

Photo credit: NOAA, TPWD, FWRI, WHOI

# Improvements and Expansion of NOAA's Harmful Algal Bloom Operational Forecast System

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November 17, 2015

<http://tidesandcurrents.noaa.gov/hab>

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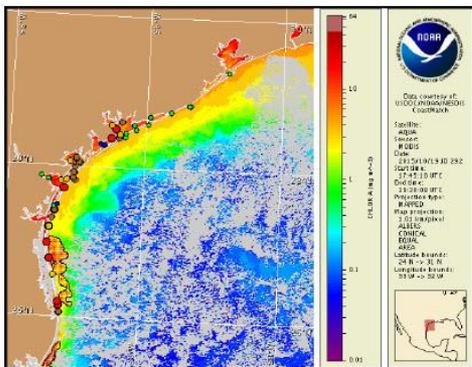


# Gulf of Mexico Harmful Algal Bloom Operational Forecast System



## Gulf of Mexico Harmful Algal Bloom Bulletin

Region: Texas  
 Thursday, 22 October 2015  
 NOAA National Ocean Service  
 NOAA Satellite and Information Service  
 NOAA National Weather Service  
 Last bulletin: Monday, October 19, 2015



Satellite chlorophyll image with possible *K. brevis* HAB areas shown by red polygon(s), when applicable. Points represent cell concentration sampling data from October 12 to 21: red (high), orange (medium), yellow (low b), brown (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Cell count data are provided by Texas Parks and Wildlife Department. For a list of sample providers and a key to the cell concentration categories, please see the HAB-OFBS bulletin guide: [http://tidesandcurrents.noaa.gov/hab/habofbs\\_bulletin\\_guide.pdf](http://tidesandcurrents.noaa.gov/hab/habofbs_bulletin_guide.pdf)

Detailed sample information can be obtained through the Texas Parks and Wildlife Department at: <http://www.tpwd.state.tx.us/landwater/water/enviroconcerns/hab/vedtide/status.plhtml>

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit the NOAA Harmful Algal Bloom Operational Forecast System bulletin archive: <http://tidesandcurrents.noaa.gov/hab/bulletins.html>

## Conditions Report

*Karenia brevis* (commonly known as Texas red tide) ranges from low concentrations along the Texas coast from Galveston Bay to the Rio Grande. Concentrations are patchy in nature and levels of respiratory irritation upon nearby bloom concentrations, ocean currents, and wind speed highest level of potential respiratory irritation forecast for Thursday, Monday, October 26 is listed below:

### Region: Forecast (Duration)

Bay region-Matagorda Bay: High (Th-M)  
 Bay region-San Antonio Bay to Espiritu Santo Bay: High (Th-M)  
 Bay region-Aransas Bay: High (Th-Su), Moderate (M)  
 Bay region-Corpus Christi Bay: High (Th-M)  
 Aransas Pass to PINS region: High (Th-Su), Very low (M)  
 Bay region-Upper Laguna Madre: High (Th-Su), Moderate (M)  
 Padre Island National Seashore region: High (Th-Su), Low (M)  
 Bay region-Lower Laguna Madre to Laguna Vista: High (Th-M)  
 Manfield Pass to Beach Access 6 region: High (Th-Su), Low (M)  
 Beach Access 6 to Rio Grande region: High (Th-Su), Low (M)  
 All Other Texas Regions: None expected (Th-M)

Check [http://tidesandcurrents.noaa.gov/hab/beach\\_conditions.html](http://tidesandcurrents.noaa.gov/hab/beach_conditions.html) for current conditions. Dead fish and discolored water have been reported in Corpus Matagorda Bay.

## Analysis

*Karenia brevis* concentrations range from 'very low' to 'high' from Galveston to the Rio Grande, with the highest concentrations collected at Padre Island at Beach Access Road 5 (TPWD; 10/20-21). Within the Imaging FlowCytobot at UTMSI Pier in Port Aransas continues to observe *K. brevis* ranging between 'very low' to 'low' concentrations (TPWD, TAMU; 10/19-22). In the Corpus Christi Bay region, no new samples were collected but discolored water continues to be reported (TPWD; 10/19). Sampling in the Lower Laguna Madre continues to indicate 'very low' to 'medium' *K. brevis* concentrations (TPWD; 10/20-21). Detailed sample information and a summary of impacts can be obtained through Texas Parks and Wildlife Department at: <http://www.tpwd.state.tx.us/landwater/water/enviroconcerns/hab/vedtide/status.plhtml>. For information on area shellfish restrictions, contact the Texas Department of State Health Services.

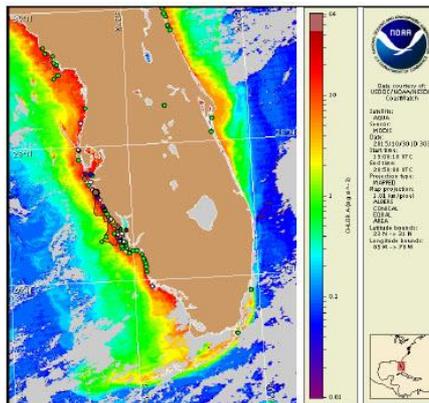
Recent MODIS Aqua imagery (10/19, shown left and 10/20 not shown) shows a band of elevated chlorophyll (2 to 4  $\mu\text{g/L}$ ) stretching alongshore Texas coast from the Matagorda Peninsula region to Mustang Island. Patches of elevated to very high chlorophyll (2 to >20  $\mu\text{g/L}$ ) are present along- and offshore the Texas and Mexico coast from Padre Island National Seashore to 380 km south of Rio Grande.

