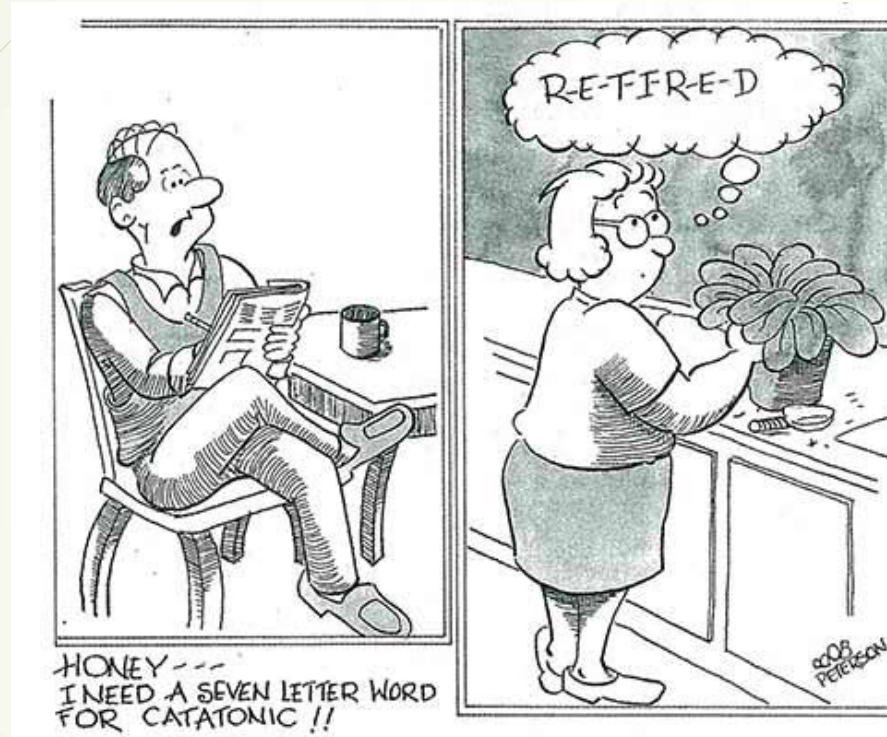


PSAW II – Another Step Forward for Protected Species Science

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Richard Merrick
Scientist Emeritus
NMFS/NEFSC

Retired ...



