



**NOAA  
FISHERIES**

# Draft Climate Science Strategy

North Pacific Council Briefing  
February 2015

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# WHY

Growing demands and requirements for climate-related information.

# GOAL

Increase the production, delivery, and use of climate-related information to support agency and stakeholder decisions.

# ASK

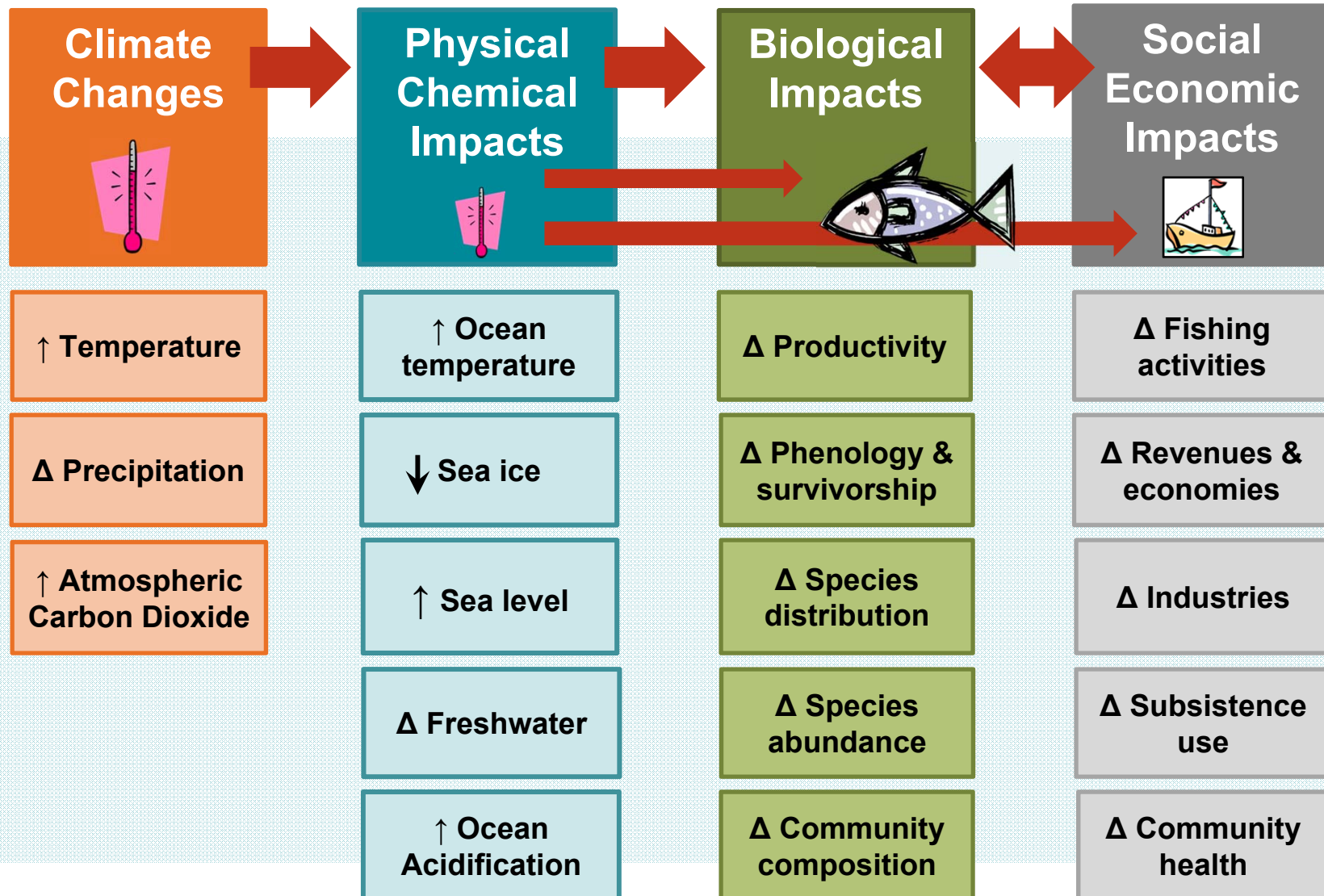
Provide input on the draft Strategy and future Regional Action Plans.



