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Adaptive Management of Marine Mammal Populations in Response to Changing Arctic Conditions

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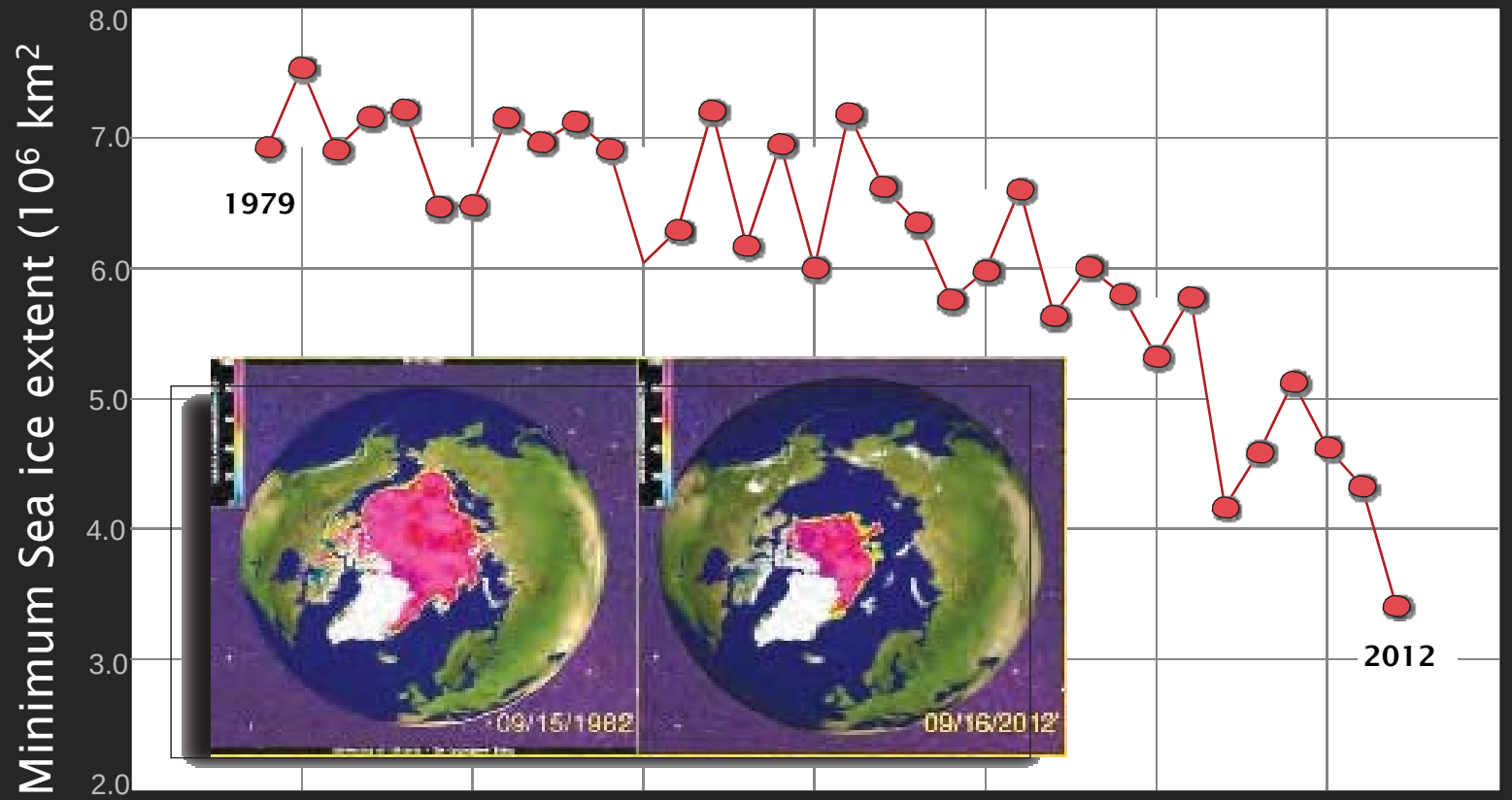
Management Challenges

Arctic Marine Mammals

- Unknown causes for decline
- Stressors outside managers' control or jurisdiction
- Long-term time frame for recovery
- Cumulative effects

Threat to Arctic Marine Mammals

Climate Change – Melting Sea Ice



Data courtesy of the National Snow and Ice Data Center; maps courtesy of University of Illinois.