The idea is to die young, as late as possible



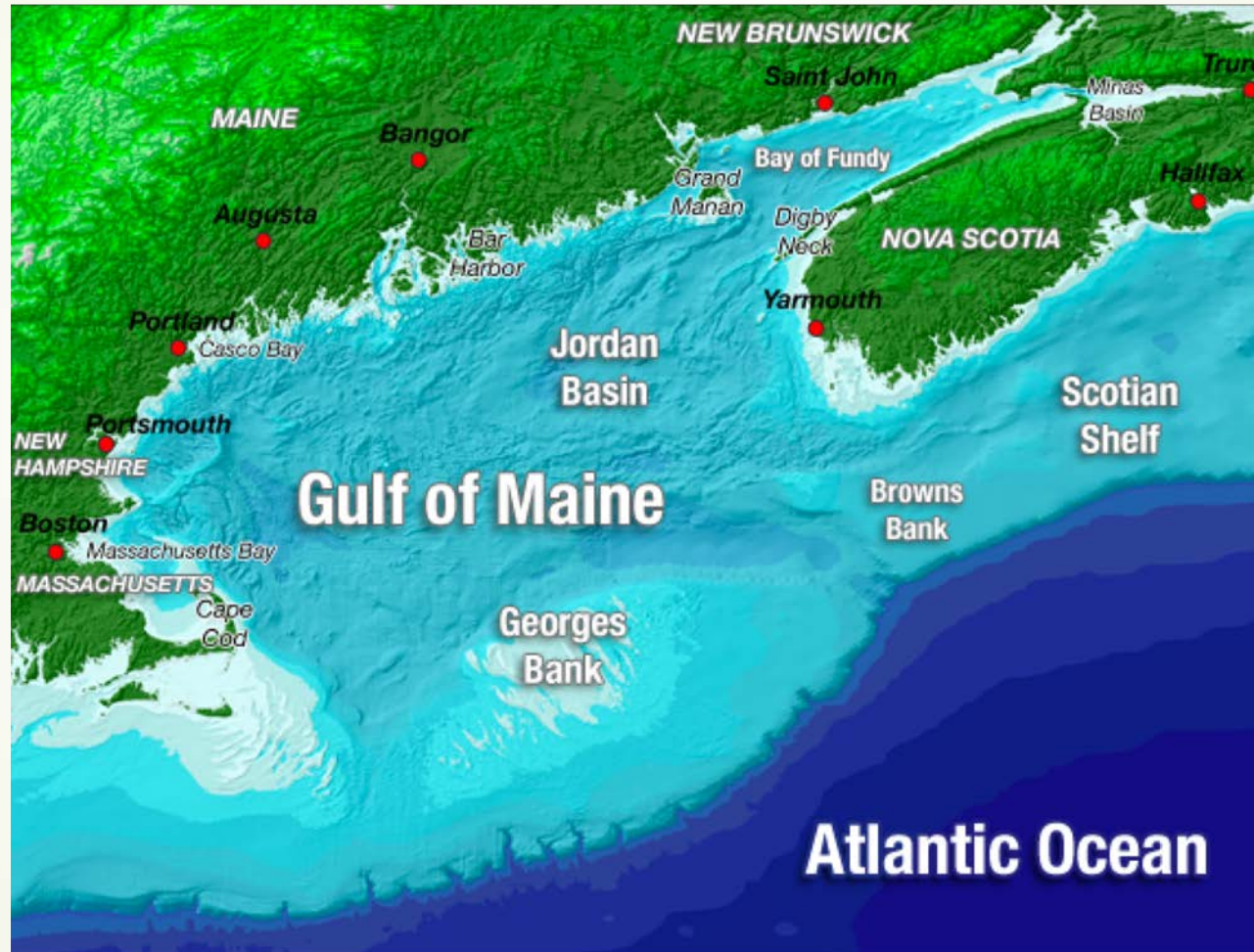
But No, it is a lot more interesting to stay engaged ...



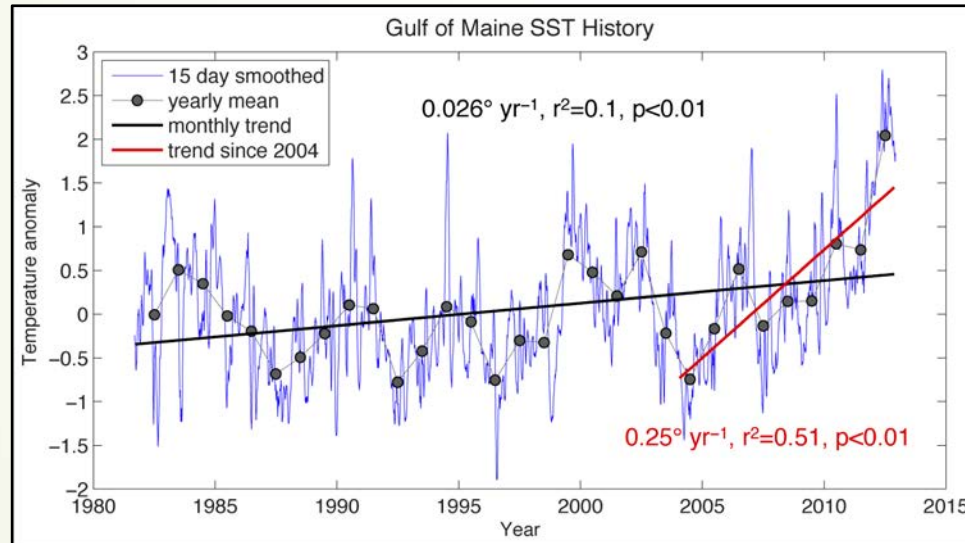
Given that – what meaningful advice can I provide to you?

