



# RIDEM

2016 Pseudo-Nitzschia  
Bloom in Rhode Island  
waters

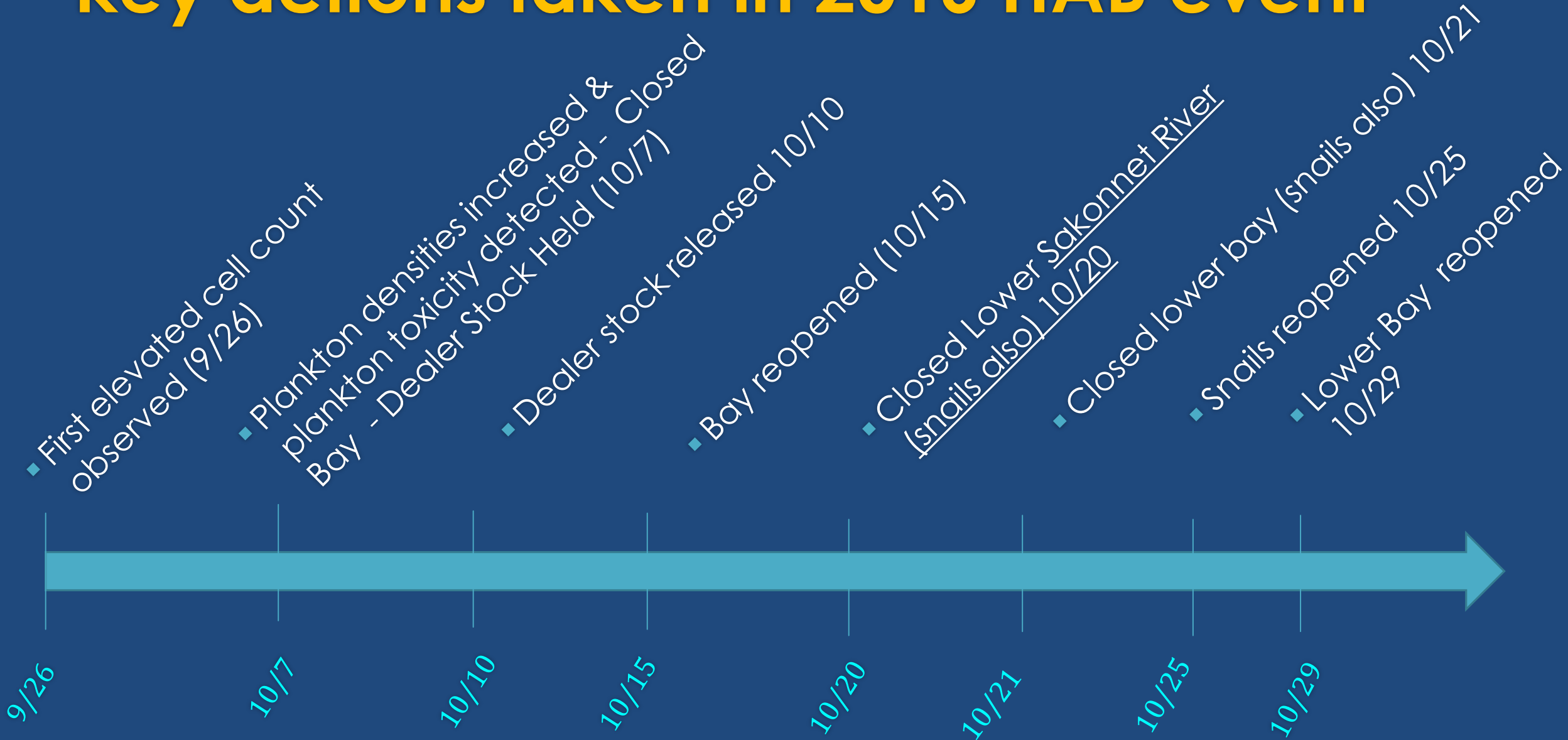
December 16, 2016  
Coastal Institute Building, URI

# Historic Shellfish Program HAB monitoring plan

- Mouse assays (1970s – 1990s)
- Collect bacteria, phytoplankton samples ~2x week in areas open for harvesting
- Phytoplankton (April – Nov):
  - cell counts for potentially harmful taxa: *Alexandrium spp*, *Dinophysis spp*, *Pseudo-nitzschia spp*.
- 100~150 phytoplankton samples analyzed annually since 2000
- Shellfish testing for presence of toxins initiated in response to elevated counts



# key actions taken in 2016 HAB event





# Events leading to initial 10/7 closure

9/26 Elevated P-N count detected in outer Newport Harbor

10/5 Expanded monitoring detects plankton counts  $>190,000$  cells/l and domoic acid screening test revealed cells producing toxins

10/7 Bay wide closure of shellfish waters all species except carnivorous snails. Dealers required to hold shellfish from the market.