Forecast models based on predicted near-surface currents indicate a maximum bloom transport from coastal sample locations of 110 km south from Pass Cavallo, 70 km south



## Gulf of Mexico Harmful Algal Bloom Bulletin

Region: Southwest Florida  
 Monday, 02 November 2015  
 NOAA National Ocean Service  
 NOAA Satellite and Information Service  
 NOAA National Weather Service  
 Last bulletin: Thursday, October 29, 2015



Satellite chlorophyll image with possible *K. brevis* HAB areas shown by red polygon(s), when applicable. Points represent cell concentration sampling data from October 23 to 30: red (high), orange (medium), yellow (low b), brown (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Cell count data are provided by Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute. For a list of sample providers and a key to the cell concentration categories, please see the HAB-OFBS bulletin guide: [http://tidesandcurrents.noaa.gov/hab/habofbs\\_bulletin\\_guide.pdf](http://tidesandcurrents.noaa.gov/hab/habofbs_bulletin_guide.pdf)

Detailed sample information can be obtained through FWC Fish and Wildlife Research Institute at: <http://myfwc.com/retidestatus>

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit at: <http://tidesandcurrents.noaa.gov/hab/bulletins.html>

## Conditions Report

*Karenia brevis* (commonly known as Florida red tide) ranges from not present to high concentrations along the coast of southwest Florida, and is not present in the Florida Keys. *K. brevis* concentrations are patchy in nature and levels of respiratory irritation will vary locally based upon nearby bloom concentrations, ocean currents, and wind speed and direction. The highest level of potential respiratory irritation forecast for Monday, November 2 through Thursday, November 5 is listed below:

### County Region: Forecast (Duration)

Southern Pinellas: Very Low (M), None (Tu-Th)  
 Southern Manatee: Low (M-Tu), None (W-Th)  
 Southern Manatee, bay regions: Low (M-Th)  
 Northern Sarasota: Low (M-Tu), Very Low (W-Th)  
 Northern Sarasota, bay regions: Moderate (M-Th)  
 Southern Sarasota: Low (M), Very Low (Tu-Th)  
 Northern Charlotte: Low (M), Very Low (Tu-Th)  
 Northern Charlotte, bay regions: Moderate (M-Th)  
 Southern Charlotte, bay regions: Moderate (M-Th)  
 Northern Lee: Very Low (M, W-Th), Low (Tu)  
 Northern Lee, bay regions: Low (M-Th)  
 All Other SWFL County Regions: None expected (M-Th)  
 All Other NWFL County Regions: Visit <http://tidesandcurrents.noaa.gov/hab/nwfl>

Check [http://tidesandcurrents.noaa.gov/hab/beach\\_conditions.html](http://tidesandcurrents.noaa.gov/hab/beach_conditions.html) for recent, local observations. Health information, from the Florida Department of Health and other agencies, is available at [http://tidesandcurrents.noaa.gov/hab/hab\\_health\\_info.html](http://tidesandcurrents.noaa.gov/hab/hab_health_info.html). Reports of respiratory irritation and dead fish have been received from alongshore Manatee and Sarasota County.

## Analysis

Recent samples collected along- and offshore southwest Florida from Pinellas to Collier counties indicate background to 'high' *Karenia brevis* concentrations, with the highest concentrations present in Sarasota Bay (FWRI, SCHD, MML, CCENRD; 10/23-10/30). Respiratory irritation has been reported in Manatee County at Coquina Beach and in Sarasota County with moderate levels reported at Manasota Beach and slight levels reported at Siesta Key (MML; 11/2). Detailed sample information and a summary of impacts can be obtained through FWC Fish and Wildlife Research Institute at: <http://myfwc.com/retidestatus>.

In recent ensemble imagery (MODIS Aqua, 10/30) patches of elevated to very high chlorophyll (2 to >20  $\mu\text{g/L}$ ) with the optical characteristics of *K. brevis* are visible along- and offshore from Pinellas to Collier counties.

Variable winds forecasted today through Thursday will decrease the potential for transport of surface *K. brevis* concentrations alongshore southwest Florida. Forecasted winds today through Thursday are not favorable for intensification of *K. brevis* concentrations at the coast. - Lalime, Davis



