

ECOSYSTEM STATUS REPORT

October Council Meeting Preview



Bridget Ferriss



Ivonne Ortiz

Elizabeth Siddon

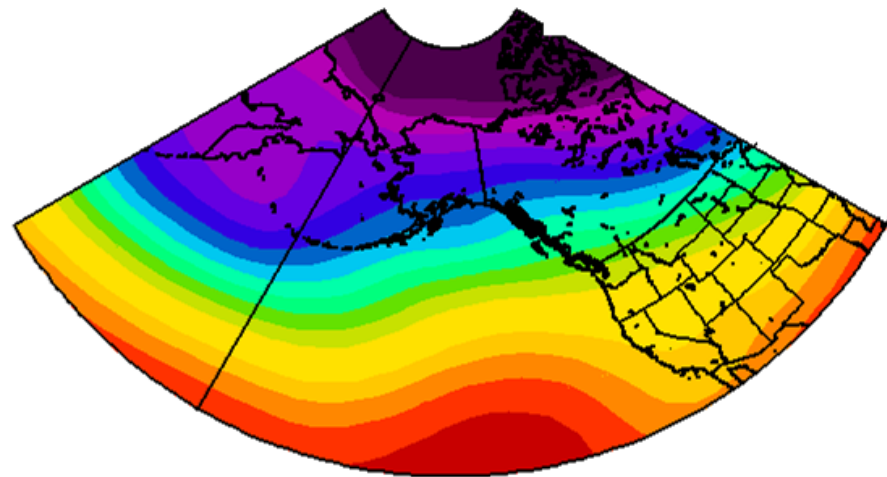


Stephani Zador

Kerim Aydin

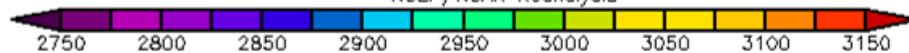
NPFMC SSC

Sept. 28, 2020



700mb Geopotential Height (m) Composite Mean
2/1/20 to 4/30/20

NCEP/NCAR Reanalysis



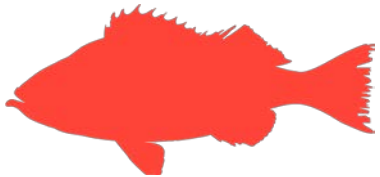
Objective 1: Identify areas of concern including potential ‘red flags’

Take home message: Most indicators received to date are within expected bounds in all regions.

Objective 2: Data loss and mitigation

Take home message: Despite delays and cancellations in data collection and sample analysis due to COVID, we are able to mitigate some data loss thanks to AFSC and external partnerships.

(THANK YOU!)



Spring PEEC (May 2020; virtual)

Preview of Ecosystem and Economic Conditions

Meeting objectives:

1. Identify areas of concern or unusual conditions relevant to ecosystem and stock assessments.
2. Inform upcoming surveys and Council process.



Gulf of Alaska

- ▶ Warmth at depth
- ▶ Juvenile pollock

Aleutian Islands

- ▶ Fluxes through Aleutian passes
- ▶ Warmth at depth in EAI

Eastern Bering Sea

- ▶ Near-normal ice extent, but thin/weak
- ▶ Primary productivity (spring bloom)
- ▶ Gray whale UME

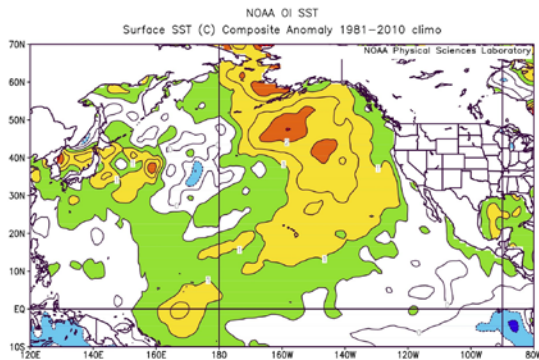


- ⚓ North Pacific Overview
- ⚓ Gulf of Alaska (Bridget Ferriss)
- ⚓ Aleutian Islands (Ivonne Ortiz)
- ⚓ Eastern Bering Sea (Elizabeth Siddon)

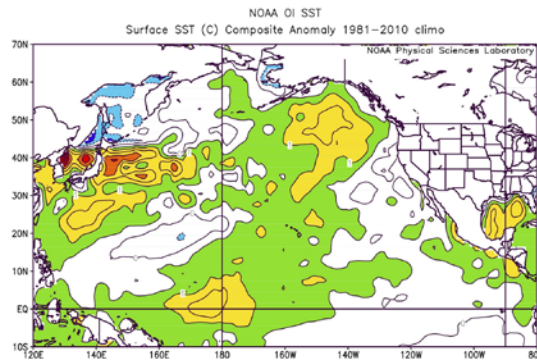
Sea Surface Temperature Anomalies

Bond

Warmer than normal across the region; moderate temps in EGOA due to upwelling.



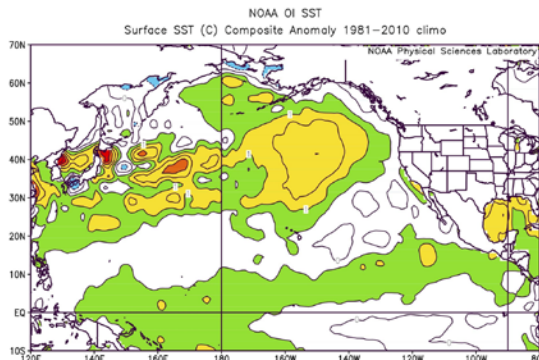
Autumn 2019



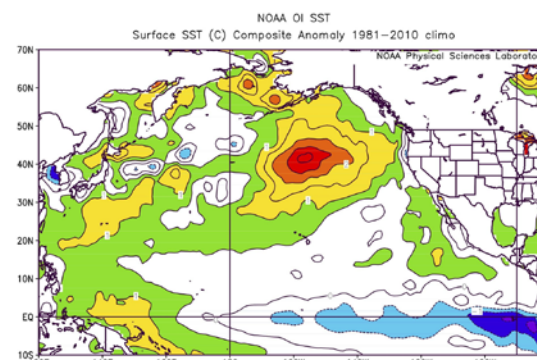
Winter 2019/20

Moderation of warmth in GOA; considerable cooling in EBS.

Warm across the region; increased SSTs in SEBS and rapid ice retreat.

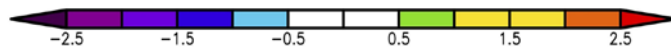


Spring 2020



Summer 2020

Warmth east of dateline; cooling west of dateline.



- Warmth at depth
- Juvenile pollock

Gulf of Alaska



Limited Ecosystem Data Loss in GOA

Data Collection

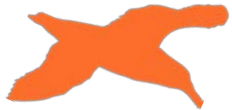
- Off-year for biennial NOAA surveys in GOA
- Other annual, regional NOAA surveys completed
- Existing partnerships continue to inform

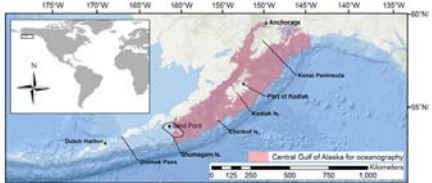
Data Loss

- Delayed analysis of 2019 data (lab access)
 - Species ID, fish condition
- Cancelled non-NOAA surveys
 - Seabird reproductive success (Alaska Maritime National Wildlife Refuge/USFWS)
 - Nearshore habitat sampling (National Parks Service)

Data Mitigation

- Seabird synthesis (COASST, USFWS, USGS, ISRC)

