

2013 VIBRIO SEASON: VIBRIO PARAHAEMOLYTICUS ILLNESS OUTBREAK AND RECALL

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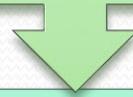
State of CT Department of Agriculture/Bureau of Aquaculture

Overview

History of Illnesses Prior to 2013



Sample Results from 2012



Control Plan in Place for 2013



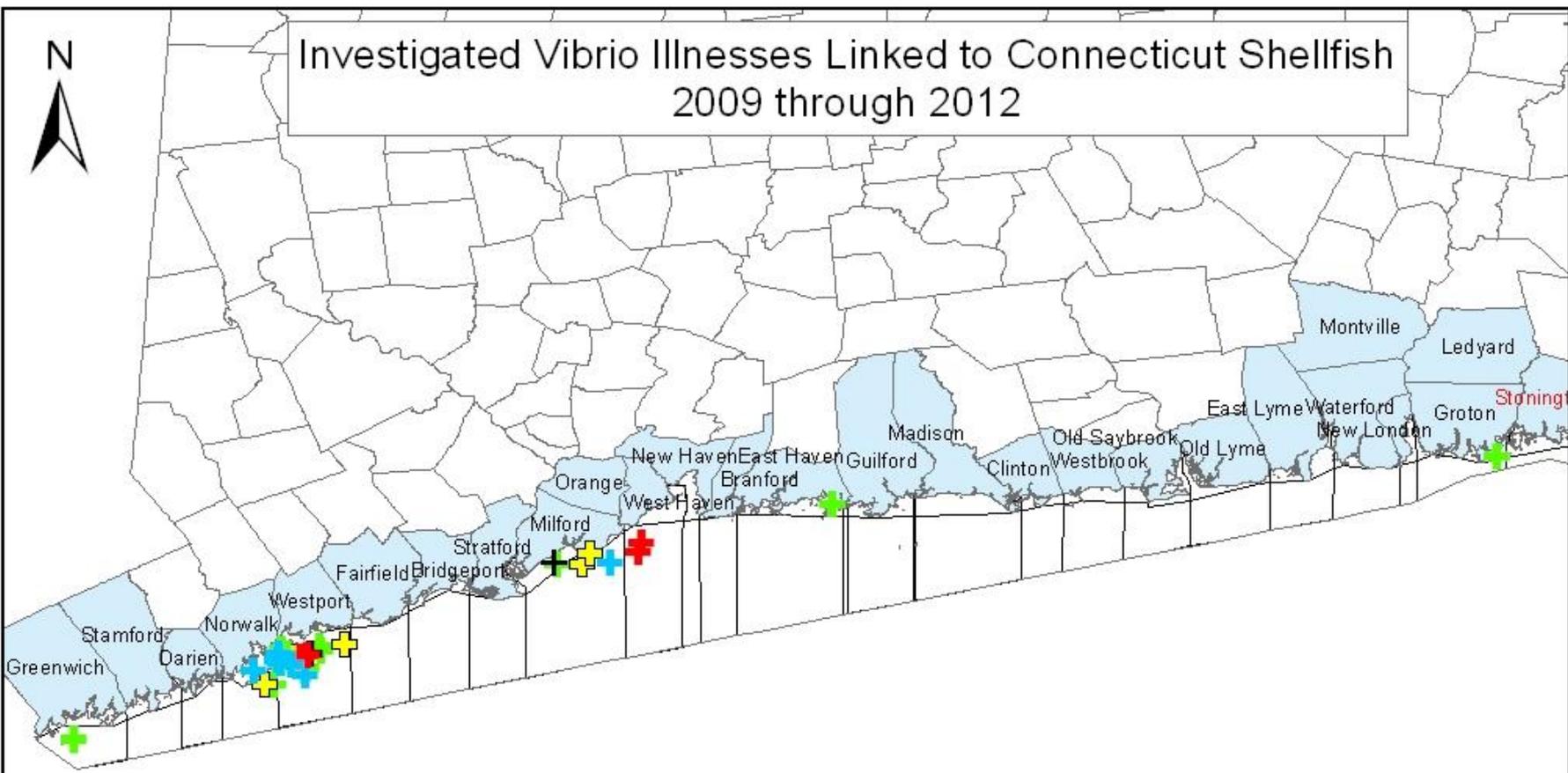
Flow of Vibrio Investigations in CT



2013 Vibrio Outbreak

Year	Number of Cases	Source States
2009	7 (1 confirmed CT)	1 MA 1 CT or RI 1 CT or NY 2 Unknown 1 Vv likely CT, 1 definitely CT
2010	5 (1 confirmed CT)	1 ME, MD or VA 1 CT, ME, or WA 1 NY, WA, ME, MA 1 likely CT, 1 Definitely CT
2011	6 (1 confirmed CT)	1 CT, PE, NY 1 Unknown 3 CT (1 Vp/Vf, 1 Vc, 1Vf) 1 CT or WA
2012	8 (1 confirmed CT)	1 RI 1 PE, MA, NY or CT 1 OB NY or CT 1MA 1 OB NY 1 CT or OB NY 1 NY, MA, NB 1CT

Investigated Vibrio Illnesses Linked to Connecticut Shellfish 2009 through 2012



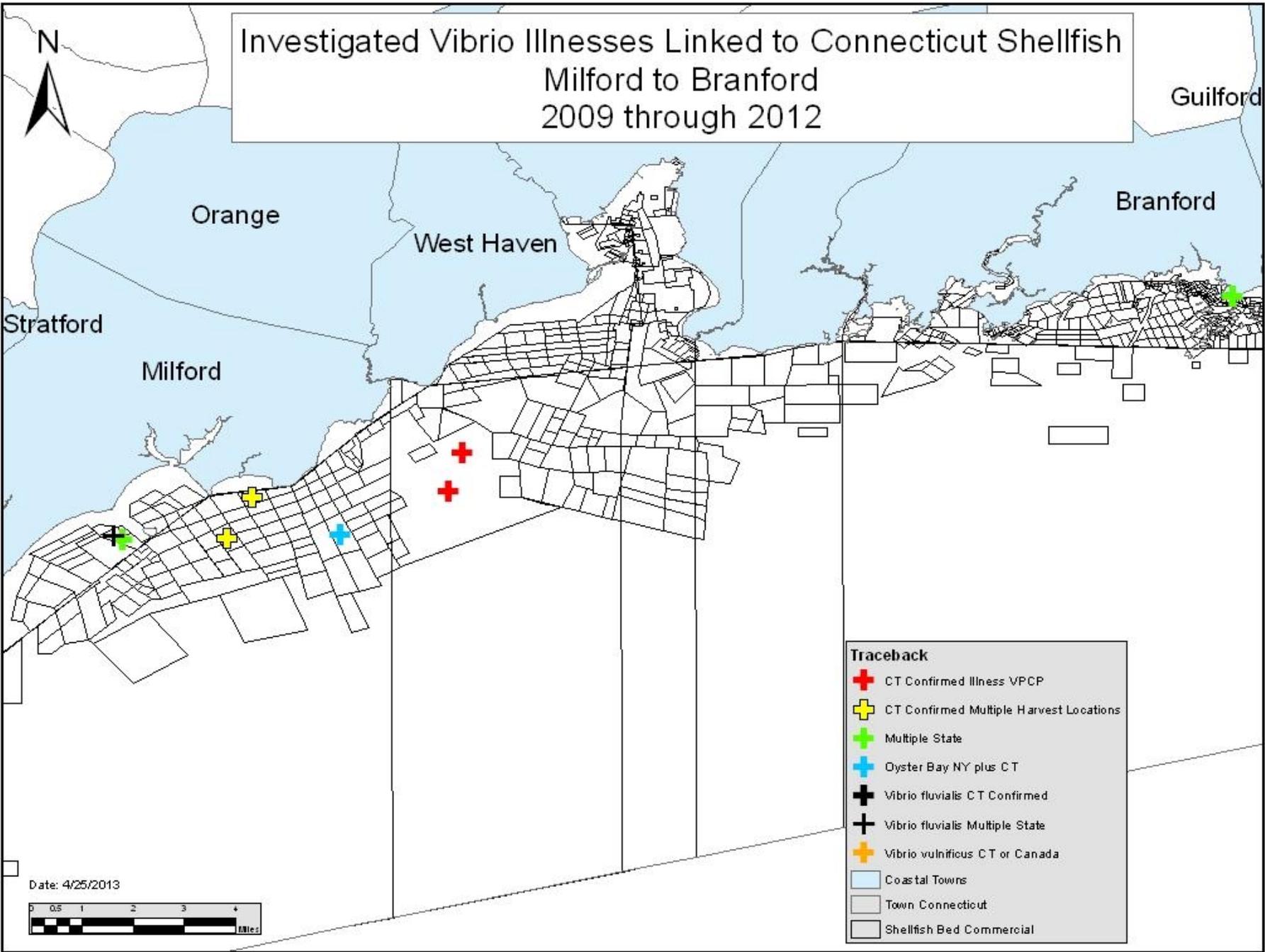
Traceback

- + CT Confirmed Illness VPCP
- + CT Confirmed Multiple Harvest Locations
- + Multiple State
- + Oyster Bay NY plus CT
- + Vibrio fluvialis CT Confirmed
- + Vibrio fluvialis Multiple State
- + Vibrio vulnificus CT or Canada
- Coastal Towns
- Town Connecticut