# Goals

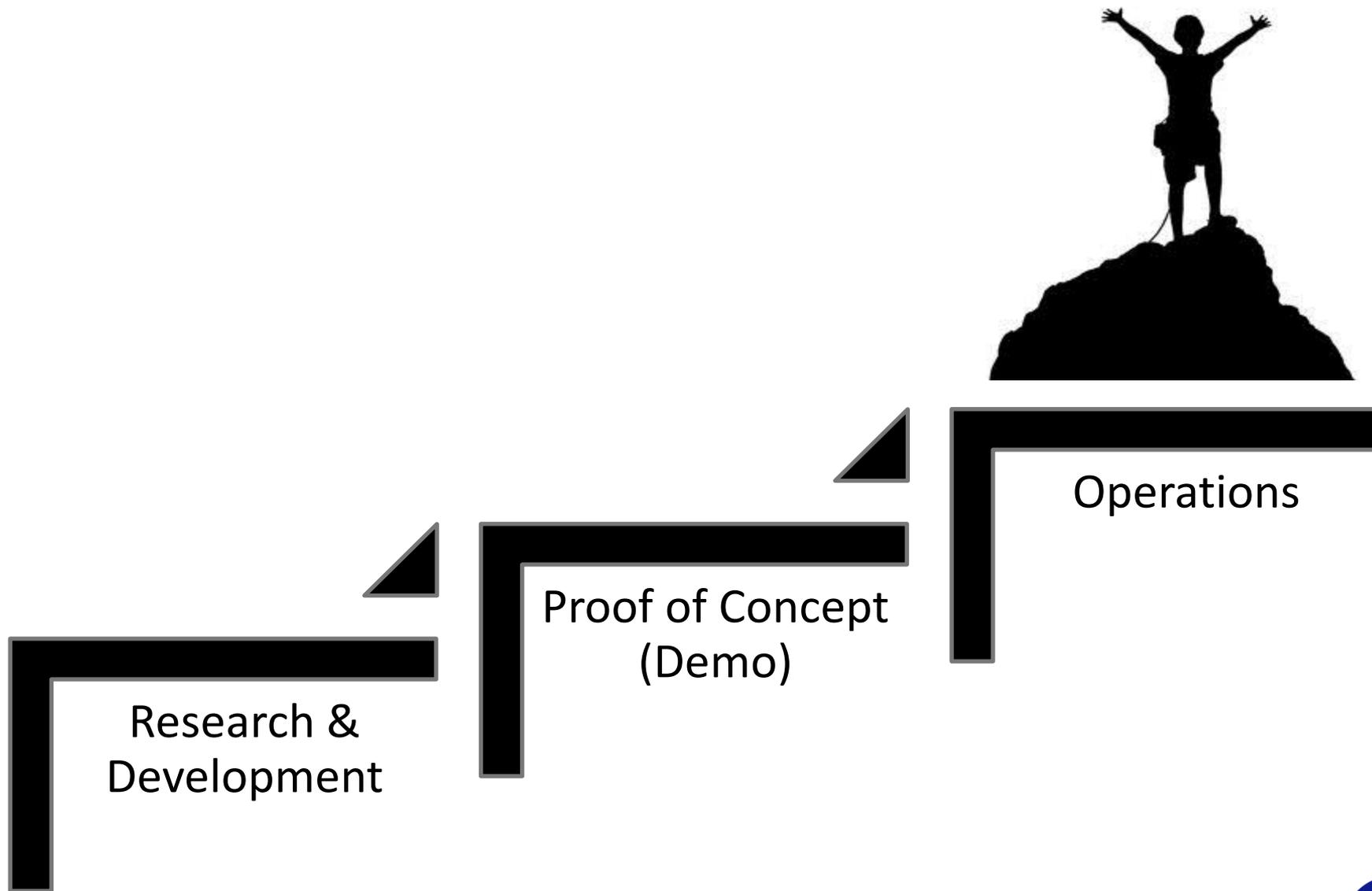
1. Continuous improvement of operational HAB forecasts for Gulf of Mexico
2. Expansion of HAB-OFS to other regions of the US

