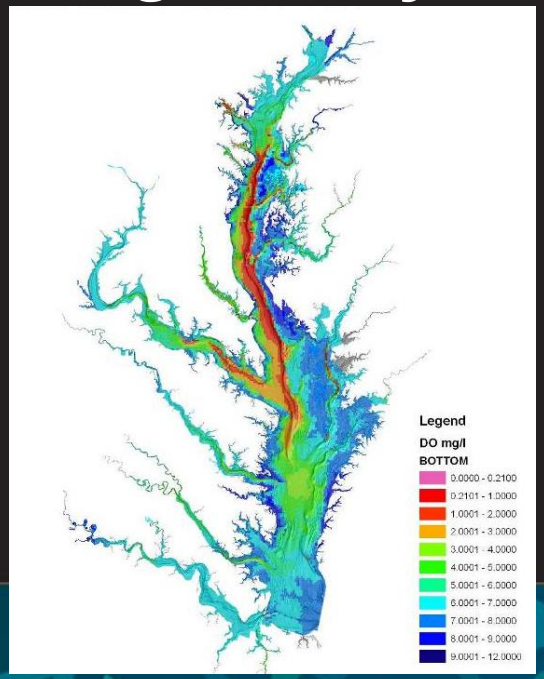
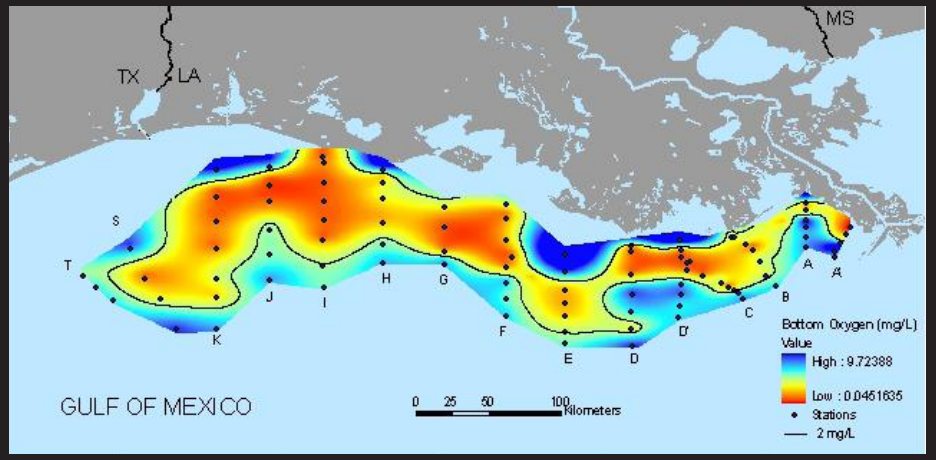
Can we Fulfill our HTF Commitments and Accomplish our Workshop Objectives?