- ▶ I addressed PSAW I, and my comments there were designed to reassure you in the transition between Administrations
- ▶ Now I urge you to consider how we provide scientific advice on the status of our trust species ... when the ecosystems they inhabit are experiencing unprecedented change
- ▶ For context, consider the Gulf of Maine ecosystem ...

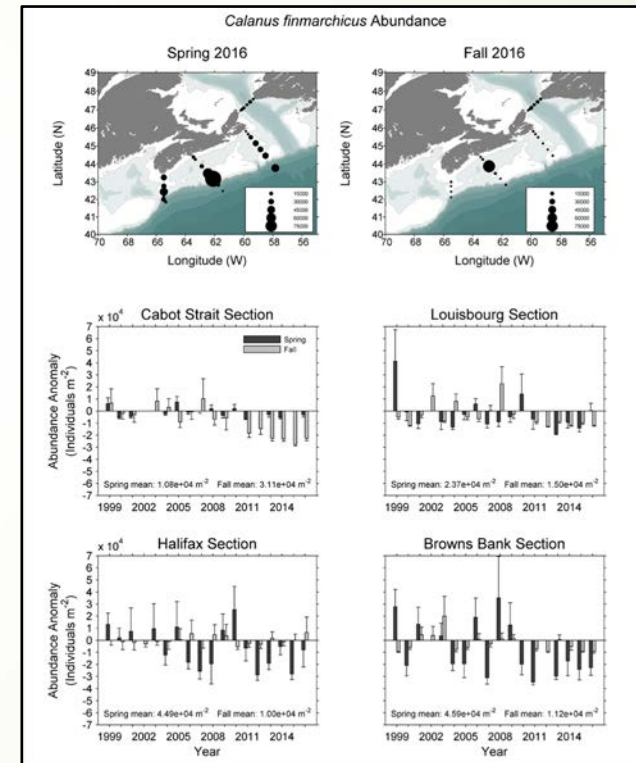
The Gulf of Maine Ecosystem



A Changing Marine Climate Has Altered the Food Web

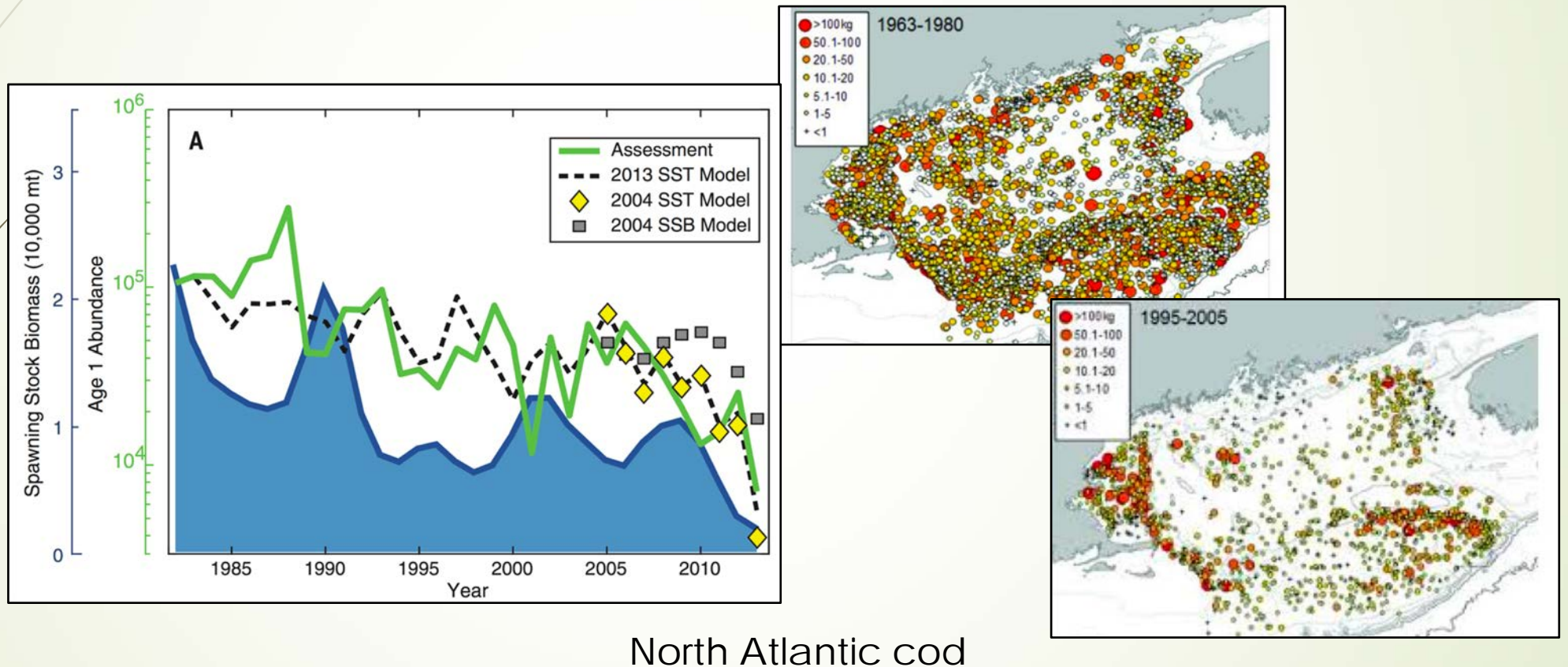


Source: Pershing 2013



Source: Johnson et al. 2017

Which In Turn Effects The Distribution And Abundance Of Species In The Ecosystem



So How Do We Embrace This Vision?

- ▶ Consider focusing on three themes in providing future assessment advice
 - ▶ Embrace ecosystem approaches to assessments
 - ▶ Recognize the influence climate change has on on distribution and abundance
 - ▶ Inform and educate our partners on how changing ecosystems impact their mission

