Water Quality Based Shellfish Closures

RI Shellfish Management Plan Meeting

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Water Quality Goals

- The Office of Water Resources (OWR) implements RI Water Pollution Control Act and the Federal Clean Water Act (CWA).
- Estuarine Water Classifications
  - Class SA
    - These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat.
  - Class SB
    - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat.

Interstate Shellfish Commerce Authorities

- U. S. Food and Drug Administration (FDA), National Shellfish Sanitation Program (NSSP)
  - federal/state cooperative program to promote and improve sanitation of shellfish moving in interstate commerce
- Interstate Shellfish Sanitation Conference –
  - National organization of State regulatory officials, shellfish industry, FDA, NMFS and USEPA that provides a structure for participating in establishing updated regulatory guidelines and procedures. Following FDA concurrence adopted and published by NSSP.

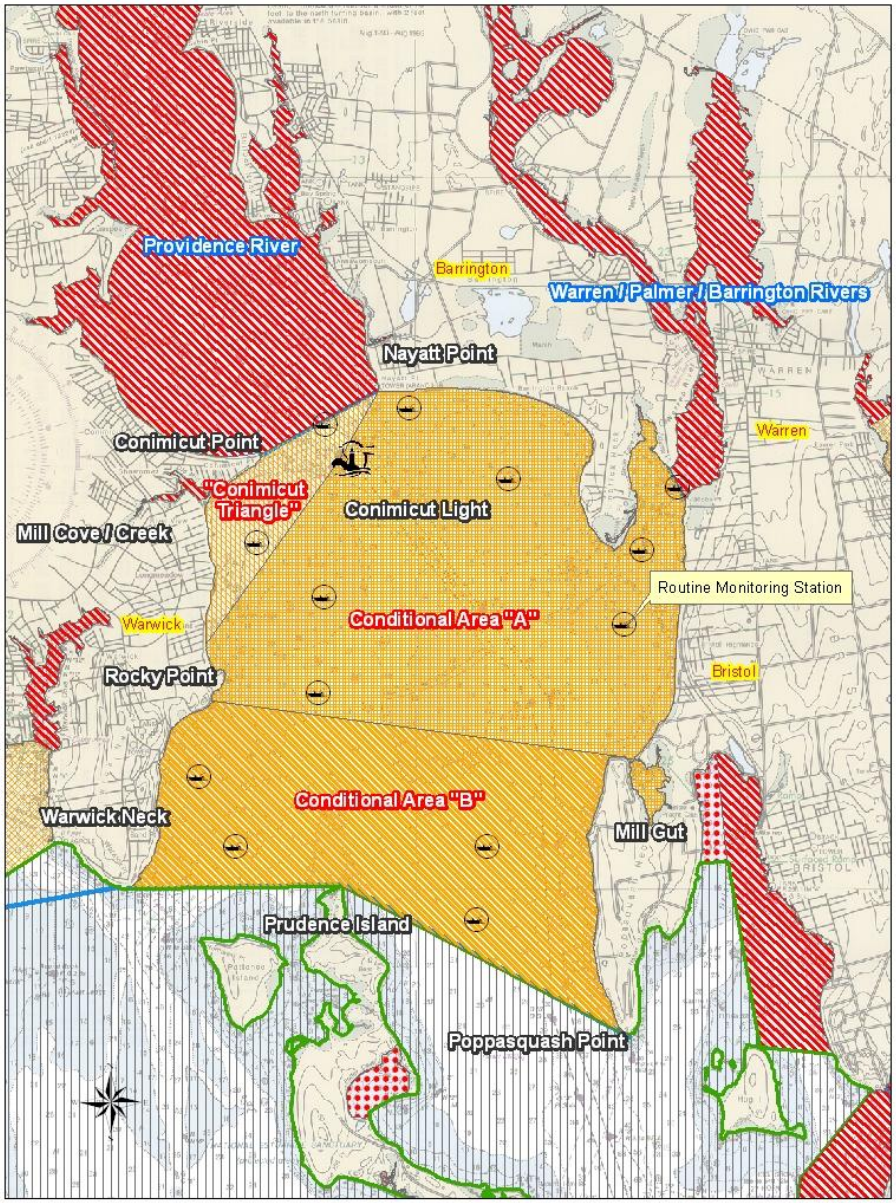
Interstate Shellfish Commerce

- To participate in interstate shellfish commerce, states (i.e. Control Authorities) agree to follow the NSSP/ISSP Guide for the Control of Molluscan Shellfish (2009). Major program areas:
  - growing area classification
  - Laboratory procedures
  - Control/patrol of growing areas
  - Storage, Transportation and Processing
  - Shellfish aquaculture

ISSC Responsibilities

- Primary agencies - HEALTH and RIDEM
- Water Resources
  - Establish shellfish harvesting classifications for all estuarine waters
    - Conduct water quality monitoring
  - Annual review of water quality for compliance with NSSP Model Ordinance
    - Shoreline surveys
    - Conditional area management plans
    - Establish legal descriptions of all classified waters including supporting maps
  - Enact emergency closures
  - Review Aquaculture farm applications
  - Vessel no discharge zones – pump out facilities

Upper Narragansett Bay Growing Area 1 effective May 2012



NSSP Harvesting Classification Requirements

- ISSC/NSSP require that harvesting is prohibited:
  - Within marinas
  - Near discharges from wastewater treatment facilities
  - Waters impacted by actual or potential sources of poisonous and deleterious substances
  - Waters where pollution impacts are not predictable
  - In response to emergencies and extreme rainfall events
    - If raw sewage from WWTF or large community sewer system must be closed for minimum of 7 days and until shellfish meats meet acceptable male specific bacteriophage levels.

Analysis of Shellfish Harvesting Areas.

