Advancing Hypoxia Monitoring in the Gulf of Mexico

6th Annual NOAA/NGI Hypoxia Research Coordination Workshop

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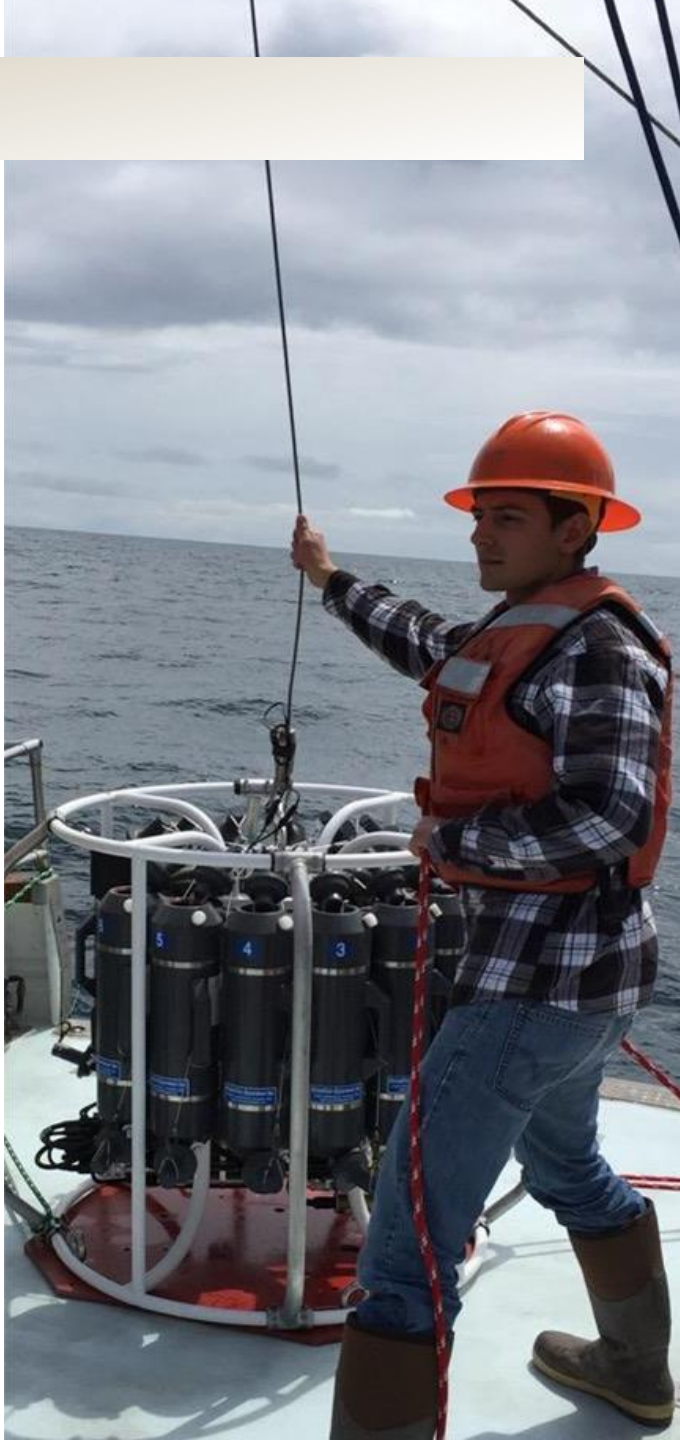
Workshop Goals

- Review partner requirements and interests
- Identify key hypoxia monitoring needs
- Identify partners to support key hypoxia monitoring needs
- Depart with clear needs identified, teams motivated to implement monitoring in a cooperative partnership