Learn From Past Research

- ▶ GAMMS I-III - Each of the three GAMMS workshops developed new, innovative approaches to stock assessments, but focused on implementation of the PBR approach to marine mammal stock assessments with little nod to ecosystems or to climate change.
- ▶ Historical survey data provides a basis for associating abundance and distribution with historical ocean climate.
- ▶ While these traditional approaches to stock assessment are still necessary, they may be insufficient to provide adequate advice in a time of a changing ocean climate

But Wait There Is More In The Past

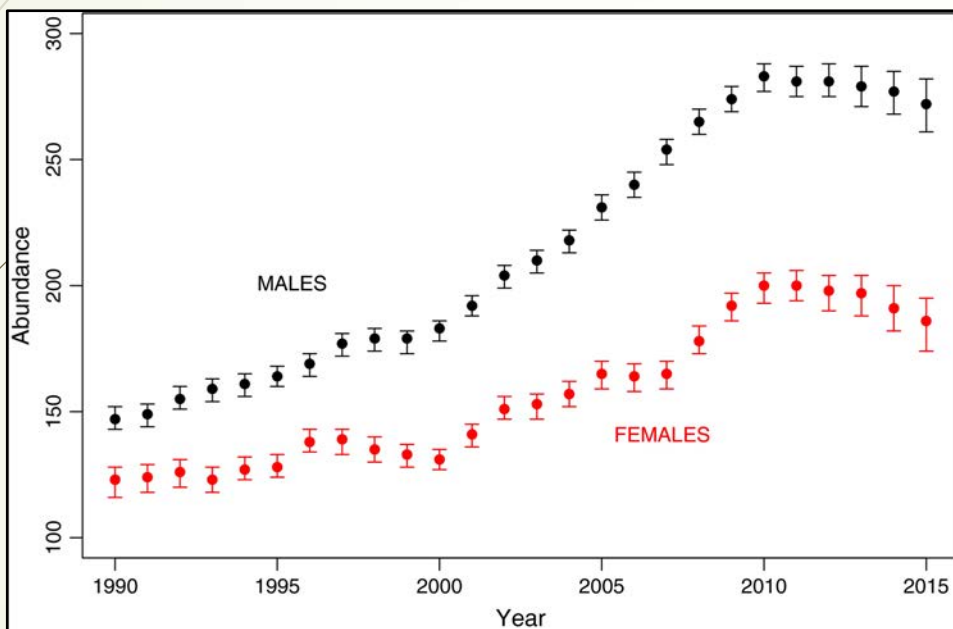
- ▶ PR SAIP Tier III Workshop – embraced ecosystem approaches, and went beyond a marine mammal focus
- ▶ Instead it focused on:
 - ▶ Ecosystem Studies with a PS component
 - ▶ PS studies with an Ecosystem component
 - ▶ Ecosystem Based Stock Assessment for Protected Species



