



**NOAA  
FISHERIES**

**Alaska Fisheries  
Science Center**

# **AFSC ecosystem observations SEBS, NBS, High Arctic in 2017**

## **Recruitment Process Alliance:**

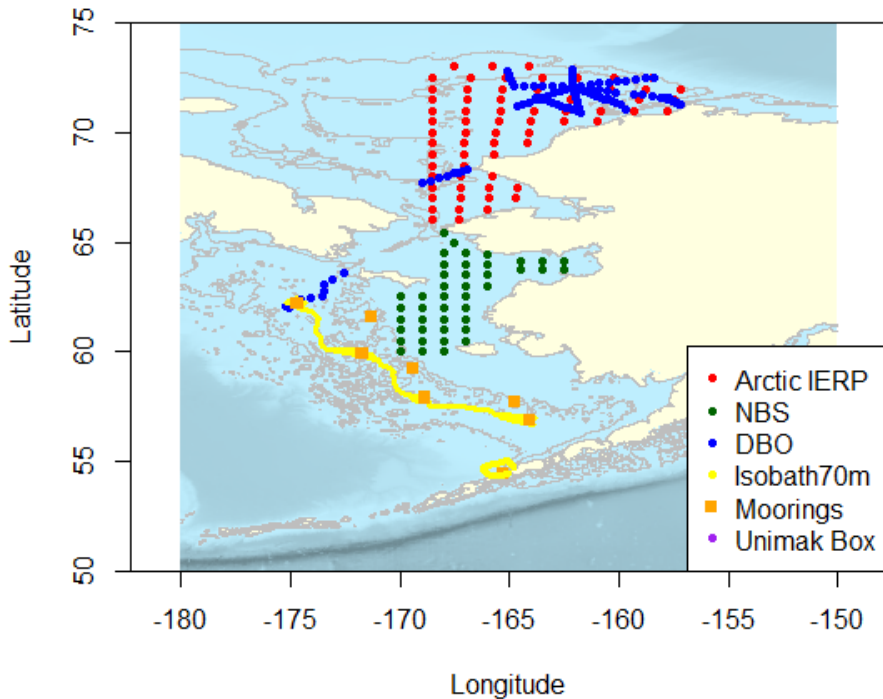
Ecosystems and Fisheries Oceanography Coordinated Investigations Program  
Ecosystem Monitoring and Assessment,  
Recruitment Energetics and Coastal Ecology

**Presenter:** Janet Duffy-Anderson

September 12, 2017

# 2017 RPA Survey Locations

Bering/Arctic Surveys



| Cruise                          | Sampling Season | Frequency                  | Yrs of Data                        |
|---------------------------------|-----------------|----------------------------|------------------------------------|
| 70 m isobath                    | spring & autumn | annual                     | 1996-2003, 2005-present            |
| BS larval pollock (not in 2017) | spring          | annual, biennial           | 2003-2012, 2014, 2016              |
| BASIS (not in 2017)             | late summer     | annual, biennial           | 2003-2012, 2014, 2015, 2016        |
| DBO/RUSALCA                     | summer          | annual, funding contingent | RUSALCA 2005-2015, DBO 2017 - 2021 |
| NBS                             | summer          | annual, funding contingent | 2003-present (no 2008)             |
| A-IERP                          | summer          | funding contingent         | 2012, 2013, 2017, 2019             |

