



Northern Fur Seal Synthesis

Discussion Paper for the North Pacific Fishery Management Council

Steve A. MacLean¹, Michael T. Williams²

¹North Pacific Fishery Management Council

²National Marine Fisheries Service, AKR, PRD

Northern fur seal general description

- Member of Family Otariidae – eared seals
- *Callorhinus ursinus* – “beautiful nose, bearlike”
- Dense fur ~ 350,000 hairs per square inch



Northern fur seal general description

- Member of Family Otariidae – eared seals
- *Callorhinus ursinus* – “beautiful nose, bearlike”
- Dense fur ~ 350,000 hairs per square inch
- Extreme sexual dimorphism
 - Males ~ 200-275 kg
 - Females ~ 35-65 kg



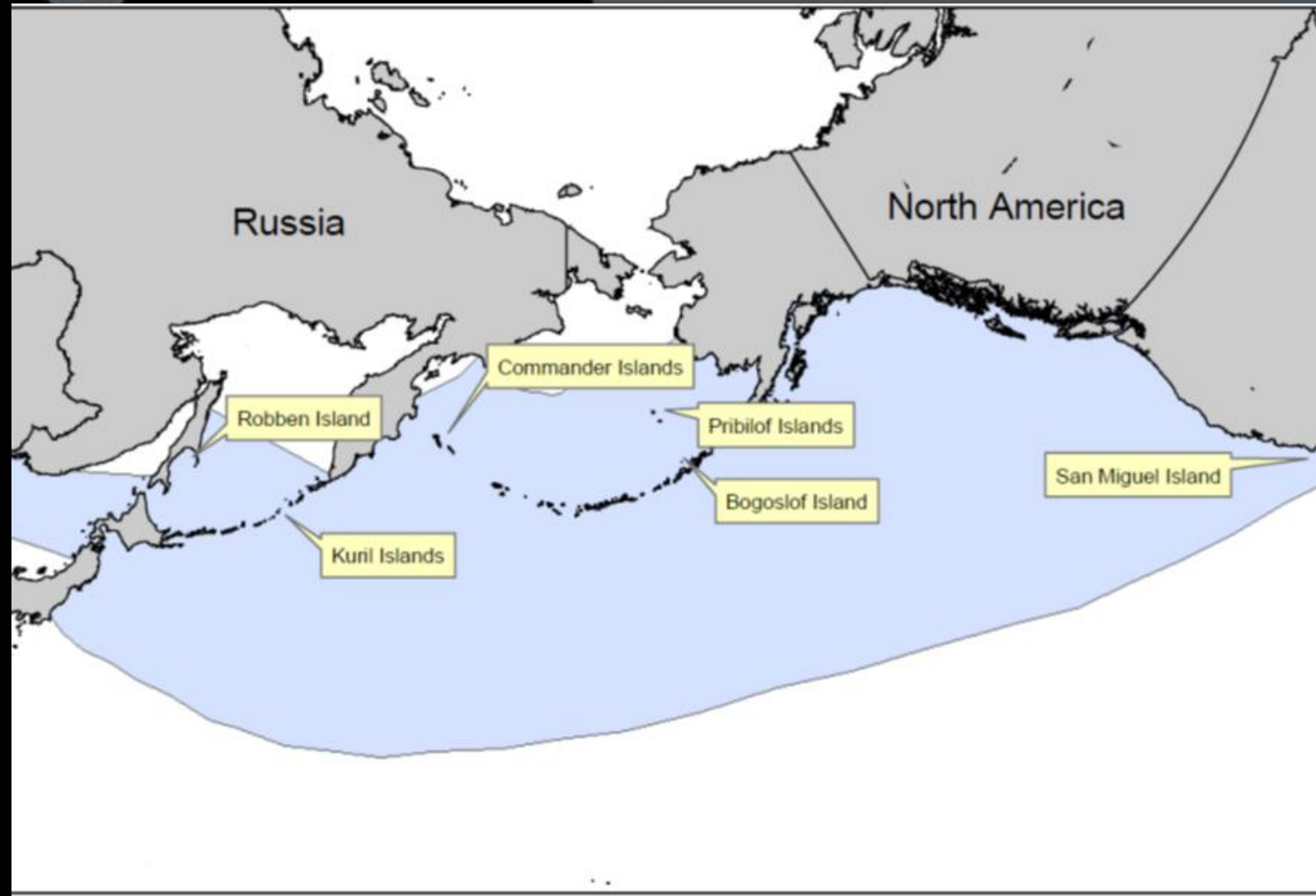
Northern fur seal general description

- Member of Family Otariidae – eared seals
- *Callorhinus ursinus* – “beautiful nose, bearlike”
- Dense fur ~ 350,000 hairs per square inch
- Extreme sexual dimorphism
 - Males ~ 200-275 kg
 - Females ~ 35-65 kg
 - Pups ~ 6 kg at birth



Distribution

- Breed at 7 locations in the North Pacific and Bering Sea
- Eastern Pacific Stock and California Stock
- Pribilof Islands hold slightly less than half breeding population
- Range throughout North Pacific in winter