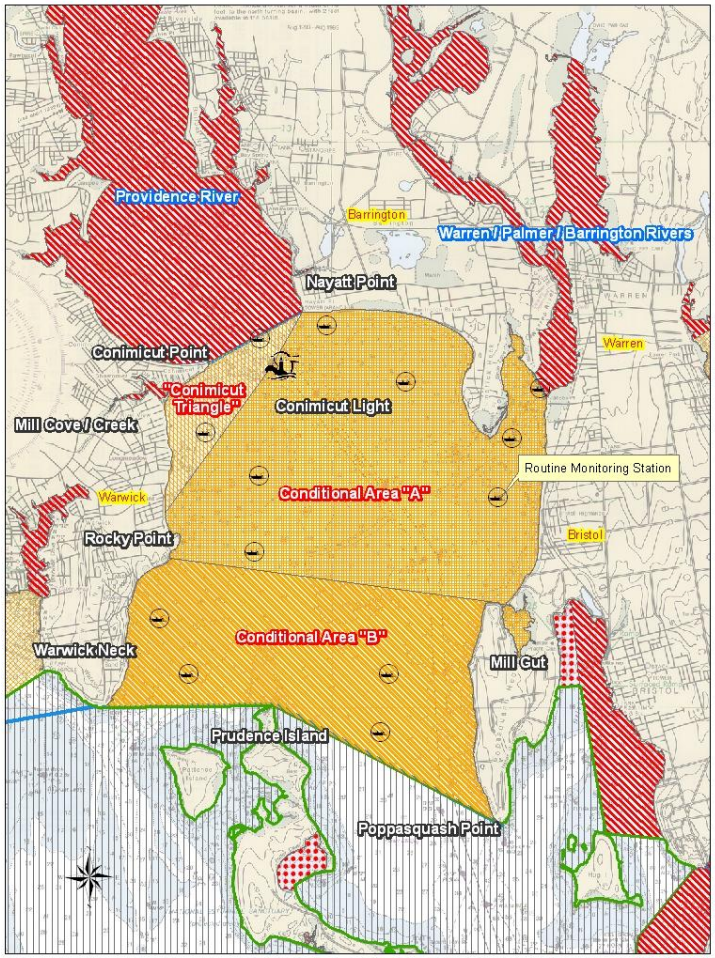
- Waters potentially available for shellfish harvesting must be evaluated annually based on:
  - Water quality monitoring of fecal coliform levels (6-12 times a year) and harmful algae blooms (HABs)
  - Shoreline surveys to identify actual and potential pollution sources
    - 12 year, annual and 3 year intervals

Fecal Coliform Sampling Program

- Conditional areas 12 times a year, approved 6 times.
- 178 stations sampled, 2,000 samples collected.
- Fecal Coliform Criteria
  - Geometric mean =14 MPN/100ml and
    - Conditional Areas 10% or less of samples ≤ 49
    - Approved areas 90^{th} percentile ≤ 49

Growing Area 1
Upper Narragansett Bay

- **June 2006** NBC's Bucklin Point Wet Weather Facility. DEM revised bypass trigger (14.5 MG not counted)
- **November 2008** NBC's CSO Project Phase I completed.
- **2008 – 2010** – DEM sampling for early re-opening and evaluation of new closure criteria.
- **June 2011** RIDEM revises closure criteria.
- **June 2012** enlarge Conimicut Triangle due to water quality violations at station 8A



Growing Area 1 - Early Reopening

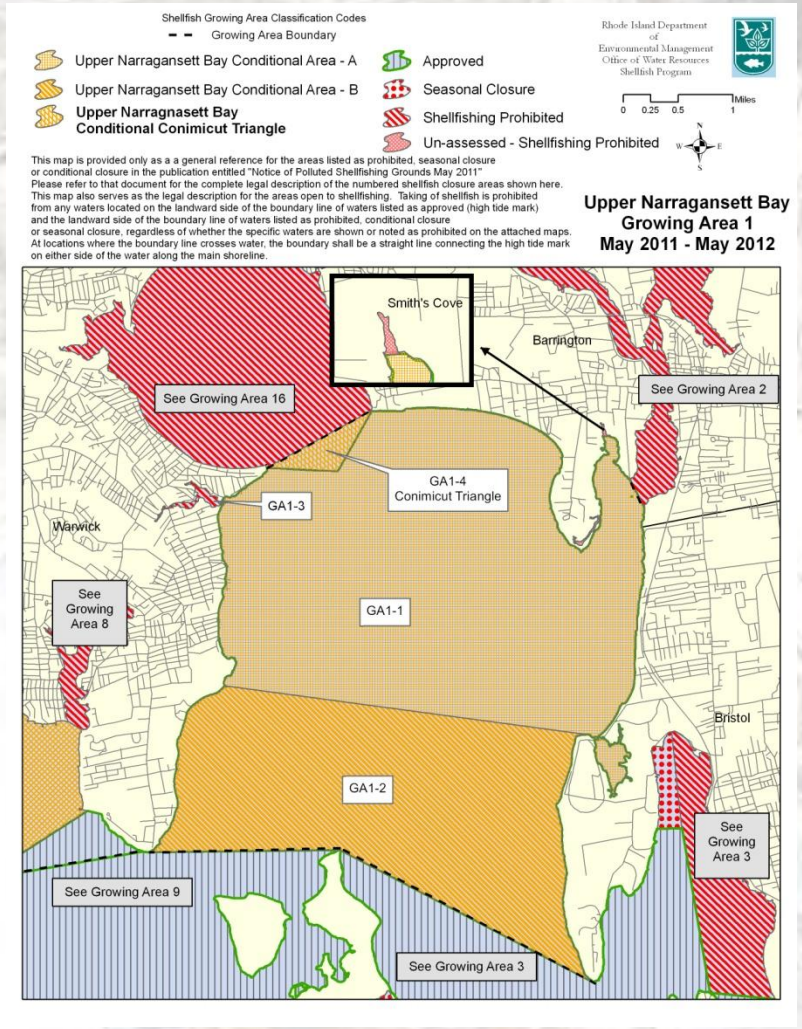
- In 2008 DEM received approval from FDA to implement post storm sampling and early reopen prior to 7 days if criteria met.