# Factors contributing to decision to close the Bay

Extremely elevated cell counts and plankton toxicity detected

Concurrent Maine P-N bloom and recall of 5 tons of mussels and clams on 9/30/2016

Uncertainty regarding progression of toxin detection from plankton to shellfish

Limited capability to monitor toxins: Toxicity kits unavailable regionally and quantitative analysis only available in Maine



# Priorities Following Initial Closure

## #1 Determine if dealer stock safe to release

- Shellfish from dealers screened for Domoic Acid (closest available test kits in ME)
- Results negative - stock released on 10/10/16

## #2 Characterize the extent of the bloom and presence of toxins in shellfish.

- Increase phytoplankton and shellfish monitoring - initial efforts hampered by insufficient toxicity screening kits

## #3 Re-open bay as soon as safe to do so



# Re-opening Options

- After threat of toxic bloom has passed (plankton and shellfish monitoring)
- Based on absence of domoic acid toxin in shellfish and reliance on Early Detection Program (to monitor quickly changing bloom conditions)

## Concerns:

- Robust public health protection (i.e. enactment of harvesting restrictions prior to detection of toxin in shellfish at or above FDA standard) and sufficient resources to implement through duration of bloom (field & lab personnel, toxicity screening kits)



# Bay Re-opened 10/15 – Early Detection Program Initiated

- Plankton collection 2/week to determine HAB abundance (cell counts)
  - 24 stations throughout Bay and at entrance to Coastal Ponds
- Test plankton for presence of toxins (screening kits)
  - Initially only samples  $> 20,000$  cells/l
  - Revised to all with sufficient plankton density (ME detected toxicity at lower levels)





# Bay Reopened 10/15

## Early Detection Program Initiated (Cont.)

- Test shellfish for presence of toxin in response to toxin detection in plankton
  - Screening with kits: if positive for presence of DA, sample sent for analytical testing
- Precautionary toxin screening of shellfish in open areas



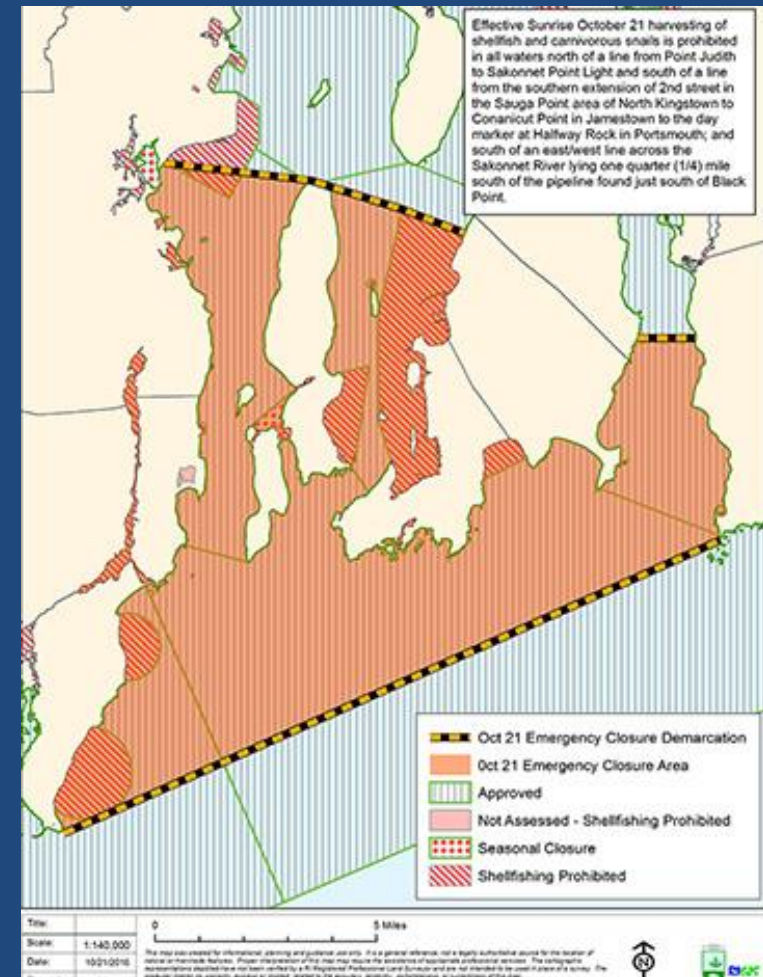
# Closure/Opening Criteria

- If toxin detected in Shellfish using screening kits – close impacted areas to shellfish harvesting (including carnivorous snails)
- Re-opening based on analytical testing results (domoic acid concentrations in shellfish & carnivorous snails) and cell counts

# Detection of toxin in Shellfish led to additional lower Bay closures

**10/20 - Lower Sakonnet River (includes snails):** Toxin detected in Quahaugs collected in Sakonnet Harbor 10/19 (HPLC 6.2 ug/g) Dealer Hold

**10/21 - Additional areas closed (includes snails) -** Toxin detected in Mussels at Ft. Wetherill collected 10/20 (HPLC 3.2 ug/g) Dealer Hold (East Passage)

