Overview of Florida Harmful Algal Bloom State of the Science Symposium

HAB Task Force Meeting

September 19, 2019

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FLORIDA HARMFUL ALGAL BLOOM STATE OF THE SCIENCE SYMPOSIUM

August 20 & 21st, 2019

St. Petersburg

Objectives

1. Facilitate information exchange and networking opportunities among (Florida's) harmful algal bloom scientists
2. Assess current state of knowledge for Florida's HABs with a focus on *Karenia brevis* and *Microcystis aeruginosa*
3. Identify data gaps and research needs and prioritize high level research priorities for moving the state of the science forward

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WHO

Steering Committee:

L. Flewelling, K. Havens, A. Reich, B. Rosen, R. Stumpf, D. Whiting

Funding Support:

Florida Sea Grant College Program and NOAA National Centers for Coastal Ocean Science

Facilitator:

C. Ellis - NOAA Office for Coastal Management

Participants:

Center for Disease Control, Florida Atlantic University, Florida Department of Environmental Protection, Florida Department of Health, Florida Gulf Coast University, Florida Sea Grant, FWC-FWRI, GCOOS, Indian River Lagoon National Estuary Program, Kenyon College, Mississippi Department of Marine Resources, Mote Marine Laboratory, NOAA, Nova Southeastern University, Ocean Conservancy, Ocean Research & Conservation Association, Ohio EPA, The Ohio State University, Sanibel-Captiva Conservation Foundation, South Florida Water Management District, Southern California Coastal Water Research Project, Tampa Bay Estuary Program, University of Central Florida, University of Florida, University of North Carolina, University of South Florida, Woods Hole Oceanographic Institution

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SESSIONS

I. **Initiation, Development & Termination**

II. **Prediction & Modeling**

III. **Detection & Monitoring**

IV. **Mitigation & Control**

V. **Public Health**

- **Introduction to the Harmful Algal Bloom and Blue-Green Algae Task Forces**
- **Emerging Issues**
  - Climate Change and HABs
  - An Overview of Marine HABs in Florida

PROCESS

15-minute presentations followed by hour long facilitated discussion addressing:

What we know, What we think we know, What we need to know

I. **Initiation, Development & Termination**

C. Heil

II. **Prediction & Modeling**

R. Weisberg and R. Stumpf

III. **Detection & Monitoring**

K. Hubbard and B. Kirkpatrick

IV. **Mitigation & Control**

D. Anderson and R. Pierce

V. **Public Health**

A. Reich and L. Backer

RESEARCH PRIORITIES

Priorities are defined as high level, broad research needs. They did not delve down into the research project level

Priorities gathered via 3 separate methods and grouped to eliminate redundancies

- Registration
- Roaming flip charts
- Facilitated discussion

Voting exercise using Turning Point Technologies & subsequent binning by relatedness

INITIATION, DEVELOPMENT & TERMINATION

Geographically and temporally identify the initiation zone(s) of *Karenia brevis* blooms and concentrations of *K. brevis* on the West Florida Shelf; determine if nearshore initiation is possible	45%
Determine to what extent anthropogenic nutrients support the exacerbation of blooms once they get into the nearshore waters	25%
Determine the impact of major storms on blooms	
Track nutrient source from the FL peninsula to the near-coastal shelf	
Evaluate the development of a normal vs super bloom	
Develop a good nutrient budget with error bars	
Geographically pinpoint what life stages of *Karenia brevis* are involved in initiating blooms	
Determine if anything will disrupt the life cycle of the initiation phase	
Evaluate the life history of the organism, including growth rates over the course of a bloom	
Evaluate the ecosystem role that *K. brevis* may play (are there any adverse impacts w/o *Karenia*?)	