	Additional Harvesting Days	
	2009	2010
Area A	11	2
Area B	8	2

2011 Conditional Closure Criteria

- Conimicut Triangle
  - Closed for minimum of 7 days on either
    - 0.5” of rainfall or greater in a 24 hour time period
    - >0.5 MG of WWTF by-pass (14 MG Bucklin Pt. not counted)
- Area “A”
  - Closed for minimum of 7 days on either
    - 0.8” of rainfall or greater in a 24 hour time period
    - >0.5 mg of WWTF by-pass (14 MG Bucklin Pt. not counted)
- Area “B”
  - Closed for a minimum of 7 days on
    - 1.5” of rainfall or greater in a 24 hour time period

Why is Conimicut Triangle Criteria 0.5” not 0.8”?



Upper Narragansett Bay GA-1

Statistical analysis of 2010 sampling results using wet weather results between 0.5" and 0.8" less than 7 days following event (n=4) combined with dry weather most recent (n=11)

	Station ID	Geo Mean <14 fc/100ml	No more than 10% Greater than 49 fc/100ml (MPN 3 tube decimal dilution)
Conimicut Triangle	12	7.6	*13.3*
Area "A"	1	3.7	0.0
	4	3.3	0.0
	5C	3.0	0.0
	6A	2.9	0.0
	7	2.8	0.0
	8A	3.3	6.7
	10	3.0	0.0
	11A	4.3	0.0
Area "B"	2	2.5	0.0
	3C	2.4	0.0

total n = 15 all stations

Why Wasn't Area A Closure Criteria Increased to 1.0" or more?

Days after	Rainfall Total	# of Stations >14 MPN/100ml	# of stations > 49
4	0.83	5	3
4	1.02	3	0

Why Are RI's Conditional Areas Closed for Seven Days?

- NSSP/ISSC Model Ordinance requires that conditional areas be manage to ensure that
  - "Sufficient time has elapsed to allow the shellstock to reduce pathogens that might be present to acceptable levels. ***"(See Chapter IV, @03 C.2(c)(iii).

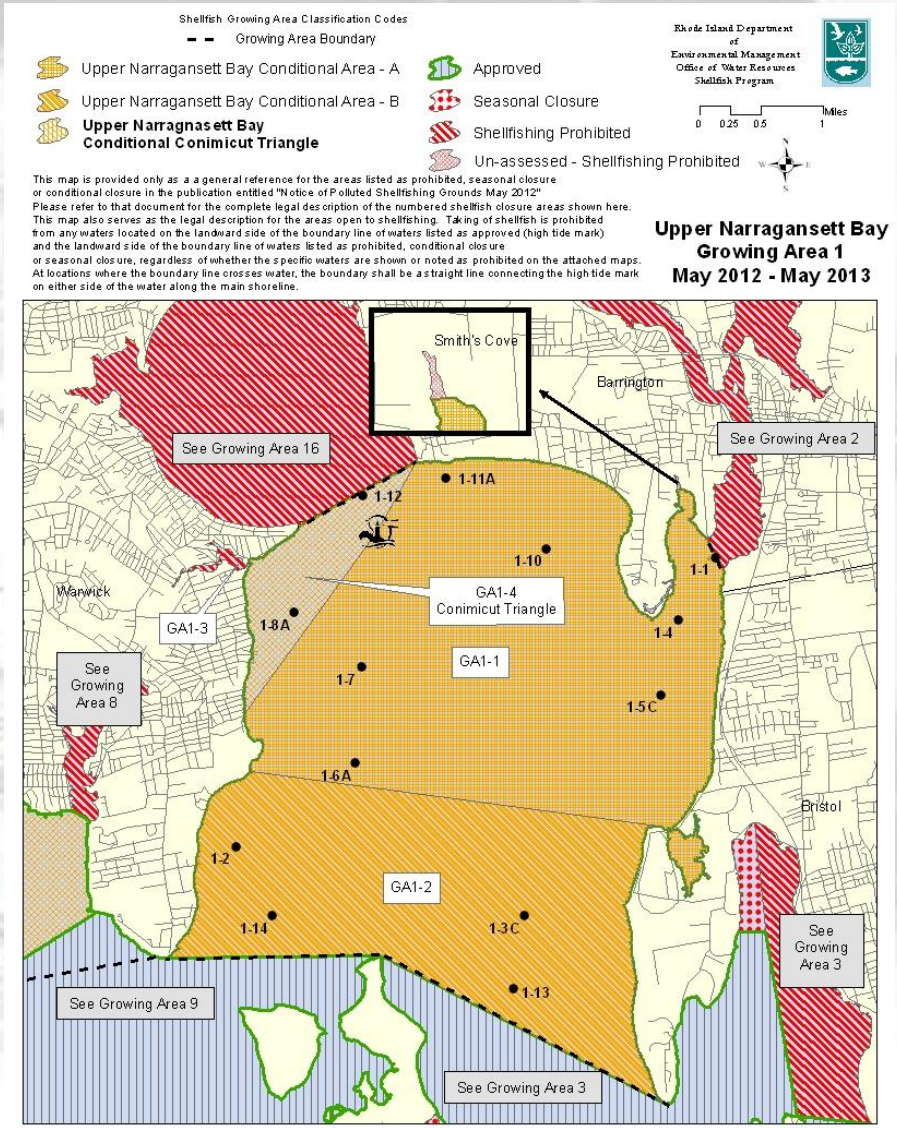
- MA and RI use two days from acceptable water quality for shellfish to reduce pathogens to acceptable levels (i.e. water quality must return to acceptable levels 5 days after closure criteria is met).
  - Data indicates that Area A and Greenwich Bay impacted for 5 days.
  - Additional data collection efforts in Area B underway.
  - FDA plans to assist MA and RI with evaluation of Fall River CSO Abatement in 2013

Why doesn't Area A open in less than 7 days?

