Shellfish Growing Area Classifications: NSSP Implementation by Producing States

Connecticut Shellfish Commission Gathering
Sound School, New Haven
01/21/17

Kristin DeRosia-Banick
Environmental Analyst 3
State of Connecticut
Department of Agriculture Bureau of Aquaculture


NSSP Growing Area Classifications
Conditional Area Management Around the Country
Municipal Programs: Survey of Northeast States
Classification Challenges for Recreational Programs
New York State Conditional Areas Case Study
Mini 2016 Season Vibrio Update
Opportunities for Connecticut

National Shellfish Sanitation Program (NSSP)

Guide for the Control of Molluscan Shellfish 2015 Revision

http://www.fda.gov/downloads/Food/GuidanceRegulation/FederalStateFoodPrograms/UCM505093.pdf

Approved Classification

NSSP MO Section II. Ch. IV @.03B

Safe for Consumption Under ALL Conditions

Meets FC standards under ALL conditions

No Direct Discharges

Area NOT contaminated with poisonous or deleterious substances (PCB's, heavy metals, etc)

Conditionally Approved

NSSP MO II. Ch. IV @.03C

Area NOT

Meet FC standards under specific conditions

No Direct Wastewater Discharges

May be indirectly impacted by Wastewater Discharges

ed with poisonous or deleterious substances (PCB's, he

Management criteria must reliably predict when an area should be in "open" or "closed" status based on supporting data

Restricted

NSSP MO II. Ch. IV @.03D

Does not meet Approved Bacteriological Standards under most conditions

Limited degree of pollution

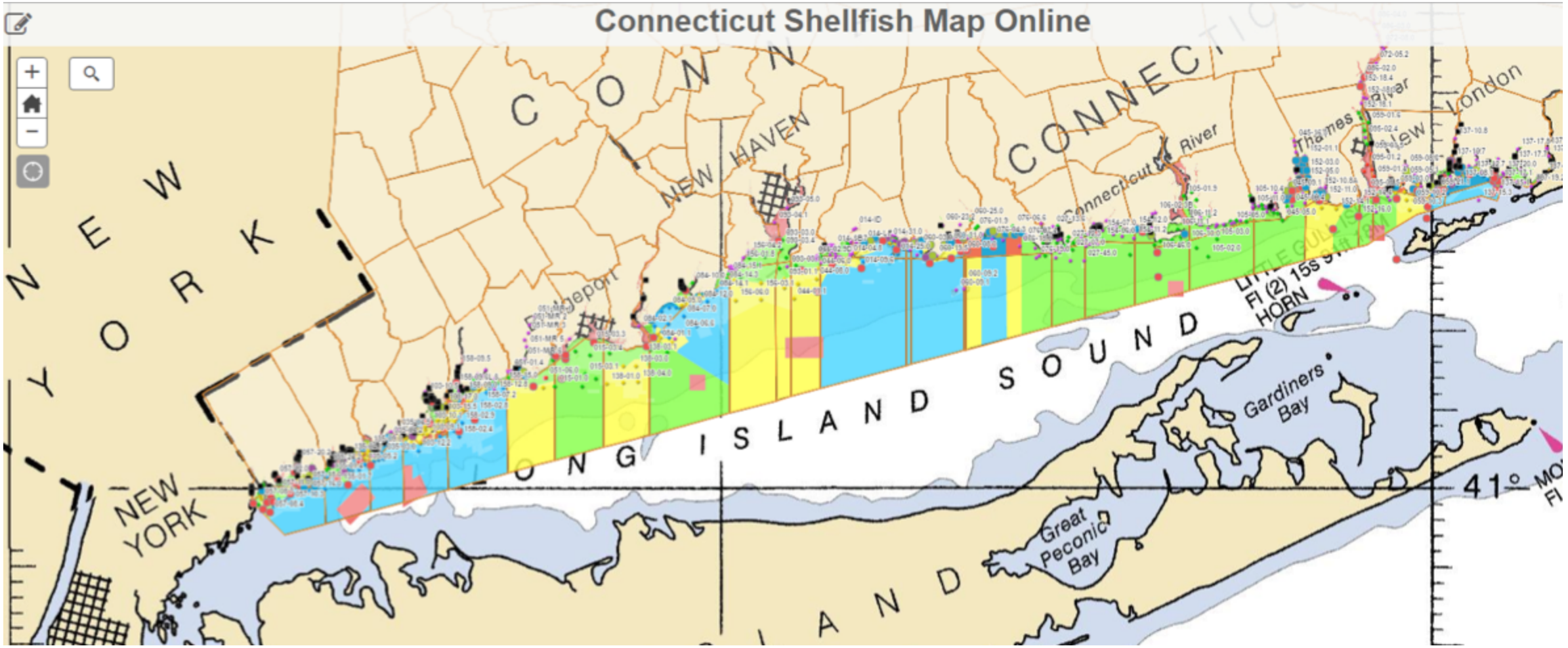
Shellfish must be relayed when water temperature >50F

Shellfish must be tested prior to Harvest

Prohibited

NSSP MO II. Ch. IV @.03E

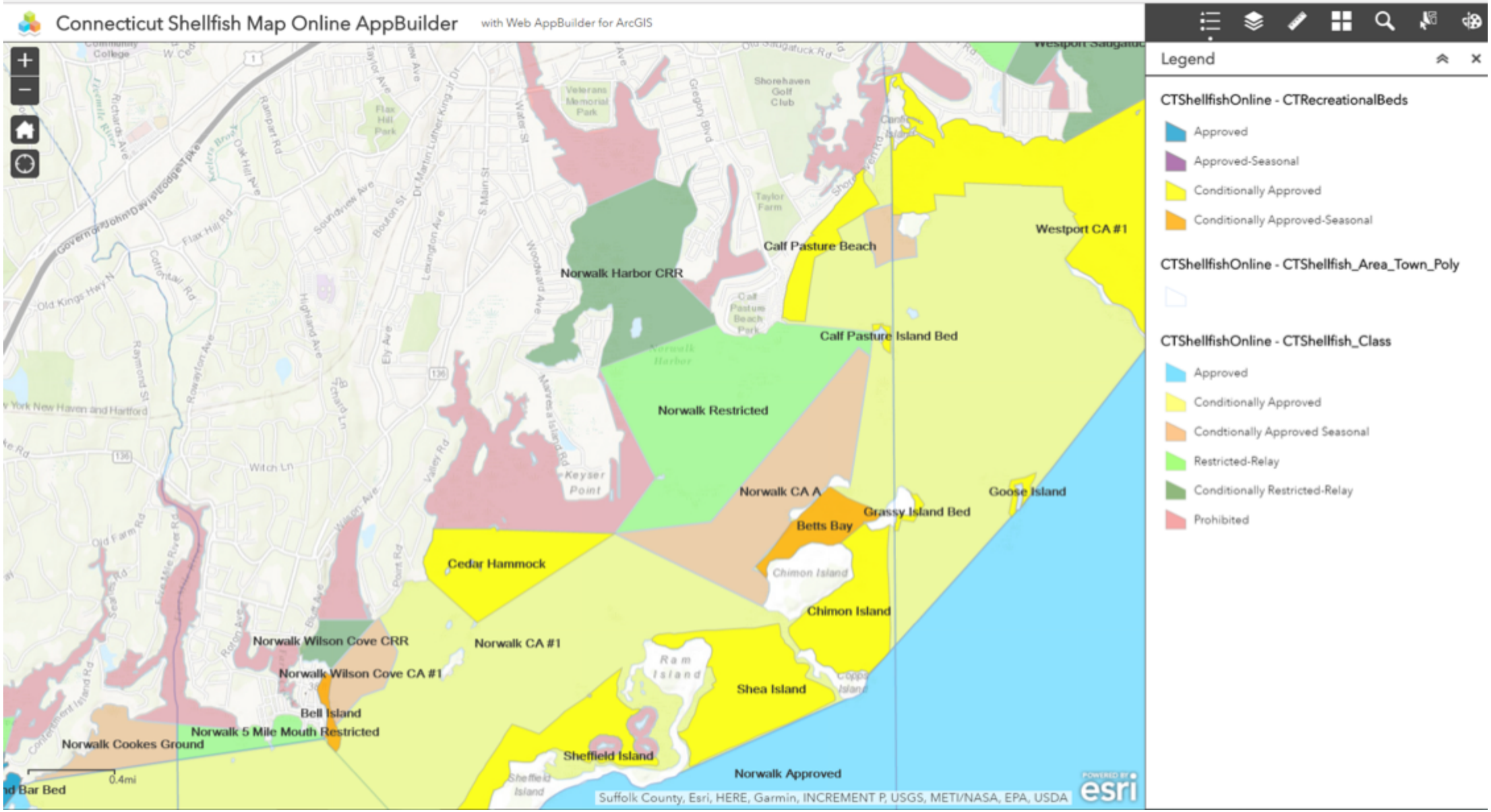
- Does not meet Approved Bacteriological Standards under most conditions
- Growing area adjacent to a WPCF outfall or other significant pollution point source
- Pollution sources that contaminate the areas are unpredictable
- Growing area contaminated with fecal waste
- Area contaminated with poisonous or deleterious substances (PCB's, heavy metals, etc)



