Fish Ecology – Baseline for Assessing Effects of Climate Change on Fishes

Brenda L. Norcross, Brenda A. Holladay and Christine Gleason

School of Fisheries and Ocean Sciences
University of Alaska Fairbanks

RUSALCA PI Meeting – Miami, FL – March 2012

UAF UNIVERSITY OF ALASKA FAIRBANKS

RUSALCA

Objectives

- Combine our fish collections 2004 – 2009
- Document the distribution of fish species
- Determine small demersal fish assemblages (species composition)
- Determine temporal distribution of juvenile demersal fish from trace elements in otoliths

Collection methods

Ichthyoplankton data from RUSALCA biological cruises in 2004 & 2009
505µm mesh, paired bongo net

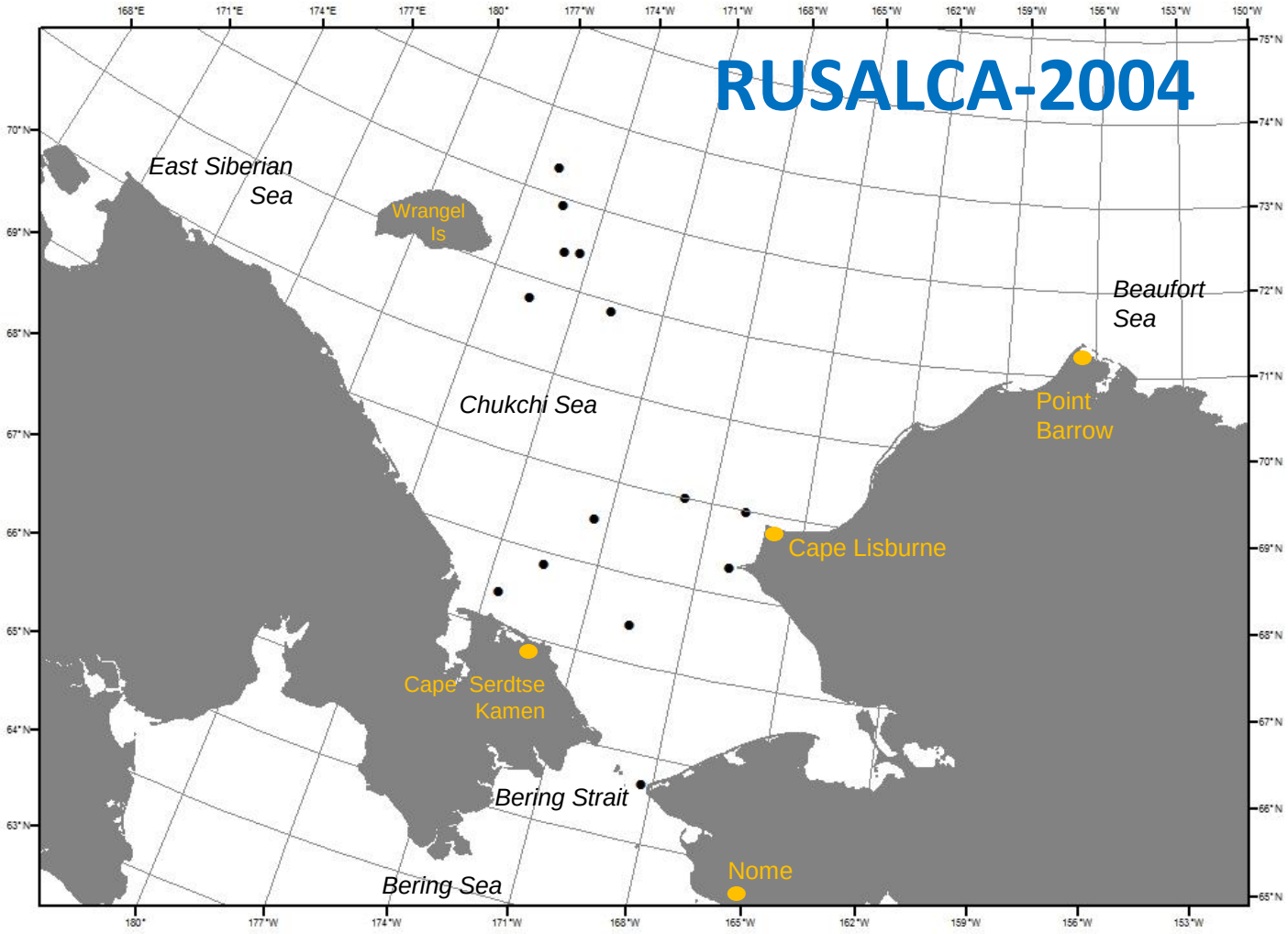
Early life stages of fish

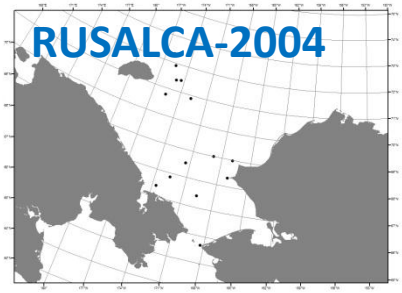
Demersal fish data from 7 cruises
n = 164 stations during 2004 – 2009
Plumb staff beam trawl – 4 mm codend liner, 3 m beam

Fish abundance estimated for area towed from quantitative hauls, where net was not overfull or damaged.

