



**NOAA
FISHERIES**

NOAA Fisheries Proactive Approach to Climate Change



Taking Action in the Face of Change

NOAA Fisheries is taking a proactive approach to reduce the impacts of a changing climate on living marine resources and the communities that depend on them. Ocean conditions are changing at an unprecedented rate – global sea level is rising, ocean temperatures are warming, and the water is acidifying. Such changes are affecting the distribution and abundance of our living marine resources, including our endangered species. In turn, these rapid changes are creating challenges for the communities and the economies that depend on these resources.

Along with our partners, NOAA Fisheries is tackling these changes head-on in an effort to conserve our natural resources, our economy, and our communities.

Climate change will have long-lasting and costly impacts to U.S. fisheries. Having the most up-to-date scientific information will help managers to better plan for future changes.

Key Examples

Changing Stock Numbers

In 2006, in the Northwest, the mortality rate of cultured oyster larvae from one hatchery was 80% higher than usual due to ocean acidification. Too few wild Pacific oysters were caught commercially to support harvest in another bay.

Changing Migration Patterns

In 2012, lobsters migrated a month early and grew faster than usual, leading to a saturated market and price collapse for Gulf of Maine lobstermen.

Changing Habitats

Approximately half of all federally managed fisheries in the U.S. depend on coral reefs and related habitats for a portion of their life cycles. In 2014, 20 new coral species were listed as threatened under the Endangered Species Act, largely in response to threats of mass coral bleaching and mortality events linked with warmer water temperatures around the world over the past 30 years.

Source: NOAA Fisheries National Climate Science Strategy

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service

Science that Works

NOAA Fisheries' efforts to mitigate climate-related impacts can already be seen across the Nation as scientists and managers work together to find innovative and effective solutions.



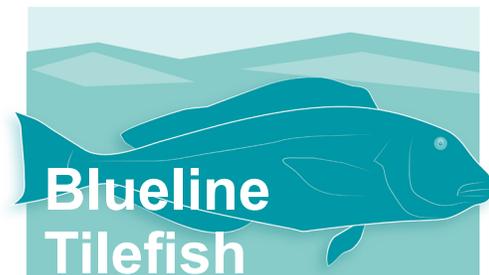
Researchers from the Northwest Fisheries Science Center released a paper in 2013 detailing how salmon habitat restoration plans should be modified to accommodate a changing climate. These recommendations will prove invaluable to resource managers, communities who fish salmon, and people everywhere who love to eat salmon!



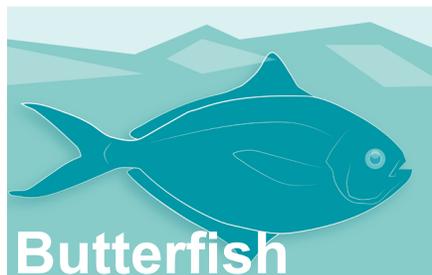
In 2012, NOAA Fisheries listed ringed and bearded seals as endangered and threatened under the Endangered Species Act (ESA), partly in response to climate modeling that forecasts continued loss of sea ice — an important component of their habitat.



The Pacific Islands Fisheries Science Center recently proposed to list the Hawaiian green sea turtle as threatened under the Endangered Species Act (ESA) after considering the effects of a changing climate on the turtle, as well as other threats. Listing them as threatened or endangered under the ESA will help improve their chances of survival.



The blueline tilefish has historically been managed by the South Atlantic Fishery Management Council (FMC), however, in recent years it has been encountered more frequently at locations north of its typical range due to warming ocean temperatures. In 2015, there was emergency action taken by the Mid-Atlantic FMC to include regulation of the catch of blueline tilefish. Including blueline tilefish in the Mid-Atlantic FMC will ensure that the species is not overfished due to lack of oversight.



Last year, NOAA Fisheries updated the butterfish stock assessment to account for the effect of bottom water temperatures. This new approach provided a better understanding of the effects of warmer water temperatures on the butterfish population and allowed for increased catch limits.



