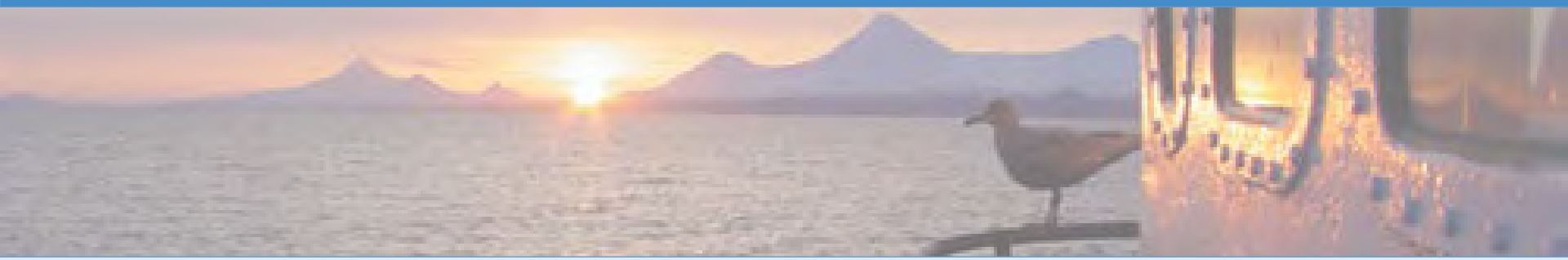
Modeling the manager: getting catch right to improve integrated climate-fisheries projections



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2 Alaska Fisheries Science Center, NOAA (Seattle)

Photo by S Neidetcher

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ACLIM
Alaska Climate Integrated Modeling Project

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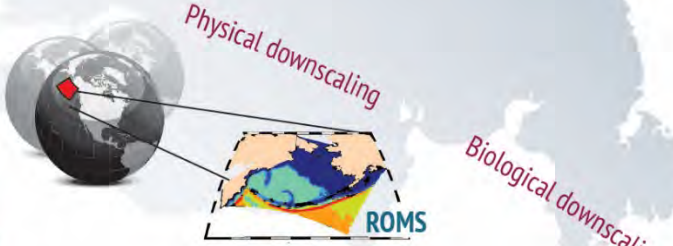
Wei Cheng (UW JISAO/PMEL)
André Punt (UW SAFS)
Jonathan Reum (UW SAFS)
Amanda Faig (UW SAFS)

FATE: Fisheries & the Environment
SAAM: Stock Assessment Analytical Methods
S&T: Climate Regimes & Ecosystem Productivity

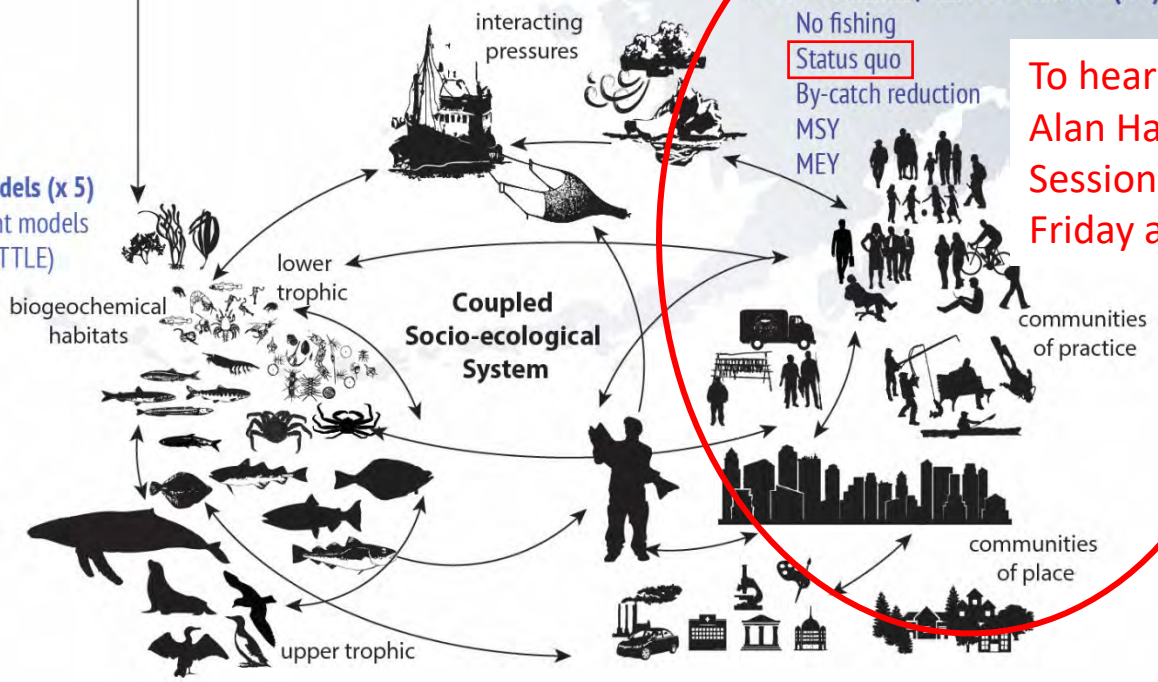
Global Climate Models (x 7)
- ECHO-G
- MIROC3.2 med res.
- CGCM3-t47
- CCSM4-NCAR- PO
- MIROCESM-C- PO
- GFDL-ESM2M*- PO
- GFDL-ESM2M*- PON