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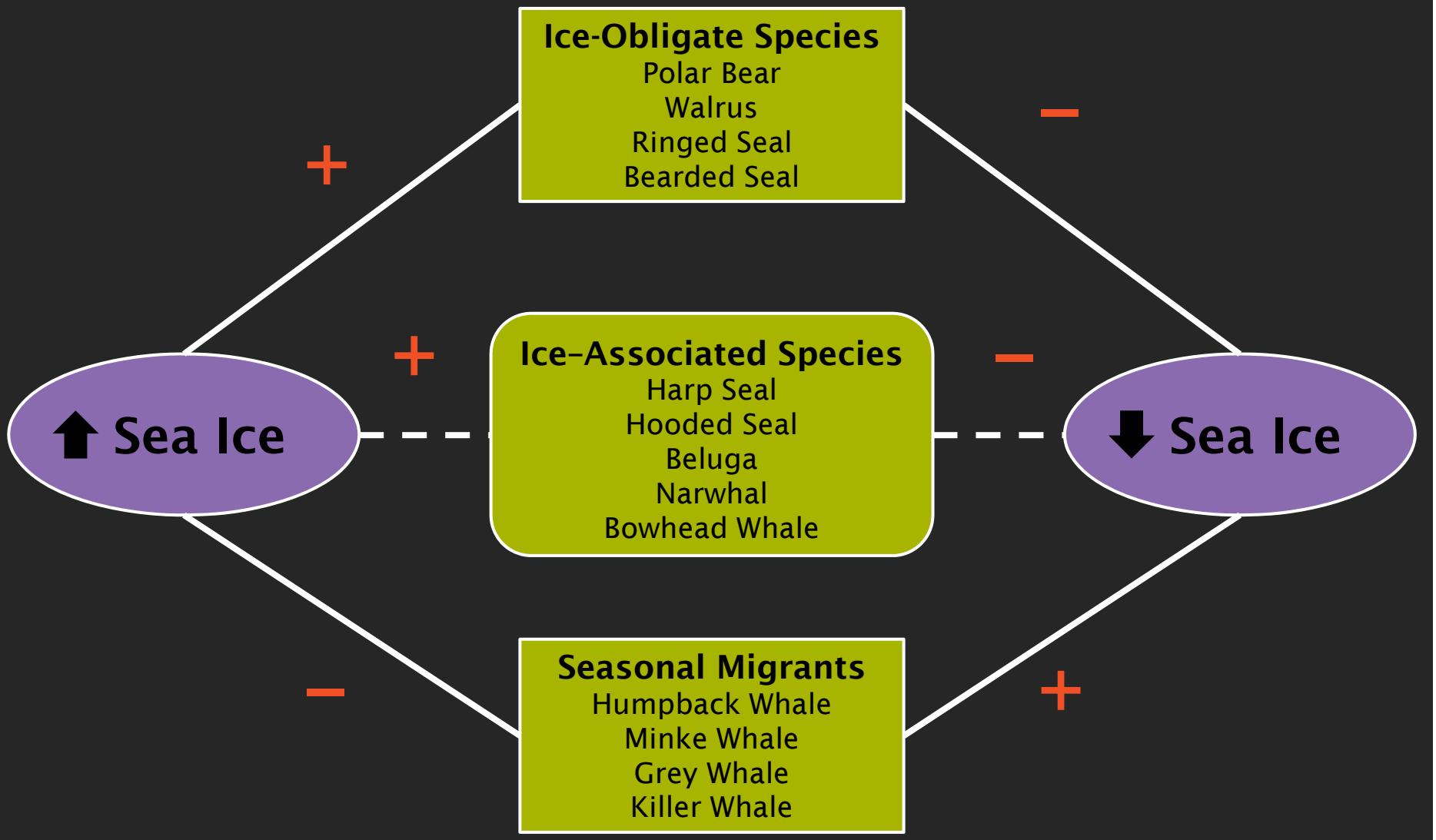
Threat to Arctic Marine Mammals



Moore and Huntington 2008

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How to Manage Resources in a Changing Climate?