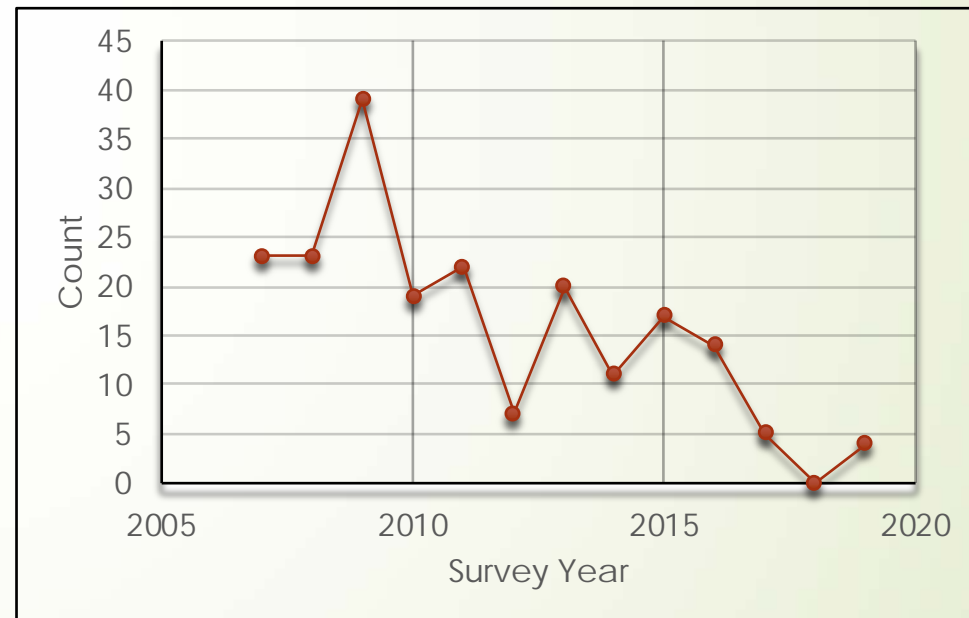
Tier III: Ecosystem Based Assessments

- ▶ These assessments should continue to provide single-species scientific advice, but include ecosystem considerations.
 - ▶ An “ensemble approach” to assessment using multiple model types may be an appropriate framework.
- ▶ Concurrently assess populations from multiple taxonomic groups, and not just marine mammals.
 - ▶ Recognize that if one taxon is showing an effect resulting from climate change, it is likely others are being effected too
- ▶ With this in mind, take an ecosystem-based approach to surveys and assessments.
 - ▶ Make sure to monitor ecosystem covariates so that we can continue to develop our understanding of how these effect distribution and abundance.