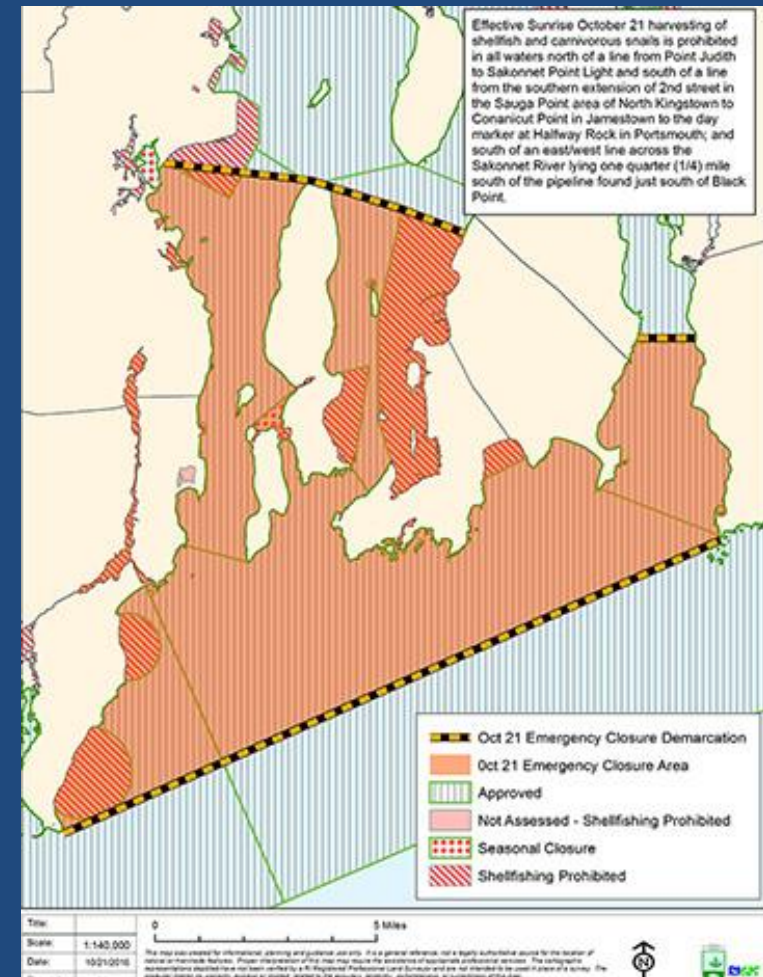


# Reopening of Lower Bay

10/22 – Released dealer hold for lower East Passage no product to release in SR, WP not held (based on shellfish DA concentrations)

10/26 Re-open harvesting of snails throughout Lower Bay

10/29 – Re-open Lower Bay







## Impact of 2016 HAB Bloom on Shellfish and Aquaculture Industries

- No illnesses
- No recall
- Upper Bay closed 8.5 days
- Lower Bay closed 16.5 – 17.5 days
- No closures Salt Ponds or Block Island waters