Looking for keys to success in the Chesapeake and the Gulf





Robert Magnien

Director, Center for Sponsored Coastal Ocean Research

National Oceanic and Atmospheric Administration

National Ocean Service, National Centers for Coastal Ocean Science

Establishing a Cooperative Hypoxic Zone Monitoring Program

The 6th Annual NOAA/NGI Hypoxia Research Coordination Workshop

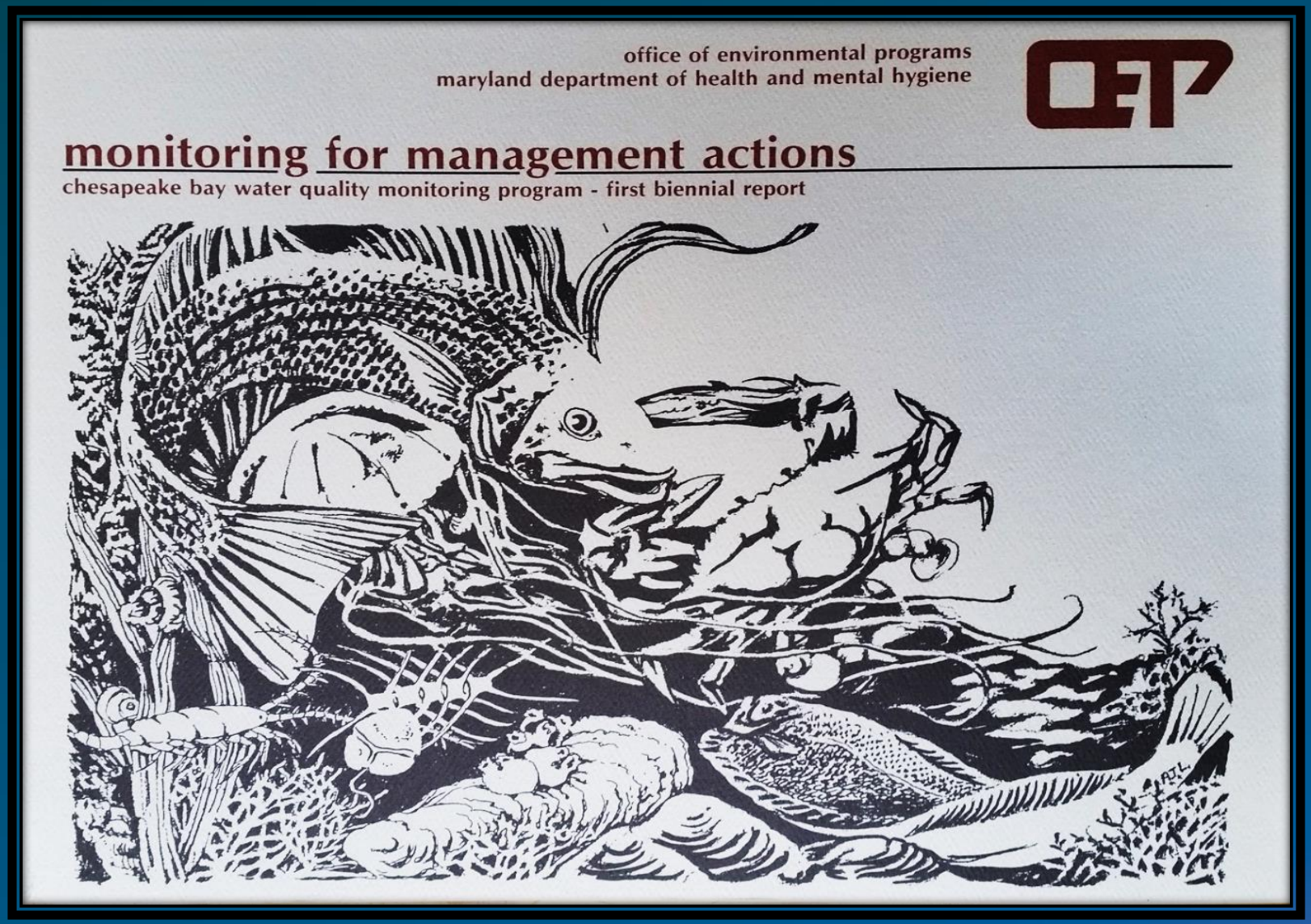
Overview/Background

- **More of a discussion than a presentation**
- **Chesapeake Bay Monitoring Program**
  - **MD: planning 1983, implementation 1984, fully operational 1985 to present**
  - **VA: a couple years later**
- **Gulf of Mexico mid-summer cruise monitoring conducted since 1985 as part of NOAA COP/CSCOR NGOMEX competitive research; includes many years of additional spatial and temporal coverage**