North Atlantic Right Whales



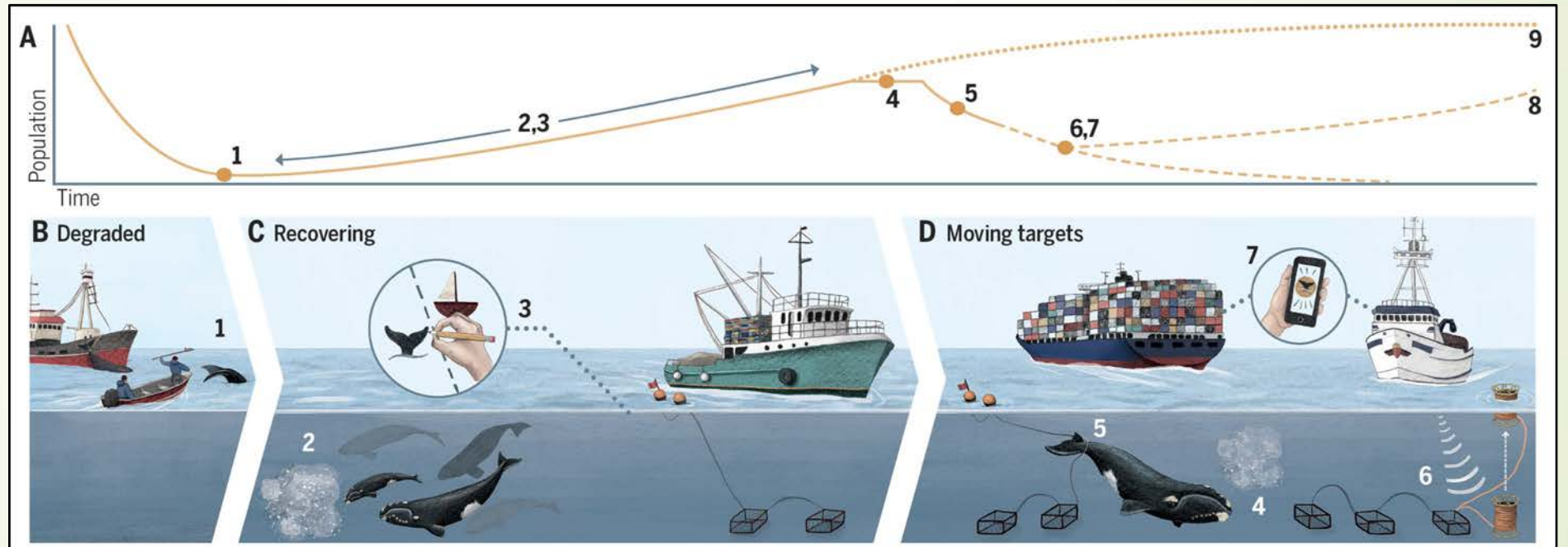
Calves Born 2007-2019
NMFS (2019)



Environmental Shifts Are Creating Moving Targets for Marine Recovery

- ▶ We use abundance and productivity baselines to measure change and set conservation targets (e.g., OSP, PBR) in ecological systems.
- ▶ Ideally, these baselines reflect the true resource productivity so as to avoid what Pauly (1995) termed the “Shifting Baseline Syndrome”.
- ▶ However, climate change introduces directional trends that are reshaping ecosystems and altering the productivity of managed species.
- ▶ Baselines need to be reexamined in systems where climate change is a critical driver of resource productivity.

