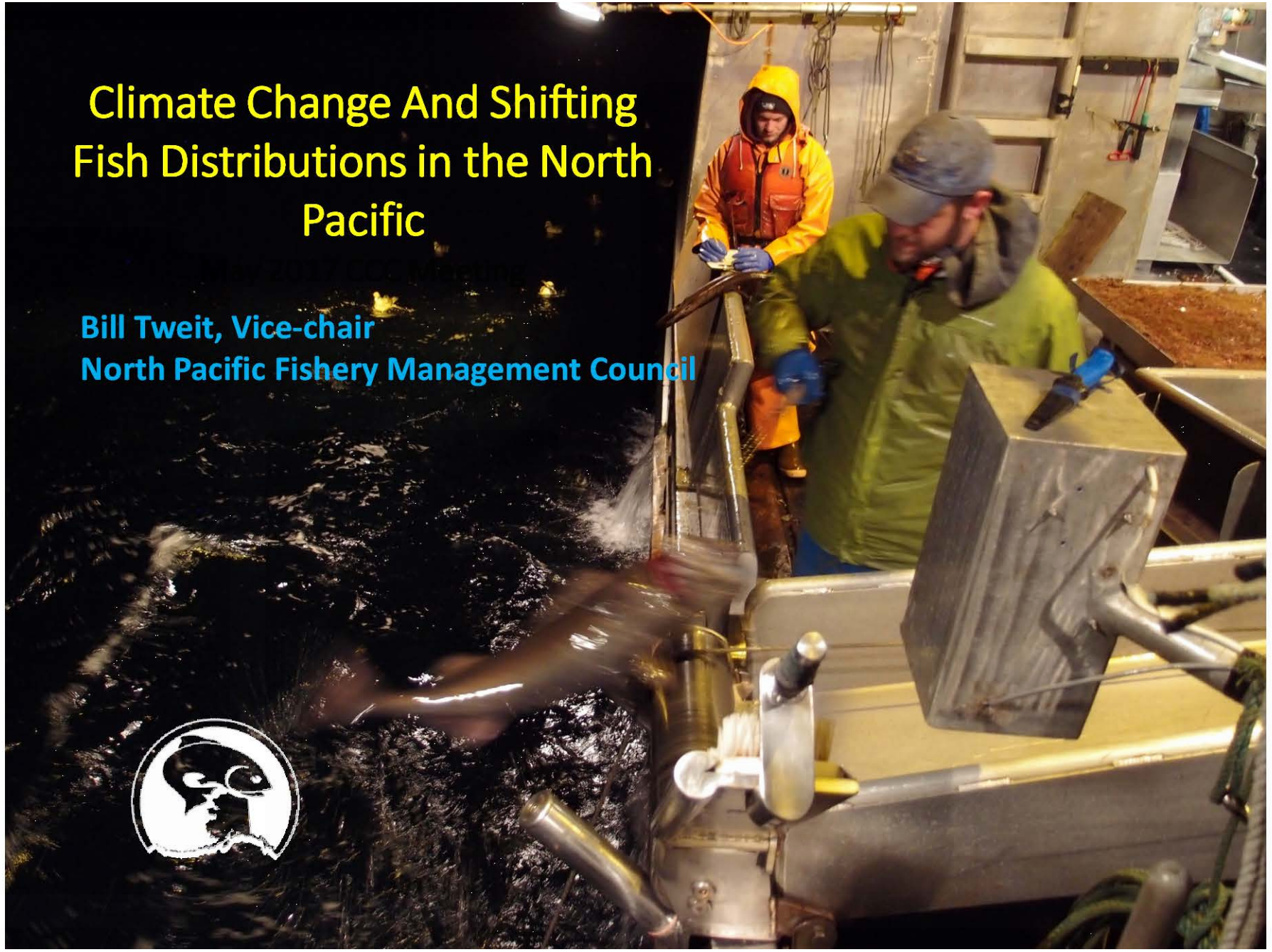
Climate Change And Shifting Fish Distributions in the North Pacific