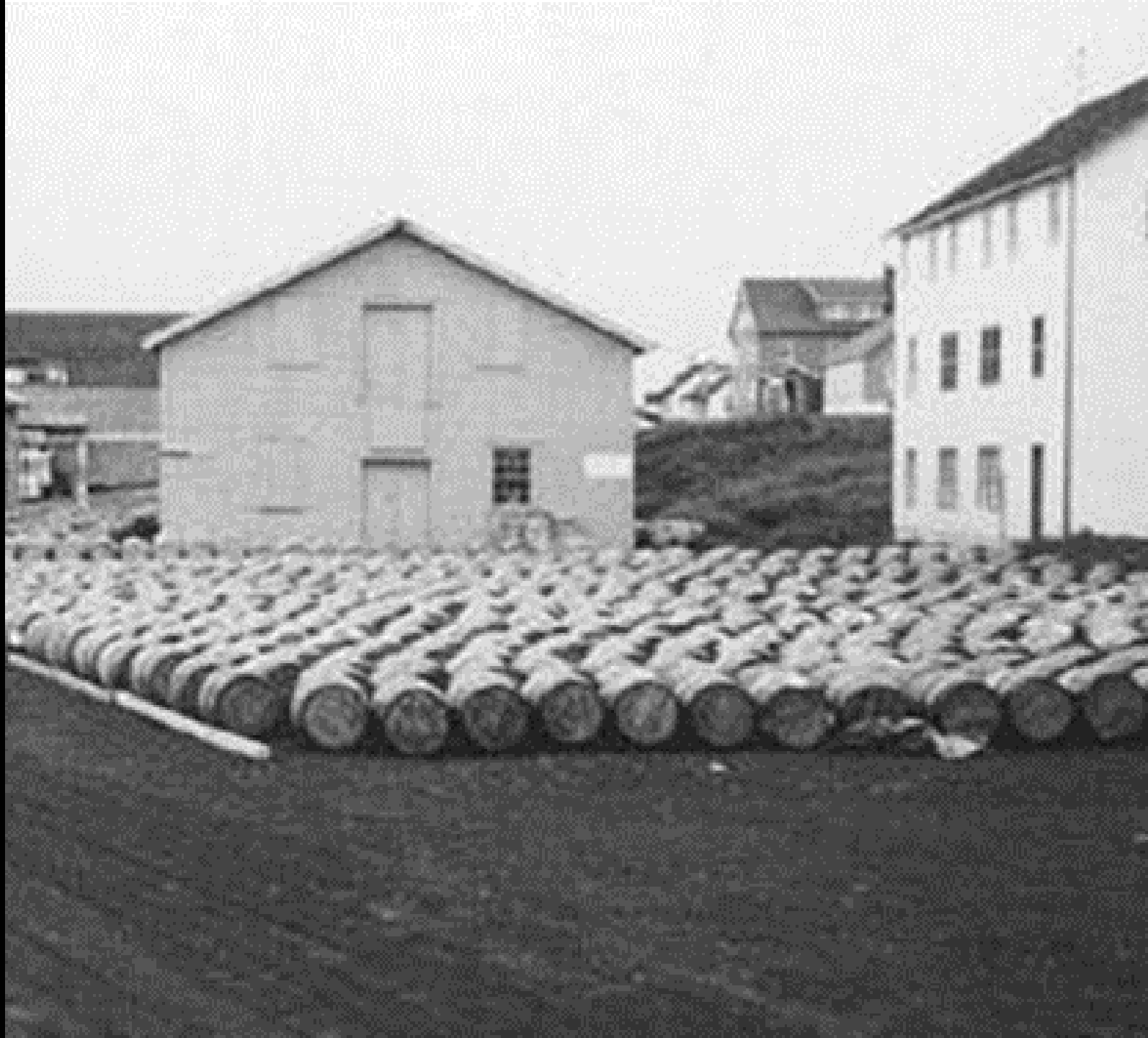
Population Size – historic and recent

- Unknown population size at description by Georg Steller in 1742
- Since description the population has been exploited for pelts



Population Size – historic and recent

- Unknown population size at description by Georg Steller in 1742
- Since description the population has been exploited for pelts
- Experienced at least three declines due to harvest strategies
 - Russian harvests in 18th & 19th century
 - American harvests after Alaska purchase



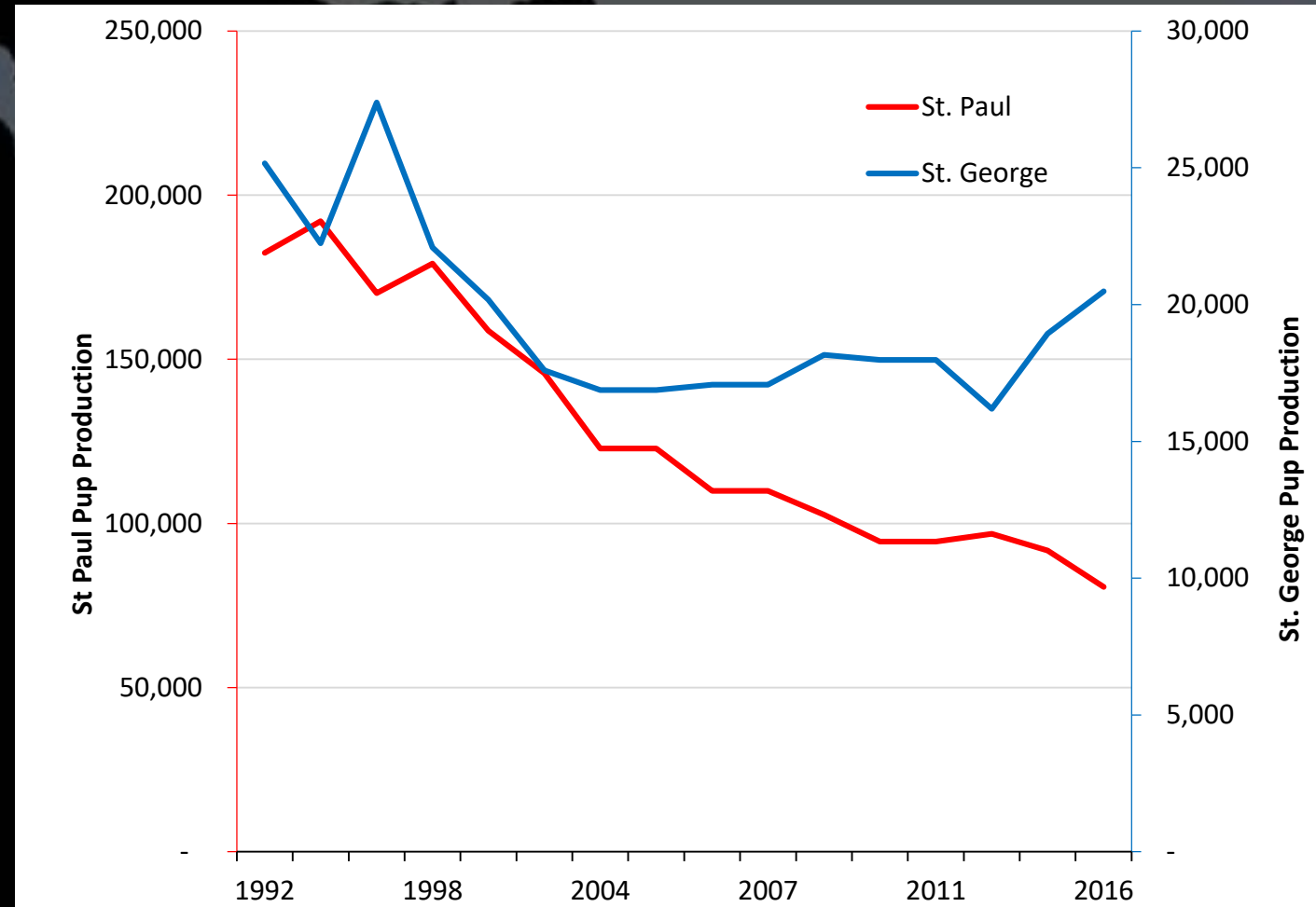
Population Size – historic and recent

- Unknown population size at description by Georg Steller in 1742
- Since description the population has been exploited for pelts
- Experienced at least three declines due to harvest strategies
 - Russian harvests in 18th & 19th century
 - American harvests after Alaska purchase
 - American Herd Reduction program in 1950s