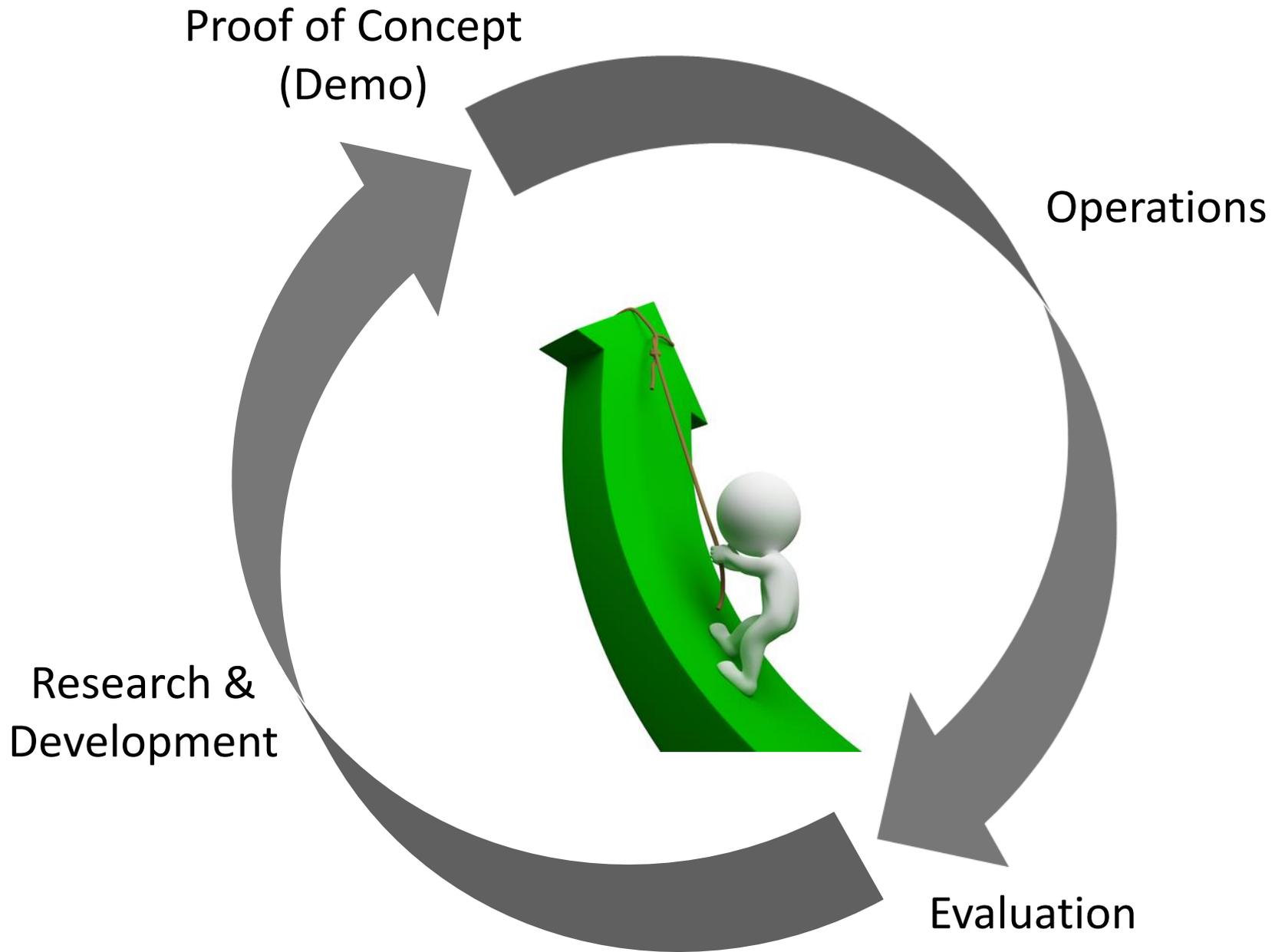
# Challenges

- Transition to operations:
  - Efficient pathway to transition from research to operations
  - Clear feedback loop from operations to research
- Need to improve infrastructure



# Transition to Operations





# Goal #1: Continuous Product Improvement

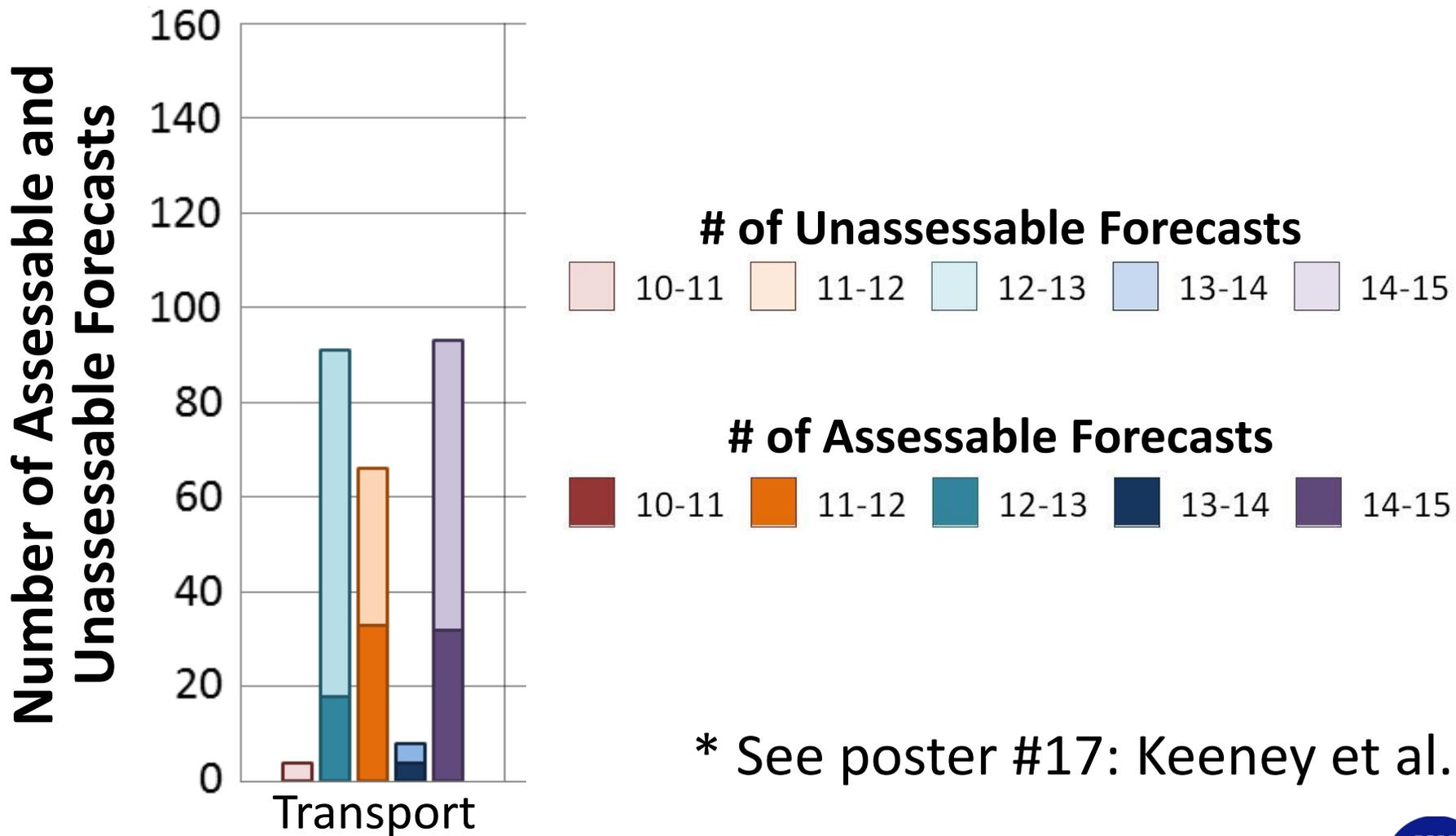
- Example

## Step

1. Evaluations of Florida HAB-OFS identified a need for improved *Karenia brevis* detection from satellite imagery in order for:
  - Early warning
  - Monitoring and assessment of transport direction and intensification forecasts