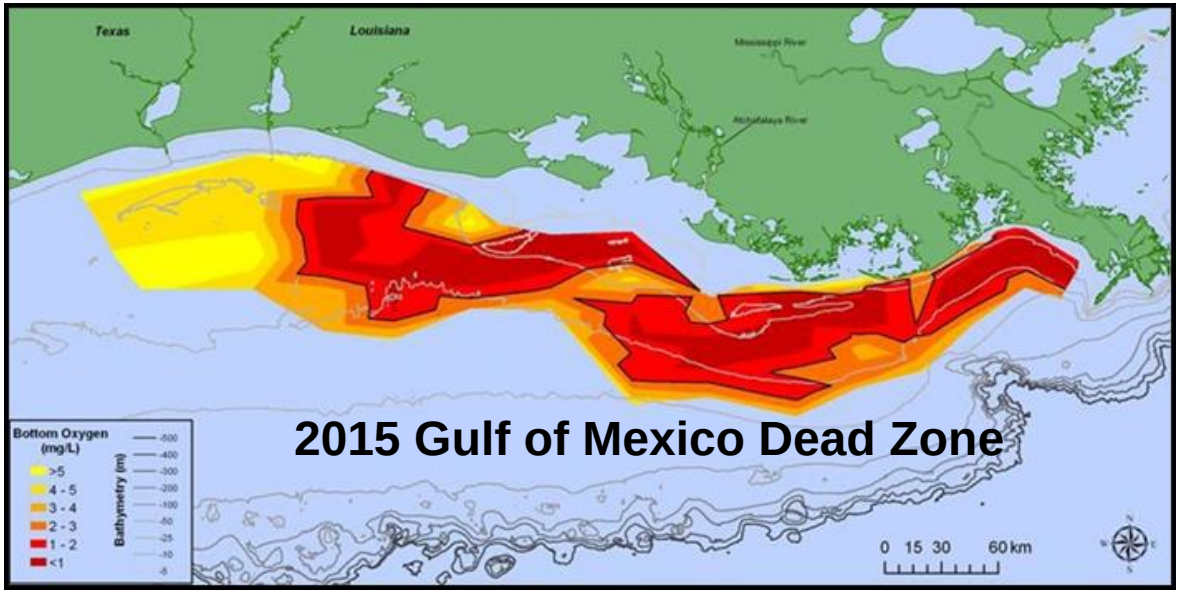
Supporting the Hypoxia Task Force: Monitoring

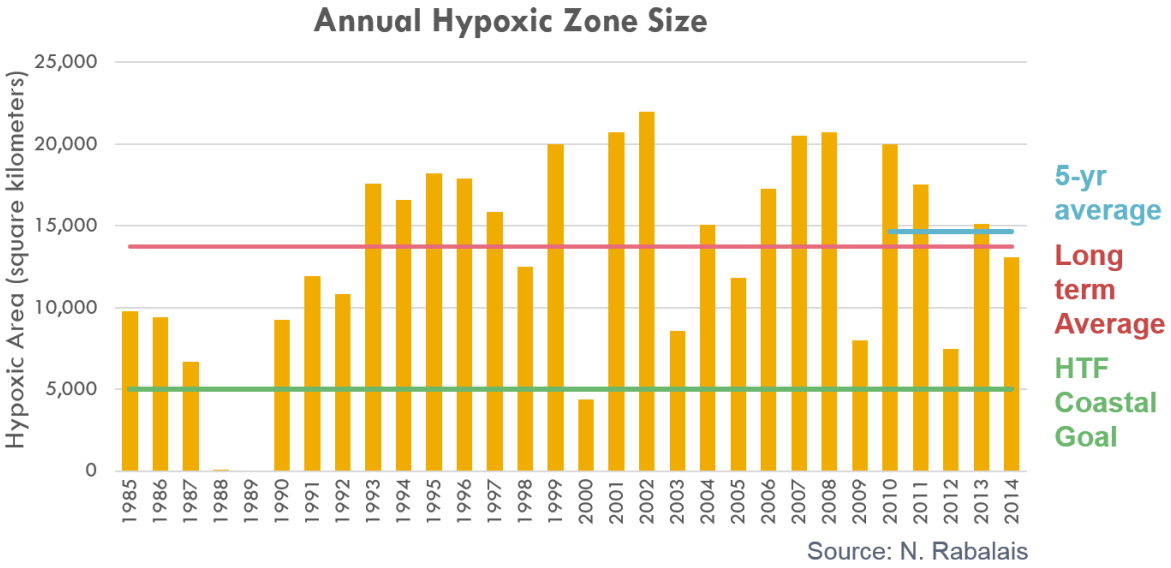
Mississippi River
Gulf of Mexico
Watershed Nutrient
Task Force

Hypoxia Task Force Science Based Goal

Coastal Goal:

By 2035, reduce 5-year running average size of the Gulf hypoxic zone to 5,000 km^2