# Our Changing Oceans

- **Climate change and ocean acidification are profoundly altering ocean ecosystems.**
- **Negative impacts expected for fisheries globally.**
- **Positive impacts expected for high latitude fisheries.**
- **Significant challenges expected for fisheries management.**

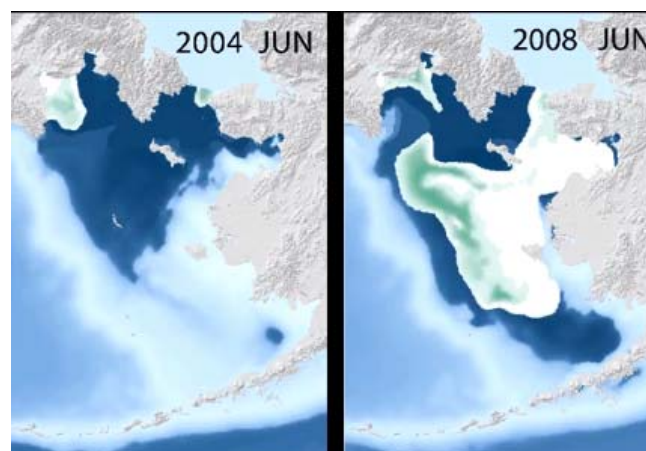
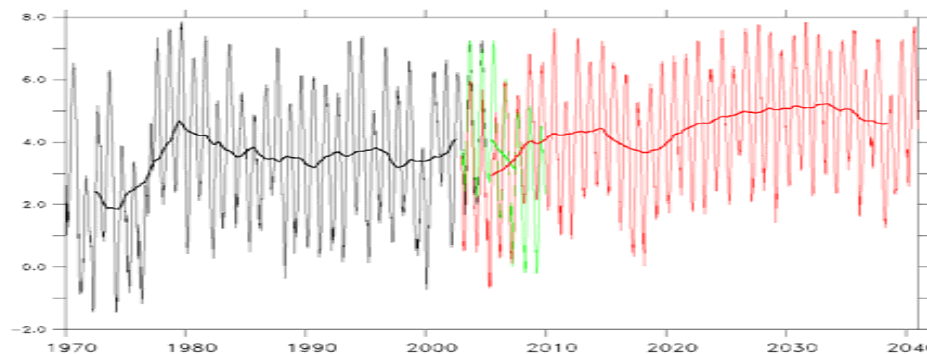
# Possible Impacts of a Changing Climate



# ALASKA

## Long-term Changes in Part of the Land-Atmosphere-Ocean System

- Temperature increasing
- Sea ice out earlier
- Salinity decreasing
- Ocean acidification
- Wind patterns changing
- Precipitation increasing
- Streamflow increasing
- Pelagic nutrients decreasing
- And more ....



