2022 AFSC Forage Species Congress

Joint Groundfish Plan Team
September 19, 2022

Steering Committee:

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A Forage Species is What?

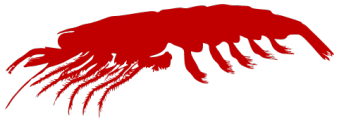
We define forage species based on their functional role:

Actively mobile species that contribute substantially to volume or energetic quality of forage for species of importance for commercial, subsistence, or protected spp.

FMP forage fish group*:

Sand lance, capelin, eulachon, other smelts, deep-sea smelts, myctophids, & krill

- "Ecosystem components"
- targeting prohibited
- retention and processing discouraged



Juvenile groundfish:

e.g. walleye pollock, Arctic cod

- Federal management of adults

Juvenile salmon:

- State management of adults

Juvenile invertebrates:

e.g. snow crab

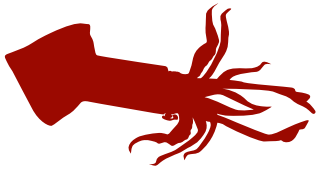
- State management of adults

Herring, shrimp:

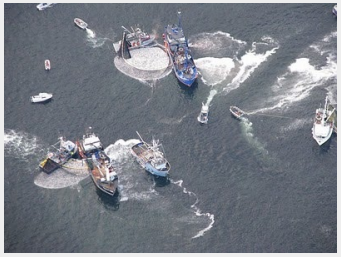
- state commercial fisheries
- federal prohibited species

Squid:

- "Ecosystem components"
- requested by Plan Team & SSC



Forage Species: Why Do We Care?



commercial harvest (AK)
herring
shrimp

subsistence & personal use
eulachon &
other smelts
herring

commercial harvest of adults
pollock
salmon

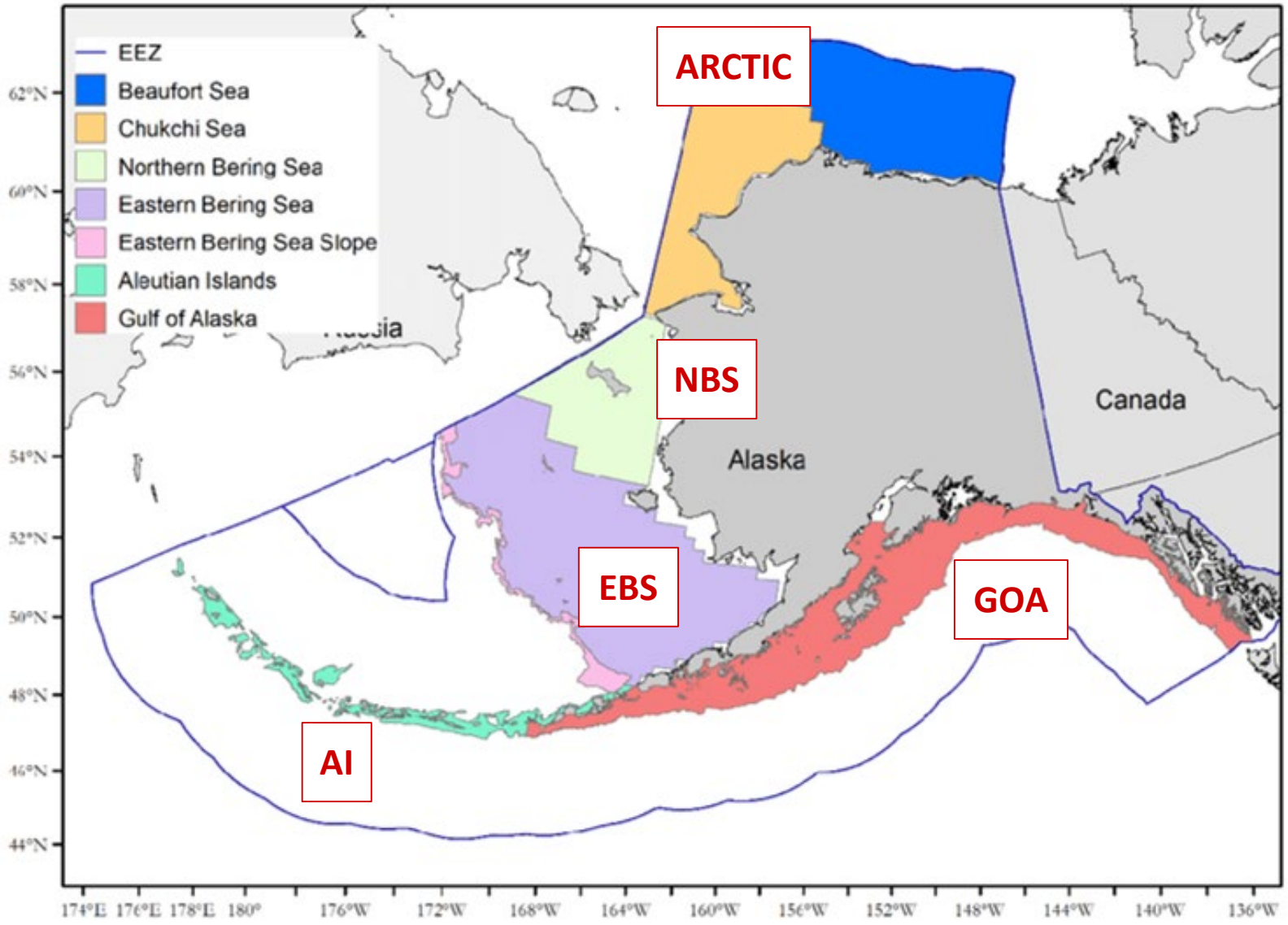
Ecological, socioeconomic, and cultural importance, but major data gaps:

- Lack of directed monitoring
- Monitoring challenging due to behavior, distribution, survey design, and availability to gear
- Limited coordinated research

bycatch (US)
herring
eulachon
squid

habitat impacts
salmon
eulachon
herring

Regional differences in spp. importance & knowledge gaps



2022 AFSC Forage Species Congress

Goal: *Improve the AFSC's state of knowledge regarding forage species in Alaska's large marine ecosystems and integrate research efforts across programs*

Objectives:

1) Identify species and species groups that serve important ecosystem roles as forage in Alaska large marine ecosystems;
2) Assess forage-related research efforts regarding these species at the AFSC and other institutions;
3) Identify major scientific goals for forage research across the AFSC and associated knowledge gaps, and identify paths to improve data collection, analysis, and information-sharing;
4) Provide specific recommendations to Center leadership regarding (1) important ecological and management questions that could be addressed in the next 5-7 years and (2) organization of cross-program forage research.

AFSC Congress Overview

2021 AFSC Condition Congress

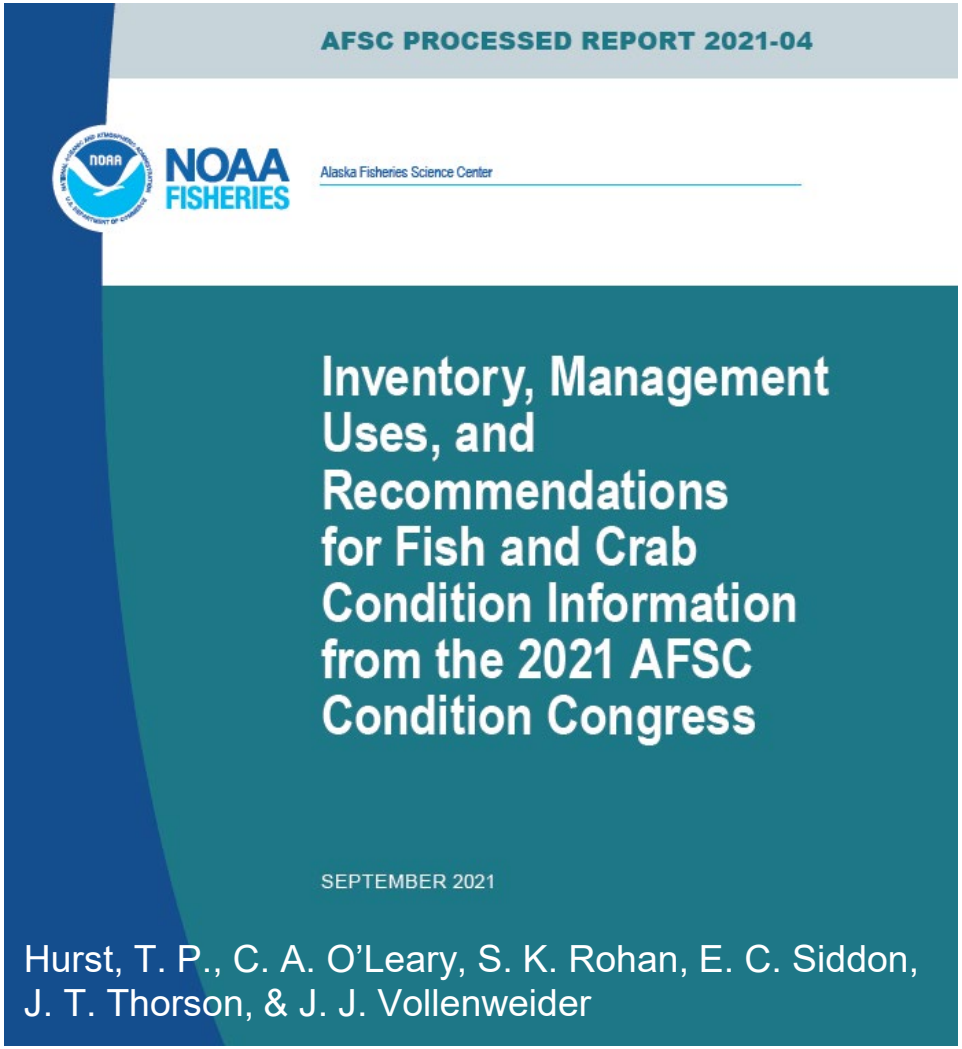
2-day virtual workshop to solicit input from AFSC staff & affiliates