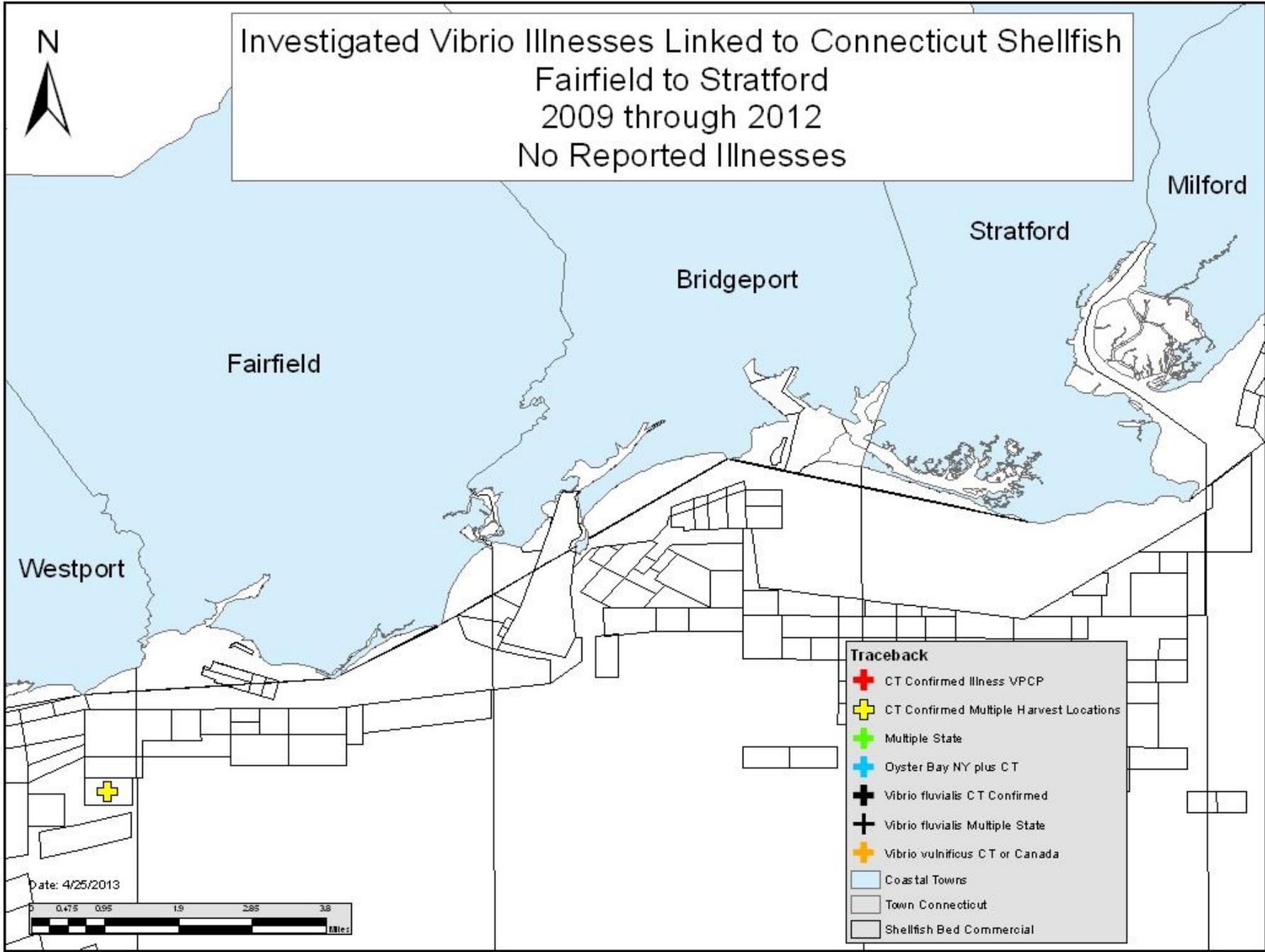
Date: 4/25/2013



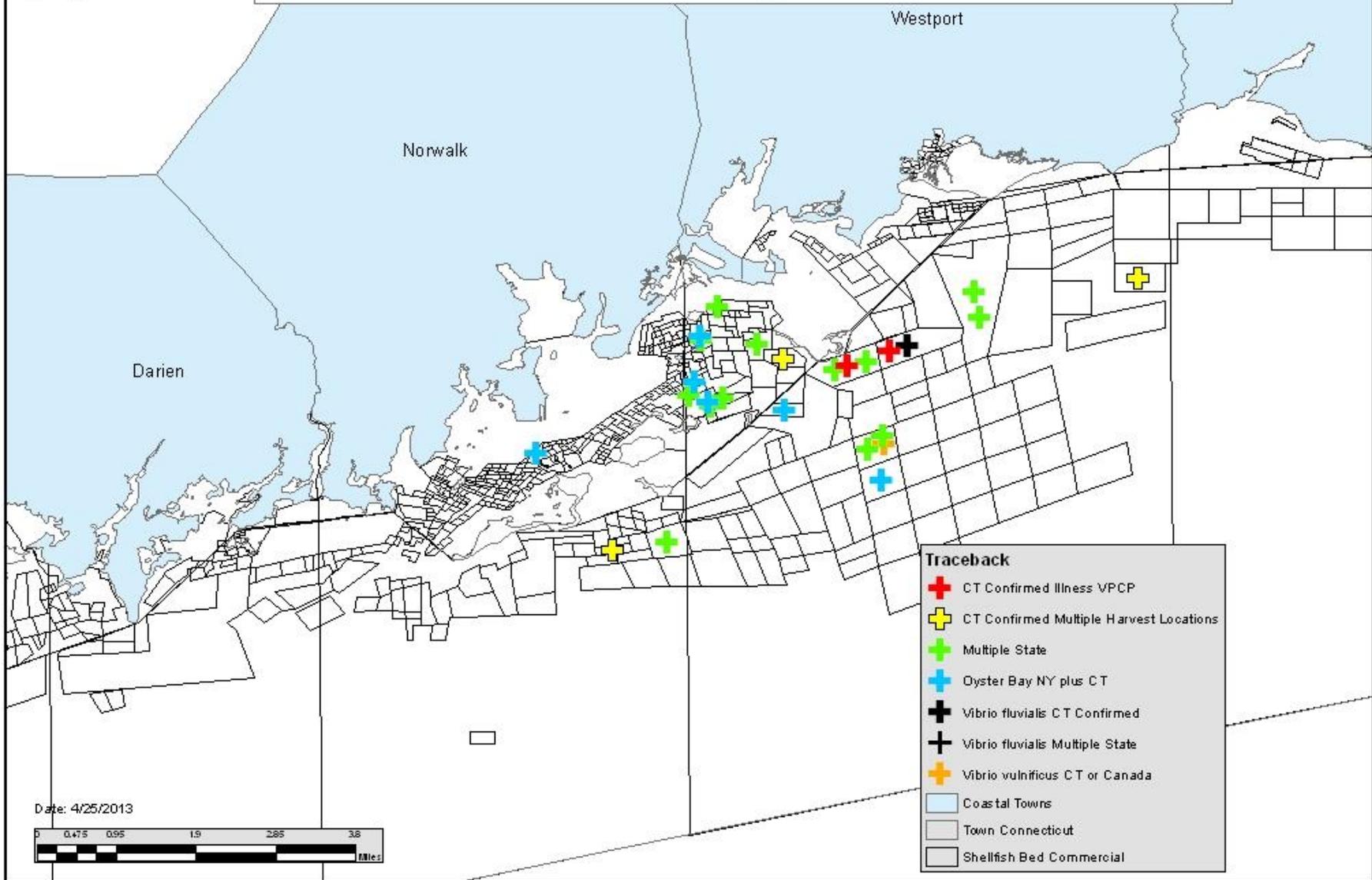
Investigated Vibrio Illnesses Linked to Connecticut Shellfish Milford to Branford 2009 through 2012



Investigated Vibrio Illnesses Linked to Connecticut Shellfish
 Fairfield to Stratford
 2009 through 2012
 No Reported Illnesses



Investigated Vibrio Illnesses Linked to Connecticut Shellfish Darien to Westport 2009 through 2012