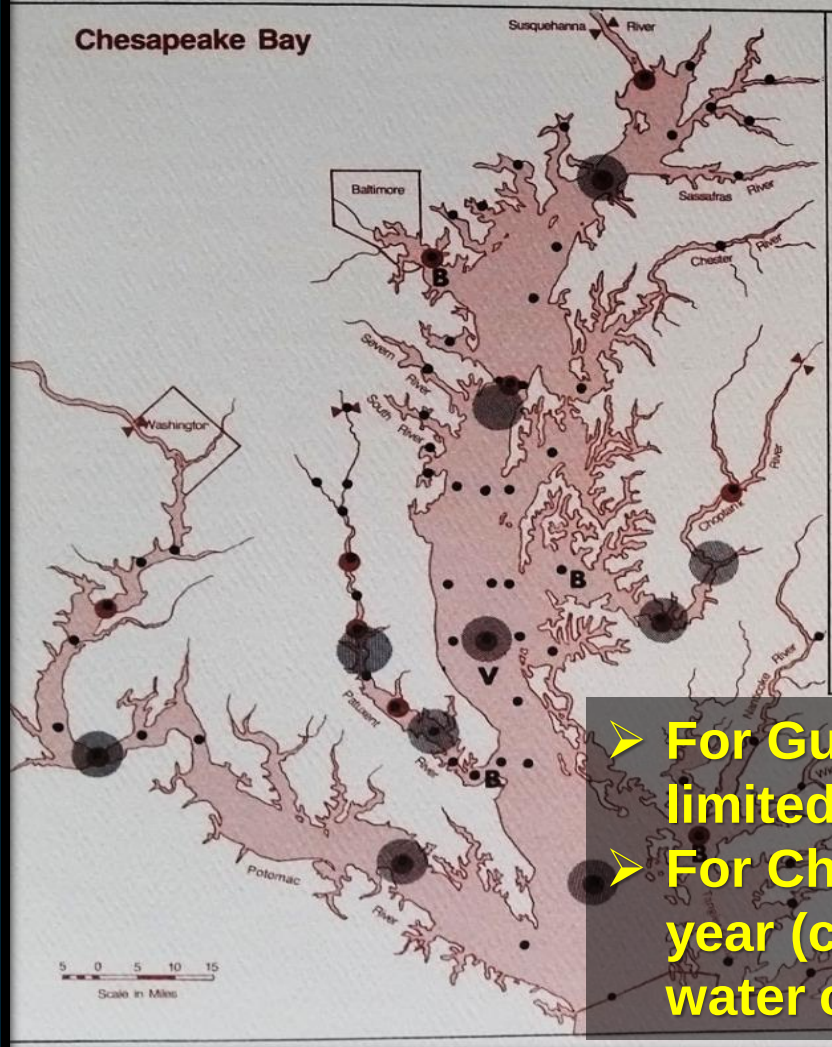
Overview/Background (cont)

- **Hypoxia Task Force 2008 Action Plan calls for "A long-term and sustainable hypoxic zone monitoring program with adequate spatial and temporal coverage. Critical components of this need include:**
  - **Increasing the number of shelf-wide monitoring surveys beyond the current one per summer with increased number of sampling stations and greater area surveyed**
  - **Additional in situ platform-based continuous monitoring devices**
  - **Mechanisms to transition monitoring from a research to operational framework**
  - **Improved predictive modeling capabilities"**

Chesapeake Graphics/Examples Come From This Foundational Document



Quick Comparison of Current Effort



MONITORING PROGRAM STATIONS

Studies conducted at each station

- Chemical and Physical Properties*
- Plankton
- Ecosystem Processes: Sediment Oxygen and Nutrients Exchange (SONE)
- V Vertical Flux (VFX)
- B Toxicants in Benthic Organisms
- River Input