- Existing closure: 7 days after rainfall of 0.8" to 3.0"; increased to 10 days after > 3.0".
- To establish period less than 7 days with 0.8" must know upper rainfall limit of new closure period (i.e appropriate up to 3").
- Data collected less than 7 days after 0.8" is available for 4-6 storms (0.8"-1.5")
- To establish a 6 day closure for storms between 0.8 and 1.5" need compliance by four days after.
  - Four days after rainfall: 4 of the 7 stations violate standards (2 geo mean, 4 % no to exceed)

2012 Conimicut Triangle

- 2011 data at station 1-8A - more than 10% of samples exceed 49 MPN/100.
- June 2012 “Triangle” enlarged adding 462 acres to area closed at 0.5” of rainfall.



2012 Expansion of Conimicut Triangle

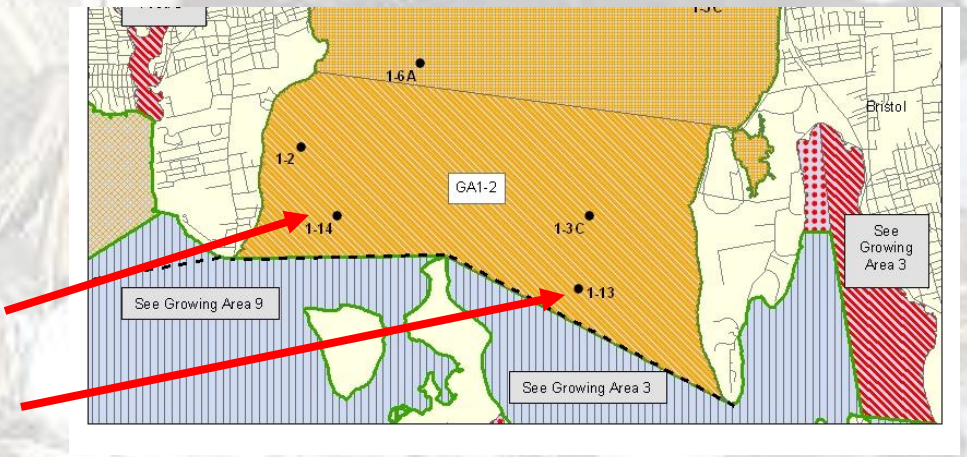
RIDEM SHELLFISH GROWING AREA MONITORING RESULTS

Station Name	*Status*	*N*	*FECAL-GEO MEAN*	*%> 49*
GA1-2	CA	17	3.4	5.88
GA1-3C	CA	17	3.4	5.88
GA1-5C	CA	15	3.5	0.00
GA1-6A	CA	15	3.7	0.00
GA1-7	CA	15	3.6	0.00
GA1-8A	**CA**	**15**	**7.4**	**13.33**
GA1-10	CA	15	4.7	0.00
GA1-11A	CA	15	8.7	0.00
GA1-12	CA	15	9.7	6.67
GA1-1	CA	15	6.5	6.67
GA1-4	CA	15	2.2	6.67
GA1-13	CA	8	4.3	0.00
GA1-14	CA	8	2.8	0.00

Wednesday, February 15, 2012
CA – denotes conditional area

Future Analysis Of Growing Area 1

- DEM added sample stations to further evaluate potential changes to Area B.

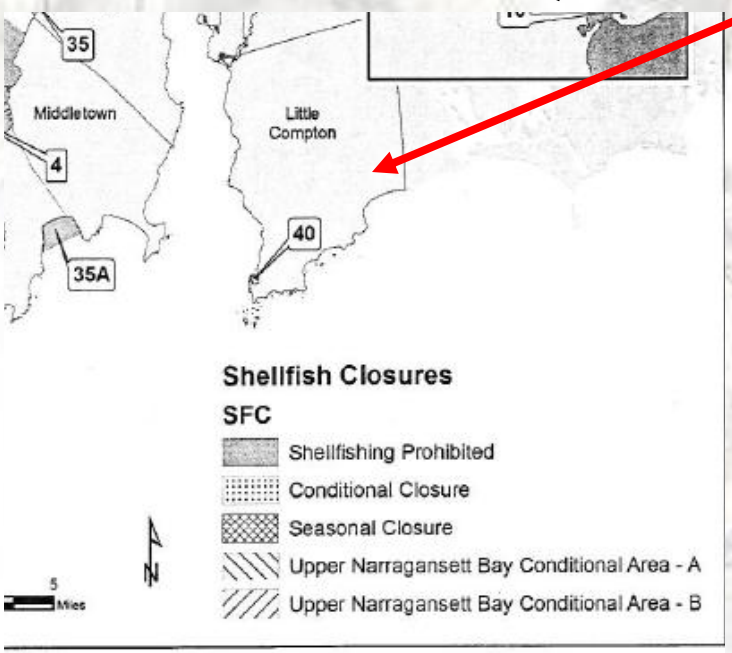


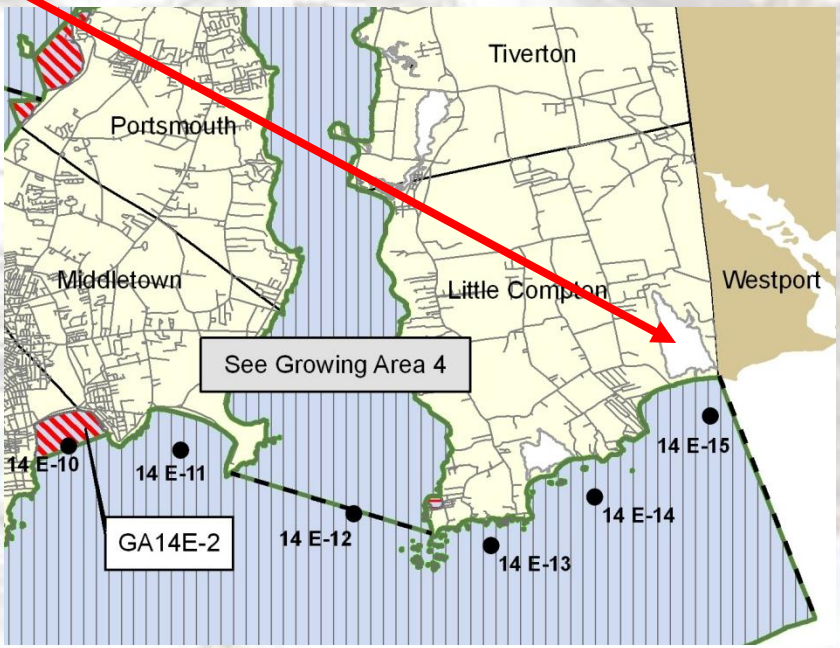
- Phase II of the NBC CSO Abatement Project Completion Required January 2015.
  - RIDEM will conduct additional monitoring to evaluate additional changes to closure criteria.