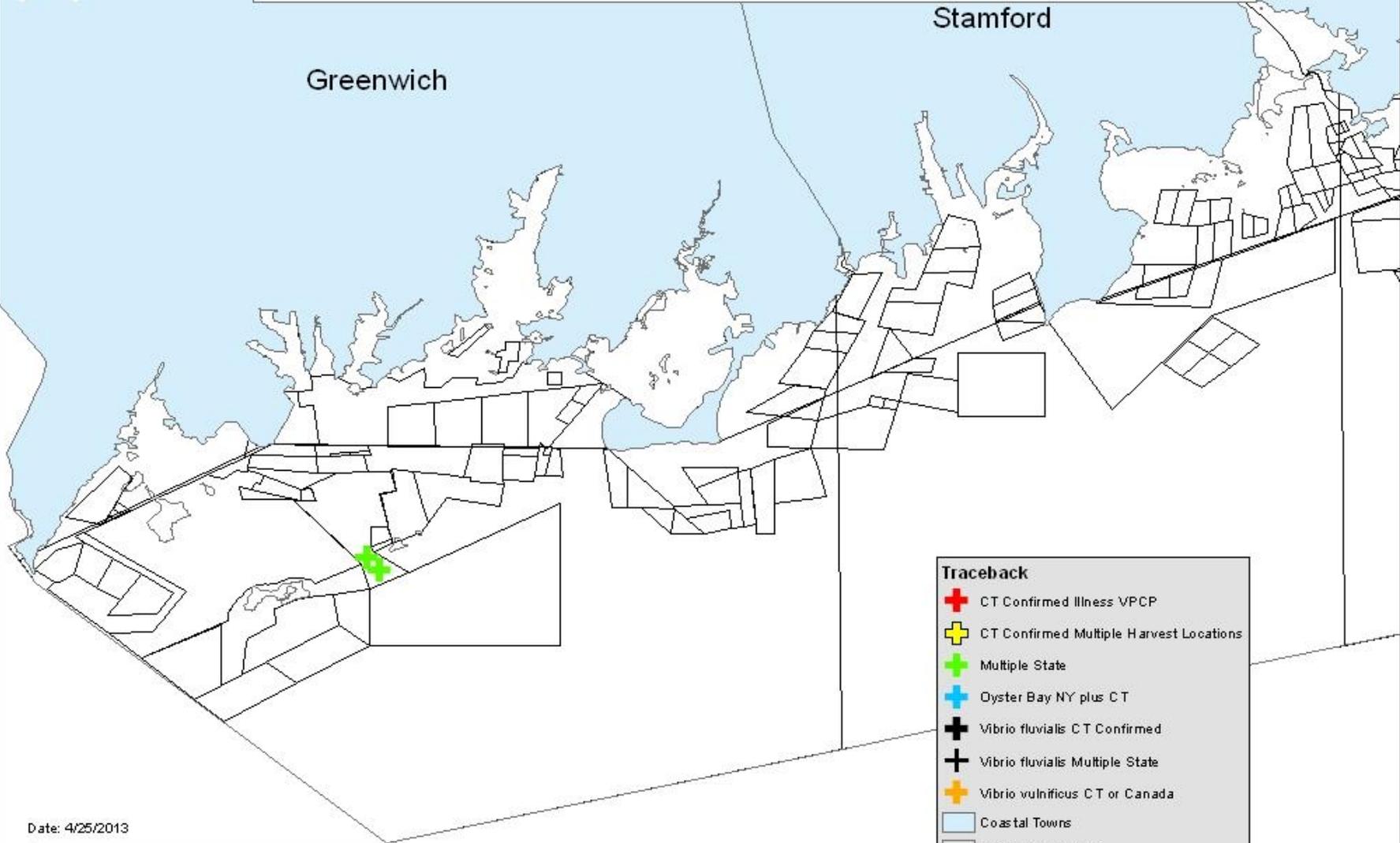


Investigated Vibrio Illnesses Linked to Connecticut Shellfish Greenwich and Stamford 2009 through 2012

Darien

Stamford

Greenwich



Traceback

-  CT Confirmed Illness VPCP
-  CT Confirmed Multiple Harvest Locations
-  Multiple State
-  Oyster Bay NY plus CT
-  Vibrio fluvialis CT Confirmed
-  Vibrio fluvialis Multiple State
-  Vibrio vulnificus CT or Canada
-  Coastal Towns
-  Town Connecticut
-  Shellfish Bed Commercial

Date: 4/25/2013



2013 Connecticut Vibrio Risk Assessment

- (1) The number of *Vibrio parahaemolyticus* cases epidemiologically linked to the consumption of oysters commercially harvested from the State; and
- (2) Levels of total and tdh+ *Vibrio parahaemolyticus* in the area, to the extent that such data exists; and
- (3) The water temperatures in the area; and
- (4) The air temperatures in the area; and
- (5) Salinity in the area; and
- (6) Harvesting techniques in the area; and
- (7) The quantity of harvest from the area and its uses i.e. shucking, halfshell, PHP.

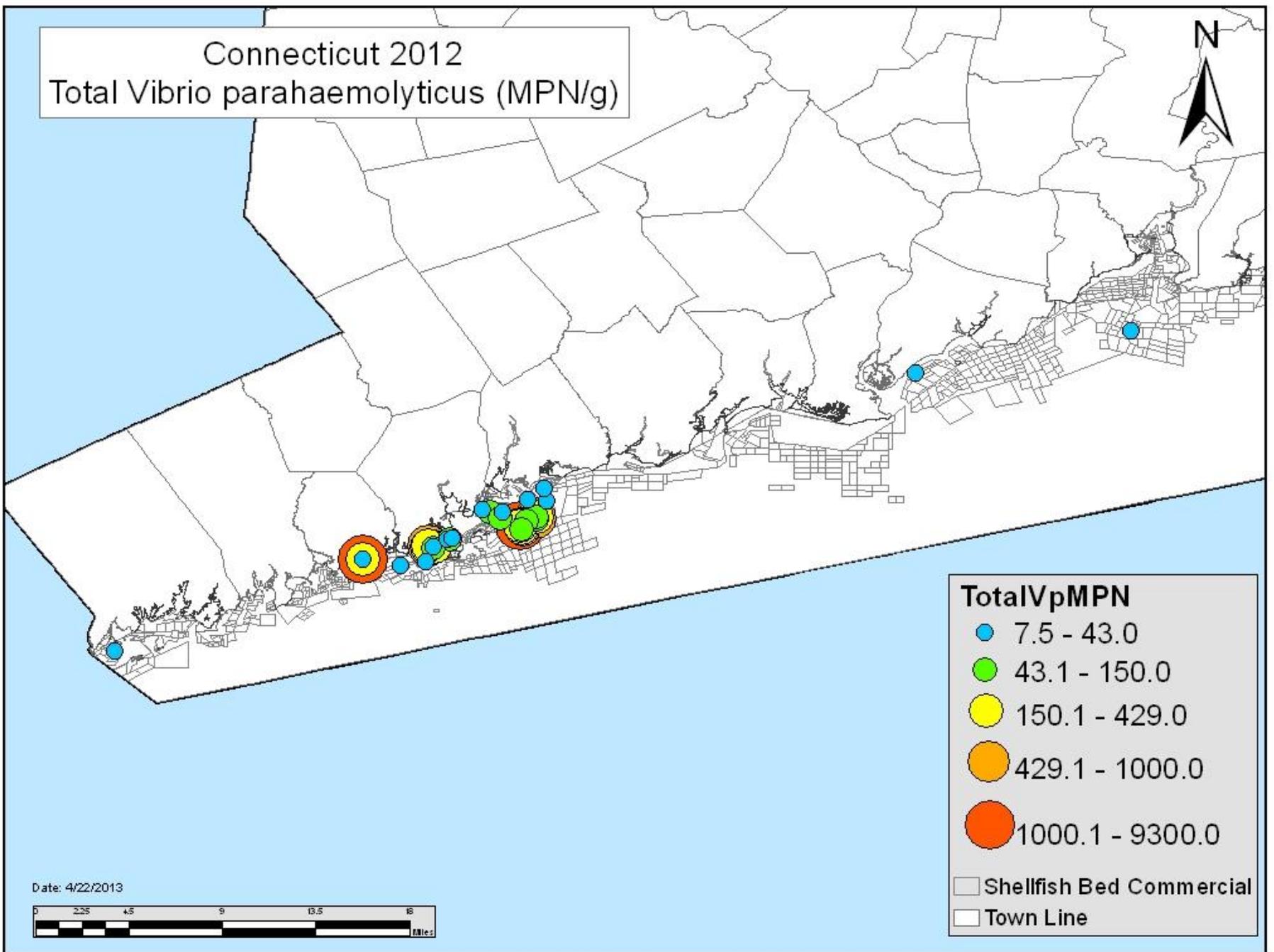
2013 Connecticut Vibrio Risk Assessment

1. The number of *Vibrio parahaemolyticus* cases epidemiologically linked to the consumption of oysters commercially harvested from the State

2013 Connecticut Vibrio Risk Assessment

2. Levels of total and tdh+ *Vibrio parahaemolyticus* in the area, to the extent that such data exists; and

Connecticut 2012
Total *Vibrio parahaemolyticus* (MPN/g)