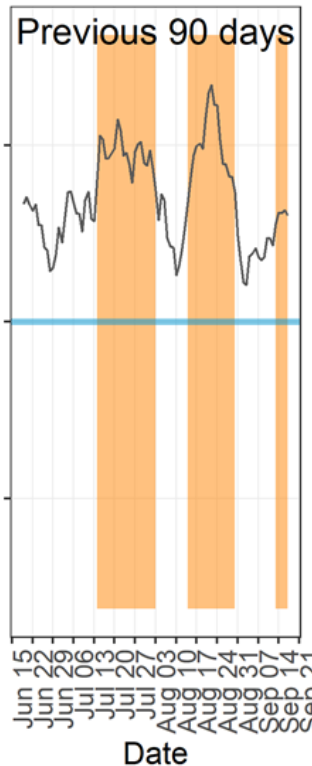
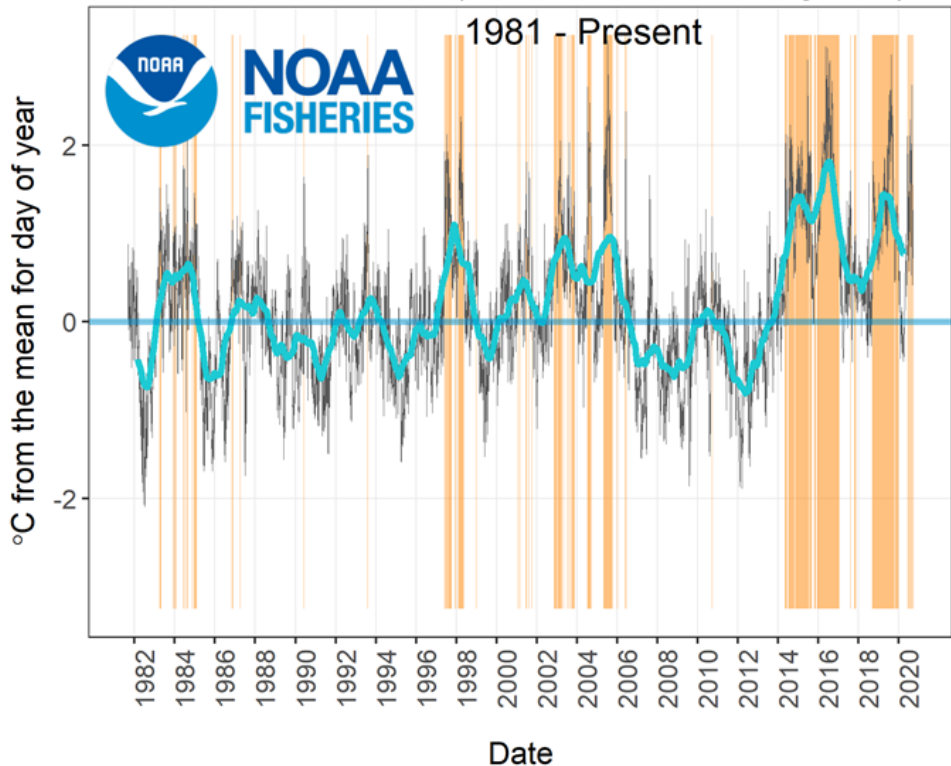




Ocean Temperature: Western Gulf of Alaska Marine Heatwave Index

S. Barbeau

Central Gulf of Alaska (145° W - 160° W longitude)



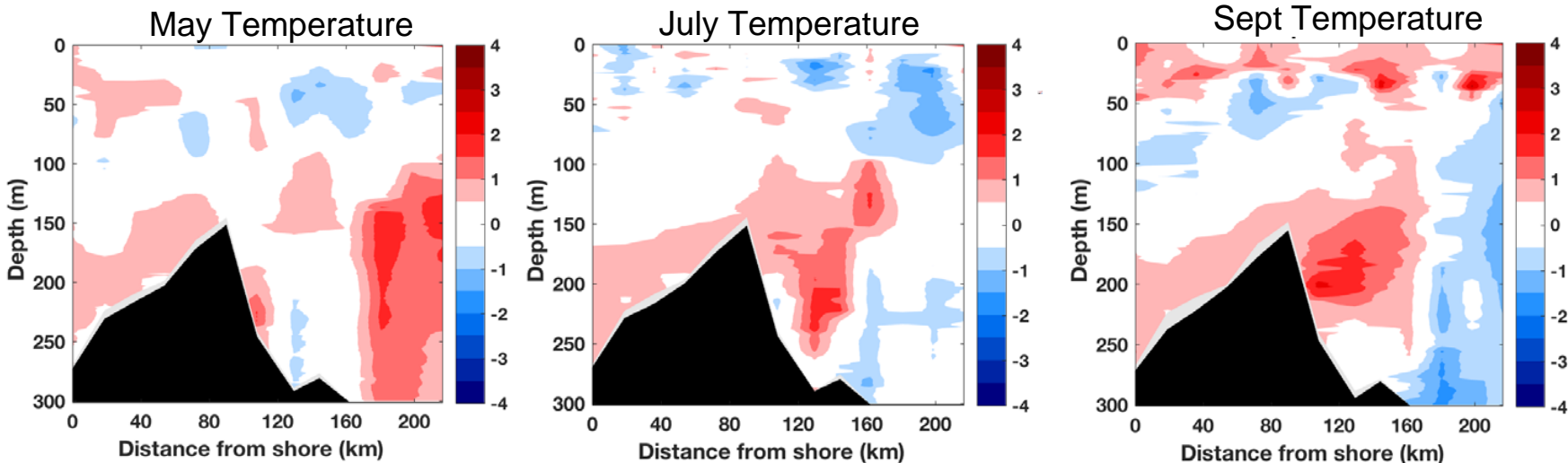
- 2019 Heatwave ended Dec. 23.
- Summer 2020 temperatures oscillated around heatwave threshold.

A. Hobday algorithm, through September 21, 2020

▶ Ocean Temperature: Warmth At Depth

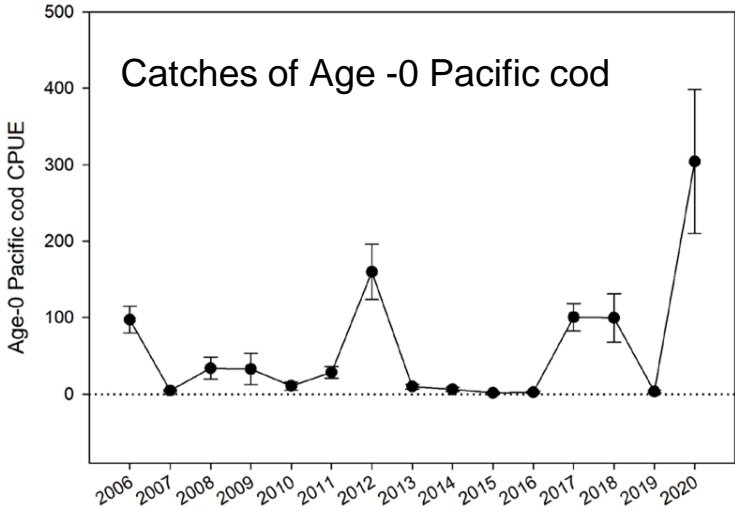
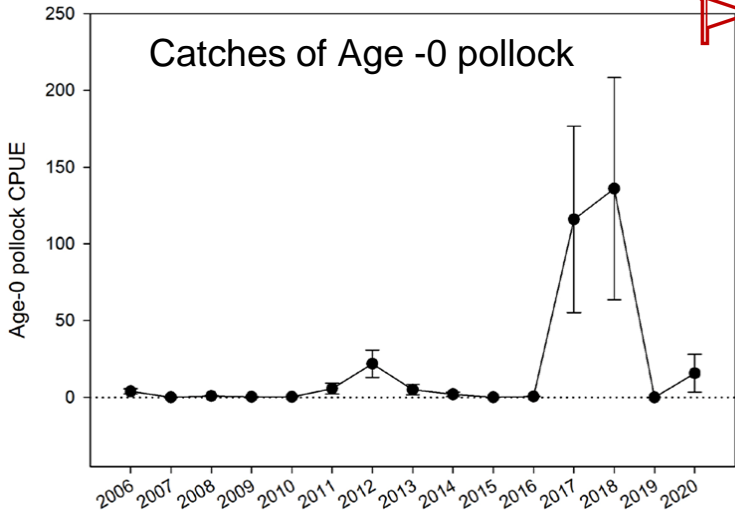
S. Danielson, R. Hopcroft,
R. Campbell