## What gets sampled?

### Physics

- Moorings
- Advanced tech

### Oceanography

### Phytoplankton

### Zooplankton

### Fish

### Diet/Energetics

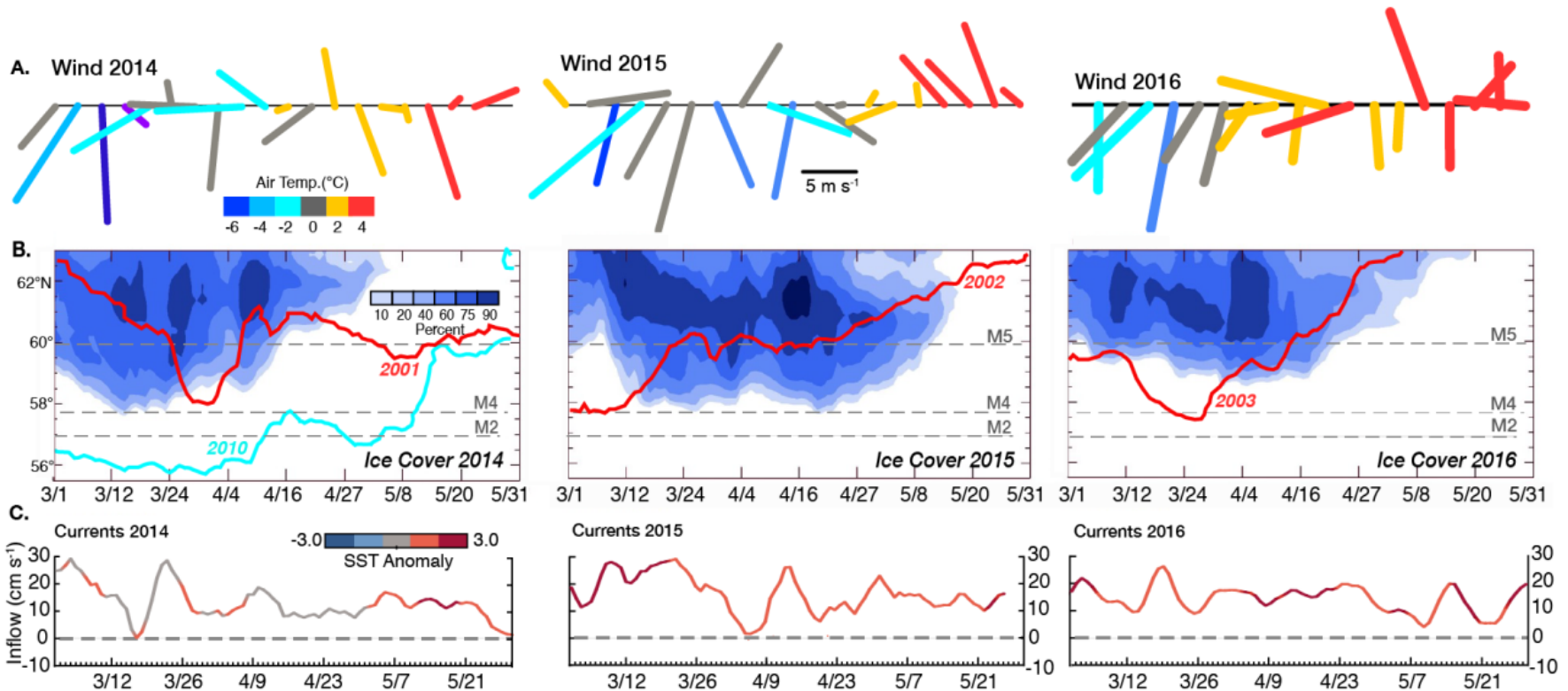
### Bird / mammal obs

### TAS

# Bering Sea 2014-2016 warm phase

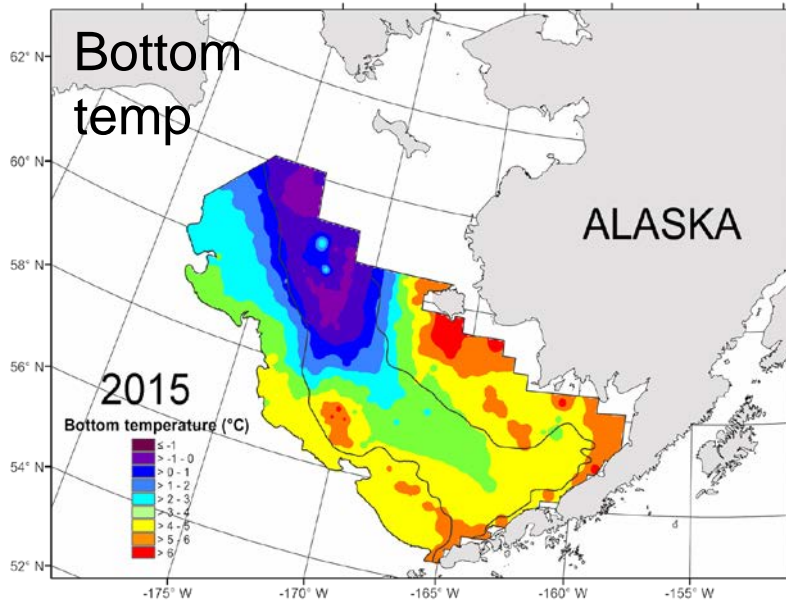
Wind and ice

*Physics*

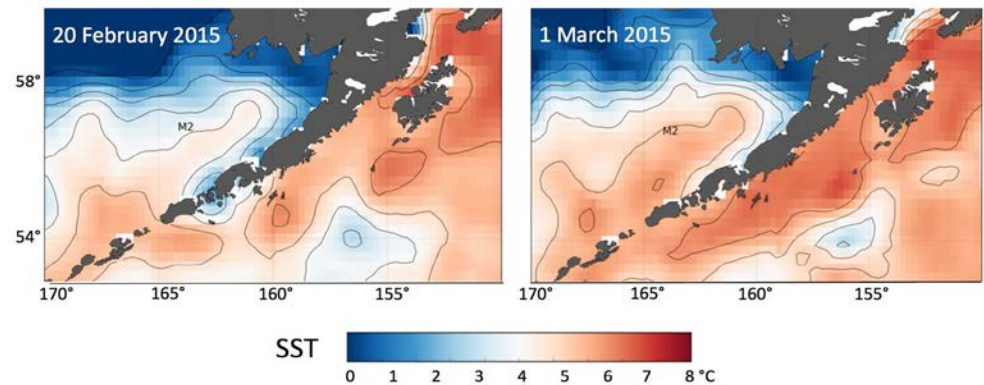


# Bering Sea 2015

## Physics



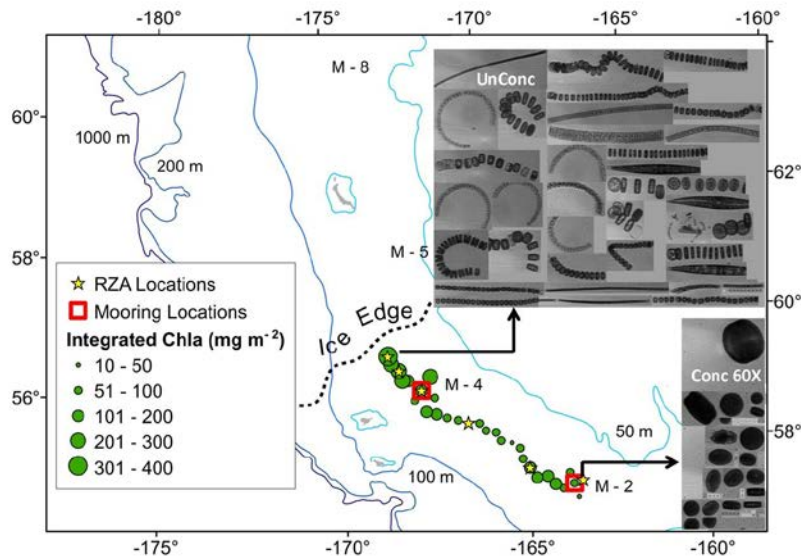
## Warm blob extension from Gulf of Alaska