Bill Tweit, Vice-chair
North Pacific Fishery Management Council



Preparing for Climate Change

a) ***Synthesize current and projected climate change impacts on the coupled social-ecological Bering Sea system*** through synthesis of diverse knowledge sources of understanding, context and impacts of change and evaluation of future impacts and risk.

b) ***Rapid Climate Vulnerability Assessments***, which use expert knowledge to identify vulnerable species and communities to climate change and prioritize research needs.

c) ***Operationalized climate change management strategy evaluations (MSEs)*** of various alternative harvest strategies for key species under the most recent Intergovernmental Panel on Climate Change projections of carbon mitigation scenarios (*sensu ACLIM: Alaska Climate Integrated Modeling Project*). Include synthesis of current understanding from cross regional and global coordination of ensemble modeling projects aimed at evaluating climate-resilient management tools.

d) ***Project changes in species distributions and phenology*** which includes projected changes in habitat under future climate scenarios in order to estimate potential shifts in BSAI FMP species distributions and potential fishing grounds (*sensu Predicting changes in habitat for groundfishes under future climate scenarios using spatial distribution modeling)*

e) ***Performance, validation, and operationalized delivery of 9 month seasonal forecasts*** of Bering Sea conditions and fish and fisheries specifically aimed at informing the annual groundfish assessment cycle (*sensu The Bering Seasons Project).*

Climate Change Adaptation

”support climate change adaptation pathways and long-term resilience for the coupled social-ecological system of the Eastern Bering Sea.”

- ✓ **synthesize current knowledge** regarding climate change effects on the EBS system,
- ✓ **identify potential climate-resilient management measures** that can improve adaptive capacity and avoid maladaptation
- ✓ **evaluate the risk, timescale, and probability of success of various climate-resilient management policies** under future scenarios of change.

Policy relevant not policy prescriptive

(climate-resilient management would go through the existing Council process)

Test new & existing tools

Adaptation

incremental (normative) adaptation to preserve current livelihoods, health, and well being and meet future demands

transformational adaptation, especially to address/prevent continued marginalization and promote diverse well being, values, and views