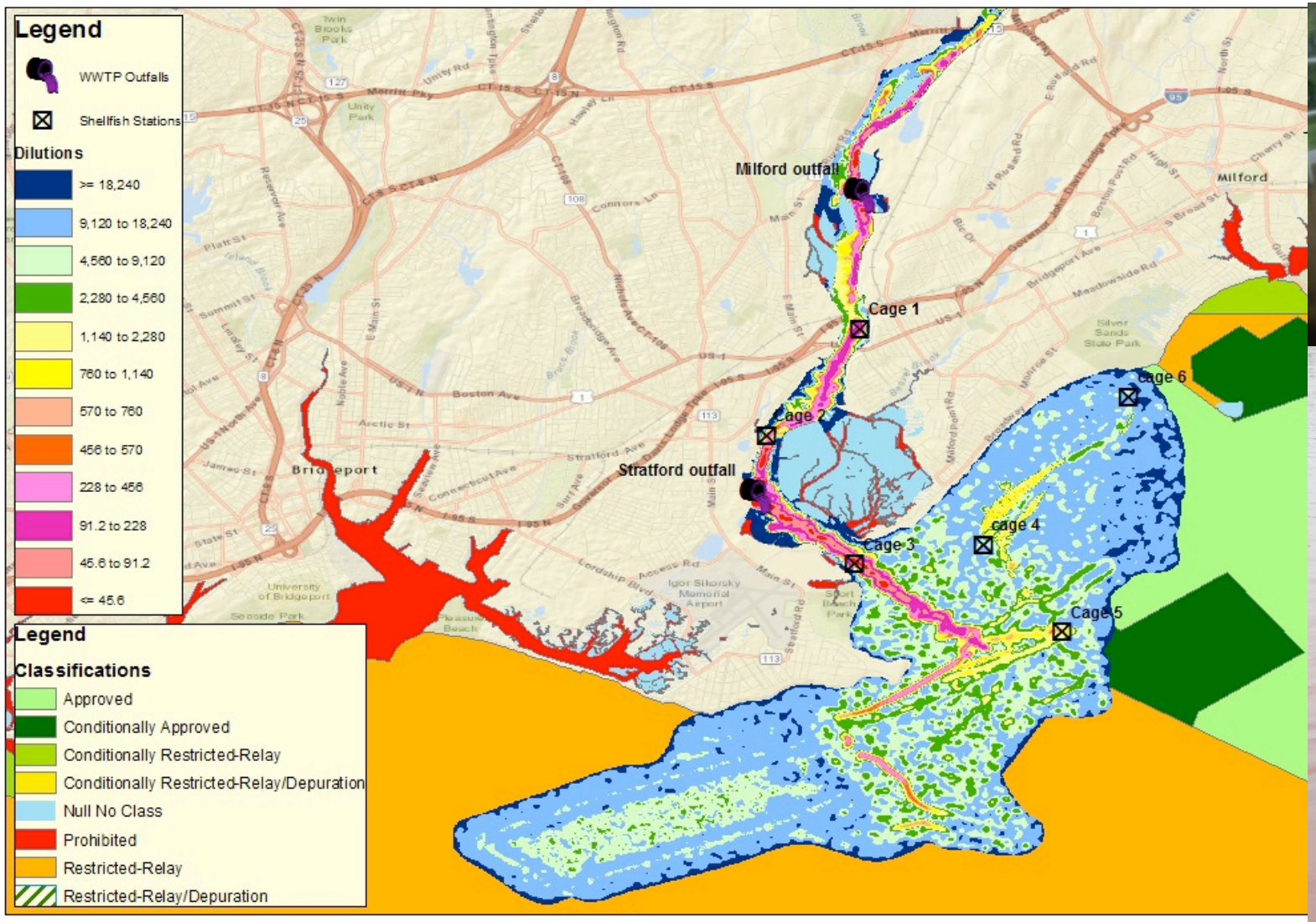
CONNECTICUT
DEPARTMENT OF AGRICULTURE

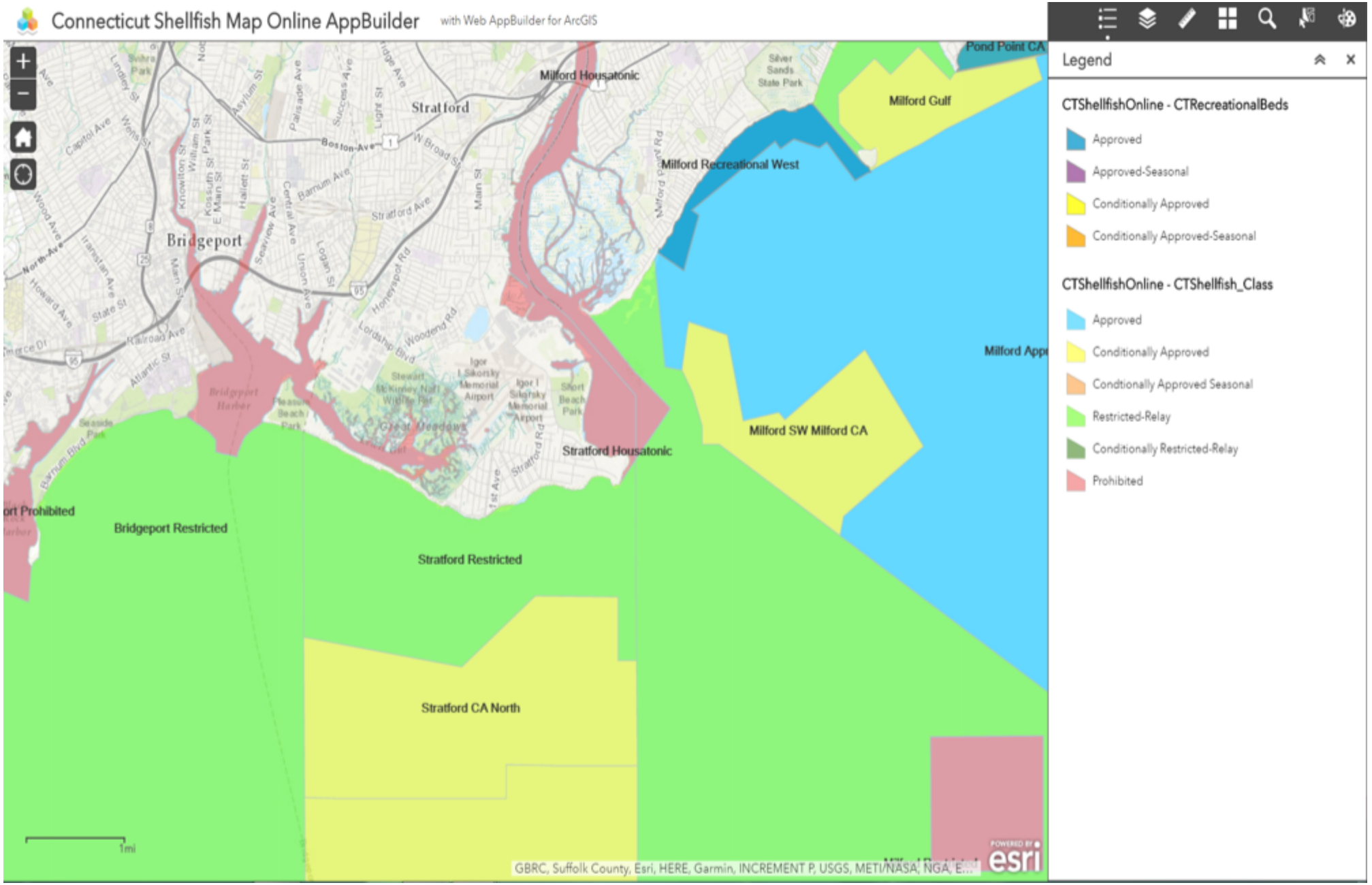
State of Connecticut
Department of Agriculture
Bureau of Aquaculture
Kristin.DeRosia-Banick@ct.gov

Classification	Sum of Acreage	Number of Areas in CT
Approved	126,415	14
Conditionally Approved	95,598	90
Conditionally Restricted-Relay	3284	19
Prohibited	25,622	12
Restricted-Relay	138,325	21
Grand Total	**389,247**	156


Connecticut Shellfish Map Online AppBuilder
with Web AppBuilder for ArcGIS
Legend
CTShellfishOnline - CTRecreationalBeds
Approved
Approved-Seasonal
Conditionally Approved
Conditionally Approved-Seasonal
CTShellfishOnline - CTShellfish_Area_Town_Poly
CTShellfishOnline - CTShellfish_Class
Approved
Conditionally Approved
Condtionally Approved Seasonal
Restricted-Relay
Conditionally Restricted-Relay
Prohibited
Norwalk Harbor CRR
Calf Pasture Beach
Westport CA #1
Calf Pasture Island Bed
Norwalk Restricted
Norwalk CA A
Goose Island
Grassy Island Bed
Betts Bay
Cedar Hammock
Chimon Island
Chimon Island
Norwalk Wilson Cove CRR
Norwalk CA #1
Norwalk Wilson Cove CA #1
Shea Island
Bell Island
Norwalk 5 Mile Mouth Restricted
Norwalk Cookes Ground
Sheffield Island
Norwalk Approved
Bar Bed
0.4mi
Suffolk County, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA
esri

Housatonic River, Milford and Stratford, CT May 2014 (Accumulated)

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CTShellfishOnline - CTShellfish_Class
Approved
Conditionally Approved
Condtionally Approved Seasonal
Restricted-Relay
Conditionally Restricted-Relay
Prohibited
Milford Housatonic
Milford Gulf
Pond Point CA
Milford Recreational West