Epibenthos from these nets used by Iken and Bluhm

Fish collections





Oshoro-Maru 2007 & 2008

East Siberian Sea

Wrangel Is

Chukchi Sea

Beaufort Sea

Point Barrow

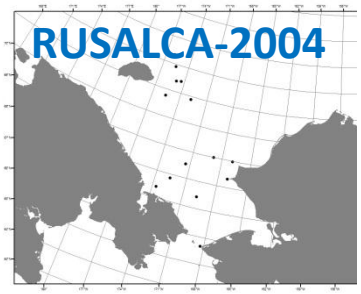
Cape Lisburne

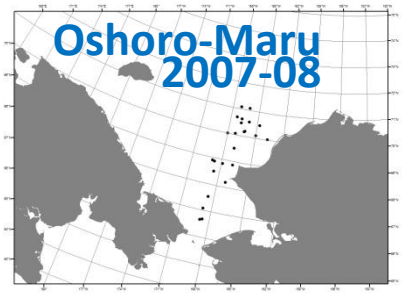
Cape Serdtse Kamen

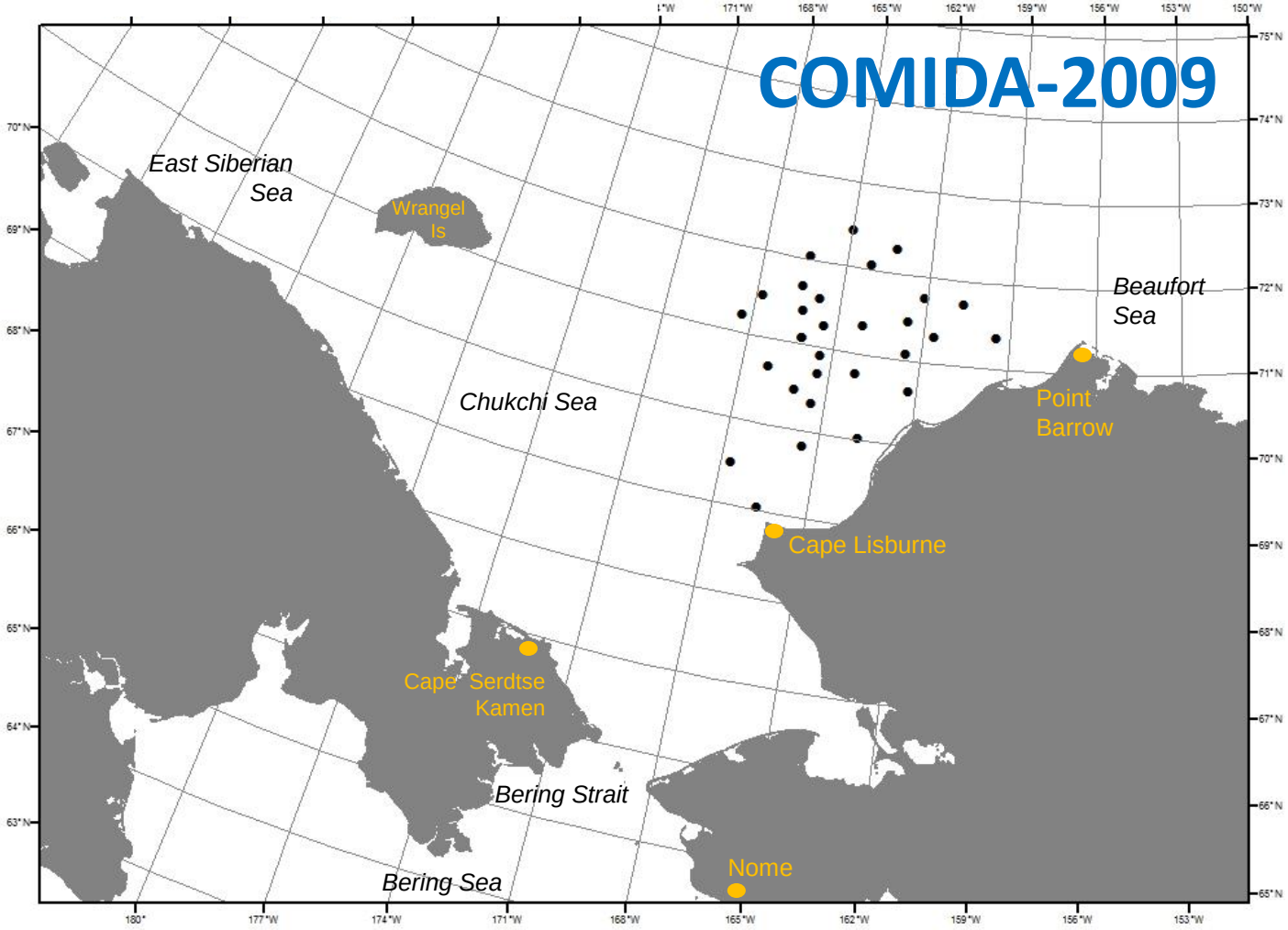
Bering Strait

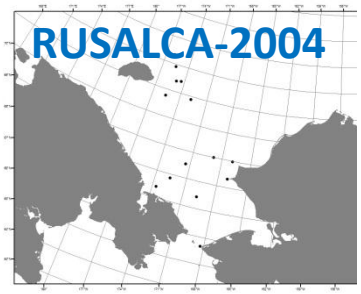
Bering Sea

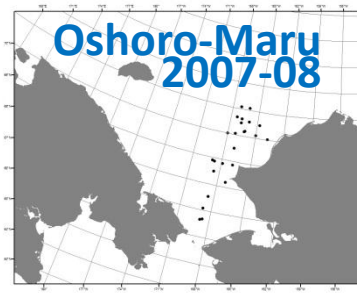
Nome

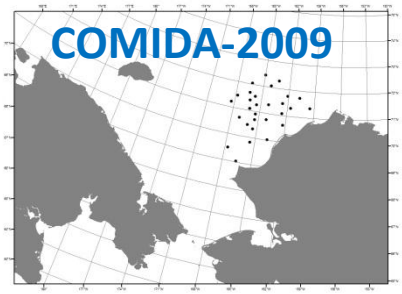

RUSALCA-2004

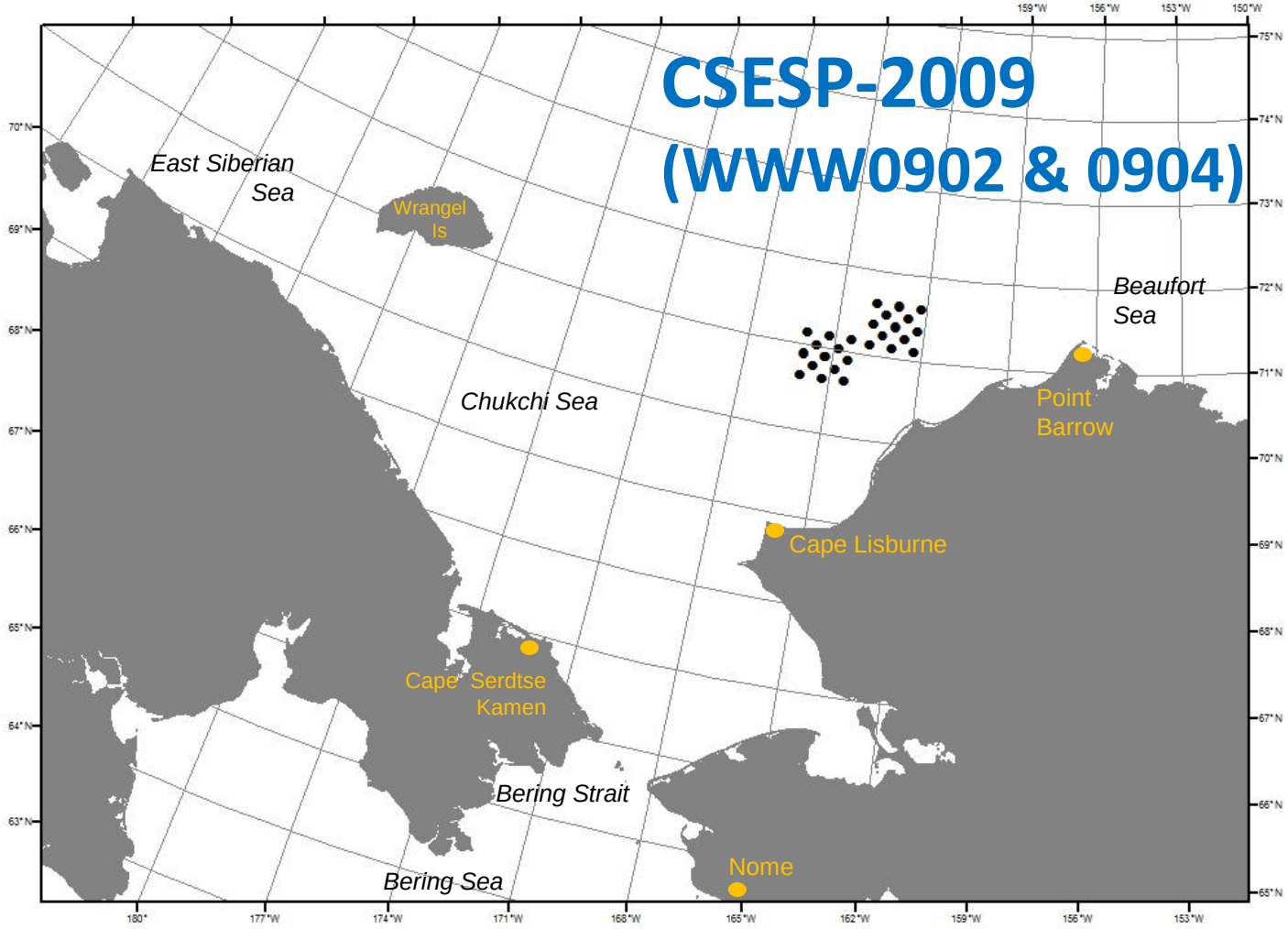

Oshoro-Maru
2007-08

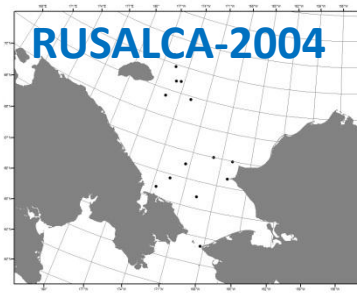

COMIDA-2009
East Siberian Sea
Wrangel Is
Chukchi Sea
Beaufort Sea
Point Barrow
Cape Lisburne
Cape Serdtse Kamen
Bering Strait
Bering Sea
Nome

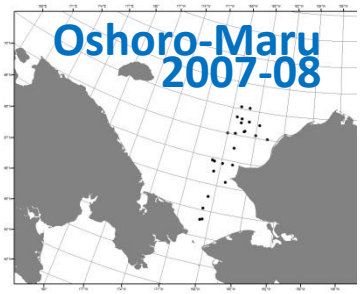

RUSALCA-2004

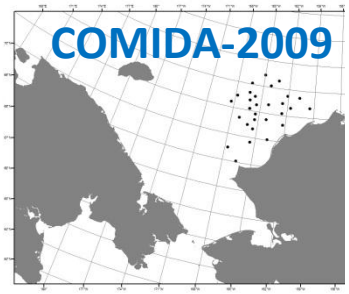

Oshoro-Maru
2007-08

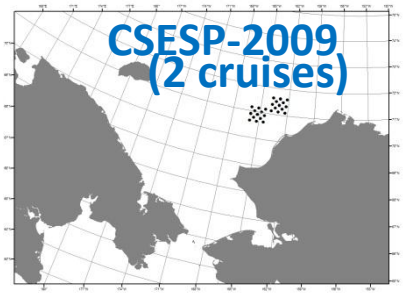

COMIDA-2009

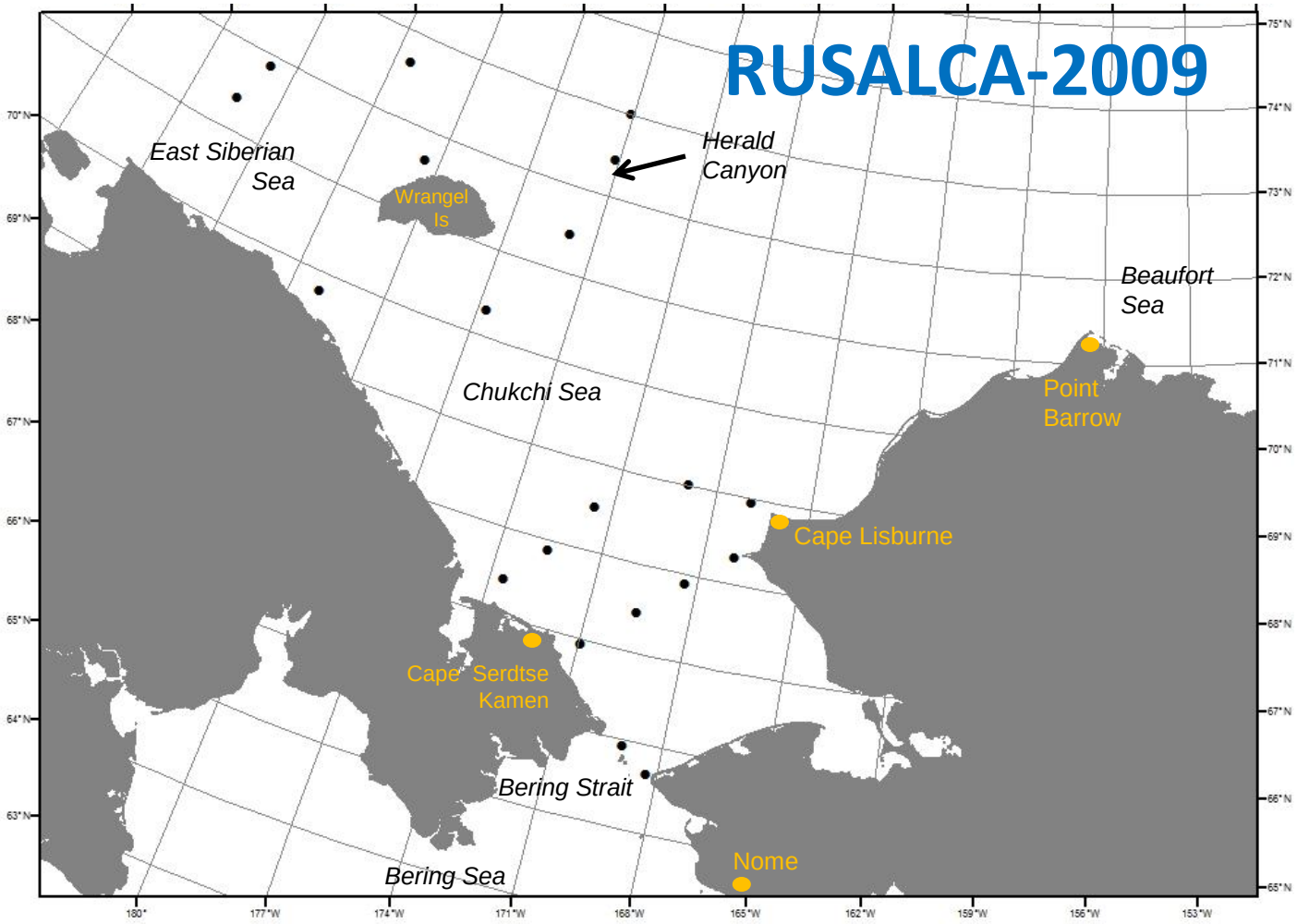

CSESP-2009
(WWW0902 & 0904)
East Siberian Sea
Wrangel Is
Chukchi Sea
Beaufort Sea
Point Barrow
Cape Lisburne
Cape Serdtse Kamen
Bering Strait
Bering Sea
Nome
159°W
156°W
153°W
150°W
75°N
74°N
73°N
72°N
71°N
70°N
69°N
68°N
67°N
66°N
65°N
70°N
69°N
68°N
67°N
66°N
65°N
64°N
63°N
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W

