WQ-2.1: Provide decision-making information regarding HAB ecology and toxicity to coastal managers.

WQ-2.2: Improve the capabilities of Gulf-wide HAB monitoring networks to support HAB detection and tracking.
GOMA Governors’ Action Plan II

• WQ-2.2.1 Facilitate completion of the HABIOS monitoring network design and the networks implementation and integration with other existing coastal and ocean monitoring systems (e.g., IOOS, HABSOS and GCOOS).

• Task 3. Provide information to HABIOS system designers so that the system will provide forecasts that are useful to coastal managers at appropriate spatial and temporal scales.
“The purpose of this workshop is to determine the requirements for observations and products of the end users... We will determine who the users are and what needs they have.”
HAB species to target

- 9 main HAB species in the Gulf
- 6 identified by GOMA as priority
HAB species to target

- *Karenia brevis* and *K. mikimotoi*
- *Dinophysis*
- *Pseudo-Nitzschia*
- *Pyrodinium*
- *Karlodinium*
- *Gambierdiscus* spp. (i.e., ciguatera)
User Needs: Types of Needs

• **Prediction** of when and where a bloom of a particular species is likely to initiate

• **Detection** of a bloom having occurred

• **Tracking and Monitoring** of a bloom’s development and its effects

• **Forecasting** an existing bloom’s movement and effects
1. Need prediction in estuaries.

2. Seasonal forecast is called an outlook by modelers rather than prediction.

3. We might want to use “watch” for this term.
DETECTION

1. Field deployable methodologies are crucial for detection.
2. Do we need to distinguish between bloom or toxin detection?
3. Near real-time results are needed.
1. The monitoring program should not be limited to only the sea surface conditions that are measured by satellite.

2. Surface measurement technology will not show important information that is deep in the waters or on the bottom; 3-dimensional data are needed.
FORECASTING

1. Modelers also call this “prediction.”

2. Needs to follow a scientific method.

3. Three-dimensional information is important.

4. Monitoring data over the entire region in which a bloom may begin is needed to provide the initial conditions for the forecast model.
HAB Users Groups having similar information needs

- Commercial
- Education
- Marine Operations
- Recreational
- Government/Elected Officials
- Local Economy
- Public Health
- Scientists/Researchers
- Media
Highest-priority needs of each type: Information Dissemination (5 of 11)

- Communication with other managers regarding potential bloom
- Disseminate information for and through health provider channels
- Education on human health impacts from HABs, and on their prevention and mitigation
- Risk communication: safety of food consumption
- Products – How to be informed of event (local news, beach flags, NOAA Bulletin, NOAA marine radio, weather channel, smart phone)
Highest-priority needs of each type: 

**OBSERVATIONS** (13 of 18)

**Physical/Environmental** (6 OF 18)

- Bloom location; Bloom spatial and temporal extent
- Bloom species and cell counts, benthic and water column
- In-situ real-time data on physical, chemical, biological parameters
- Nutrient conditions of freshwater and groundwater and atmosphere (loads)
- River runoff and precipitation and groundwater data (seasonal, other frequency)
- Meteorology/climatological data
Highest-priority needs of each type: OBSERVATIONS (13 of 18)

Health & Preference (6 of 18)

- Aerosols, area of effect and toxin levels
- HAB toxin abundance. Toxin levels and/or cysts in water, sediment, and biota (fish, shellfish, and other impacted species).
- Calls to poison control about respiratory or food poisoning incidents, skin rashes
- Epidemiology and surveillance
- Kill and stranding data for fish and other animals
- Aesthetically detectable (from surface or by divers)
Forecasting (4 of 17)

• Forecast location, scale (boundaries), intensity and duration of bloom

• Forecast location, scope, and duration of HAB toxins and residual effects, water column & sediment

• Forecast of landfall (moderate accuracy OK)

• Watch locations and times (i.e., a bloom is predicted)
Highest-priority needs of each type: MODELING (10 of 17)

Other (6 of 17)

• 3-D distribution of the bloom or toxin
• 3-D fields of T, S, velocity, sea surface height, freshwater inflow, winds, heat flux
• Coupled 3-D physical biological model
• Socioeconomic impacts
• Scientifically-defensible models
• Vertical and horizontal spatial extent on human health
Highest-priority needs of each type: 

**PRODUCTS** (17 of 32)

Public A (6 of 32)

- Aerial survey
- Background/HAB information
- Bloom duration prediction
- Bloom intensity (concentration and toxicity)
- HAB history (patterns)
- Bloom impacts to residents
Highest-priority needs of each type: **PRODUCTS** (17 of 32)

Public B (5 of 32)

- Information on preventative health measures (wear masks, take antihistamines, etc.)
- Information on unaffected beaches, tourist sites, restaurants, etc.
- Multi-lingual information and forecasts (e.g., watches)
- Special notices for at-risk public (forecast for at-risk populations)
- Warning – HAB event present (location, size, potential impacts, etc.)
Highest-priority needs of each type: 

PRODUCTS (17 of 32)

Managers/Technical (5 of 32)

- Bloom Initiation model
- Lagrangian analyses of HF radar and drifter data
- Lagrangian analyses of satellite altimeter data
- Model Output – circulation, transport, etc.
- Syndromic surveillance
Questions?