



NOAA's Role in Climate Services, Adaptation, and Applications

Presenters:

*Dr. Chester Koblinsky, Director, NOAA Climate Program Office and Climate Goal Team
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The Climate Challenge

- **The Trends (IPCC, 2007)**
 - *Climate is unequivocally warming and changing, projected to continue and increase*
 - *Humans are very likely responsible for the warming*
 - *Impacts already affecting many sectors and regions, some more than others*
- **The Questions**
 - *What impacts will the future climate bring?*
 - *How will we mitigate effects?*
 - *How will we adapt to an evolving climate?*
 - *What climate information is needed to help society adapt?*
 - *Water resources managers, farmers, etc.*

***Climate information is needed now to inform
decisions today and tomorrow***



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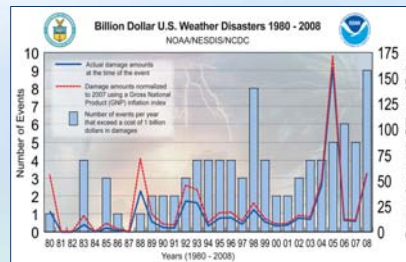
What is NOAA's Role?

Briefing I - Climate science and research

- Observations, modeling, and research
 - Observations and monitoring
 - Modeling, predictions, and projections
 - Understanding the causes and impacts of climate extremes

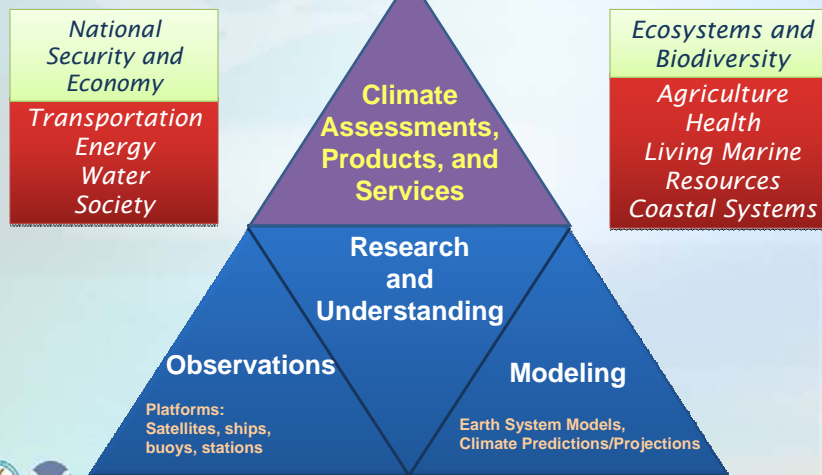
Briefing II - Climate services, adaptation, and applications

- Overview of the services we provide
 - Who are our customers?
 - Why do we need these services?
- Examples of how climate information is used to support NOAA's climate services, adaptation, and applications:
 - Water resources
 - Coasts
 - Living marine resources



NOAA: Understanding Changing Climate For Climate Risk Management

NOAA's tool box



Primary Drivers for NOAA's Climate Services

Legislative Mandates

- National Climate Program Act
- Global Change Research Act
- National Integrated Drought Information Services Act
- Hydrographic Services Improvement Act
- National Weather Service Organic Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Coastal Zone Management Act
- Marine Mammal Protection Act
- National Marine Sanctuaries Act
- Endangered Species Act
- Coral Reef Conservation Act

"We need federal policies and funding that will enable local communities to identify their vulnerabilities in the face of the climate disruption, and that will support local efforts to minimize, prepare for and adapt to these impacts." [U.S. Mayors Federal Climate Policy Framework, 2007]



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NOAA's Climate Services to the Nation

- Develop and deliver operational climate information products and services
- Support research on the impacts of climate variability and change on human and natural environments
- Support the development of assessments and adaptation strategies from international to local levels
- Collaborate with stakeholders to enhance their capacity to use climate information and related decision-support resources
- Two emerging areas:
 - Regions (local translation through NOAA's regional channels)
 - Sectors of interest (water, agriculture, coastal and marine resources, energy)

"Decision makers at all levels of government and in the private sector need reliable and timely information to understand the possible impacts and corresponding vulnerabilities that are posed by climate change so that they can plan and respond accordingly." [Western Governors Association statement to House Committee on Science and Technology, May 3, 2007]