Warming ocean temperatures and low zooplankton numbers (unfavorable conditions for Bering Sea Pollock) from 2001-2005 prompted the North Pacific Fishery Management Council (NPFSC) to lower the Bering Sea Pollock catch quota almost 50%. Then, 2007-2011 brought colder weather, more sea ice, and more favorable conditions for Pollock so the NPFSC raised the quota. Managing fisheries based on oceanographic conditions has helped businesses better prepare for climate-related changes.

What is...

A Climate-Informed Reference Point?

A threshold, influenced by climate-related effects on living marine resources, upon which management decisions are made.

An Adaptive Decision Process?

A process that is effective at reacting to change in a situation. Effective management of living marine resources in a changing climate will require increased coordination and responsiveness of both science and management to changing and perhaps unexpected conditions.

Science Infrastructure?

The fundamental facilities and systems, including ships, bouys, satellites, mega-computers, laboratories, and scientists that serve NOAA Fisheries science objectives.

Laying a Foundation for Climate Resilience

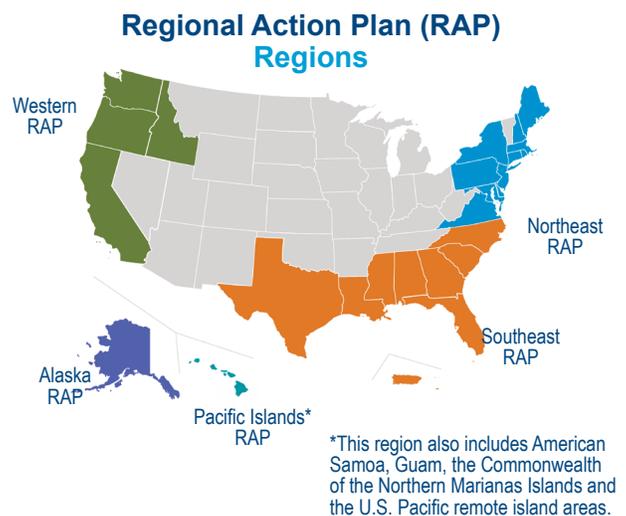
To effectively manage and respond to changing climate and ocean conditions, NOAA Fisheries and other decision-makers need better information on what is changing, what is at risk, and what actions to take. The NOAA Fisheries Climate Science Strategy identifies seven objectives to effectively meet these information needs and that, together, lay a foundation for climate resilience.



Taking Action

While some impacts of climate change are shared across the United States, each region has a unique combination of climate-related challenges, capabilities, and information needs that need to be addressed. To meet the needs of each region, NOAA Fisheries is working with partners to develop Regional Action

Plans (RAPs) to identify strengths, weaknesses, priorities, and actions to implement the Climate Science Strategy (Strategy) in each Region. The Strategy is designed to be customized and implemented through RAPs that focus on building regional capacity and partnerships to address the seven objectives listed above.



Current and Expected Climate-Related Impacts on Marine Ecosystems

Each region has a unique combination of climate-related challenges, capabilities, and information needs that need to be addressed. Regional Action Plans give regions the flexibility to make the Climate Science Strategy fit their needs.

Climate-Related Impacts	Alaska	West Coast	Hawaii & Pacific Islands	Northeast	Mid-Atlantic	Southeast/Caribbean	Gulf of Mexico
Temperature Increasing	●	●	●	●	●	●	●
Salinity Decreasing	●			●	●		
Sea Level Rising	●	●	●	●	●	●	●
Surface Chlorophyll Declining			●				
Ocean Acidification	●	●	●	●	●	●	●
Loss of Sea Ice	●						
Precipitation Change	●	●	●	●	●		
Wildfires	●	●					
Hypoxia		●				●	●
Streamflow Change	●			●	●		
Species Shifts	●	●		●	●		
Coral Bleaching			●			●	
Ocean Currents Changing		●		●			●
Nutrient Supply Changing		●		●	●		●
Community Impacts	●	●	●	●	●	●	●
Fishing Impacts	●	●	●	●	●	●	●
Extreme Weather						●	●

NOAA Fisheries ST Climate Webpage

www.st.nmfs.noaa.gov/ecosystems/climate/index

NOAA Fisheries Climate Science Strategy and Regional Action Plans

www.st.nmfs.noaa.gov/ecosystems/climate/national-climate-strategy

Regional Action Plans

www.st.nmfs.noaa.gov/ecosystems/climate/rap/index