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



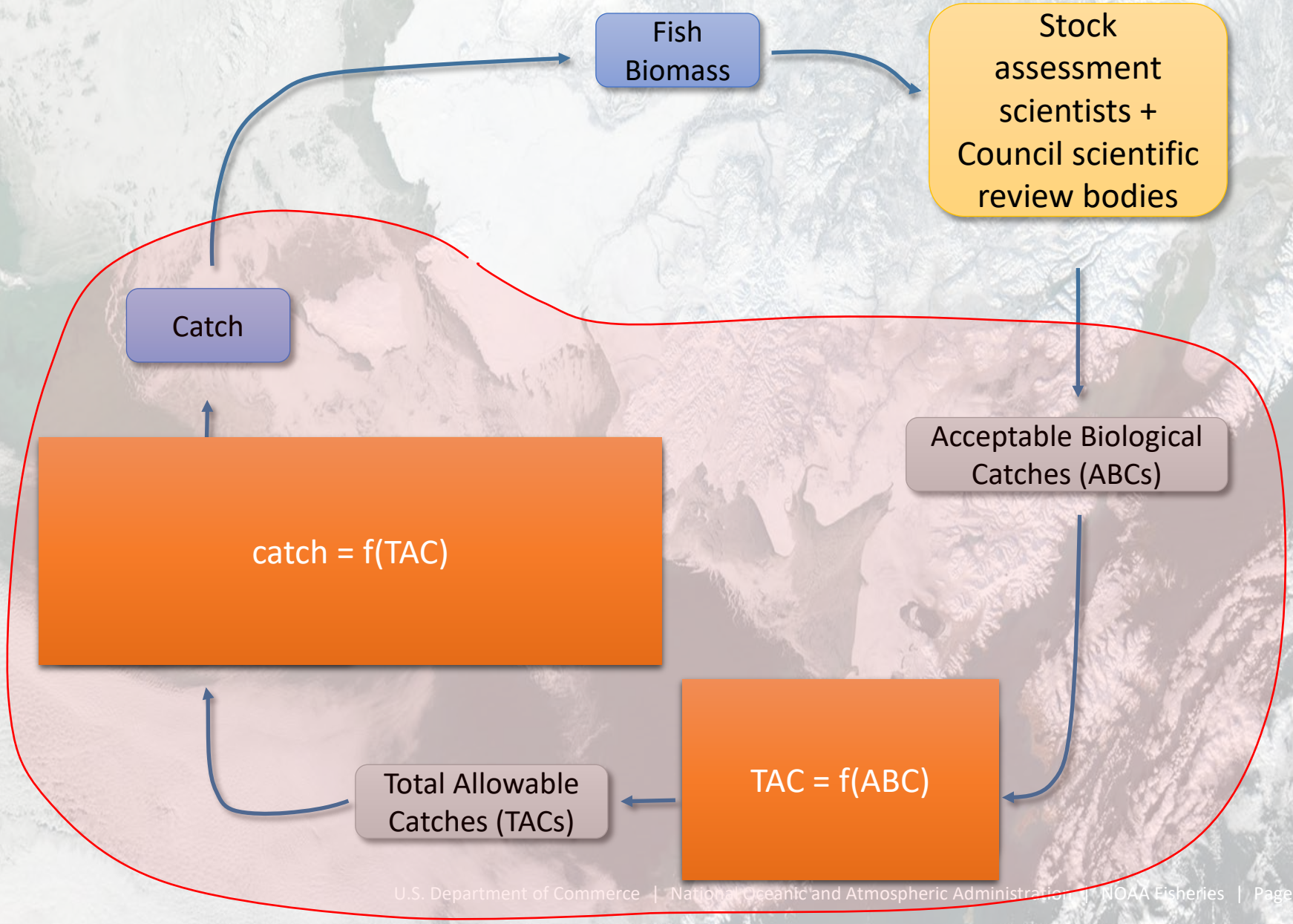
Socio-economic / harvest scenarios (x 5)
- No fishing
- Status quo
- By-catch reduction
- MSY
- MEY

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)