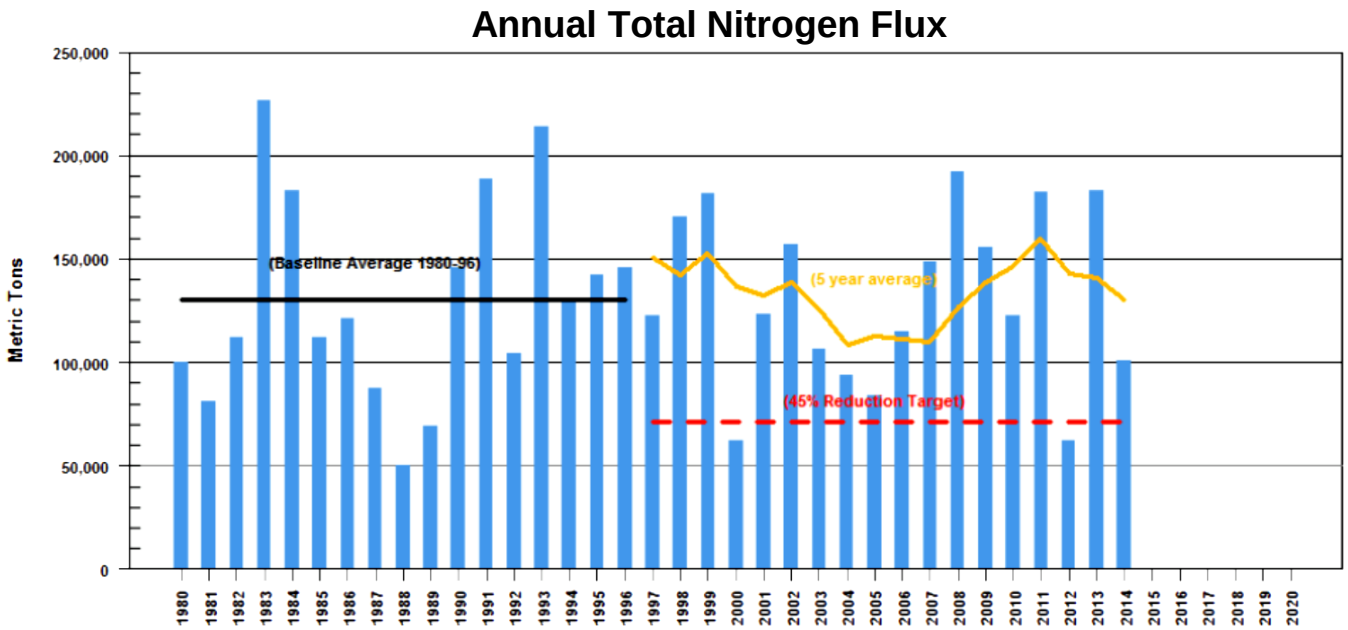


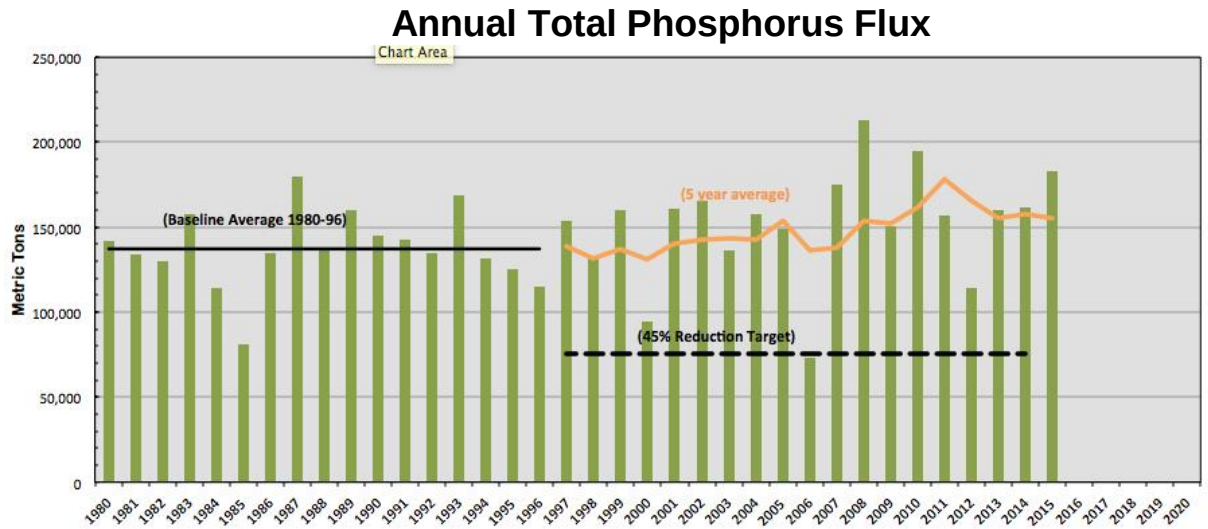


Hypoxia Task Force Science Based Goal

Interim Target:

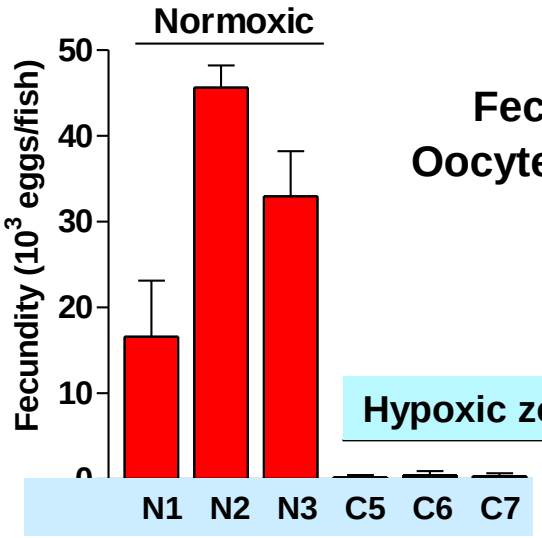
20% reduction of nitrogen and phosphorus loading by 2025 (USGS plots)