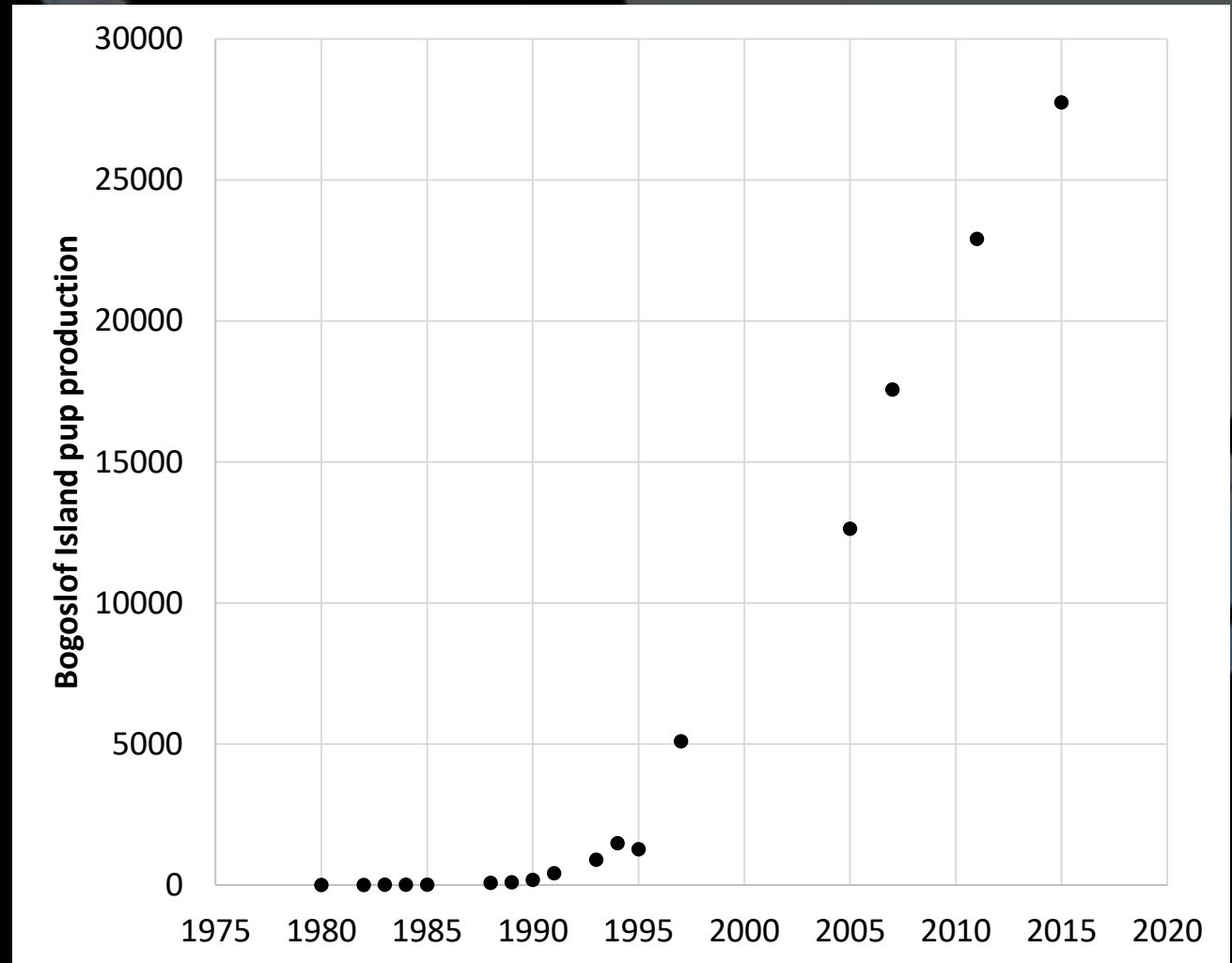
Recent Pribilof Island population

- Population estimated by number of pups x expansion factors
- Long decline from 1950s to 1980
- St. Paul
 - 192K in 1994 to 80.6K in 2016
 - -55% (-4.1% annually)
- St. George
 - 27.3K in 1996 to 16.1K in 2012
 - Stable since 2002



Bogoslof Island population

- Bogoslof began forming in 1796
- NFS identified on Bogoslof in 1976
 - First pups in 1980
- 27,750 pups in 2015
 - +33.7 % annually since 1980
 - +10.1% since 1987