# Product Evaluations

Florida Transport Direction Forecasts, 2010-2015\*

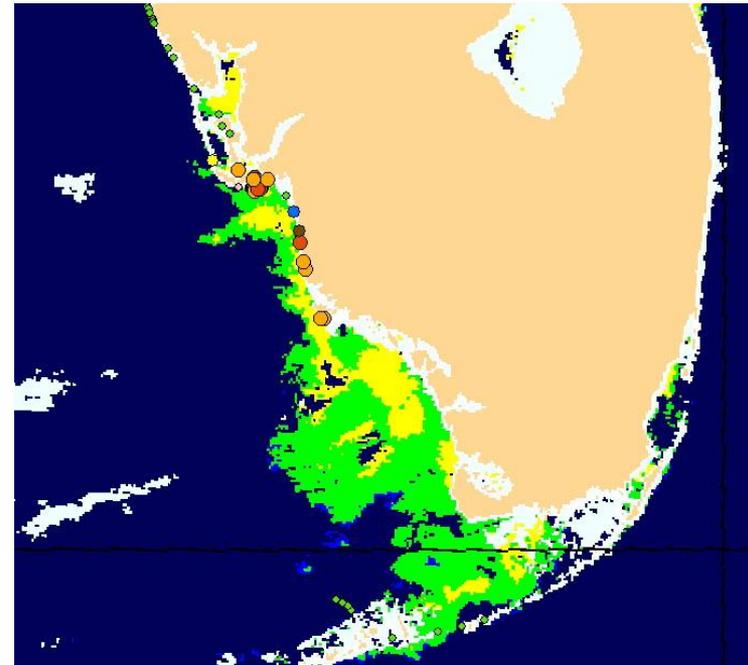


\* See poster #17: Keeney et al.

# Improved HAB Detection with Ensemble Imagery

## Steps

2. R&D: Ensemble imagery prototype developed
3. Prototype evaluation\* showed:
  - More specific to *Karenia brevis*
  - Reduction in false positives
4. Transitioned to operations:  
Sep. 8, 2015



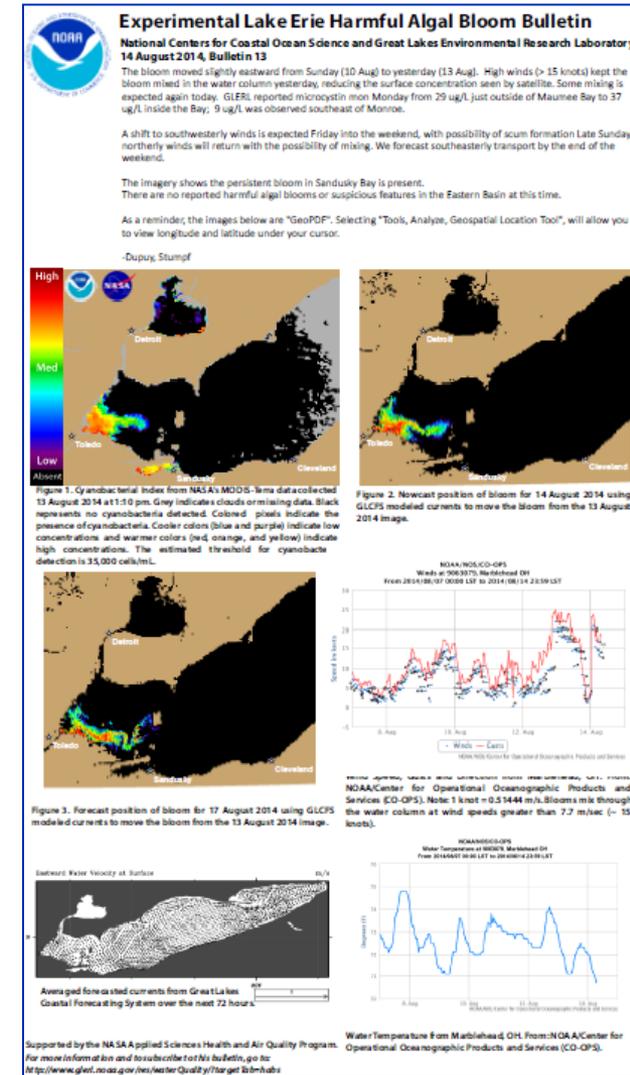
\* See poster #9: Derner et al.



# NOAA Demonstration HAB Forecasts

- Example: Great Lakes (Lake Erie)
  - Semi-weekly bulletin issued by NOAA's NCCOS since 2008\*
  - Work is underway to transition Lake Erie to operations in CO-OPS:
    - Set-up operational infrastructure
    - Parallel testing
    - Evaluation
    - Operational

\* See poster #13: Dupuy et al.