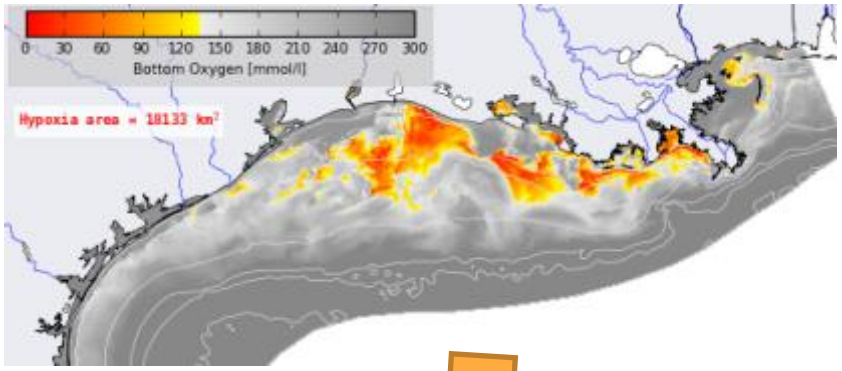


Understanding Impacts to Habitats and Living Resources

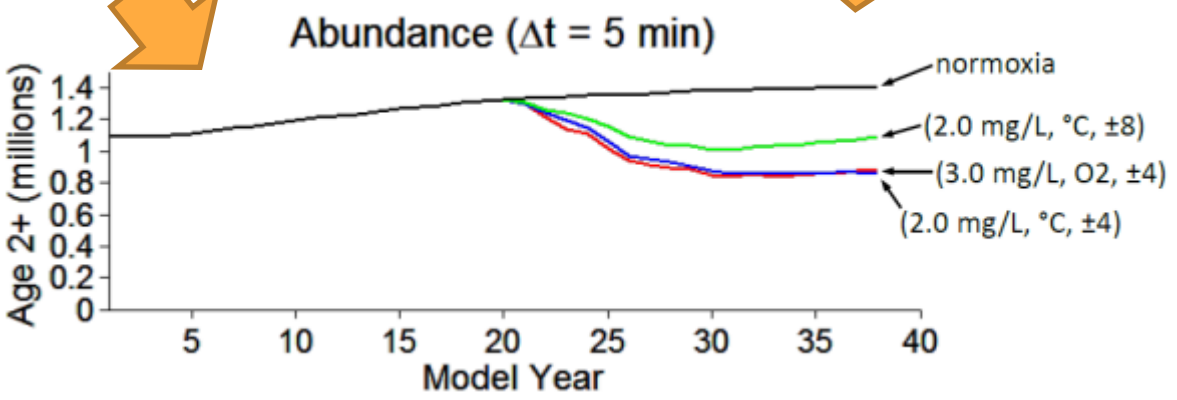
Tools provide guidance on impacts



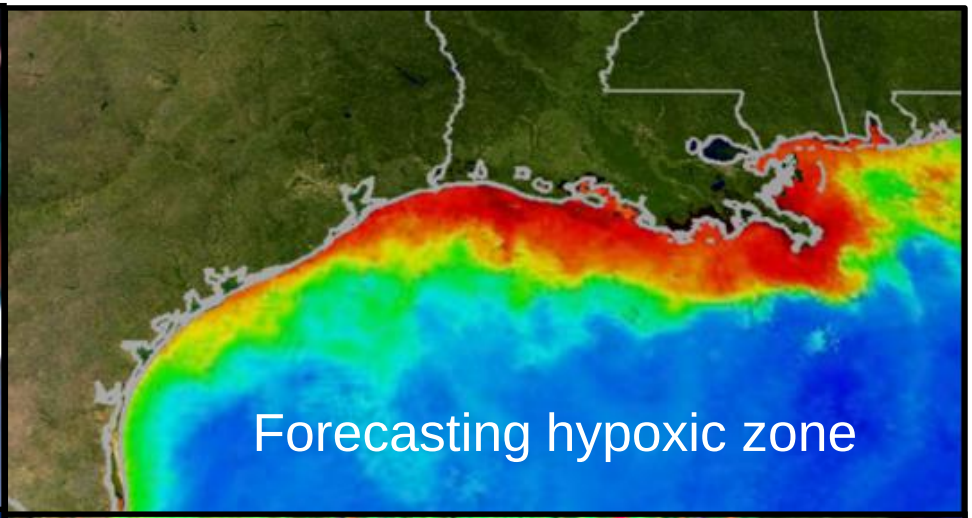
Fecundity
Oocyte>350 µm

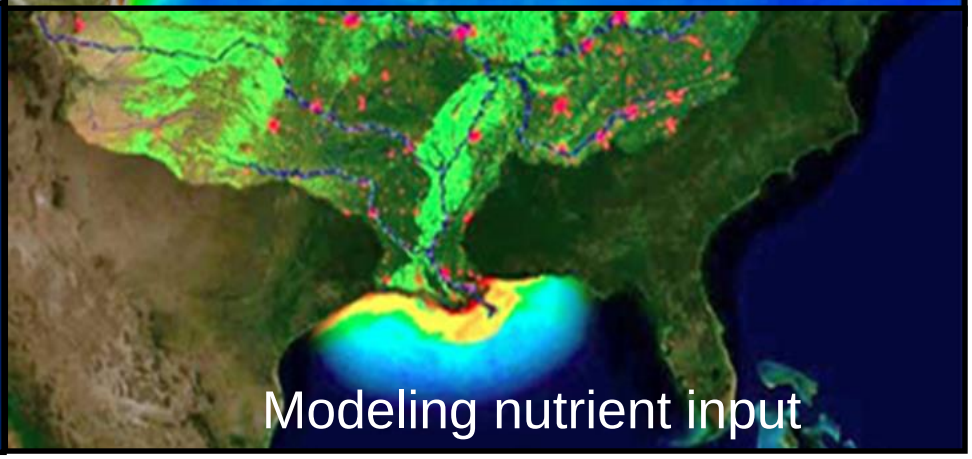


Atlantic Croaker Population