Stock size and status

Minimum population estimate in 2016: 530,474

NFS are “Depleted” under MMPA

NFS are not listed under US ESA



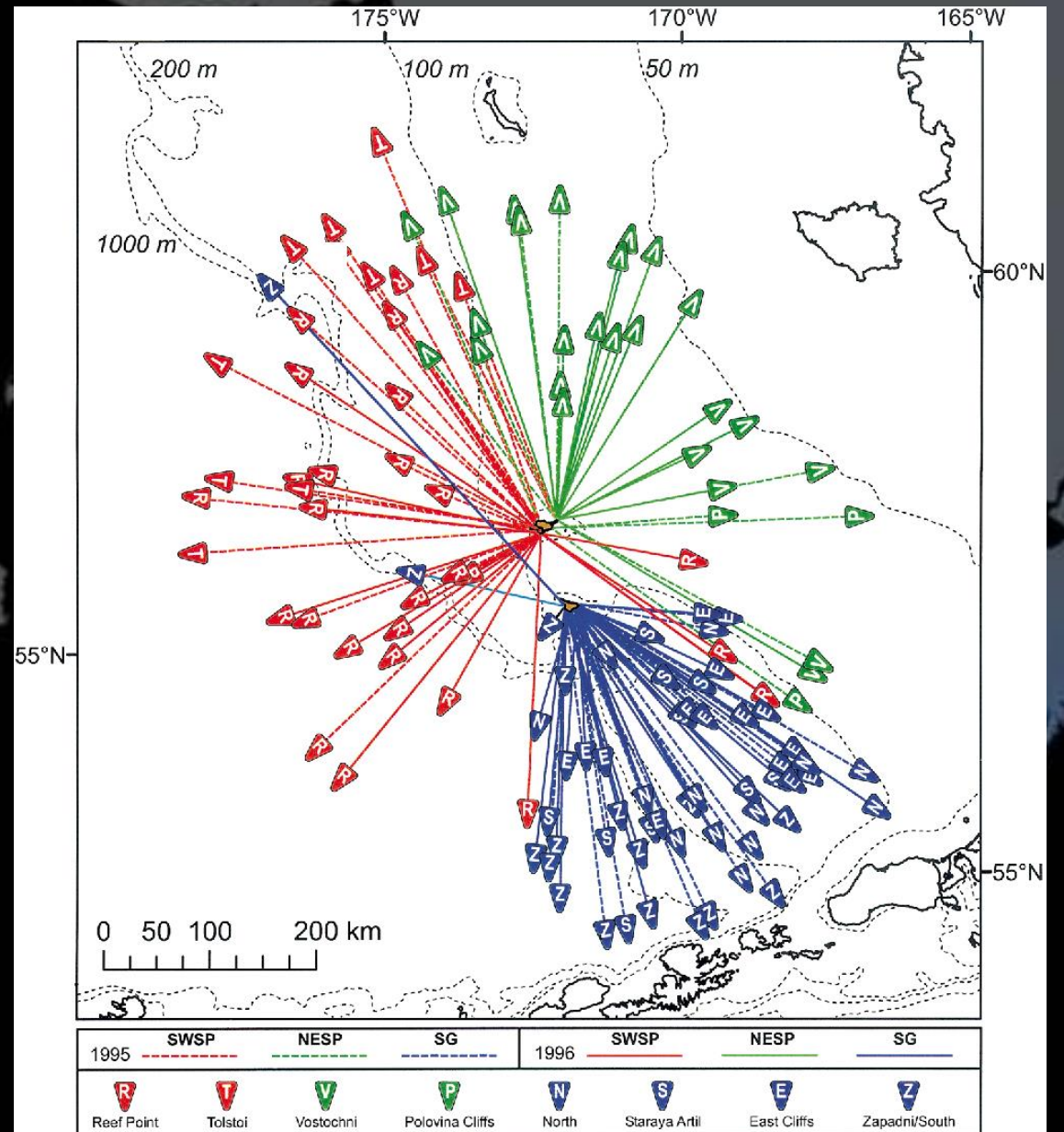
NFS Feeding

- NFS feed on a wide variety of fishes and squid
- Pollock dominates diet on the Pribilof Islands
- Diet of adult females varies among islands and rookery complexes

Prey	St. Paul Island	St. George Island
Walleye Pollock	70.0	40.0
Pacific Sand Lance	10.7	6.5
Northern Smoothtongue	1.6	3.0
Pacific sandfish	1.4	2.4
Atka mackerel	9.1	3.6
Deepsea smelt	1.8	3.8
Flounder	1.8	1.8
Bering wolffish	2.4	-
Salmon	4.2	7.7
Capelin	-	-
Pacific herring	2.0	1.2
Sculpin	0.2	1.8
Arctic Flounder	0.2	-
Scaly paperbone	-	-
Smelt	0.4	-
Eulachon	0.2	-
Greenling	-	-
Unidentified Fish	15.1	22.0
Squid	20.7	50.7

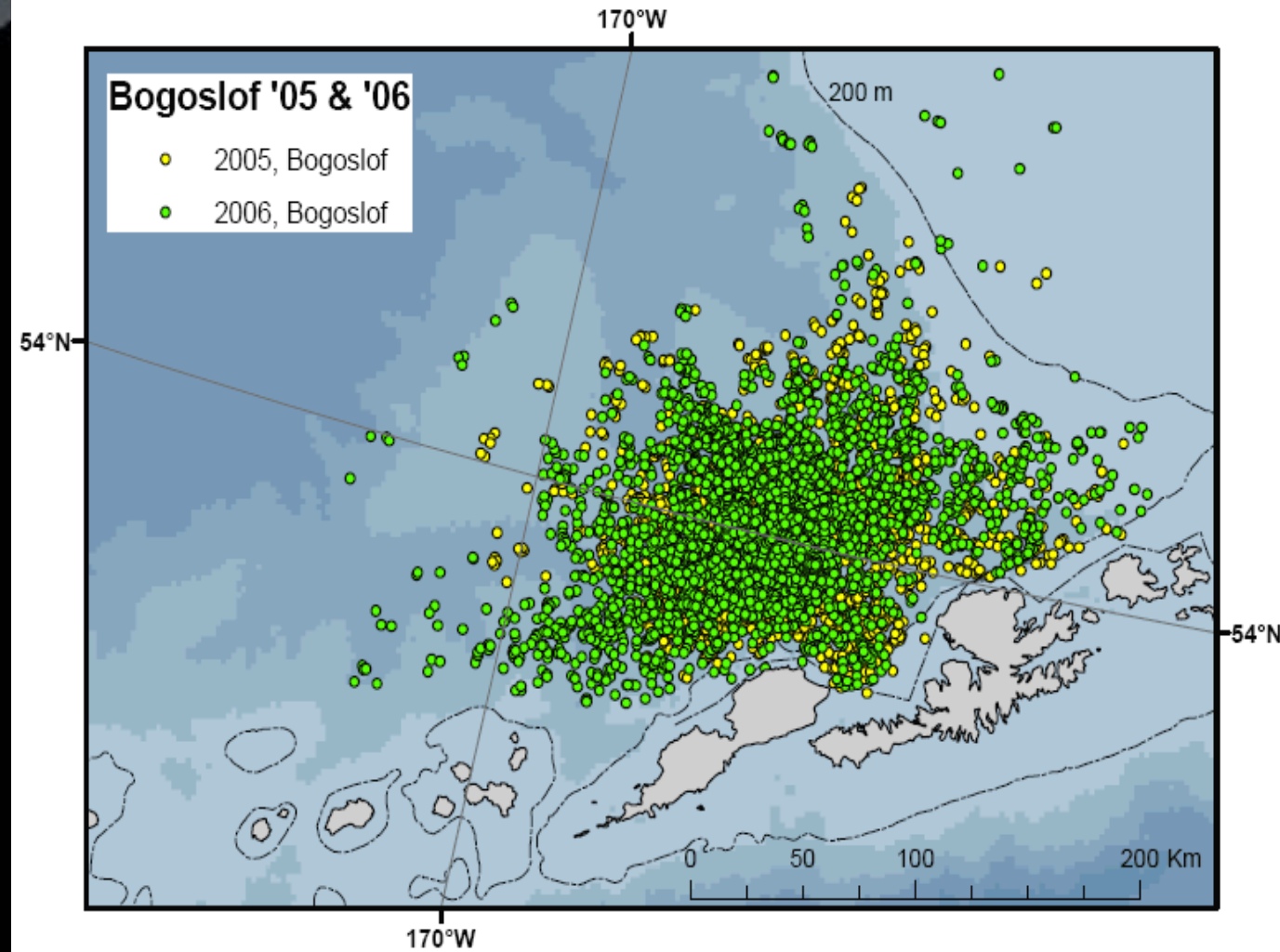
NFS Feeding

- NFS feed on a wide variety of fishes and squid
- Pollock dominates diet on the Pribilof Islands
- Diet of adult females varies among islands and rookery complexes
- Lactating females from St. Paul and St. George travel in different directions to forage