Benthic Organisms - See Map 9, Chapter 6 for monitoring stations

*In Patuxent and Potomac Rivers toxicant monitoring only at plankton stations

MONITORING COMPONENTS

Yearly frequency of sampling for parameters measured by the monitoring program

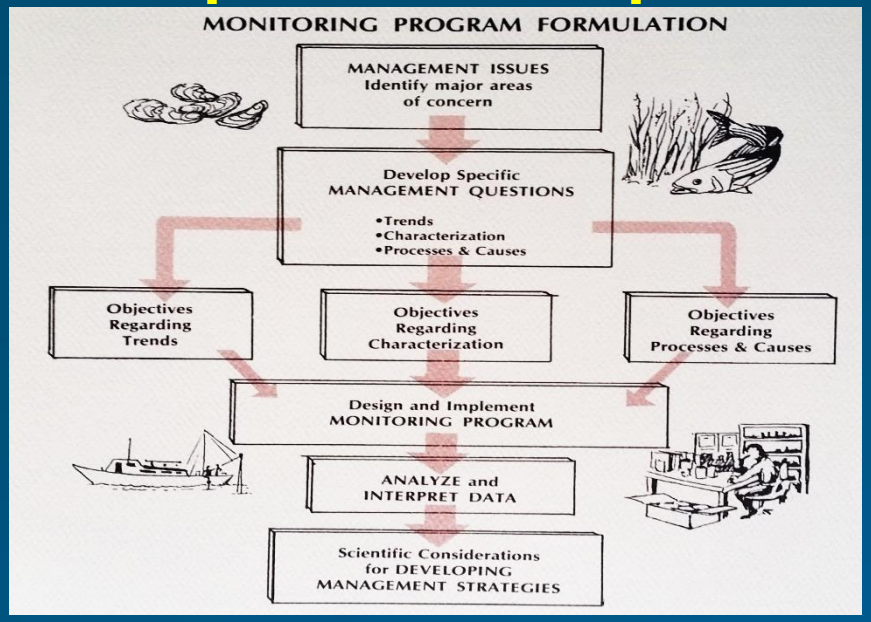
	MEASURED PARAMETER	Chemical and Physical Properties	[1]Plankton	Benthic Organisms	Ecosystem Processes: SONE	Ecosystem Processes: VFX	[2]River Input
WATER COLUMN	Salinity	12-20		10	4	17	12+
	Conductivity	12-20		10	4	17	365
	Temperature	12-20		10	4	17	365
	Dissolved Oxygen	12-20		10	4	17	12+
	pH	12-20		10			12+
	Secchi Depth	12-20					
	Nitrogen				4	17	12+
	Phosphorus	12-20			4	17	12+
	Carbon	12-20			4	17	12+
	Silicon	12-20			4		12+
	Total Suspended Solids	12-20			4	17	365
	Chlorophyll a	12-20	18		4		12+
	Pheophytin a	12-20	18		4		12+
	Phytoplankton Productivity		18				
	Species Composition, Abundance and Biomass		12-18	10			
	Freshwater Discharge						365
SEDIMENT	Oxygen Demand				4		
	Nitrogen Content and Flux				4	17	
	Phosphorus Content and Flux				4	17	
	Carbon Content or Flux	1		10	4	17	
	Chlorophyll a				4		
	Phytoplankton species composition and abundance					17	
	Particle Size Distribution	1		10			
	Moisture Content	1		10			
	Nutrients	1					
	Metal Toxicants	1					

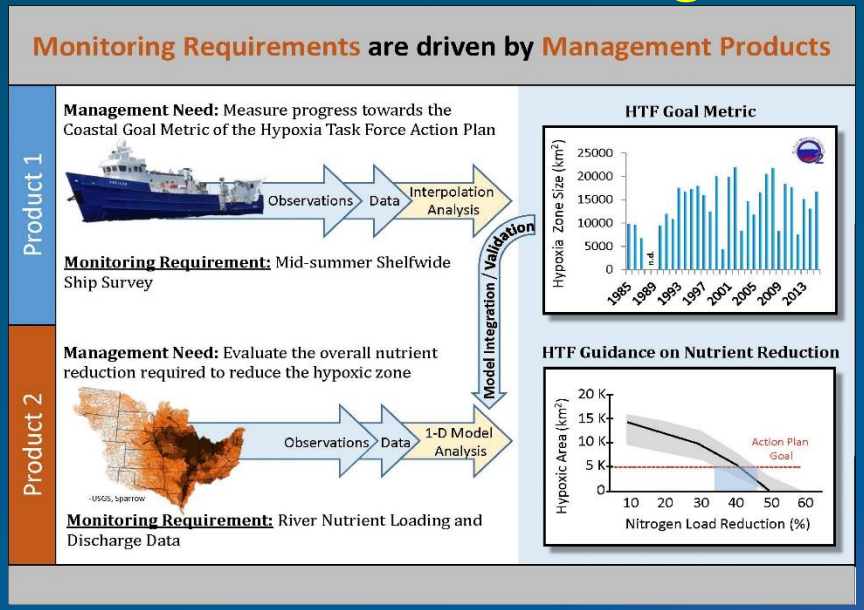
[1]Sampling in coincidence with chemical and physical properties; includes microzooplankton and mesozooplankton.
[2]12+ indicates that frequency of sampling includes monthly measurements plus intensive sampling during storm events.
Toxicants were also measured in benthic organisms from 1 to 3 times per year.