Trend Scenarios



Current Progress

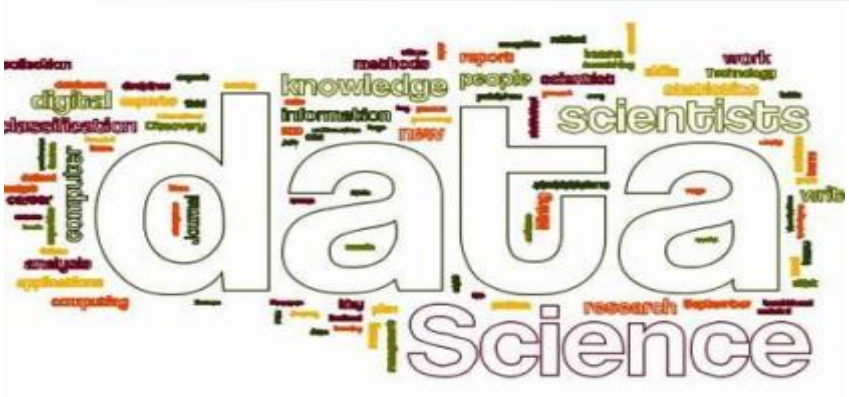




Challenges and Opportunities

- Diverse Customers
- Diverse Needs
- Complex and changing environment

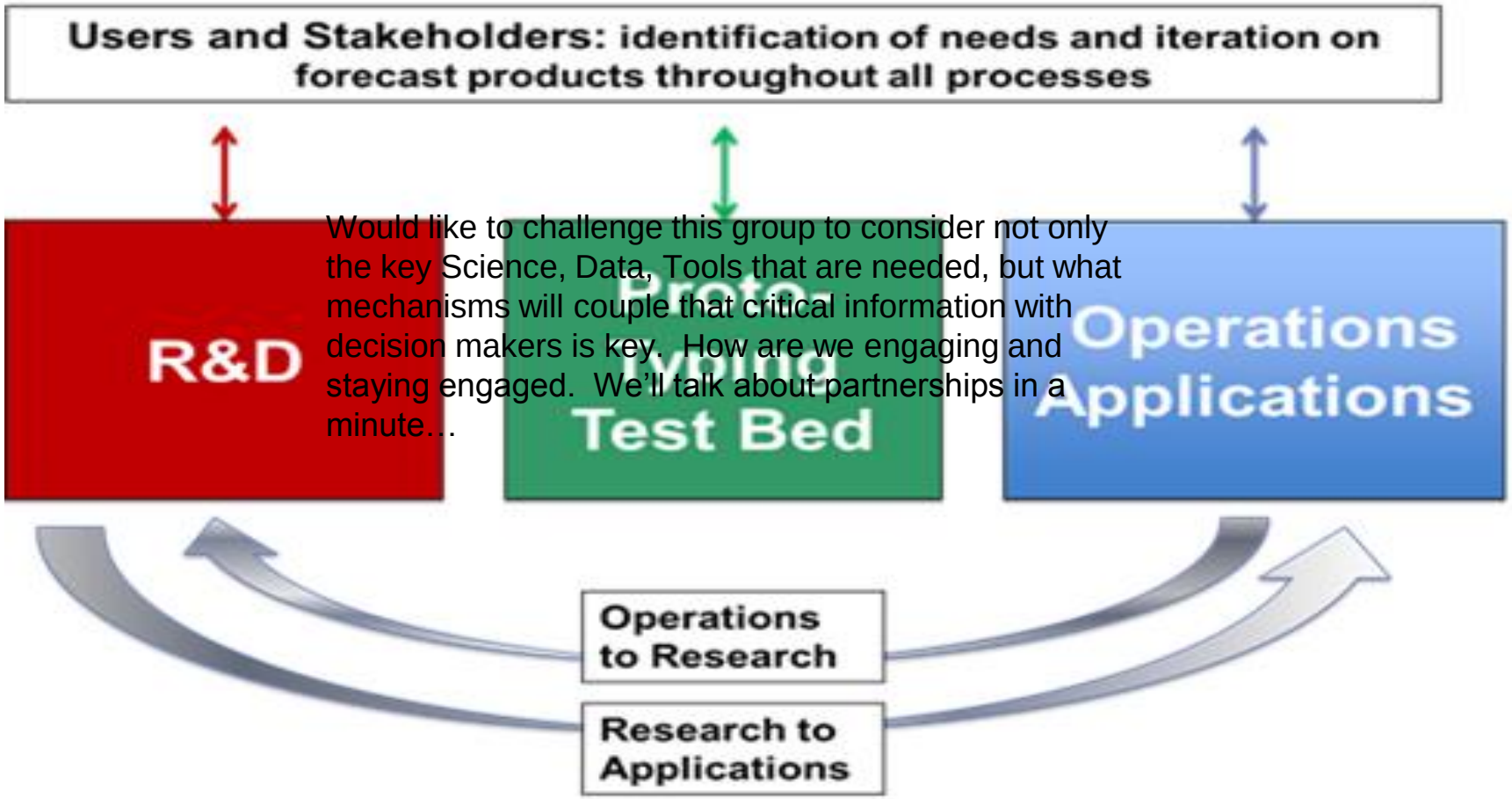
A Very Real Need



NATIONAL MARINE SANCTUARIES

Next Steps - Transition

NOAA's Ecological Forecasting Roadmap



Would like to challenge this group to consider not only the key Science, Data, Tools that are needed, but what mechanisms will couple that critical information with decision makers is key. How are we engaging and staying engaged. We'll talk about partnerships in a minute…

What Does Success Look Like?