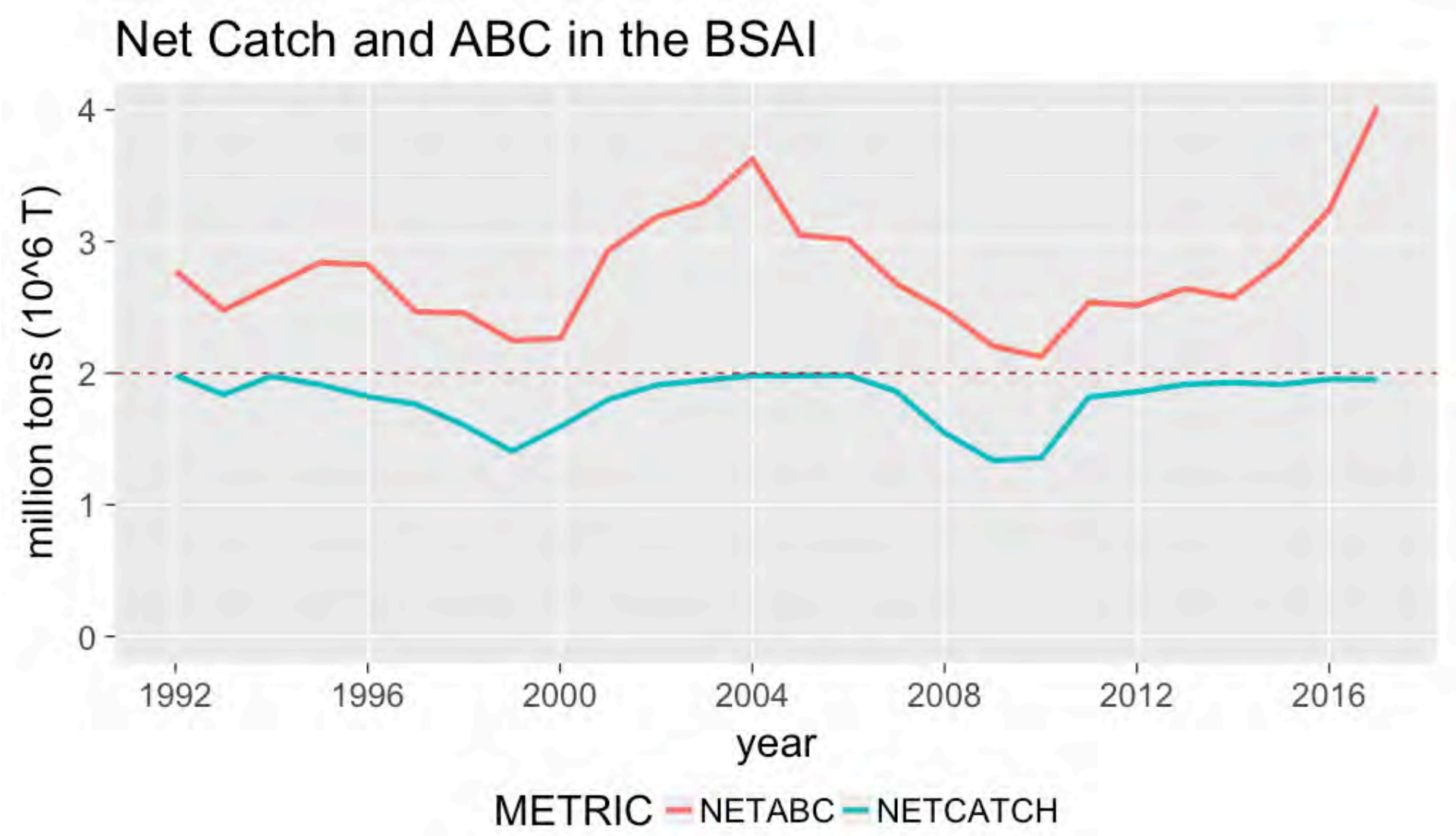


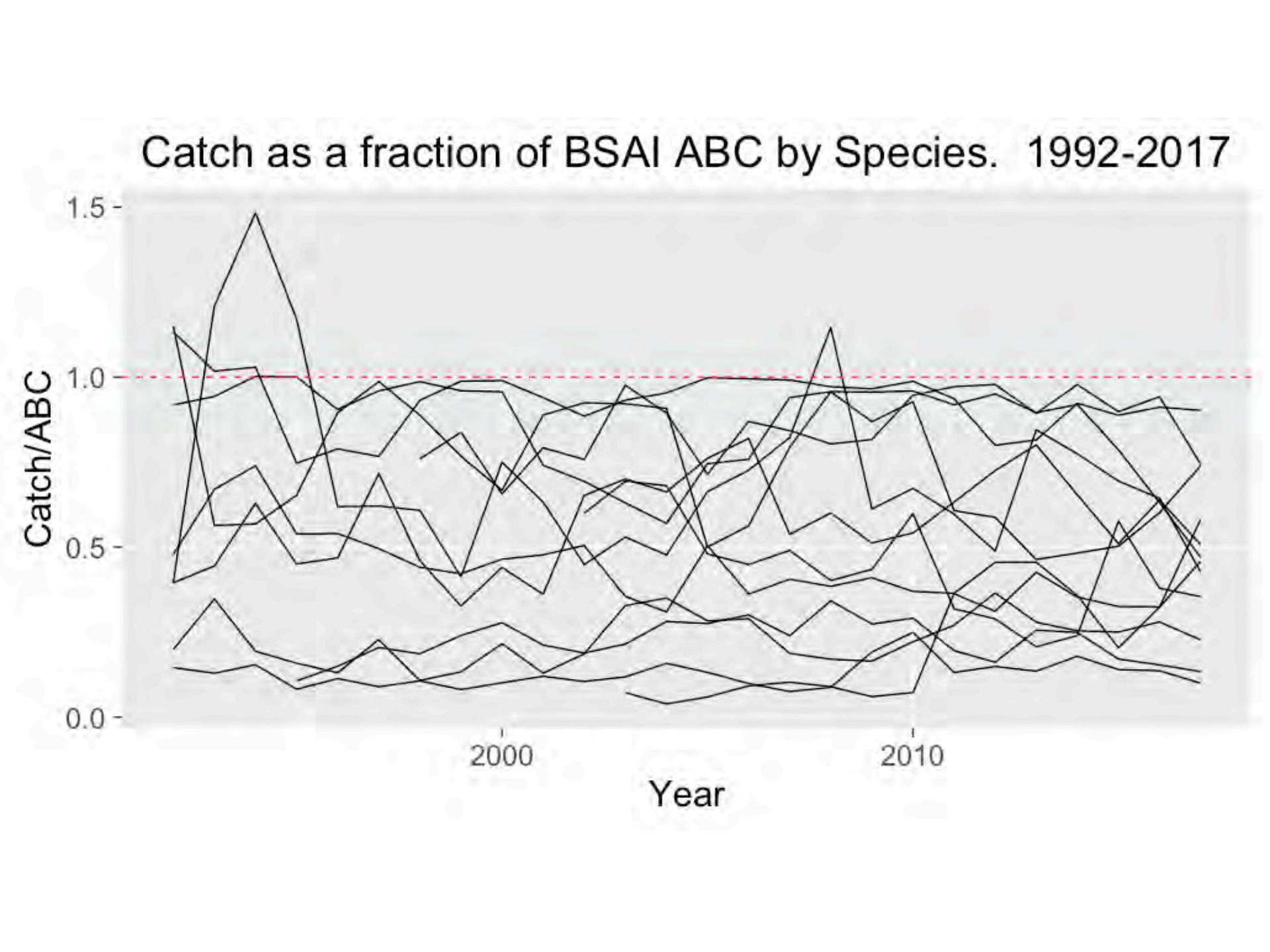
To hear about scenarios:
Alan Haynie
Session 14 (day 2)
Friday at noon