- For Gulf, only1X per year (only limited parameters)
- For Chesapeake,12-20X per year (comprehensive suite of water column and sediment

Keys to Success #1: High-Level Support for Products

- **Be crystal clear about management utility of the monitoring data and its products (e.g. status, trends, model-derived guidance)**
- **Communicate these compelling needs and get agreement up and down the chain that this information is required for responsible science-based management**





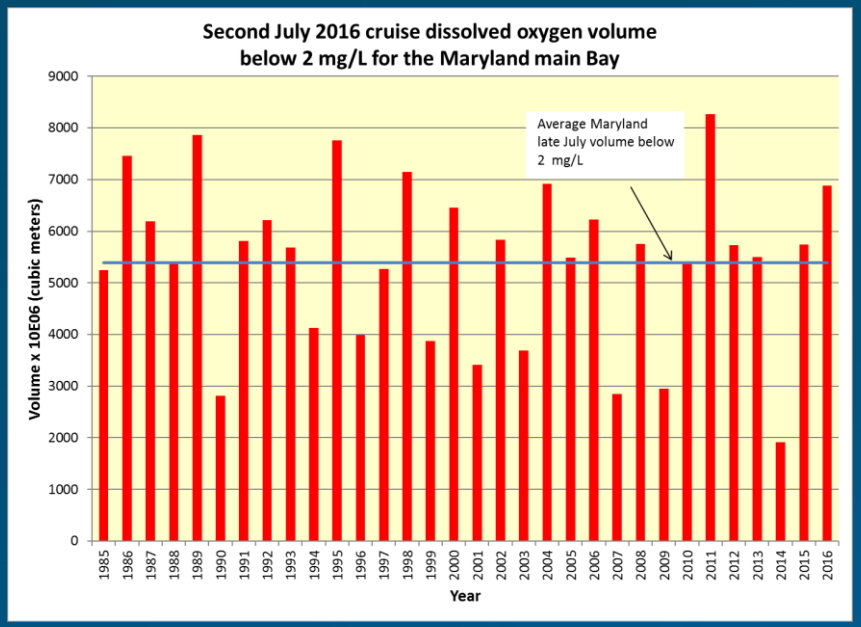
Keys to Success #2: Define Minimum Requirements

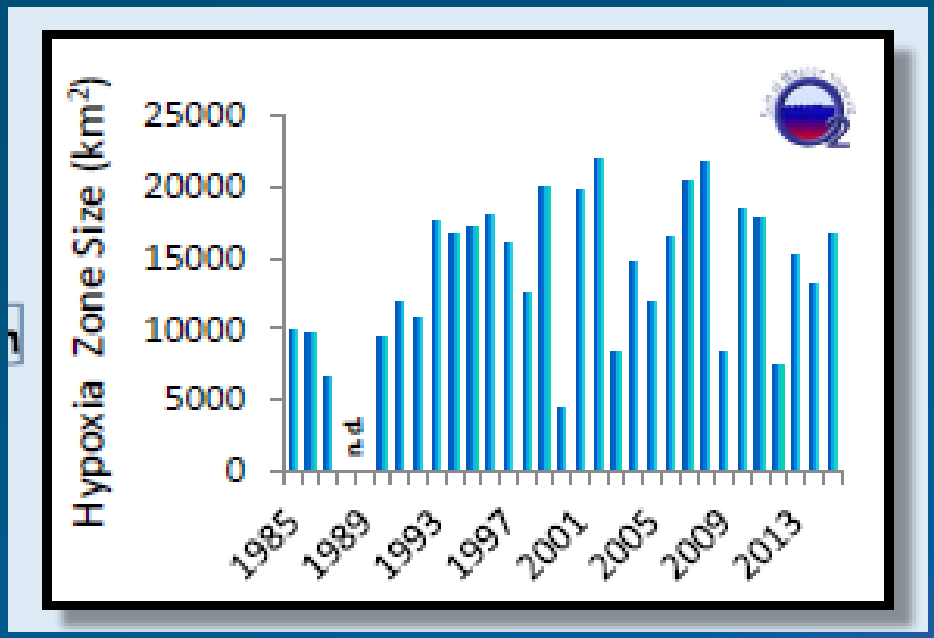
- **While never an exact science, gain consensus among the scientific and management communities on a narrowed range of monitoring "requirements" needed to support management-relevant products in a scientifically robust fashion**