Public health, natural resource management, and commercial and recreational opportunities are enhanced because of ecological forecasts.

- Existing ecological forecasts have been transitioned to operations
- Foundational infrastructure, observations, modeling, dissemination, and data management elements are institutionally supported
- Strategies are underway to address gaps in capacity

Developing Partnerships

Coordination across:

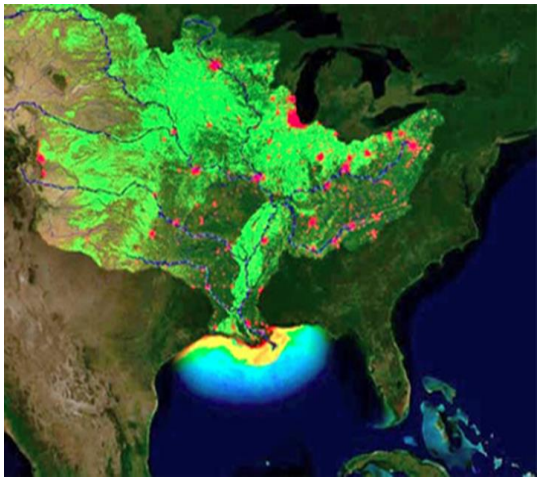
- Communities and missions
- Programs and platforms

Coastal

Modeling/Forecasts

Monitoring

Impact Assessment



Watershed

Load reductions

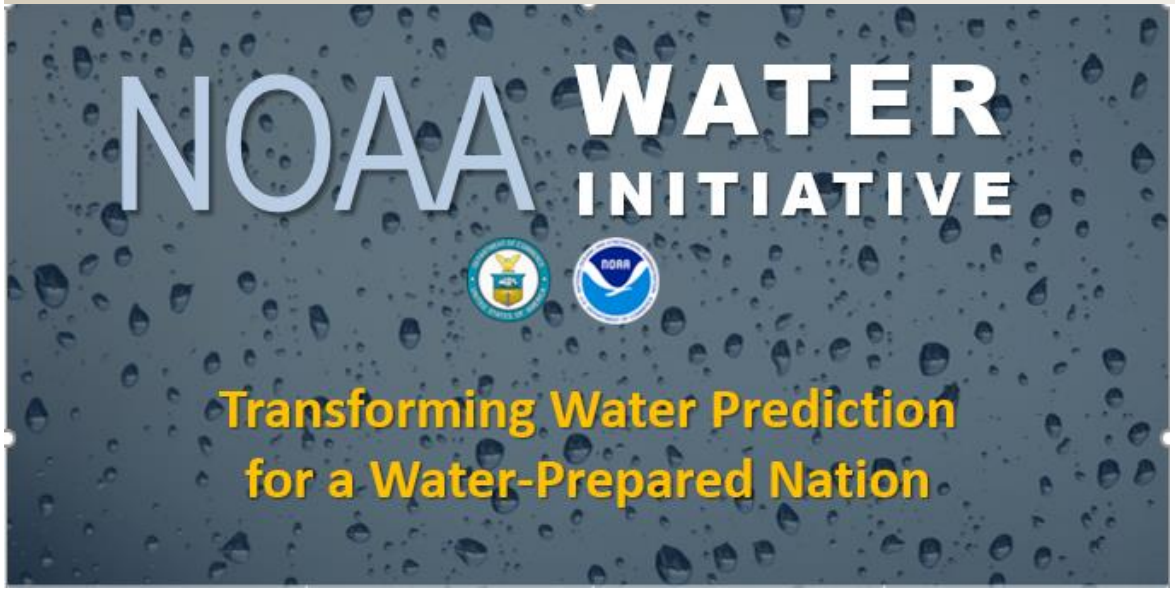
Nutrient monitoring innovations

Nutrient reduction tracking models

Ocean

Long term ocean changes

Next Steps: Partnerships, Opportunities



Stakeholder Needs
Flooding
Water Availability
Water Quality
Drought
Climate Variability