2007 Closure of Upland Waters

- 2007 FDA national retail study. FDA reported finding norovirus in oysters from RI dealer.
- HEALTH and DEM coordinated the response. Resulted in recall of oysters and revealed harvest of shellfish from un-assessed waters.

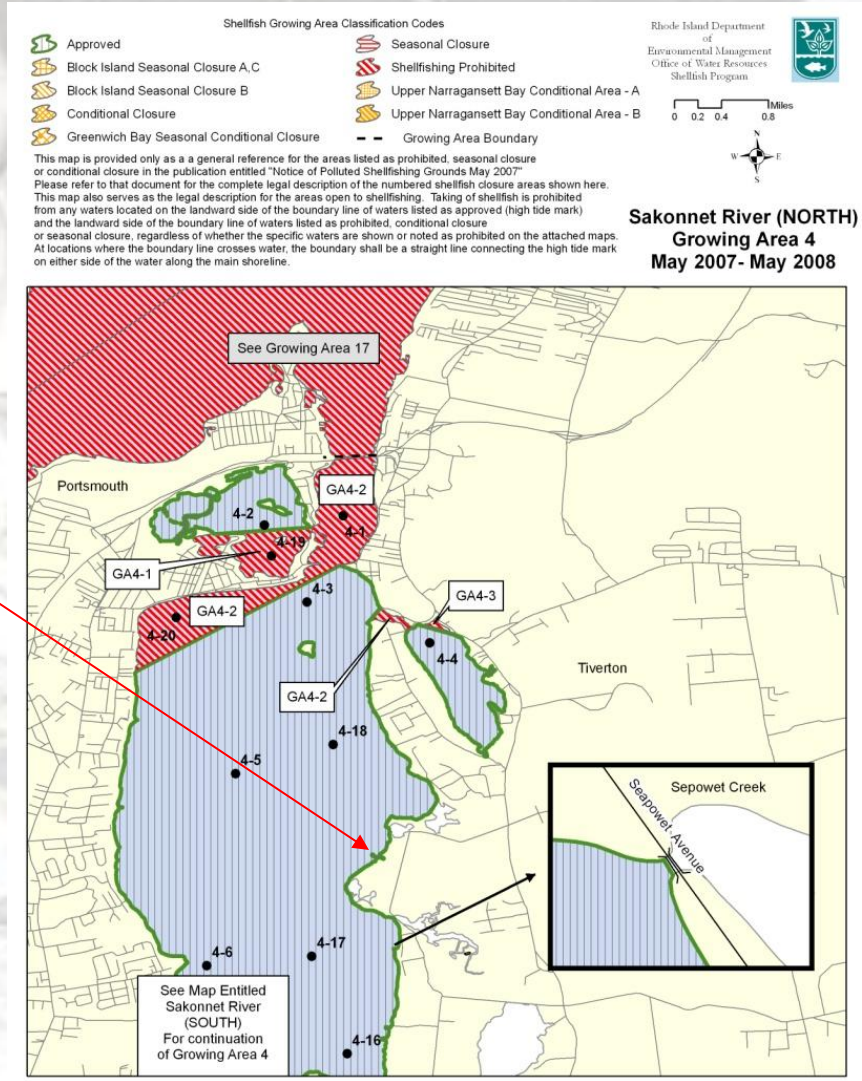
Quicksand Pond





How Unassessed Waters Were Identified (i.e. long green line)

- The landward limit of all assessed waters was established. New maps depict as a green line along the shore at the point where the high tide line would intersect across a tidal opening or embayment.



