

**NOAA
FISHERIES**

**Alaska
Fisheries
Science Center
Auke Bay
Laboratories
Juneau, Alaska**

Long Term Planning for Joint Program of Scientific Research and Monitoring Central Arctic Ocean and Adjacent Seas JPSRM

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Pacific Arctic Group (PAG) Spring Meeting

March 13, 2016

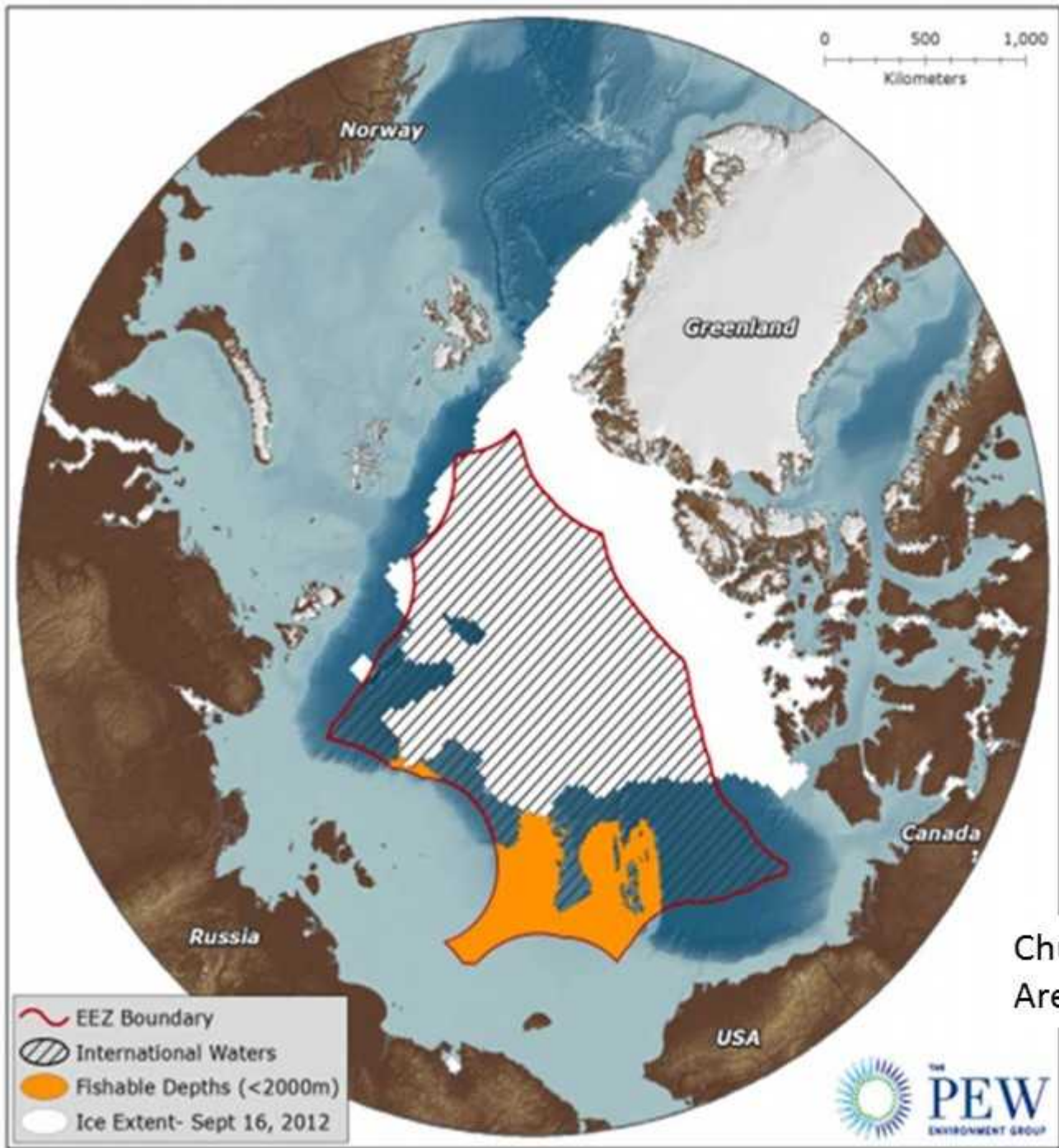
Arctic Science Summit Week

Gruening 306 University of Alaska Fairbanks

Fairbanks Alaska USA

Developing international cooperation to collect the information necessary to support international fisheries negotiations in the central Arctic Ocean