Establish Baseline
Collect information
Broad temporal scales

Assess Impacts
Climate models
Impact models

Incorporate Uncertainty
Pre-defined triggers
Conscious experimentation

Monitor and Adapt
Set priorities
Consider triage

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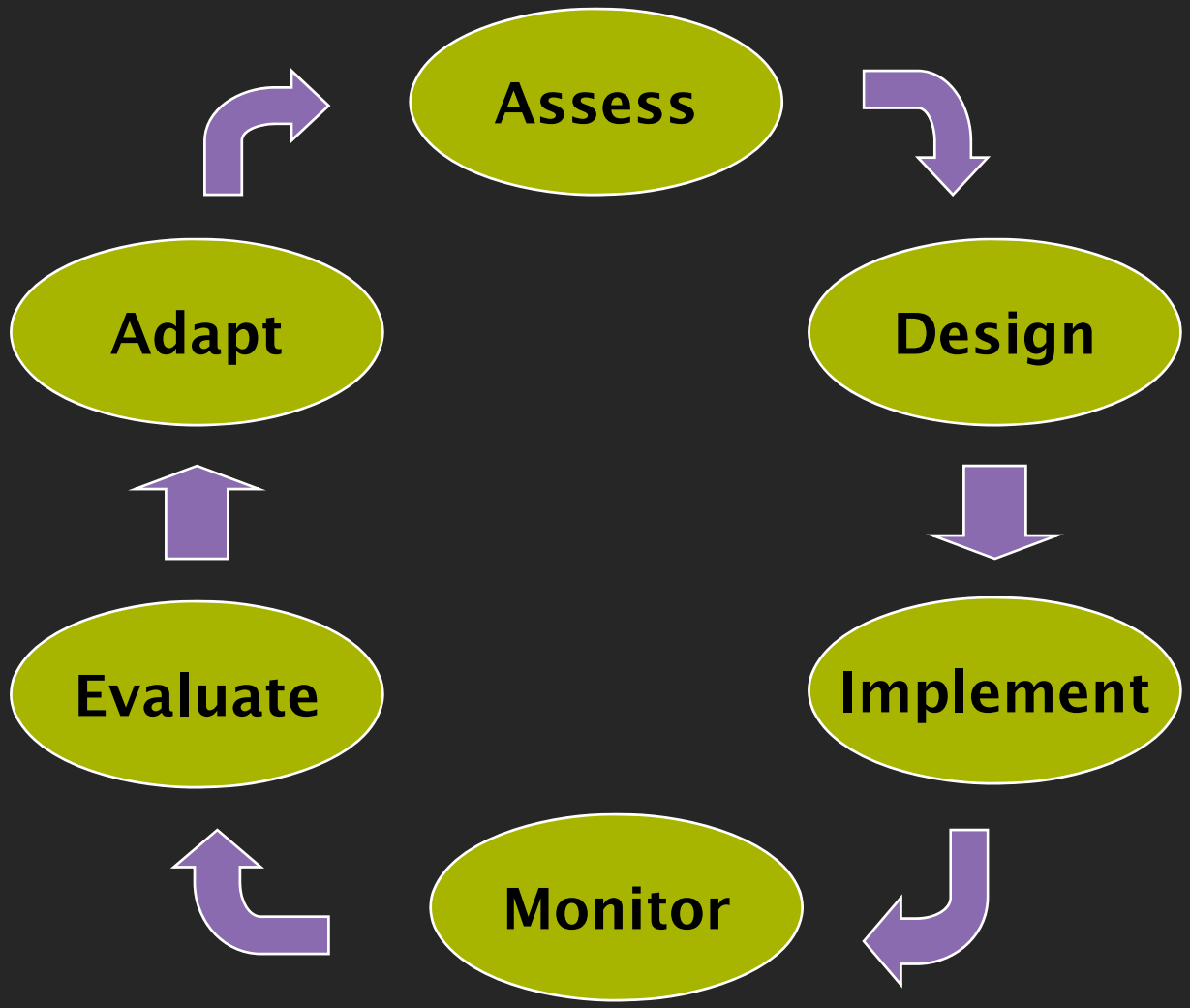
Baseline Studies – Ecosystem Services

