Jan 20, 2013 Notes for bkout: Upper Trophic and Acoustics Breakout Group
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Given 5 years and unlimited funding, challenge questions
- How do we "think" the Chukchi-Beaufort Seas (US) are "operating" as a "system?" [quotations identify words for which we do not have working definitions]
- What are the key questions, key data, and data collection needs?
- Is there or are there any model examples to use as a template for this process?

Use of passive acoustics - id species, context (e.g., reproduction, migration, foraging)
Use of active acoustics – abundance, density of fishes, invertebrates

What are the key upper trophic topics?

What are fundamental themes for research?

Anthropogenic effects on marine mammals and other vertebrates, i.e. fishes. Need for awareness that many invertebrate are acoustically active and have acoustic perception mechanisms.

- Regional bias driven by economic and regulatory drivers – not necessarily a holistic environmental view that provides sampling at ecologically meaningful scales.
- Acoustic data acquisition applied with an eye toward bowheads and other marine mammals – data could be mined for other species occurrence, synthesis, and integration within a systems approach. A broader array of species available in existing data. Underscores values of extensive passive acoustic datasets sampling over large spatial and temporal scales – e.g., could review to study acoustically active fishes, cross-validate with visual survey data to evaluate value.

Where does the information from this breakout group go?
Focus: Come up with outline of questions. They will go on the web page for PacMARS. They will go to program managers who will engage at a high-level workshop in May where they will get "big thinkers" via IARPC. The group here is not broad enough to provide the insights requested or expected from the questions. In 3 years there will be a National Academies report. The "train is moving for the Chukchi Sea. "

What do we know about the Bering, Chukchi, and Beaufort seas"
These areas are functioning now, and how may they change – what are the most important parameters to measure – what are the research objectives – multiple perspectives.

What resources do we have to answer the questions? How do we get an integrated research objective?

What are the data out there currently that you would bring forward?

Take a marine ecosystem – BEST BSIERP / GOA – NPRB have done these. Integrated ecological looks with a target goal for fisheries. GOA / PWS GEM looked at the ecosystem to be prepared in the event of a spill. Peer reviewed GEM was published not funded. BEST was NPRB – human

and people – NSF brought about the physics and lower trophic aspect, NPRB the upper trophic and human connections.

Questions are different for the Bering vs. Chukchi regions. Systems are different – what about ice? i.e. nothing related to Oil and Gas for example.

Changes in productivity and capacity for fish and MM – key ecological theme

Large ship traffic
Oil and Gas
Industrial Development – O&G, ship traffic,
Ongoing climate change concurrently

Have a handle on the Bering Strait to Beaufort region –
Conductivity of Bering Strait to Beaufort / Chukchi – fish – do the fish overwinter in the Chukchi Sea or do they migrate?

There are data out there – what we don't know is if the data have been used for a mechanistic understanding of the ecosystem.

How to pull historical and ongoing data to result in a more predictive responsive model.

Conductivity is important – flows between regions / organisms –i.e. seabird colonies at SLI dependent on copepods – upwelled from off the shelf and brought to the birds. Breeding Success variable on the flow of winds/currents. Snow crabs – economic – advected east/west to SE Bering Sea and up to Chirikov basin…advected through the Strait…to what extent are the Chukchi Sea communities dependent on advection from the Bering Sea? Progression of organisms ecosystems north.

A lot of talk about a bottom up system – benthic organisms but we also have a lot of benthic feeders. Are there any talks about top down effects/influences on the ecosystem.

Changes in wind are very important – moves the ice – redistributing the organic matter differently. How will wind patterns change? How does wind distribute organic matter. Met. Oceanographic conditions – needs to be studied. Understanding physical

Current models – communications theme – between regions

USGS modeling of polar bears - brings data together in a framework. Some parameters missing – what / how will the processes be different… Ocean acidification effects? Is Native knowledge being used – but folks struggle with what is the mechanism to do that? Walrus model / had

Upper Tropic – economic opportunities/resources might change – top down model / subsistence needs / people / regulatory push /

Struggle with prey species for upper trophic organisms – ex. Chukchi Sea – Fish perspective – bottom trawl / surface trawl / mid water acoustic – this year.

International problems – we need comprehensive perspective

Communications internationally, communications regionally, communication among scientist and coastal stakeholders.

Need more comprehensive coverage.

Gap: comprehensive temporal, regional, international data (holistic ecosystem coverage) collaboration, communications.

Survey for fishes/marine mammal prey: need a comprehensive repeatable sampling station(s).

Conductivity – international coverage – comprehensive.

Do we have what we need yet to understand the systems?

Sampling designs – not standardized, historical yet applicable? Can the historical data even be used for modeling the future?

Developing a model – to test the system – is as good as the data you put into it. Need to start somewhere. The Arctic is not ready yet – can have targeted model though – focus on key species – lower trophic to higher trophic.

Mechanistic understanding – first step – understanding the forcing factors and spatial/temporal parameters. Ex. Passive acoustic data – still in the Middle earth period – poor standardization of procedures. Sampling design – important – BEST BSIERP was able to pull this off.

What standardized data do exist for a region – important tool. Need standardized data collection.

Identify key things to monitor w/unlimited project. Ex. Mooring project…:
Integrated surveys – not species / trophic level specific but truly integrated including physical.
Agencies restricted by mandated organisms – regulatory constraints - inter-agency/multiple stakeholders need to be brought

Identify key locations:
Bering Strait – chokepoint, Point Hope, Barrow Canyon, Peard Bay, Hannah Shoal, Kaktovik
Mackenzie River

Overarching
Fisheries survey grid – E/W Chukchi Sea, OCSEAP grid, Broad scale 20-40 km across the shelf

Integrated from physics, temporal

Integration of observational network – regionally specific change – thought can be driven by forces from other regions

There is currently no large public participatory process for coastal stakeholders to integrate their observations / TEK / regional expertise.

TEK problems – scale of observations; questions asked –

Use public – i.e. Christmas bird count

Chukchi – TEK – community and BS

Ex. Africa – Clark's example of data collection by communication

Moorings – put on more sensors – utilize what we have to the max. benefit