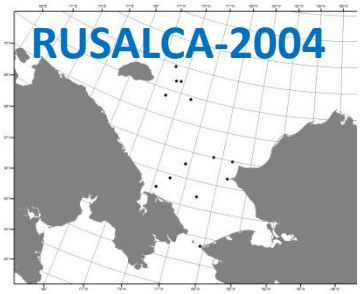

RUSALCA-2004

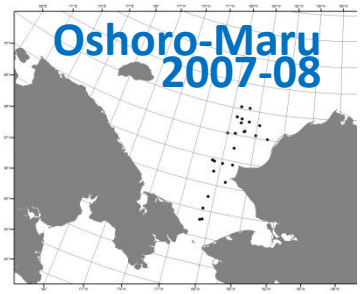

Oshoro-Maru
2007-08

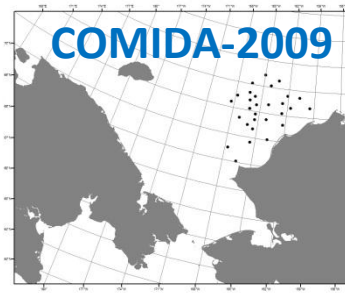

COMIDA-2009

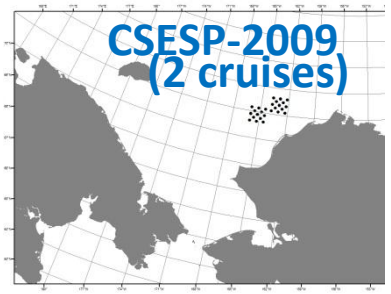

CSESP-2009
(2 cruises)

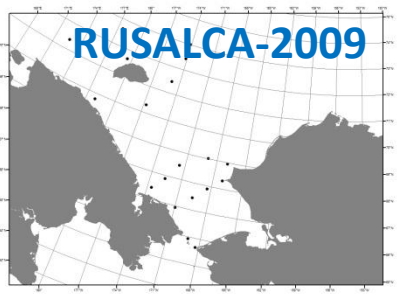

RUSALCA-2009
East Siberian Sea
Herald Canyon
Wrangel Is
Beaufort Sea
Chukchi Sea
Point Barrow
Cape Lisburne
Cape Serdtse Kamen
Bering Strait
Nome
Bering Sea
70°N
69°N
68°N
67°N
66°N
65°N
64°N
63°N
75°N
74°N
73°N
72°N
71°N
70°N
69°N
68°N
67°N
66°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W

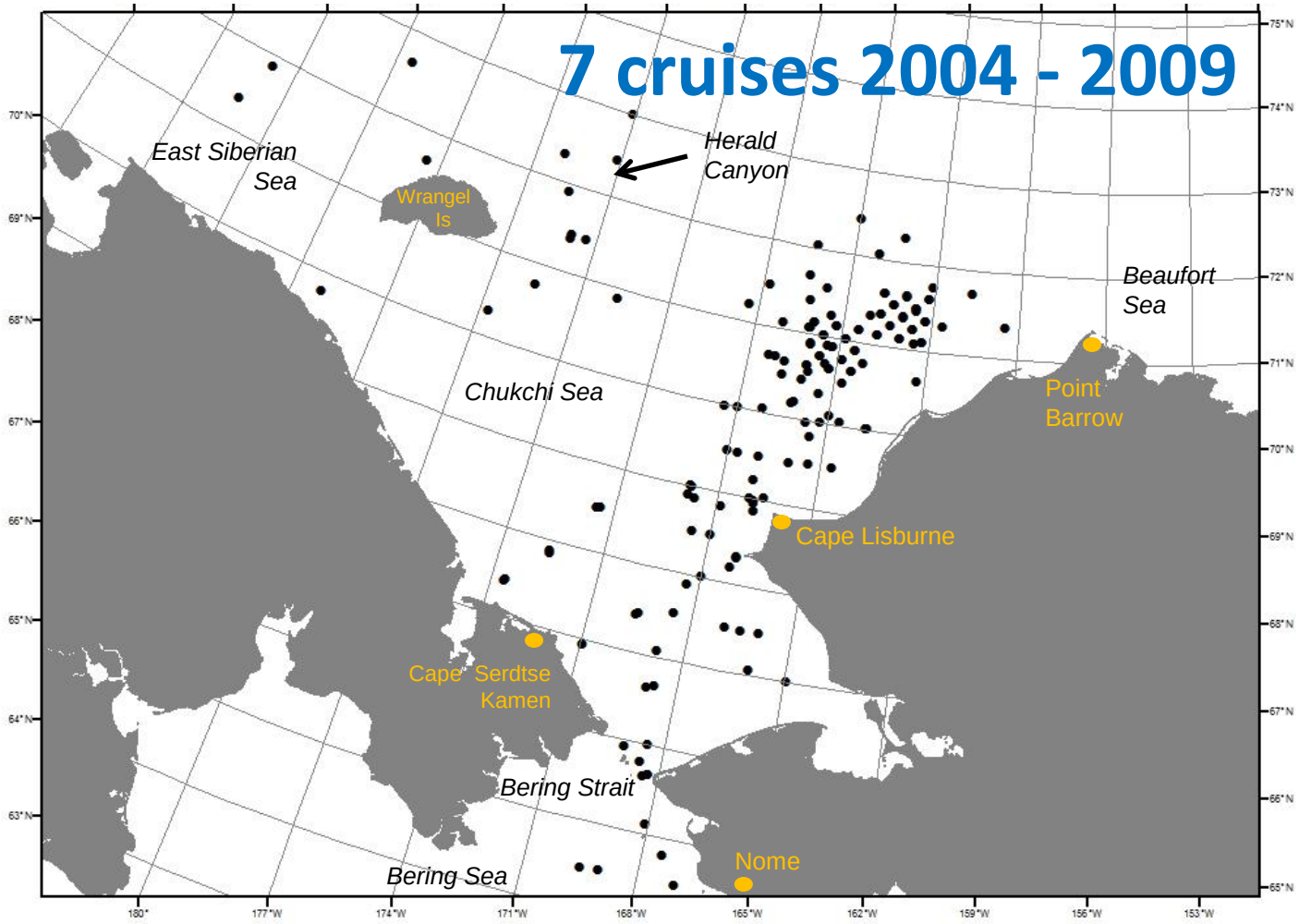

RUSALCA-2004


Oshoro-Maru
2007-08


COMIDA-2009


CSESP-2009
(2 cruises)


RUSALCA-2009


7 cruises 2004 - 2009
East Siberian Sea
Herald Canyon
Wrangel Is
Beaufort Sea
Chukchi Sea
Point Barrow
Cape Lisburne
Cape Serdtse Kamen
Bering Strait
Nome
Bering Sea
70°N
69°N
68°N
67°N
66°N
65°N
64°N
63°N
75°N
74°N
73°N
72°N
71°N
70°N
69°N
68°N
67°N
66°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W

Methods

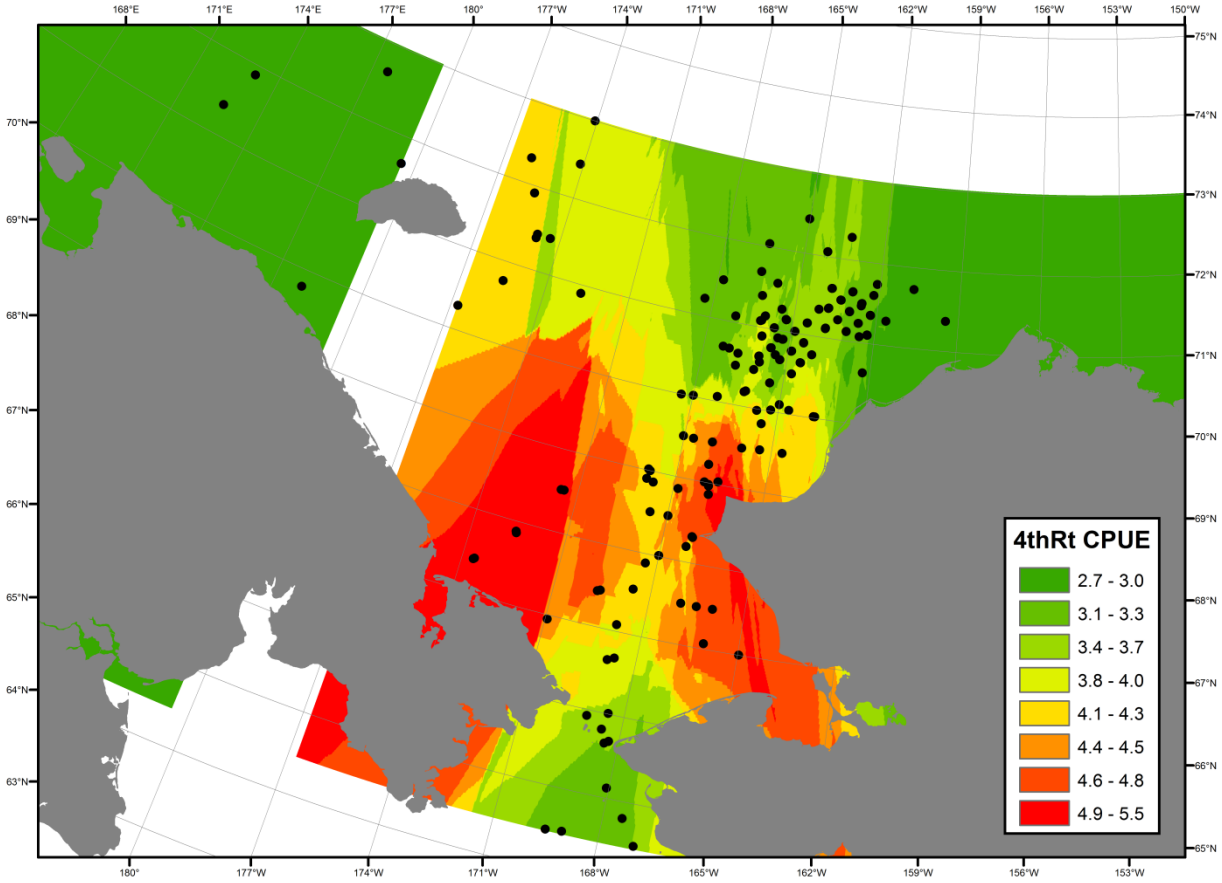
- 7 cruises combined
- Abundant species
- CPUE = count of individuals per 1000 m^2 (4^{th} root)
- Lengths from specimens processed in lab, not all fish collected
- Cluster analysis for fish communities