Milford SW Milford CA
Stratford Housatonic
Bridgeport Restricted
Stratford Restricted
Stratford CA North
Bridgeport
Stratford
1mi
GBRC, Suffolk County, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, E...

Conditional Management around the Country

Use of the conditional classification is a voluntary option for the Authority

reopen the area as required. Use of these classifications imposes additional manpower and resource burdens on the Authority. For example sources of pollution must be routinely monitored; coordination between state, local and industry officials must be timely; performance standards must be monitored; and closures must be immediate and effective. Any Authority that has elected to use the conditionally approved or conditionally restricted classifications has found the resource investment to be substantial and this investment must be balanced against the benefit of the additional shellfish resource available.

Factors in Use

Factor	Number States
Rainfall	15
Seasonal Fc levels	10
Marina	8
River	7
Sewage Treatment Plant	7
Tide Range	1
Pharmaceutical Plant	1

Combination Plans

Factors	Number States
Rainfall/STP	5
Rainfall/River	5
Seasonal Fc/Marina	2
Rainfall/Seasonal Fc	1
Rainfall/River/Seasonal Fc	1
Rainfall/STP/Marina	1
Seasonal Fc/River	1
STP/Marina	1
STP/River	1

Rainfall Monitoring

Approaches	Number States
Single gauge	11
Multiple gauges	3
Multisensor Precipitation Estimator (MPE)	1

Number of Growing Areas

Total number of growing areas per State ranges from 4 to 303

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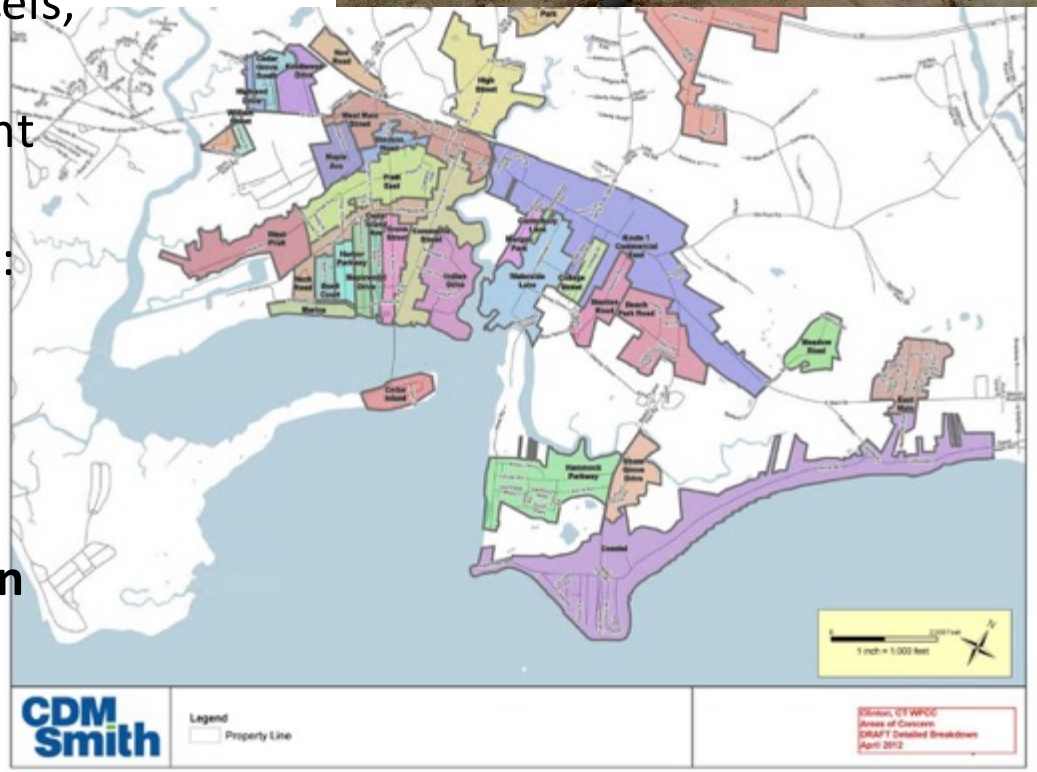
Ongoing Classification Challenges for Recreational Programs