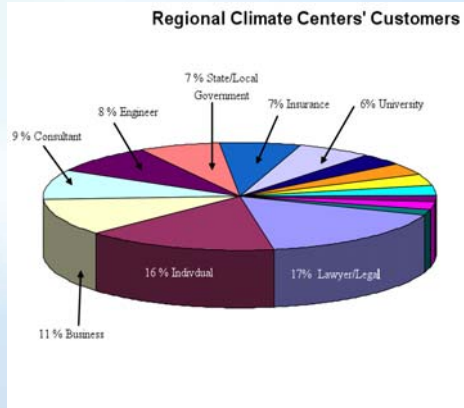


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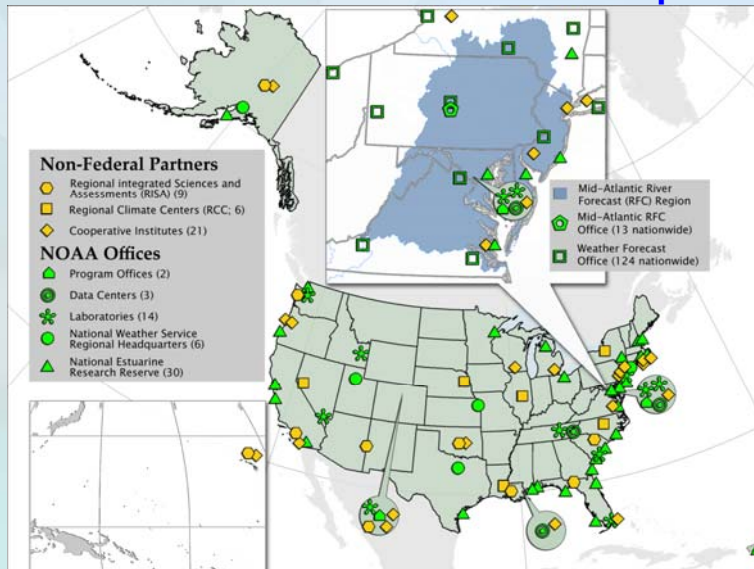
Serving NOAA's Customers: International to Local

NOAA's labs, centers, and partners provide climate information, products, services, and training to various customers via:

- 🌐 Climate tools and outlooks
- 🌐 Online access to data from:
 - Observations and monitoring stations
(e.g. <http://www.weather.gov/climate>)
 - Model simulations
 - Research
- 🌐 Outreach and capacity building to regional and local decision makers on the use of its climate products



NOAA'S Broad-based Climate Services Capabilities



"Experience has shown that connections between climate scientists and stakeholders are most effective at the local, regional, statewide, and multistate scales at which the stakeholders operate." - Ed Miles (PNAS, 2006)



Connecting NOAA's Climate Related Research and Services to Local/Regional/International Adaptation Efforts

Climate Change Guidebook: Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments

Provides detailed description of why and how to prepare for climate change at the local/regional scale



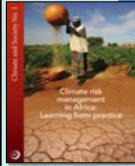
Digital Coast - NOAA Visualization and Data Tools

Provide GIS and visualization tools for users to examine the impacts of changing climate conditions in their area

Example (Left) - data simulation of inundation on Charleston, SC

State- and Local-Level Adaptation Planning:

Support state and local adaptation planning efforts through NOAA's climate related research and services



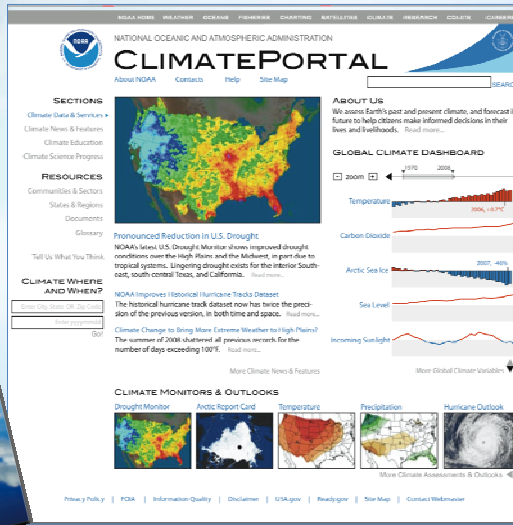
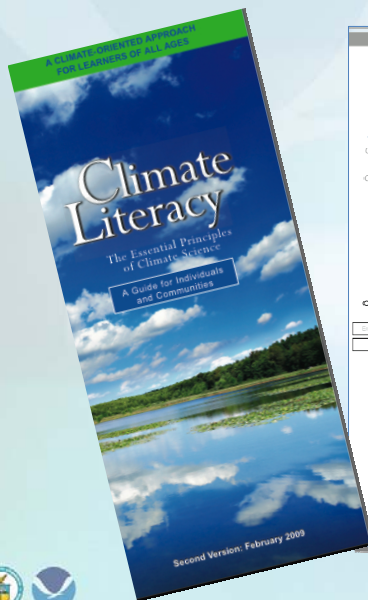
International: Climate Risk Literacy Guides