- No one nation has the capabilities to conduct quantitative Arctic fish stock biomass estimation
- Arctic fish stock biomass estimation requires information not only on fish biomass, but also on predator biomass, prey biomass, and physical and chemical drivers of biomass
- An international program of scientific research and monitoring is therefore necessary to support diplomatic efforts to control fisheries in the central Arctic Ocean



Chukchi Borderlands
Area is shown in orange



DIPLOMATIC MILESTONES

- **OSLO ACCORD JULY 2015**

Five nations, Denmark/Greenland, Norway, Russia, United States, Canada agree to no commercial fishing until sustainability is demonstrated (precautionary approach)

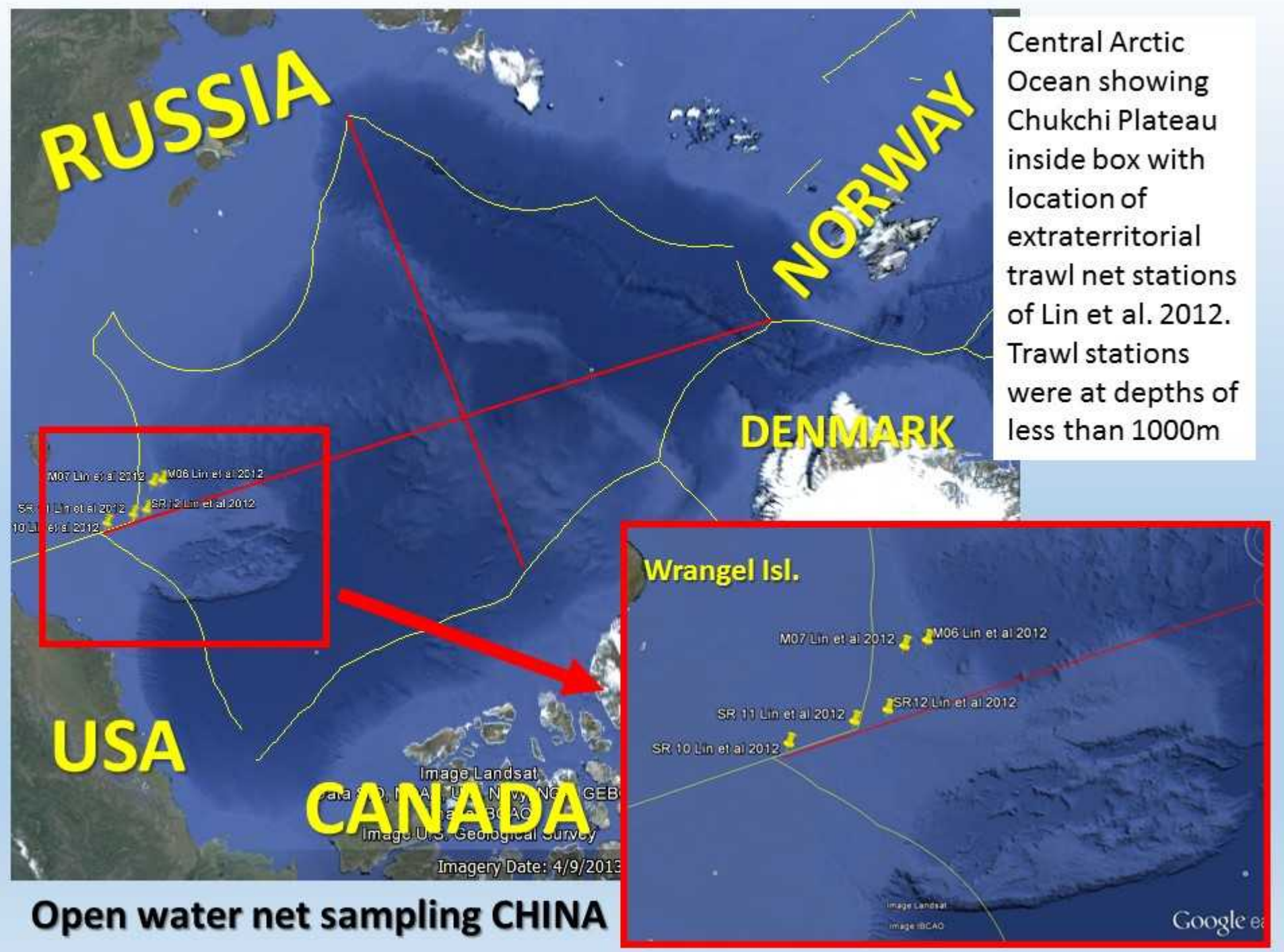
- **5+5 AGREEMENT DECEMBER 2015**

The original five Oslo Accord nations are joined by China, Japan, Korea, Iceland and the EU to agree in principle to an international program of scientific research and monitoring to support diplomatic efforts to reach accord on control of fisheries

SCIENTIFIC MILESTONES

- **MEETINGS OF SCIENTIFIC EXPERTS ON FISH STOCKS IN THE CENTRAL ARCTIC OCEAN**
 - First 2011 Anchorage USA (CN,DE,NO,RU,US)