SSDS Impacts to Recreational Areas

- **A number of shoreline towns are under consent order by the DEEP for pollution abatement due to SSDS**
- Approximately 40% of the coastline in CT is served by SSDS
- SSDS on the coastline may not be effectively treating sewage due to site limitations (sand, high water table, small parcels, ledge rock)
- Many SSDS are 50+ years old and installed prior to current Public Health Code
- Options for correction are limited in many of these areas:
  - On-site retrofits
  - Community systems
  - Extend sewers
  - Vacate properties
- **According to current PHC, SSDS would not be allowed on many of these lots!**



What's the big deal?

- WA State Norovirus Outbreak November/December 2014
- At least 11 people became ill after consuming oysters harvested from WA growing area
- Sanitary survey conducted identified a failing septic system in the growing area
- In coastal areas, septic systems that are ineffective at removing pathogens may be impossible to identify via sanitary survey or more invasive techniques like dye studies
- Conditional Management requires "Predictable Triggers": SSDS failures are sporadic and unpredictable

Not the media attention we are looking for…

barfblog
safe food from farm to fork

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SEARCH RESULTS FOR: NOROVIRUS WELLFLEET

OysterFest in Wellfleet MA to go on, without raw oysters, after 75 ill with noro

0

Posted on October 15, 2016 by Ben Chapman

I've eaten exactly one raw oyster ever. It was at a reception for a food safety meeting in New Zealand. I picked up the shell, dumped the contents (salt water and a slimy shellfish meat) into my mouth, getting about … Continue reading →

Posted in Norovirus | Tagged Oysters | 0 Comments

Old Saybrook Decentralized Wastewater Management Program

- High density development
  - *4 to 8 homes per acre*
- Older systems (50+ years old) built prior to current Public Health Code
- Marginal land developed because of proximity to shore
- Shallow groundwater
  - *Permeable soils, but unsuitable for septic systems*
- Nitrogen loading to Long Island Sound

Decentralized Wastewater Management for an Established Coastal Community

http://www.oswpca.org/files/CAWPCA_OS_DWMP_113010.pdf

Guilford Coastal SSDS Long Term Planning

Categories of Options	Possible Options
Management of coastal real estate and structures	Building codes (freeboard, V zone standards in A zones)
	Acquisition of damaged properties
	Zoning overlays
	Zoning amendments
	Coastal realignments through any of the above
Shoreline protection and management of coastal and near-shore lands	Hard shoreline protection
	Living shorelines
	Buffers for flood protection
	Land acquisition for tidal marsh migration
	Land conservation for tidal marsh migration
Roadway alterations	Elevation of roadways
	Abandonment of roads
	Re-evaluation of emergency routes
	Alternate egress
Protection or replacement of water supply wells and septic systems	On-site retrofits of septic systems
	Community wastewater systems
	Extension of sewer system
	Individual water treatment systems
	Community water systems
	Extension of water mains
	Vacate properties

The options listed in Table 1 were presented to the public. A number of comments were received during the public participation component of the meeting. In general, these comments were grouped into the following four themes:

Guilford Coastal Resilience Plan
http://www.ci.guilford.ct.us/pdf/Coastal%20Resilience%20Plan,%20Report%20&%20Options.pdf

Survey of Northeast States Municipal Programs

	NY	NH	MA	RI	ME	CT
Growing area classification	state	state	state	state	state	state
Dedicated Municipal Staff?	Depends on community	NO	YES, Shellfish Constable Position	Yes, through Harbormaster	Depends on community	Depends on community
Paid/Volunteer Staff?	BOTH	NONE	BOTH	BOTH	BOTH	BOTH
Water Sample Collection by Municipality?	YES, Required	NO	NO, not permitted	YES, BI	YES	Combination
Sample Transportation to State Lab?	Municipal	NO	NO, not permitted	Municipal: BI FERRY/Airplane	Municipal	Combination
Number of Municipal Programs?	2	NONE	61	1, Block Island	78 of 95 towns	14 of 26 towns
Number of Growing Areas?	35	10	303 DSGA (749 Class areas)	10	100s	156
Conditionally Approved Areas?	2 Seasonal CA areas	5	159	2 Seasonal CA areas	88	90

A Cautionary Tale: New York State Conditional Areas

1980s	NYS DEC first established conditional areas (rainfall and seasonal)
1990s	17 Conditional programs in 11 towns (state management and sampling)
2000s	State advised Towns that they would be required to assume sampling responsibilities due to "limited resources“ at state level
2000 to 2008	NY operated ~ 15 CA Programs with Town required sampling
2008 to 2011	State advised towns that could no longer operate conditional programs due to "limited resources“ at state levels
2011	Conditional management resumed by State, but Towns required to collect all water samples
2011-2016	Only 2 CA programs operated (seasonal and rainfall trigger)
2016-2017	5 or 6 Towns have started collecting samples to re-establish CA programs

