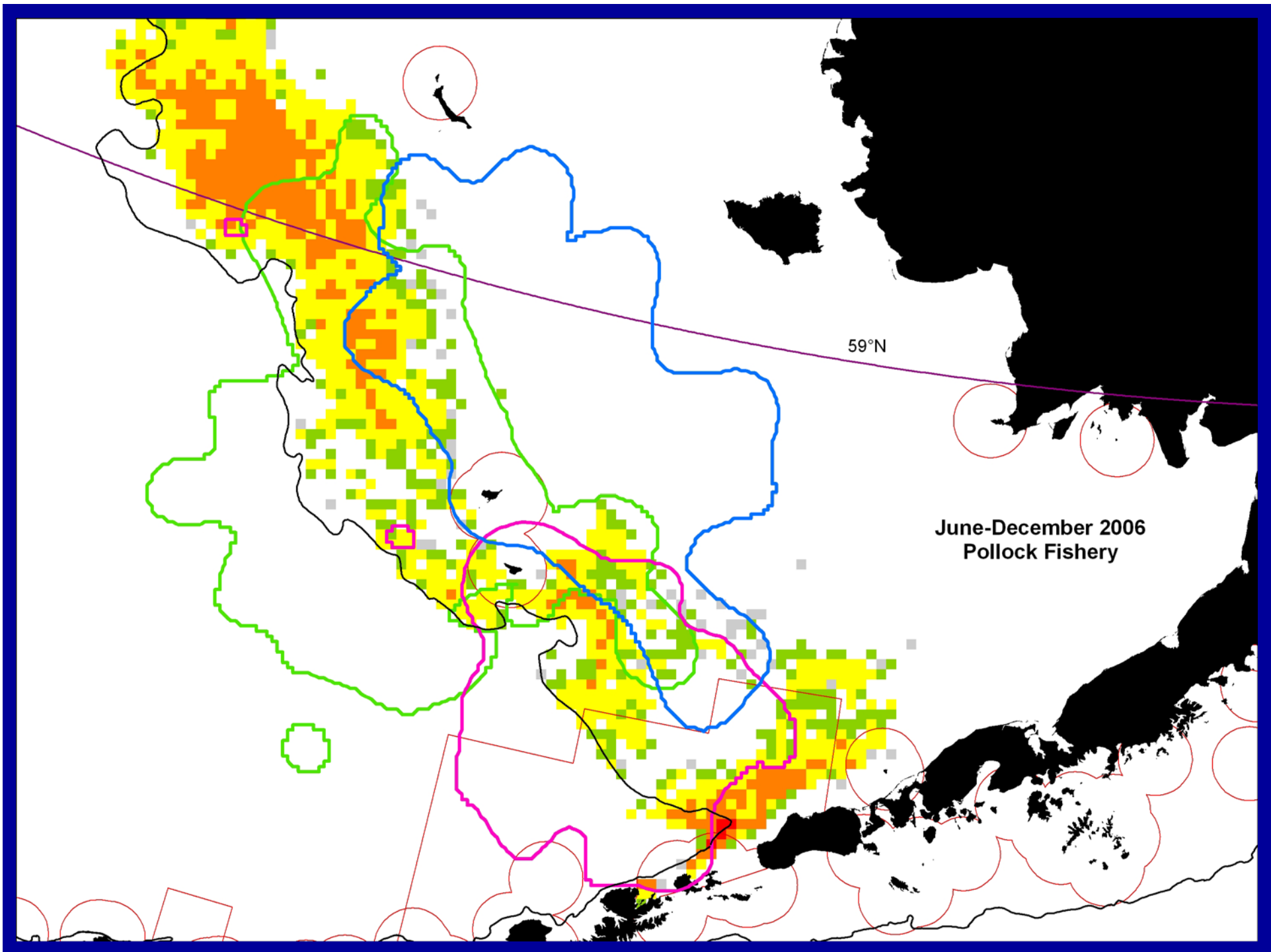
Pollock Catch June-December



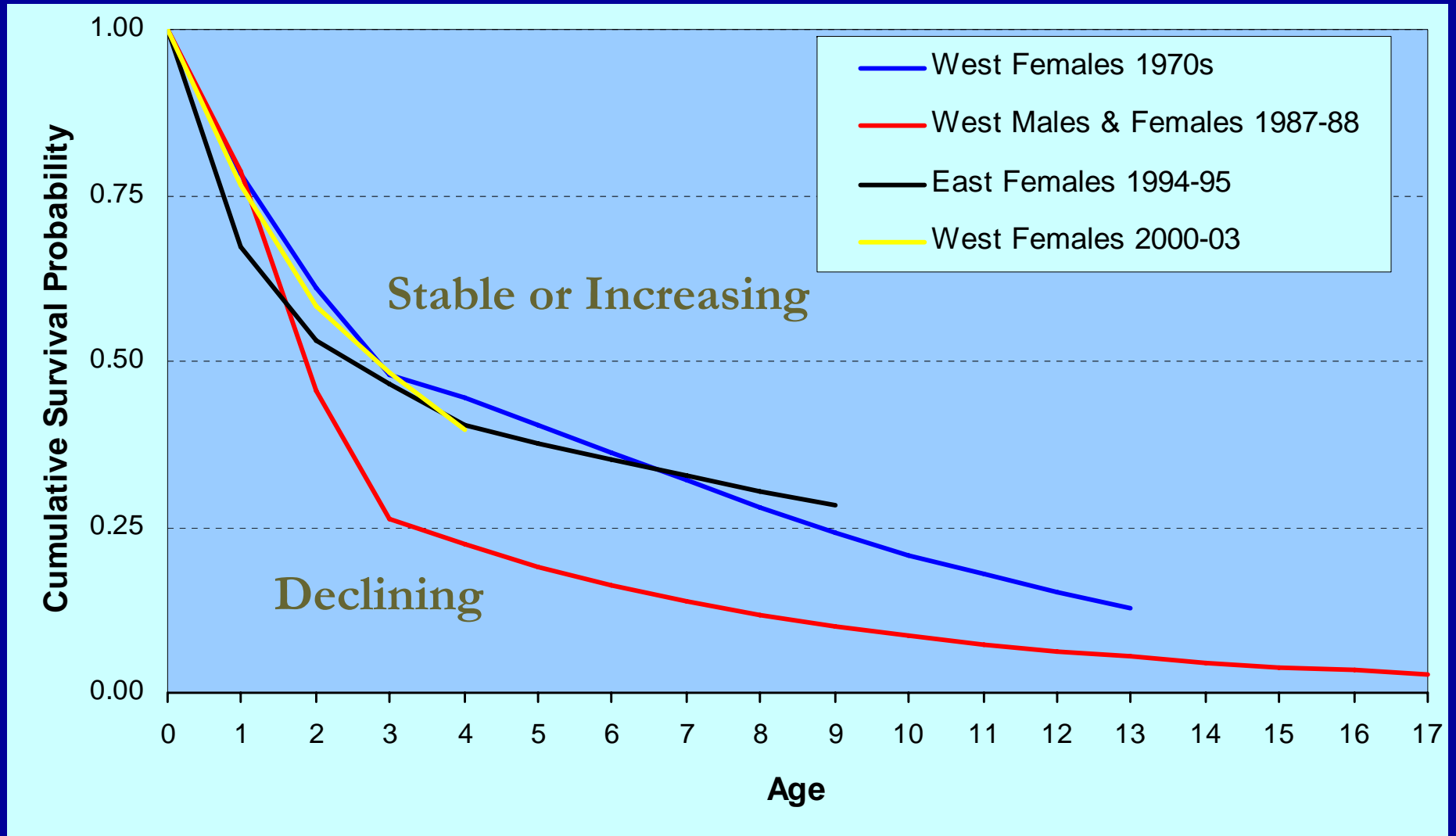