Demersal fish abundance – over all species

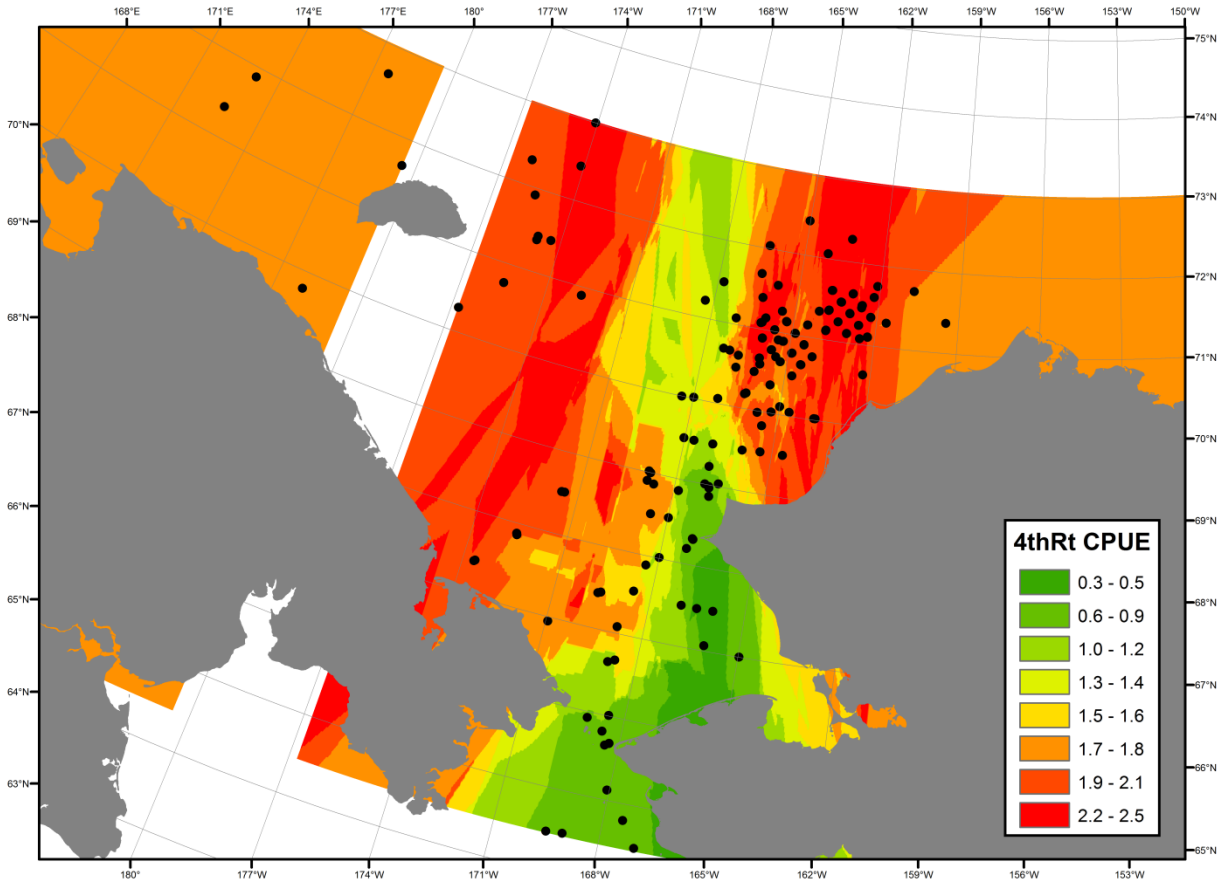
High on both sides of southern Chukchi Sea

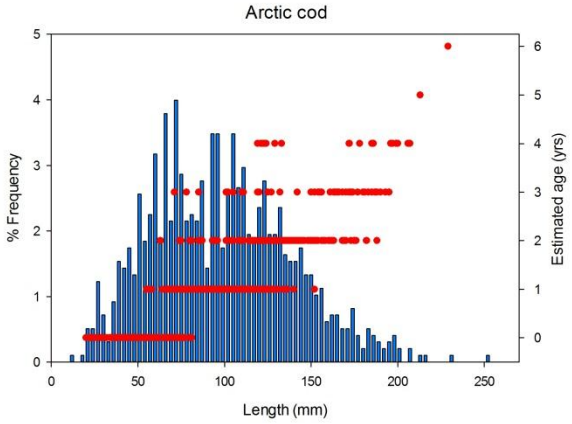
Low in Bering Strait and northern areas

Higher in the northwestern Chukchi Sea than the northeastern Chukchi Sea

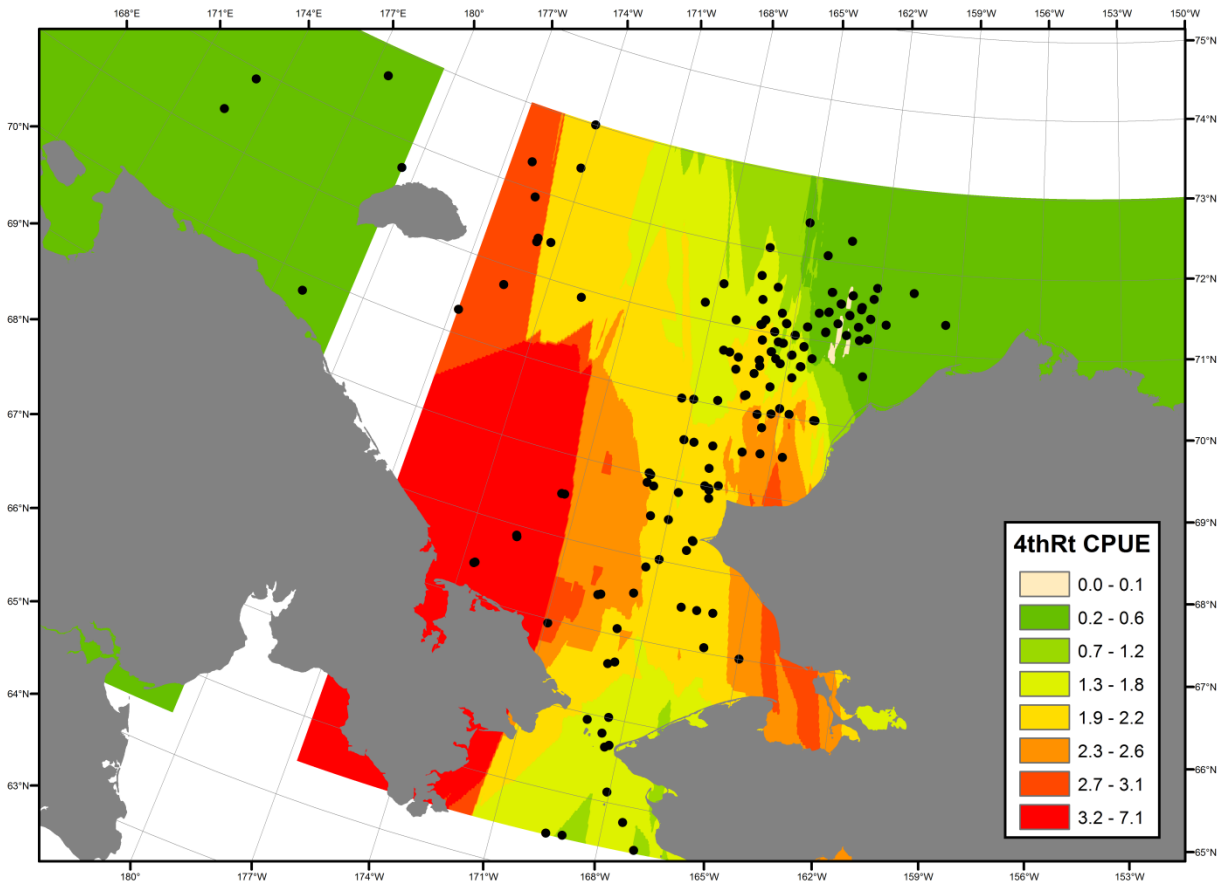


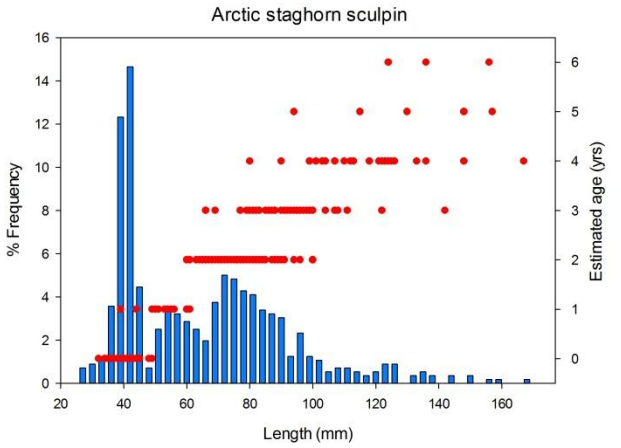
Arctic cod - *Boreogadus saida*



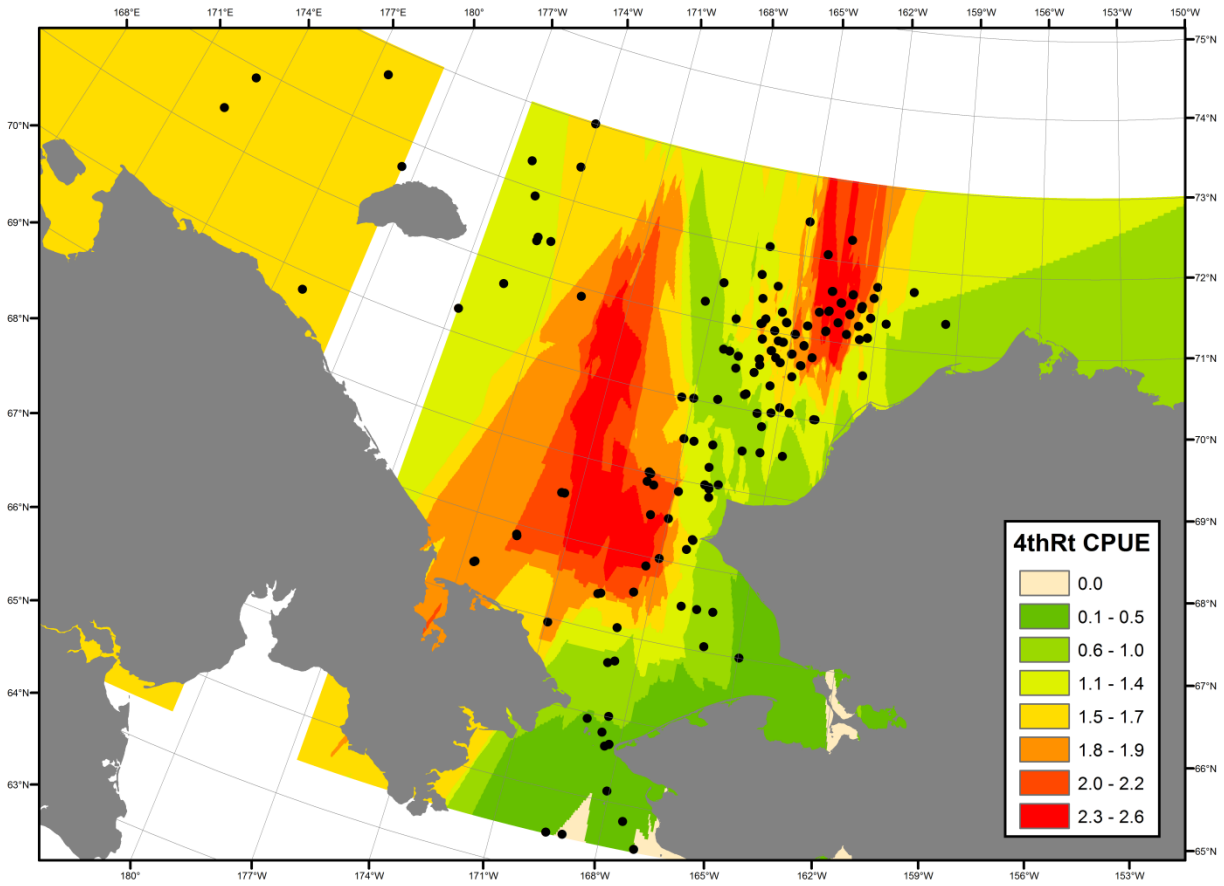


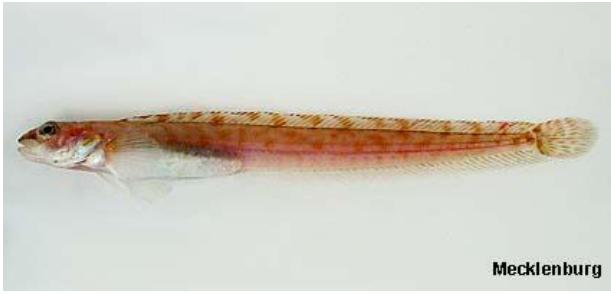
Arctic staghorn sculpin – *Gymnocanthus tricuspis*

