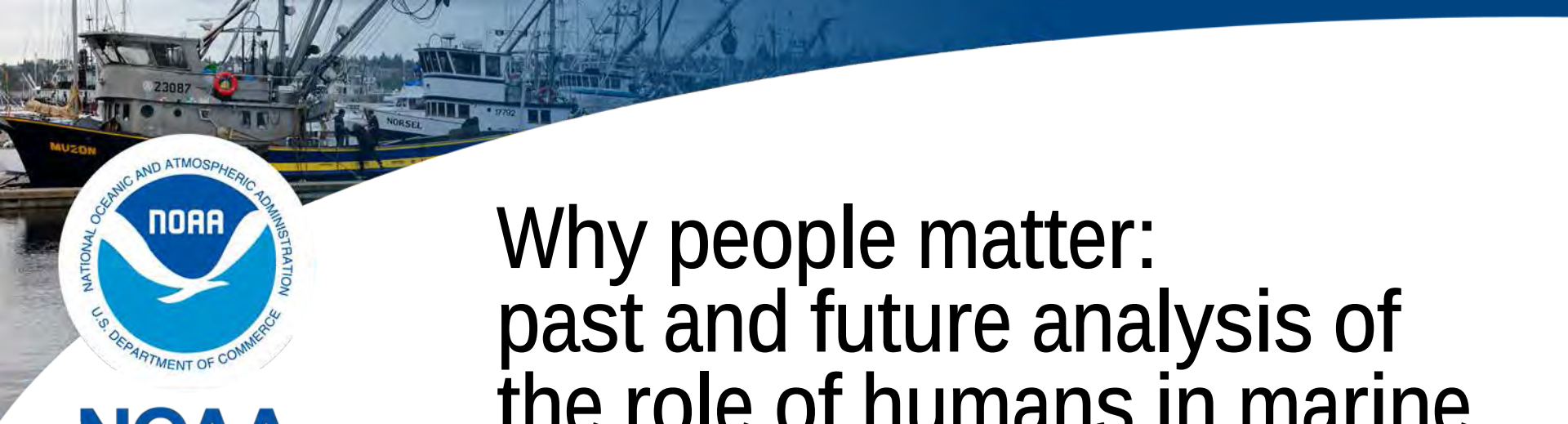


Why people matter: past and future analysis of the role of humans in marine ecosystems

NOAA FISHERIES

Alaska Fisheries Science Center

Seattle, WA

Alan Haynie

PICES 2016 Annual Meeting, Session S1

November 7, 2016

Note: This talk represents the opinions of the author and not NOAA Fisheries, NPRB, or the Department of Commerce.

“The elephant in the room is how we need to integrate human dimensions into all of these aspects of FUTURE.”

- paraphrasing John Davis
from yesterday’s FUTURE mini-symposium

Social Scientist

AND

Elephant trainer/ tamer!

Dangerous Jobs

"What is the most dangerous occupation in the United States?

…fisher, or elephant trainer? "

Answer #1:
Depends on how you organize the data!

Tuscano, Guy. *Compensation and Working Conditions Summer 1997*

Dangerous Jobs

"What is the most dangerous occupation in the United States?

…fisher, or elephant trainer? "

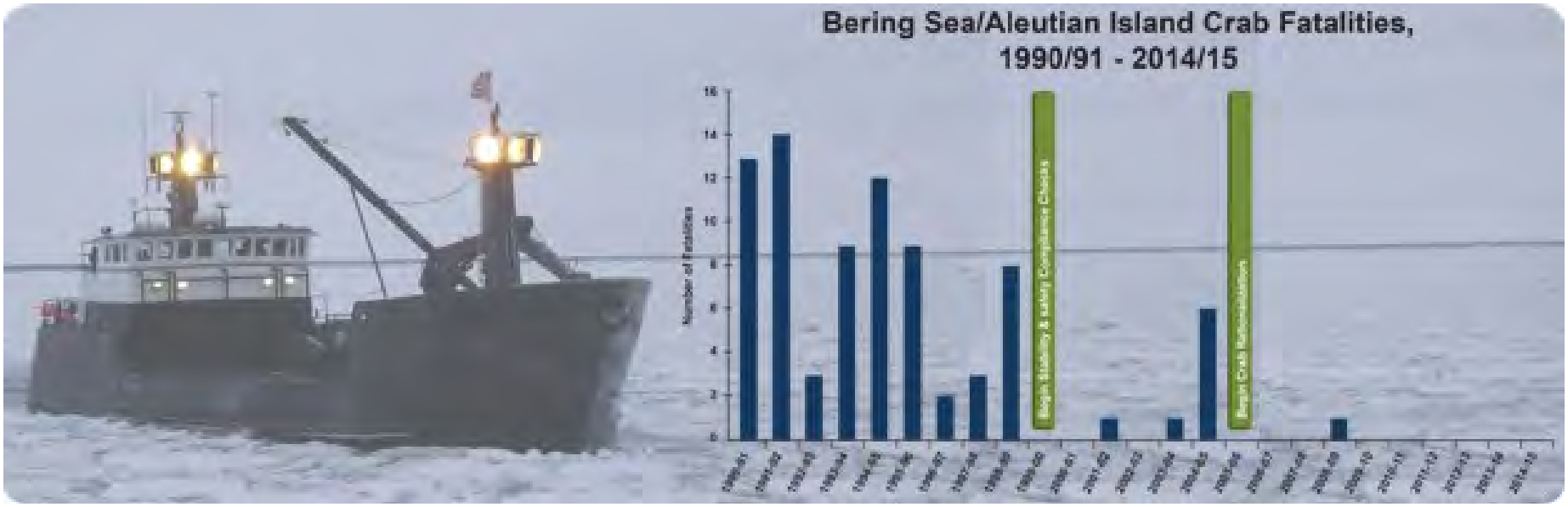
Tuscano, Guy. *Compensation and Working Conditions Summer 1997*

Answer #1:
Depends on how you organize the data!