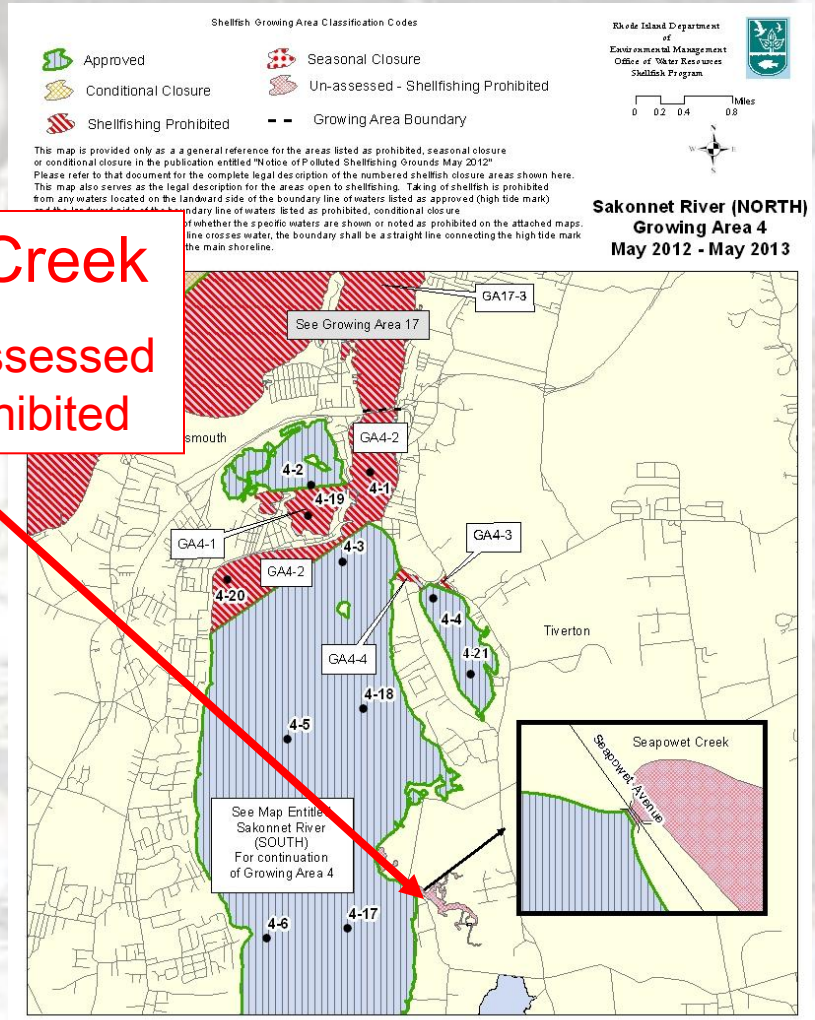
Monitoring To Assess Landward Areas

- Un assessed areas where shellfishing is a goal were prioritized for monitoring
  - East Bay Land Run
  - West Bay Land Run
  - Prudence Island Land Run
- Monitoring runs started in July of 2007 and is on-going.
  - Some areas re-classified as Prohibited due to sampling results
  - Areas with insufficient data, remain un-assessed (harvesting prohibited), and sampling ongoing.