 - Second 2013 Tromso Norway (CN,DE,NO,RU,US)
 - Third 2015 Seattle USA (CN,DE,NO,RU,US,CN,JP,KO,IS)
- **5+5 AGREEMENT SCIENTIFIC MANDATES**
 - Continuing scientific process (scientific expert meetings)
 - Specific questions to be answered
 - Joint Program of Scientific Research and Monitoring

Central Arctic Ocean showing Chukchi Plateau inside box with location of extraterritorial trawl net stations of Lin et al. 2012. Trawl stations were at depths of less than 1000m



Open water net sampling CHINA

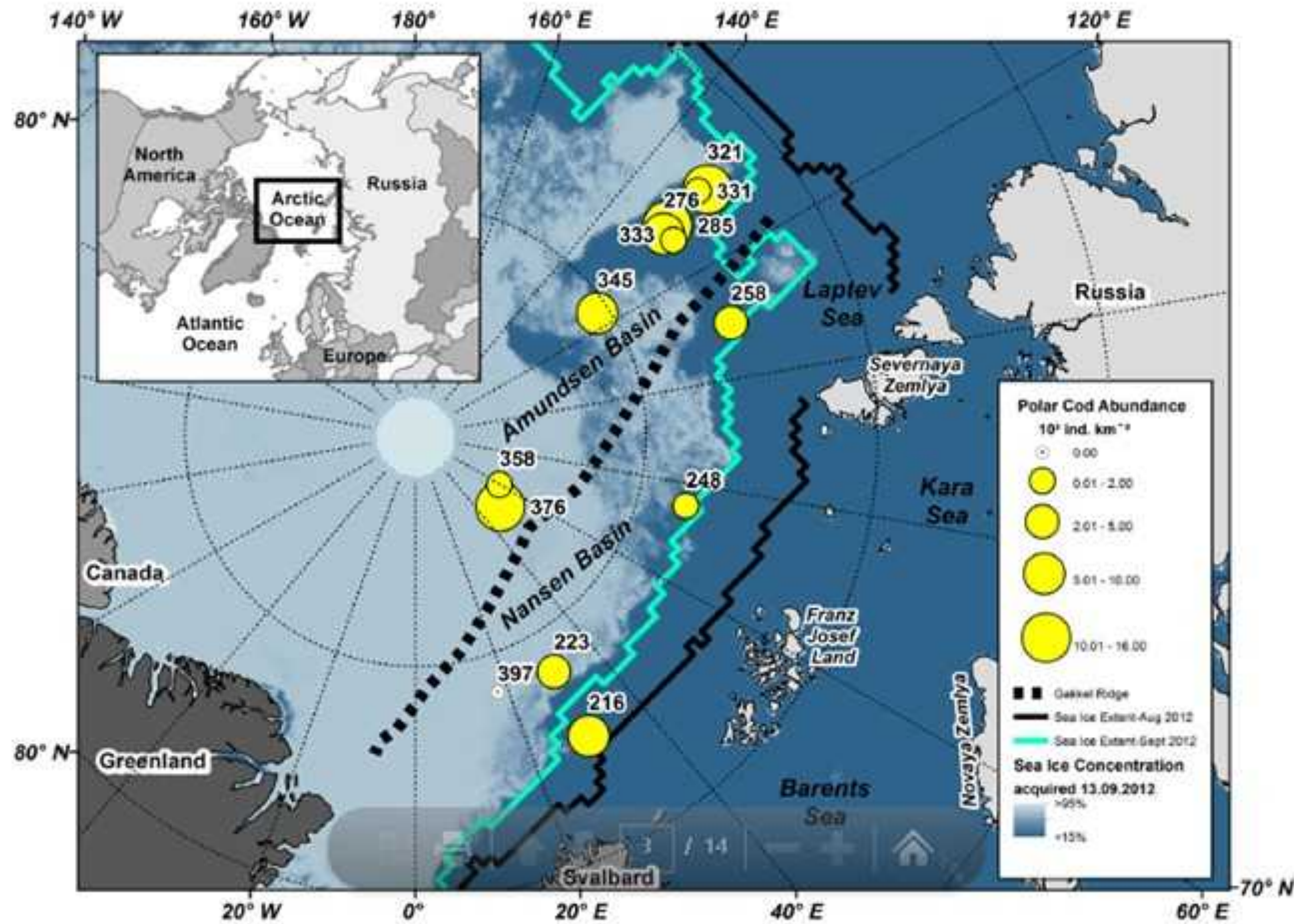
CENTRAL ARCTIC OCEAN UNDER ICE SAMPLING *Polarstern* GERMANY