Build capacity to revaluate & enable transformative actions

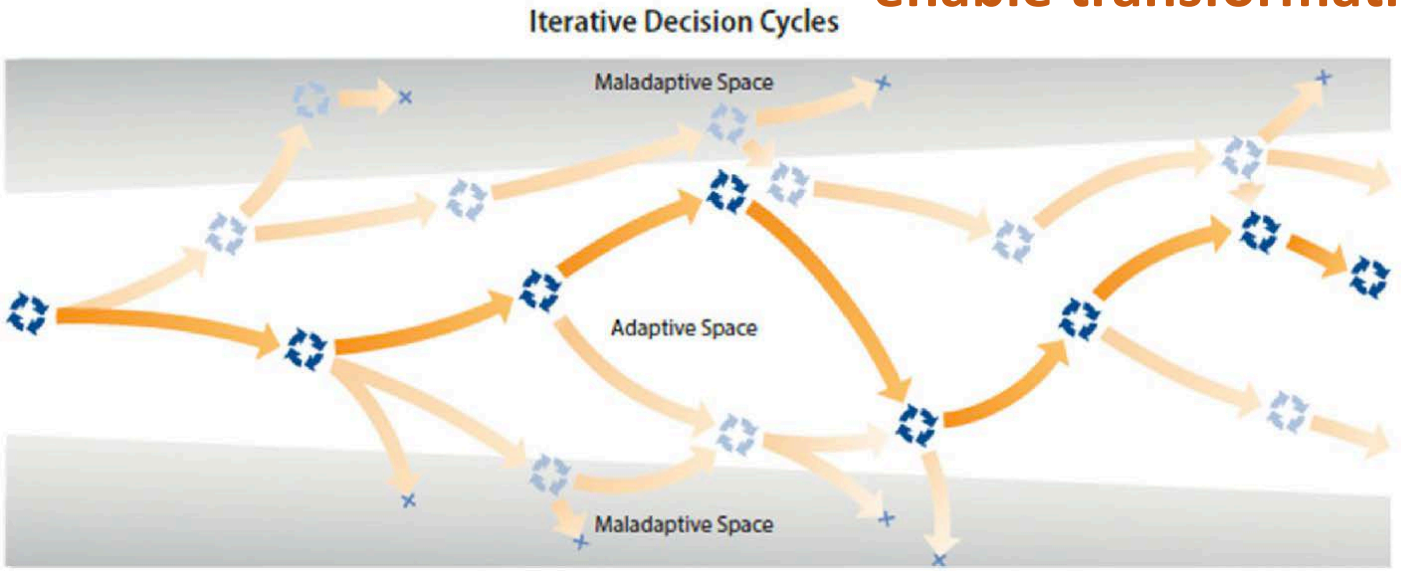