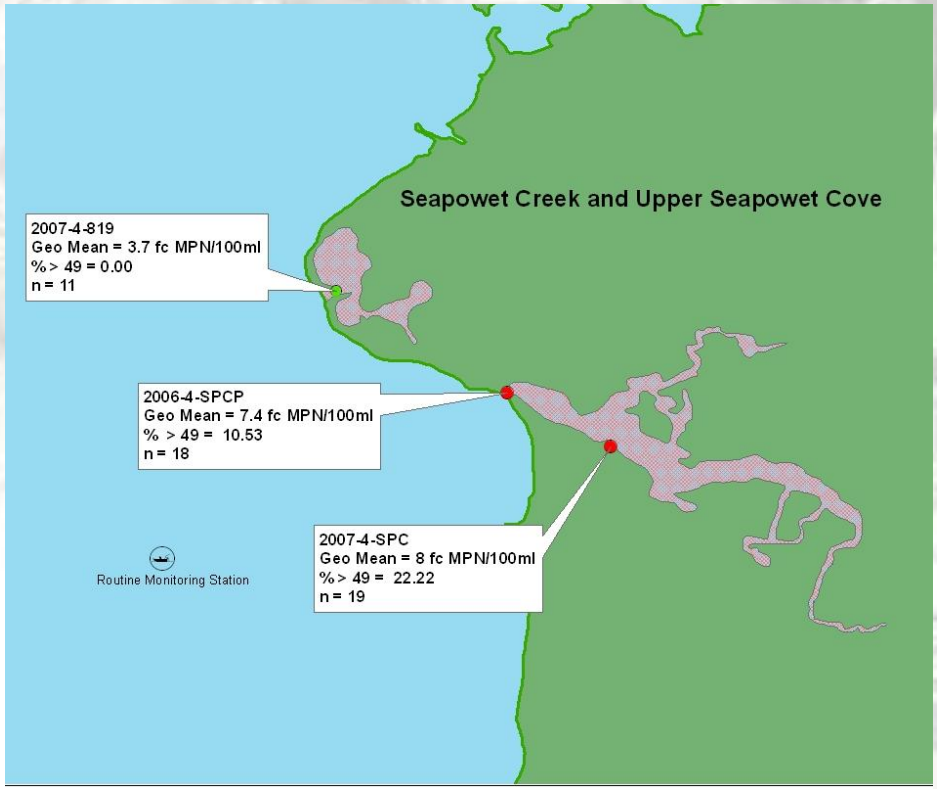
East Bay Land Run

Seapowet Creek

Currently Un-assessed
Therefore Prohibited

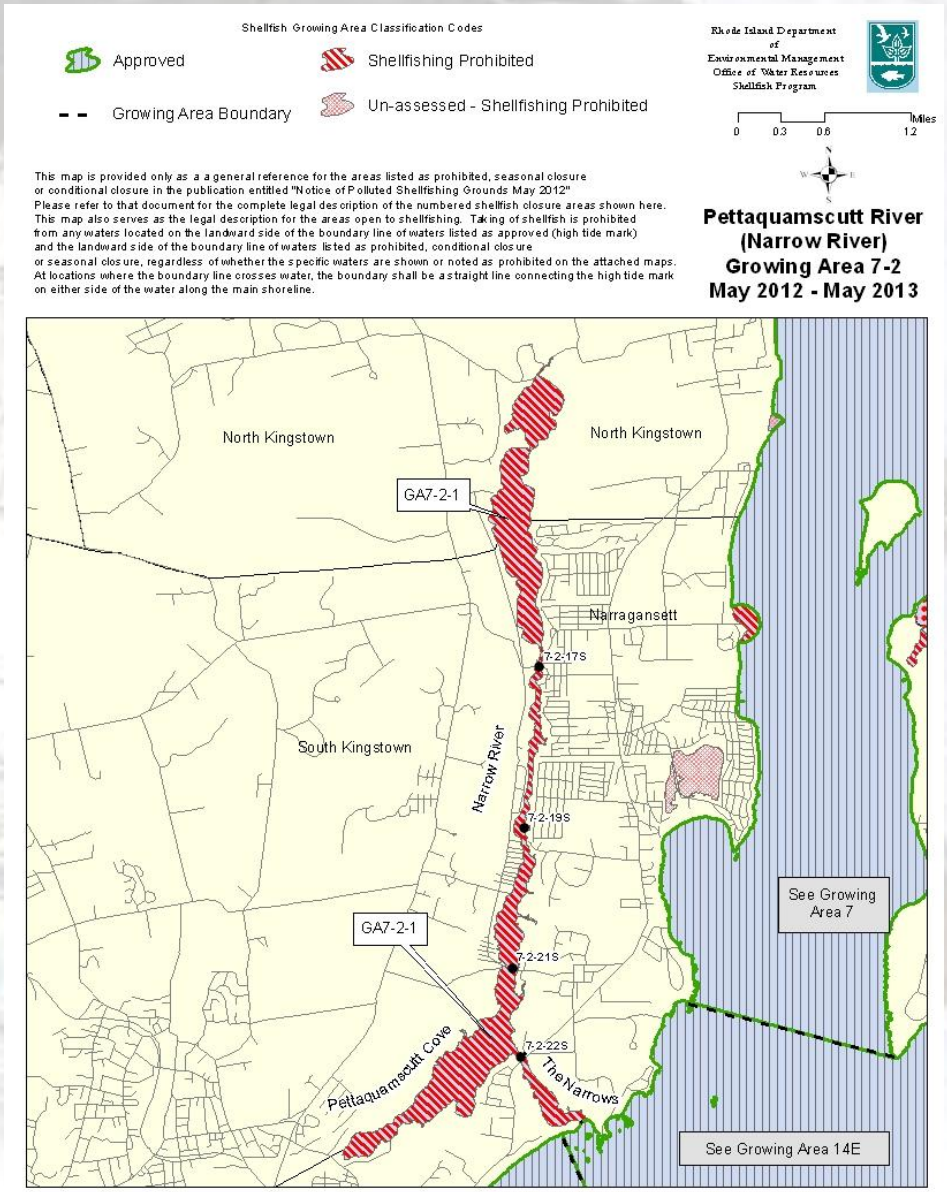


Seapowet Creek Data



Narrow River

- The Narrow River (Pettaquamscutt River) closed to shellfishing for more than 25 years (1986). Results did not support approval as a seasonal shellfish area.



Narrow River Sampling Results

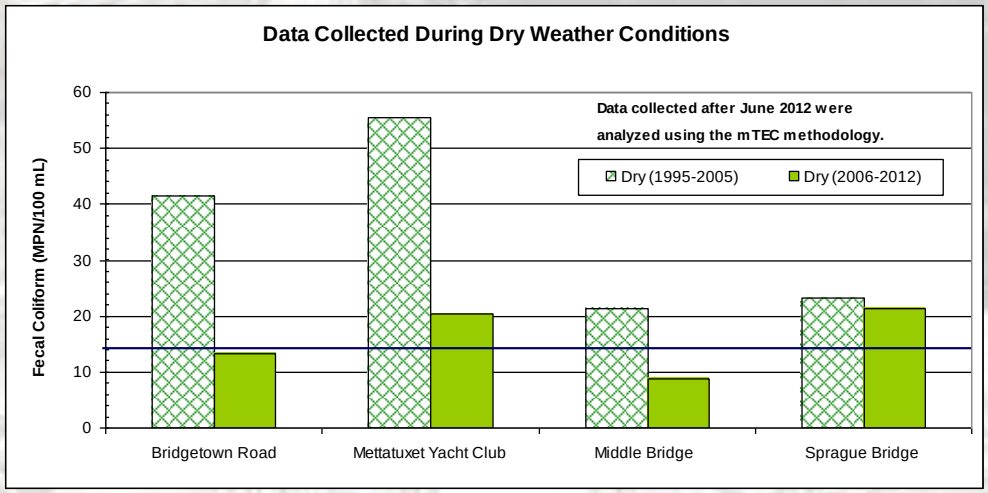
COMBINED WET AND DRY DATA

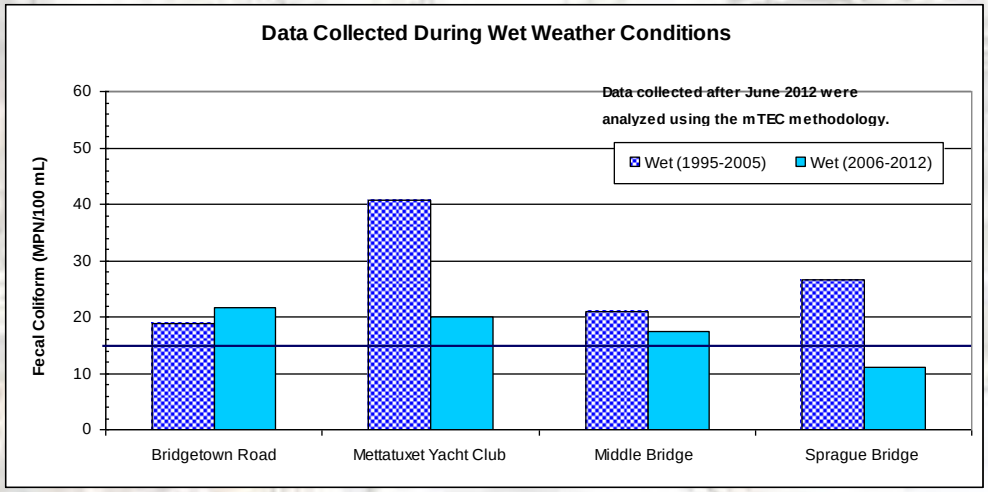
Station Name	Status	N	FECAL-GEO MEAN	%> 49	90TH Percentile)
GA72-17S	P	15	17.6	20.00	173.1
GA72-19S	P	15	19.3	20.00	168.9
GA72-21S	P	15	11.0	20.00	70.1
GA72-22S	P	15	12.6	26.67	96.6