CT 2016 Vibrio Season Update

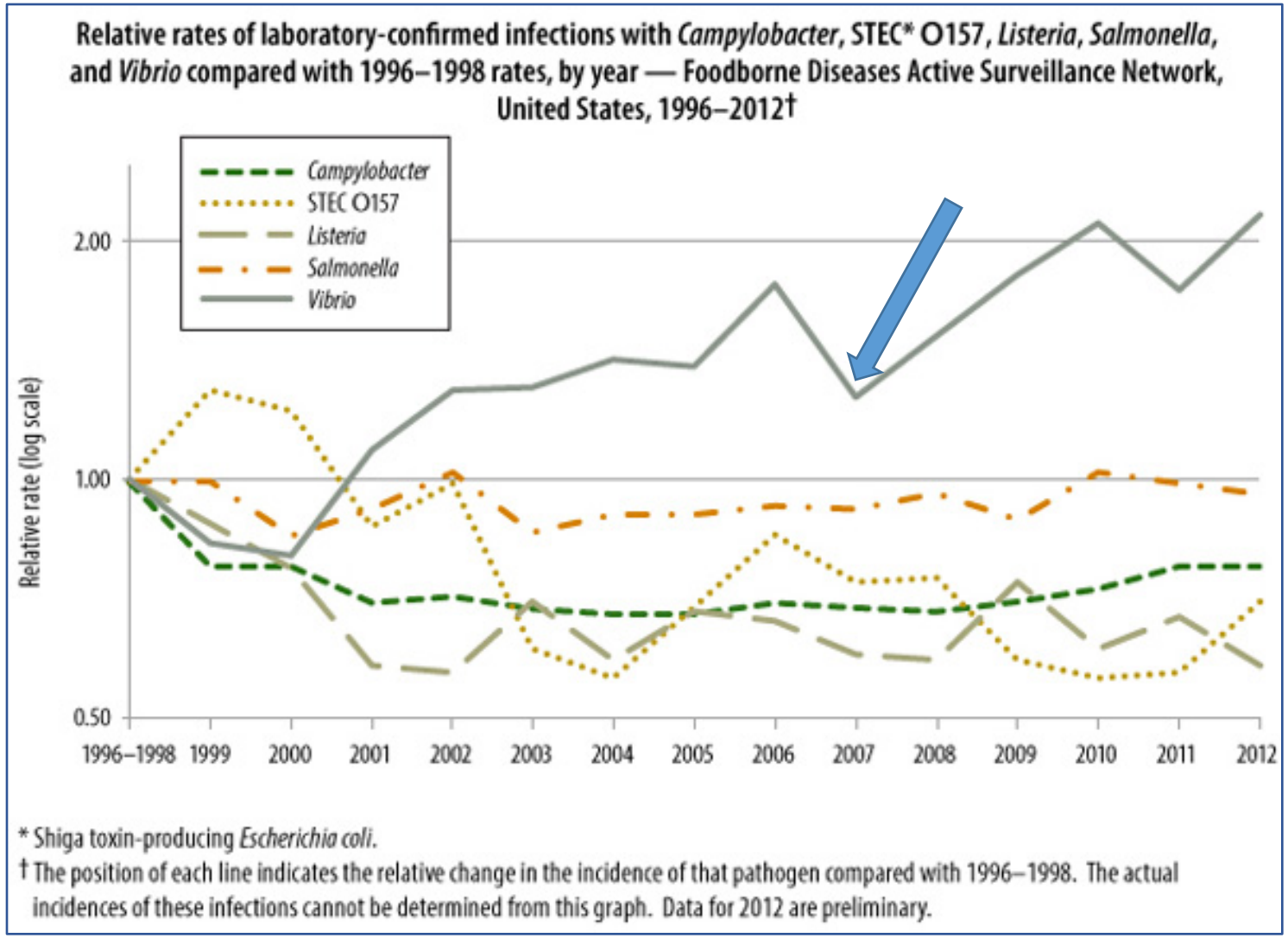
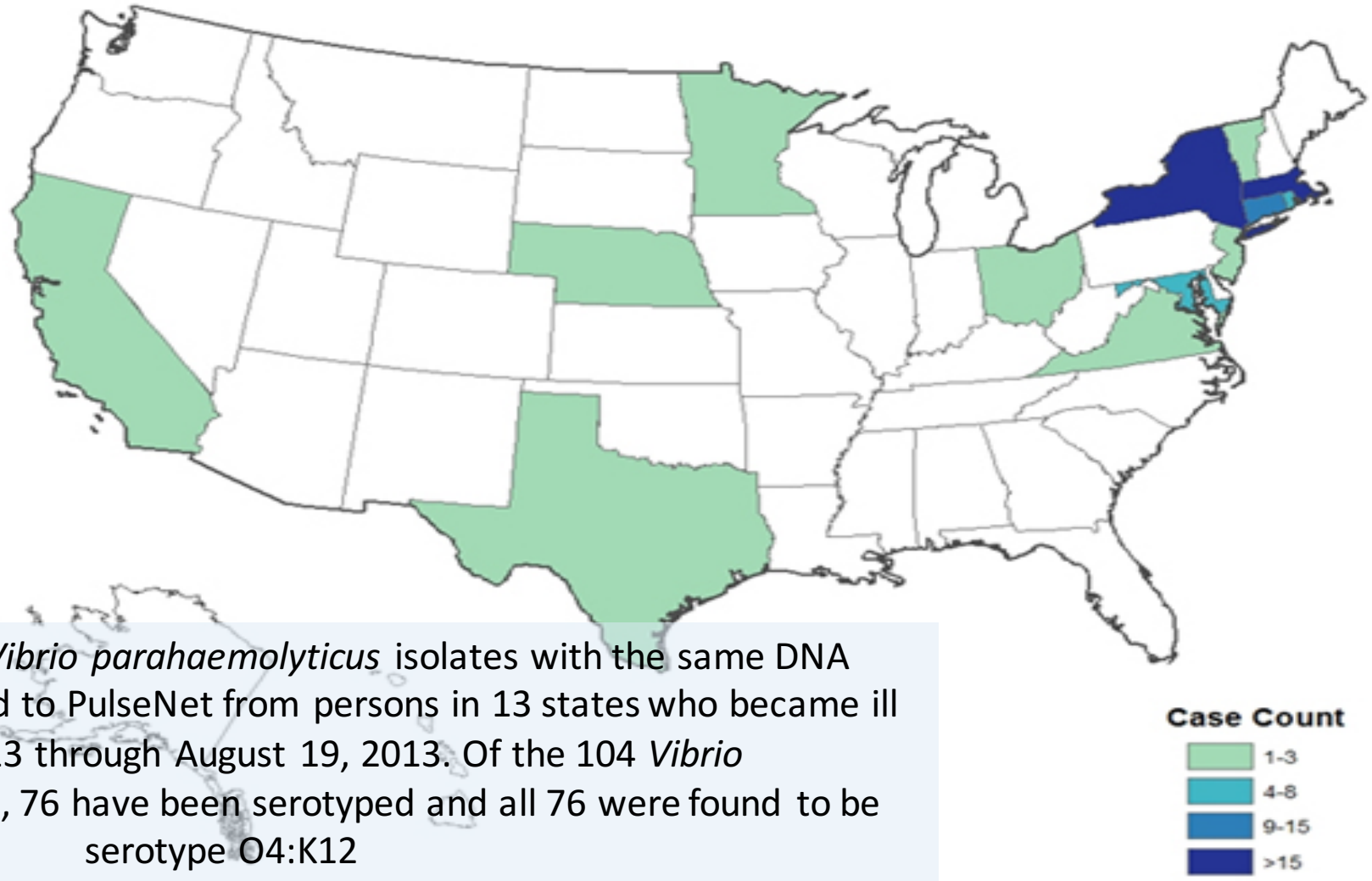