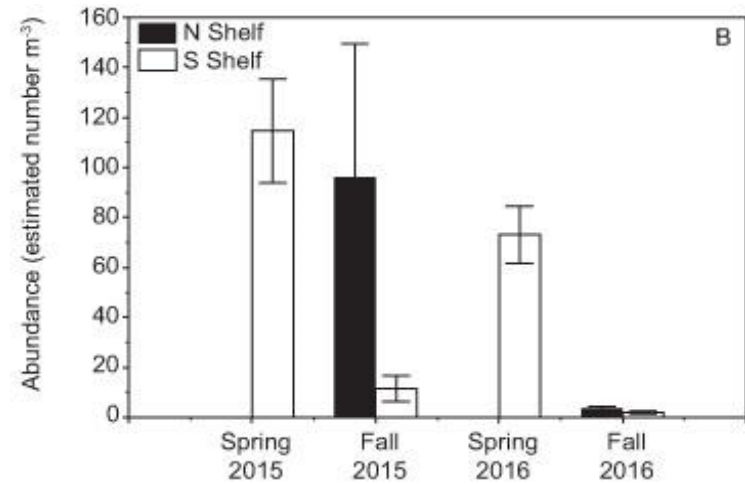
# Bering Sea 2015

## Biology

### Diatoms

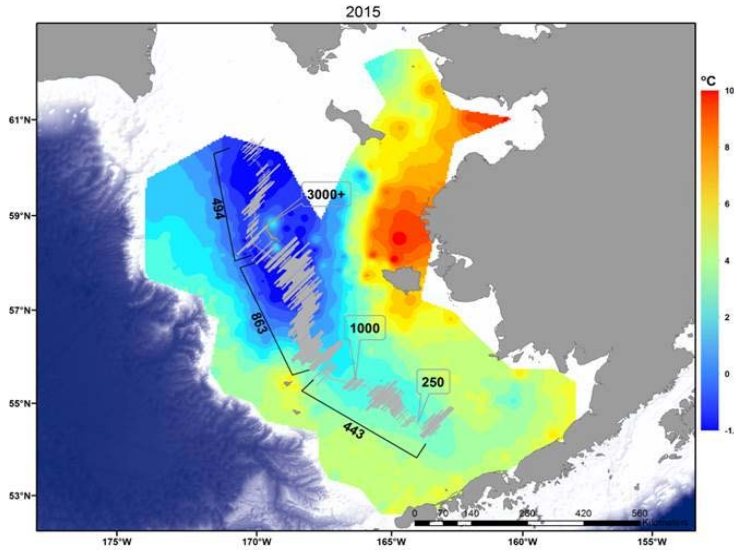


### Zooplankton



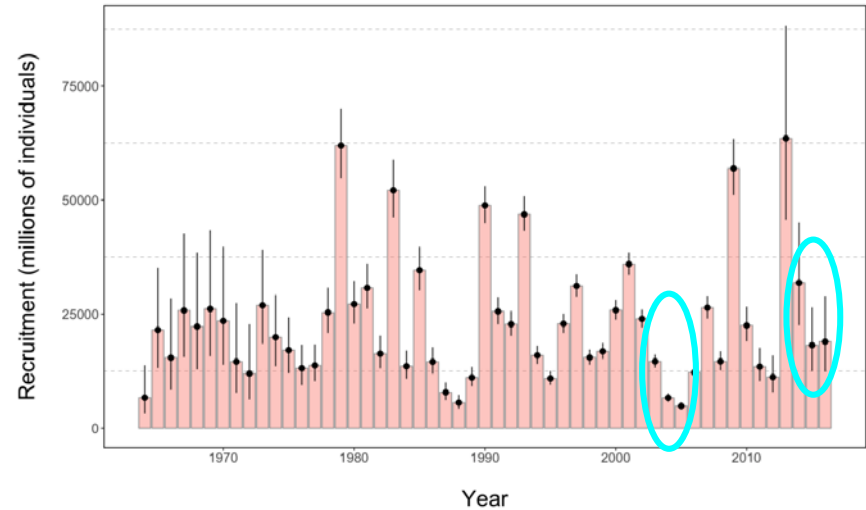
# Bering Sea 2015

Pollock age-0 and age-1



## Biology

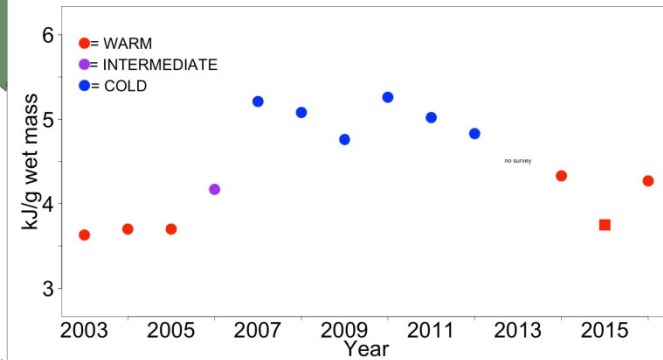
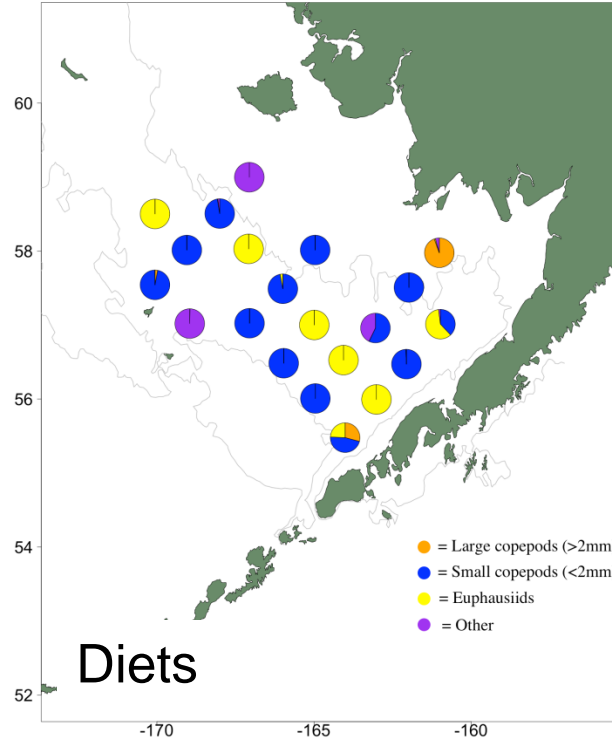
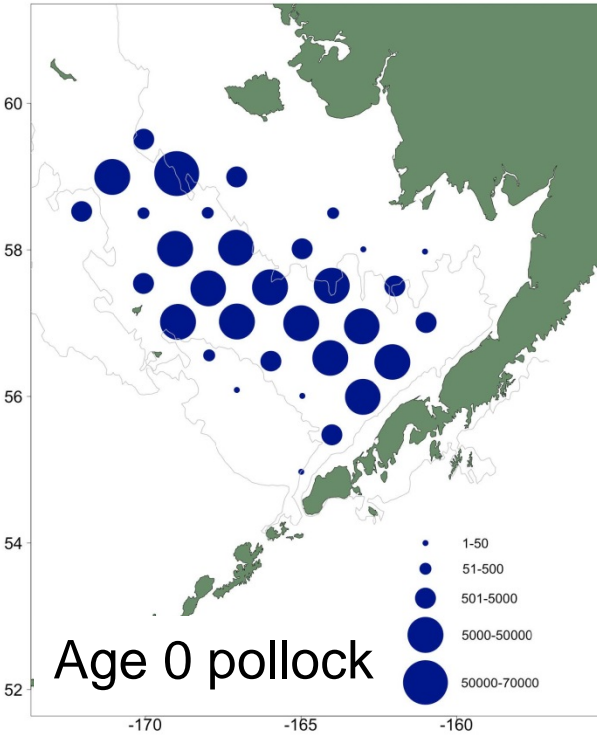
Pollock



**The GOA Blob warmed the ocean in an otherwise cold year (icy winds from the north) but the Cold Pool provided a refuge for good survivorship of the 2015 pollock year class**