# Narragansett Bay Plankton Results from 2016 bloom

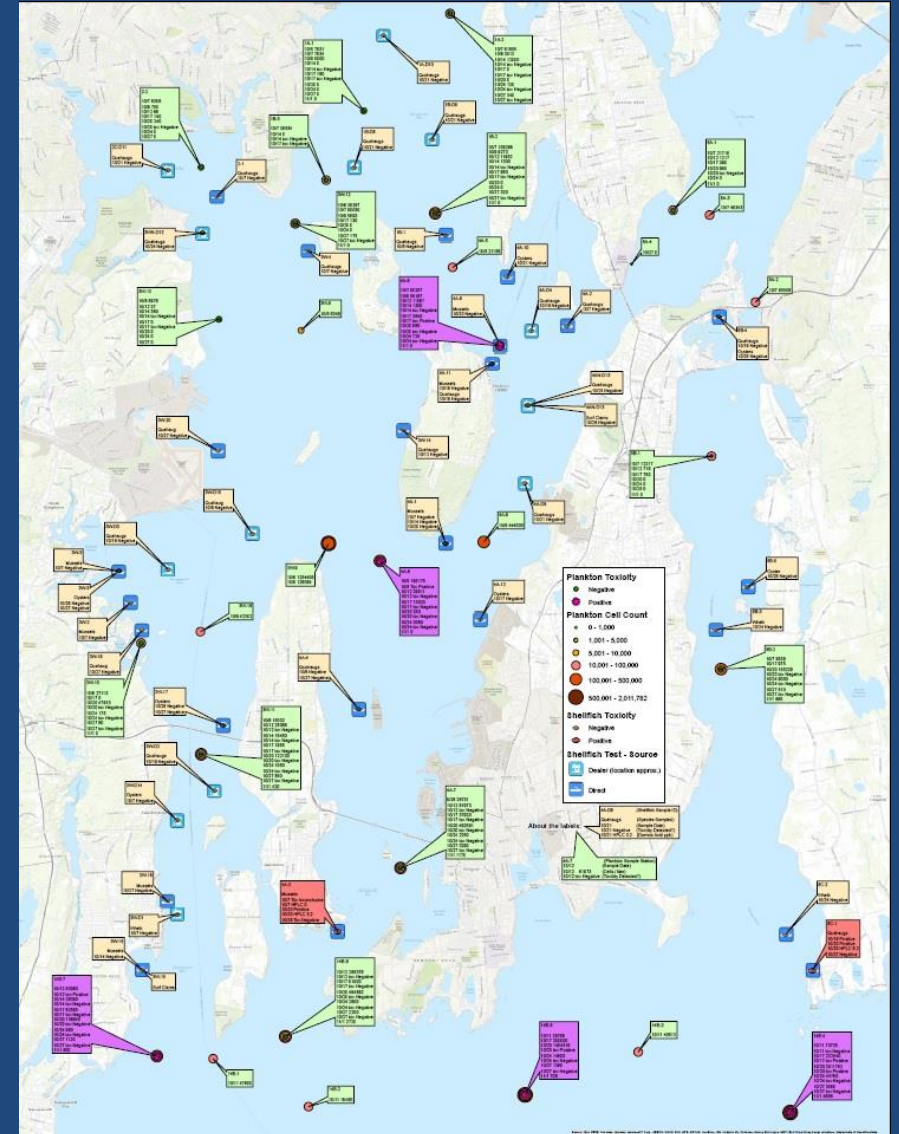
16 Plankton Surveys

176 cell counts (52 >20,000 cells/l)

150 screened for domoic acid toxin

6 positive toxin results:

- 5 > 20,000 cells/L (toxin detected in shellfish at two)
- 1 < 20,000 cells/l (no toxin detected in shellfish)



# Narragansett Bay Shellfish Results from October 2016 bloom

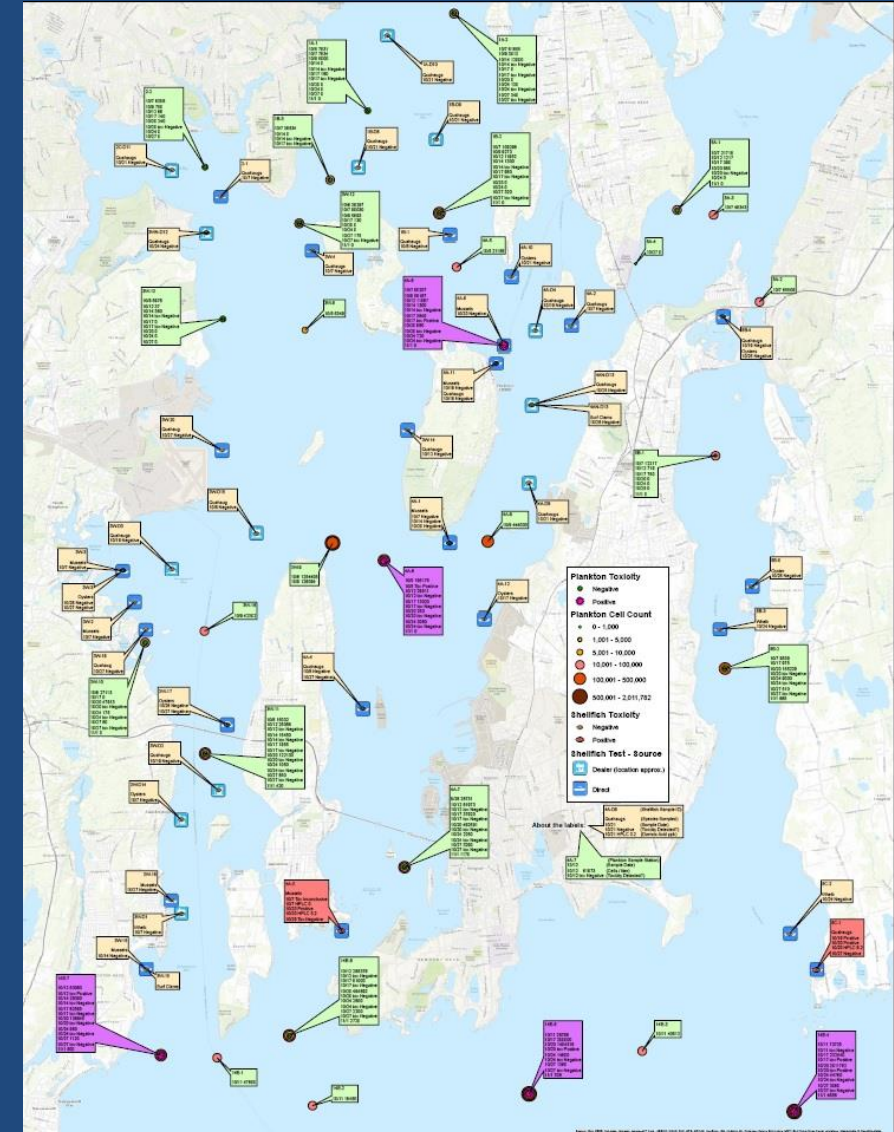
15 Shellfish Surveys

57 samples screened for domoic acid toxin  
(includes precautionary)

**3 positive toxin results**

- Sakonnet Harbor: 10/19 & 10/20
- Ft. Wetherill: 10/20
- 2 samples of sufficient quantity for DA analysis: 6.2 & 3.2 ug/g

2 of 3 results detecting toxin in shellfish were preceded by detection of toxin in phytoplankton