Is "elephant trainer" reported by itself or with other related jobs?

Did a trainer die this year?

Answer #2: Catch share management & regulations have made fishing safer



Lesson: improving fisheries management can make a large difference in human welfare.

Source: NIOSH, https://www.cdc.gov/niosh/topics/fishing/

Overview of Talk

- The past & present of Human Dimensions in PICES
- How do we actually do interdisciplinary work?
- The future of PICES Human Dimensions
- Challenges & some ways to address them

From the PICES Convention that went into force in March 1991- one reference for “human”

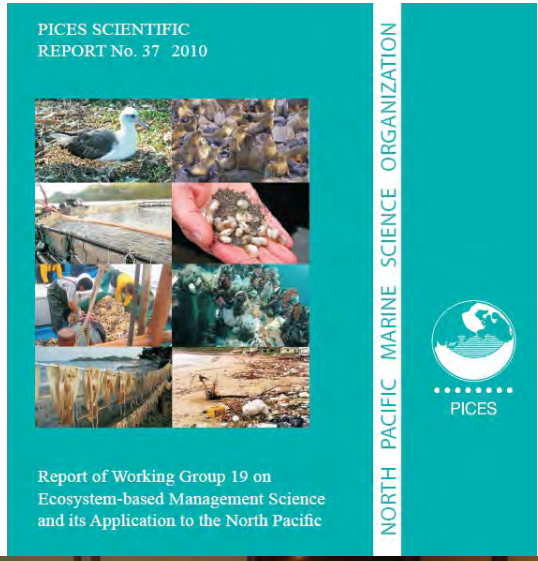
Article III: Purpose of the Organization

The purpose of the Organization shall be: to promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources, including but not necessarily limited to research with respect to the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna and ecosystems, its uses and resources, and impacts upon it from human activities;

Source: http://meetings.pices.int/about/convention

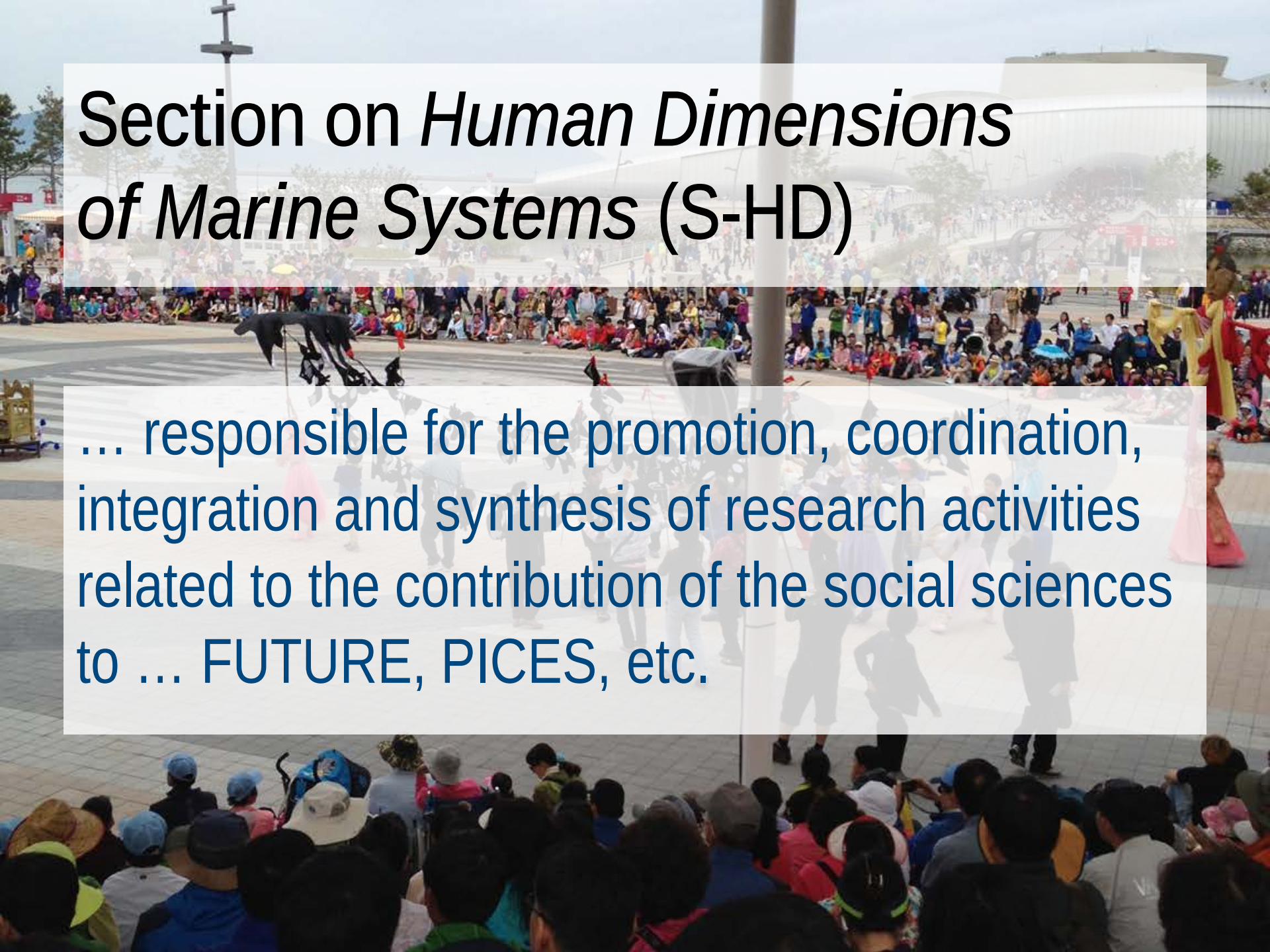
Select events in PICES Human Dimensions History