TotalVpMPN

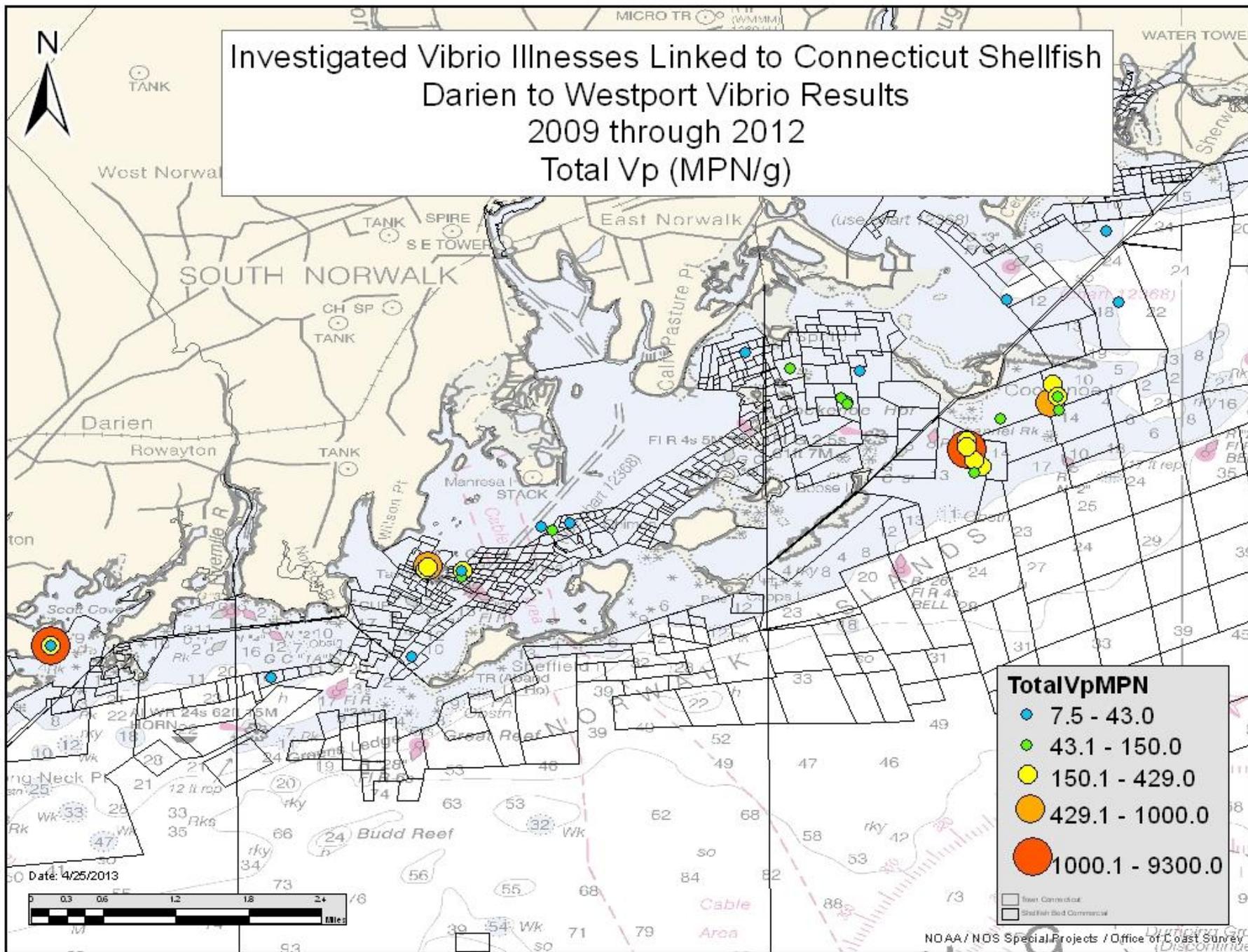
- 7.5 - 43.0
- 43.1 - 150.0
- 150.1 - 429.0
- 429.1 - 1000.0
- 1000.1 - 9300.0

□ Shellfish Bed Commercial
□ Town Line

Date: 4/22/2013



Investigated Vibrio Illnesses Linked to Connecticut Shellfish Darien to Westport Vibrio Results 2009 through 2012 Total Vp (MPN/g)



Vp Bacteria Doubling Times

Temperature specific Vp Growth rates and Doubling times for calculating cumulative growth based on hourly temperature observations

Oyster Temperature	Doubling Time	Oyster Temperature	Doubling Time
(degree F)	(hrs)	(degree F)	(hrs)
50	35.8		
55	13.8	80	1.64
60	7.24	85	1.28
65	4.45	90	1.03
70	3.01	95	0.85
75	2.17	100	0.71

Vp Bacteria Doubling Times at 76°F

FDAID	Total Vp MPNg	After 4Hr	After 6Hr	After 8Hr	After 10Hr
7-12-CT-10	7.5	30	60	120	240
7-12-CT-11	93.0	372	744	1488	2976
7-12-CT-12	43.0	172	344	688	1376
7-12-CT-13	43.0	172	344	688	1376
7-12-CT-14	230.0	920	1840	3680	7360
7-12-CT-15	150.0	600	1200	2400	4800
7-12-CT-16	23.0	92	184	368	736

Vp Bacteria Doubling Times at 76°F

FDAID	Total Vp MPNg	After 4Hr	After 6Hr	After 8Hr	After 10Hr
8-12-CT-1	15.0	60	120	240	480
8-12-CT-2	7500.0	30000	60000	120000	240000
8-12-CT-3	210.0	840	1680	3360	6720
8-12-CT-4	150.0	600	1200	2400	4800
8-12-CT-5	150.0	600	1200	2400	4800
8-12-CT-6	43.0	172	344	688	1376
8-12-CT-7	43.0	172	344	688	1376
8-12-CT-8	9300.0	37200	74400	148800	297600

Vp Bacteria Doubling Times at 76°F

FDAID	Total Vp MPNg	After 4Hr	After 6Hr	After 8Hr	After 10Hr
8-12-CT-10	15.0	60	120	240	480
8-12-CT-11	43.0	172	344	688	1376
8-12-CT-13	430.0	1720	3440	6880	13760
8-12-CT-14	43.0	172	344	688	1376
8-12-CT-15	120.0	480	960	1920	3840
8-12-CT-16	230.0	920	1840	3680	7360
8-12-CT-17	93.0	372	744	1488	2976
8-12-CT-12	120.0	480	960	1920	3840

Vp Bacteria Doubling Times at 76°F

FDAID	Total Vp MPNg	After 4Hr	After 6Hr	After 8Hr	After 10Hr
9-12-CT-1	43.0	172	344	688	1376
9-12-CT-2	150.0	600	1200	2400	4800
9-12-CT-3	43.0	172	344	688	1376
9-12-CT-4	210.0	840	1680	3360	6720
9-12-CT-5	210.0	840	1680	3360	6720
9-12-CT-6	240.0	960	1920	3840	7680
9-12-CT-7	210.0	840	1680	3360	6720
9-12-CT-8	290.0	1160	2320	4640	9280

2013 Vibrio Parahaemolyticus

Control Plan for Connecticut: Oysters

- 1. OYSTERS: Limit time from harvest to refrigeration to no more than five hours during the months of June, July and August; 7 hours during September.**

Time begins once the first shellstock harvested is no longer submerged.

Dealers may harvest and place shellstock into refrigeration within 5 hours, then make subsequent harvest trips, provided that each trip allows the shellstock to be placed into refrigeration within 5 hours.

2013 *Vibrio Parahaemolyticus* Control Plan for Connecticut: Oysters

- 2. Require the original dealer to cool oysters to an internal temperature of 50°F (10°C) or below within 10 hours or less, however the DA/BA strongly recommends cooling to 50°F within 5 hours.** The 2012 verification studies of dealers cooling practices have demonstrated that cooling to 50 °F takes between 1.5 and 5 hours.
- 3. All shellstock (clams and oysters) shall be shaded onboard the vessel and as needed at points of transfer to prevent the shellstock from increasing in temperature.**

2013 Vibrio Parahaemolyticus Recommendations for Connecticut-Hard Clams

- 1. Hard Clams: Limit time from harvest to refrigeration to no more than 8 hours during the months of June, July and August.**
- 2. The DA/BA strongly recommends that the original dealer cool hard clams to an internal temperature of 50°F (10°C) or below within 10 hours or less.**
- 3. All shellstock (clams and oysters) shall be shaded onboard the vessel and as needed at points of transfer to prevent the shellstock from increasing in temperature.**

Flow of Vibrio Investigation in CT

Case Patient becomes ill and seeks treatment
(1 to 7 days)

Specimen collected and clinical laboratory determines Vibrio infection
(2 to 3 days from collection to ID)

Vibrio infection is reported to State and Local Health Department
(up to 10 days)

All Vibrio isolates from clinical laboratories are required to be submitted to
the State Laboratory for confirmation;
2-7 days from clinical lab identification to receipt at DPH lab

DPH confirms ID and reports within 2 to 3 days

Epi works with local HD to conduct follow-up;
conducts interviews with case-patients (several days to a week)

Flow of Vibrio Investigation in CT

Cases that report molluscan shellfish exposure (clam, oyster, mussel, etc) are referred to CT DA/BA

CT DA/BA via FPP requests assistance from Local HD to perform follow-up inspection at point of consumption or purchase (within 1 week)

CT DA/BA Investigation continues through the entire CT distribution chain back to the original harvester

CT DA/BA may request other states shellfish authority to conduct audit at out-of-state shippers

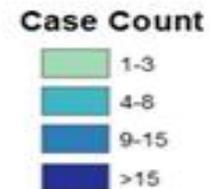
CT DA/BA Submits COVIS to FPP for submission to CDC

CT DA/BA Submits Summary Report to FDA Regional Shellfish Specialist

Persons infected with the outbreak strain (O4: K12) of *Vibrio parahaemolyticus*, by State*



76 isolates serotyped out of 104 Vp isolates:
May 12, 2013 through August 19, 2013



<http://www.cdc.gov/vibrio/investigations/vibriop-09-13/map.html>

Vp Outbreak Strain 2013 (O4:K12)

- Serotype O4:K12
- More virulent than other pathogenic Vp strains
- **Infectious at lower doses** than native strains typically found on the East Coast
- First identified in 1988
- Cause large outbreaks in 1997 and 2004
- First identified outside of Pacific NW in 2012 (Oyster Bay, NY)
- During 2013, 76 of the 104 isolates collected by CDC were determined to be O4: K12

Vp Outbreak Strain 2013 (O4:K12)

How did it get here???

