Modeling the manager: getting catch right to improve integrated climate-fisheries projections

Amanda Faig¹,², Alan Haynie² and Kirstin Holsmann²

¹ School of Aquatic Fisheries and Sciences, University of Washington. Contact: amanda.faig@noaa.gov
² Alaska Fisheries Science Center, NOAA (Seattle)
Global Climate Models (x 7)
- ECHO-G
- MIROC3.2 med res.
- CGCM3-t47
- CCSM4-NCAR-PO
- MIROCESM-C-PO
- GFDL-ESM2M* PO
- GFDL-ESM2M* PON

Projection Scenarios (x3)
- AR4 A1B
- AR5 RCP 4.5
- AR5 RCP 8.5

ACLIM
Alaska Climate Integrated Modeling Project
- Anne Hollowed (AFSC, SSMA/REFM)
- Kirstin Holsman (AFSC, REEM/REFM)
- Alan Haynie (AFSC ESSR/REFM)
- Stephen Kasperski (AFSC ESSR/REFM)
- Jim Ianelli (AFSC, SSMA/REFM)
- Kerim Aydin (AFSC, REEM/REFM)
- Trond Kristiansen (IMR, Norway)
- Al Hermann (UW JISAO/PMEL)
- Wei Cheng (UW JISAO/PMEL)
- André Punt (UW SAFS)
- Jonathan Reum (UW SAFS)
- Amanda Faig (UW SAFS)

Climate Enhanced Biological models (x 5)
- CE: single species assessment models
- CE: multispecies model (CEATTLE)
- CE: Size spectrum model
- CE: Ecopath with Ecosim
- End-to-End model (FEAST)

Socio-economic / harvest scenarios (x 5)
- No fishing
- Status quo
- By-catch reduction
- MSY
- MEY

To hear about scenarios:
Alan Haynie
Session 14 (day 2)
Friday at noon
TAC setting and executing process

Fish
Biomass

Stock assessment scientists + Council scientific review bodies

Acceptable Biological Catches (ABCs)

Catch

TAC = f(ABC)

catch = f(TAC)

Total Allowable Catches (TACs)
2 million ton cap is limiting in all years

Net Catch and ABC in the BSAI

![Graph showing Net Catch and ABC in the BSAI from 1992 to 2016. The graph displays the trends of million tons (10^6 T) over the years, with two lines representing different metrics: NETABC and NETCATCH. The y-axis indicates million tons (10^6 T) ranging from 0 to 4, and the x-axis represents the years from 1992 to 2016.]
Catch as a fraction of BSAI ABC by Species. 1992-2017
Catch as a fraction of BSAI ABC by Species. 1992-2017

Year

species

Arrowtooth_Flounder  Sablefish  Yellowfin_Sole
Catch as a fraction of BSAI ABC by Species. 1992-2017

Year

species

Atka_Mackeral
Greenland_Turbot
Influential Events

• American Fisheries Act (1998)
• Amendment 80 (2008)
• Steller sea lion closures (multiple years)
COMPARE ALTERNATIVE MODELS TO CREATE AN ENSEMBLE
Out of sample BS Pollock catch predictions from ABC

Graph showing the catch of BS Pollock over the years from 1992 to 2016, with actual (red line) and predicted (blue line) catches. The catch is measured in million tons.
Out of sample BS Yellowfin catch predictions from ABC

thousand tons

year


catch Actual Predicted
Out of sample BS PCod catch predictions from ABC

![Graph showing BS PCod catch predictions from ABC. The graph plots the actual and predicted catches over the years from 1992 to 2016.]
What will the future bring?
Improves the model

Improves the questions
THANK YOU!

Thank you to ACLIM’s many collaborators & workshop participants.

Funding:
- Fisheries & the Environment (FATE)
- Stock Assessment Analytical Methods (SAAM)
- Climate Regimes & Ecosystem Productivity (CREP)
- Economics and Human Dimensions Program
- NOAA Integrated Ecosystem Assessment Program (IEA)
- NOAA Research Transition Acceleration Program (RTAP)