Present the knowledge that is important for citizens to know and understand about Earth's climate

Goal is to promote greater Climate Science Literacy among the public



Communicating NOAA's Climate Information

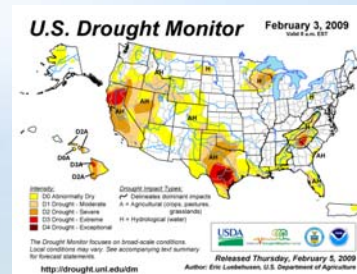


NOTE: Currently under development

NOAA's Climate Services: Water Resources

NOAA provides climate information and tools to stakeholders on:

- ☑ Drought
- ☑ Floods
- ☑ Changes in snowpack (quantity and timing)
- ☑ River stream flow
- ☑ Fire outlooks
- ☑ Physical infrastructure (i.e., dams, reservoirs, water delivery systems)
- ☑ Planning (e.g., urban, agriculture, health)

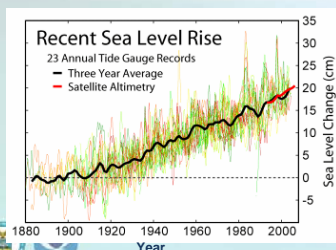


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NOAA's Climate Services: Coastal Regions

NOAA provides climate information and tools to stakeholders on:

- ☑ Precipitation patterns and associated effects on freshwater, nutrient, and sediment flow
- ☑ Levels of atmospheric CO₂ and ocean acidification
- ☑ Frequency, track, and intensity of coastal storms
- ☑ Sea level rise
- ☑ Ocean temperature
- ☑ Ocean circulation patterns



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NOAA's Climate Services: Living Marine Resources

NOAA provides climate information and tools to stakeholders on:

- ✔ Attribution of climate signals impacting ecosystems : long term change & natural variability
- ✔ Ocean warming: Impacts on distribution & productivity (phenology, production, invasives)
- ✔ Impacts of loss of sea ice on living marine resources (at both poles)
- ✔ Physical and chemical changes to the ocean (ocean acidification impacts on marine biota)
- ✔ Extremes of weather and climate
- ✔ Water quality and quantity
- ✔ Freshwater supply & resource management
- ✔ Sea level rise (natural resources implications)



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NOAA's Climate Services, Adaptation and Applications for Drought and Water Resources

Presenter:

Dr. Roger S. Pulwarty, Director, National Integrated Drought Information System

February 27, 2009



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Drought and Water Resources: Critical issues

How are communities, economies, and environment affected?

- Water Supply...Water Quality...Water Demand...
 - Energy, agriculture, health, urbanization, ecosystem services
- Climate impacts on water resources and management practices, shared watersheds...

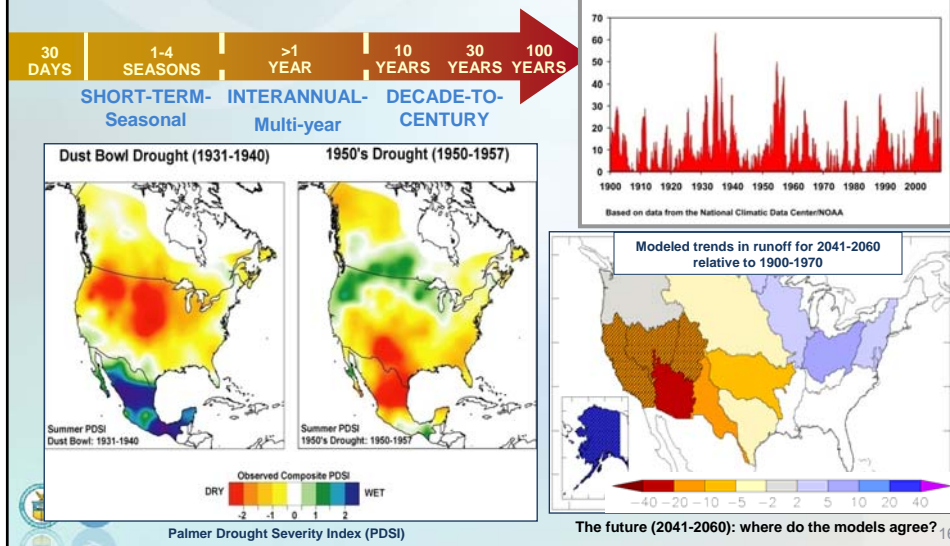
What role does NOAA play in reducing and managing risks?