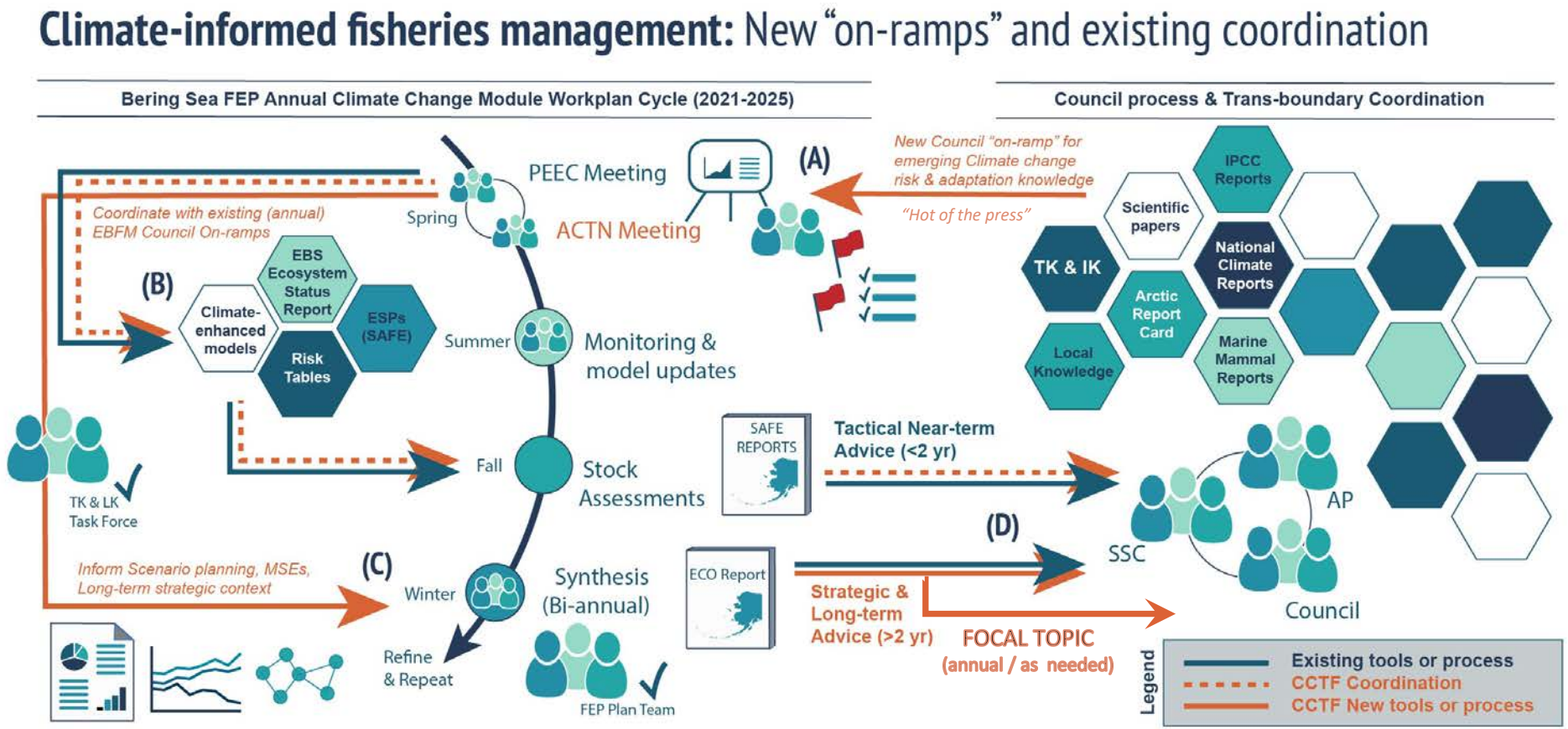
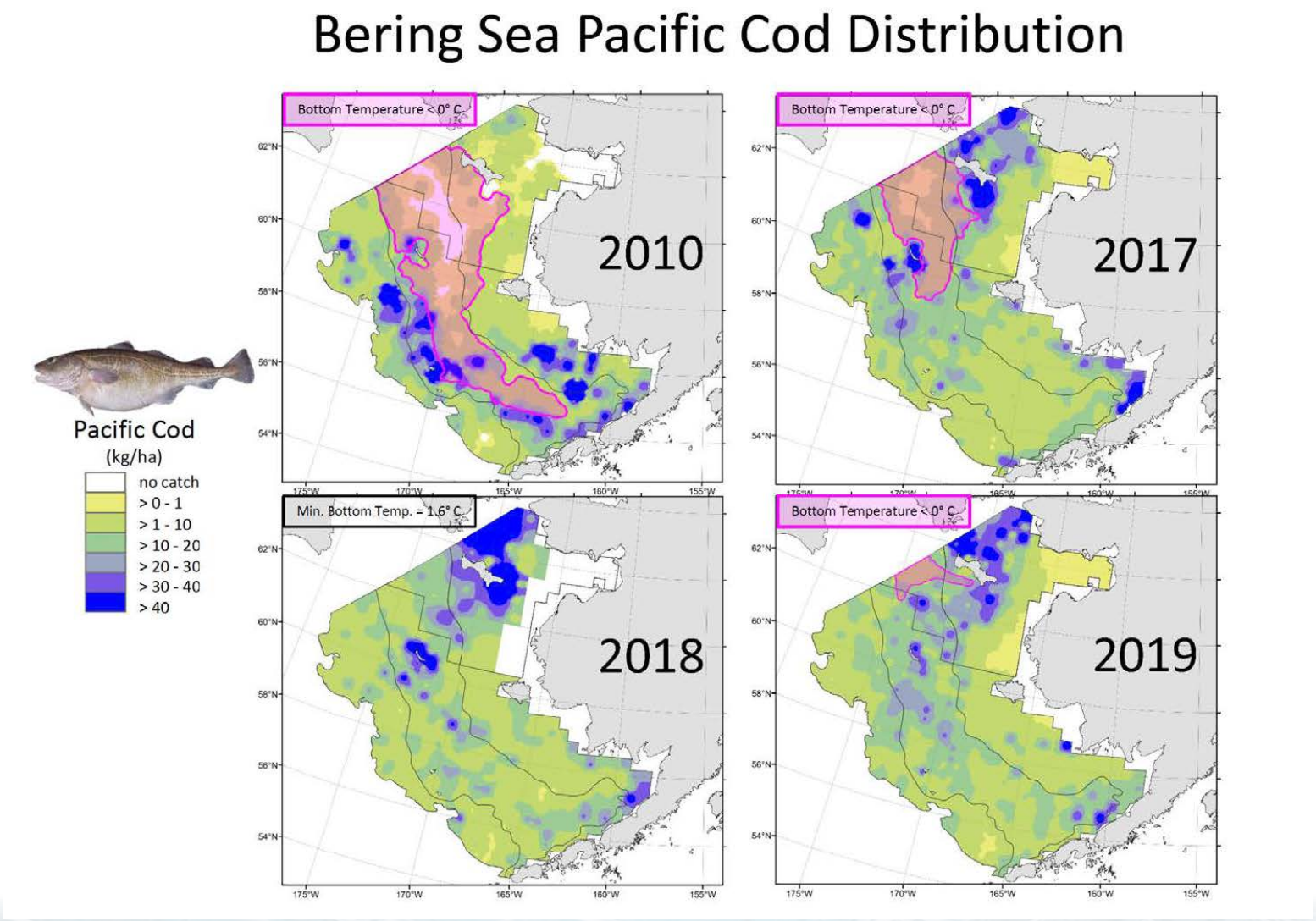