In partnership with the Great Lakes Environmental Research Laboratory

# Underlying Challenge: Improving the Infrastructure\*

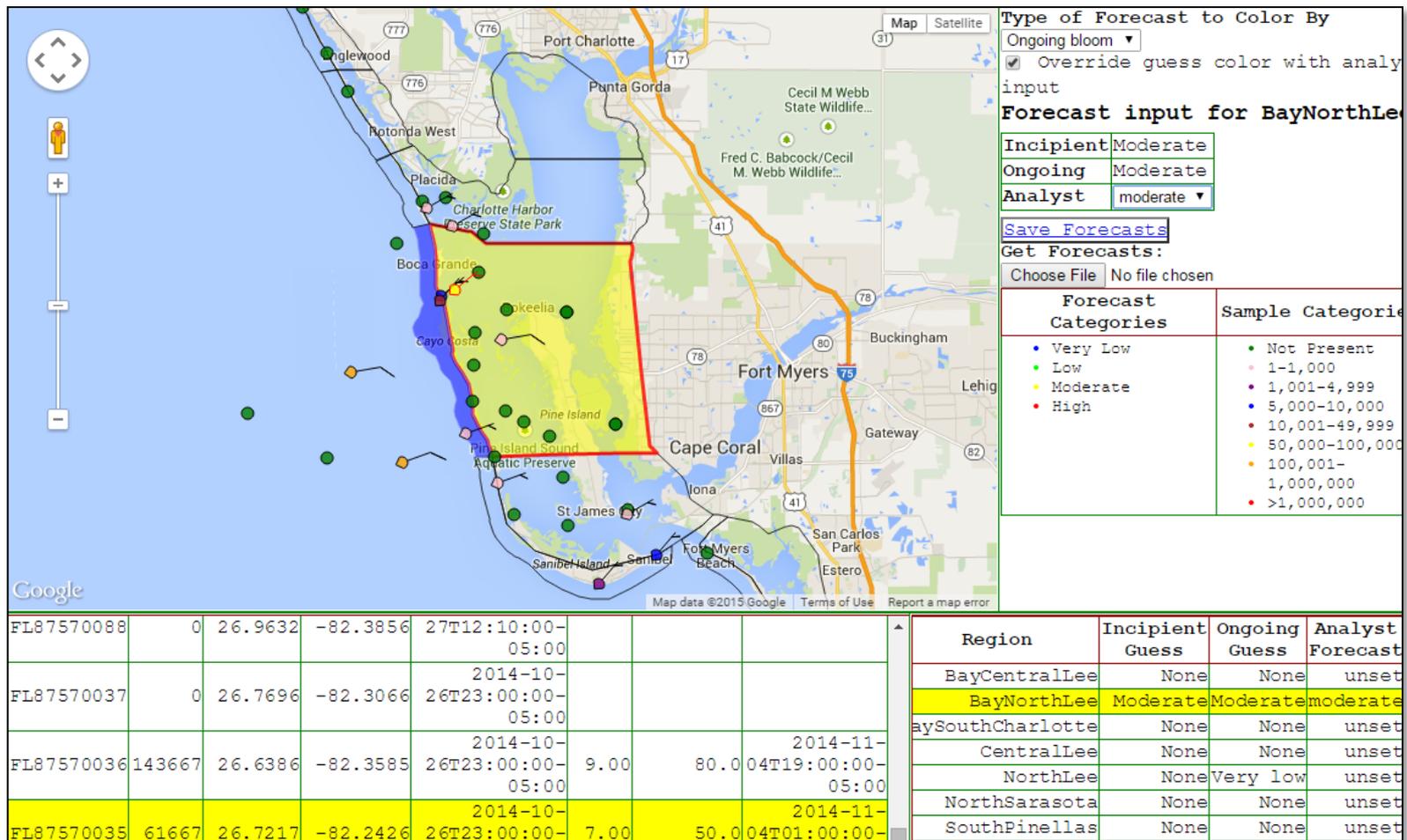
- Inefficient product generation and assessment
- Major redesign needed to ingest new datasets for improvements and expansion

\* See poster #5: Davis et al.