# ALASKA

## Observed or Projected Changes in Oceanography

**Ocean Temperature:** 1900-2008 +0.6 °C  
1999 to 2050-99 +2. °C

**Salinity:** 1950-2000 -0.12 (Gulf of AK);  
-0.2 (Bering Sea)  
2000 to 2050-99 -0.2 psu

**Sea Level:** 1957-2013 -5 to -15 mm/yr  
2000-2100 0 to 10 mm/yr

**Ocean Acidification:** 1900-2000 -0.08 pH  
2000-2100 -0.50 pH

# ALASKA

## Changes in Marine Resources

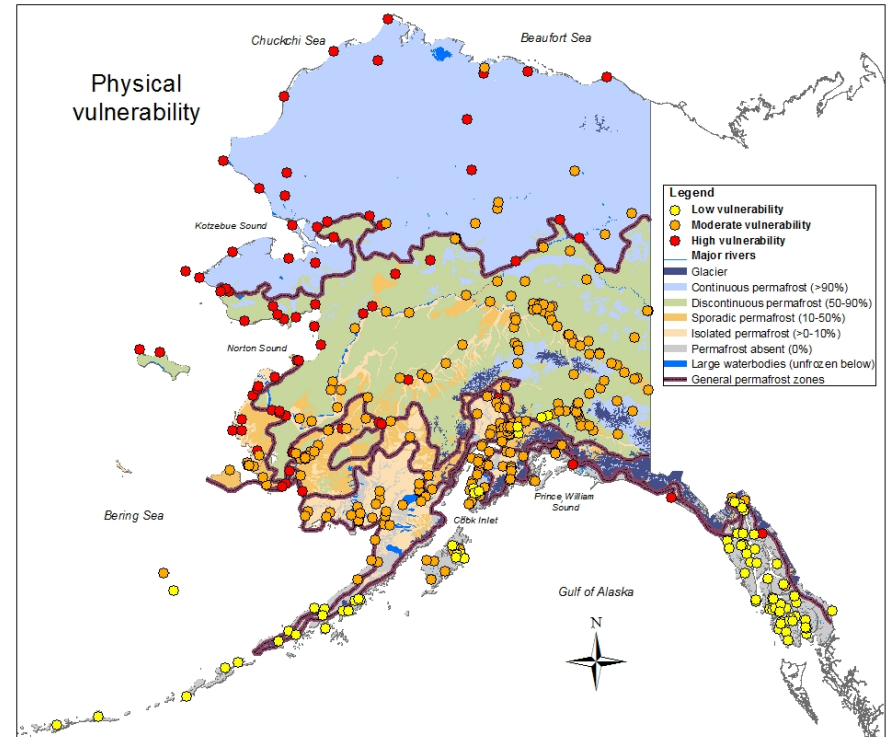
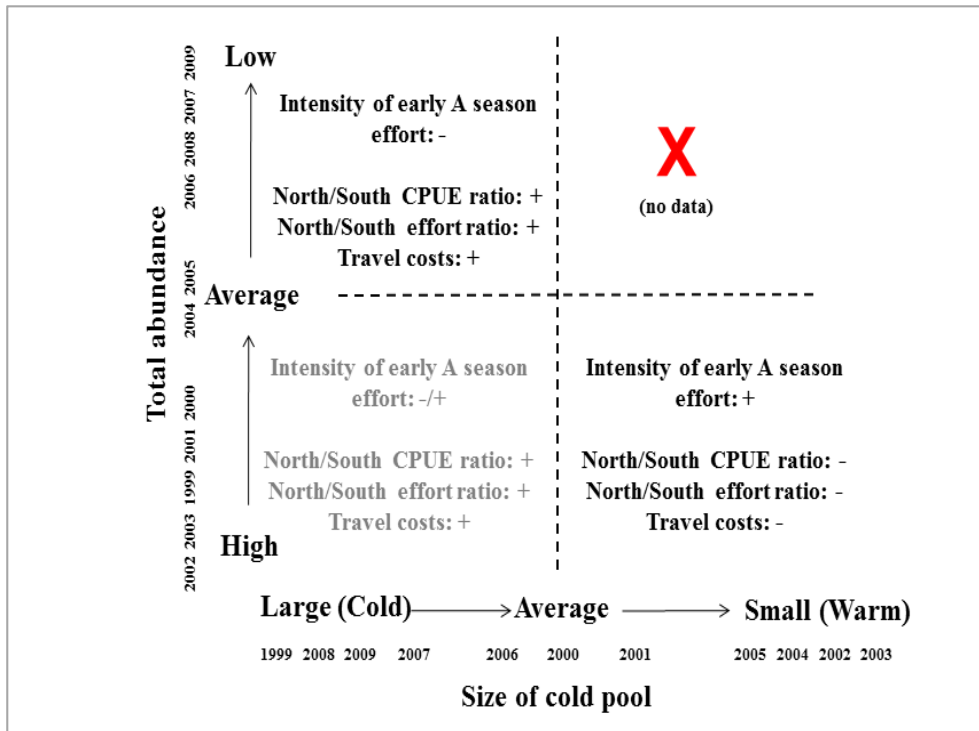
- Decrease in ice algae and krill in the Bering Sea & shifts in zooplankton community assemblage
- Decrease in forage fish and pollock productivity
- Increase in predatory flatfish
- Decline in ice-associated habitat for ice seals & walrus
- Decrease in western Alaska chinook salmon returns
- Decrease in Prince William Sound pink salmon condition
- Decrease in red king crab yields (OA)



# ALASKA

## Implications for AK Fishing Communities

- Fishery impacts vary with sector, gear, etc.
- Interactions with climate change will be complicated





# Draft Climate Science Strategy

## GOAL

Increase the production, delivery and use of climate-related information to support NOAA Fisheries and stakeholder decisions.