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PREDICTION & MODELING

Improve predictive capabilities	37.5%
Tie predictions back to what society uses that information for. Determine what the best models are to get those predictions and evaluate the data gaps	22.5%
Need *Karenia* measurements subsurface (nothing to correlate it to without)	20%
Develop/expand respiratory forecasts	
Develop predictive model of a super bloom	
Evaluate the development of a normal vs super bloom	
Understand the role of the Loop Current	
Evaluate the role of particulate nutrients from the Mississippi River Delta on *Karenia*	

PREDICTION & MODELING

Improve predictive capabilities • Develop predictive model of a super bloom • Need *Karenia* measurements subsurface (nothing to correlate it to without) • Evaluate the role of particulate nutrients from the Mississippi River Delta on *Karenia* • Understand the role of the Loop Current	67.5%
Tie predictions back to what society uses that information for. Determine what the best models are to get those predictions and evaluate the data gaps • Develop/expand respiratory forecasts	32.5%

DETECTION & MONITORING

Improve routine monitoring of nearshore and offshore, particularly at depth	64%
Improve understanding of ecosystem stressors associated with red tide (e.g., hypoxia)	
Improve our detection capabilities	
Integrate the detection/monitoring of non-*Karenia* blooms into existing programs	
Increase tried and true sampling methods at more offshore stations	
Validate the accuracy of in situ sensors	
Develop new monitoring programs that build upon historic data sets (don't want to lose the old stuff)	
Develop a local taxonomic image library with flowcam technology	
Include dissolved oxygen measurements in monitoring	
Investigate potential connection with *Trichodesmium* blooms	

DETECTION & MONITORING

Improve routine monitoring of nearshore and offshore, particularly at depth	100%
Improve understanding of ecosystem stressors associated with red tide (e.g., hypoxia)	
Improve our detection capabilities	
Integrate the detection/monitoring of non-*Karenia* blooms into existing programs	
Increase tried and true sampling methods at more offshore stations	
Validate the accuracy of in situ sensors	
Develop new monitoring programs that build upon historic data sets (don't want to lose the old stuff)	
Develop a local taxonomic image library with flowcam technology	
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MITIGATION & CONTROL

Expand lab studies investigating the broad or specific impacts of red tide mitigation techniques on benthos, nekton, sea grasses and corals	21%
Use multiple approaches to bloom controls (site-specific BMPs)	19%
Better understand the impact of technologies	14%
Coordinate data repository for all data collected by the various institutions and government agencies that can be accessed by all those interested in doing red tide research and mitigation	12%
Determine via social-science study, what the public really wants (e.g water quality or *Karenia* control, nutrient reduction)	
Incorporate local ecological knowledge in understanding and mitigation of red tide	
Evaluate the biogeochemical ramifications of materials put into the sediment; what happens with the red tide flocculate sediments to the benthos?	
Determine how much we should control a naturally occurring algae	
Measure baseline biogeochemical sediments during natural blooms and control	
Develop performance measures to track progress	

MITIGATION & CONTROL

• Expand lab studies investigating the broad or specific impacts of red tide mitigation techniques on benthos, nekton, sea grasses and corals • Better understand the impact of technologies	38%
Use multiple approaches to bloom controls (site-specific BMPs)	19%
• Determine via social-science study, what the public really wants (e.g water quality or *Karenia* control, nutrient reduction) • Determine how much we should control a naturally occurring algae • Develop performance measures to track progress	17%
Coordinate data repository for all data collected by the various institutions and government agencies that can be accessed by all those interested in doing red tide research and mitigation	
Measure baseline biogeochemical sediments during natural blooms and control • Evaluate the biogeochemical ramifications of materials put into the sediment; what happens with the red tide flocculate sediments to the benthos?	
Incorporate local ecological knowledge in understanding and mitigation of red tide	

HUMAN HEALTH

Evaluate exposure or incidence rates for skin rashes, mucus membranes, derm	33%
Determine the risk of chronic and low-level exposure from fish tissue	33%
Develop multi-lingual outreach materials	33%

CONSENSUS DOCUMENT - NEXT STEP

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THANK YOU

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