- Joint Studies such as Marine Arctic Ecosystem Study (MARES):
  - Joint US-Canada effort Lead by BOEM with help from Shell, the USCG, and the US Arctic Research Commission.
  - Will study components of the Beaufort Sea ecosystem from Barrow in Alaska to the Mackenzie River delta off of Canada.
  - The overarching goal of the study is to better understand the interrelationships of the physical, biological, chemical and human systems, including traditional knowledge, of the Beaufort Sea

What is Adaptive Management?

Managing based on observation and continuous learning



Nyberg 1999

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How Can Adaptive Management Help?

- Allows for the management of highly uncertain systems (Lawler 2009)
- Considers the “big” picture
  - supersedes small spatial and temporal scales and individuals (Canter 2008)
- Identifies data gaps

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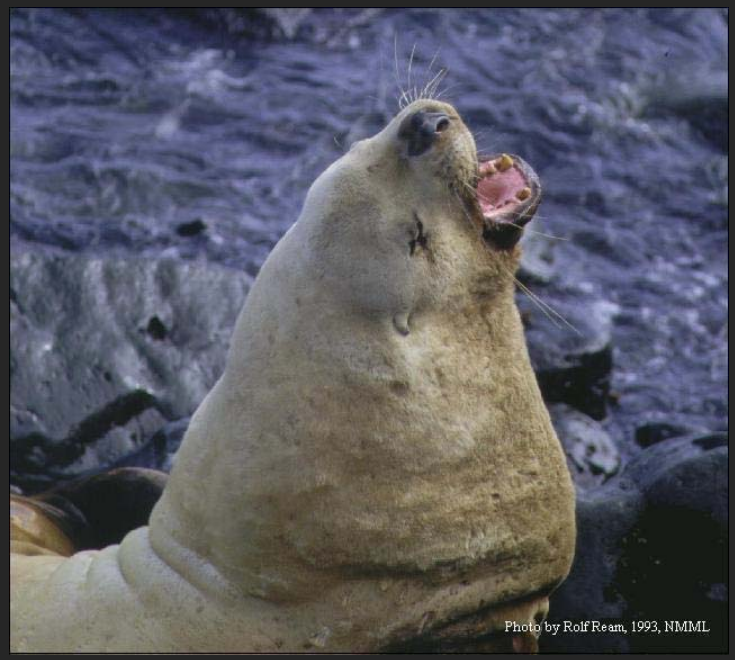
Tools for Assessing Impacts and Incorporating Uncertainty

- Scenario-based evaluation and planning
  - Goals and specific objectives
- Conceptual models
  - Predict, mitigate, implement, monitor, adapt

Scenario Based Impact Assessment

- Make assumptions based on parallel case studies
- Evaluate historical trends
- Utilize surrogate species