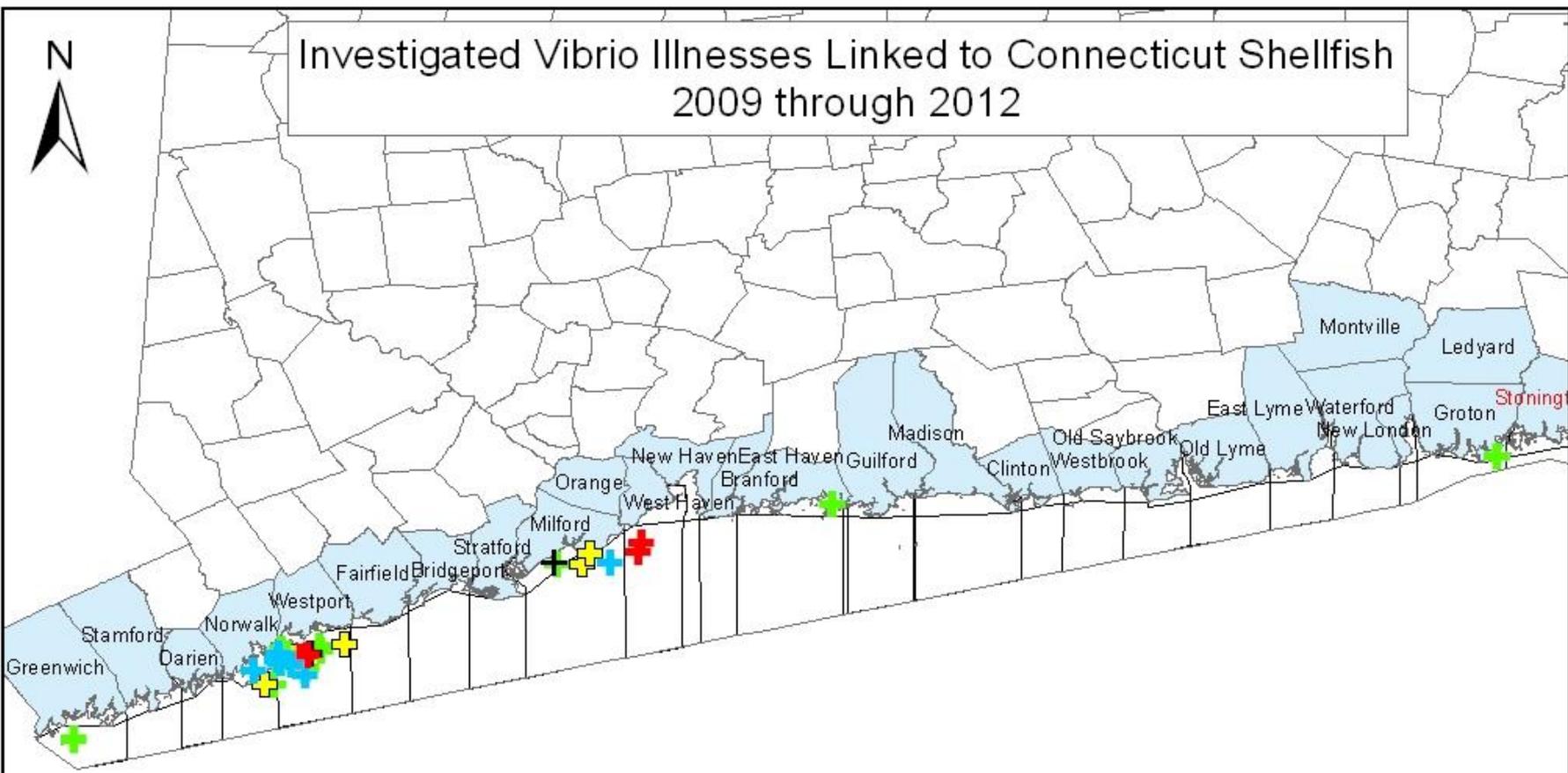
- Mechanism of introduction is unknown
- Importation of contaminated shellfish into local waters
- Ballast water movement
- Long-distance oceanic transportation

Vp Outbreak Strain 2013 (O4:K12)

What can we do?

- Strain is naturally occurring
- Now that it is present in CT waters, it is probably not going away
- Difficult to ID in environment
- Research collaboration into genotyping of strains (underway)
- Post-harvest controls for Vp (time-temperature controls)

Investigated Vibrio Illnesses Linked to Connecticut Shellfish 2009 through 2012



Date: 4/25/2013

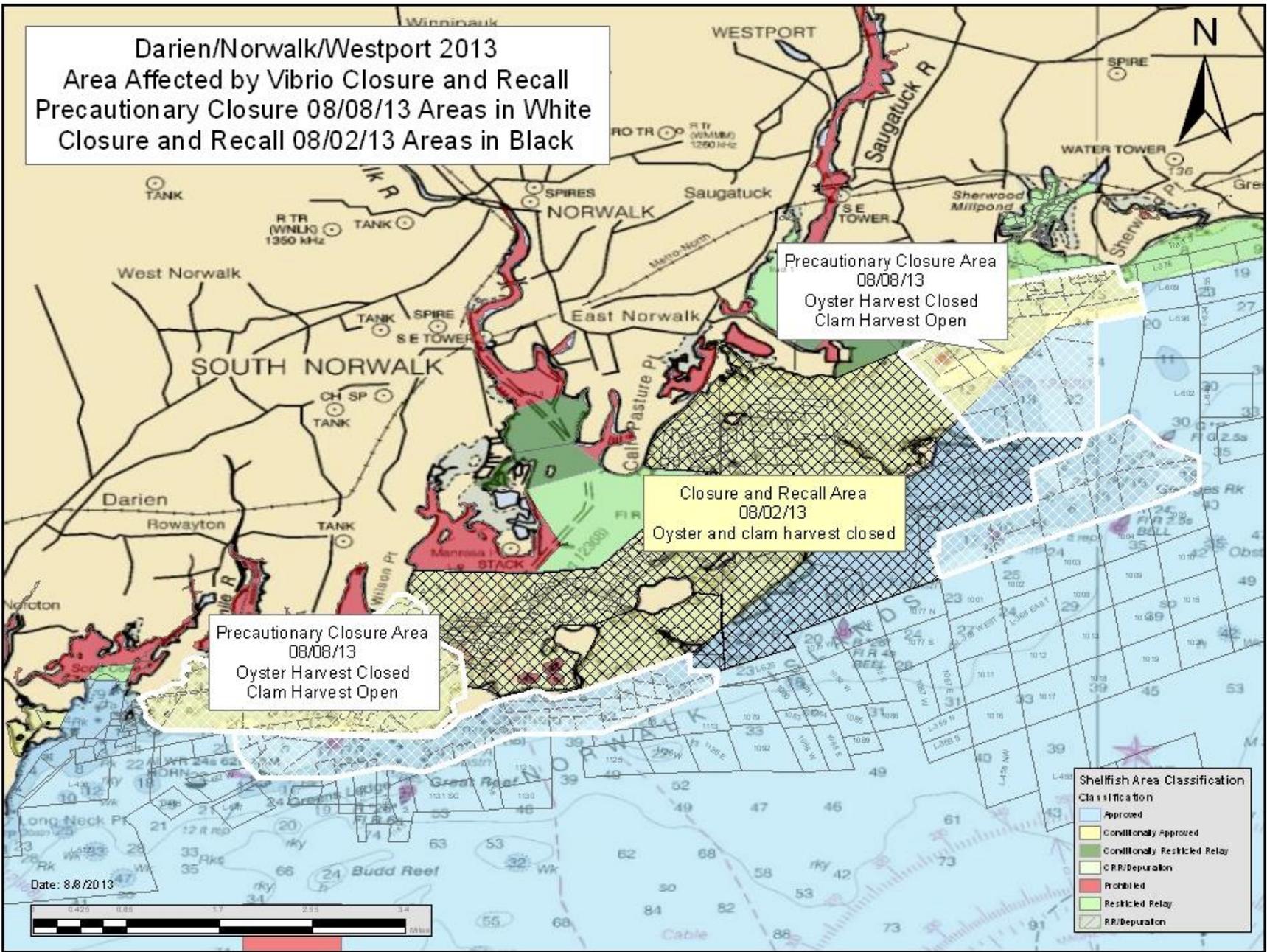


Traceback

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Darien/Norwalk/Westport 2013
 Area Affected by Vibrio Closure and Recall
 Precautionary Closure 08/08/13 Areas in White
 Closure and Recall 08/02/13 Areas in Black



Precautionary Closure Area
 08/08/13
 Oyster Harvest Closed
 Clam Harvest Open

Closure and Recall Area
 08/02/13
 Oyster and clam harvest closed

Precautionary Closure Area
 08/08/13
 Oyster Harvest Closed
 Clam Harvest Open

- Shellfish Area Classification
- Approved
 - Conditionally Approved
 - Conditionally Restricted Relay
 - CRR/Depuration
 - Prohibited
 - Restricted Relay
 - RR/Depuration

Date: 8/8/2013



CT Shellfish Related Illness Investigations 2013		
	Total Vp/Total All CT Shellfish Investigations	45/52
Traceback Code		Number of Cases
1	CT Confirmed to Outbreak/Closure Area	11
2	CT Confirmed (Outbreak/Closure plus other)	8
3	CT Confirmed (outside of outbreak area)	2
4	Out-of-State Confirmed	7
5	CT Outbreak Plus Out-of-State (with PFGE Match)	5
6	CT Plus Out-of-State (NO PFGE Match)	6
7	Unconfirmed case, CT Product	2
8	Recreational Case	3
9	CT Multi-Source Cases	2
	Total Vp Outbreak Area	19
	Total Confirmed CT cases	23