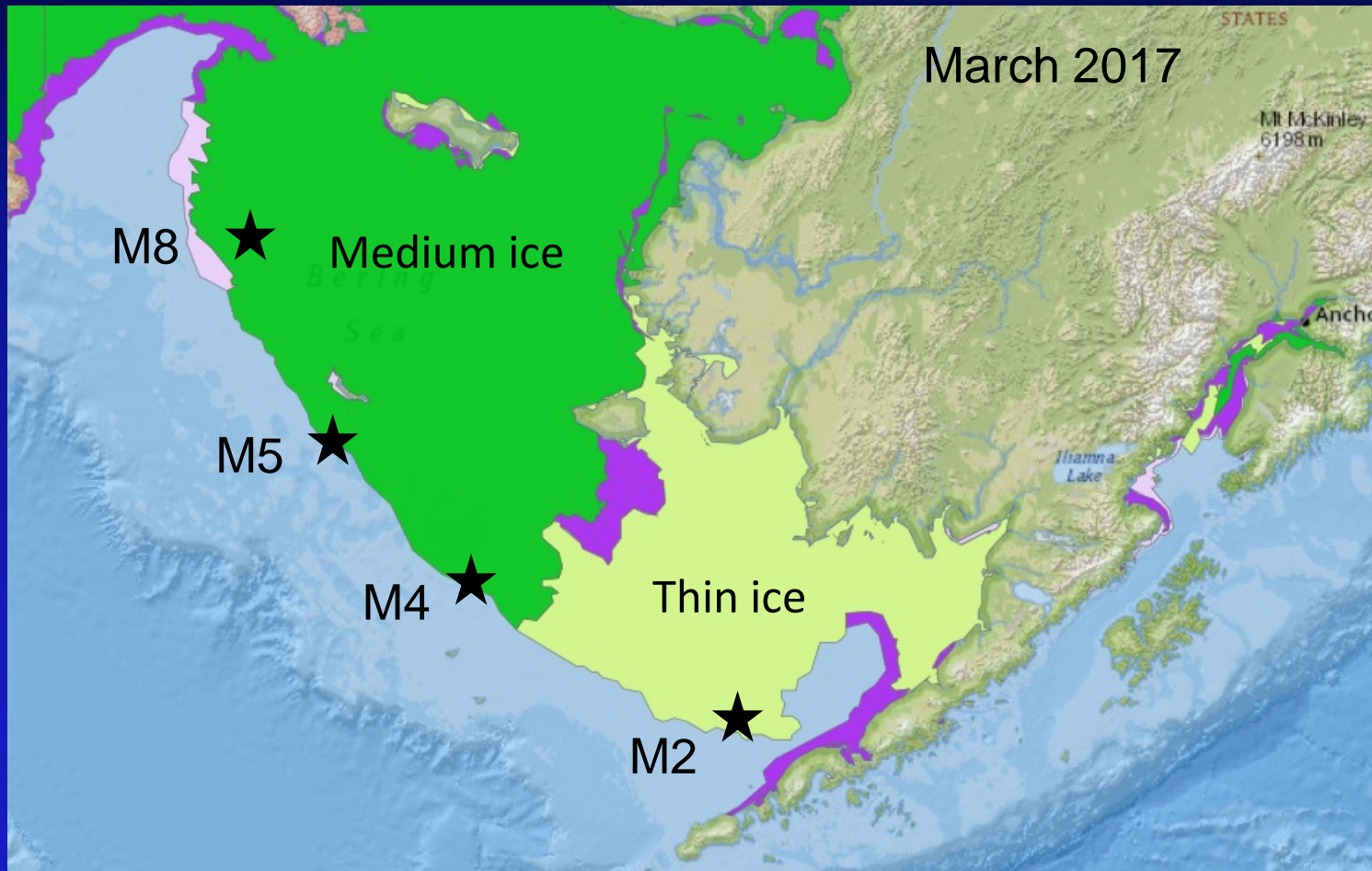
# Bering Sea 2016

## Biology



Energy Density

# 2017 Observations SEBS/NBS



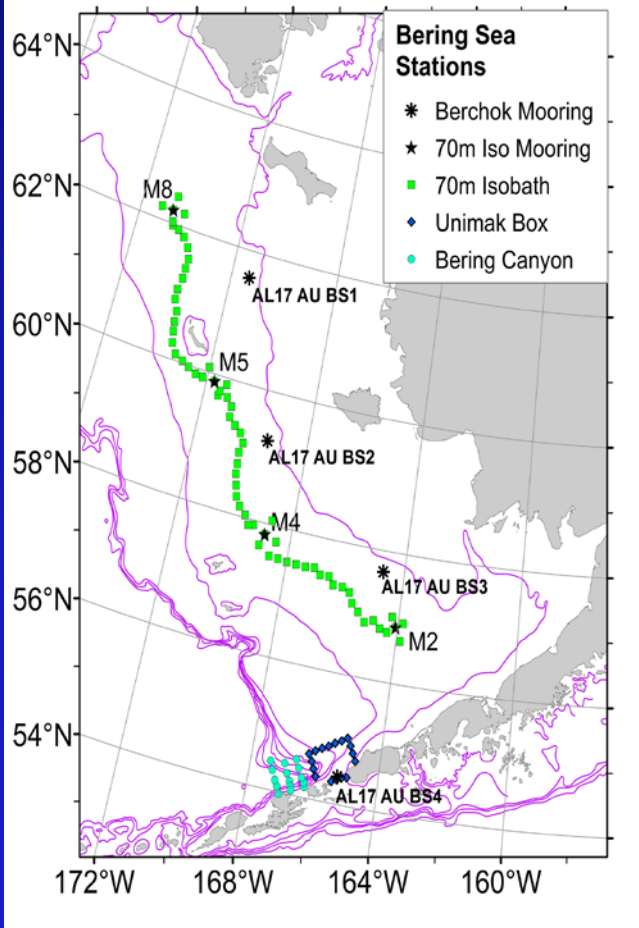


# Moorings and 70m isobath

2017: April 22 – May 8 *and* Sept 21 – Oct 7



Latitudinal picture of lower trophic dynamics and processes on middle shelf