Polar Biol

Carmen David et al. 2015 DOI 10.1007/s00300-015-1774-0

Under-ice distribution of polar cod *Boreogadus saida* in the central Arctic Ocean and their association with sea-ice habitat properties

Carmen David^{1,2} · Benjamin Lange^{1,2} · Thomas Krumpen¹ · Fokje Schaafsma³ · Jan Andrius van Franeker³ · Hauke Flores^{1,2}



***Boreogadus saida* median 5,000 km², max 16,000 km²**

Program, Pacific Arctic: 2015-2020



RUSALCA DBO
Lines



KOREA, JAPAN,
RUSSIA- USA,
CHINA, Others?



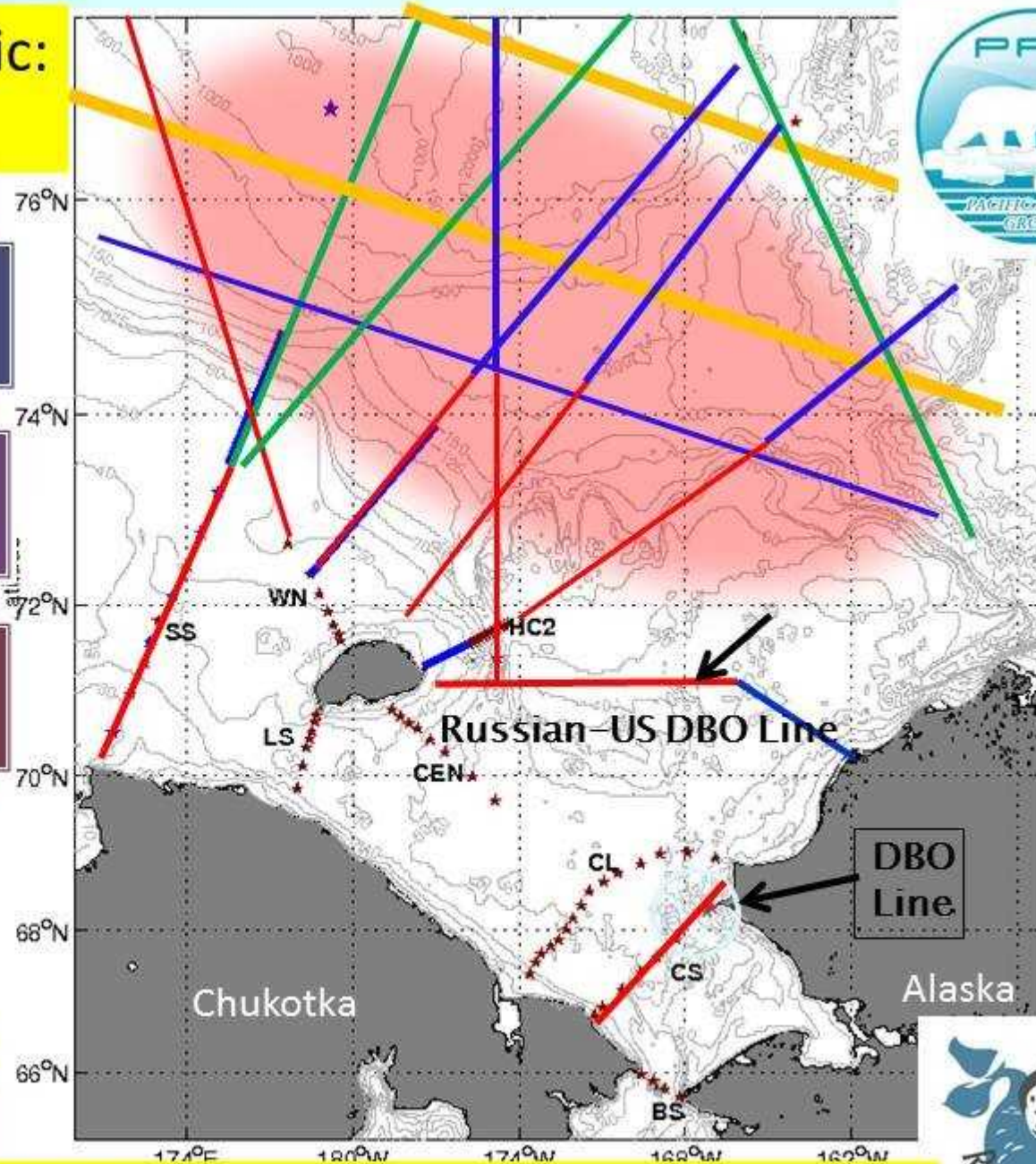
Ice-Ocean =
Ecosystem
Atmosphere
Mixing and

KOREA

JAPAN

RUSSIA-US

US ? CHINA? CANADA



U.S.- Russia-Japan-Korea-China 2015-2020 synoptic surveys:

UPCOMING EVENTS 2016

- **MAY**
 - **ICES WORKING GROUP INTEGRATED ECOSYSTEM ASSESSMENT CENTRAL ARCTIC OCEAN (WGICA), COPENHAGEN (CLOSED)**
- **SEPT**
 - **ICES ANNUAL SCIENCE MEETING, ARCTIC SESSION, RIGA (OPEN)**
- **SEPT**
 - **FOURTH MEETING OF SCIENTIFIC EXPERTS ON FISH STOCKS IN THE CENTRAL ARCTIC OCEAN, TROMSO (CLOSED)**