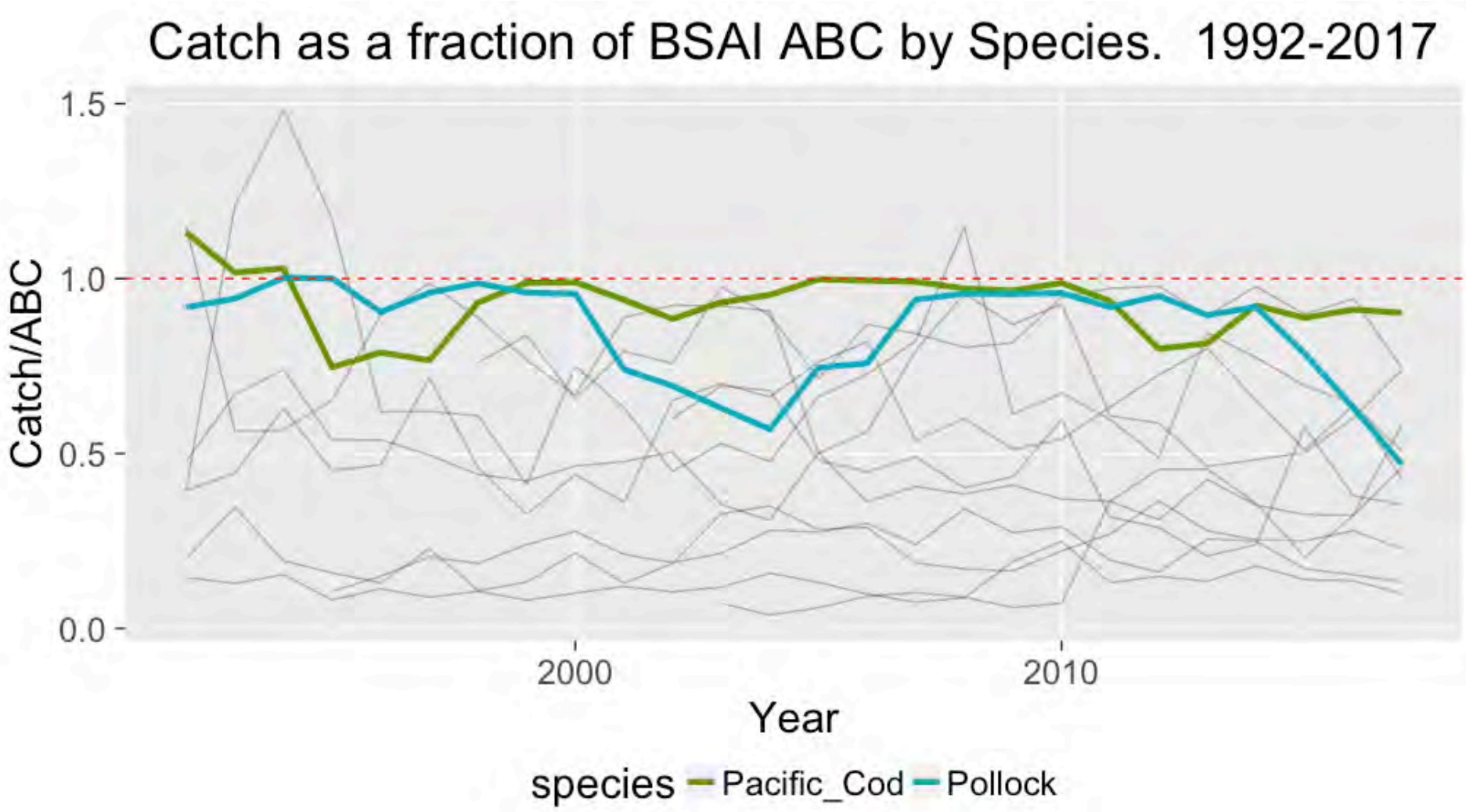
TAC setting and executing process

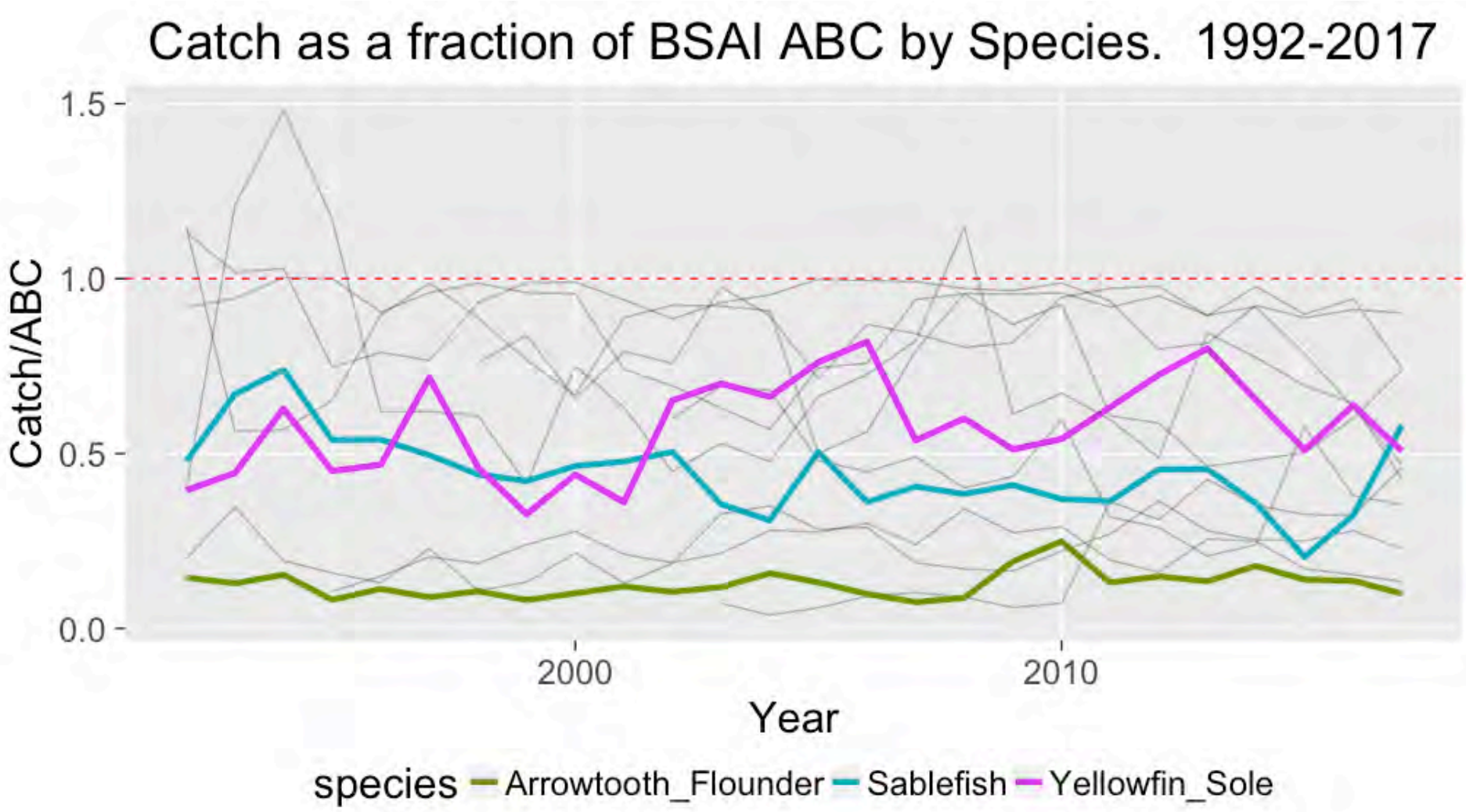