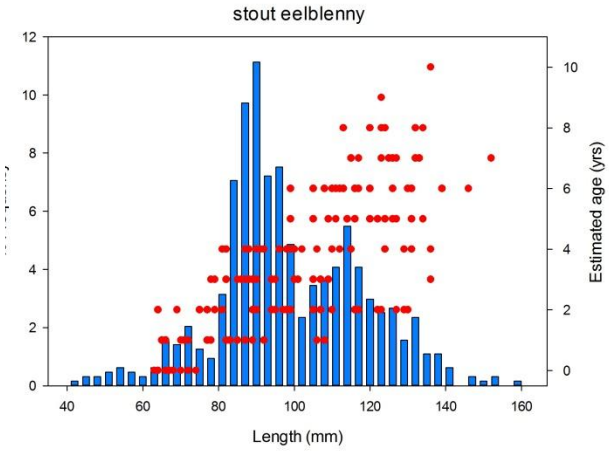




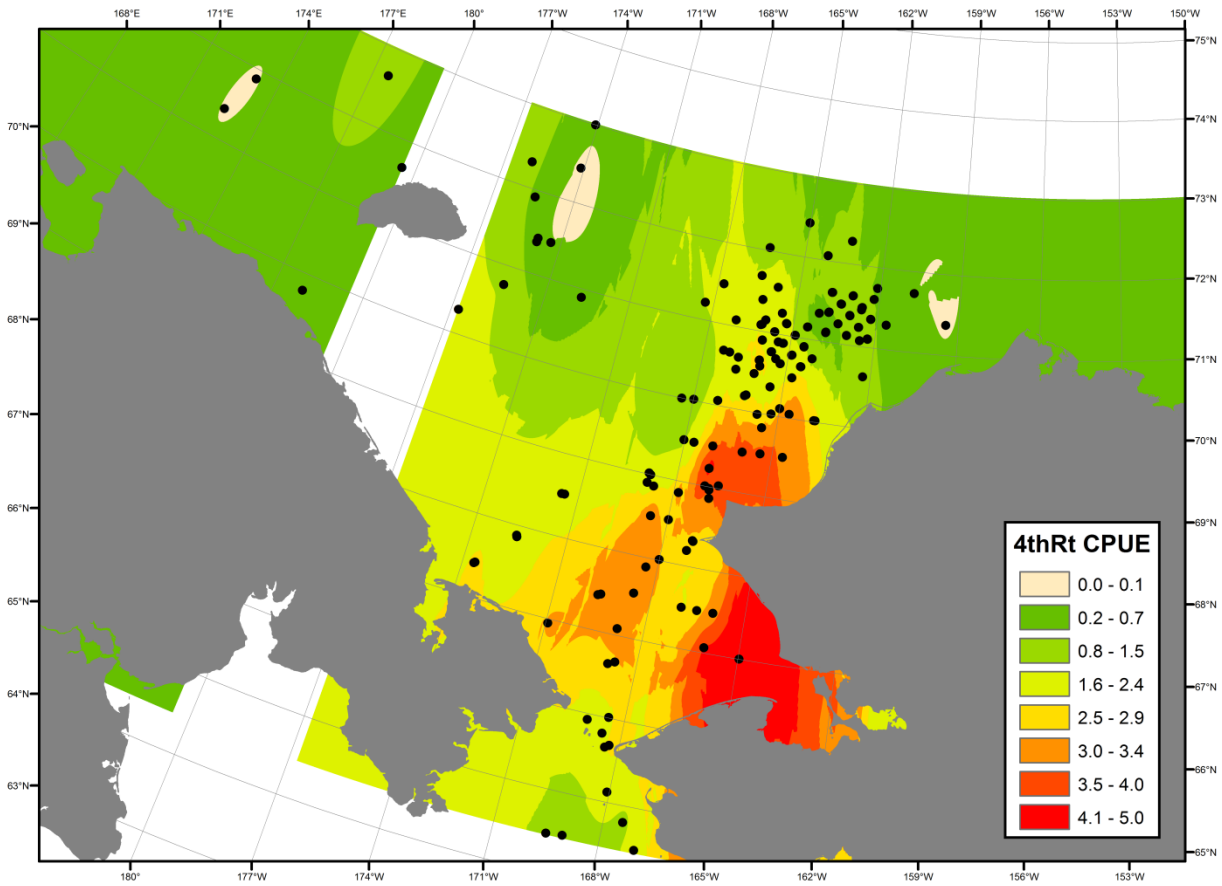
Stout eelblenny – *Anisarchus medius*

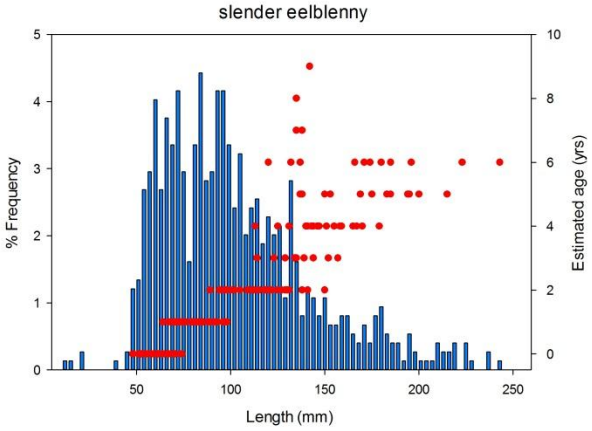




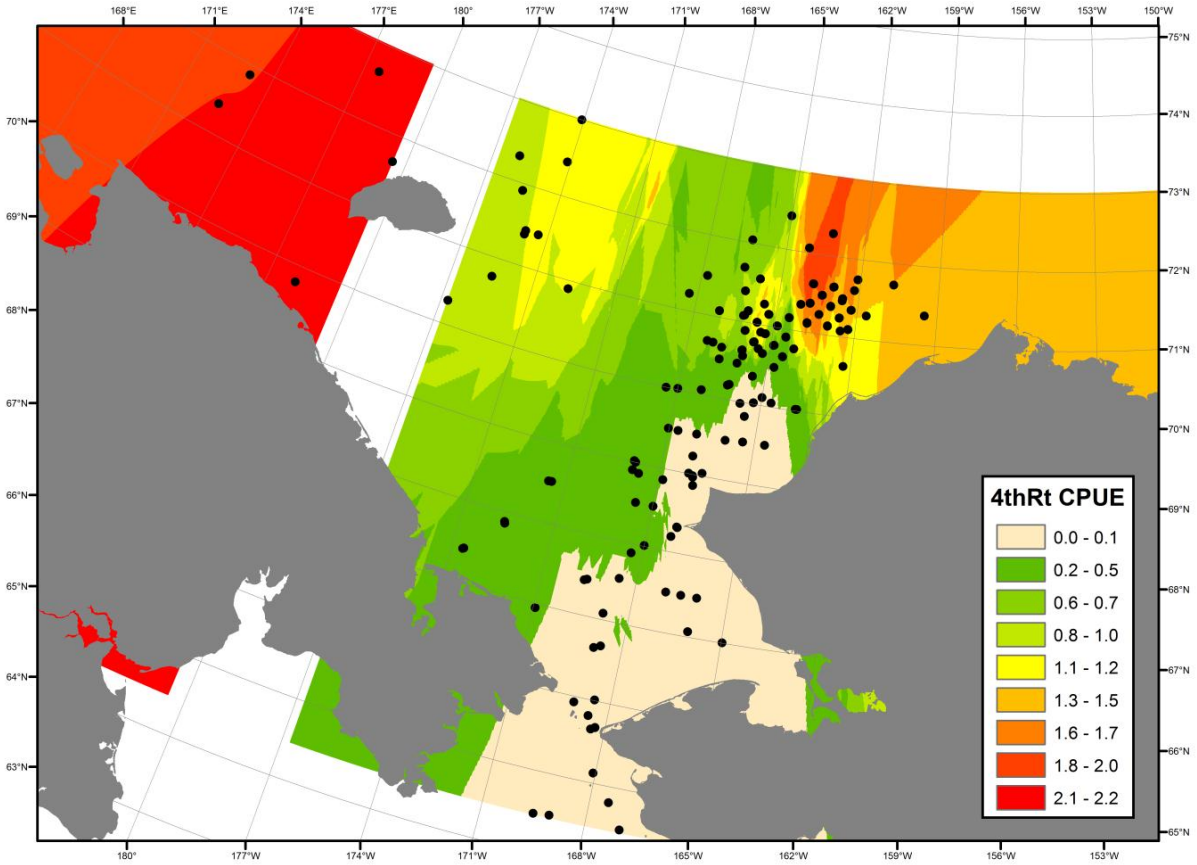


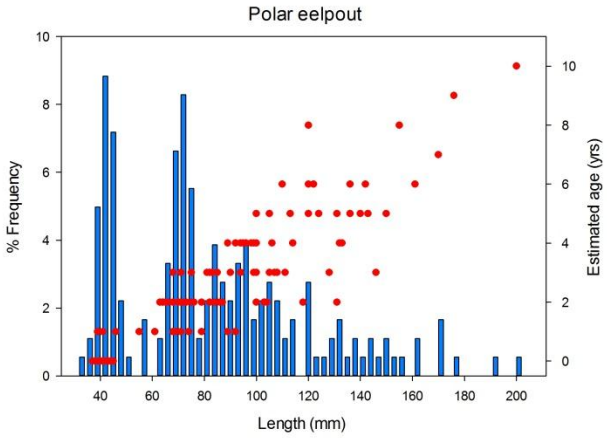
Slender eelblenny – *Lumpenus fabricii*