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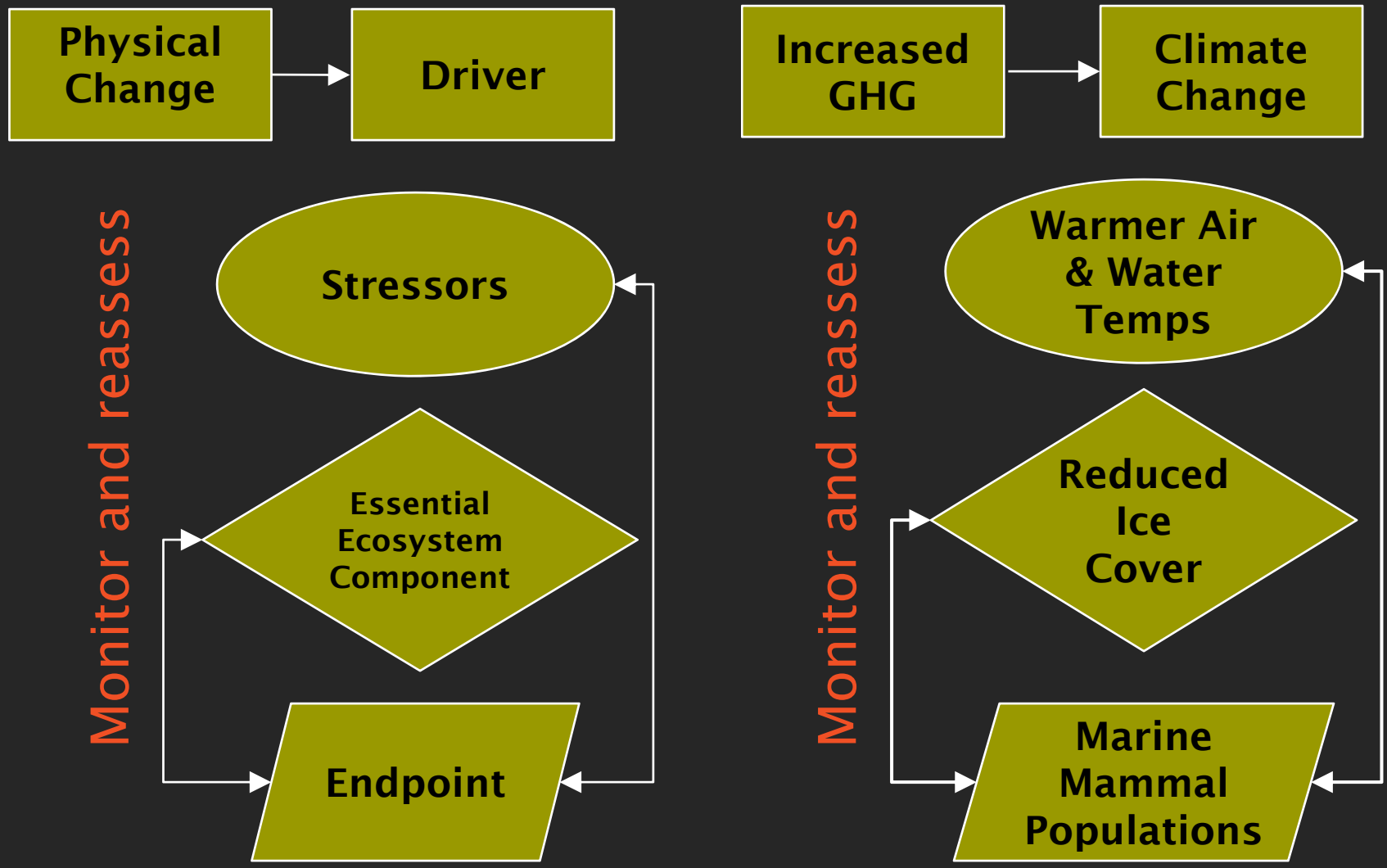
Conceptual Models



Based on: Canter 2008

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Management Examples - Ice Obligates and the Endangered Species Act

- Climate-focused ESA listings.
- Polar bear – listed as threatened in 2008.
- Bearded & Ringed Seals- listed in Dec. 2012.
- Walrus – listing decision to be made in 2017.

Polar Bear

- ESA uses term “foreseeable future”, but doesn’t define it.
- Polar bear listing (upheld by courts) was based on 45-year projection of effects of climate change.
- However in Jan. of 2013, the courts voided the polar bear critical habitat designation (187,157 mi^2 as being too extensive.

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Bearded Seal Case

- NMFS looked 100 years into the future.
- "Forecasting more than 50 years into the future is simply too speculative and remote to support a determination that the bearded seal is in danger of becoming extinct".

- The listing was vacated in July of 2014.

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Ringed Seals

- Dec 2, 2013 NMFS proposed about 350,000 mi^2 as critical habitat for ringed seals.
- Would be the nation's most vast area of CH.
- Currently in 90-day public review period.