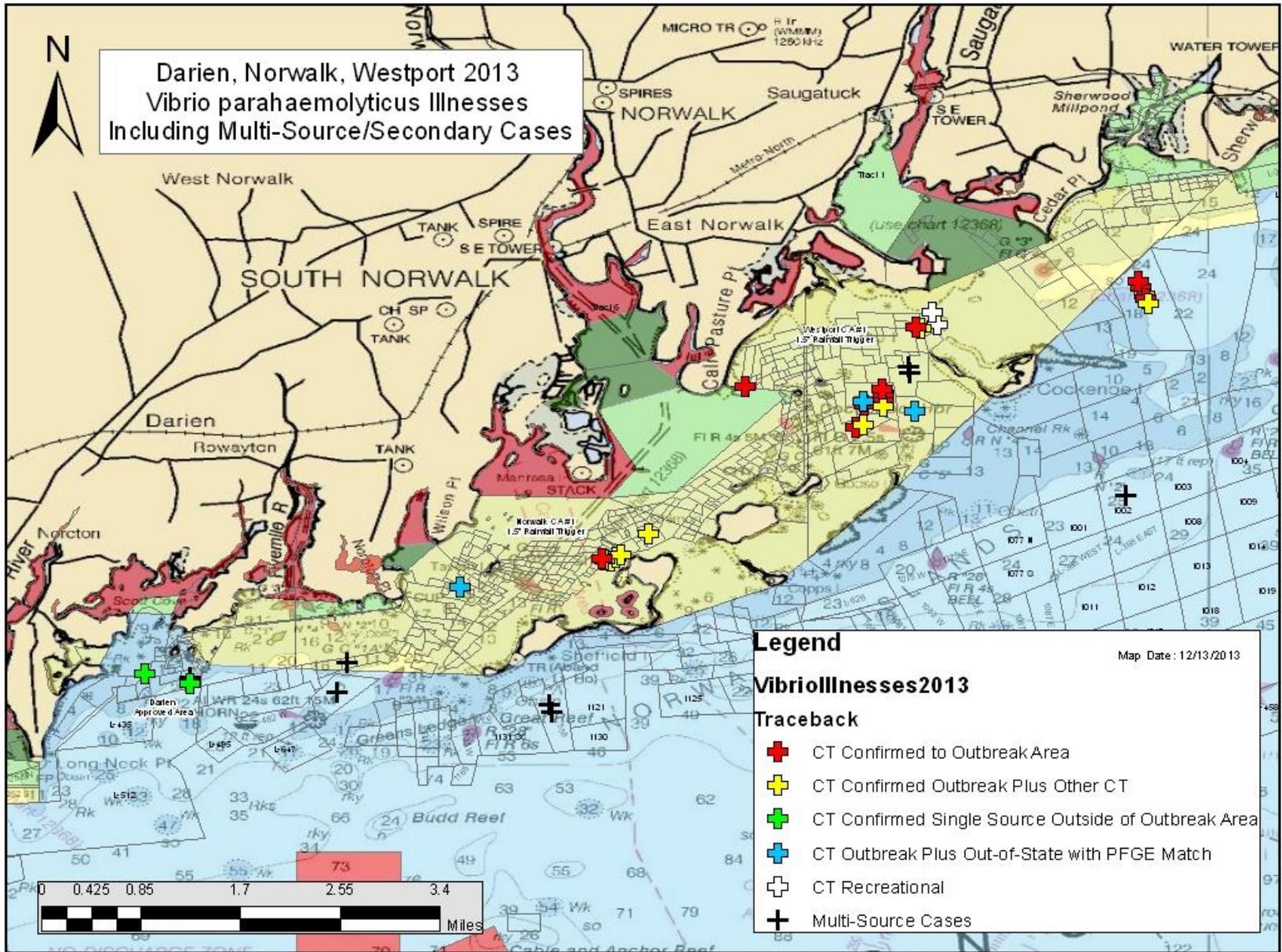
CT Vibrio Outbreak 2013

- Harvest dates ranged from 06/26/13 through 08/01/13
- Many cases only consumed 1 or 2 oysters
- Many cases affected young and healthy persons with no underlying conditions
- No confirmed single-source clam cases (those reporting only clam consumption)
- Closure and recall appears to have been successful in limiting the extent of illnesses

Temperatures at time of Harvest

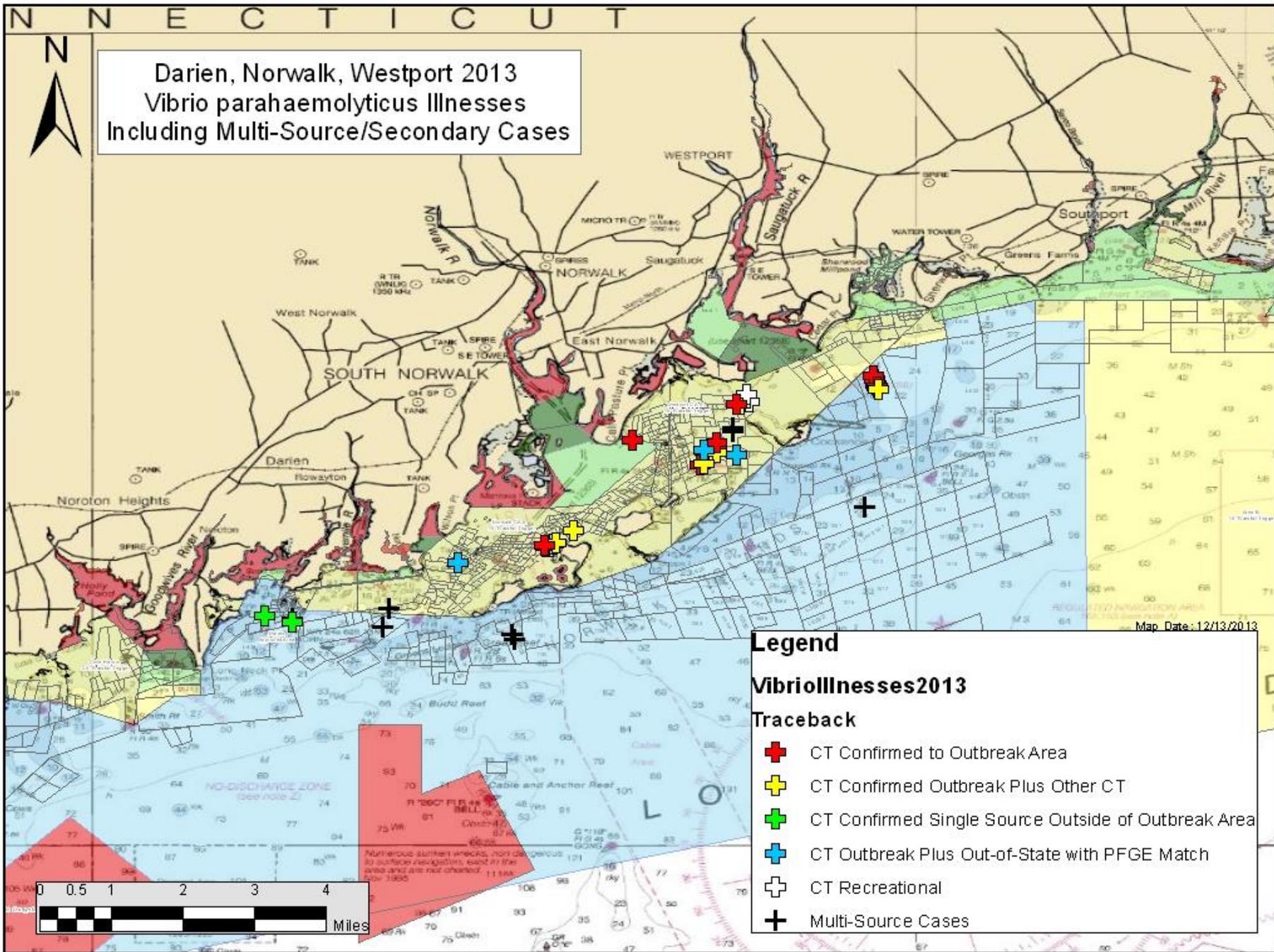
	Air Temp (NOAA Bridgeport)	Water Temp ° F (DA/BA)	Water Temp ° F (DEEP)
GeoMean	85.9	70.4	65.8
Max	95	74.5	69.5
Min	76	67.8	60.0

Darien, Norwalk, Westport 2013
 Vibrio parahaemolyticus Illnesses
 Including Multi-Source/Secondary Cases





Darien, Norwalk, Westport 2013
 Vibrio parahaemolyticus Illnesses
 Including Multi-Source/Secondary Cases