- 2000s the real start of human dimensions in PICES
- 2008 - PICES/ICES/ FAO Symposium on marine social-ecological-systems
- 2009-2011 Study Group on Human Dimensions
- 2011- Section on Human Dimensions (S-HD) started
- 2016- Proposed creation of Human Dimensions Committee



Select Human Dimensions History in PICES Annual Meetings

- Many invited and contributed economics talks in diverse workshops/ sessions
- “Economic Relation Between Marine Aquaculture and Wild Capture Fisheries” (2010)
- “Experiences and lessons learned in managing shared/transboundary stock fisheries” (2015)
- “Social sciences” beginning to appear more frequently in PICES Annual Meeting books of abstracts



Section on *Human Dimensions of Marine Systems* (S-HD)

… responsible for the promotion, coordination, integration and synthesis of research activities related to the contribution of the social sciences to … FUTURE, PICES, etc.

Section on Human Dimensions (S-HD) Select TOR

- S-HD will work towards SCIENTIFIC clarification of differences in societal objectives and needs among stakeholders in different sectors and countries.

- … S-HD will SCIENTIFICALLY explore the consequences to and responses of human social systems to factors such as climate-induced changes in marine ecosystems.

- S-HD will facilitate academic cooperation with other international research activities….

Social Sciences are playing an increasing role in a diversity of international symposia.

ICES/PICES/IOC Symposium on "Effects of Climate Change on the World Oceans"
19 - 23 May 2008, Gijón, Spain

The ICES/PICES Workshop on Economic Modelling of the Effects of Climate Change on Fish and Fisheries (WKSICCME_Econ)

- Chaired by Alan Haynie (USA), Sophie Gourguet (France), John Pinnegar (UK), Lisa Pfeiffer (USA), and Jörn Schmidt (Germany)
- June 3-4, 2016 in Brest, France connected to MSEAS meeting
- ~35 people
- Mixture of economists, other social scientists, and biologists

Integrated Ecosystem Assessments

The IEA synthesizes attributes of multiple ecosystem components into a single dynamic assessment.

http://www.noaa.gov/iea/Assets/iea/california/conceptual-models/Integrated-SocioEcological-System-Overview6.png

MSEAS

Brest, France

30 May – 3 June, 2016

Understanding marine socio-ecological systems

Including the human dimension in integrated ecosystem assessment

www.ices.dk/mseas2016

Theme sessions:

- Identifying policy, management, and industry needs
- Methods and tools for scenario development and prediction
- Data, indicators & reference points
- Participatory assessment processes
- Governance & institutional frameworks
- Practical case studies

ICES CIEM · PICES · Ifremer · WBO · CSIRO · NOAA

Brest

France

Understanding marine socio-ecological systems

Including the human dimension in integrated ecosystem assessment

May 30 - June 3, 2016

www.ices.dk/mseas2016

Integration of economics and social science into large interdisciplinary projects – from the Bering Sea Project to
the Alaska Climate Change Integrated Modeling Project (ACLIM)

Bering Sea Integrated Ecosystem Study (BSIERP) and Bering Ecosystem Study (BEST)



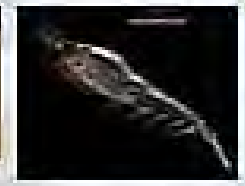
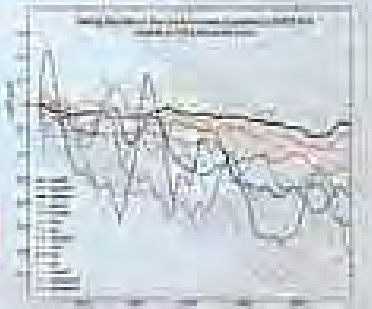