## CONTENT

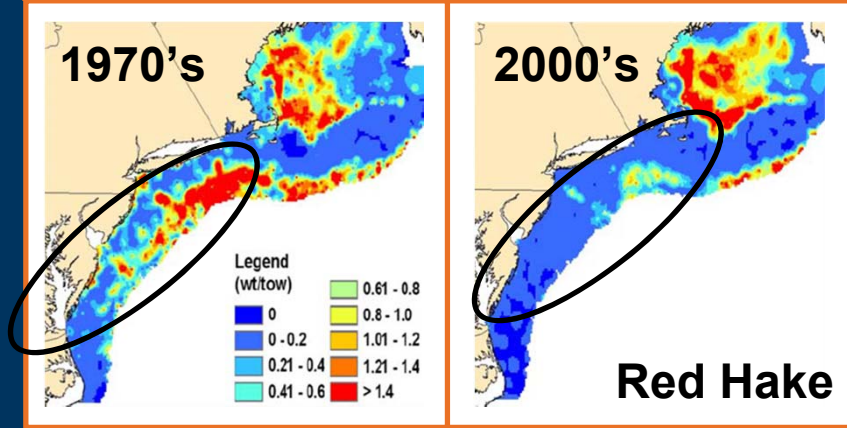
Identifies 7 key objectives to meet NOAA Fisheries information requirements for resource management in a changing climate.

## INTENDED USE

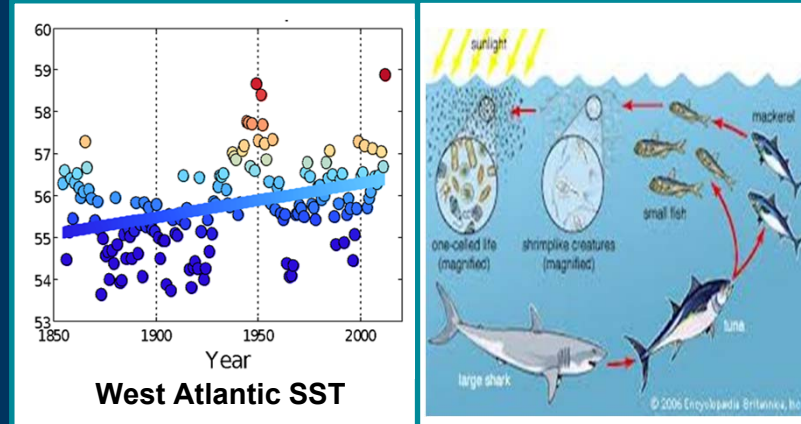
Help guide development of NOAA Fisheries science enterprise at national to regional levels (e.g., regional action plans).

# Key Information Requirements

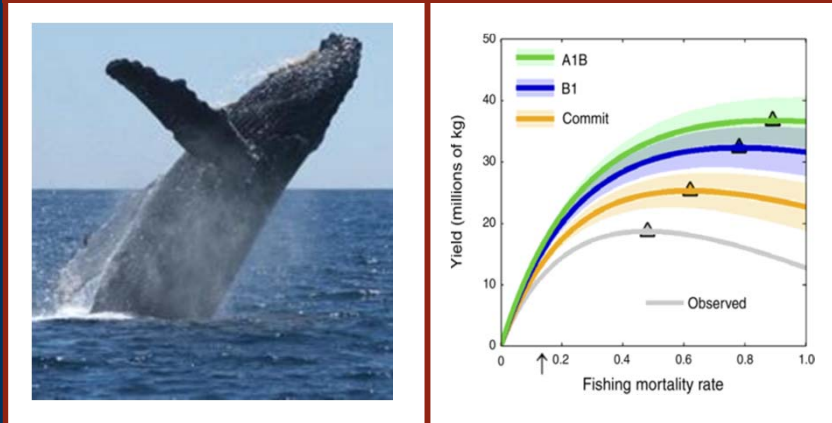
## WHAT IS CHANGING?