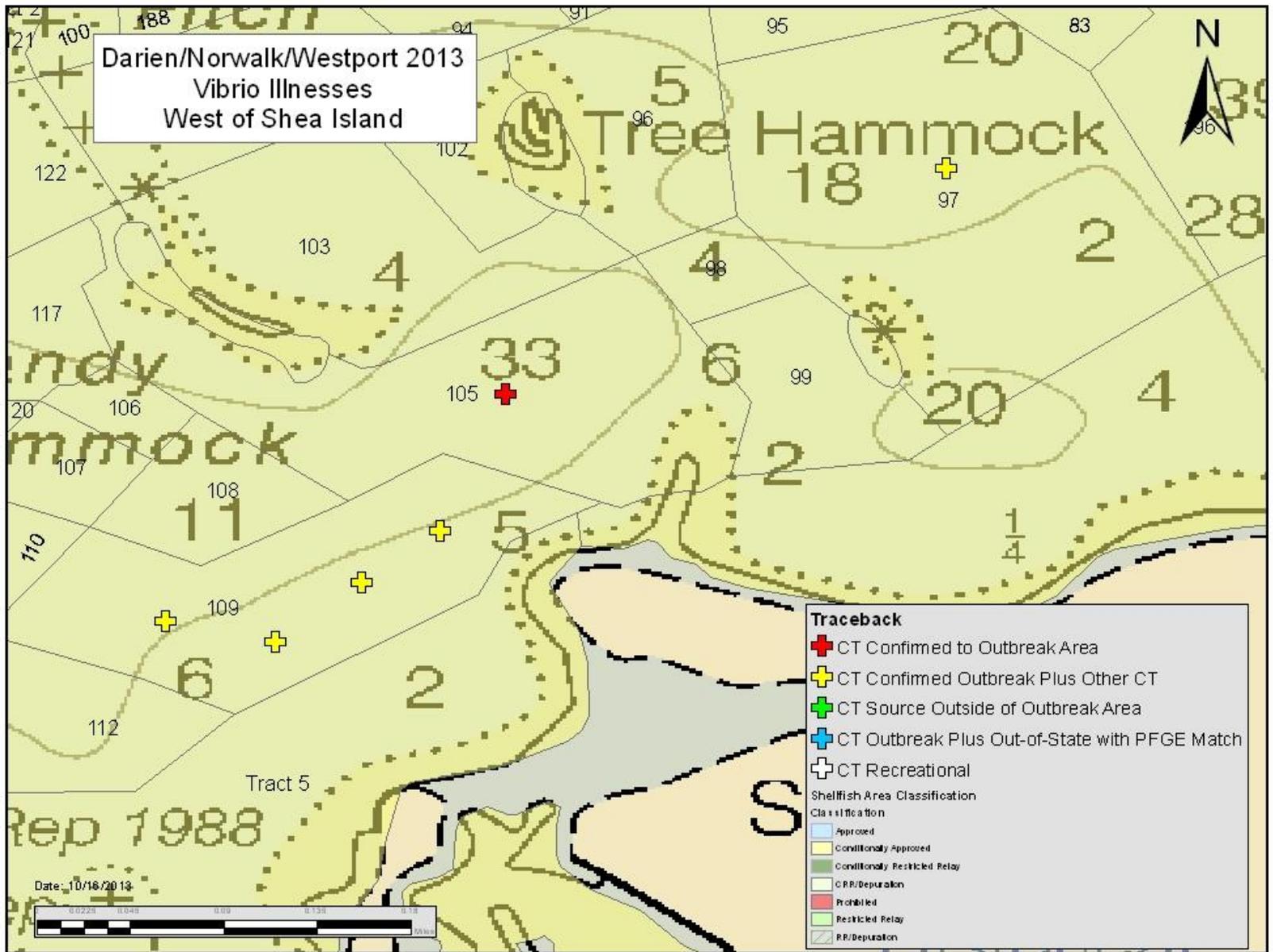
Map Date: 12/13/2013

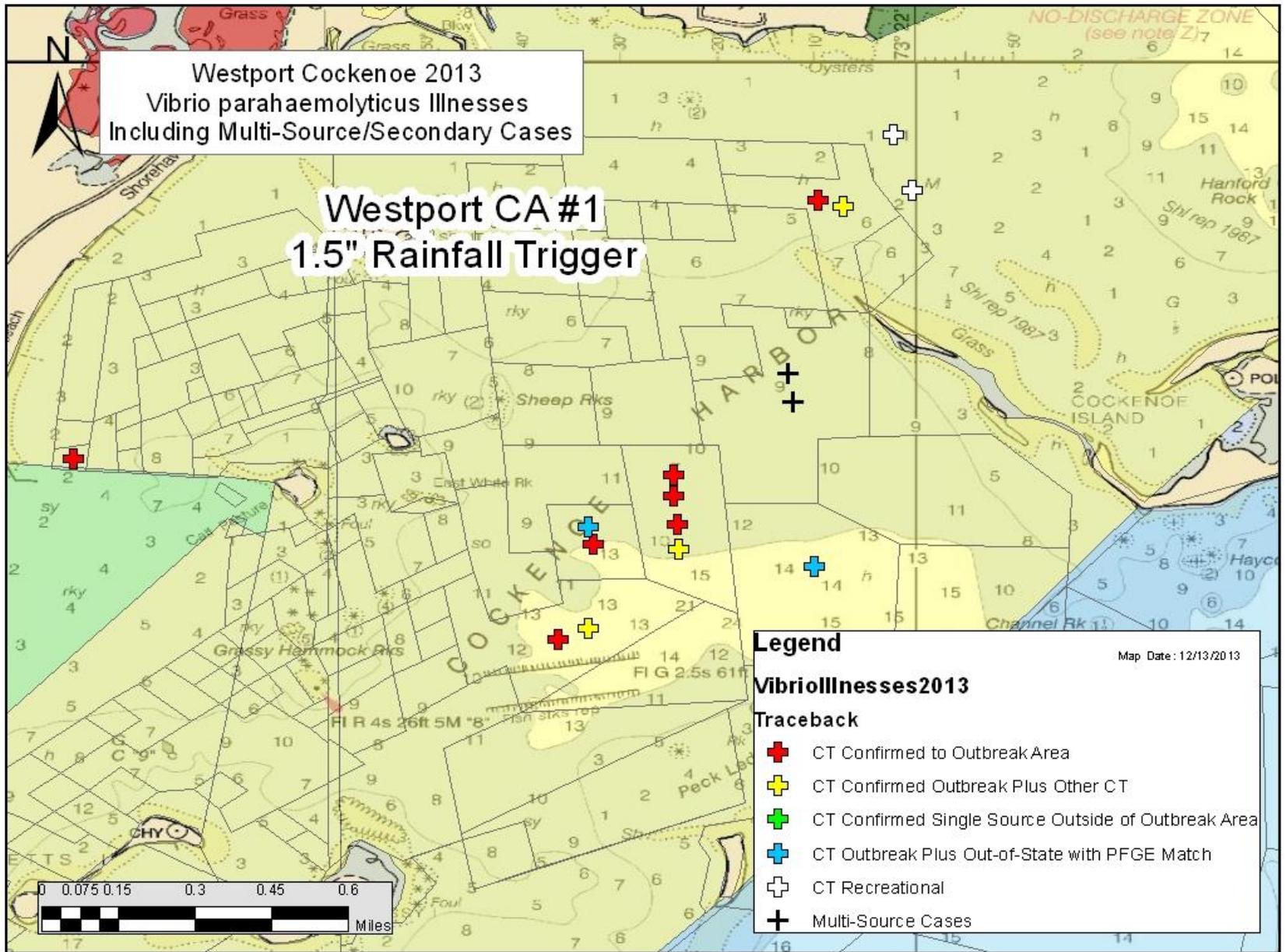
Legend

Vibriosis 2013

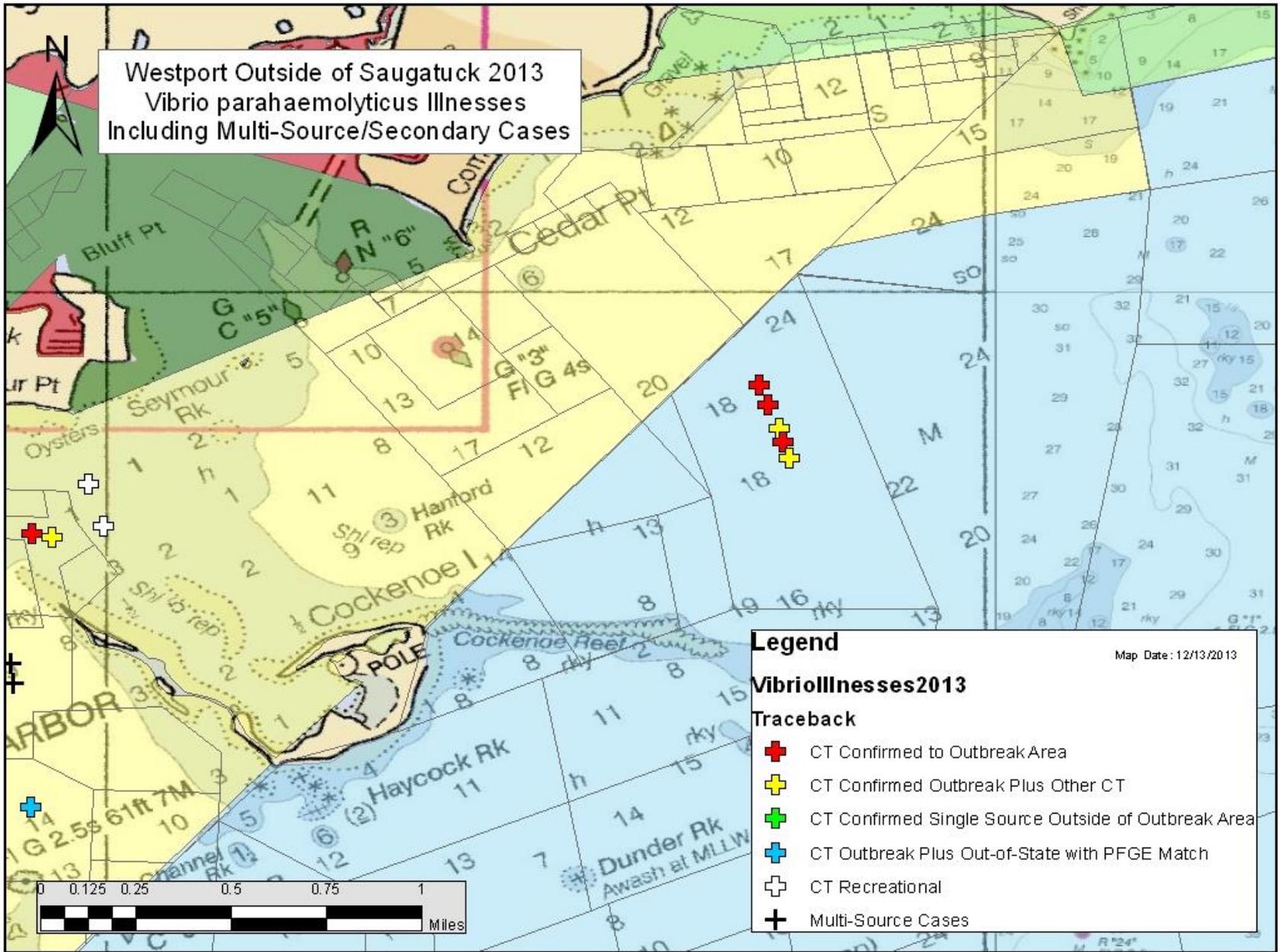
Traceback

- + CT Confirmed to Outbreak Area
- + CT Confirmed Outbreak Plus Other CT
- + CT Confirmed Single Source Outside of Outbreak Area
- + CT Outbreak Plus Out-of-State with PFGE Match
- + CT Recreational
- + Multi-Source Cases