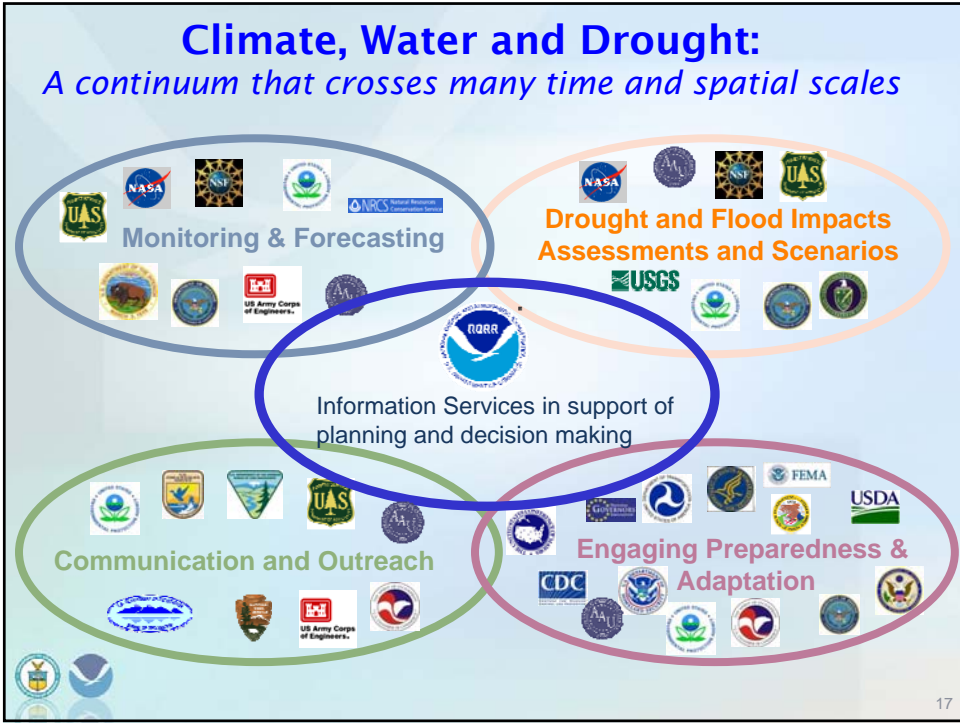
- Use of climate information to inform proactive decision making, and
- Early warning for drought:
 - onset, location, duration, severity, impacts, preparedness plans



Climate, Water, and Drought:

A continuum that crosses many time and spatial scales





National Integrated Drought Information System (NIDIS):

A NOAA-led Federal, State, Tribal and Local Partnership

Goal: Enable the Nation to move from a reactive to a more proactive approach to managing drought risks and impacts (Public Law 109-430, 2006)

U.S. Drought Monitor January 13, 2009

U.S. Seasonal Drought Outlook
Drought Tendency During the Vernal Period
Valid: January 15, 2009 - April 2009
Retrieved January 15, 2009

KEY:

- Drought to persist or intensify
- Drought emerging, some improvement
- Drought likely to improve
- Impacts area
- Drought development early

Creating a Drought Early Warning System for the 21st Century

U.S. Integrated Drought Information System
National Integrated Drought Information System
State Adaptation Framework

THE NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM IMPLEMENTATION PLAN

A PATHWAY FOR NATIONAL GOVERNMENT

Natural variability together with near- and longer-term projections for a warmer climate make critical early warning information to support adaptation.