## WHY IS IT CHANGING?



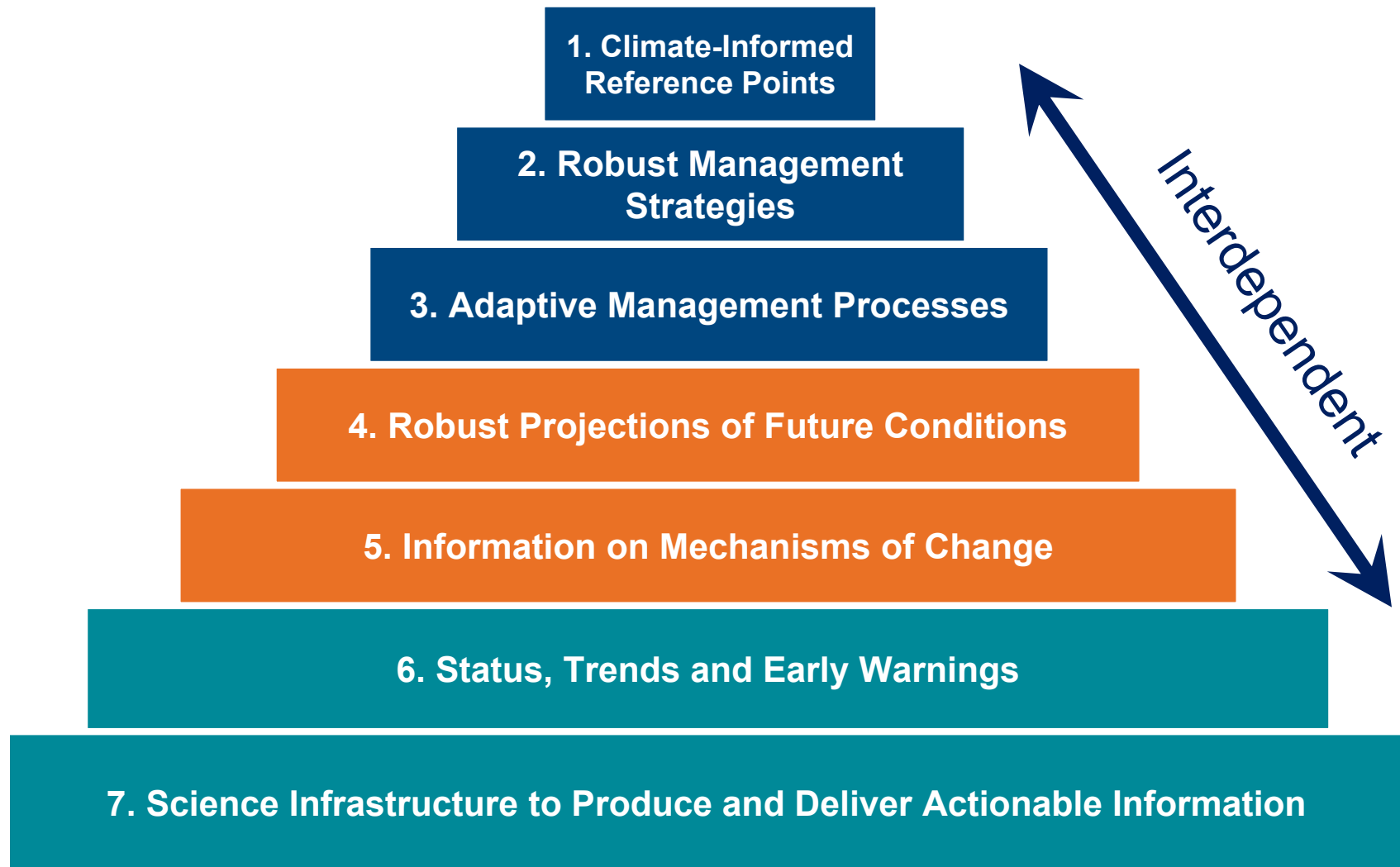
## HOW WILL IT CHANGE?



## HOW TO RESPOND?



# Draft Climate Science Objectives



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# Recommendations— Immediate Actions

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**1** **progress** Conduct LMR climate vulnerability analyses in each region.

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**2** **progress** Maintain and develop Ecosystem Status Reports to track change and provide early-warnings.

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**3** Increase capacity to conduct climate-informed Management Strategy Evaluations

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# Recommendations— Short-term Actions (6-24 months)

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**1**

**Complete region-level action plans.**

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**2**

**Strengthen climate-related science capacity nation-wide.**

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**3**

**Increase resources for process-oriented research.**

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**4**

**Establish climate-ready terms of reference for ESA, MSFCMA, MMPA stock assessments and Biological Opinions, etc.**

# Expected Results:

- ***Better tracking*** of ecosystem changes providing early warnings of climate-related changes.
- ***Increased understanding*** of the mechanisms of change and the vulnerability of fish stocks, communities.
- ***Near and long term forecasts*** of ocean & resource conditions.
- ***Climate sensitive*** stock assessments and biological reference points.
- ***Improved management scenarios.***



# Request for Input

## 1. Climate Science Strategy

- Input requested thru March 31.

## 2. Regional Action Plans

- Developed in 2015.
- Future call for input on regional needs & priorities.

[www.st.nmfs.noaa.gov/ecosystems/climate](http://www.st.nmfs.noaa.gov/ecosystems/climate)

# Questions?

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