Humans

Humpback and fin whales

Commercial/subsistence fish: Pollock, cod, arrowtooth flounder

Kittiwakes and murres, fur seals, walrus

Forage species: Juvenile pollock, myctophids

capelin,

NPZ: Ichthyoplankton, euphausiids, Copepods

Infauna: Bivalves, gastropods, polychaetes

Atmosphere/ocean

Climate Scenarios

Two economic research pathways

Integrated Model (FEAST)

- Catch removed as part of the integrated model
- No economic response in the model

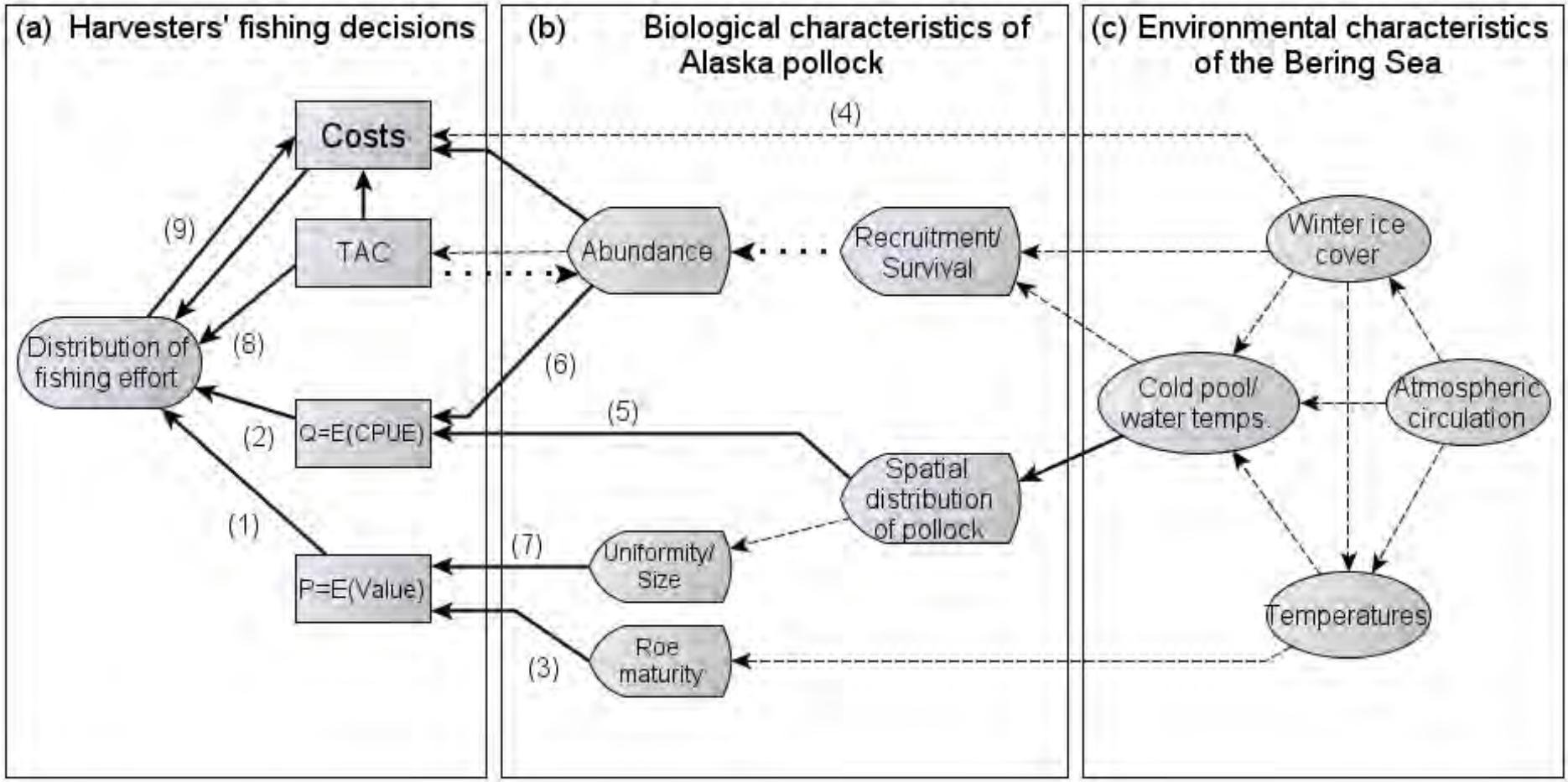
Pollock and cod models

- Examined the spatial and temporal behavior of the pollock and cod fisheries in response to change
- How well can we explain and predict these relationships?