- Day 1 lightning talks
- Day 2 guided discussions

Produced an AFSC Processed Report

- Defined broad classes of condition metrics
- Provided an inventory of current research
- Identified uses for condition information
- Provided process & research recommendations

Photo: National Geographic



2022 Congress Meeting Structure

Day 1 (March 30): Information

Overviews

Review of Existing Information:

Overview of forage spp (Ormseth)
Management considerations (Thorson)
Key predator-prey relationships (Ferriss)
Dedicated surveys - GOA & AI (Siple)
Dedicated surveys - BS & Arctic (Ormseth)
Non-AFSC research programs (Arimitsu, USGS)
Process studies (Suryan/Rogers/Copeman)
Fish predator food-habits research (Reum)
Seabirds as samplers (Zador)
Marine mammals as samplers (Zeppelin/Luxa)
Ecosystem modeling (Aydin/Whitehouse)
Data synthesis (McGowan)

Discussion

Day 2 (April 6): Discussion

Plenary

Breakout 1: Identify major goals & knowledge gaps by region

- *Gulf of Alaska*
- *Bering Sea*
- *Arctic*

Breakout 2: Recommendations for future research priorities

- *Improved surveys & data collection*
- *Information needed for management*
- *Process and modeling needs*

Plenary

Major Scientific Goals & Knowledge Gaps: Gulf of Alaska

Breakout session led by M. Zaleski (AKRO/HC) & M. Siple (RACE)

Discussed 4 perspectives for prioritizing key species:

Spatial, temporal, ESRs, predators

Key species:

Herring, capelin, eulachon, sand lance, krill, and juv. pollock

Scientific goals/priority data gaps:

Integrate existing data sources from surveys* & predators**

* Perretti & Thorson '19; McGowan et al. '20

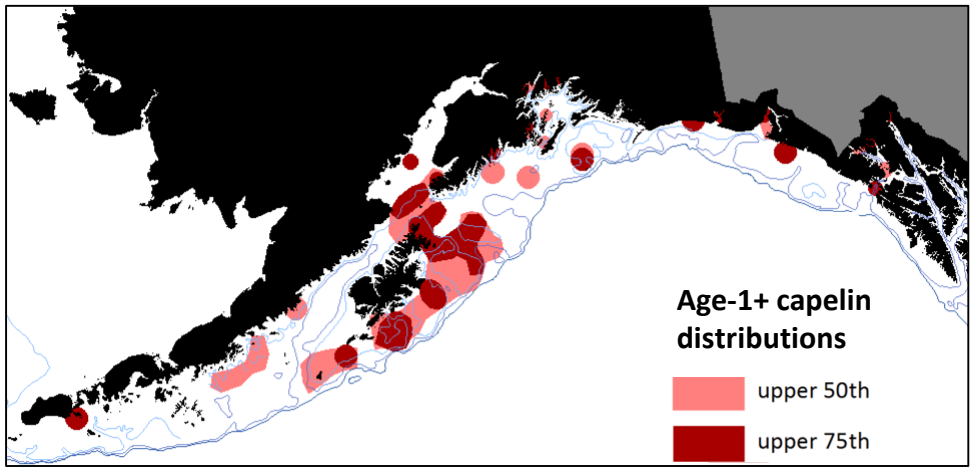
** Piatt et al. 2018; Barnes et al. '20; Ng et al. '21

Expand nearshore spawning surveys

- collaborate with local communities
- fill gaps in the Nearshore Fish Atlas (EFH)