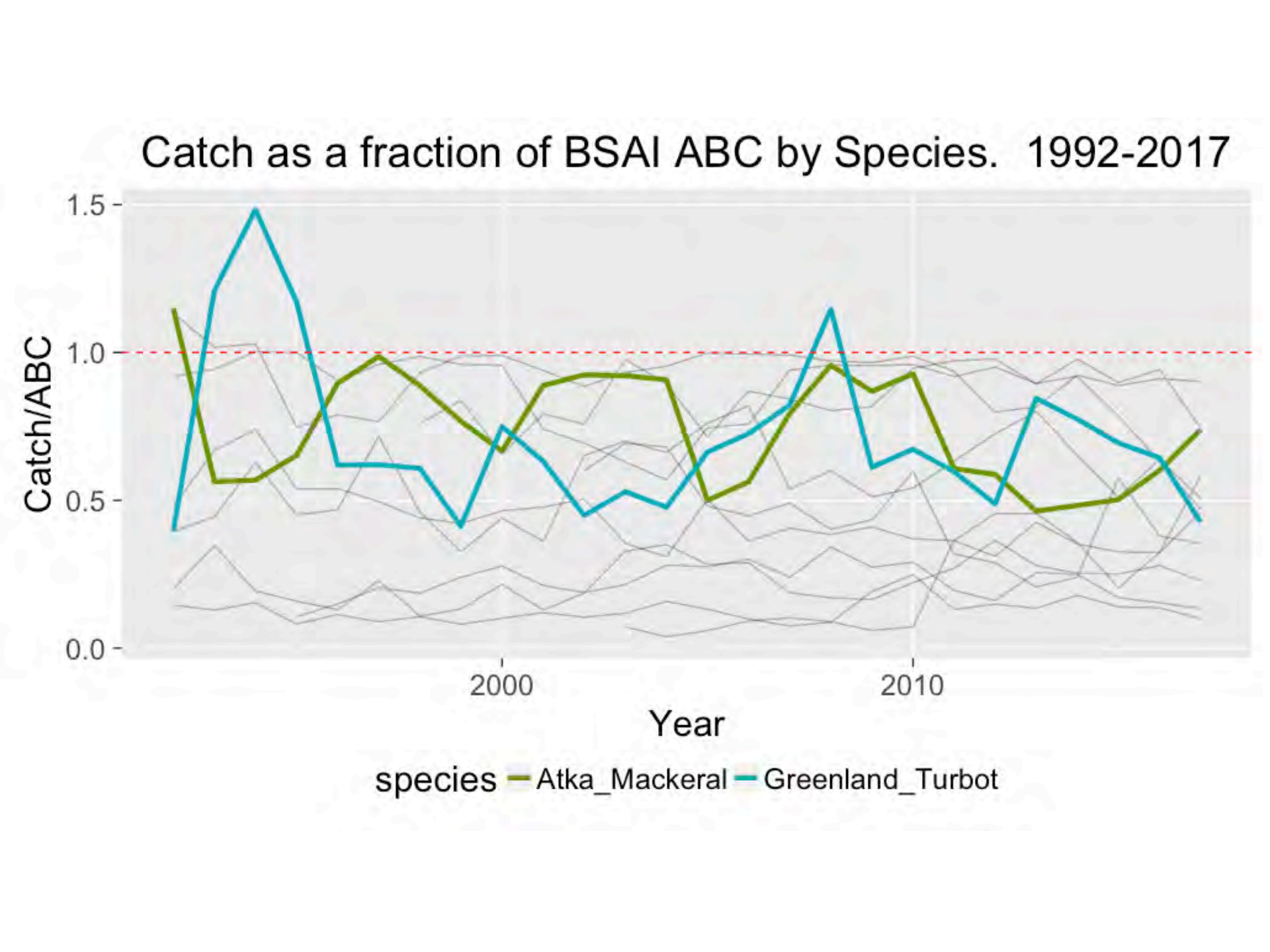
2 million ton cap is limiting in all years