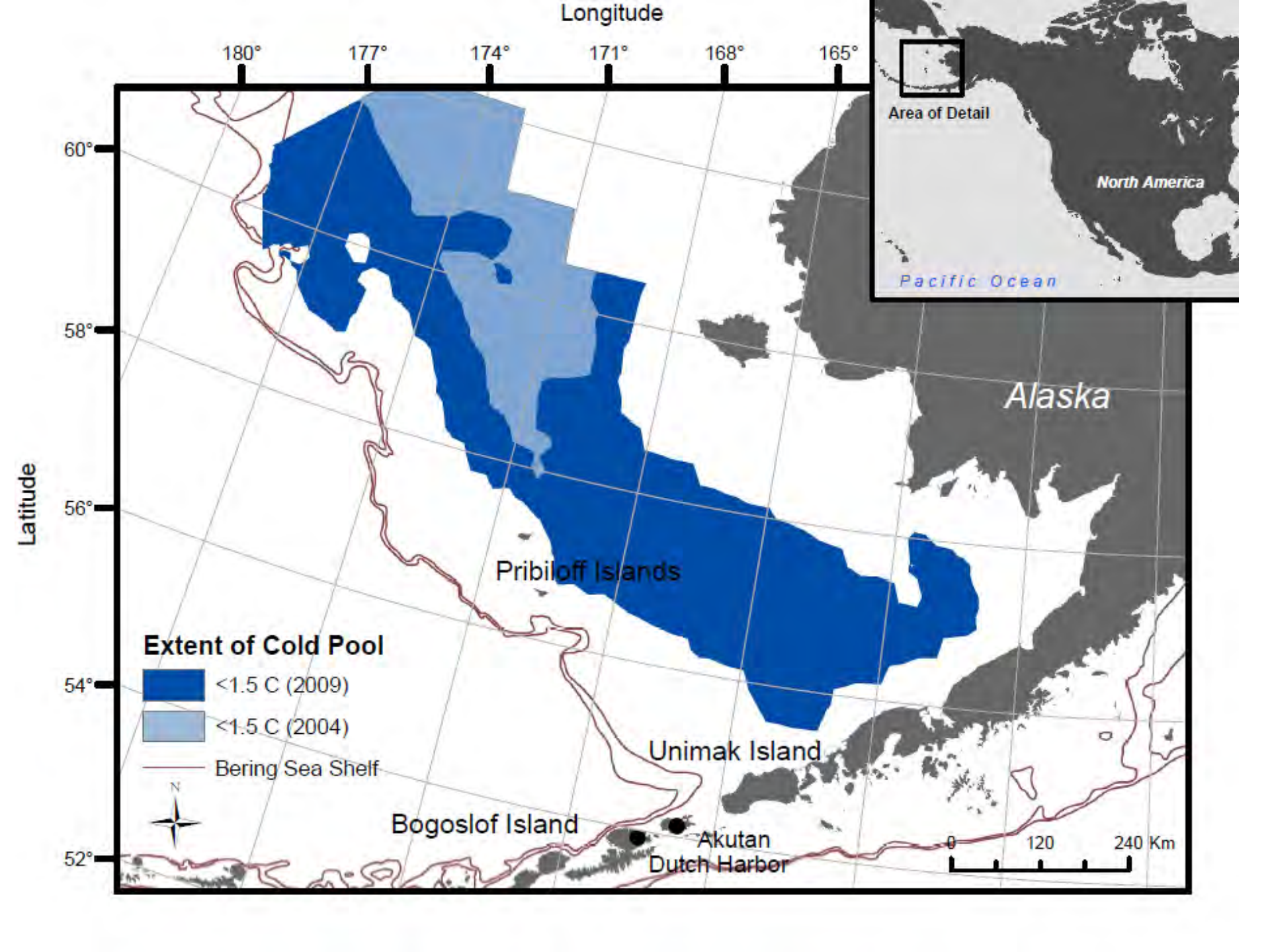
Original Plan: Integrate the fleet models into the FEAST Model.

Results: different but good outcomes

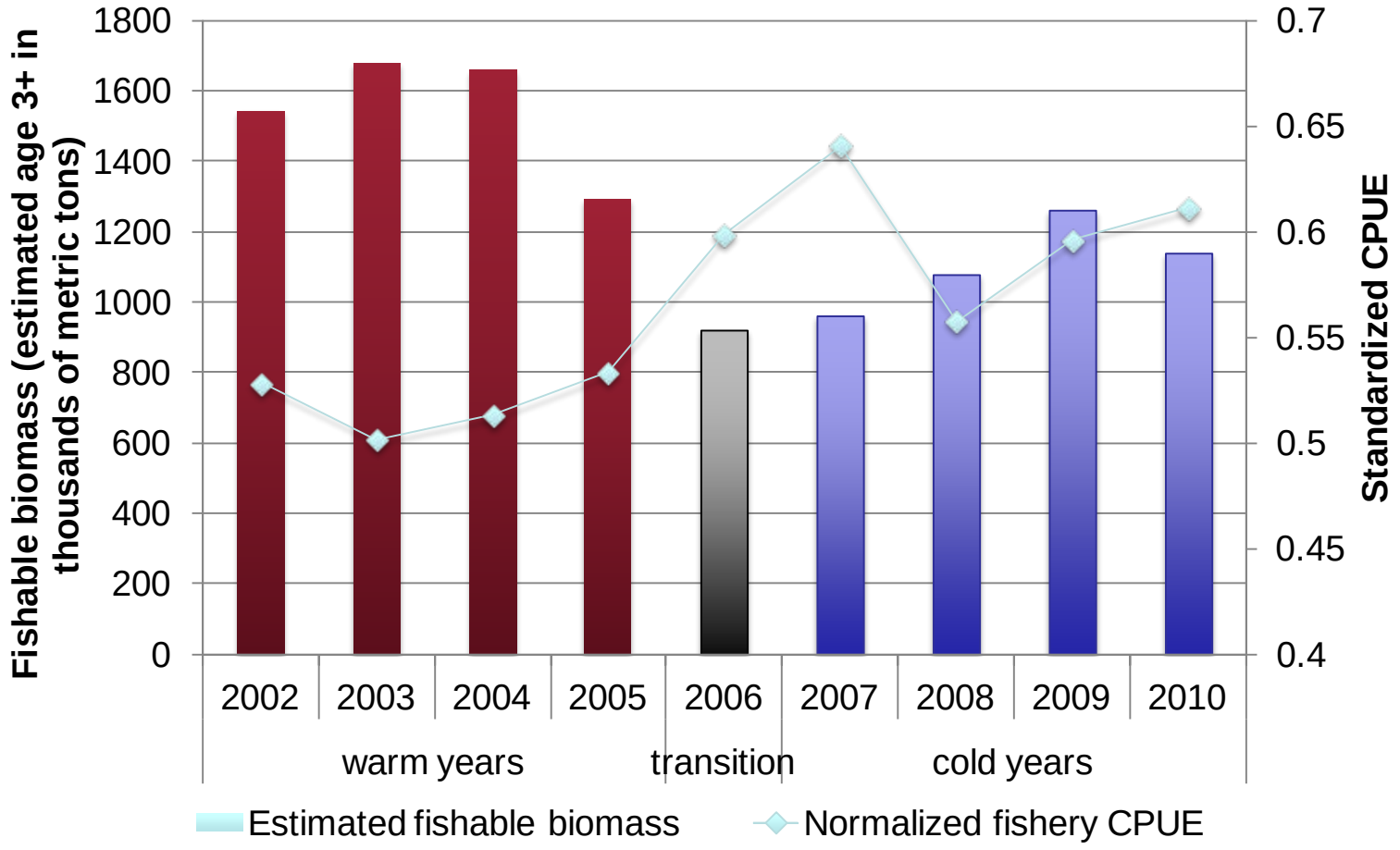
- Both projects generated exciting new research
- Delays occurred so that integration was not feasible and we didn't fully integrate those two parts of the project.