Breakout Group #1			
Monitoring Activity	Justification for including activity as monitoring requirement; how will this support model application to management needs?	Minimum Need	Notes
ANNUAL METRIC FOR HTF: HYPOXIC ZONE MID-SUMMER AREAL EXTENT (MANAGEMENT DRIVER 1; PRODUCTS 1 & 2)			
Mid-summer shelf-wide ship survey west of Mississippi Delta	Provides long-standing metric that HTF relies on to assess progress towards Coastal Goal; Provides calibration and validation data for statistical and 3-D time variable hypoxia models.		
MONITORING DATA TO SUPPORT VALIDATION OF 3-D TIME VARIABLE HYPOXIA MODELS (MANAGEMENT DRIVER 2; PRODUCTS 3-5)			
SHIP SURVEYS			
Mid-summer shelf-wide survey east of Mississippi Delta	Area influenced by discharge from the Mississippi River and contributes to Gulf wide hypoxia; Currently missing from most mid-summer dead zone area estimates; Could provide early warning of changes in hypoxia area due to nutrient reductions.		
Monthly shelf-wide ship surveys east of Mississippi Delta (Apr, May, June, Aug, Sept, Oct)	Hypoxia processes in region are strongly connected to coast and provide additional information for living resource and habitat impacts in delta region; Provides strong linkages to ongoing State monitoring programs and diversion studies and impacts.		
Cross-shelf transects Transects C and F: monthly all year (Feb, Apr, June, Aug, Oct, Dec)	Key transects at the mouths of the Mississippi and Atchafalaya rivers; Ideal for measuring the evolution of hypoxia in the core areas of the dead zone; Smaller scale and temporal resolution would provide critical data for model calibration/validation through time.		
SEAMAP groundfish survey mapping hypoxia from June through mid-July	Provides area snapshots of hypoxia over a several month period during the critical summer months; Oxygen data is collected with other abundance and fisheries data so is critical for model parameterization.		
Additional Activities (Other Shelfwide Surveys) (Other Transect Lines) (Other Partner Surveys/Transects)			
MOORED OBSERVING SYSTEMS			
Sites West of Delta (CSI-6, c, CSI-9, G)	Provides key long-term and temporal oxygen data to monitor hypoxia evolution through time in the core of the dead zone; Temporal model validation and calibration data at core areas on the shelf.		
Sites East of Delta (USM 3M01, CSI-16)	Provides key temporal oxygen data to monitor hypoxia evolution through time in an area on the edge of the hypoxic zone; Temporal model validation and calibration data for an area of the shelf expected to be highly dynamic.		
Additional Activities (Other Strategic Locations) (Other Partner Platforms)			
GLIDERS			
Tier 1 of Glider Implementation Plan (4 transects; cover June through Aug)	Provides opportunity to collect high resolution temporal and spatial oxygen data in concert with other key physical and biological parameters; Provides key data sets for model calibration and validation and model formulation and parameter estimation analysis.		
Additional Activities (Tier 2 of Glider Implementation Plan - Area pattern) (Tier 3 of Glider Implementation plan - Sawtooth pattern)			

Keys to Success #3: Take the Long View

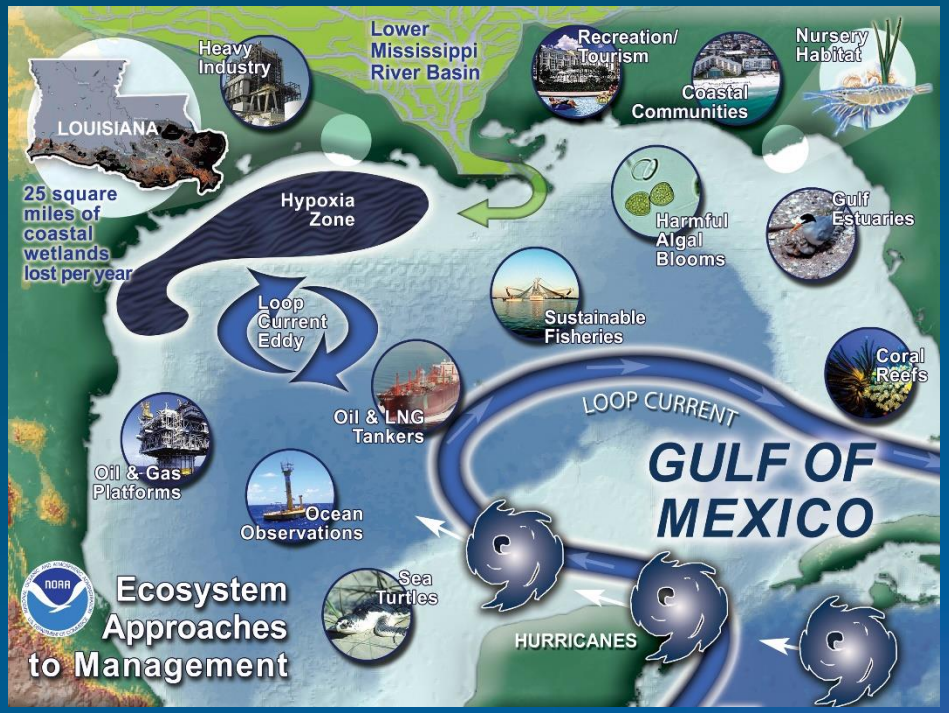
- **Management of hypoxia/related issues is long-term (generational), how can monitoring progress not be?**
- **How can we get our bureaucracies to embrace long-term commitments to science to support management?**