Fig. 1 from Wise et al. 2014. Reconceptualising adaptation to climate change as part of pathways of change and response. Global Environmental Change 28: 325–336

CCTF Process



Shifting Stocks in the Bering Sea



Adapting to shifting stocks

EBS Pacific cod discussion

Can Hypothesis 1 (EBS only) be removed, given that:

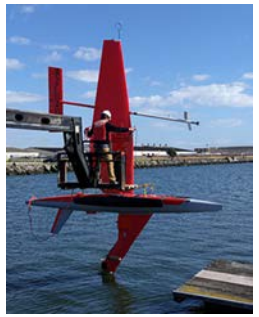
- another year of NBS and EBS survey data are now available,
- young fish are present in the NBS,
- genetics are similar between the areas, and
- the longline fishery has been operating in the NBS

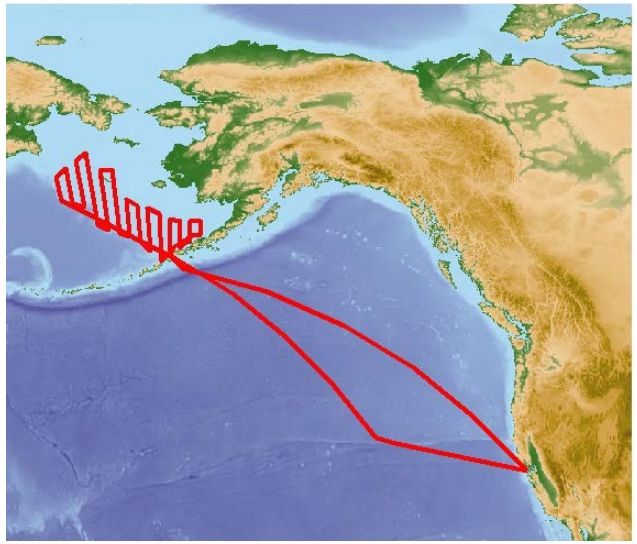
Given concerns regarding uncertainty in the connection with Russian waters and the possibility that young fish could have moved into the survey area as a result of warm water nearshore in the NBS, Hypothesis 1 is still useful

Funding is in place for a 2020 NBS survey

Hypothesis 1 could be downweighted if there is less support for it than for the others

Adapting to Change – New Tools
Saildrones





Approach

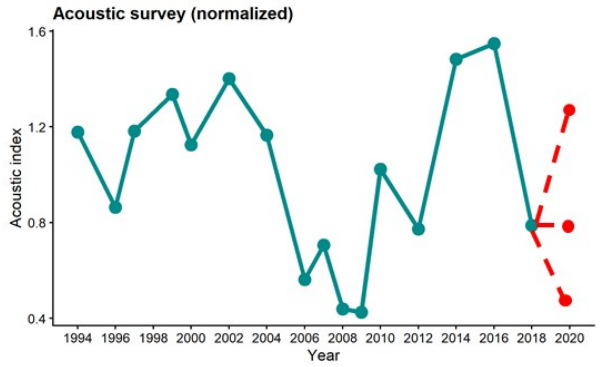
- Sail to/from Alaska
- 3 saildrones
- 40 nmi spacing
  - vs. 20 nmi for standard acoustic survey
- Survey July 4 – August 20
- Data recovery in mid-October