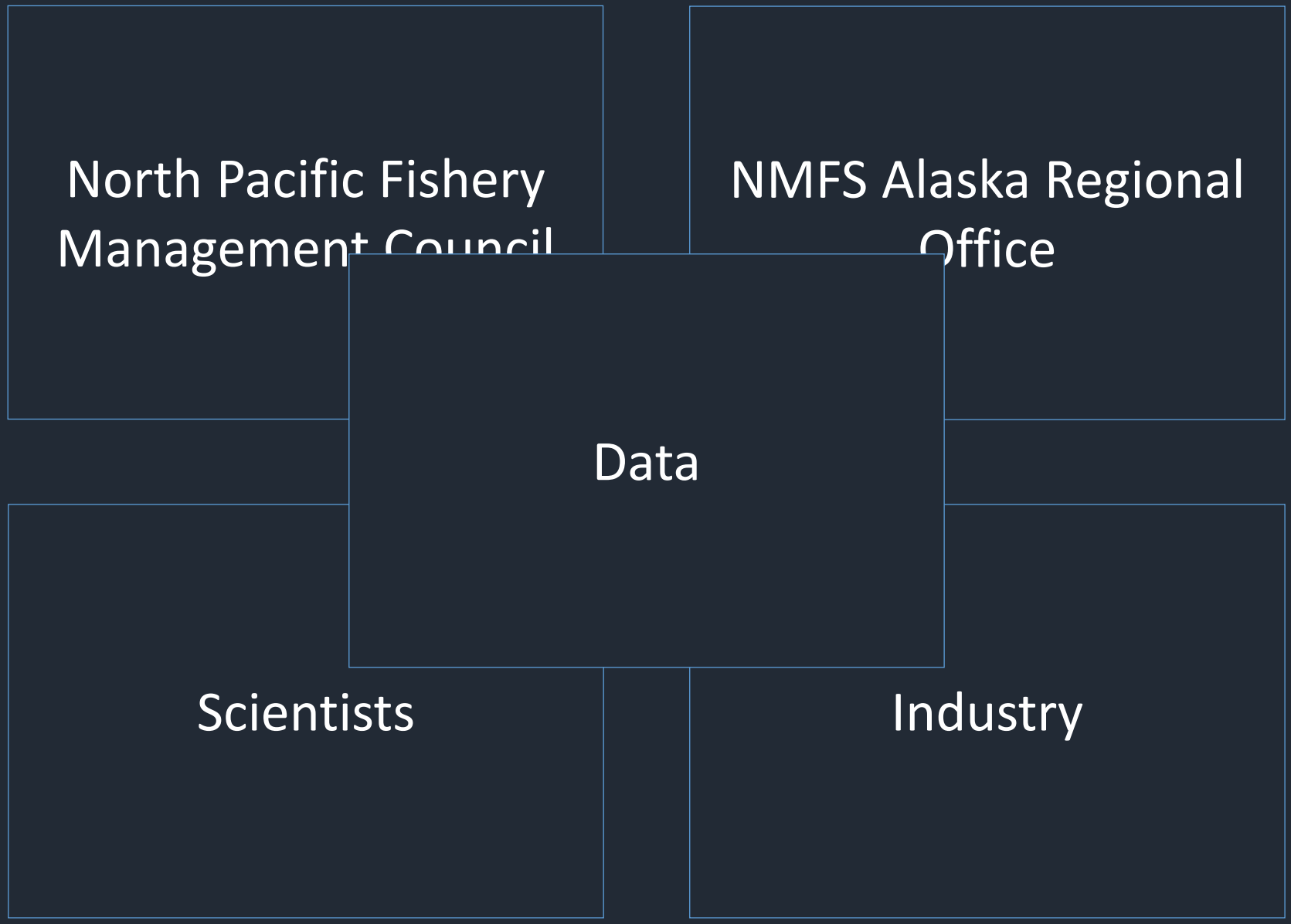



Catch as a fraction of BSAI ABC by Species. 1992-2017
Catch/ABC
1.5
1.0
0.5
0.0
2000
2010
Year


Catch as a fraction of BSAI ABC by Species. 1992-2017
Catch/ABC
1.5
1.0
0.5
0.0
2000
2010
Year
species
Pacific_Cod
Pollock

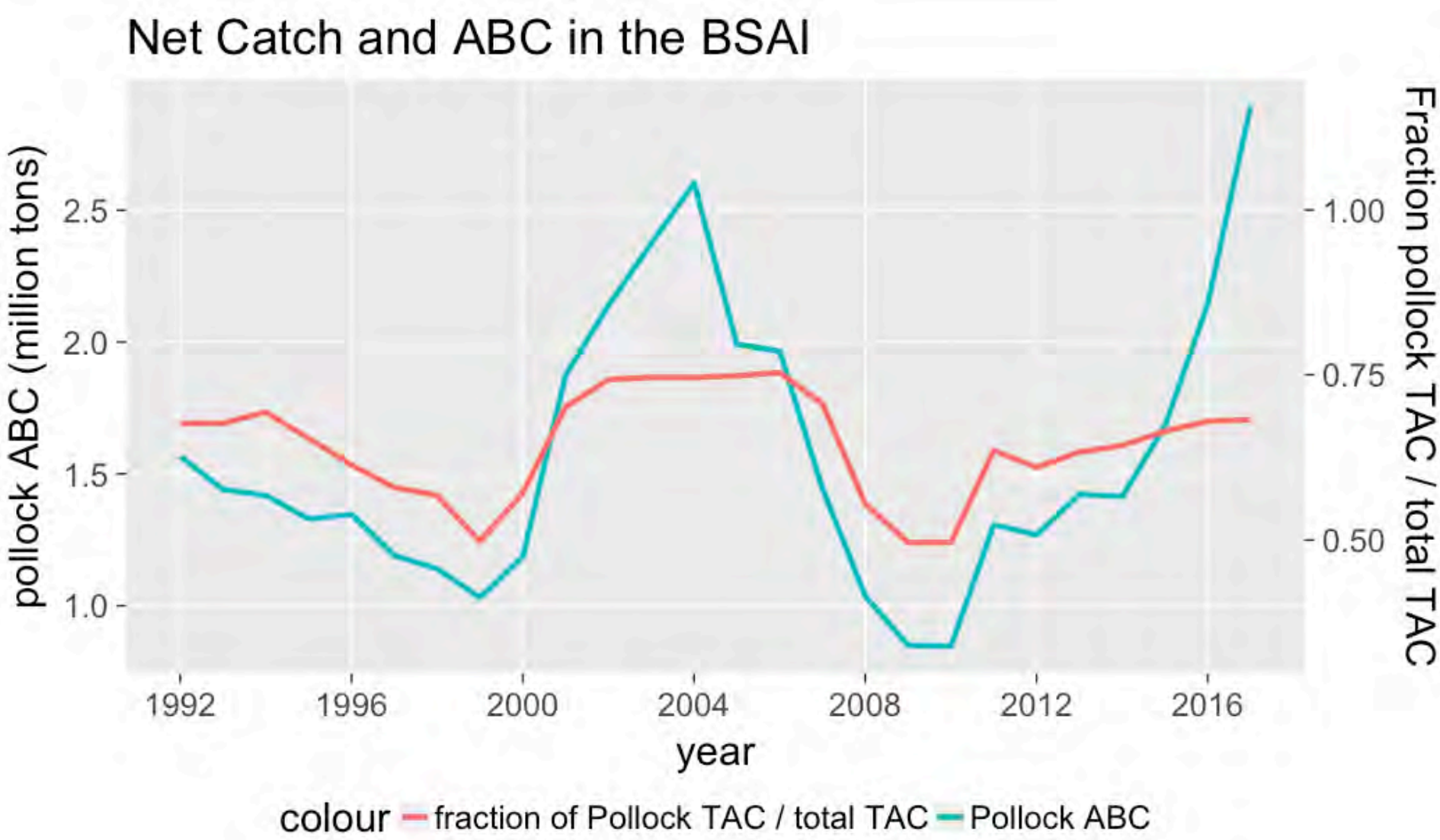

Catch as a fraction of BSAI ABC by Species. 1992-2017
Catch/ABC
1.5
1.0
0.5
0.0
2000
2010
Year
species
Arrowtooth_Flounder
Sablefish
Yellowfin_Sole


Catch as a fraction of BSAI ABC by Species. 1992-2017
Catch/ABC
1.5
1.0
0.5
0.0
2000
2010
Year
species
Atka_Mackeral
Greenland_Turbot