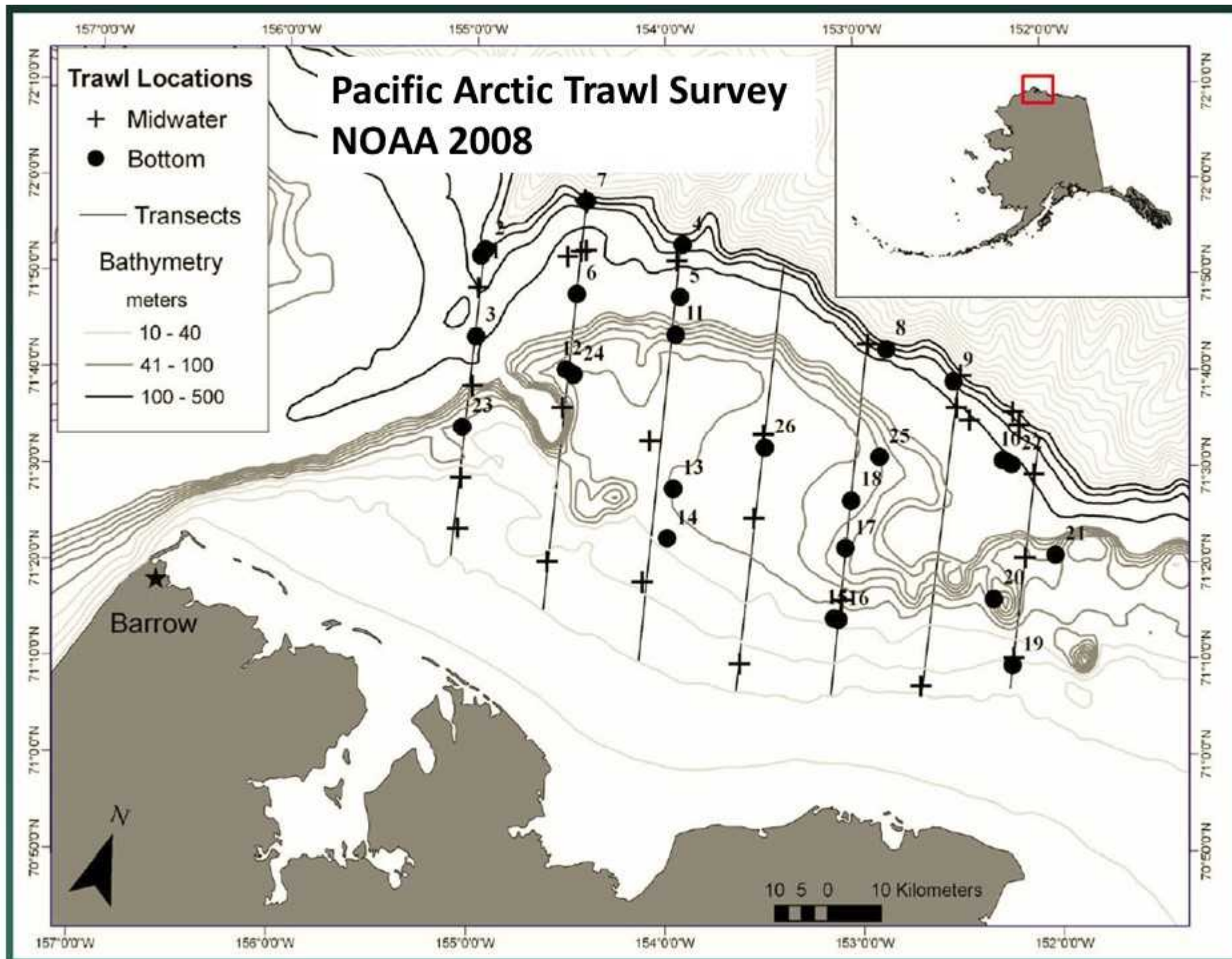


The End

For more information

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Geographic comparisons

| Species | Beaufort Sea 2008 ¹ CPUE (kg/ha) | Chukchi Sea 1990 ² CPUE (kg/ha) | Bering Sea 2008 ³ CPUE (kg/ha) |
|----------------------------|---------------------------------------------------|--------------------------------------------------|-------------------------------------------------|
| Arctic cod | 6.12 | 3.02 | 1.04 |
| Arrowtooth flounder | * | * | 11.87 |
| Bering Flounder | 0.11 | 0.18 | 0.45 |
| Cottidae (sculpin family) | 0.03 | 0.76 | 4.22 |
| Flathead sole | * | * | 10.81 |
| Greenland turbot | * | <0.01 | 0.27 |
| Northern rock sole | * | * | 41 |
| Pacific cod | * | 0.12 | 8.65 |
| Saffron cod | * | 0.39 | <0.01 |
| Walleye pollock | 0.13 | 0.02 | 61.2 |
| Yellowfin sole | * | * | 42.4 |
| Zoarcidae (eelpout family) | 0.03 | 0.21 | 0.5 |
| Snow Crab | 0.47 | 6.73 | 72.3 |

¹ NOAA ² Barber et al., 1997 ³ Eastern Bering Sea 2008 survey (Jason Conner, AFSC, pers. com)