## Operations:

Surface, subsurface moorings and instrumentation (incl Prawler)

CTDs

Integrated Chla

Zooplankton samples – on board rapid analyses  
Larval fish (spring), juveniles (autumn, acoustics)

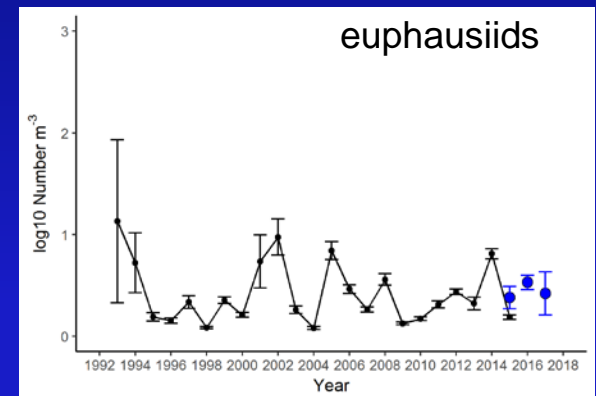
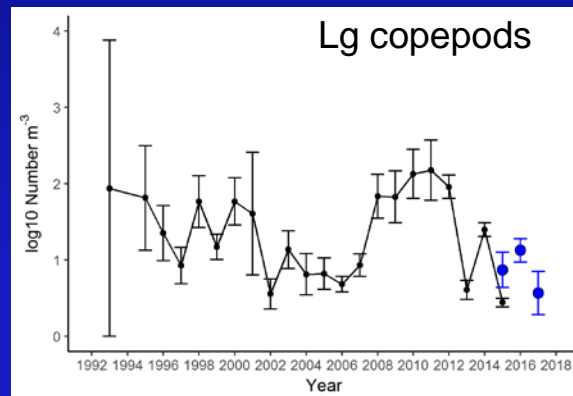
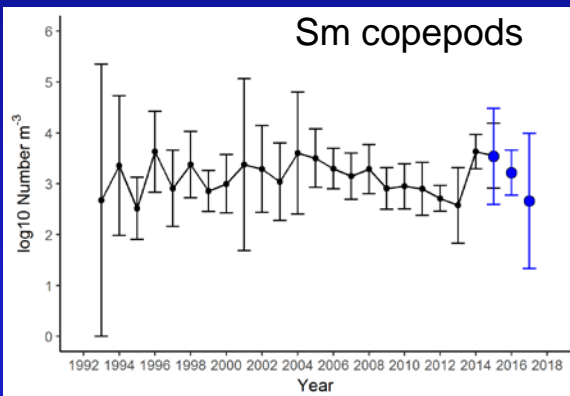
# Mooring and 70m isobath