- Residual heat at depth nearshore and at distance from shore
- Seward Line-cross shelf transect temperature anomaly profile



Groundfish: Beach Seine (Kodiak)

B. Laurel

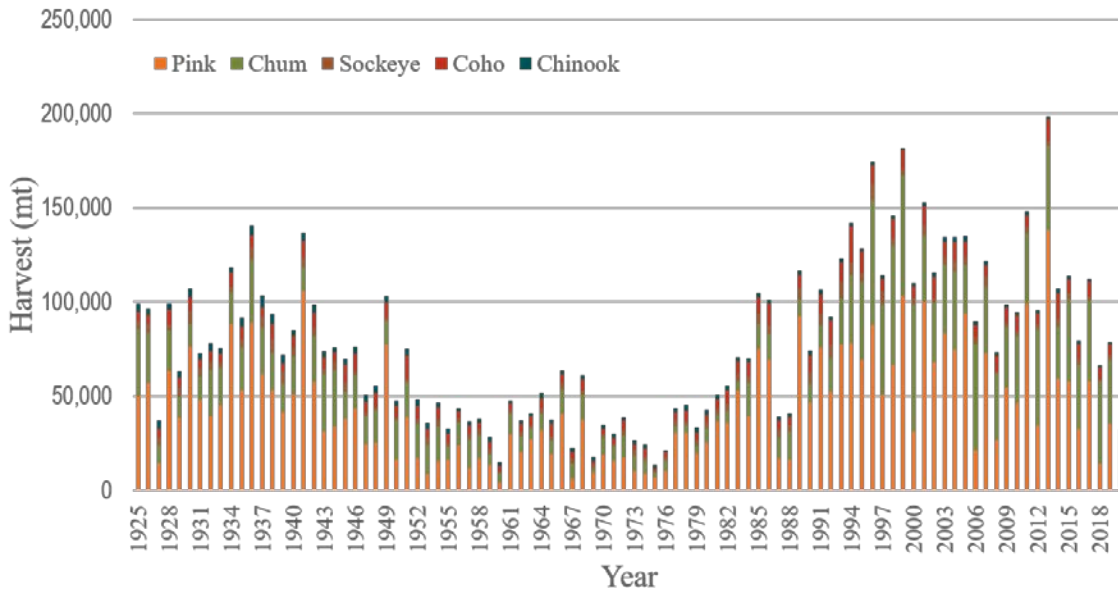


- Age-0 pollock: increase from 2019 (similar to 2012) but lower than higher abundance in 2017/2018
- High catches of age-0 Pacific cod
 - Caveat – only 18 of 64 hauls completed for this stat
- Also saw relative high catches of YOY cod and pollock similar to 2018 (much higher than 2019) in expanded WGOA beach seine (Litzow, Abookire)

Low Salmon Catches in GOA & SE Alaska

J. Murphy, R. Brenner

SE Alaska Commercial Salmon Harvest, 1925-2020*
(source, www.npafc.org, and Rich Brenner, ADFG)



*2020 harvest data updated on Sep 22, 2020

- GOA low commercial salmon catches (chum & sockeye)
- SEAK lowest since 1976 (pink, sockeye, chum)
- Increasing juvenile abundance since 2017 indicates harvests will increase in coming years although may still be below average

Data Mitigation: Preliminary Seabird Synthesis

COASST, R. Corcorin, S. Hatch



Colony attendance and reproductive success appear “fair to good” but variable between colonies (kittiwakes & puffins)

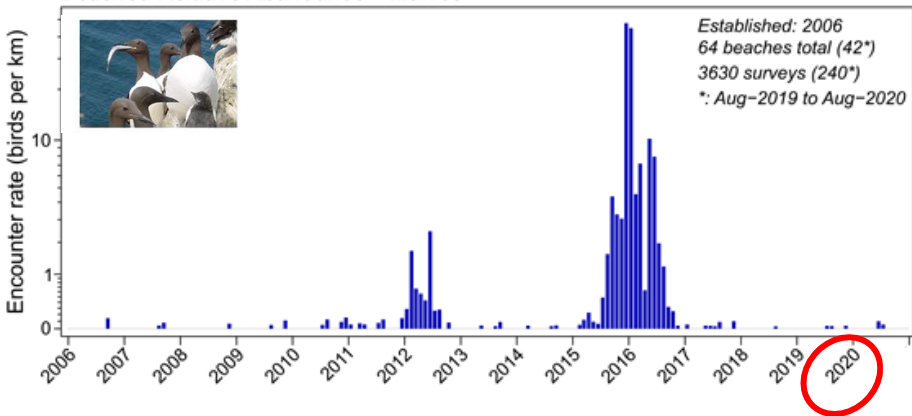


Reports of possible late breeding by diving, fish eating species (murre & rhinoceros auklets)



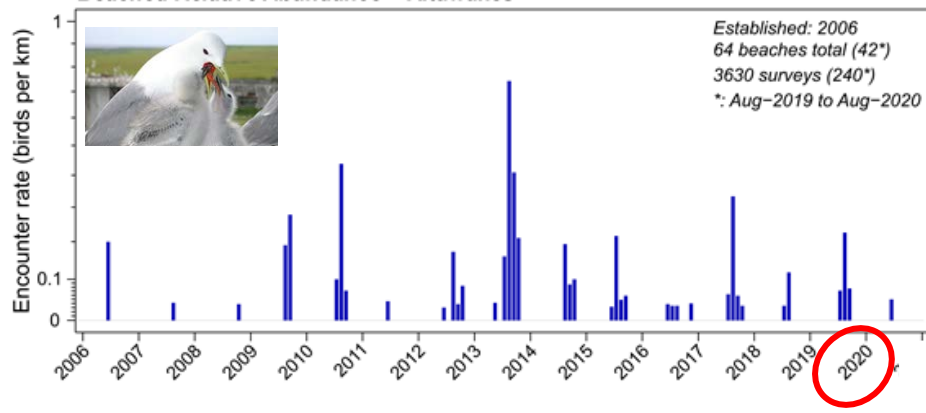
No unusual mortality events recorded in any group

Beached Relative Abundance – Murres



Diving, fish eating bird mortality, COASST

Beached Relative Abundance – Kittiwakes

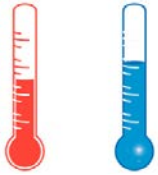


Surface feeding, fish eating bird mortality, COASST

GOA: Key Messages



Limited ecosystem data gaps (AFSC & partnerships!)