Limitations

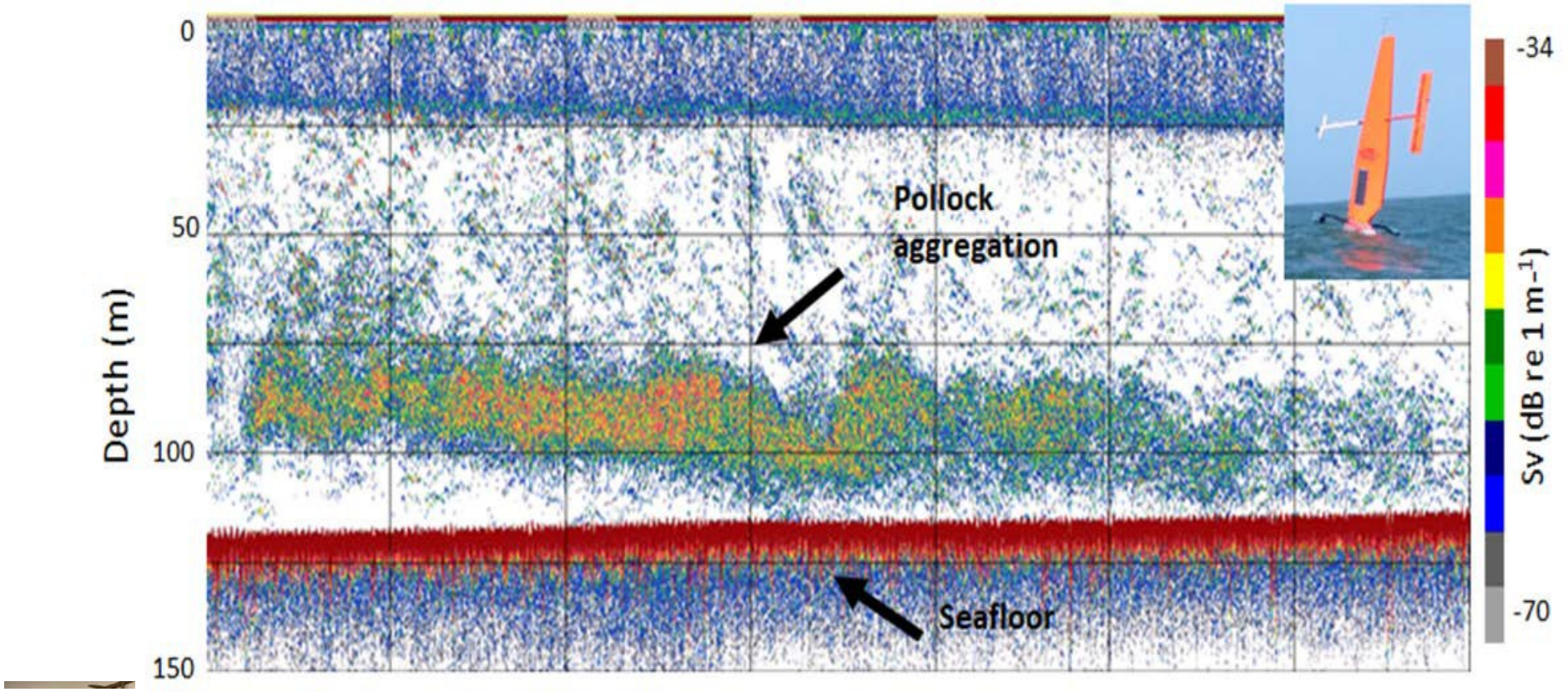
- No size/age composition
- Lower sampling density
- No data until vehicles are recovered

Future Plans

- Recover data, add a 2020 to acoustic time series
- Quantify uncertainty in new index
- Incorporate index in assessment model



Saildrone results - 2020



Questions ?

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