Climate Change Creates Moving Targets

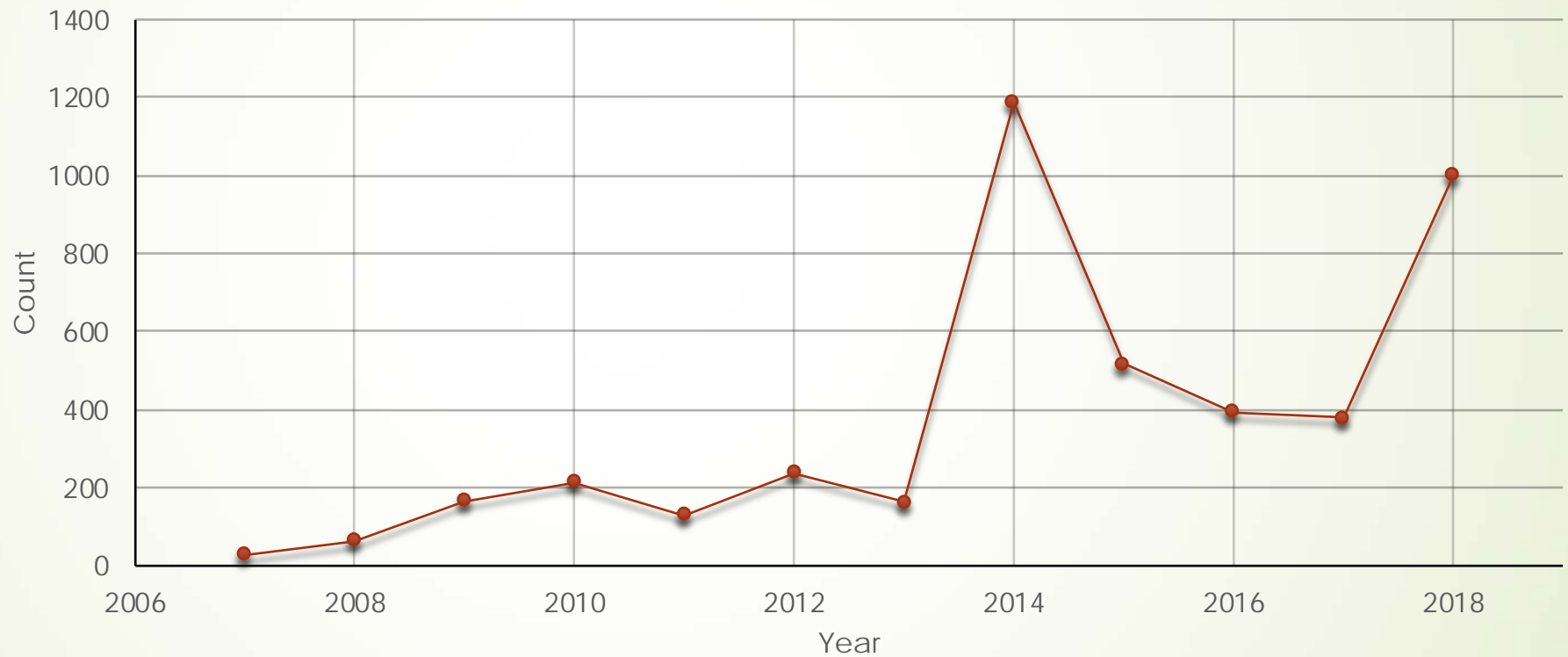


Source: Ingeman, Samhuri, and Stier. 2019

Climate Change Impacts

- ▶ Embrace the fact that even the largest and most mobile marine organisms are effected directly and indirectly by ocean climate change
- ▶ Kudos to the Centers and F/ST:F/PR for developing the protected species vulnerability assessments as they show many of our species will be significantly impacted by a warming, more acidic ocean.
- ▶ But, remember that not all impacts are directly related to food web dynamics

Cape Cod Kemp's Ridley Cold Stun Strandings: 2007 to 2018



(Source: Mass Audubon; 2018 number is early estimate)

Climate Change Impacts

- ▶ Want to harness the power of strong survey designs coupled with ocean climate data (historical and predicted) to provide accurate prediction of future PS distribution
- ▶ But think beyond predicting distribution, as we need to be aware that changes in survival and reproduction related to ocean climate change will have significant impacts on future abundance
- ▶ Again, our past approaches to evaluating status may be inadequate to deal with the future state when baselines have shifted