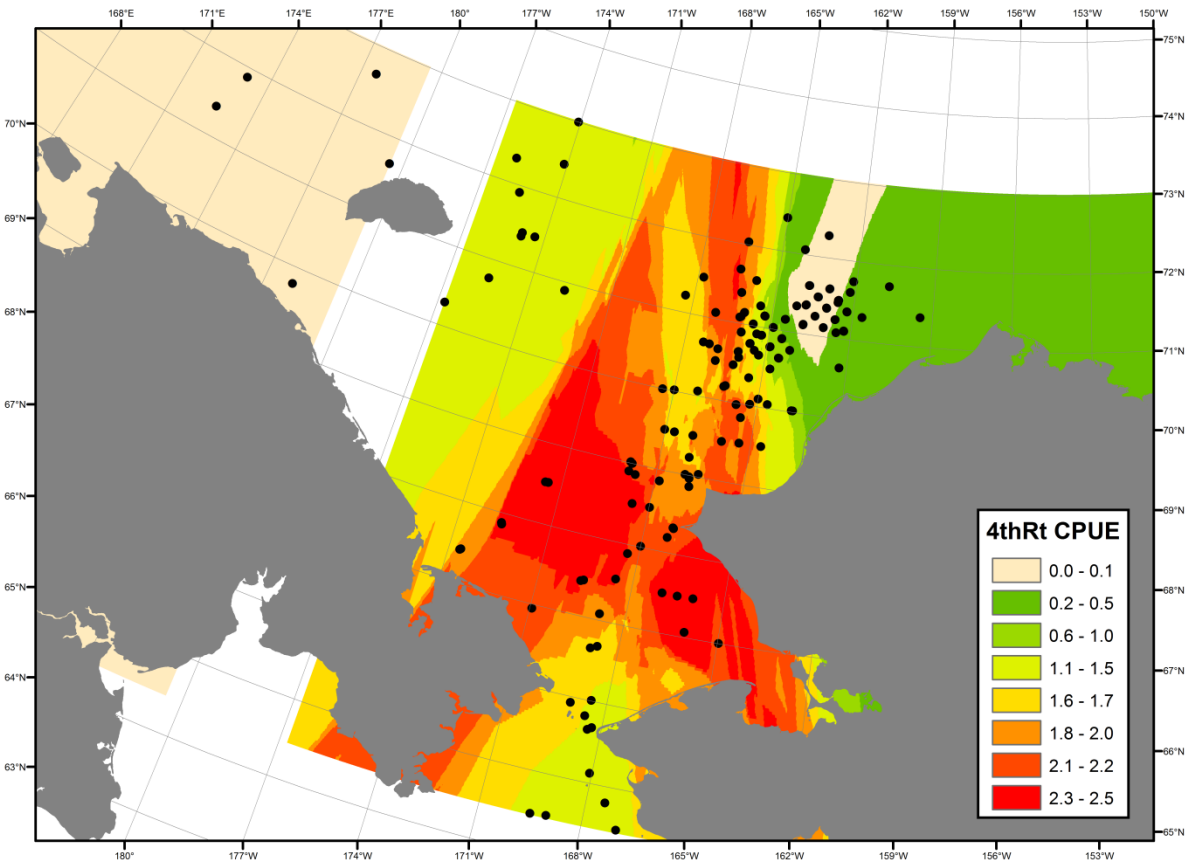


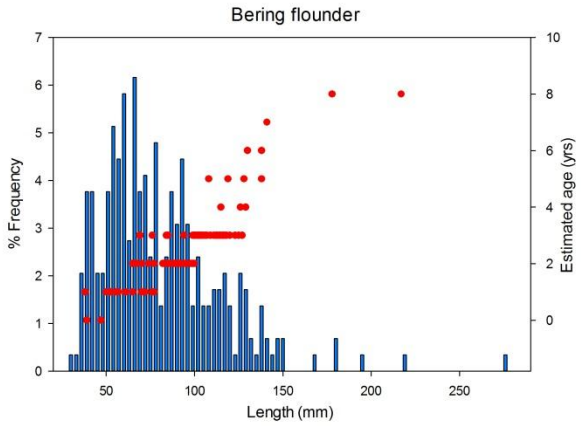
Polar eelpout – *Lycodes polaris*

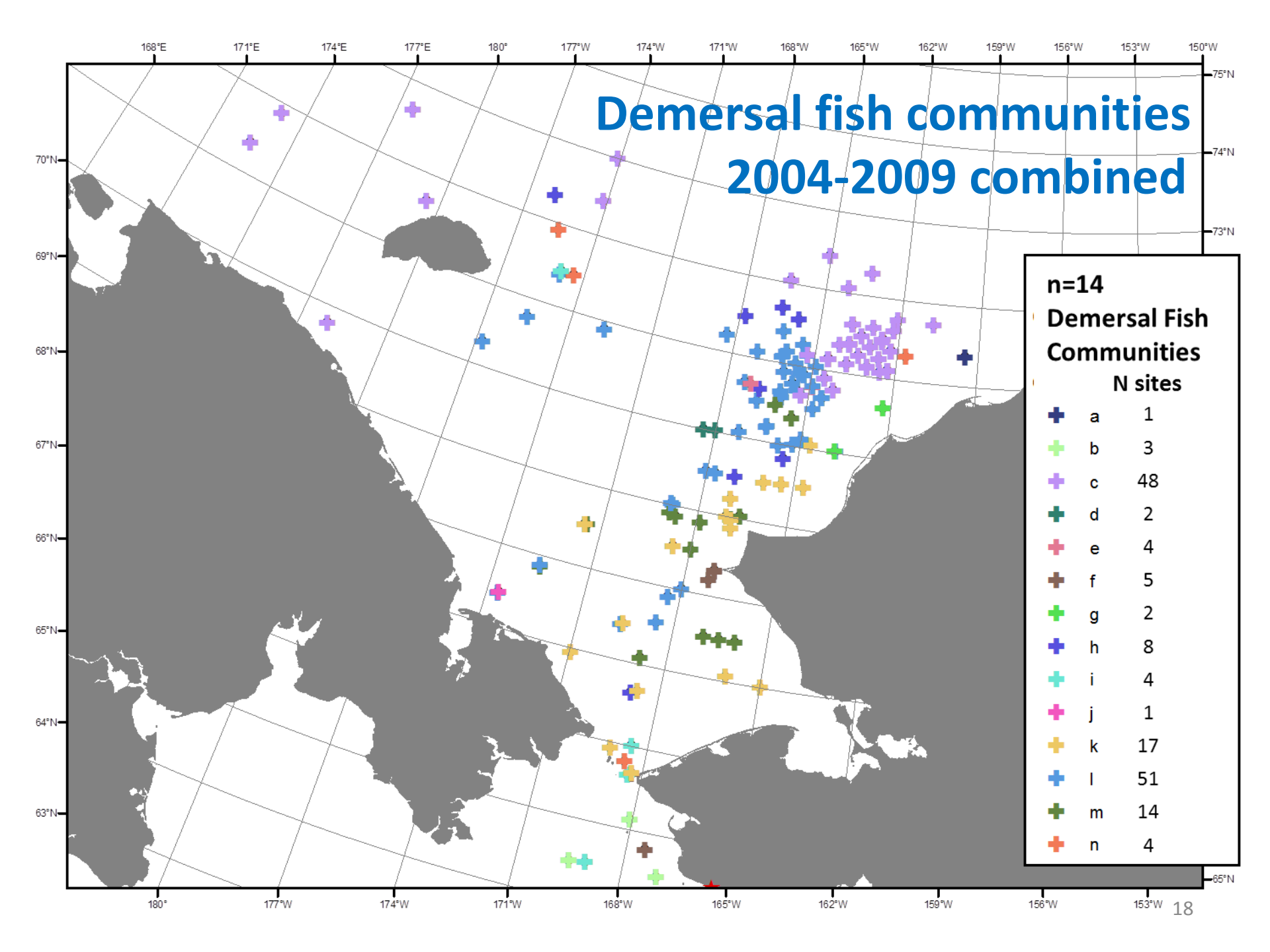


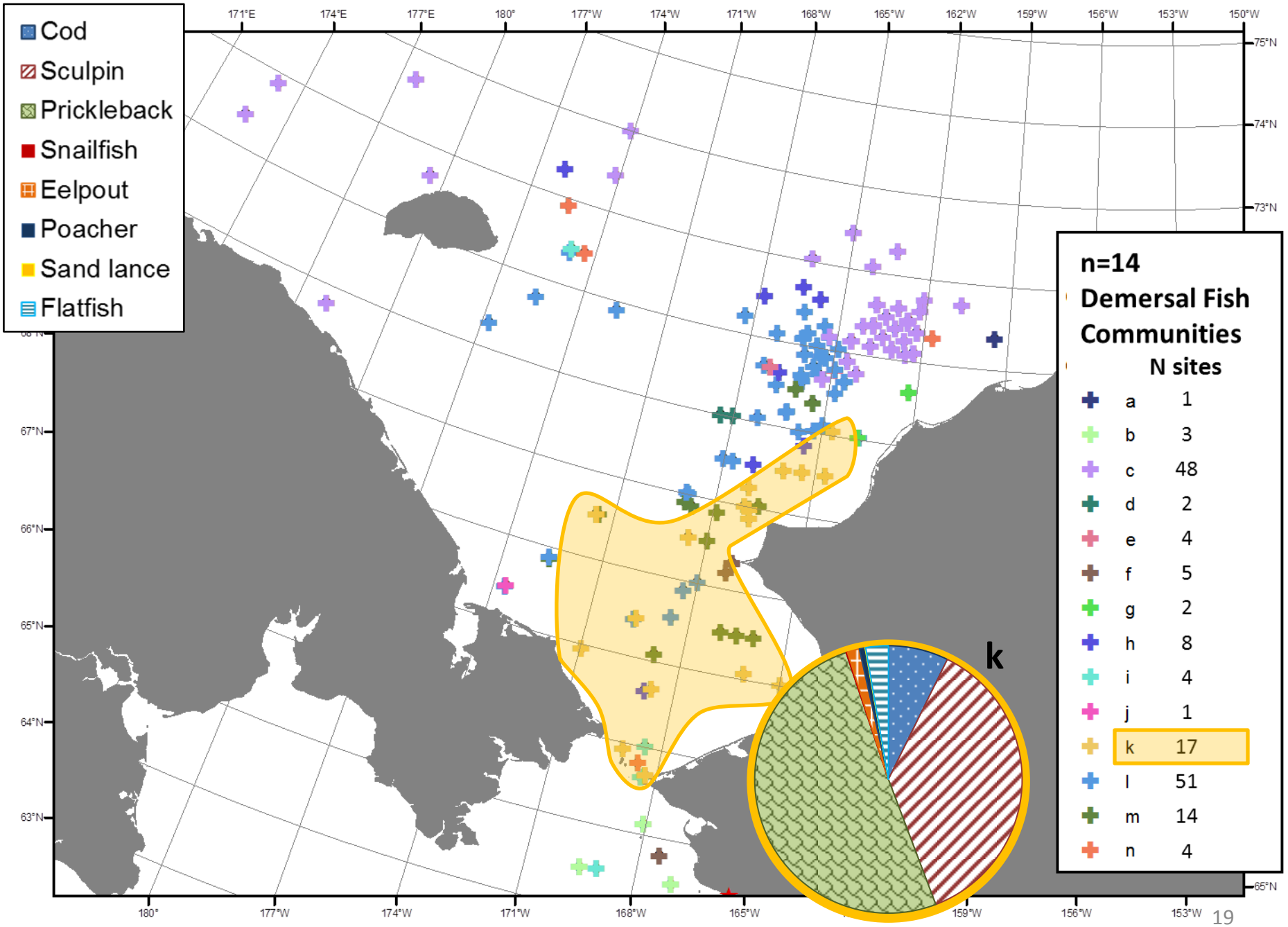


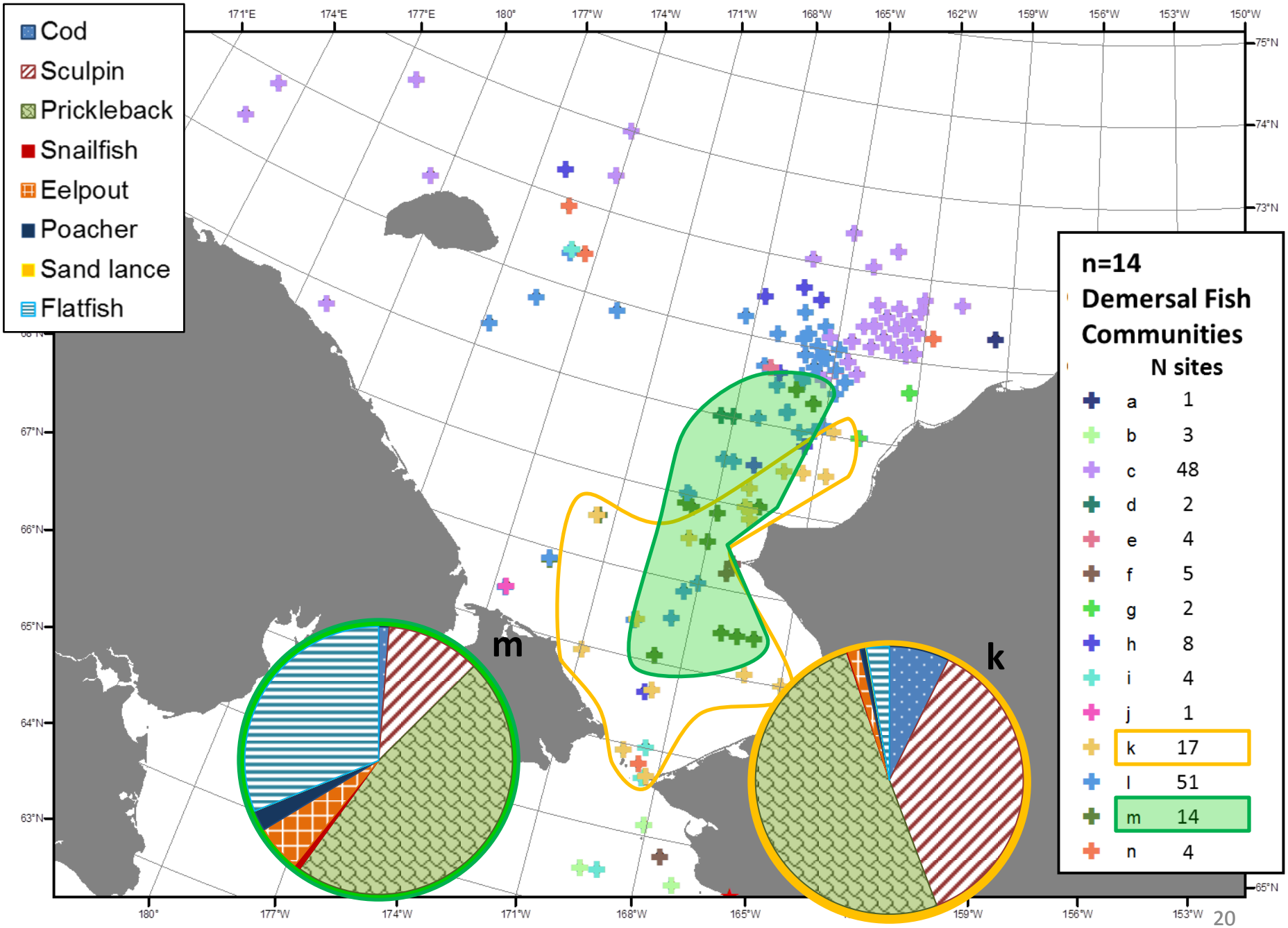
Bering flounder – *Hippoglossoides robustus*