Integrate enhanced National Water Model with key water quality data sets, models and tools to begin water quality prediction

- *Incorporate water quality data from federal and State partners into NWM*
- *Link NWM output to NOAA ecological forecasting operations*
- *New decision support services for predicting water quality issues (HABs)*
- *New decision support services for emergencies such as chemical spills*
- ***NWC operations center expands to include water quality decision support services***

Keys to Progress

- Understand monitoring needs and supported management products
- Explore synergies with related programs
- Think creatively and long-term to support both institutional and collective needs in a cooperative program
- Stay involved post-workshop

Let’s get started!

Ecoforecasting: Missions and Mandates

"Our job is to build an understanding of the Earth, the atmosphere, and the oceans to transform that understanding into critical environmental intelligence: timely, actionable information, developed from reliable and authoritative science, that gives us foresight about future conditions"

Dr. Kathy Sullivan
NOAA Administrator

EF Roadmap Policy Drivers

- **Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2014**
- Chesapeake Bay Executive Order
- Coastal Zone Management Act
- Coral Reef Protection Executive Order/Coral Reef Conservation Act
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
- Clean Water Act
- National Marine Sanctuaries Act
- Marine Mammal Protection Act

Hypoxia Task Force Members

5 Federal Agencies and Tribes:

- US Army Corps of Engineers
- US Environmental Protection Agency
- US Department of Agriculture
- US Geological Survey
- National Oceanic and Atmospheric Administration
- National Tribal Water Council

12 State Agencies:

- Arkansas
- Missouri
- Iowa
- Tennessee
- Minnesota
- Indiana
- Ohio
- Louisiana
- Illinois
- Mississippi
- Kentucky
- Wisconsin

Each state is represented by one of:

Agriculture agency, Environmental Quality agency, or Natural Resources agency

Stakeholder Priorities

Flooding

Water Quality

Water Availability

Drought

Climate Variability

Need integrated understanding of near- and long-term outlook and risks

Actionable Water Intelligence

High Resolution, Integrated Water Analyses, Predictions and Data

Transform information into intelligence by linking hydrologic, infrastructure, economic, demographic, environmental, and political data

Multi-Year Strategic Science and Services Plan

Integrated Water Prediction and the National Water Center (NWC)

Core Capability

Centralized Water Forecasting

National Water Model (NWM) operational [V1.0 July 2016]

- *Water forecasts for 2.7 million stream reaches*
- *Expand from only flow/stage forecasts to forecasts of* ***full water budget***
- ***100 million people get a terrestrial water forecast for first time***
- *Forecasts linked to geospatial informational to* ***provide water intelligence***

Key Enhancement

Flash Flood and Urban Hydrology

Enhance NWM with nested hyper-resolution zoom capability and urban hydrologic processes

- *Heightened focus on regions of interests (e.g. follow storms)*
- ***Street level flood inundation forecasts*** *for selected urban demonstration areas*
- *NWC increases guidance to NWS field offices to* ***improve consistency and services for flash floods***

Major Integration

Coastal Total Water Level

Couple NWM with marine models to predict combined storm surge, tide, and riverine effects

- ***More complete picture of coastal storm impacts***
- ***Summit-to-sea*** *water prediction information linked to geospatial risk and vulnerability*
- ***New service delivery model implemented*** *– increased stakeholder engagement and integrated information*
- ***NWC operations center opens and provides national decision support services and situational awareness***

Key Enhancement

Dry Side: Drought and Post-Fire

Couple NWM with groundwater and transport models to predict low flows, drought and fire impacts

- *Add NWM processes that capture subsurface water movement and storage during dry conditions*
- *Add NWM ability to track constituents (e.g. sediment, contaminants, nutrients) through stream network*
- *New decision support services for water shortage situations and waterborne transport*
- ***NWC operations center expands to include drought and post-fire decision support services***

Major Integration

Water Quality

Integrate enhanced NWM with key water quality data sets, models and tools to begin water quality prediction

- *Incorporate water quality data from federal and State partners into NWM*
- *Link NWM output to NOAA ecological forecasting operations*
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