NFS Feeding

- NFS feed on a wide variety of fishes and squid
- Pollock dominates diet on the Pribilof Islands
- Diet of adult females varies among islands and rookery complexes
- Lactating females from St. Paul and St. George travel in different directions to forage
- Females from Bogoslof forage in deep water, close to the island



Current Research – Saildrones

- Concurrent study of NFS foraging trips and acoustic surveys for NFS prey



Current Research – Saildrones 2016-17

Concurrent study of NFS foraging trips
and acoustic surveys for NFS prey

In 2016 29 adult females tagged and
tracked from July – October

34,000 hours at sea

284,000 dives



Current Research – Saildrones 2016-17

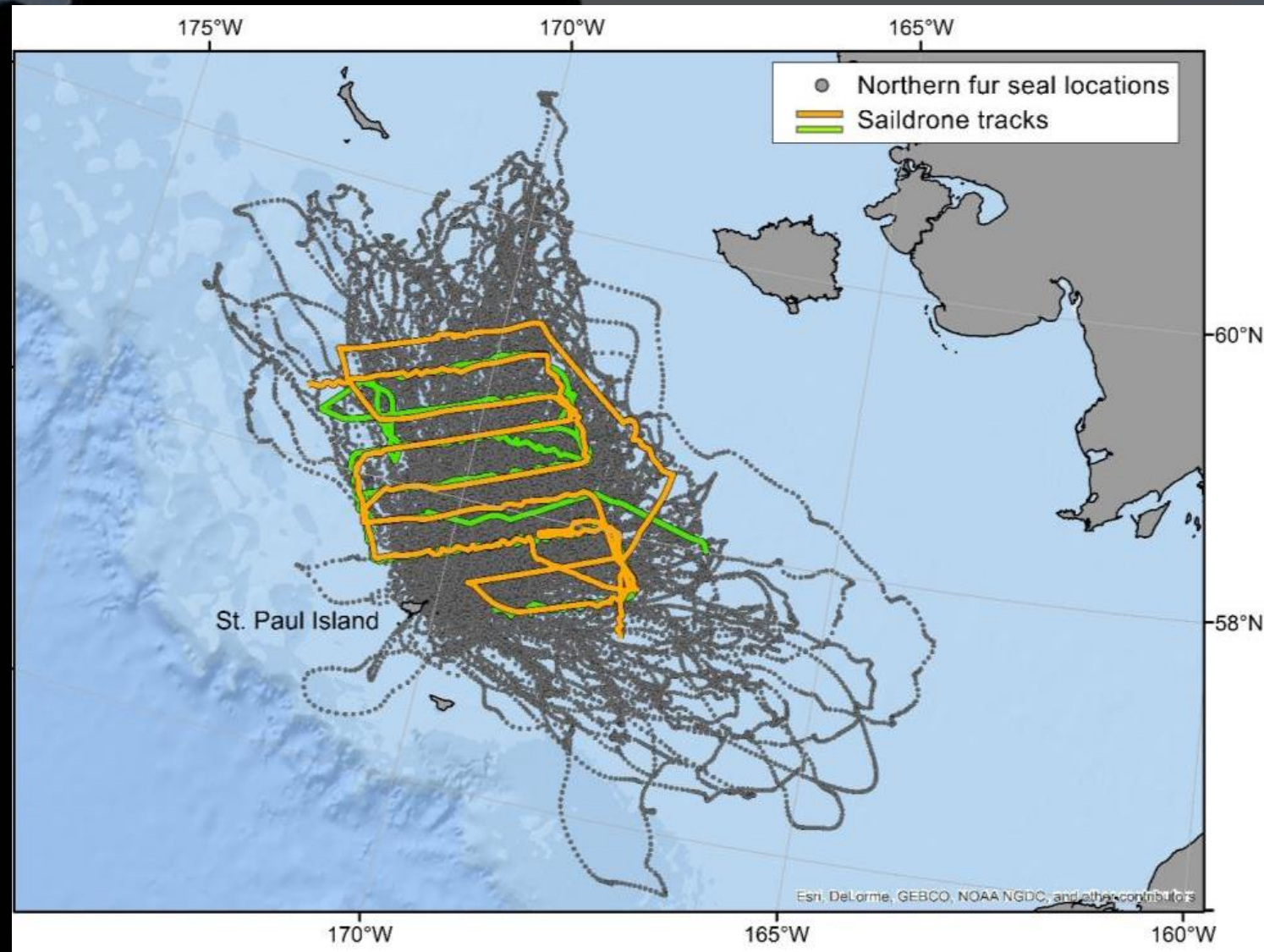
Concurrent study of NFS foraging trips
and acoustic surveys for NFS prey