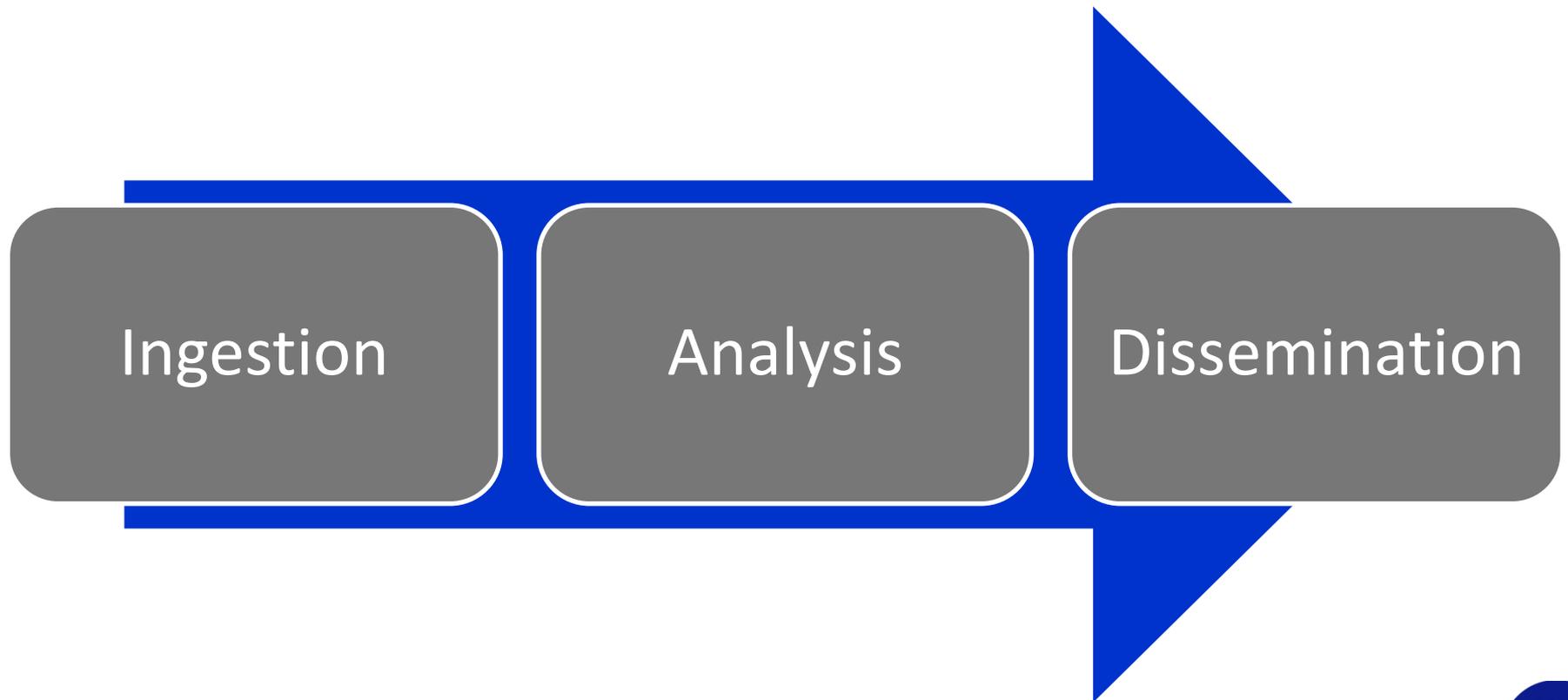
# More Efficient Forecasting

- Example:** Developed tool that increases the efficiency of creating the respiratory irritation forecasts by **20-50%**



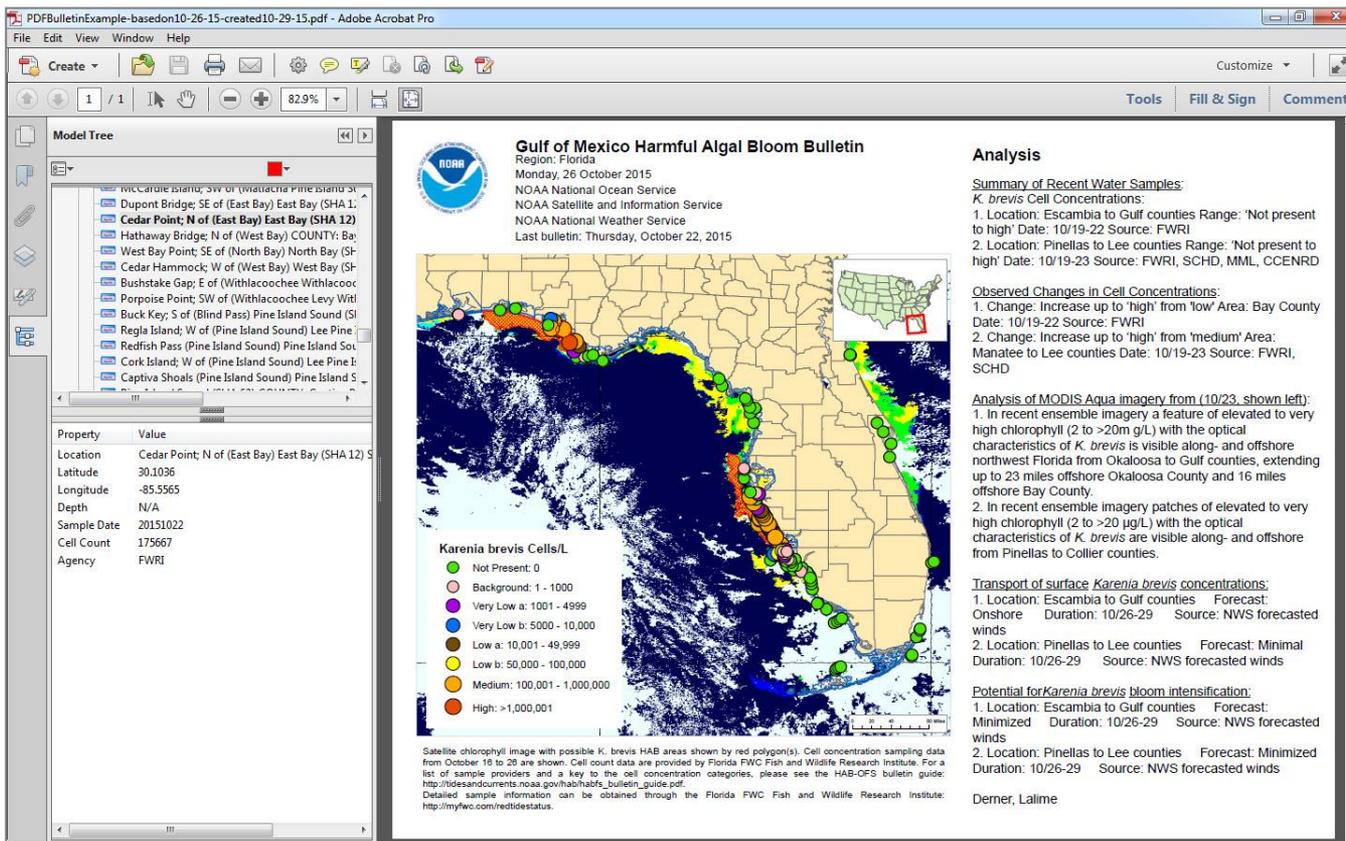
# Improving the Infrastructure

- Developing ArcGIS-based infrastructure:
  - More agile to enable ingestion of new datasets
  - Will allow more efficient data flow