DRY WEATHER ONLY

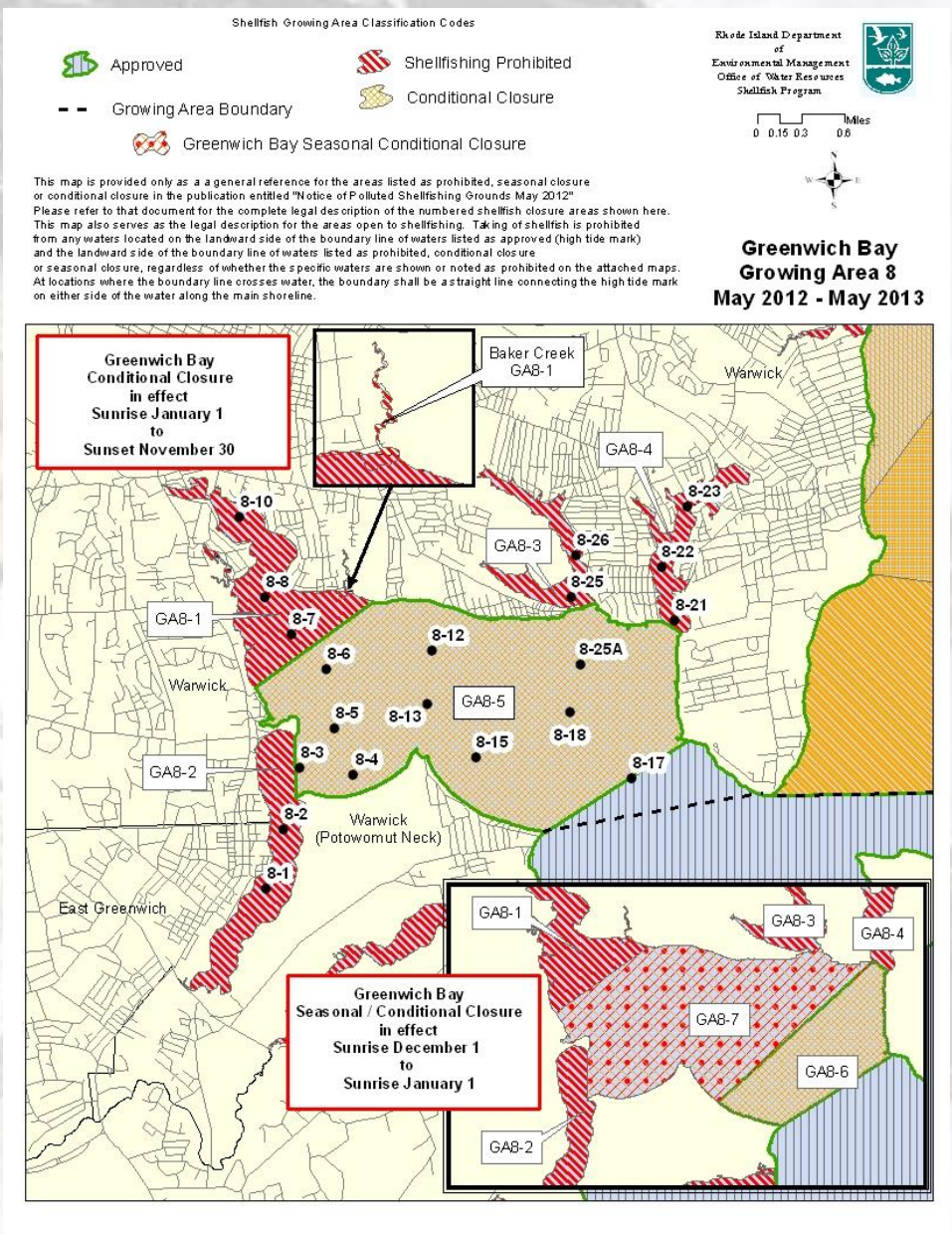
Station Name	Status	N	FECAL-GEO MEAN	%> 49	90TH Percentile
GA72-17S	P	15	16.6	20.00	155.9
GA72-19S	P	15	26.5	40.00	322.1
GA72-21S	P	15	9.1	26.67	80.2
GA72-22S	P	15	23.5	33.33	381.4

Narrow River - WQ improvement?





Greenwich Bay December Closure (May 2012)



GB 2012 with and without December Data

RIDEM SHELLFISH FECAL COLIFORM GROWING AREA MONITORING RESULTS

					Excluding December data (7/7/10 – 1/18/11)	
Station	***Status***	***MEAN(14)***	***%> 49 (10%)***		***MEAN(14)***	***%> 49 (10%)***
GA8-4	**CA**	3.5	0		2.8	0
GA8-5	**CA**	4.5	**13.33**		2.5	0
GA8-12	**CA**	3	0		2.6	0
GA8-13	**CA**	3.5	**13.33**		2.1	0
GA8-15	**CA**	2.2	0		2	0
GA8-17	**CA**	3.1	0		3	0
GA8-18	CA	2.6	0		2.4	0
GA8-25A	**CA**	3.1	0		2.3	0

CA = Conditional Area

RIDEM SHELLFISH FECAL COLIFORM GROWING AREA MONITORING RESULTS

					December only data 2000 to present		Excluding December data (7/7/10 - 1/18/11)	
Station	***Status***	***MEAN(14)***	***%> 49 (10%)***		***MEAN(14)***	***%> 49 (10%)***	***MEAN(14)***	***%> 49 (10%)***
GA8-4	**CA**	3.5	0		**13.9**	9.09	2.8	0
GA8-5	**CA**	4.5	**13.33**		**23.3**	**27.27**	2.5	0
GA8-12	**CA**	3	0		**18.5**	**27.27**	2.6	0
GA8-13	**CA**	3.5	**13.33**		**30.5**	**45.45**	2.1	0
GA8-15	**CA**	2.2	0		5.5	9.09	2	0
GA8-17	**CA**	3.1	0		11.5	9.09	3	0
GA8-18	CA	2.6	0		12.9	9.09	2.4	0
GA8-25A	**CA**	3.1	0		**18.8**	**14.29**	2.3	0

CA = Conditional Area

Point Judith Pond Water Quality After Significant Rain Events