Ocean temperatures: not a heat wave year, warm summer SST, and residual warmth at depth



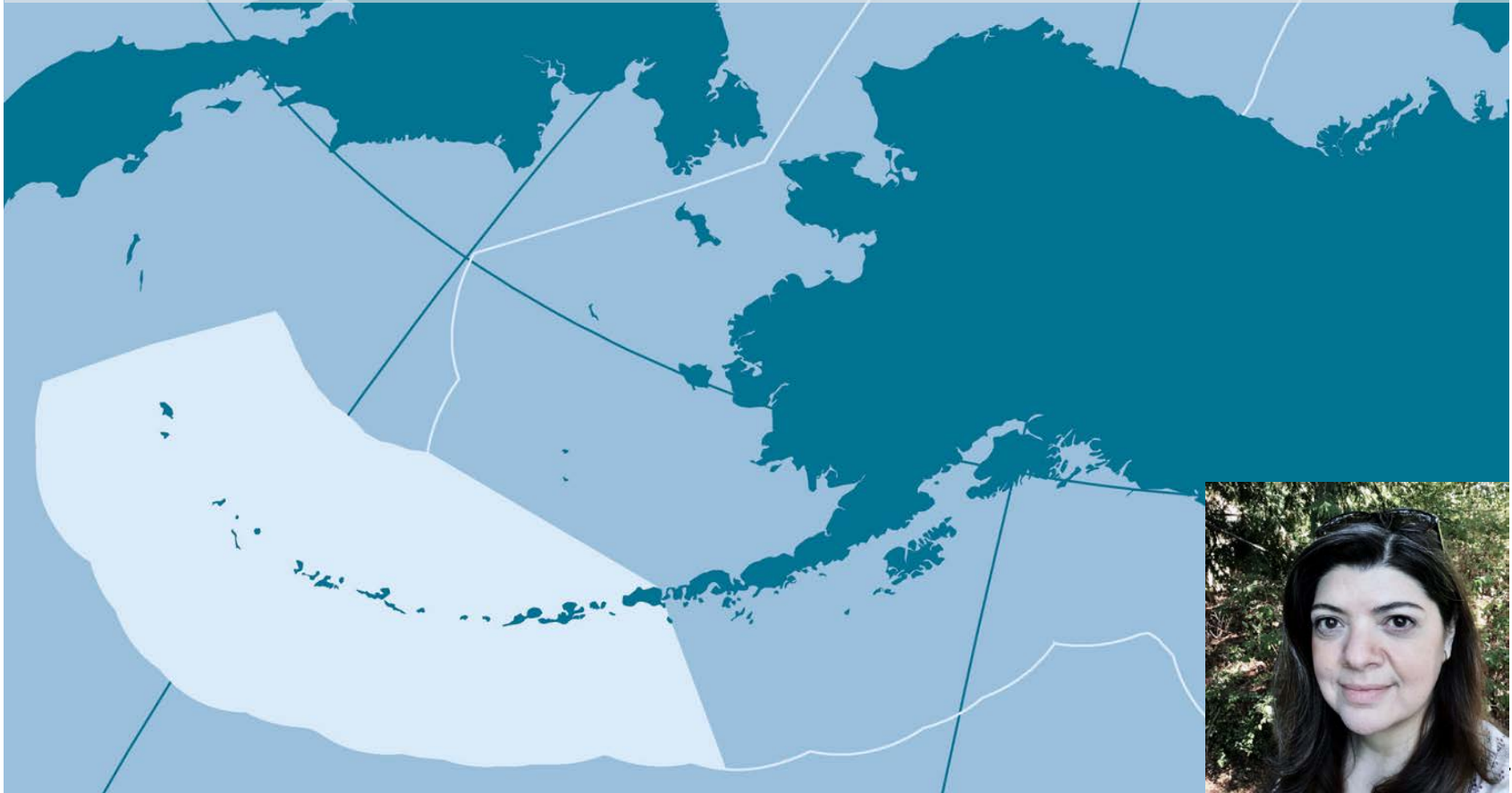
Relative increases in age-0 walleye pollock and age-0 Pacific cod



Low salmon catches across GOA, especially in SE AK

Aleutian Islands

- Fluxes through Aleutian Passes
- Warmth at depth in EAI



High Ecosystem Data Loss in AI

Data Collection

- Delayed benthic survey (sea otters) by FWS
- Existing and new partners fill knowledge gaps: satellite, industry, consulting, state
- Economic/community data mostly unaffected

Data Loss

- Fewer data streams relative to other LMEs so higher proportional impact
- Lost biennial NOAA groundfish survey
 - Groundfish, jellyfish, water column temperature
- Seabird reproductive success (AK Maritime National Wildlife Refuge/USFWS)
- Steller sea lion pups and non pups counts

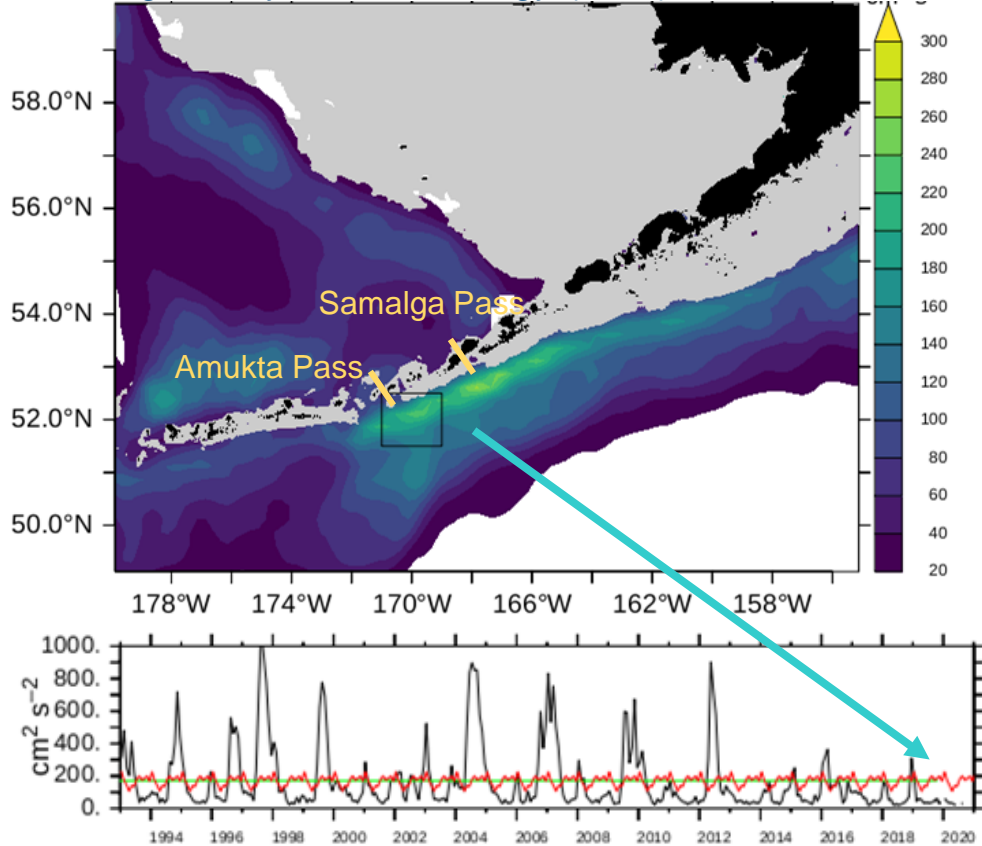
Data Mitigation

- Seabirds synthesis (Coastal Observation Seabird Survey Team, USFWS, USGS)
- Marine Mammal Stranding Database (NOAA)
- Satellite data (Chla)
- Bottom temperature from crab pots

Eddies in the Eastern Aleutians

▶ Ladd

Average Eddy Kinetic Energy (EKE) Jan 1993 - Dec 2020



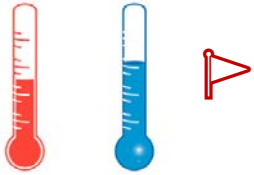
- EKE low since 2012 - longest stretch with low flow/ EKE
- Different from WGOA where EKE was high in 2020.
- Influences flow through Amukta Pass
- Sustained below-average transport of heat, salt, and nutrient fluxes to the Bering Sea, and Bering Slope & Aleutian North Slope Currents.