Explore utility of archived acoustic data

Increased collaboration within AFSC & with outside partners



Credit: McGowan et al. 2020

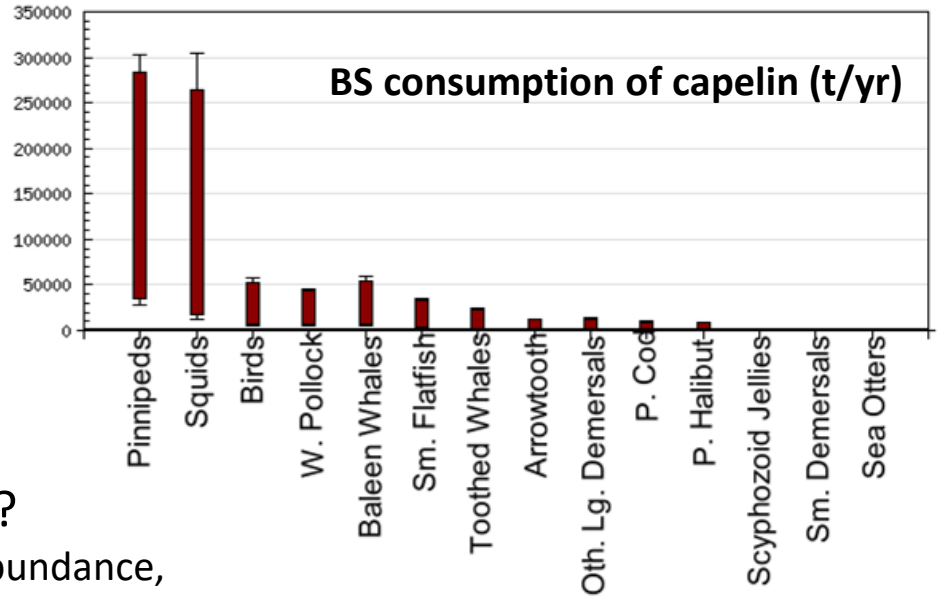
Major Scientific Goals & Knowledge Gaps: Bering Sea/Aleutians

Breakout session led by T. Zeppelin (MML) & L. Rogers (RACE)

Key species prioritized by management & ecological importance in two regions: Bering Sea shelf (< 200 m) & deep sea basin

Key species:

Juvenile pollock, cod, & salmon, capelin, sand lance, eulachon, herring, northern smoothtongue, krill, squid



Credit: K. Aydin

Scientific goals/priority data gaps:

How will forage species respond to climate change → likely winners & losers?

- Prioritize improved monitoring of changes in abundance, distribution, migration timing, and condition

How often are forage species limiting in food web models?

- Predator perspective, are forage species interchangeable?

Major Scientific Goals & Knowledge Gaps: Arctic

Breakout session led by J. Thorson (HEPR) & J. Vollenweider (ABL)

Key species:

Juv. Arctic cod

Also capelin, saffron cod, sand lance

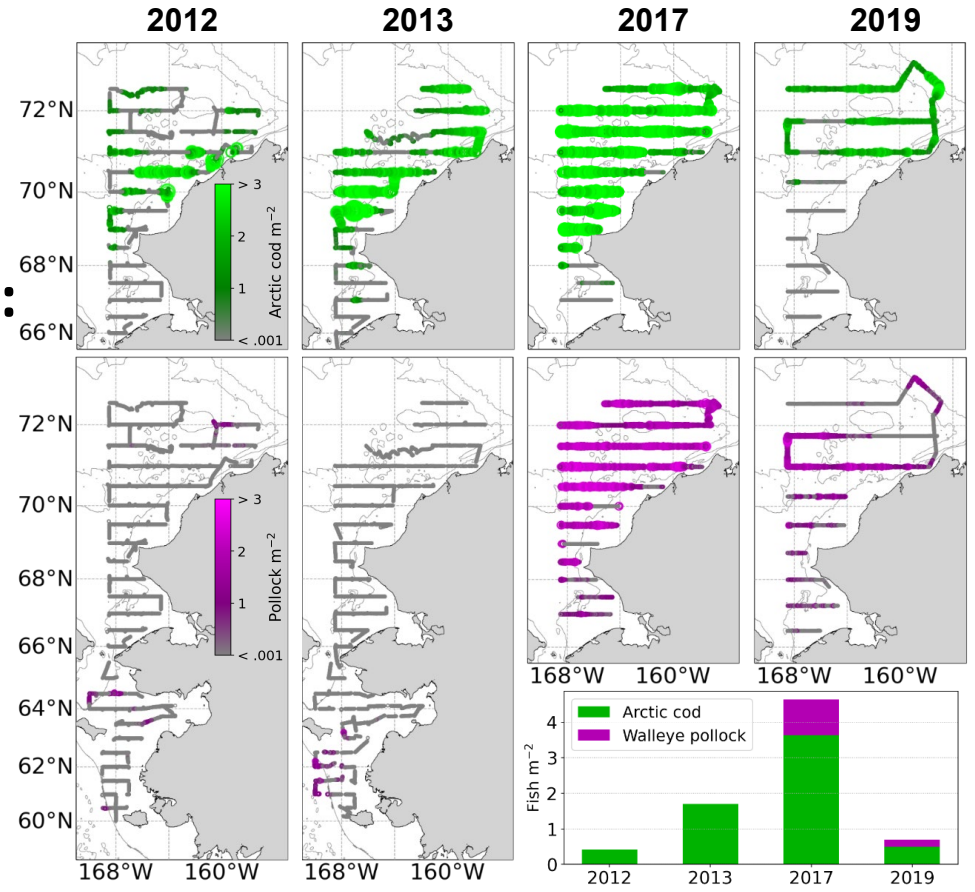
Scientific goals/priority data gaps:

Most info from short-lived time series &/or nearshore studies

Improved understanding of Arctic cod survival from juveniles to recruitment

- Also monitoring adult Arctic cod abundance, maturation, and reproduction

Movement of sub-Arctic species into the Arctic



*Credit: Levine et al. In revision**

Recommendations for Future Research Priorities: Improved Surveys & data collection

*** *In progress* ***

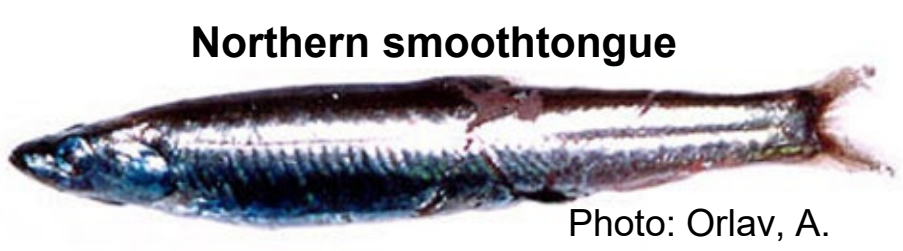
1. **Modifications to existing surveys**
2. **New data collection**
3. **Analytic approaches for improved monitoring**

Recommendations for Future Research Priorities: Identify scientific information needed for EBFM

*** *In progress* ***

1. **Understanding and reporting direct and indirect fishery impacts on forage species**
2. **Understand impact of changes in forage on managed predators**
3. **Measure status of ecosystem to support sustainable fisheries; climate change monitoring & projections**

Each topic will include reporting tool/applications and recommendations



Recommendations for Future Research Priorities: Process/modeling needs

*** *In progress* ***

Process studies priorities for key forage species (non-gadids)

- Habitat characteristics required to support critical life stages & essential fish habitat
- Vital rates and thermal response curves
- Mechanistic linkages between body condition and their future performance
- Abundance, distribution, & early life history info needed for myctophids & squid
- Evaluate differential digestion rates by species, lifestage, and temperature to enhance REEM diet database

Enhanced communication between divisions

- Identify data gaps process research can fill
- Identify forage fish indicators for stock assessment and other models

Next Steps and Expected Congress Products

Present recommendations to:

- AFSC Leadership
- NPFMC Ecosystem Committee (Dec?)

Complete Congress tech memo in FY23

Proposed session on N. Pacific forage species at the North Pacific Marine Science Organization (PICES) annual meeting in Seattle Oct '23

Improved detection & understanding of factors affecting changes in N. Pacific forage communities and implications to ecosystems

- Organize special issue/synthesis manuscripts that also draws from this Congress

Steering Committee Questions for Plan Team

1. Does the Plan Team have enough information on the status of forage species ('ecosystem' component of the SAFE) to ensure that there are enough prey for commercially important groundfish and to ensure healthy, resilient ecosystems?
2. Is the frequency of forage information updates (e.g. forage report produced every other year for each LME) sufficient for the Plan Team to identify changes in forage status?
3. Are there certain species/locations that they could use more or more frequent information?
4. Are forage indicators that are integrated across surveys (e.g. multivariate, index standardization models) preferred compared to survey-specific indicators (e.g., separate acoustic-trawl, bottom trawl, and BASIS indices)?