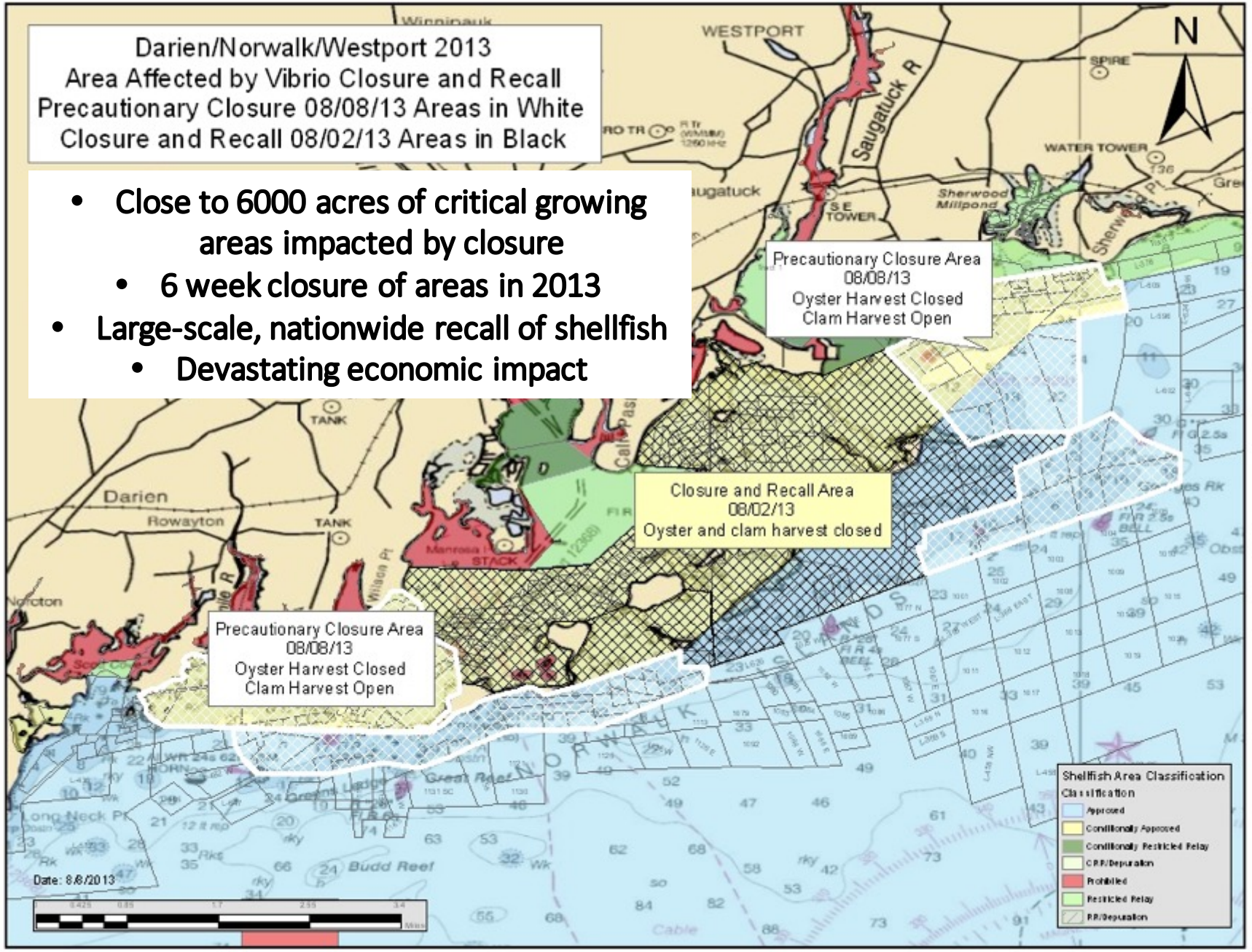
Figure 1. Relative rates of laboratory-confirmed infections with *Campylobacter*, *E. coli* O157, *Listeria*, *Salmonella*, and *Vibrio*, compared with 1996--1998 rates, by year --- Foodborne Diseases Active Surveillance Network, United States, 1996--2012*
http://www.cdc.gov/foodborneburden/trends-in-foodborne-illness.html

Vp Outbreak Strain 2013 (O4:K12)



One hundred and four *Vibrio parahaemolyticus* isolates with the same DNA "fingerprint" were reported to PulseNet from persons in 13 states who became ill from May 12, 2013 through August 19, 2013. Of the 104 *Vibrio parahaemolyticus* isolates, 76 have been serotyped and all 76 were found to be serotype O4:K12

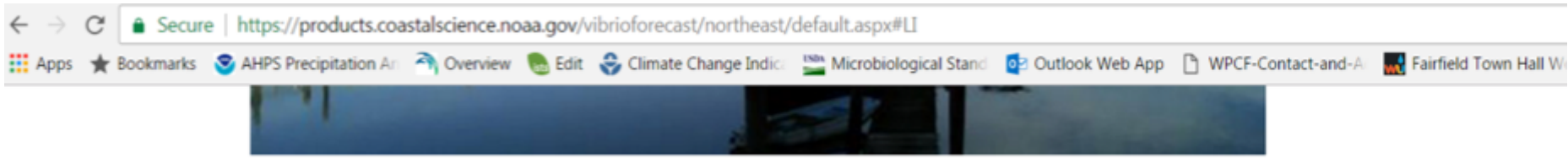
http://www.cdc.gov/vibrio/investigations/vibriop-09-13/map.html

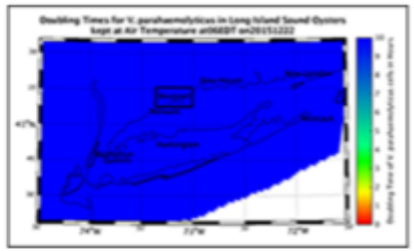

Darien/Norwalk/Westport 2013
Area Affected by Vibrio Closure and Recall
Precautionary Closure 08/08/13 Areas in White
Closure and Recall 08/02/13 Areas in Black
• Close to 6000 acres of critical growing areas impacted by closure
• 6 week closure of areas in 2013
• Large-scale, nationwide recall of shellfish
• Devastating economic impact
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
WESTPORT
Saugatuck R
WATER TOWER
Darien
Rowayton
Norwalk
Budd Reef
Date: 8/8/2013
Shellfish Area Classification
Classification
Approved
Conditionally Approved
Conditionally Restricted Relay
CRR/Depuration
Prohibited
Restricted Relay
RR/Depuration

Vp Illness History in Connecticut: 2009 to 2016 Illness Summary

Year	Confirmed Cases Linked to CT Shellfish
2009	1
2010	1
2011	1
2012	1* (8 week closure)
2013	23** (6 week closure)
2014	1 (95.6% reduction vs 2013)
2015	2
2016	1

Cooling Profiles: Ice Slurry

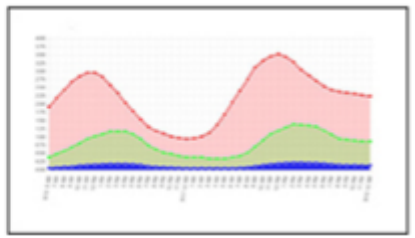




Doubling Time of *Vibrio parahaemolyticus (Vp)* in Long Island Sound Oysters

Vibro parahaemolyticus has one of the fastest growth rates of all estuarine bacteria, and the population can replace itself, or double every hour at 90Â°C. This product uses local *NWS* gridded forecasts of air temperature from the National Digital Forecast Database to force a statistical growth rate equation (USFDA 2005) for *Vp*. The spatially explicit graphical display allows users to determine where and when the highest doubling times will occur every hour, out to 7 days in advance to plan harvest and refrigeration strategies.

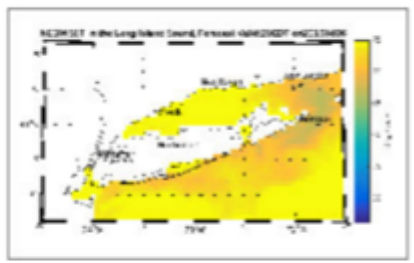
View Models



Best Harvest Windows

The *Vp* doublings given different cooling strategies are shown for growing areas in Long Island Sound. These graphs allow users to determine where and when the highest doubling times will occur in advance to plan harvest and cooling strategies.

View Models



Sea Surface Temperature (SST)

Temperature is a major driver of *Vibrio* growth. In general, once water temperatures exceed 15Â° C, or 59Â°F growth will occur, with faster replication at higher temperatures. Because of the strong dependence on temperature for growth, *SST* is used in some cases to trigger harvest restrictions. This product provides 96 hr modeled guidance for *SST* for parts of the Long Island Sound.