Conceptual model of how the environment affects the distribution of pollock fishing effort.
(from Haynie and Pfeiffer *ICES J. of Mar. Sci.* 2012).


Longitude
180°
177°
174°
171°
168°
165°
60°
58°
56°
54°
52°
Latitude
Area of Detail
North America
Pacific Ocean
Alaska
Pribiloff Islands
Extent of Cold Pool
<1.5 C (2009)
<1.5 C (2004)
Bering Sea Shelf
N
Unimak Island
Bogoslof Island
Akutan
Dutch Harbor
0
120
240 Km

The “march to the north” is not a consistent story for the Pacific cod fishery



Relationships between fishery CPUE, 1) survey abundance and 2) climate regime.

Some great parts of the Bering Sea Project

- Parallel project approach
- Multiple exposure to research over a 5-year period
  - Weekly / Monthly Calls
  - Annual Principal Investigator meetings and participation in many larger scientific meetings
- Comparisons across trophic levels

Great parts of the Bering Sea Project

- Parallel project approach
- Multiple exposure to research over a 5-year period
  - Weekly / Monthly Calls
  - Annual principle investigator meetings and participation in many larger scientific meetings
- Comparison across trophic levels
- The project created a large group of scientists with strong relationships and experience working with other disciplines.

Integration is Hard!

Integration Challenges

- Model timing - everyone wants their models to be functioning well before integration
- Large integrated models are computationally expensive
- It takes time to talk to each other
- Local Traditional Knowledge (LTK) and commercial economic work were challenging to integrate
  - Different relationships to the environment
  - Very different data

Don’t Wait

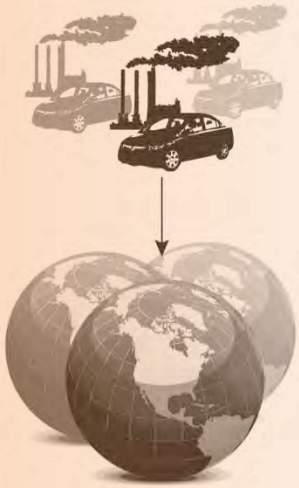
To Integrate !!

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Alaska CLIMate 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)

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



Future Climate Scenarios

IPCC Scenarios (x3)

AR4 A1B
AR5 RCP6.0
AR5 RCP8.5

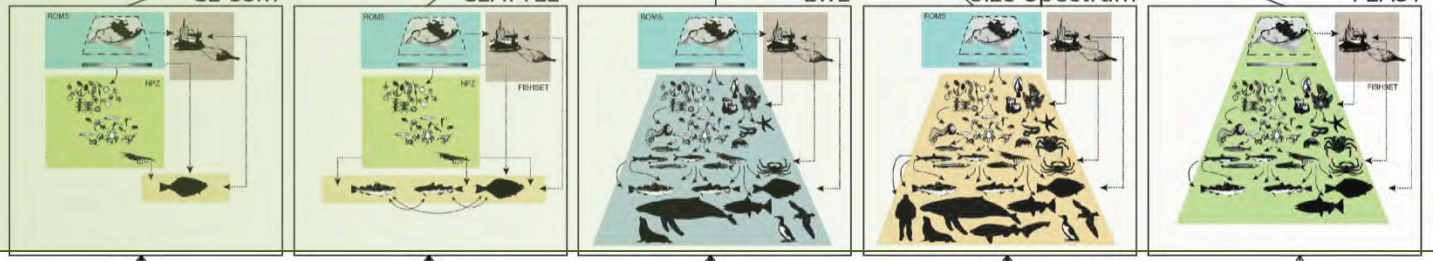
Global Climate Models (x 11)