Aleutian Islands community news

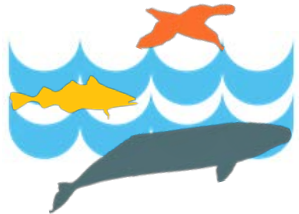
- HABs Unalaska: recent community member died after consumption of blue mussels and snails; above normal (140x) levels in Unalaska Bay
 - Overall low toxicity so far ($<80\mu\text{g}/100\text{g}$ limit), lower than average for AK
 - Expanded local monitoring effort
- Golden Harvest temporarily closed; ongoing work on expedited BSAI Pacific cod trawl CV cooperative style Limited Access Privilege Program
- Atka mackerel effort: changes due to large vessel retirement, catch now fished by smaller vessels with lower capacity, which increased product quality and prices



AI: Key Messages



Ocean temperatures: cooler summer SST, no information on water column temperature due to lack of survey. GODAS subsurface GOA/ AK Pen. not extended to AI, \; 100-200m warmer than mean since 2016 in CAI, EAI, cooler in WAI -tentative. EKE low for 8th year in a row.



High ecosystem data loss for 2020 particularly for all upper trophic levels: fish, seabirds and marine mammals.



Community and fishing impacts due to HABs (particularly subsistence harvest) unknown so far for upper trophic levels, Golden Harvest closure, and changes in Atka mackerel fishery



Eastern Bering Sea

- ▶ Near-normal ice extent, but thin/weak
- ▶ Primary productivity (spring bloom)
- ▶ Gray whale UME



Moderate-High Ecosystem Data Loss in EBS

Data Collection

- On-year for biennial NOAA surveys in the EBS
- Nearly all NOAA surveys were canceled (DBO survey underway)
- Internal and external collaborations provided continued and new information (e.g., Alaska Sea Grant, industry)

Data Loss

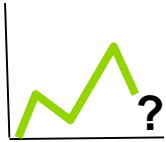
- Delayed analysis of 2019 data due to restricted lab access
- Upper trophic levels (e.g., groundfish, seabird reproductive success, marine mammals)

Data Mitigation

- ROMS model output (bottom temperature, OA)
- Satellite-derived data (SST, chl-a)

Indicator Improvements

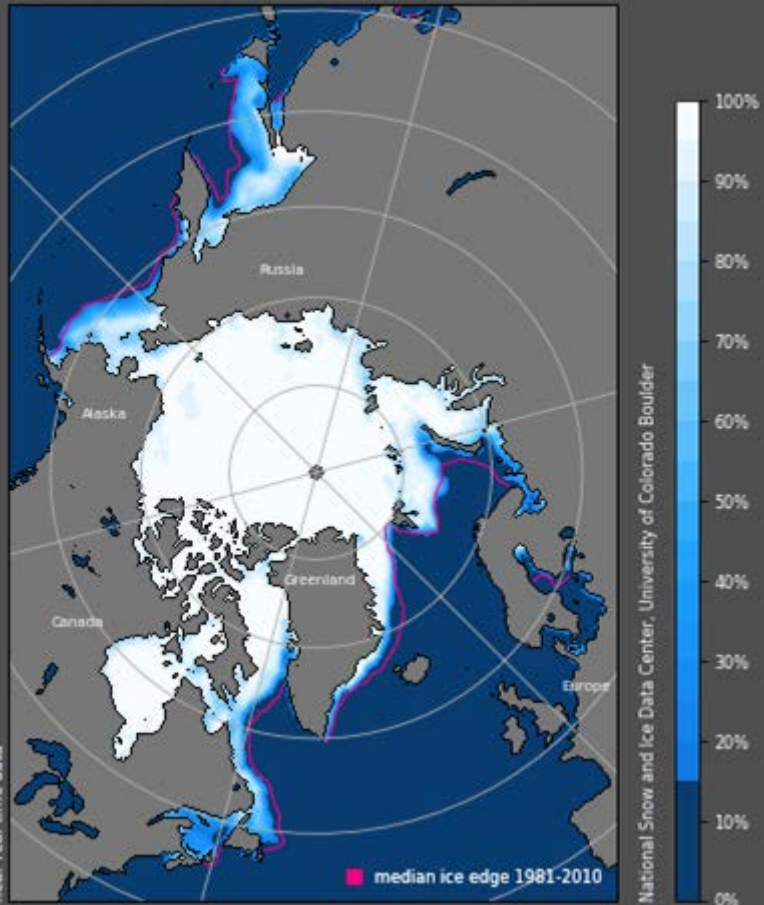
- Updates based on 2019 data (e.g., groundfish condition metric, zooplankton timeseries)