View Models Return to top of page

https://products.coastalscience.noaa.gov/vibrioforecast/northeast/default.aspx#LI

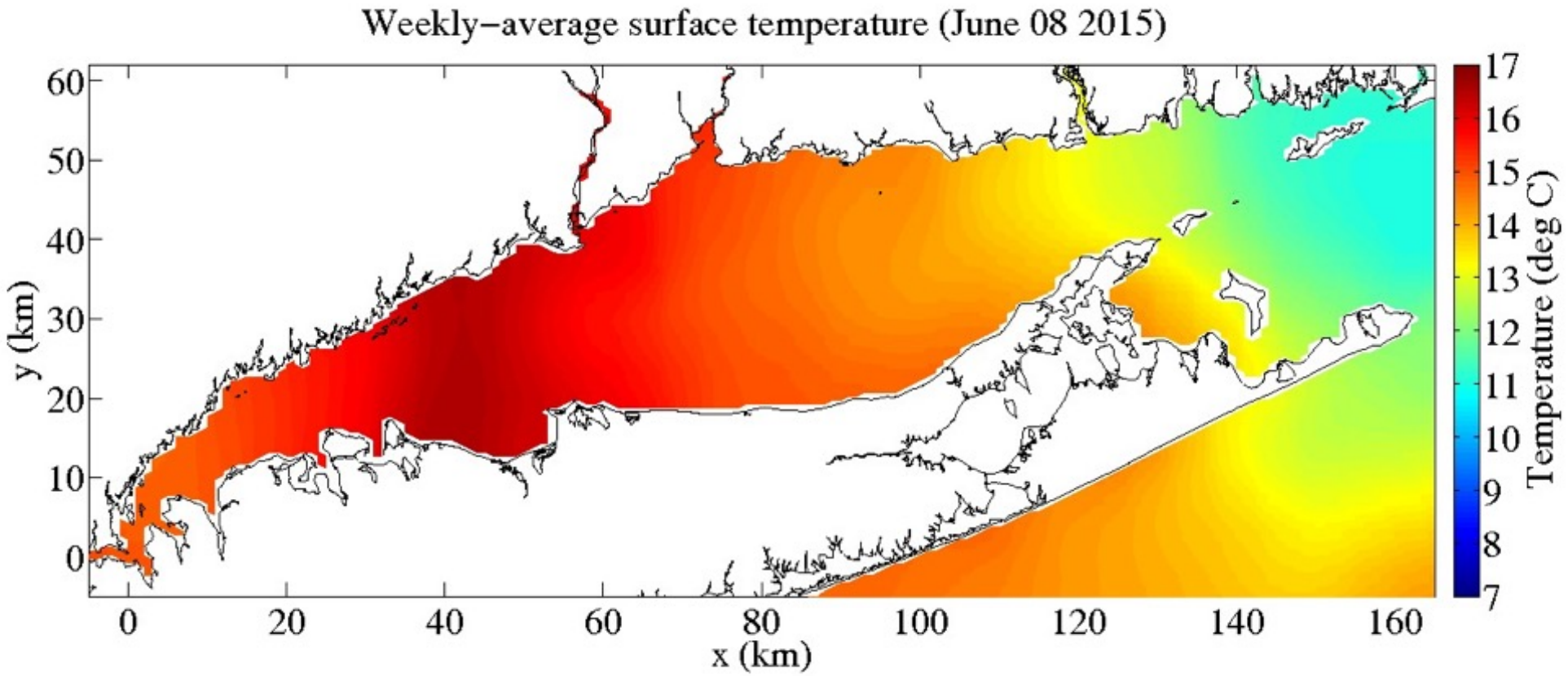
Modeling *Vibrio parahaemolyticus* Outbreaks in Commercial Shellfish Areas

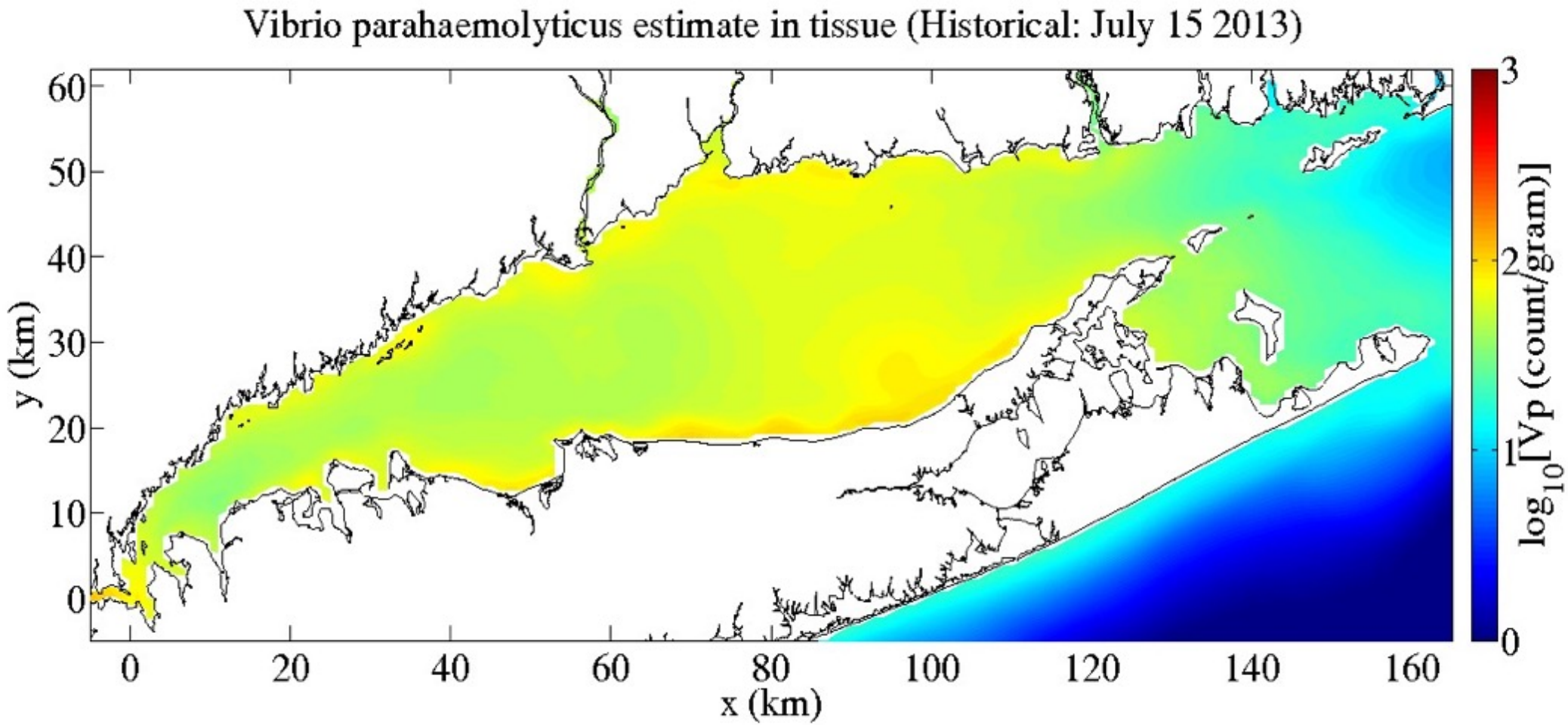
Principal investigators are Mike Whitney(UCONN Marine Sciences), Evan Ward (UCONN Marine Sciences), and Kristin DeRosia-Banick (CT Department of Agriculture Bureau of Aquaculture)

Project Page: http://cprime.uconn.edu/vibrio/

Funding Provided by Connecticut Sea Grant, University of Connecticut through Award No. NA14OAR4170086, Project Number R/EM-2

Daily sea-surface temperature (SST) data are acquired from the G1SST product (from the NASA Jet Propulsion Laboratory) that includes observations from satellites. The prior week (7 days) of SST are averaged together to construct the weekly-averaged surface temperature field throughout LIS