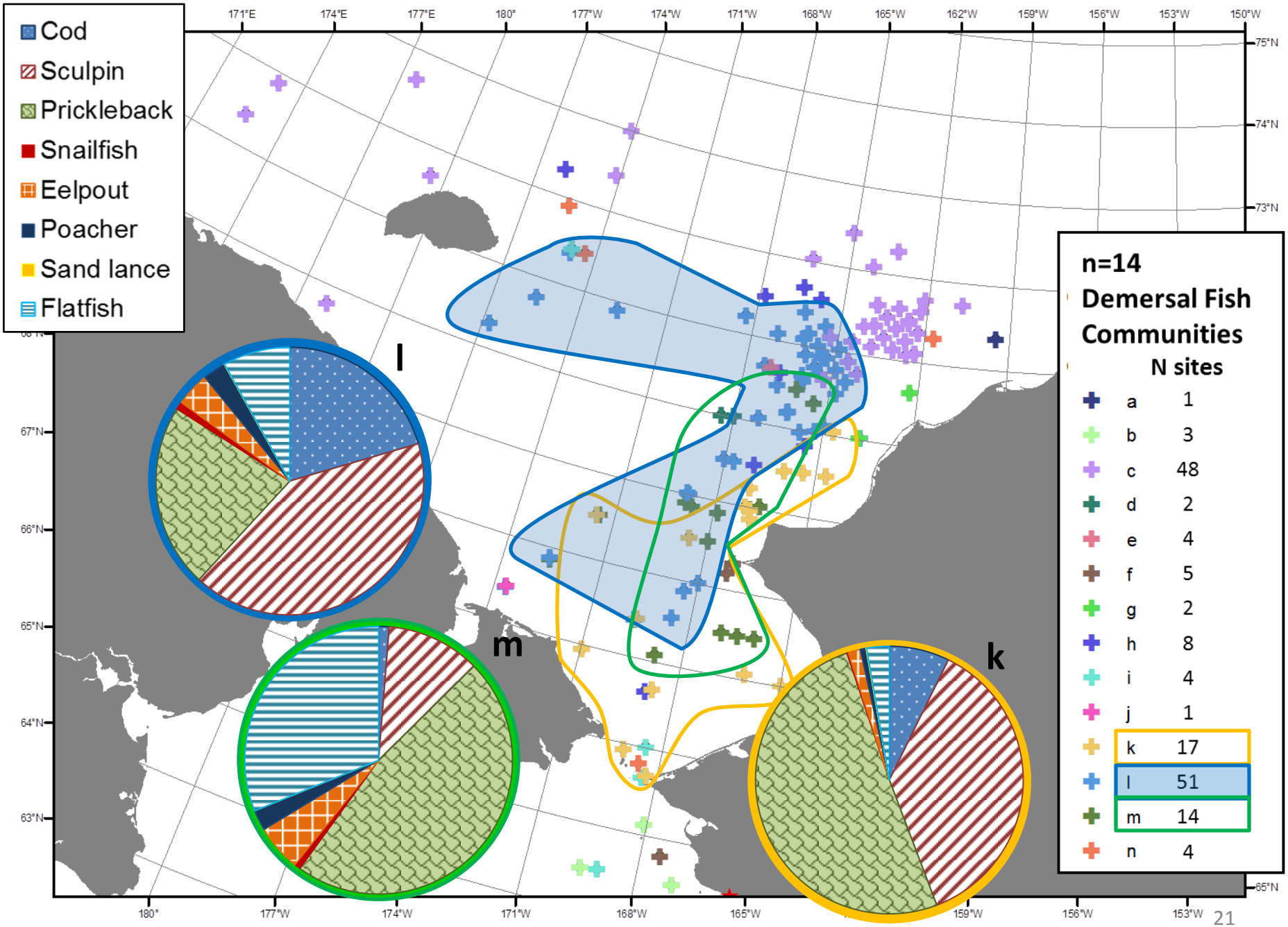


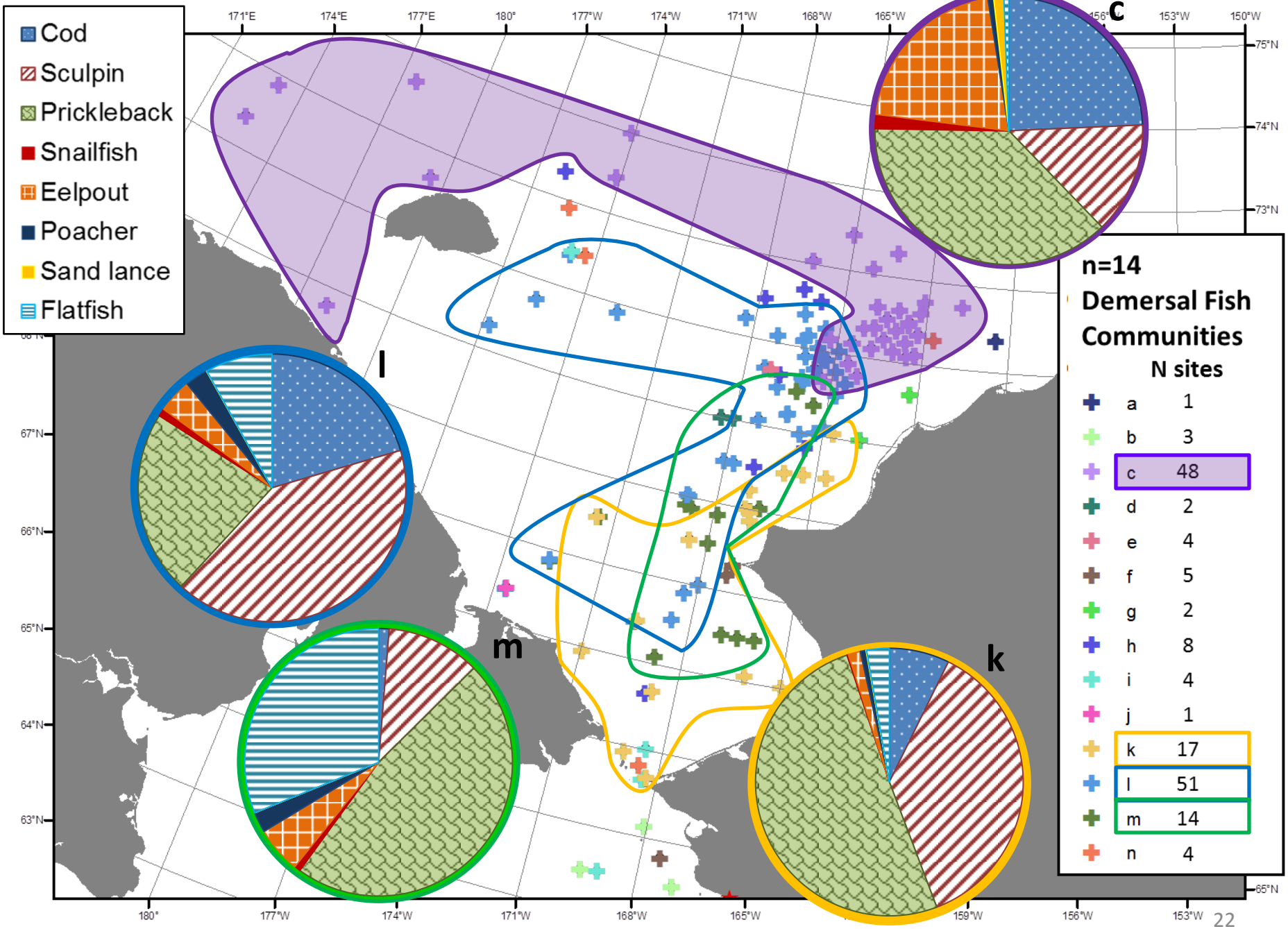


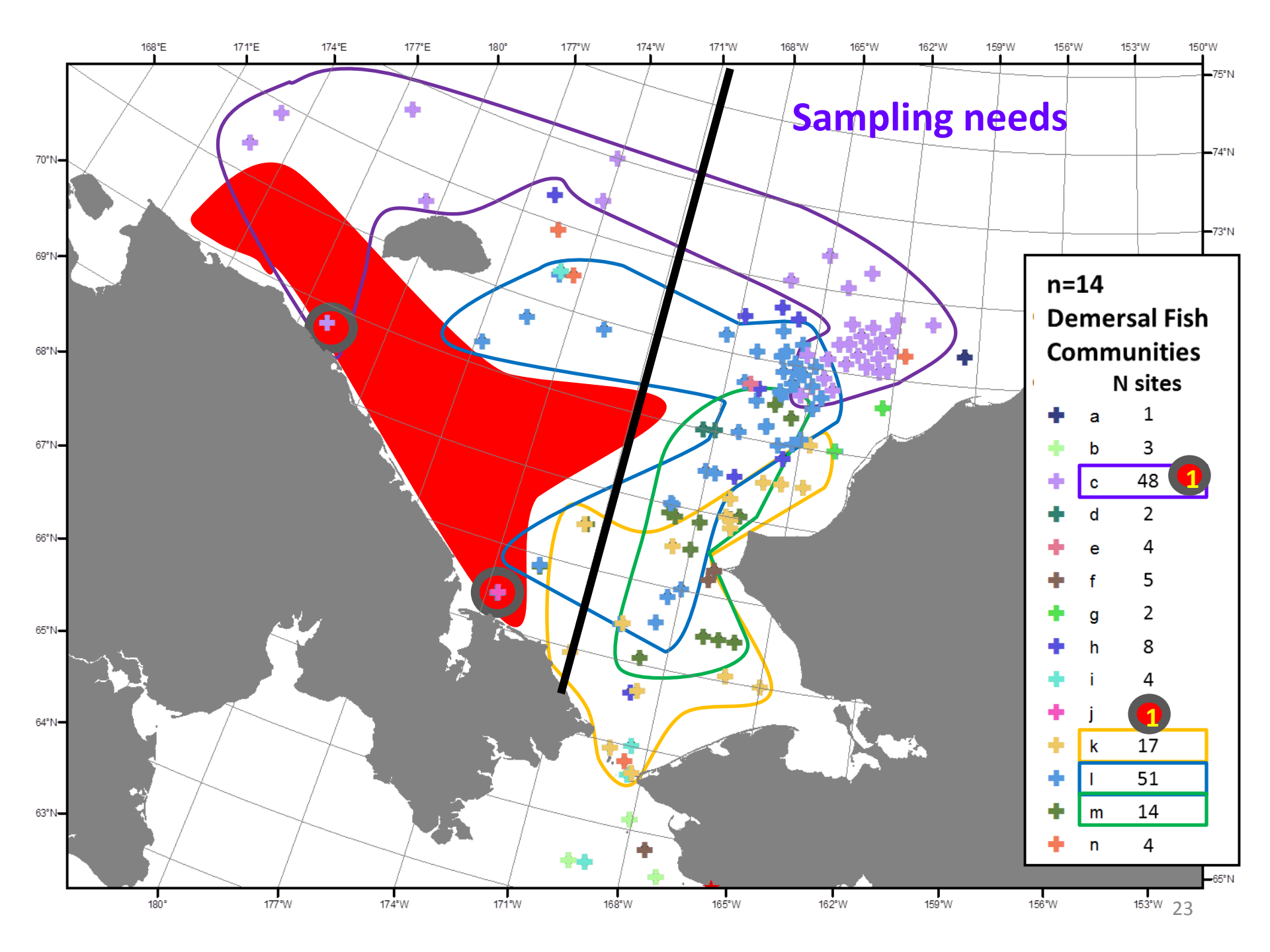

Demersal fish communities
2004-2009 combined
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
168°E
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W
150°W
75°N
74°N
73°N
70°N
69°N
68°N
67°N
66°N
65°N
64°N
63°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W


Cod
Sculpin
Prickleback
Snailfish
Eelpout
Poacher
Sand lance
Flatfish
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
k
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W
150°W
75°N
74°N
73°N
67°N
66°N
65°N
64°N
63°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
159°W
156°W
153°W


Cod
Sculpin
Prickleback
Snailfish
Eelpout
Poacher
Sand lance
Flatfish
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
m
k
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W
150°W
75°N
74°N
73°N
67°N
66°N
65°N
64°N
63°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
159°W
156°W
153°W


Cod
Sculpin
Prickleback
Snailfish
Eelpout
Poacher
Sand lance
Flatfish
l
m
k
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W
150°W
75°N
74°N
73°N
67°N
66°N
65°N
64°N
63°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
159°W
156°W
153°W


Cod
Sculpin