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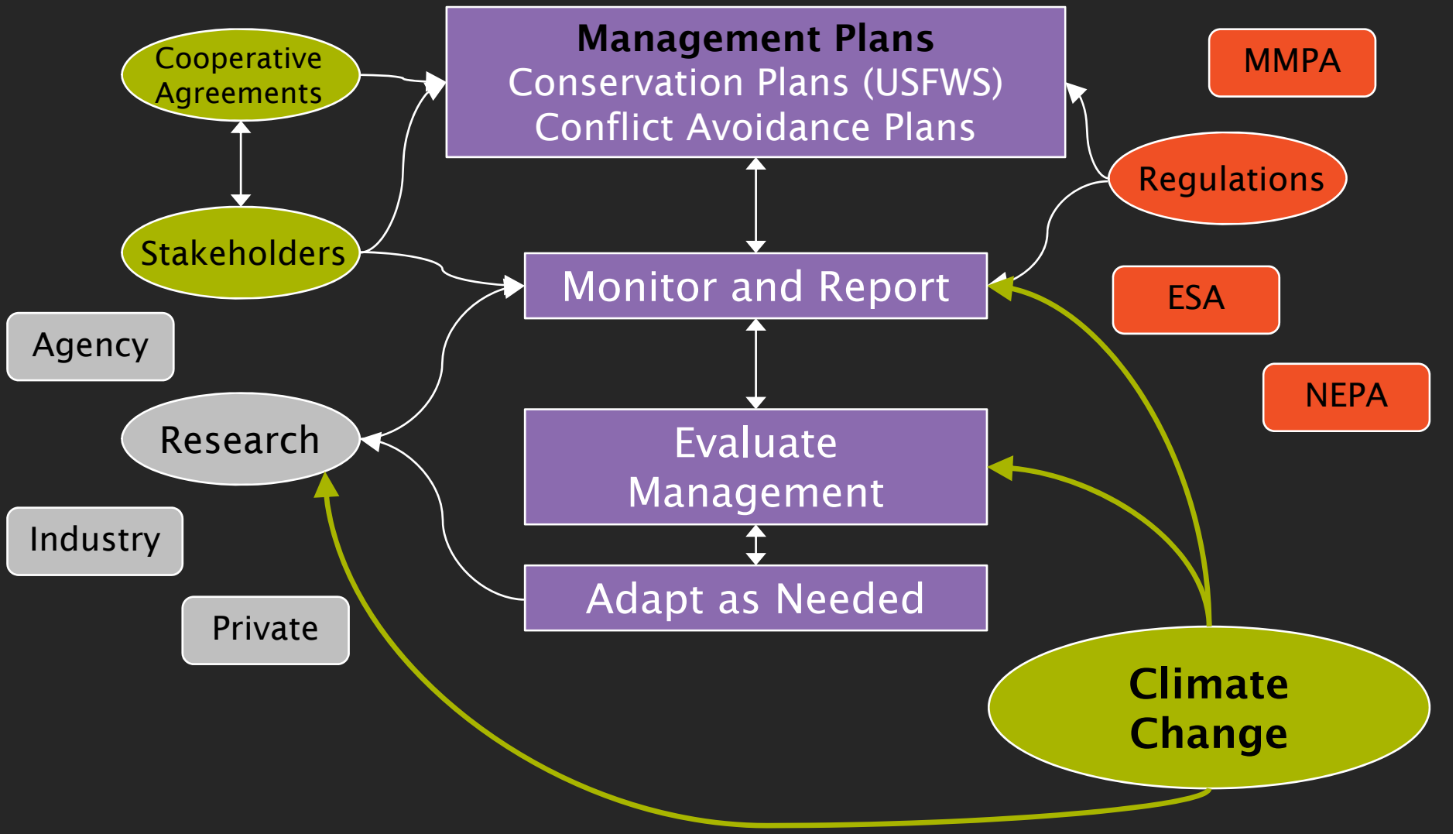
Integrating Climate Change



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Conclusion

Adaptive Management

- Test assumptions, adjust policy, and incorporate learning into decision-making processes
- Integrate climate change scenarios into existing management thus enhancing conservation of populations that may be experiencing significant declines
- Shift from managing individual species and species assemblages to a broader range of ecosystem services

Citations

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Thank You!

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