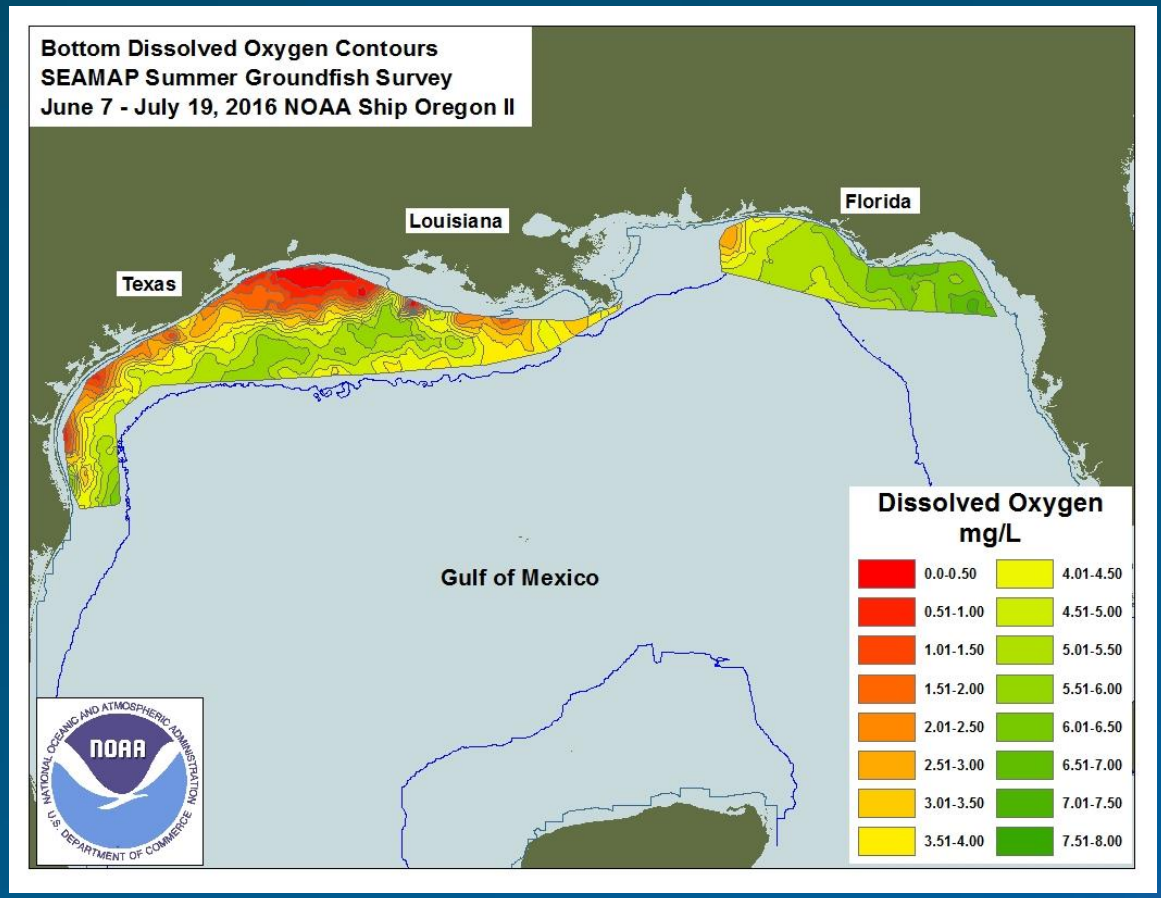


Keys to Success #4: Be Innovative and Move Toward Ecosystem Approaches

- **Scientific understanding strongly suggests that we should be managing in an ecosystem context**
- **Ecosystem approach presents more opportunities for synergies and partnerships of mutual benefit**