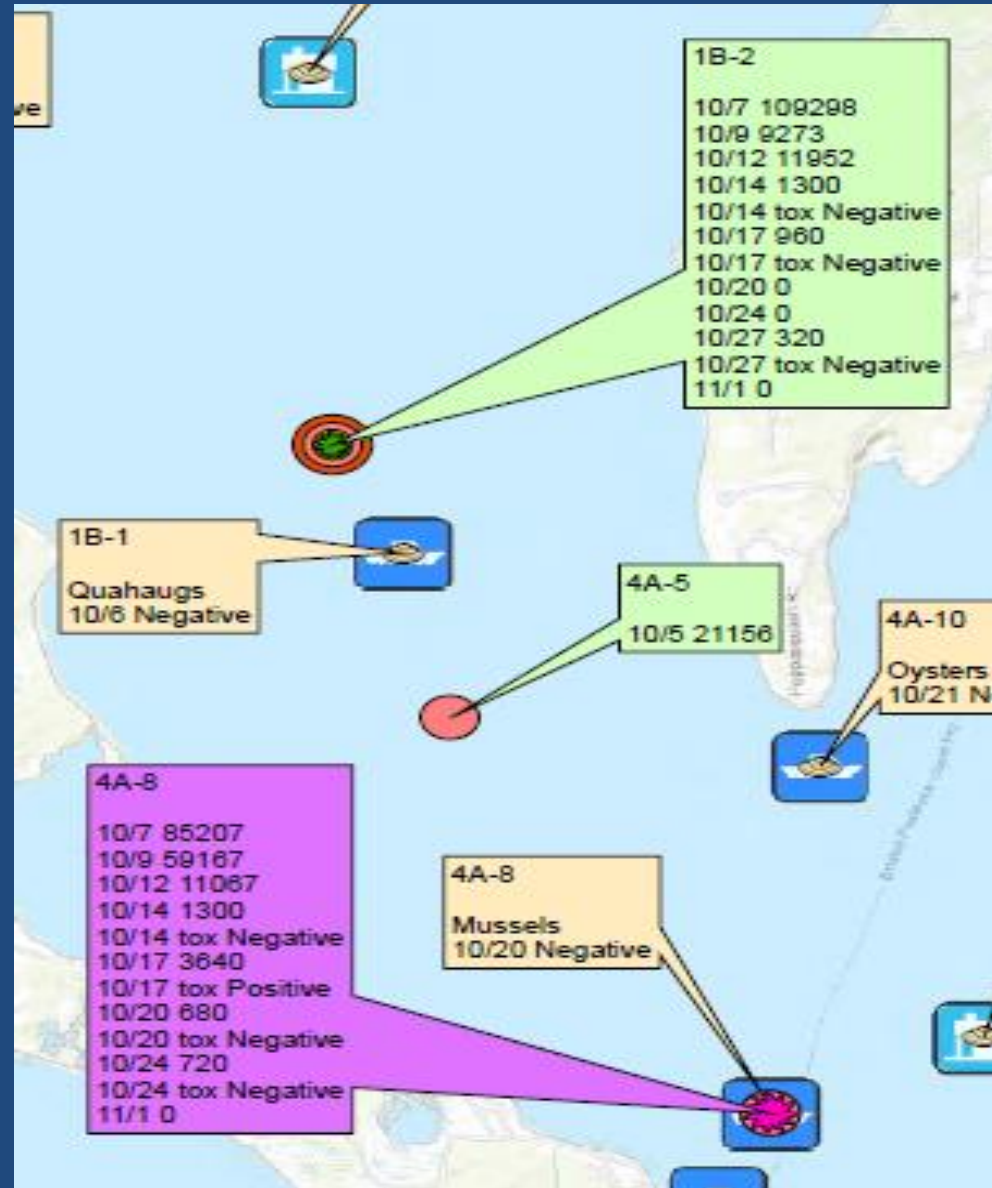


# General Observations of Bloom Dynamics

- Bloom primarily Mid and Lower Bay
- Conditional Areas A and B, Greenwich Bay, Mt. Hope Bay and the upper half of Sakonnet River remained <12,000 cells/l, with exception of 10/7
- Bloom duration in East & West Passages from mid Conanicut Island to northern tip of Jamestown – 10/7 - 10/17
  - max concentration 1.2 M cells/l dropped to <15,000 cells/l (bloom more prevalent in East Passage)
- Bloom sustained longest in near shore waters of RI Sound,
  - Peaked on 10/20 appeared to propagate from east to west
  - Spikes also recorded on 10/20 in lower East and West Passages (South of mid Conanicut Island)
  - Concentrations dropped significantly 10/24 - 10/27