Spring survey



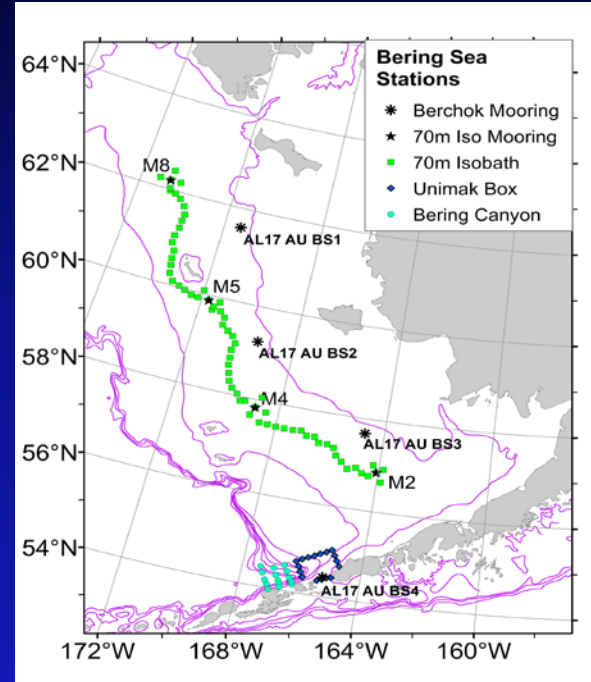
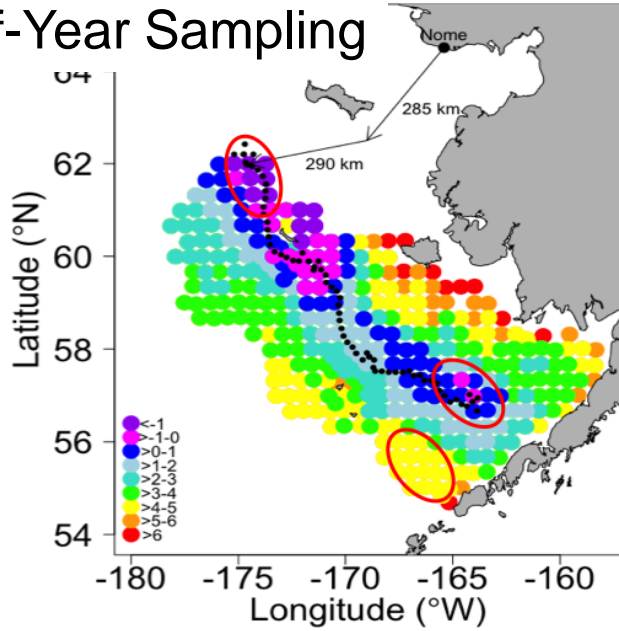
M2 depth integrated T indicates thermally average year on middle shelf

On-board zooplankton analysis:



# BS – Supplemental Sampling (2017: Sept 28 - Oct 5)

## Off-Year Sampling



### Operations:

Trawls  
Acoustics  
Phytoplankton  
Zooplankton  
Bioenergetics  
Diets

### Questions: prey

base,  
energetics,  
diets, Cold Pool  
use

### Products:

ED time series since 2002  
Plankton time series  
Juvenile pollock conditional status  
Juvenile pollock forecast for 2018

# NBS Surface Trawl Survey (2017: Sept 1-25)

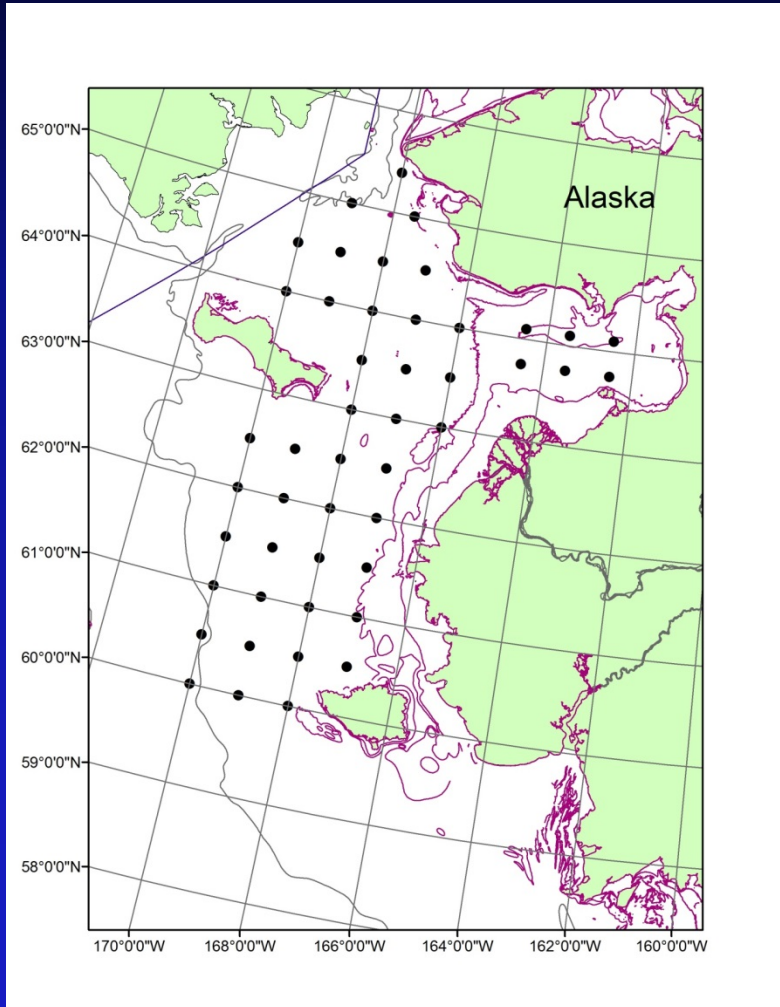
When: 2003-2007, 2009-2017  
25 DAS during late August – September

Operations (2003-2019): Integrated fisheries oceanography survey that collects information on forage fish, salmon, seabirds, biological and physical oceanography