Keys to Success #5: Communicate Early and Often – Make Data Widely Available



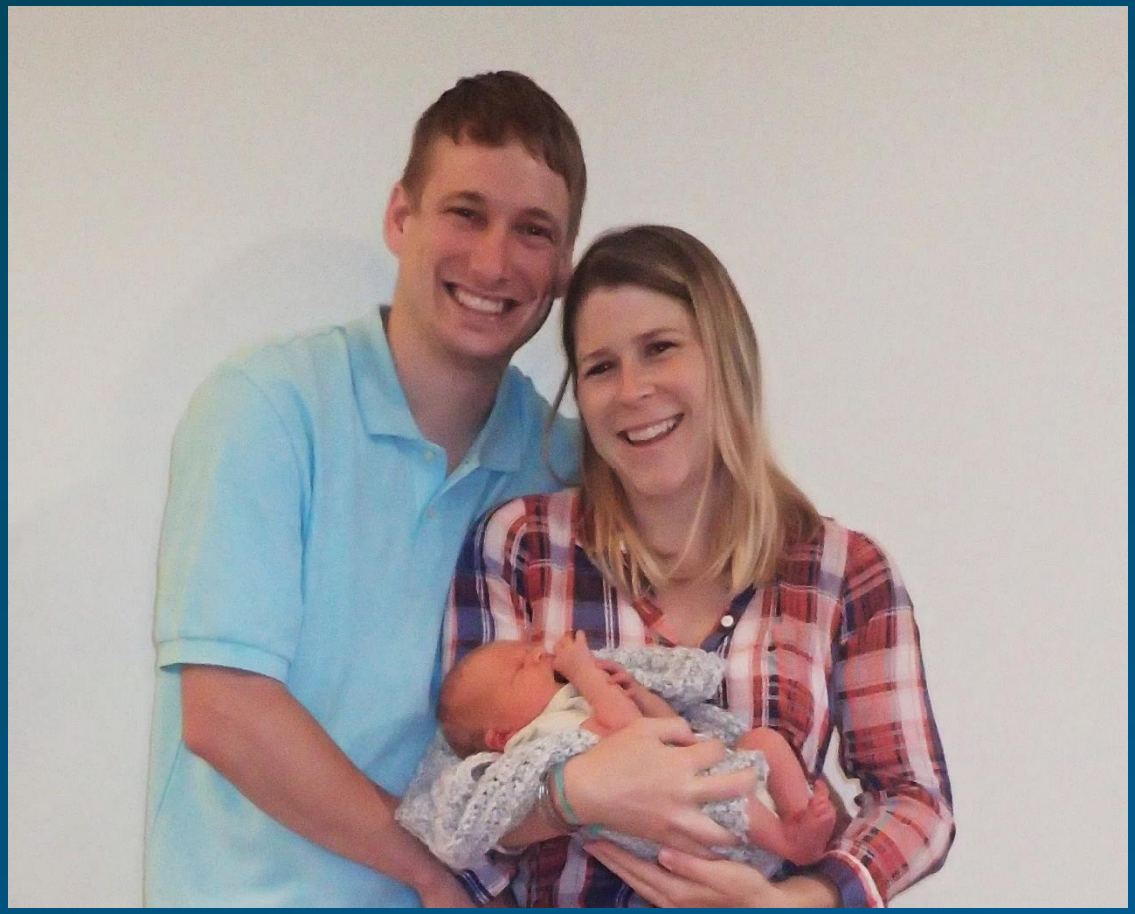
Keys to Success #6: Committed Leadership

- **That would be all of <u>you</u> aggressively supporting a common gameplan to emerge from this workshop**
- **And it would be even better if agency heads, governors and politicians were actively supportive**

Keys to Success #7: Partnerships

- **Share resources toward common or synergistic goals**
- **The whole being greater than the individual parts provides justification to get through tough times in a long-term program**

Let’s Get Something Done For Jack!



Trevor Meckley (CSCOR Knauss Fellow), wife Megan and new arrival, Jack