(www.drought.gov)

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The NIDIS U.S. Drought Portal

(www.drought.gov)

(Public, academic and private partnerships)

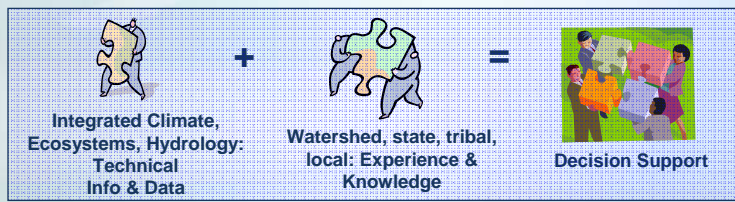
Key Clearinghouse Functions:
 To provide **Credible, Accessible, Timely Information** to questions such as:
 -Where are drought conditions now?
 -Does this event look like other events?
 -How is the drought affecting me?
 -Will the drought continue?
 -Where can I go for help?

Portlet example: NWS River Forecast Center
 Ohio River
 Water Resources
 Outlook-Ecosystem Recovery

Drought and Water Resources: Beyond The Damage Report

Engaging communities and resource managers in assessment and decision support as climate varies and changes

(RISAs, RCCs, Climate and Hydromet Test-Beds, NWS Field Offices...
 → NOAA-Integrated Water Resources Services teams, Coastal Services Center, NIDIS...)



ASSESSING CLIMATE INFORMATION USER NEEDS
 A forum for proactive planning



HELPING SOCIETY ADAPT
 Provide best available information to inform infrastructure development and ongoing adaptation





NOAA's Climate Services, Adaptation and Applications for Coasts and Living Marine Resources

Presenter:
Ms. Margaret Davidson, Director, NOAA Coastal Services Center

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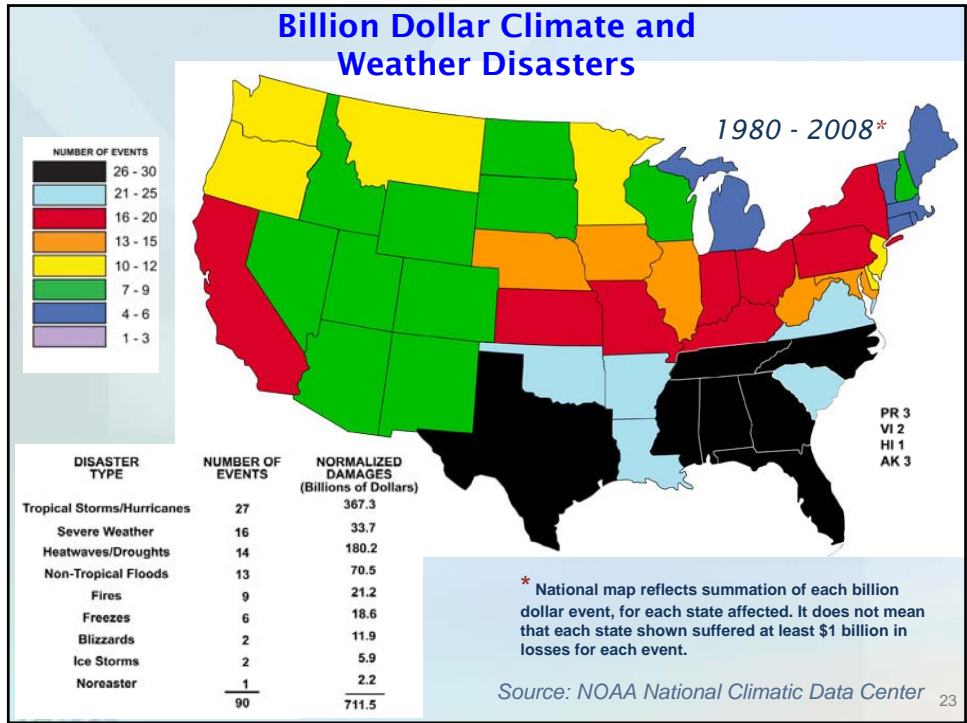
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Coastal Communities: VITAL TO U.S. AND INTERNATIONAL ECONOMIES

- 57% of U.S. national GDP is contributed by coastal watershed counties.
- Coastal counties contain 53% of the Nation's population - but account for only 17% of U.S. land area (excludes Alaska).
- Waterborne commerce along the Nation's seaports is a \$1 trillion industry supporting more than 13 million U.S. jobs.
- Coastal habitats help reduce impacts of floods, storms, and climate change on coastal communities by absorbing water, wave energy, and other stressors.