# Improving the Infrastructure

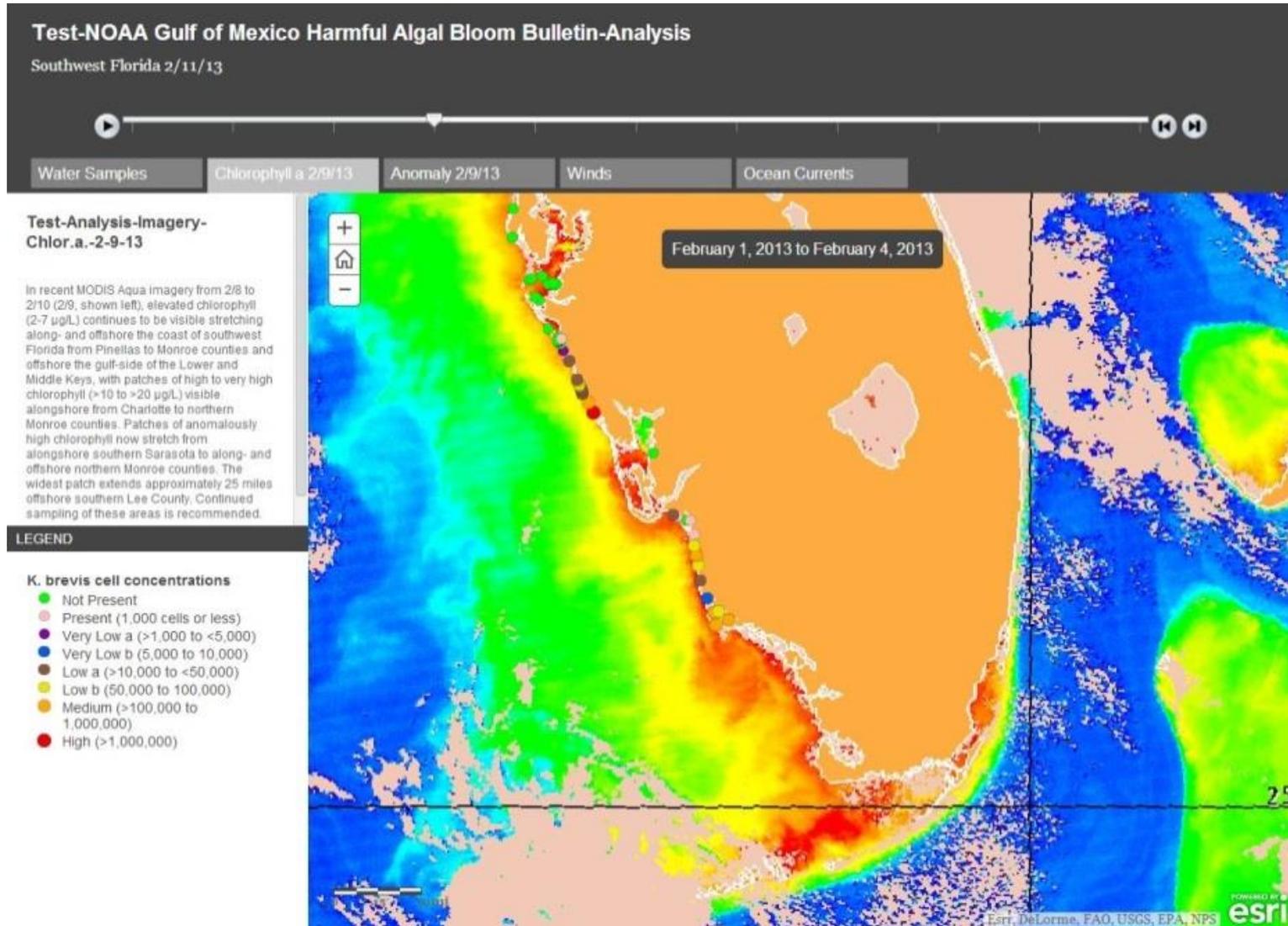
- ArcGIS infrastructure will also enable improved products:
  - Georeferenced pdf
  - Interactive web map



**Example of a georeferenced pdf version of FL bulletin**

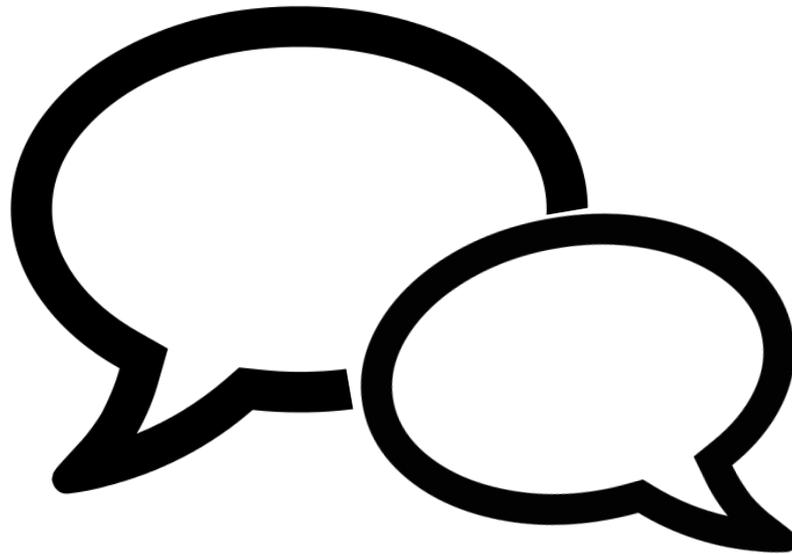


# ArcGIS: Interactive Web Map Bulletin



# User Feedback

- Important that products meet user requirements
- Feedback period before launch of major change
- Changes will not be made during an active HAB



# For More Information

- Visit the following posters:
  - #5: Davis et al.
  - #9: Derner et al.
  - #13: Dupuy et al.
  - #17: Keeney et al.

<http://tidesandcurrents.noaa.gov/hab>