Arctic Sea Ice Extent

National Snow and Ice Data Center

Sea Ice Concentration, Mar 2020



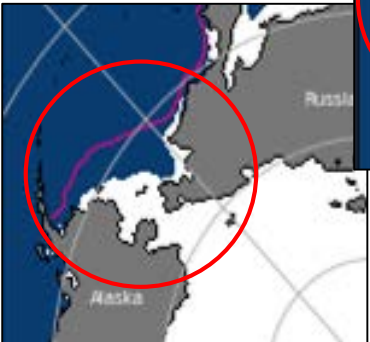
March 2020



March 2019



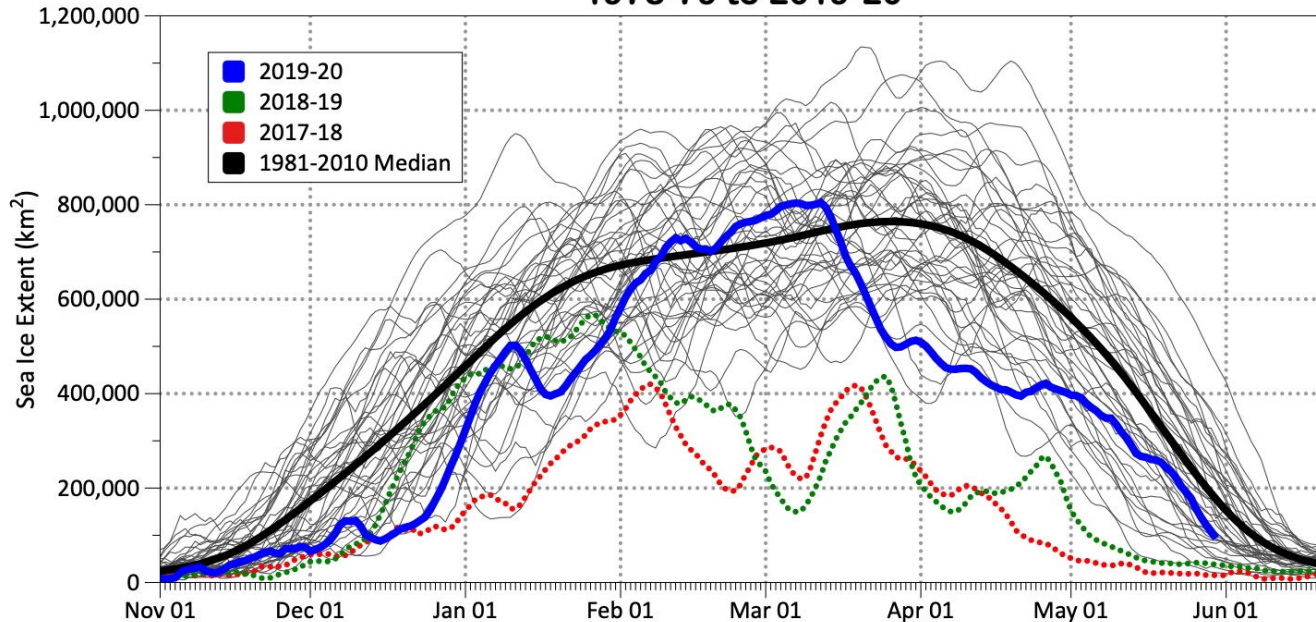
March 2018



▶ Bering Sea Ice Extent

Thoman

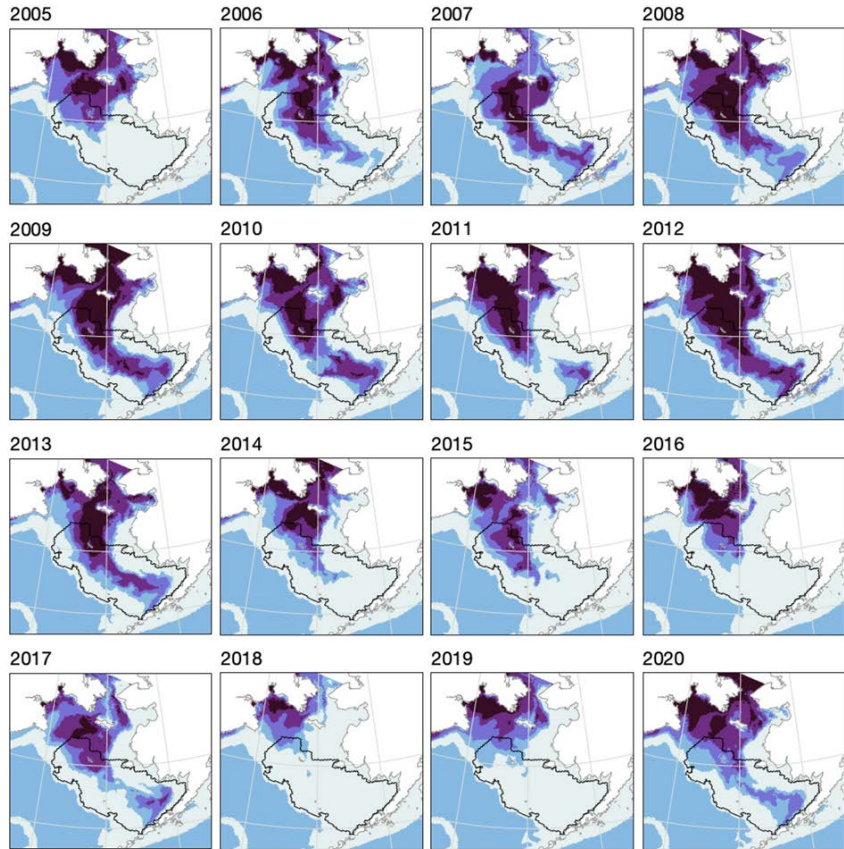
**Bering Sea Daily Ice Extent
1978-79 to 2019-20**



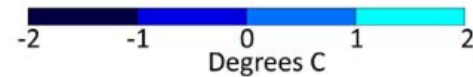
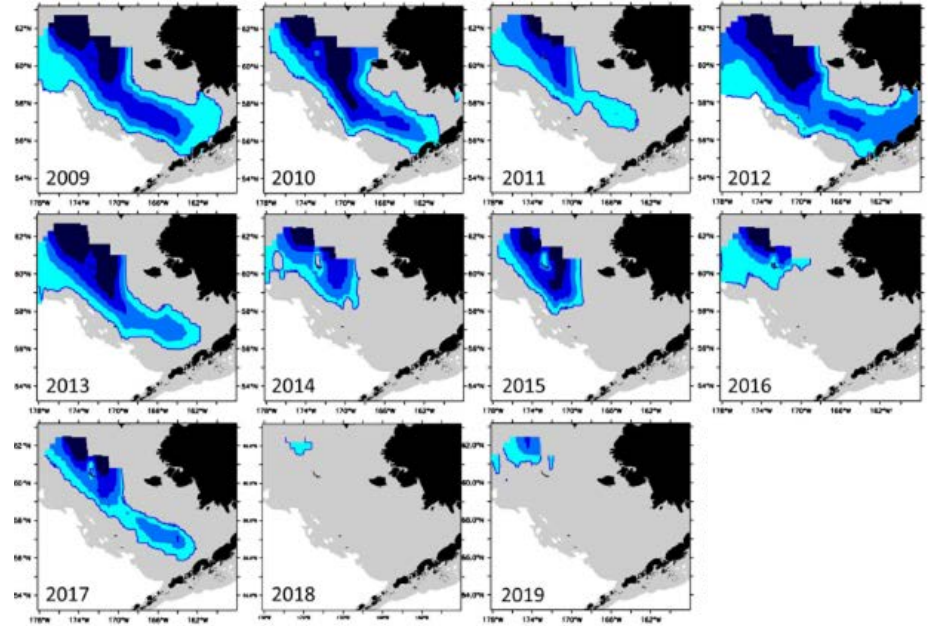
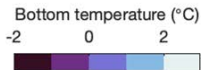
- Residual warmth delayed freeze-up.
- Cooling in late winter resulted in a rapid build-up of sea ice.
- Exceeded median in February/March.
- Southerly (warm) winds in spring lead to rapid ice retreat.

Data Mitigation: Bottom Temperatures

Kearney, Aydin, Britt, Ladd



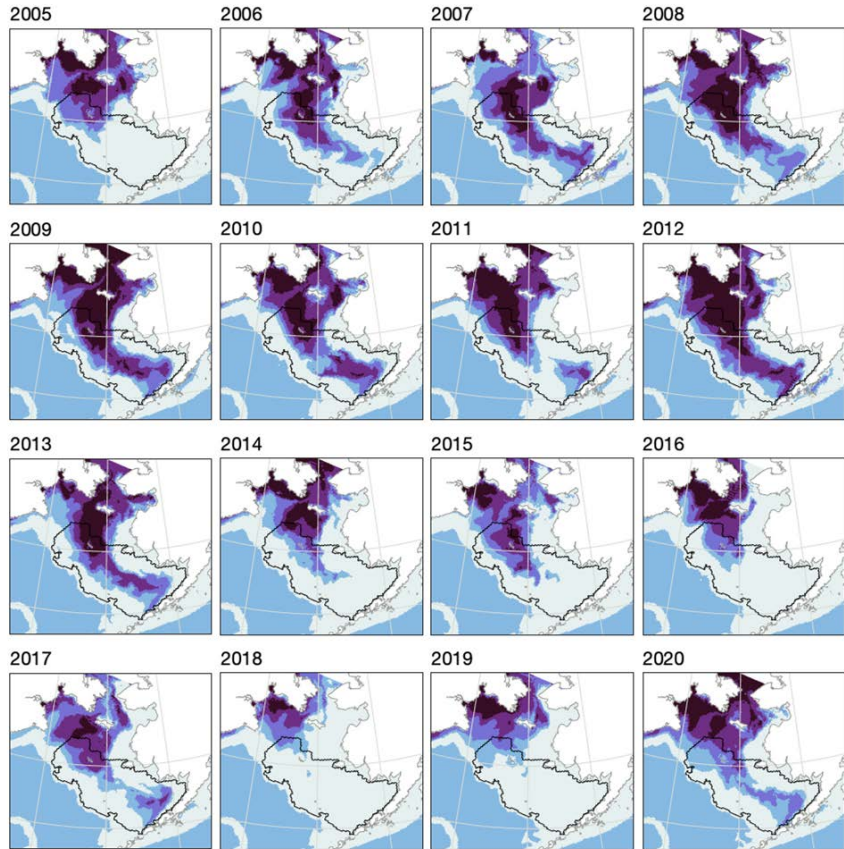
Bering 10K ROMS hindcast



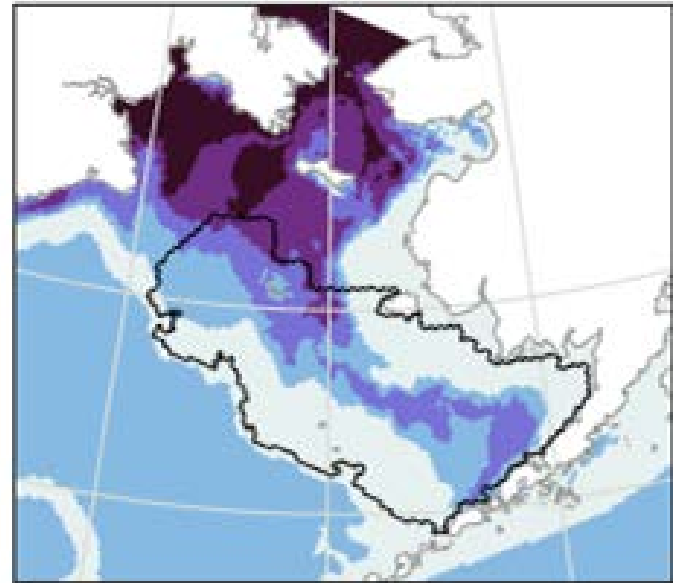
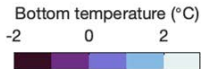
Data Mitigation: Bottom Temperatures