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Examples of NOAA's Climate Capabilities and Partnerships



Capabilities

- 🌊 Living marine resource management
- 📊 Data and Information
- 🌳 Land acquisition and restoration
- 👥 Support direct resource management and policy development
- 🎓 Training, outreach, capacity building
- 🔧 Value-added tools and assessments
- 📍 Fundamental geospatial infrastructure

Partners

- 🏛️ Government cooperation: Local, State, Federal, Tribal, Territories
- 👥 Regional Governors' Associations/Alliances
- 🎓 Academia
- 🌊 Coastal mapping community
- 🌐 U.S. Integrated Ocean Observing System (IOOS) Regional Associations
- 🏠 Non-governmental organizations
- 🏢 Trade associations
- 🏪 Chambers of Commerce
- 🌐 Regional Climate Centers

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Addressing Impacts of A Changing Climate: NOAA's Coastal Strategy

Goal

Increase the resilience of coastal environments and communities by protecting and restoring coastal ecosystems and their services and ensuring sustainable coastal communities

Priorities

- Coastal hazards and climate change
- Competing coastal uses and habitat loss
- Coastal pollution and human health effects

“Because global warming may result in a substantial sea level rise with serious adverse effects in the coastal zone, coastal states must anticipate and plan for such an occurrence.”

Coastal Zone Management Act, 16 U.S.C. § 1451(I)



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Addressing Impacts of a Changing Climate: Gulf of Mexico Example

Improving awareness of climate change risks

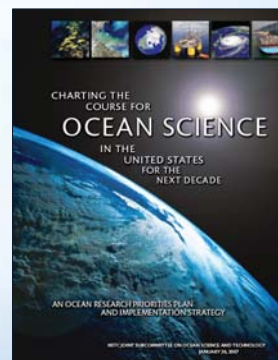
- Coastal Storms Program – Gulf pilot
- RiskWise partnership

Improving analytic capacity

- Improving Gulf Coast storm surge data, modeling, and tools
- NOAA-USGS coastal climate partnership
- Integrated Ecosystem Assessments

Implementing adaptation actions

- Community and Regional Resilience Initiative (CARRI) (MS, TN and SC)
- Coastal and Estuarine Land Conservation Program (CELCP) and Community Based Restoration Program
- Satellite-based coral bleaching warning system and *Reef Manager's Guide*



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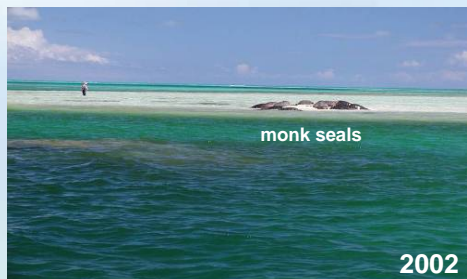
Effects of Sea Level Rise on Protected Species

Example: Whaleskate Island
French Frigate Shoals, NWHI



1963

- Important nesting islands for Hawaiian green sea turtles and a primary pupping site for endangered Hawaiian monk seals
- What are the projected impacts of observed rates of SLR on Protected Species breeding and nesting habitat?
- 2006 study published by NOAA scientists in the journal Biological Conservation (Baker et al. 2006)

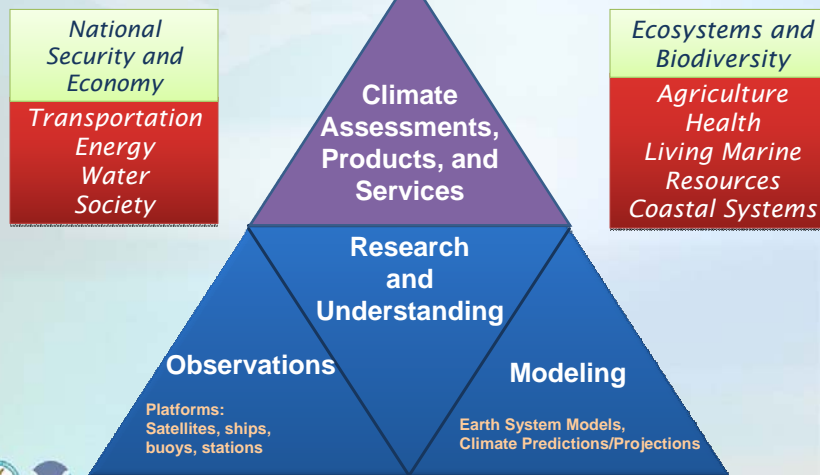


monk seals

2002

NOAA: Understanding Changing Climate For Climate Risk Management

NOAA's tool box



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