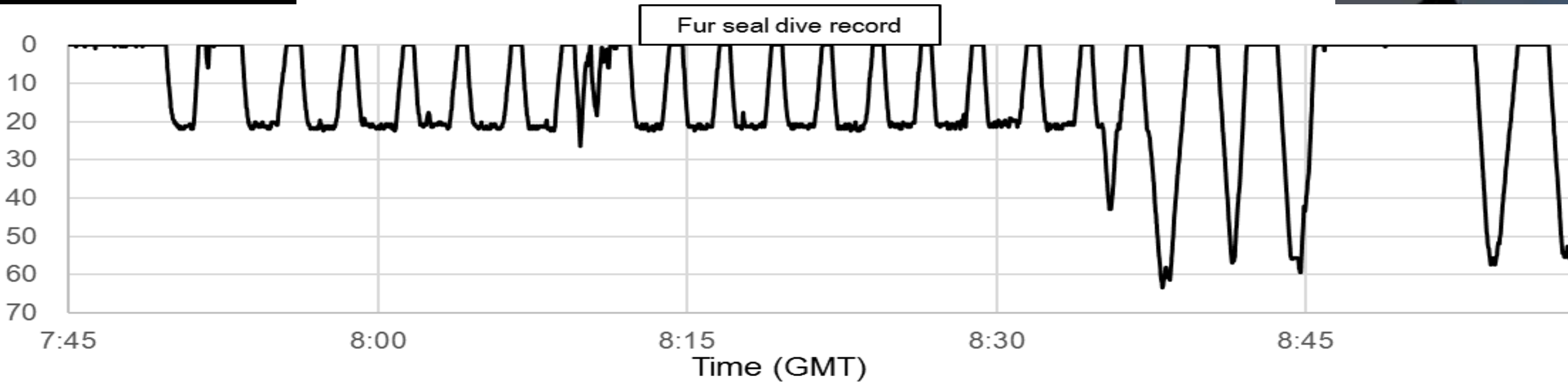
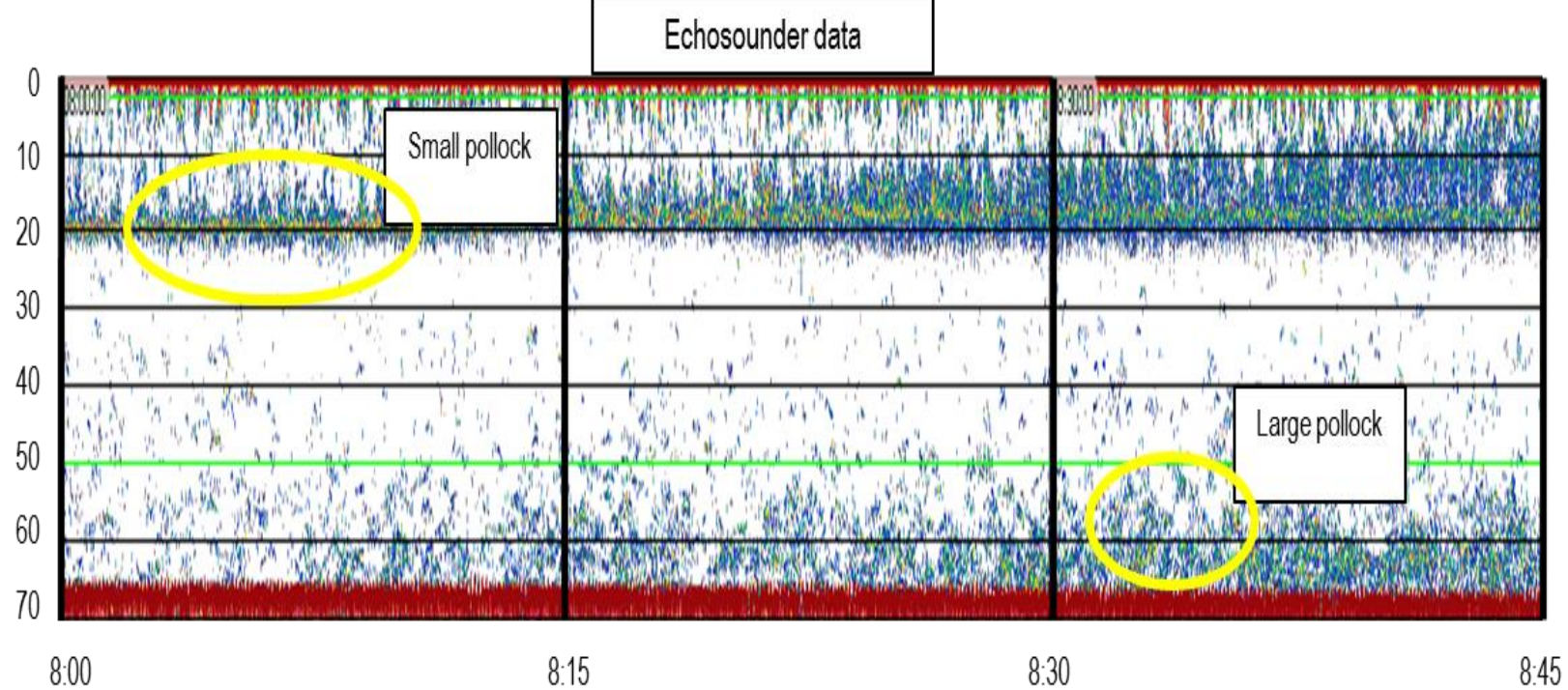
In 2016 29 adult females tagged and
tracked from July – October

34,000 hours at sea

284,000 dives

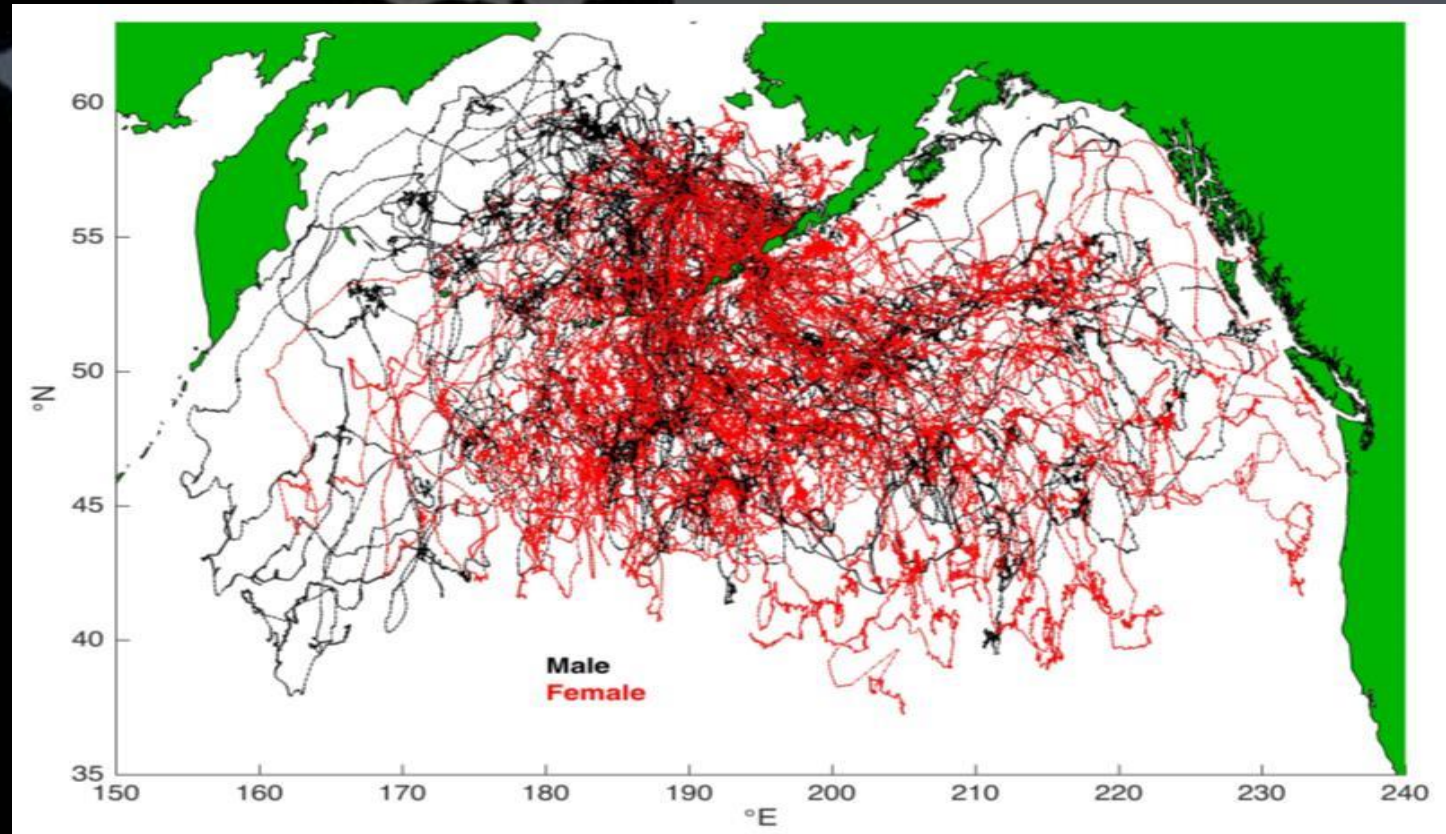
Overlay NFS locations and saildrone
track