# Plankton Toxicity vs Cell Counts/Status of Bloom

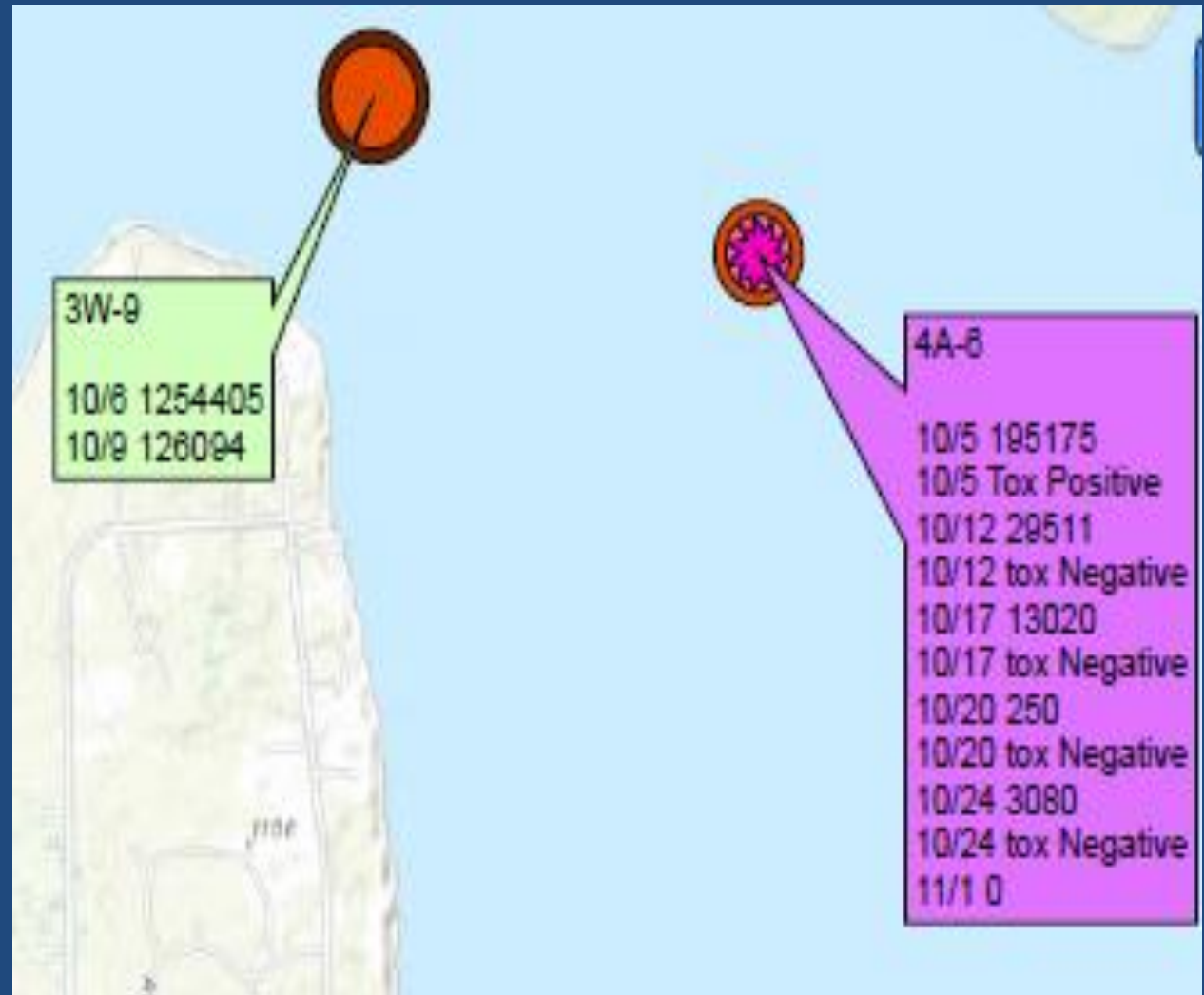
Two stations on Northeast side of Prudence: similar cell counts but toxin only detected in plankton once at one of the stations (& toxin never detected in shellfish).