Focus: juvenile chinook salmon and forage fish

Indicators: abundance, distribution, energetics, diets

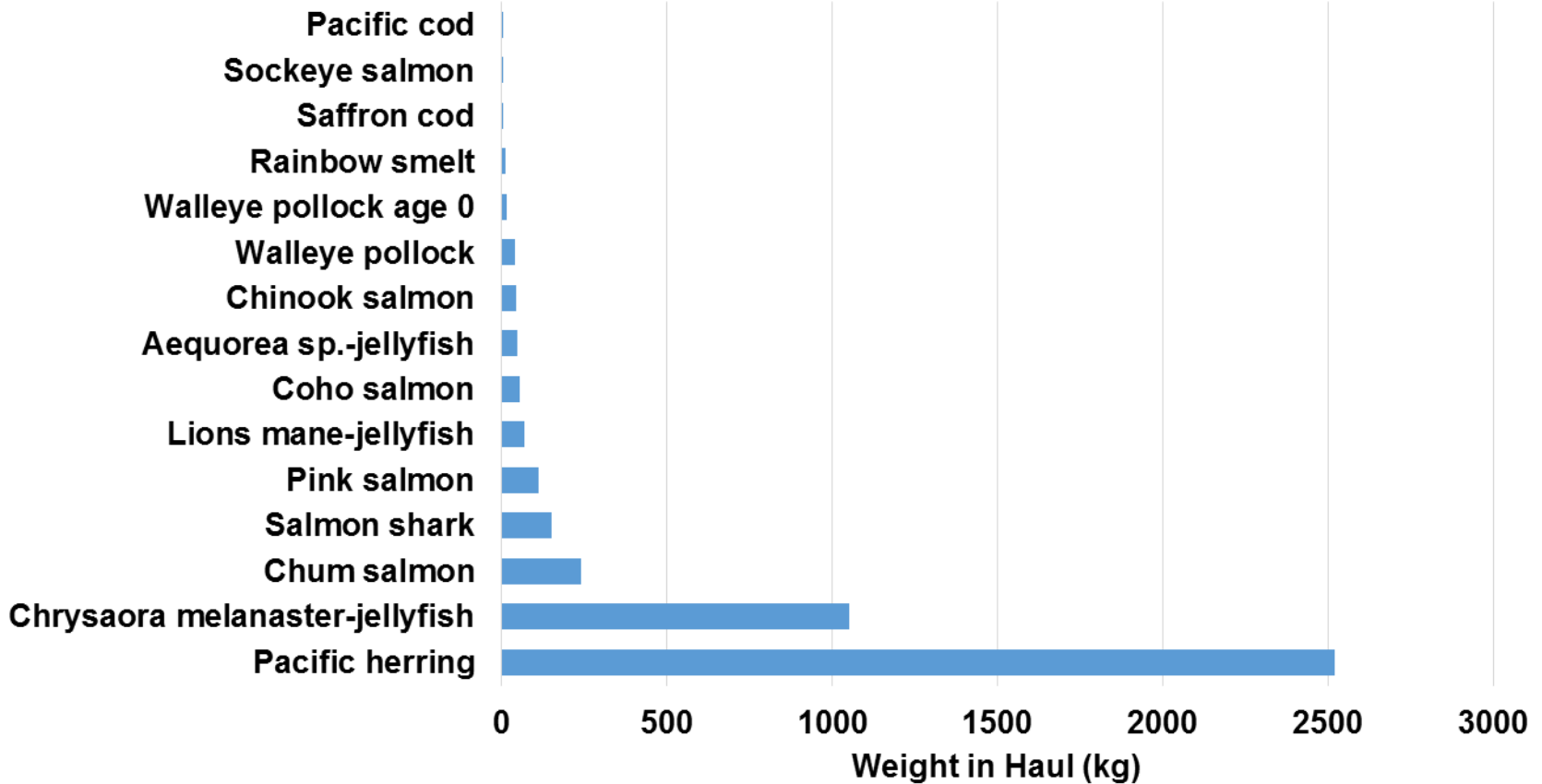
Products: 14-yr time series for juvenile salmon and forage fish  
Chinook salmon forecast ADF&G