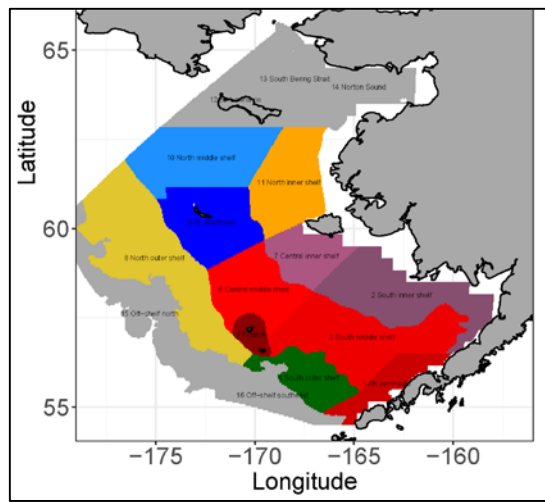
Kearney, Aydin

2020 was an average year



Bering 10K ROMS hindcast





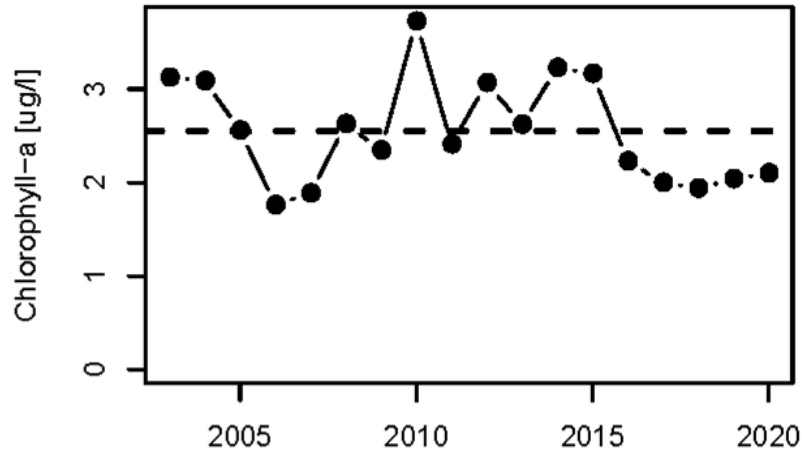
Primary Productivity

Nielsen, Eisner



- Biomass has been below average for the last 5 years.

Southern middle domain (April-June)



- Timing of peak bloom was similar to 2019; about a week earlier than the long-term average.



Gray Whale UME

Savage

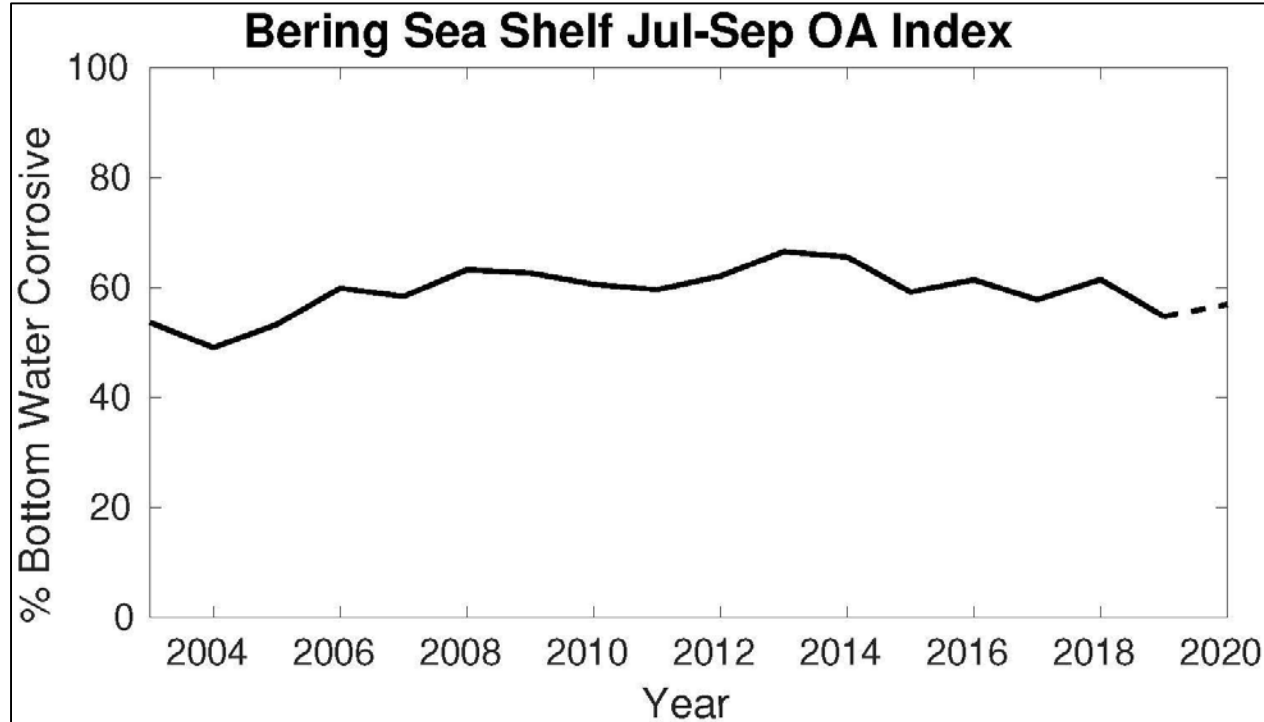
- 2019 Unusual Mortality Event continued into 2020.
- Whales spend summer and fall in the Bering and Chukchi Seas feeding on invertebrates (e.g., amphipods, mysids, crab larvae).
- Potential explanations include nutritional stress, contaminants, biotoxins, disease and parasites, direct anthropogenic factors, and having reached carrying capacity.