# Plankton Toxicity vs Cell Counts/Status of Bloom

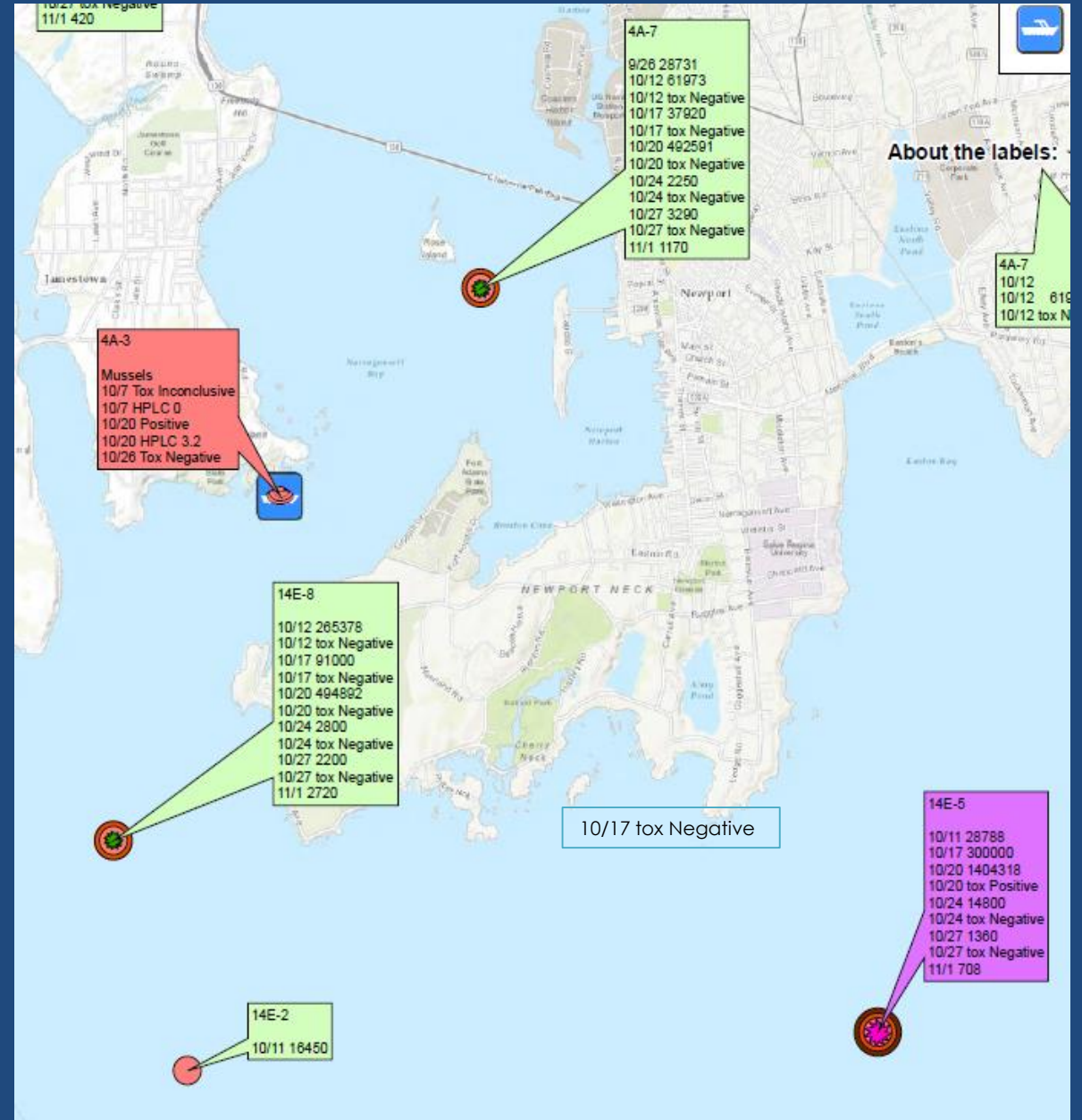
Station north of Conanicut Island:

- only positive toxin result in plankton was prior to peak cell counts
- no toxins detected in 3 plankton samples taken when bloom declined