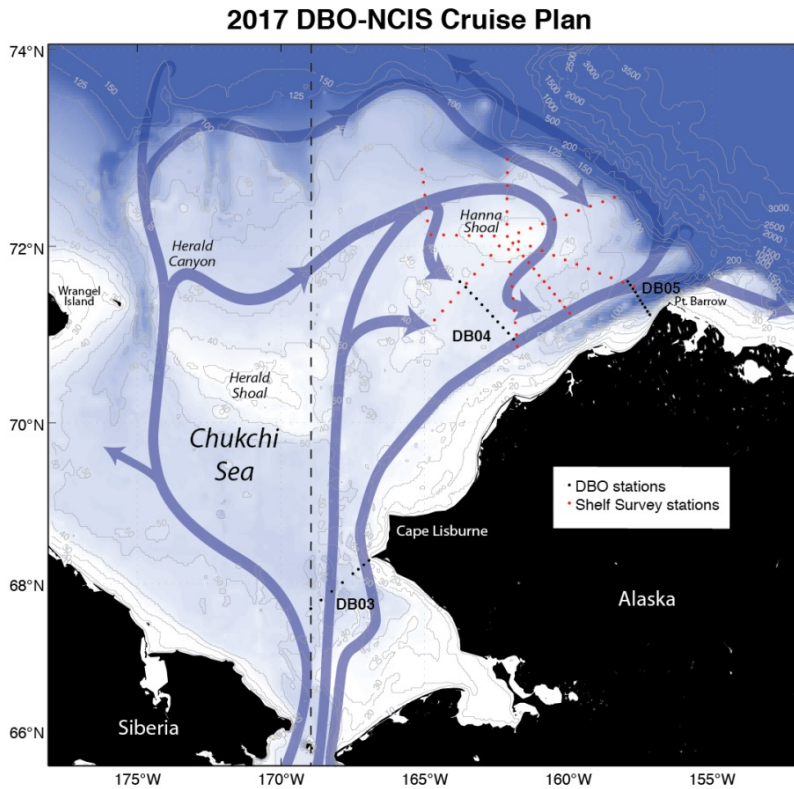
Kris Ciciel & Jim Murphy

# NBS Surface Trawl Survey (2017: Sept 1-25)

2017 Catch Data for 29 out of 55 Stations



# High Arctic – Distributed Biological Observatory 2017: 26 August – 15 September



## Operations:

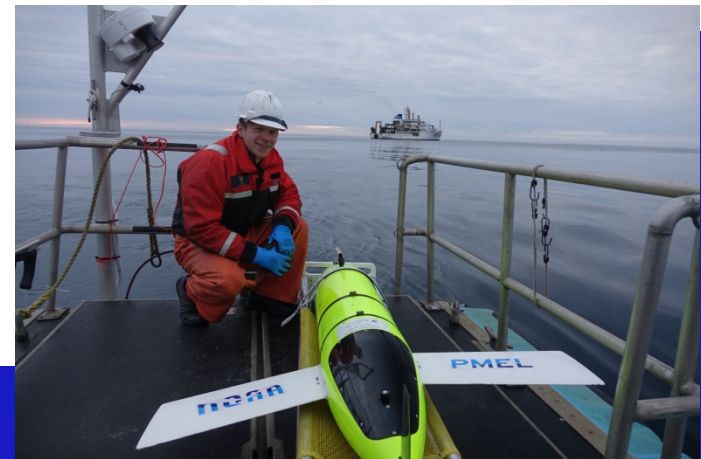
CTDs

Integrated Chla

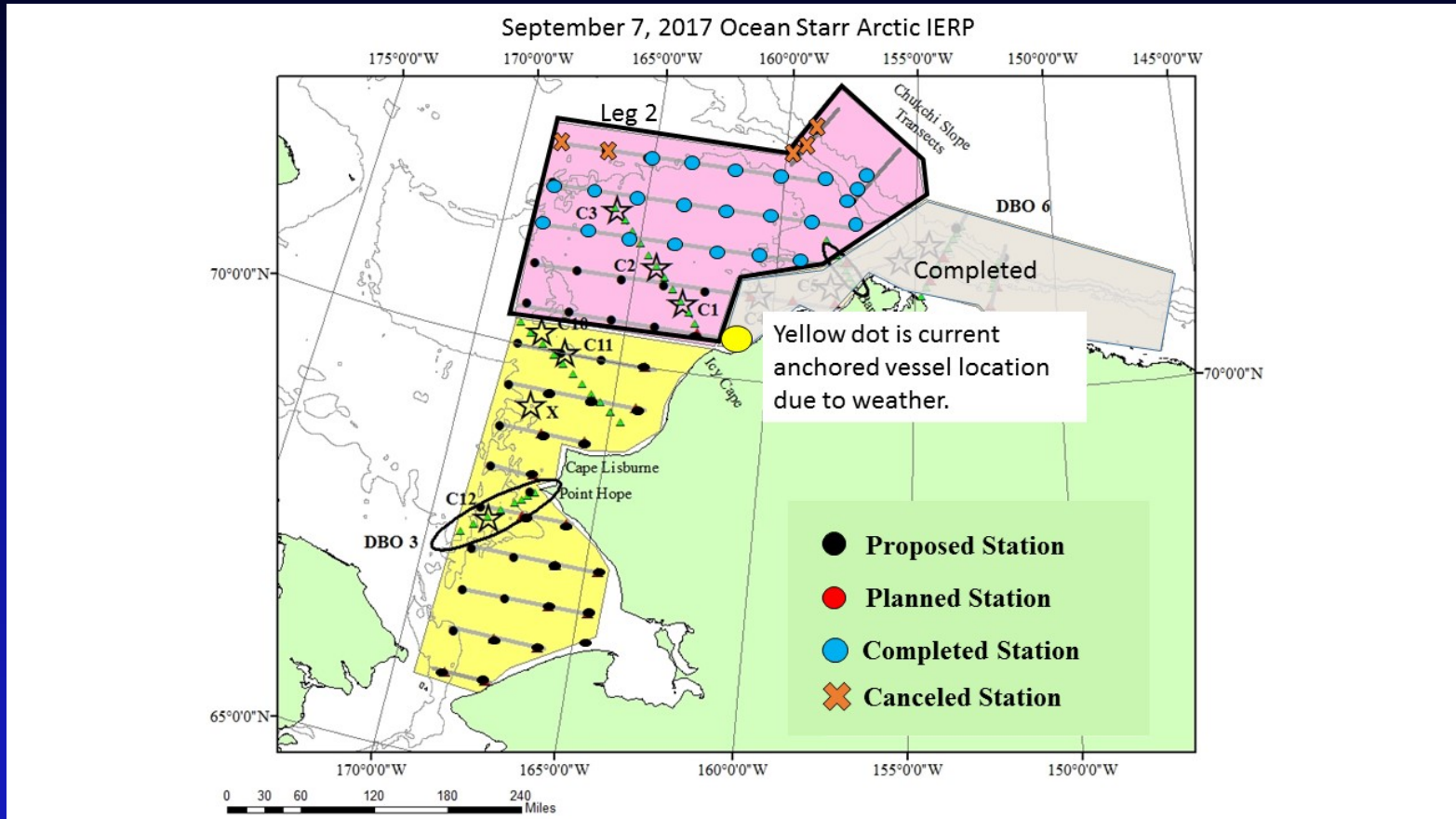
Zooplankton samples – on board rapid analyses

Larval fish data

Oculus glider (CTD, O<sub>2</sub>, fluorescence, turbidity, CDOM, PAR – VPR in 2018)



# High Arctic - Arctic IERP



Loss of sea ice

Warming ocean temperatures

Food web restructuring

Reduced lipid content in prey base

# High Arctic - Arctic IERP

Physical  
Oceanography



Zooplankton  
Larval fish



Fish  
Invertebrates



On board  
Fish Diet



Laboratory Analyses