Photo courtesy Mark Kosbruk

Hot Topic: Ocean Acidification

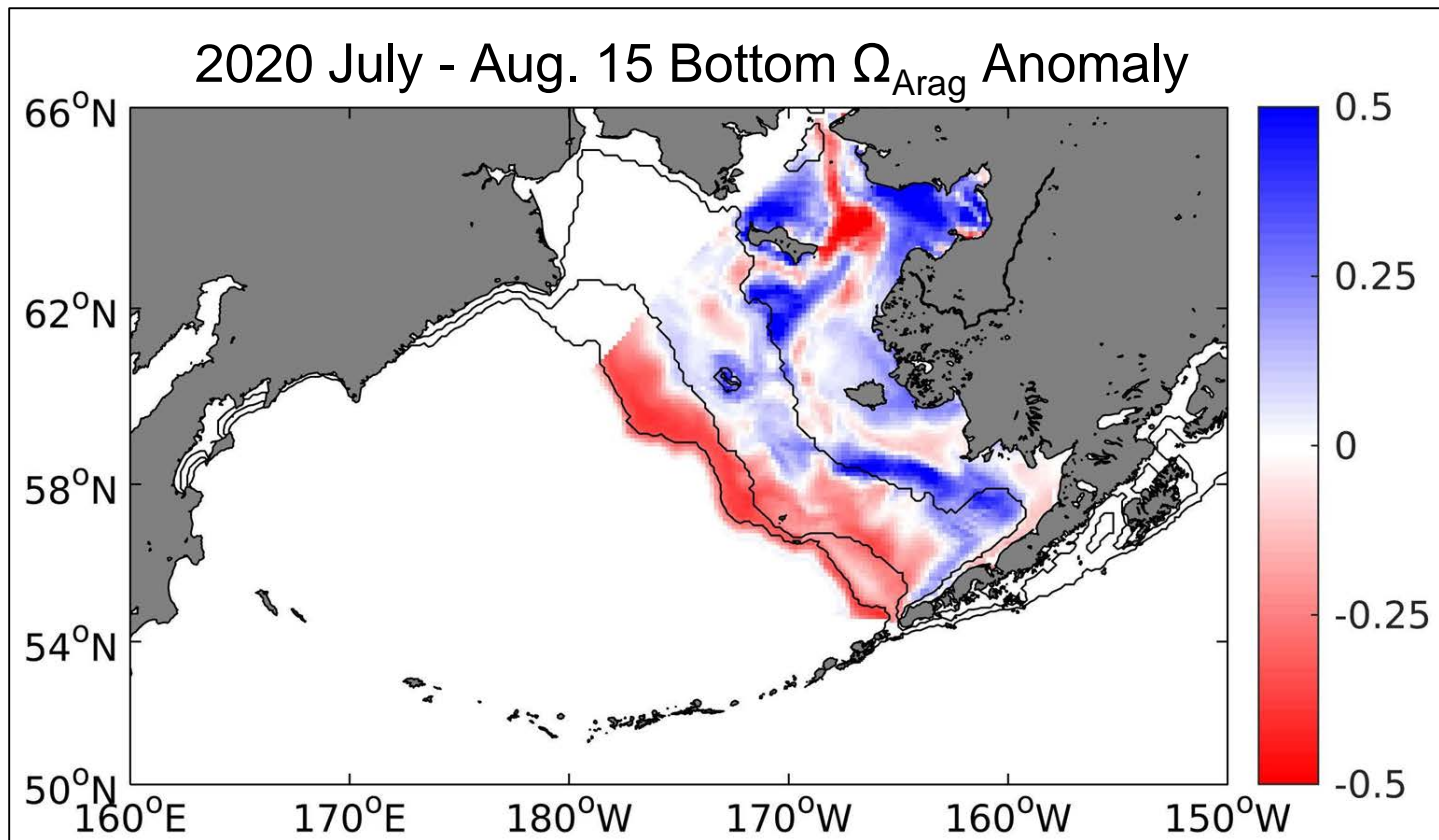
Pilcher, Cross



- The spatial extent (% of the EBS shelf) of bottom waters with an average Ω_{arag} value <1 for July - Sept.
- Ω_{arag} value $<1 \approx \text{pH}7.8$. Considered corrosive.
- 2020 value only through Aug. 15 (underestimate).

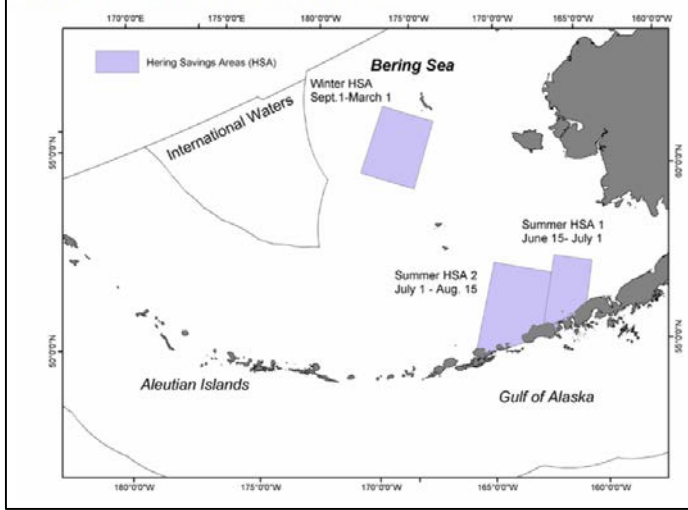
Hot Topic: Ocean Acidification

Pilcher, Cross



- Anomaly plot shows 2020 compared to the 2003-2019 mean.
- Blue is better; red is worse.

Figure 3-20 Herring Savings Areas.



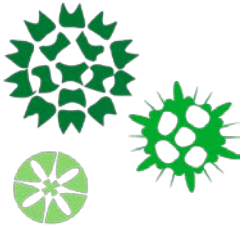
- There are several other ‘hot topics’ we are following, including:
 - Herring Prohibited Species Catch
 - Marine debris
- We are currently collaborating with partners to better understand the ecosystem impacts and implications of these issues.
- We will bring you a more thorough summary of these in December.



EBS: Key Messages



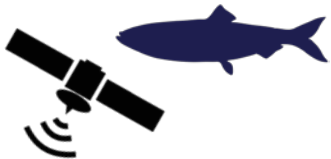
Sea ice extent was near-normal, but quality was thin/weak. The ice retreated rapidly in spring. *Will sea ice formation be delayed due to residual warmth?*



Spring bloom biomass was below average for the 5th consecutive year. Peak bloom occurred early (similar to 2019). *Due to missing data collection on the zooplankton community, we cannot address whether low biomass is due to grazing.*



Gray whale UME continued. *May indicate cumulative impacts of changes in food web structure and carrying capacity of the NBS.*



Internal and external collaborations have provided continued and new information to mitigate data loss and inform emerging hot topics. *Thank you!*

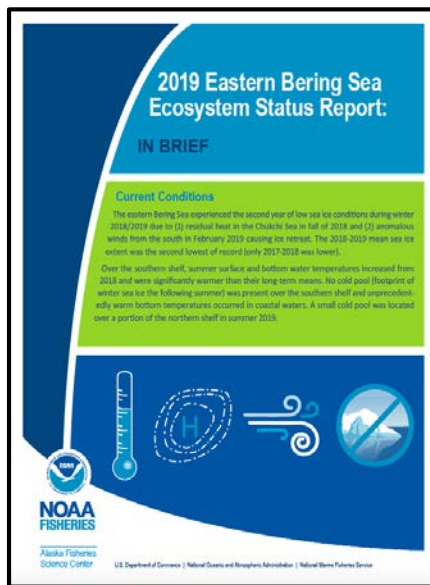
2020 Ecosystem Status Report

Communication Products

Full Reports for EBS, GOA, and AI



In Briefs for EBS, GOA, and AI



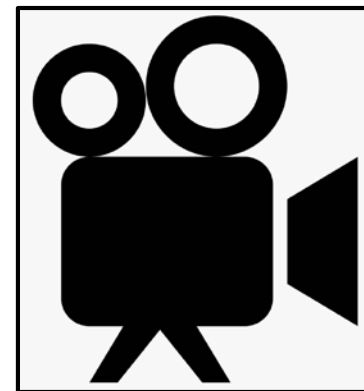
Story Maps for EBS, GOA, and AI



[Gulf of Alaska 2019: It's All About the Food](#)

[2019 Second Year of Record Low Sea Ice in the Bering Sea](#)

Educational outreach videos



“Sets of ecosystem data that indicate there may be problems not accounted for in the assessment models need to be brought to the attention of the SSC and the Plan Teams as early in the process of setting specifications as possible....this information should be presented at the October Council meeting”

SSC minutes, Oct 2017

Questions for the SSC:

1. Would you like to receive ecosystem previews each year, or only when ‘problems’ occur?
2. If the latter, what constitutes a ‘problem’?