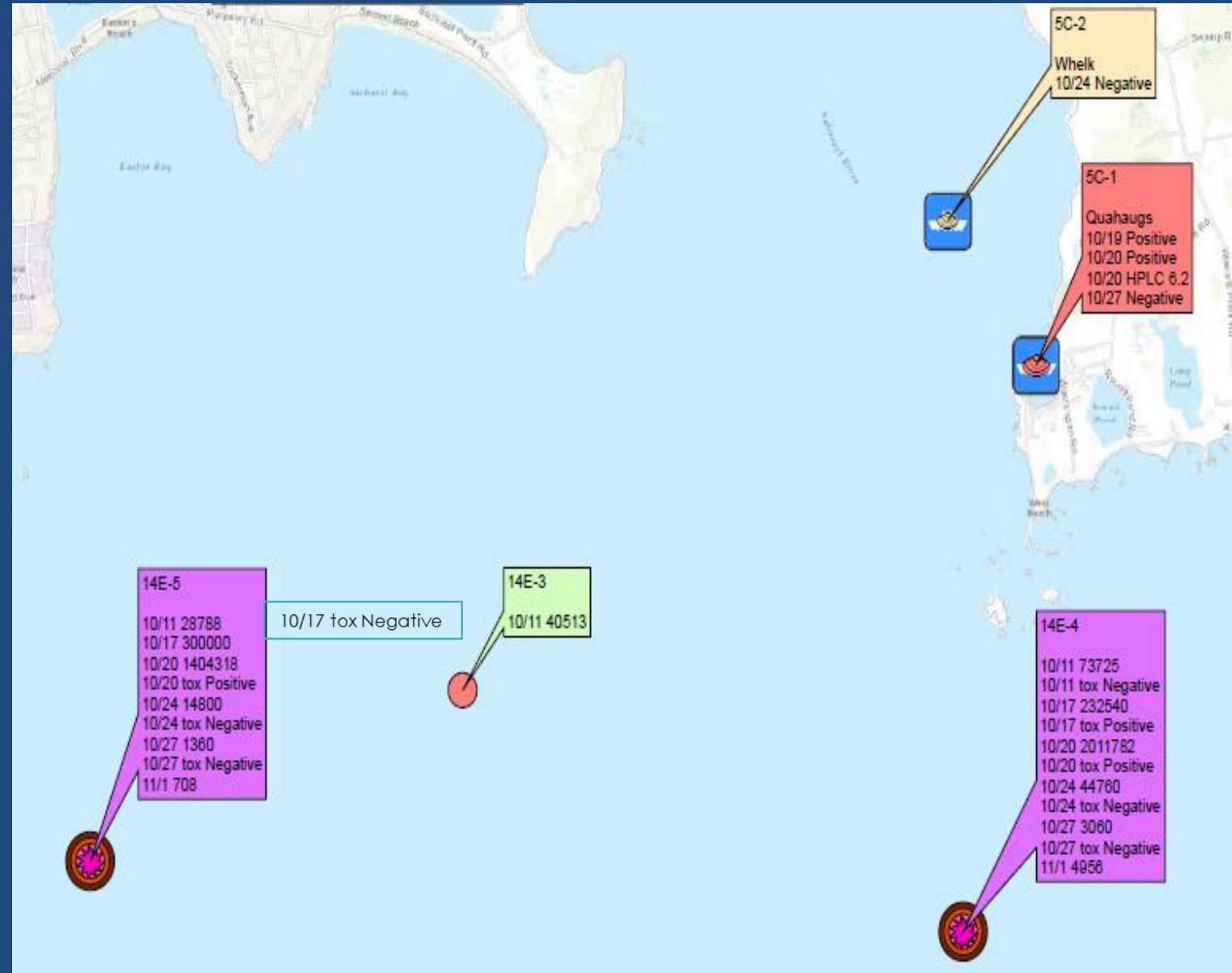
# Detection of Domoic Acid in Shellfish

Toxin detected in Mussels at Wetherill on 10/20 (3.2  $\mu\text{g/g}$ ) despite high cell counts and absence of plankton toxicity at stations north and south on 10/12, 10/17 and 10/20



# Detection of Domoic Acid in Shellfish

Toxin detected in quahogs 10/19 and 10/20 (6.2 ug/g) at Sakonnet Harbor; at nearest station (RI Sound), plankton toxicity negative on 10/11, and positive on 10/17 and 10/20





## Conclusions from RI bloom data

Plankton toxicity tests failed to predict toxins in Shellfish ( $\approx 15\%$  of FDA Domoic Acid std) at Ft Wetherill

In Sakonnet Harbor, toxin detected in plankton within 6 days and in shellfish ( $\approx 30\%$  of FDA Domoic Acid std) within 2 days of positive plankton result.

# regional concurrent blooms

## Maine

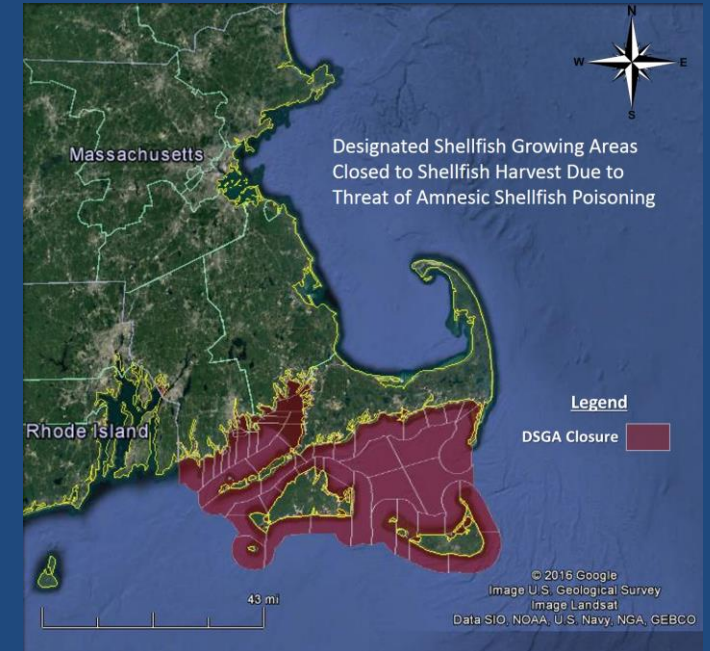
- Different Pseudo-nitzschia species assemblages apparent north (Gulf of Maine) vs south (of Cape)
- In Gleason Cove:
  - Cell counts went from 0 to 40,000 and toxic cells within 7 days
  - Shellfish were 3-4 times FDA Domoic Acid standard 22 days from 0 cells
- **LED TO FIVE TONS OF SHELLFISH BEING RECALLED**
- No reported illnesses from the contaminated shellfish



# regional concurrent blooms

## Massachusetts

- On October 8 thru October 31 closed waters south of Cape Cod to shellfishing due to a substantial *Pseudo-nitzschia* bloom.
- Cell counts in southcoast region ranging from 2,106 to 762,300 cells/L
- The presence of DA was confirmed in quahogs collected from East Branch of Westport River on 10/19; all other samples tested negative for DA.







# Summary

Bloom initiation and duration consistent throughout the NE region.

Cause of bloom unknown – to be discussed later in agenda

Toxin detected in 10% of plankton samples with cell counts > 20,000

30% of plankton samples testing positive for toxin also detected toxin in shellfish, 30% of shellfish samples testing positive for toxin were not preceded by toxins in plankton - however, three pronged early warning program kept public safe.

*Bloom served to reaffirm cooperative relationship between shellfish program staff & HAB researchers in other states, NOAA, and Rhode Islanders: (state personnel, wild harvest, and aquaculture community, researchers, etc).*

# Acknowledgements

A big thank you for the tireless efforts of state personnel in:

DEM/Office of Water Resources Shellfish Program

DEM/Division of Marine Fisheries

DEM/Division of Law Enforcement

DOH/Division of Food Protection

DOH/State Health Laboratory

And to shellfish industry representatives who provided assistance in sampling and collecting shellfish

# Additional Information:



DEM/Office of Water Resources Shellfish Program  
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[www.dem.ri.gov](http://www.dem.ri.gov)



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