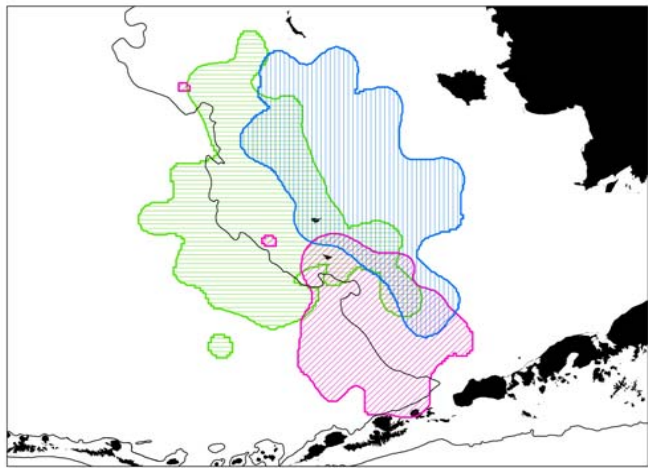
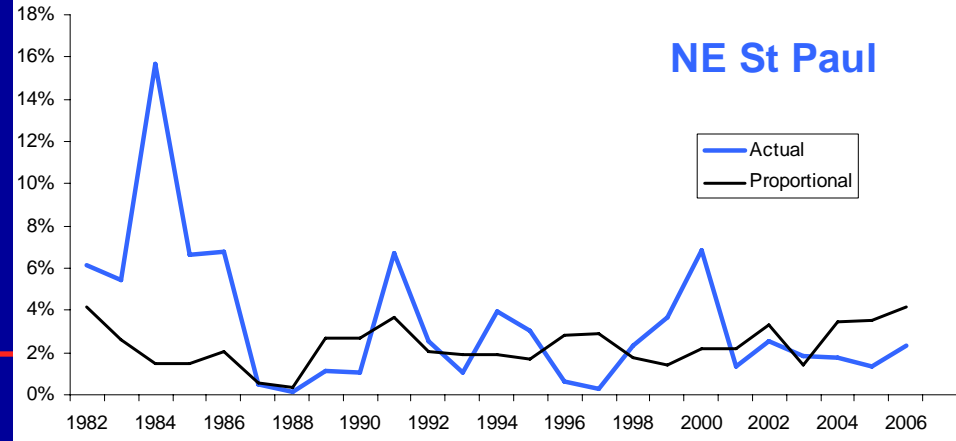
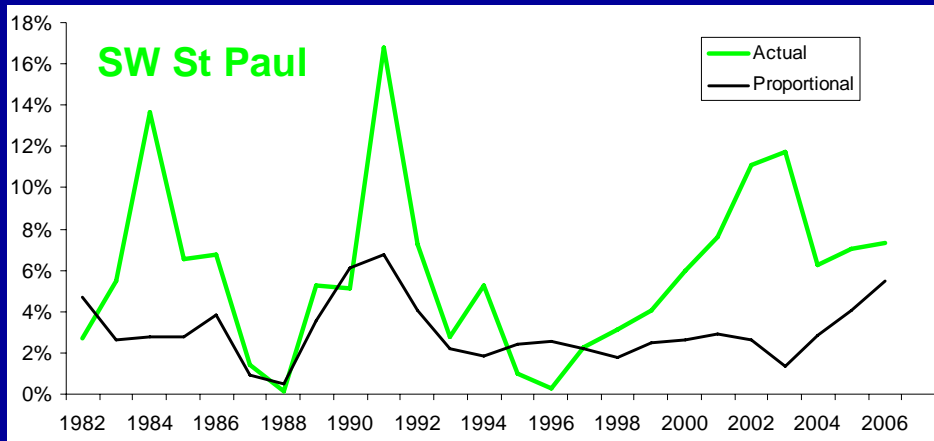




Steller Sea Lion Survival East & West, 1970s-2000s



Extra NFS slides



Relative Harvest Indices by Fur Seal Foraging Range 1982-2006