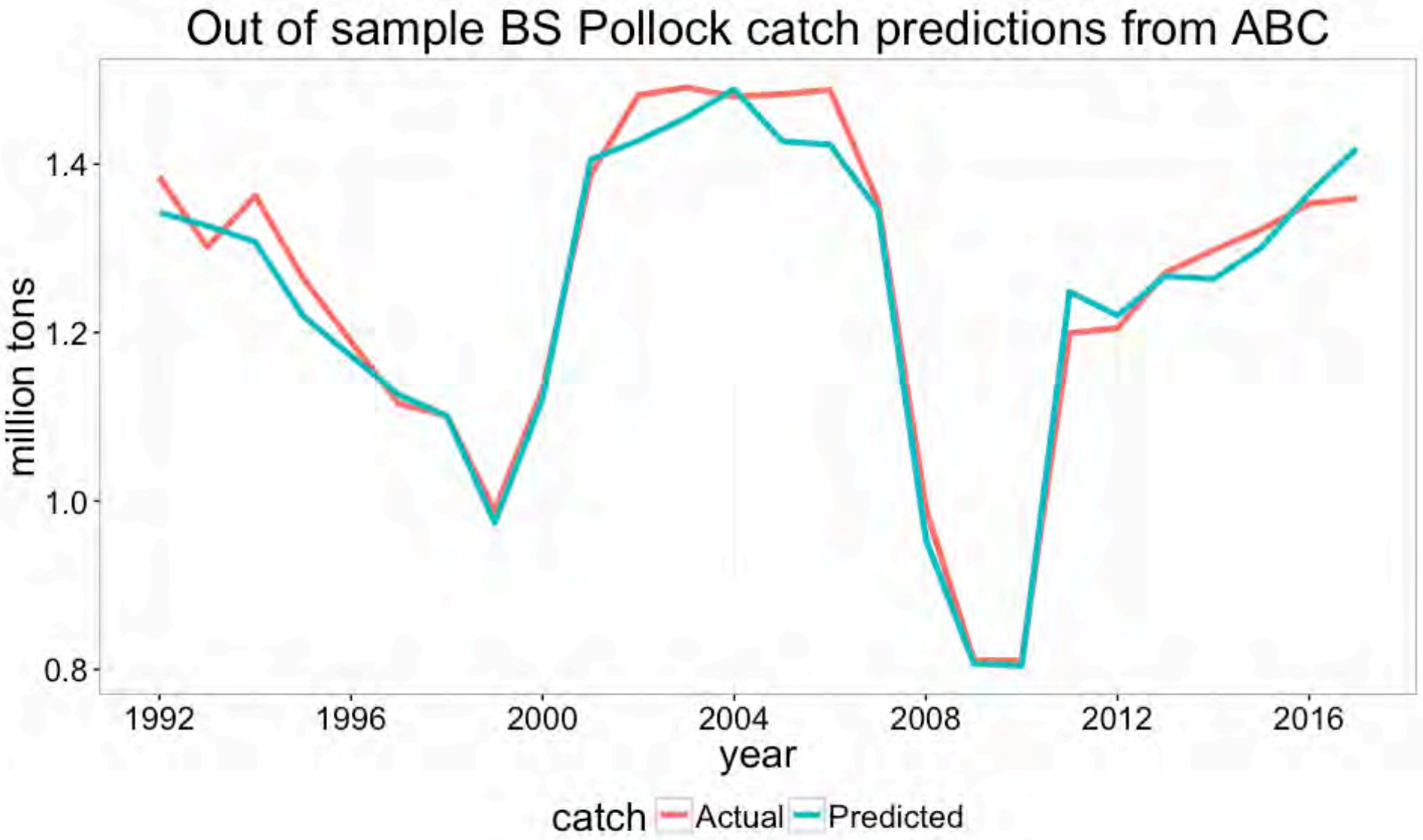

North Pacific Fishery Management Council
NMFS Alaska Regional Office
Data
Scientists
Industry