ECHO-G (AR4 A1B)
MIROC3.2 med res. (AR4 A1B)
CGCM3-t47 (AR4 A1B)
CCSM4-NCAR- PO (AR5 RCP 6.0 & 8.5)
MIROCESM-C- PO (AR5 RCP 6.0 & 8.5)
GFDL-ESM2M*- PO (AR5 RCP 6.0 & 8.5)
GFDL-ESM2M*- PON (AR5 RCP 6.0 & 8.5)

Climate-enhanced Models

Bering Sea Models

CE-SSM | CEATTLE | EwE | Size-Spectrum | FEAST



Fishing Scenarios

CE-SSM	CEATTLE	EwE	Size-Spectrum	FEAST
By-catch, MSY	By-catch, MSY	By-catch, MSY	By-catch, MSY	Fleet dynamics
Status quo, MEY, No fishing	Status quo, MEY, No fishing	Status quo, MEY, No fishing	Status quo, MEY, No fishing	Status quo, No fishing
Harvest Control Rules (x5)	**Harvest Control Rules (x5)**	**Harvest Control Rules (x5)**	**Harvest Control Rules (x5)**	**Harvest Control Rules (x3)**

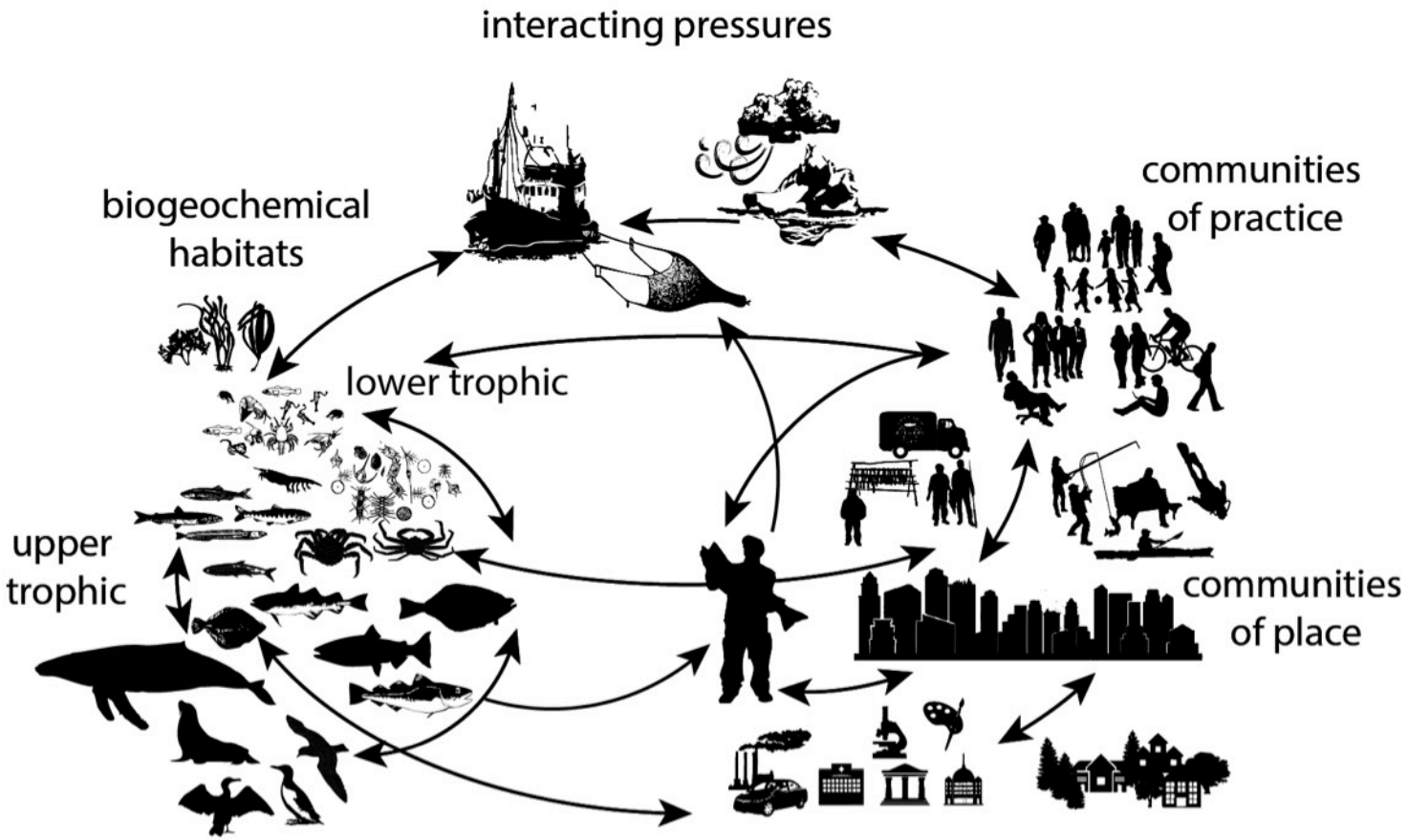
multiple non-linear pressures

multiple non-linear interacting pressures

- How do bottom-up vs. top-down models look different?