Prickleback
Snailfish
Eelpout
Poacher
Sand lance
Flatfish
c
l
m
k
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
156°W
153°W
150°W
75°N
74°N
73°N
67°N
66°N
65°N
64°N
63°N
180°
177°W
174°W
171°W
168°W
165°W
159°W
156°W
153°W
65°N

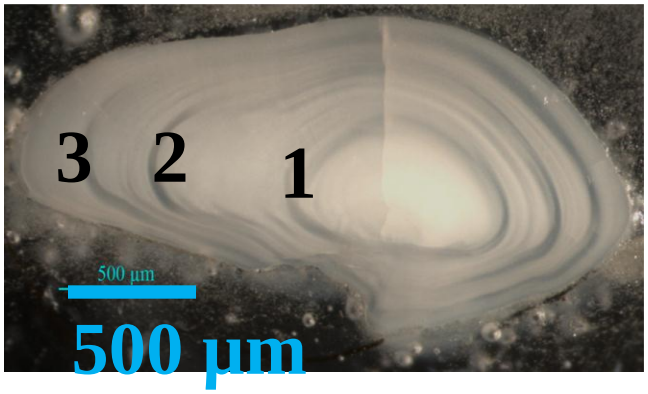

Sampling needs
n=14
Demersal Fish
Communities
N sites
a 1
b 3
c 48
d 2
e 4
f 5
g 2
h 8
i 4
j 1
k 17
l 51
m 14
n 4
1
1
168°E
171°E
174°E
177°E
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W
150°W
75°N
74°N
73°N
70°N
69°N
68°N
67°N
66°N
65°N
64°N
63°N
65°N
180°
177°W
174°W
171°W
168°W
165°W
162°W
159°W
156°W
153°W

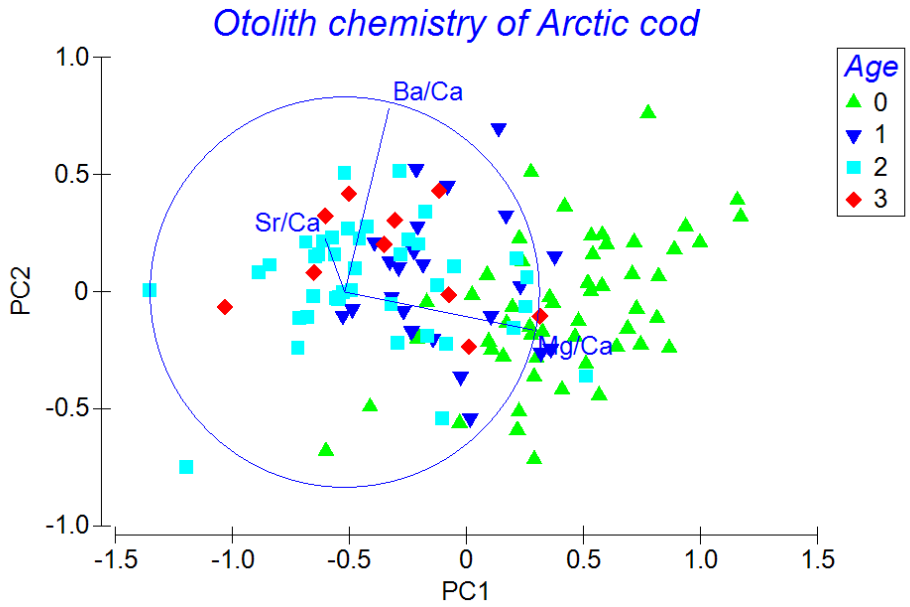
2012 Sample priorities for Fish Ecology

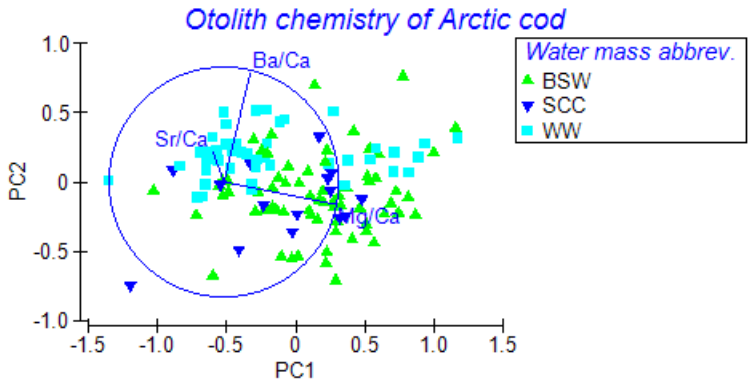
1. Repeat BS, CS and CL transects
2. Russian and US waters
3. Russian waters, including to ice edge
4. US waters, including shelf break and slope and to ice edge

Otolith trace elements – not useful tool offshore

- Species-specific trends
- Elemental trends inconsistent
- Requires wide range of environment
- Assumes fish caught where otolith band formed







Thank you,
Спасибо!

RUSALCA

Additional Support

Coastal Marine Institute
University of Alaska & Minerals Management Service

ConocoPhillips

Statoil

Olgoonik Fairweather LLC