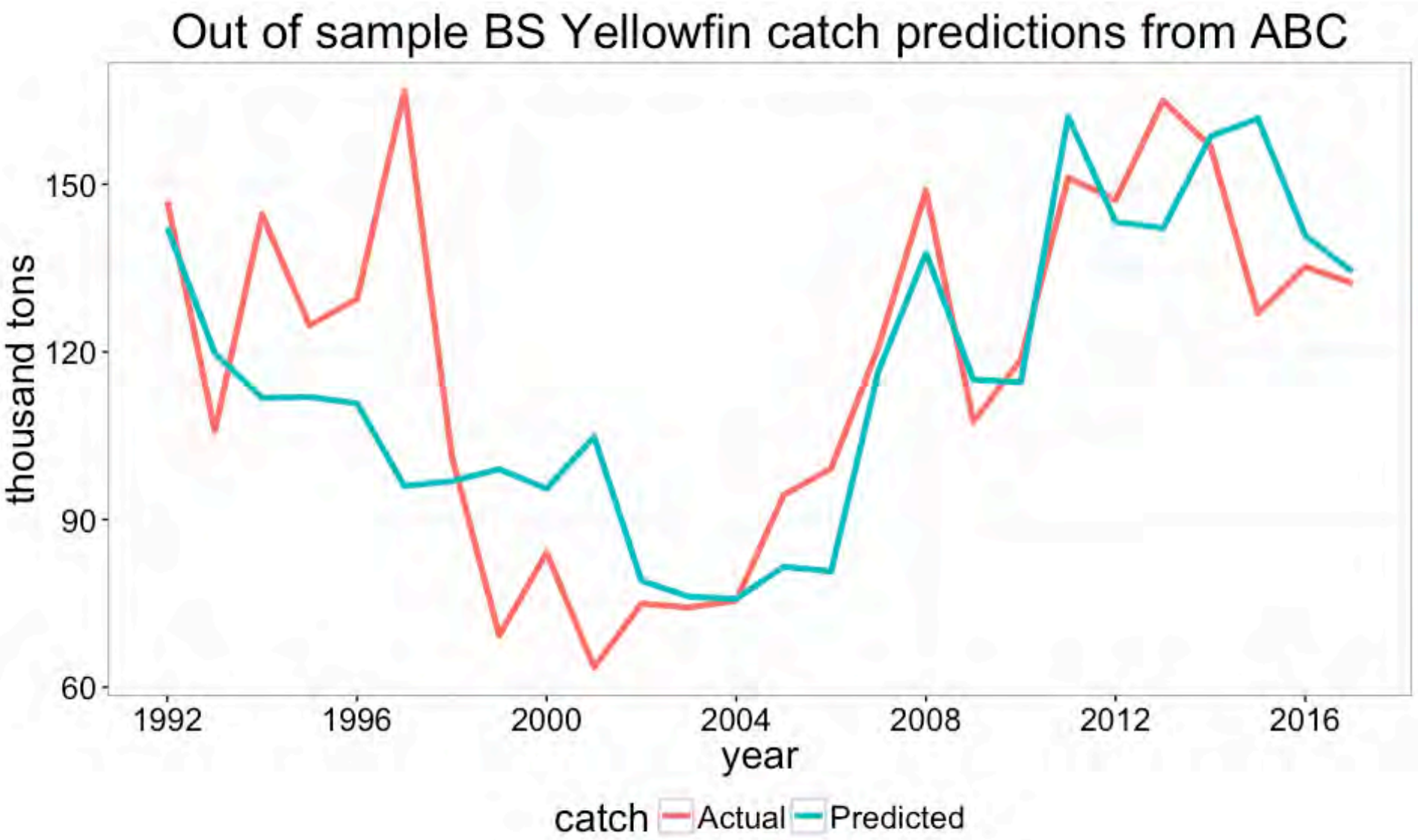
Influential Events

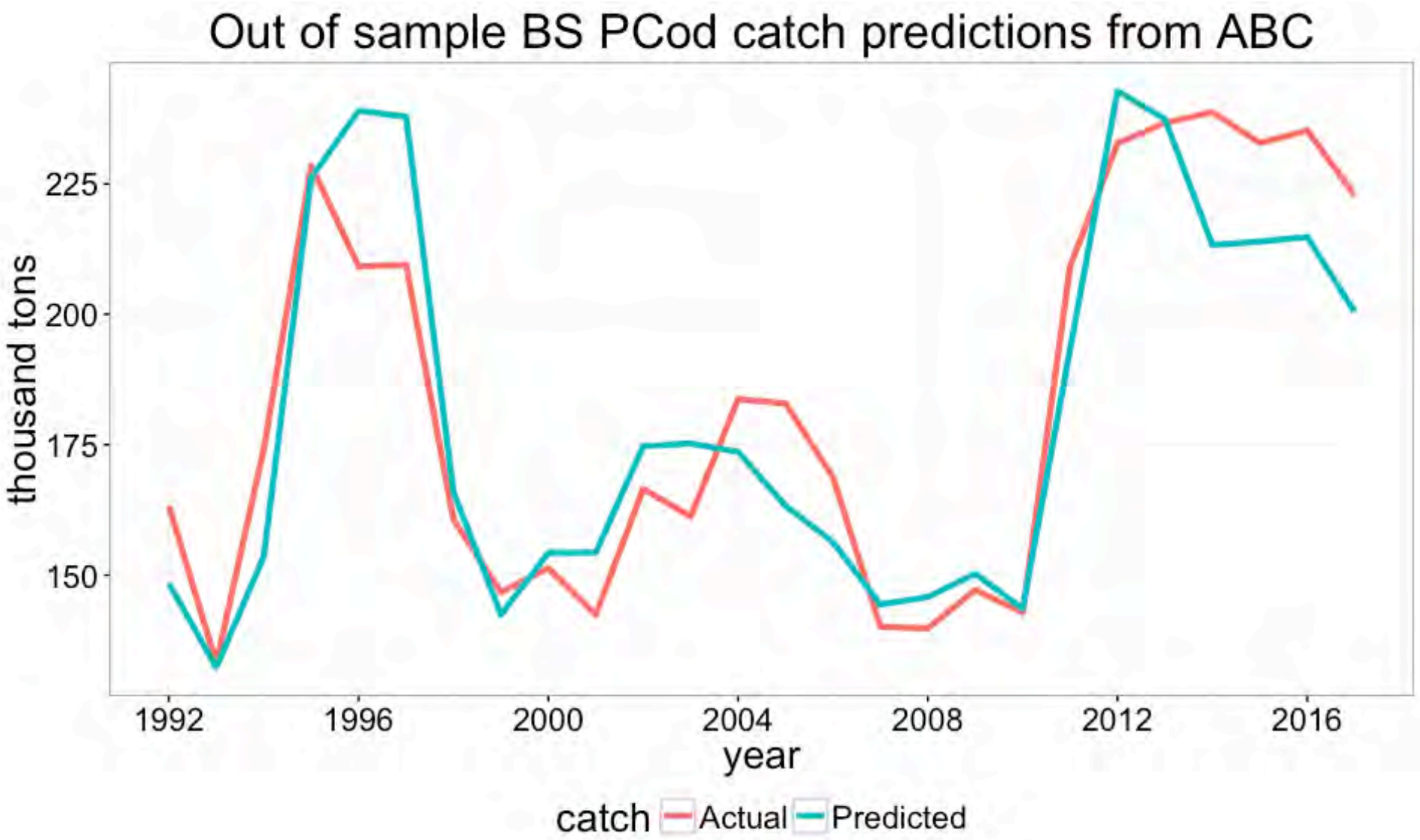
- American Fisheries Act (1998)
- Amendment 80 (2008)
- Steller sea lion closures (multiple years)


Net Catch and ABC in the BSAI
pollock ABC (million tons)
2.5
2.0
1.5
1.0
Fraction pollock TAC / total TAC
1.00
0.75
0.50
1992
1996
2000
2004
2008
2012
2016
year
colour
fraction of Pollock TAC / total TAC
Pollock ABC

COMPARE ALTERNATIVE MODELS TO CREATE AN ENSEMBLE


Out of sample BS Pollock catch predictions from ABC
million tons
1.4
1.2
1.0
0.8
1992
1996
2000
2004
2008
2012
2016
year
catch
Actual
Predicted


Out of sample BS Yellowfin catch predictions from ABC
thousand tons
150
120
90
60
1992
1996
2000
2004
2008
2012
2016
year
catch
Actual
Predicted


Out of sample BS PCod catch predictions from ABC
thousand tons
225
200
175
150
1992
1996
2000
2004
2008
2012
2016
year
catch
Actual
Predicted

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)