Westport Outside of Saugatuck 2013
 Vibrio parahaemolyticus Illnesses
 Including Multi-Source/Secondary Cases

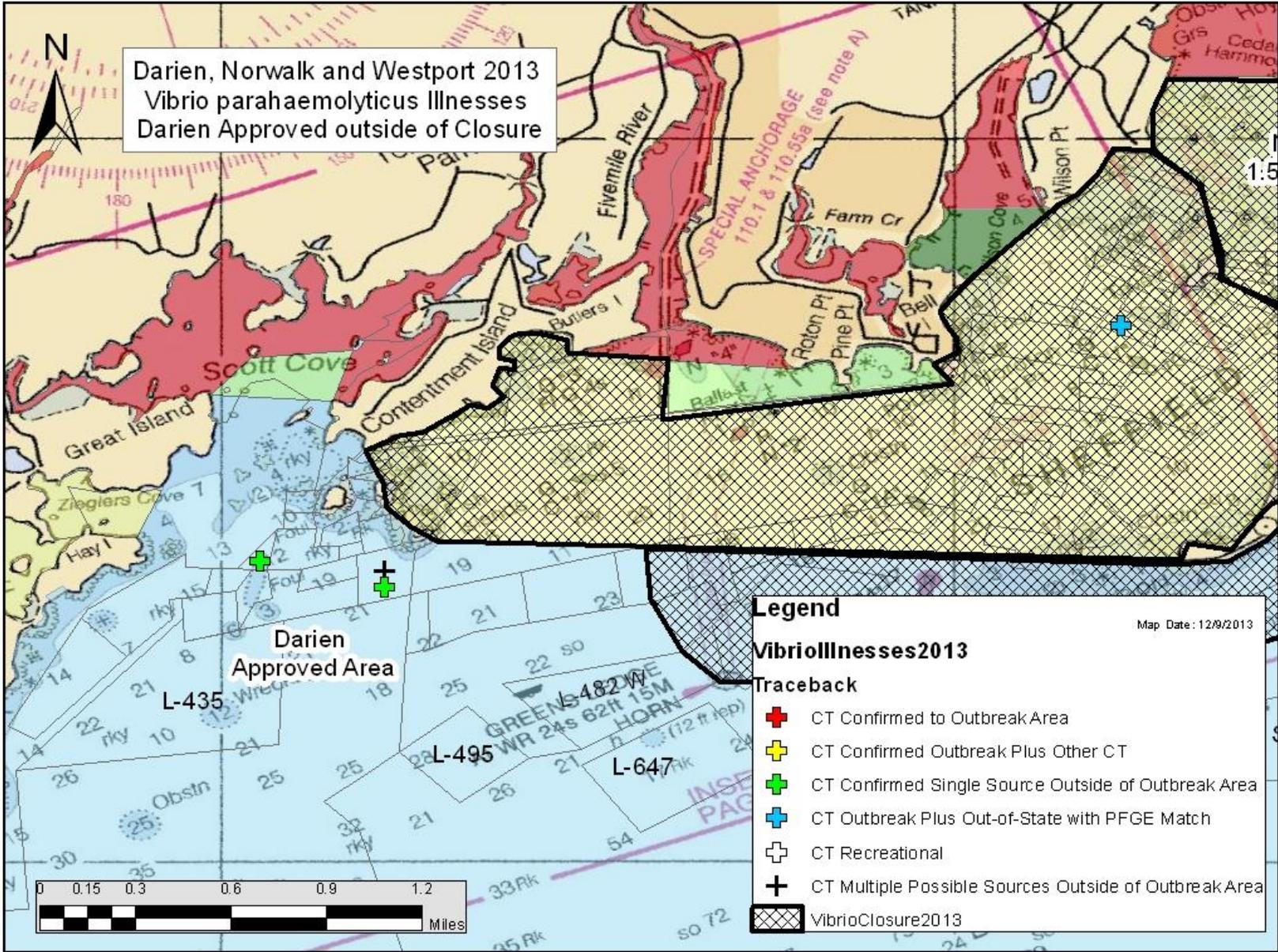


Map Date: 12/13/2013

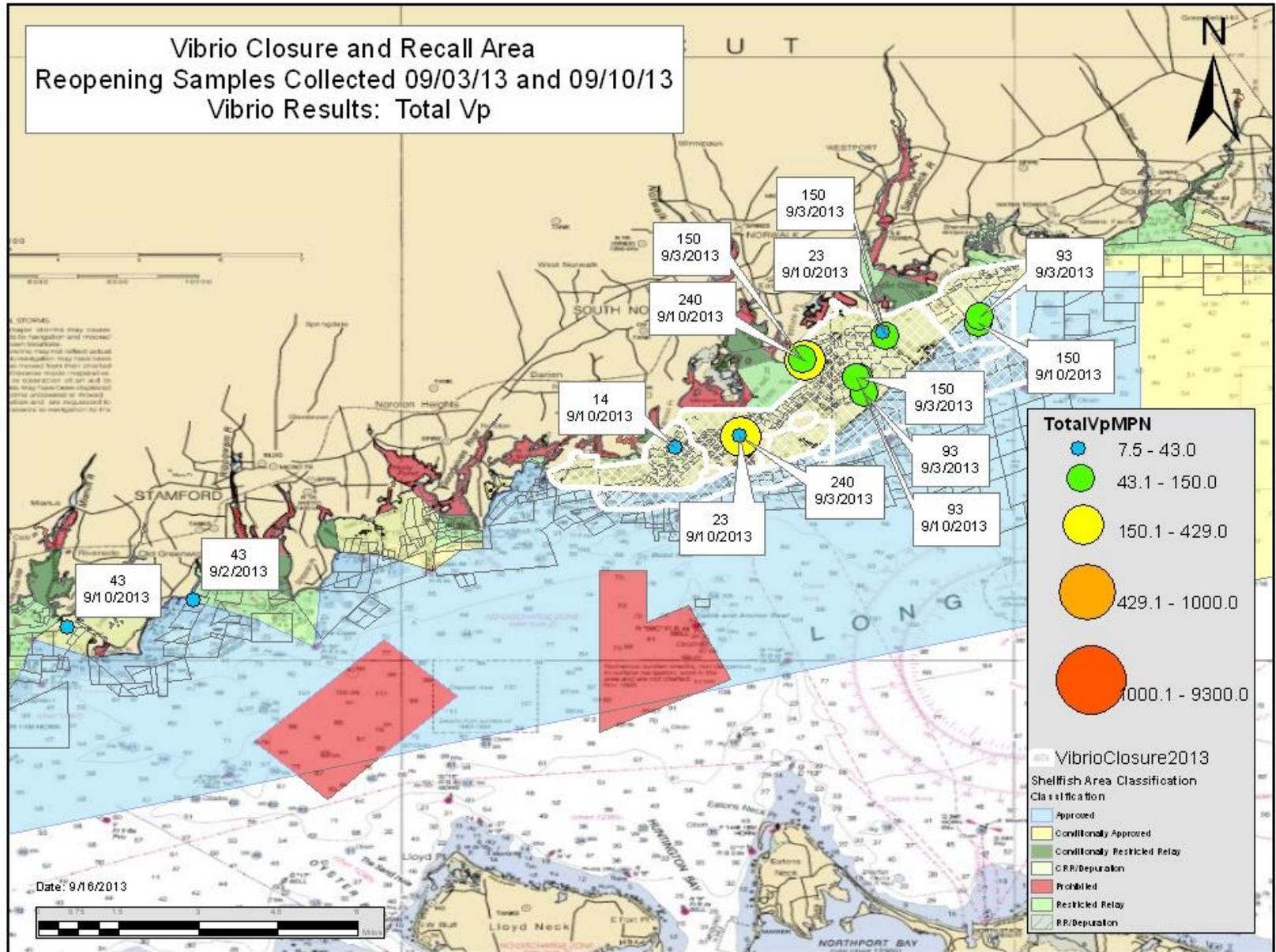
Vibri illnesses 2013

Traceback

- ✚ CT Confirmed to Outbreak Area
- ✚ CT Confirmed Outbreak Plus Other CT
- ✚ CT Confirmed Single Source Outside of Outbreak Area
- ✚ CT Outbreak Plus Out-of-State with PFGE Match
- ✚ CT Recreational
- ✚ Multi-Source Cases



Vibrio Closure and Recall Area
 Reopening Samples Collected 09/03/13 and 09/10/13
 Vibrio Results: Total Vp



Outbreak Timeline

- Initial illnesses reported and confirmed to outbreak area
- 08/02/13 Closure of Darien, Norwalk and Westport growing area
- Recall of shellfish harvested between 07/03/13 and 08/02/13 and
- Closure extended on 08/08/13 based upon additional illness reports
- No additional illnesses reported from shellfish harvested after 08/01/13
- Samples collected 09/03/13 and 09/10/13
- 09/16/13: Outbreak area reopened with 5 hour harvest limit for oysters
- 10/17/13: All time/temperatures controls lifted in outbreak area