Winter Movements

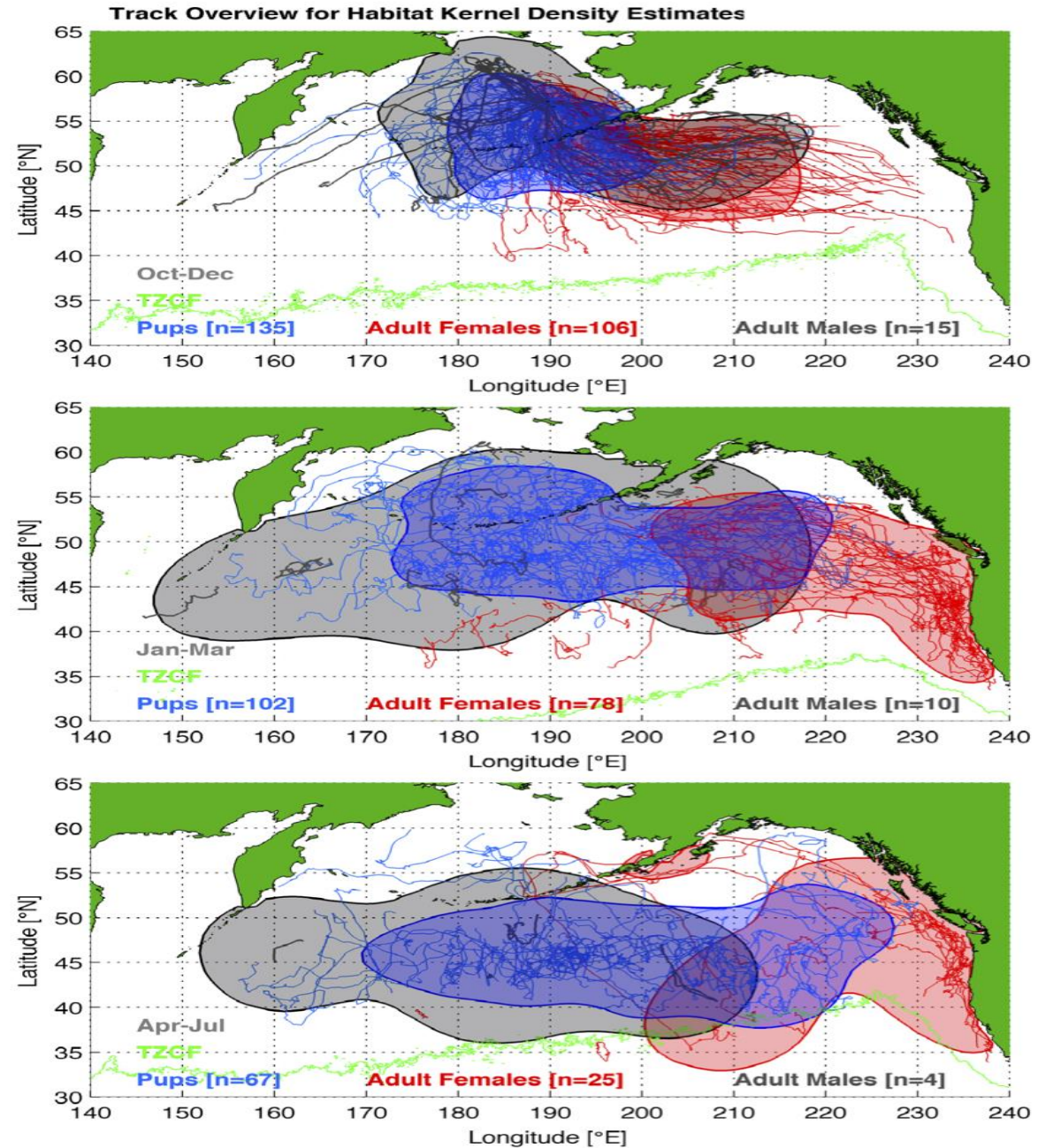
- Alaska population spends summer in the Bering Sea and migrates to the North Pacific in winter
- MML tagged five cohorts of pups to track winter movements
 - Dispersed widely throughout the North Pacific



Tracks of northern fur seal pups tagged in fall of 1996, 1997, 2005, 2006, and 2015.