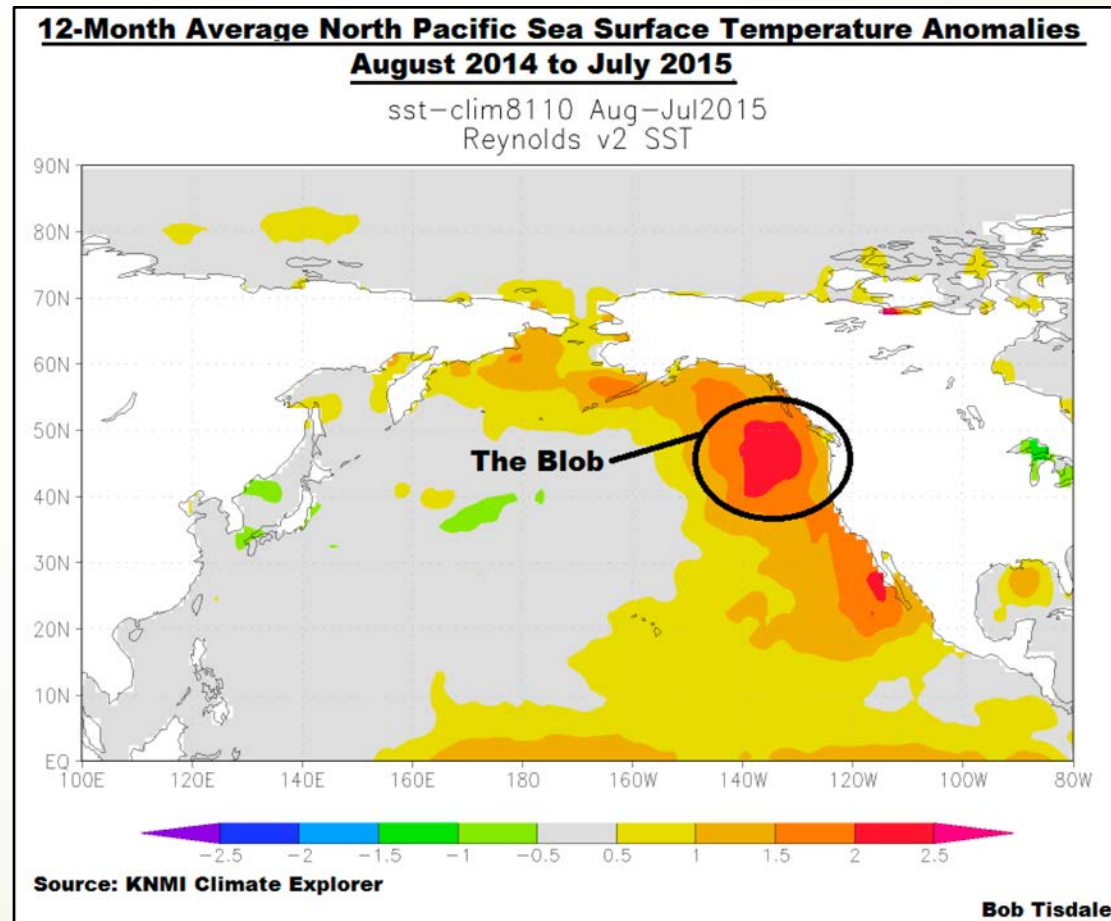
Inform and Educate Our Partners

- ▶ Provide advice based on current and future (not past) ecosystems and the recovery dynamics of species inhabiting them.
- ▶ Provide the science to support a vision recognizing that recovery goals can encompass a range of outcomes in the space between minimum ecological viability and maximum carrying capacity.
- ▶ Develop tools (e.g. MSEs and IEAs) that allow managers to embrace nimble responses to changing conditions.

Inform and Educate Our Partners

- ▶ The ocean is changing and will likely not be the same again in our lifetimes:
 - ▶ As a result, some traditional baselines are shifting
 - ▶ So, it may not be appropriate to expect all Protected Species populations to recover to historical levels
- ▶ Prediction of changes resulting from evolving ocean climate may now be more relevant than retrospective based analyses
- ▶ This recognition can help change the regulatory culture to become more resilient, adaptable to relatively sudden changes in ocean climate

The Blob – A Case Study of the Need for Ecosystem-wide Decision Making



My Challenge To You All In This Meeting

- ▶ Embrace ecosystem approaches to assessments
- ▶ Recognize the influence climate change has on on distribution and abundance
- ▶ Inform and educate our partners on how changing ecosystems impact their mission