- We are approaching the research questions in ACLIM from all directions.

ACLIM utilizes a fully integrated approach



ACLIM: *Alaska Climate-change Integrated Modeling project*

Key ACLIM Integration Elements (from an economist's perspective!)

- Three NOAA economists + post-doc economist on project team
- Regular all-team meetings
- Many integrated collaborations
- Anne Hollowed and Kirstin Holsman attended 2-day climate economic modeling workshop associated with MSEAS
- 1-day workshop on economic models and model integration held in August at the Alaska Fisheries Science Center
- Strong existing AFSC / BSIERP relationships
  - Trust and years to work together in the future

Some challenges for better integration of human dimensions in marine sciences

- Easier access to Data & Models
- Doing great science
- Building and Maintaining Connections

FishSET

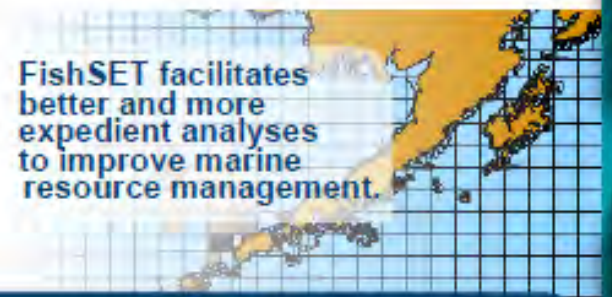
Spatial Economics Toolbox for Fisheries

FishSET's goal is to enable NOAA Fisheries economists and social scientists to better inform policy decisions by predicting how a variety of factors might influence fisher behavior.

Many modeling challenges exist. While predictive models are valuable tools for sustainable fisheries management and conservation, challenges to their development include preparing, integrating & updating many data sources, choosing appropriate models, and interpreting results.

FishSET provides:

1. **Superior data organization, analysis, and integration** for spatial models.
2. **Best management practices** for data, modeling, and model comparison.
3. **Many models in a single toolbox** for ease of model comparision and use. Combines several fisheries economics modeling approaches in one toolbox.



FishSET facilitates better and more expedient analyses to improve marine resource management.

To learn more, visit
www.st.nmfs.noaa.gov/humandimensions/fishset/index

What tools are in the FishSET toolbox?

Data Tools

Data Management & Integration Tool
Facilitates the development and integration of datasets for spatial modeling

Monte Carlo Tool
Simulates real fisheries data while preserving confidentiality, allowing better model testing and comparison.

Data Analysis & Mapping Tool
Enables graphical and geographic data viewing and prepares data for spatial modeling

Model Tools

Model Design & Selection Tool
Enables modeling of different combinations of variables and models

Modeling Tool
Runs standard, cutting-edge, and user-designed models

Model Comparison & Reporting Tool
Provides an extensive comparison of model performance and summarizes data, models, and results

Policy Tools

Policy Simulation Tool
Predicts location choices and estimates policy impacts

How do we balance

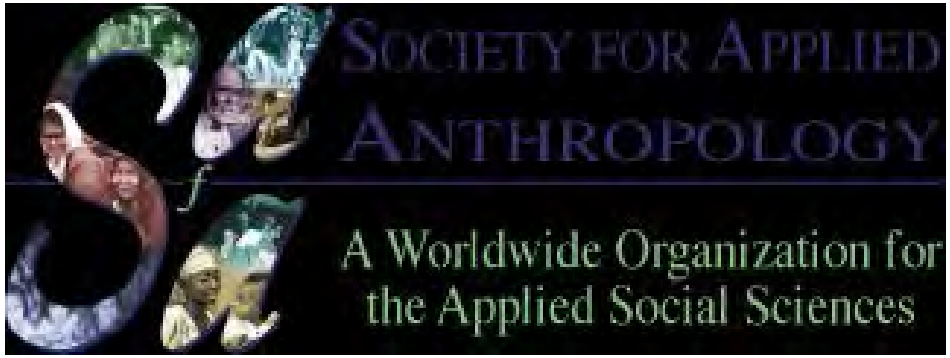
the exciting opportunities for new multi- / inter -/ trans-disciplinary work

with

very focused opportunities to improve resource management?

- Avoid naïve projections / predictions and ensure that messages are properly understood

  - More work with end-users needed to understand how they interpret uncertain outputs.



+ others

Many organizations are ready for collaboration.

MSEAS-II

Potentially in Yokohama, Japan
2019 / 2020

Great opportunity to have other meetings and workshops build towards this setting.

Integrating Human Dimensions is a long-term process

– but is essential

Thank you!

Thanks to PICES for travel support,
NPRB, NMFS Economics Program, Lisa Pfeiffer, Anne Hollowed, Kirstin Holsman, Jordan Watson, Tom Van Pelt, Ron Felthoven, Steve Kasperski, Henry Huntington, and the whole BSIERP and ACLIM research teams.

Alan.Haynie@noaa.gov