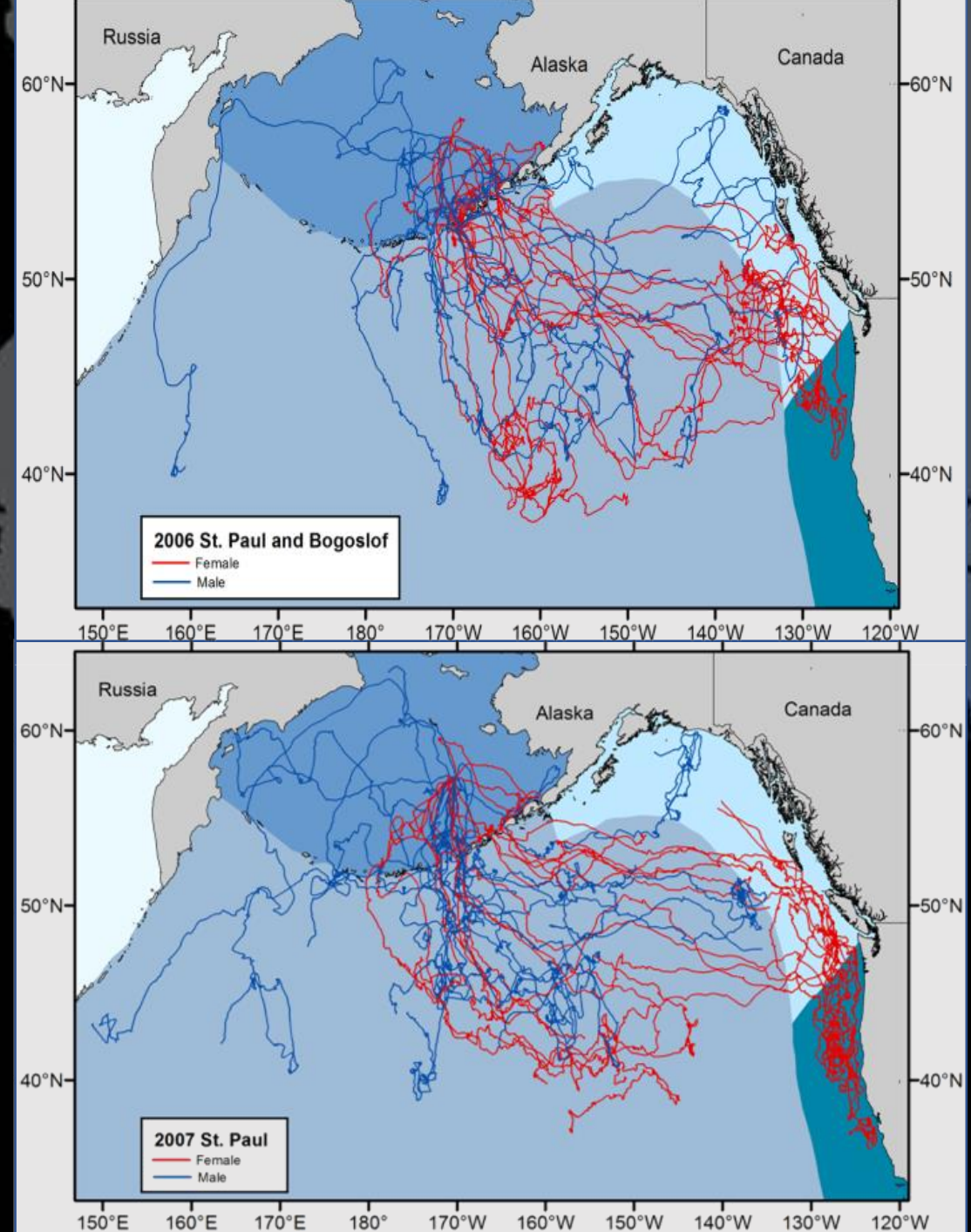
Winter Movements

- Alaska population spends summer in the Bering Sea and migrates to the North Pacific in winter
- MML tagged five cohorts of pups to track winter movements
 - Dispersed widely throughout the North Pacific
- Adults also distributed broadly through the North Pacific



Winter Movements

- Alaska population spends summer in the Bering Sea and migrates to the North Pacific in winter
- MML tagged five cohorts of pups to track winter movements
 - Dispersed widely throughout the North Pacific
- Adults also distributed broadly through the North Pacific
- Juvenile fur seals tagged on St. Paul and Bogoslof in 2006 and St. Paul in 2007 showed little difference in winter distribution
- Winter foraging may be related to oceanographic features (eddies, etc.) that optimize foraging



Vital Rates – Survival and Reproduction

- More than 15,000 adult females, juveniles, and pups have been tagged since 2007
- Thousands of hours of resighting effort
- Survival to age 4 ~18-21 percent
- Survival adult females ~76-84%
- Estimates are capable of driving a decline of 5-9%
- Decline during the time was slower than predicted



Vital Rates – Survival and Reproduction

- More than 15,000 adult females, juveniles, and pups have been tagged since 2007
- Thousands of hours of resighting effort
- Survival to age 4 ~18-21 percent
- Survival adult females ~76-84%
- Estimates are capable of driving a decline of 5-9%
- Decline during the time was slower than predicted
- Pregnancy rates from 2005 – 2008 were as high or higher than rates found in the 1960s
- Resighting data confirm pupping rates are near historical and contemporary pregnancy rates
- Females typically have their first pup by age 5



Vital Rates – Mortality

- Northern fur seals are taken infrequently in commercial fisheries in Alaska
- 2010-2014 northern fur seals were taken in
 - BSAI Flatfish trawl
 - BSAI pollock trawl
 - BSAI Pacific cod longline
- Estimated mean annual mortality is 1.1 seals/year
- Northern fur seals are regularly entangled in marine debris
 - Studies from the Pribilofs estimate juvenile male entanglement rate between 0.15 and 0.38% on St. Paul and 0.06 and 0.08% on St. George
- Estimates from mortality and serious injury are well below Potential Biological Removal of 11,405



Alaska Native Subsistence

- Alaska Natives on the Pribilof Islands are authorized an annual subsistence harvest
- Based on subsistence needs
- Typically juvenile males are taken
- YOY harvest authorized on St. George in 2014
 - Draft EIS for St. Paul harvest regs completed in Jan 2017
- Total annual subsistence harvest is well below PBR

Year	St. Paul Island	St. George Island	Total harvest
2013	301	80	381
2014	266	158	424
2015	314	118	432
2016	309	83	392
2017	N/A	38**	N/A
Mean annual take			407

* Ten females were killed accidentally during 2013-2017
** Does not include the pup harvest which begins on September 17, 2017.

Conservation and Management

- Northern fur seals are not listed under the US ESA
- Northern fur seals are listed as “Depleted” under MMPA
- Conservation Plan for the Eastern Pacific Population of Northern Fur Seals
- Plan implemented a place-based research and monitoring program
- Plan called for Federal, Tribal, State, international, and private organizations to work together to coordinate research, management, and recovery
- Co-management agreements between NMFS and Tribal Governments on St. Paul and St. George since 2000



Conservation and Management

- Conservation Plan identified objectives to restore and maintain Eastern Pacific Stock at OSP
- Called for research that can be compared with historical data to compare ecological parameters
- Conservation Plan included Conservation Action Outline (Appendix 1) that included actions designed to meet conservation objectives
- Council and commercial fisheries have been actively engaged in Conservation Action 1.2
Improve assessments of incidental take of fur seals in commercial fishing operations
and 2.7.4
Quantify relationships between fur seals, fisheries, and fish resources

CONSERVATION PLAN

for the

EASTERN PACIFIC STOCK OF NORTHERN FUR SEAL (*Callorhinus ursinus*)

December 2007



U.S. Department of Commerce
National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE
Protected Resources Division, Alaska Region

Conservation and Management

- Conservation Plan is intended to be dynamic
- Recommended review and revised periodically
 - Assess success of actions
 - Prioritize new actions, as needed
- Last update in 2007
- Many conservation actions have been and continue to be implemented by NMFS
- Many conservation actions remain relevant

CONSERVATION PLAN

for the

EASTERN PACIFIC STOCK OF NORTHERN FUR SEAL (*Callorhinus ursinus*)

December 2007



U.S. Department of Commerce
National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE
Protected Resources Division, Alaska Region

Conclusions

- Eastern Pacific stock of northern fur seals was impacted by large-scale commercial harvests from 1742 – 1984
- At least three major population declines
- Since the early 1990s the Pribilof Islands population has declined dramatically
- Population decline continues on St. Paul Island, may have stopped on St. George
- Research continues to understand the decline and recover the species
- Unangan people of the Pribilof Islands rely on northern fur seals for subsistence needs – great concern about decline
- Much more work is necessary