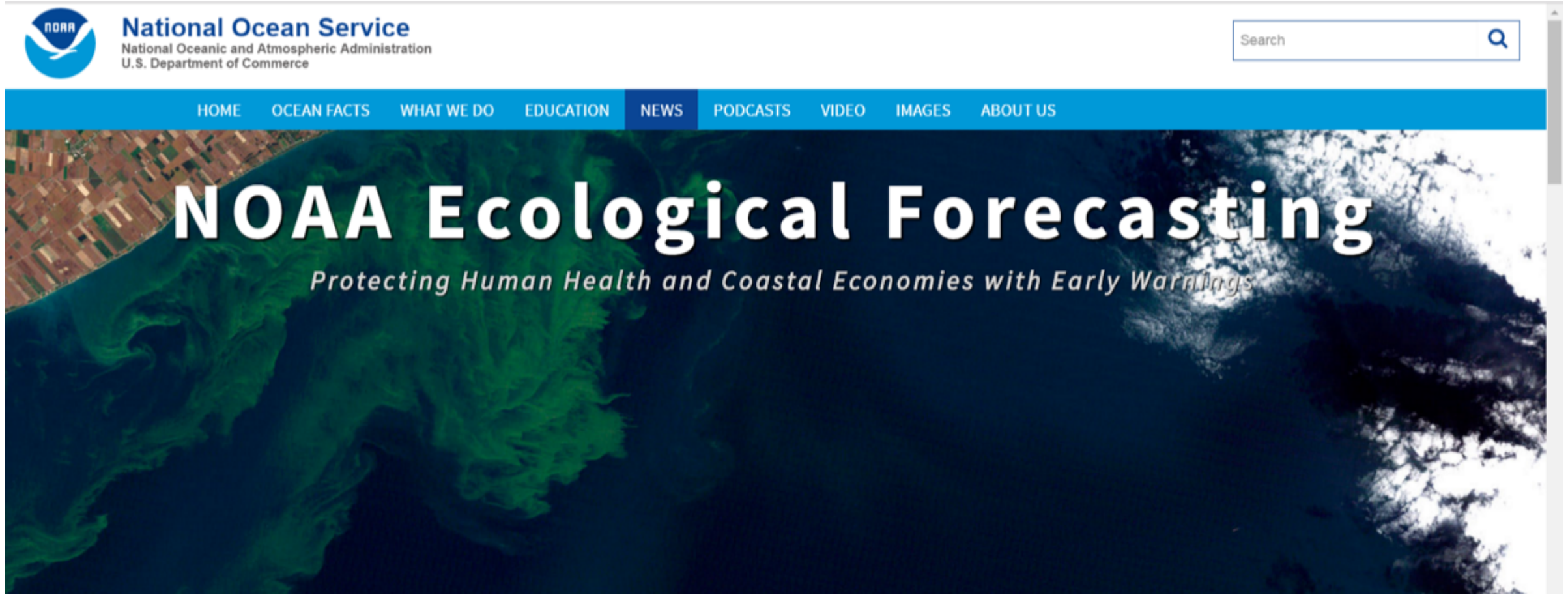




Vp counts in pre-harvest oyster tissue calculated using the FDA Quantitative Risk Assessment with bottom temperature and salinity estimates as inputs.

Eco-forecasting for Shellfish Management

- Connecticut Shellfish Initiative Implementation: DABA WQ Database Project
- Develop predictive models for bacterial and viral indicators to enhance growing area management
  - fecal coliform monitoring data
  - rainfall data
  - stream gauge data
  - current models
  - WPCF hydrographic models
  - Real-time monitoring of environmental parameters
- Leverage existing collaborations between States, Academia, USFDA, IOOS, NOAA and Private Sector


National Ocean Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
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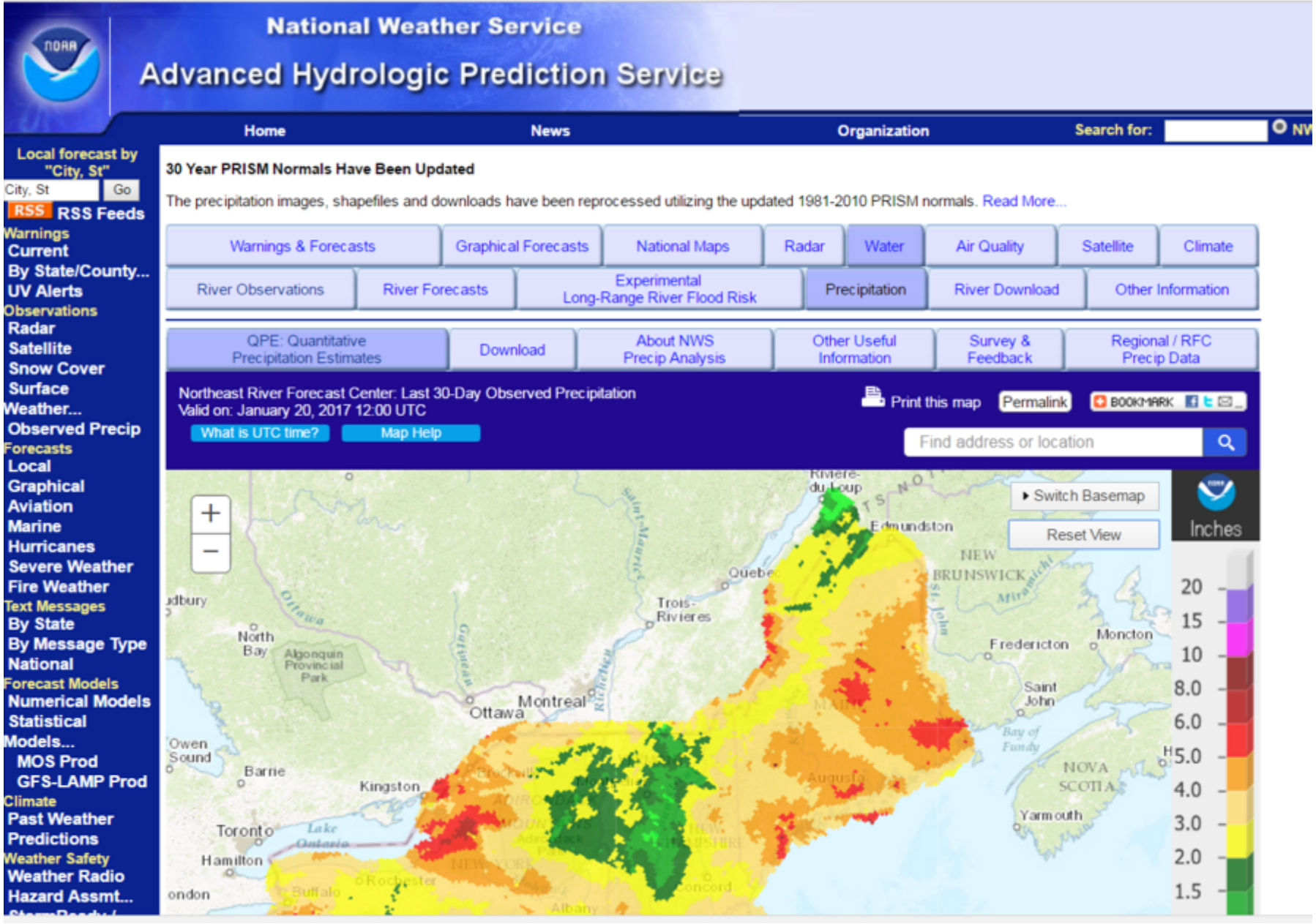
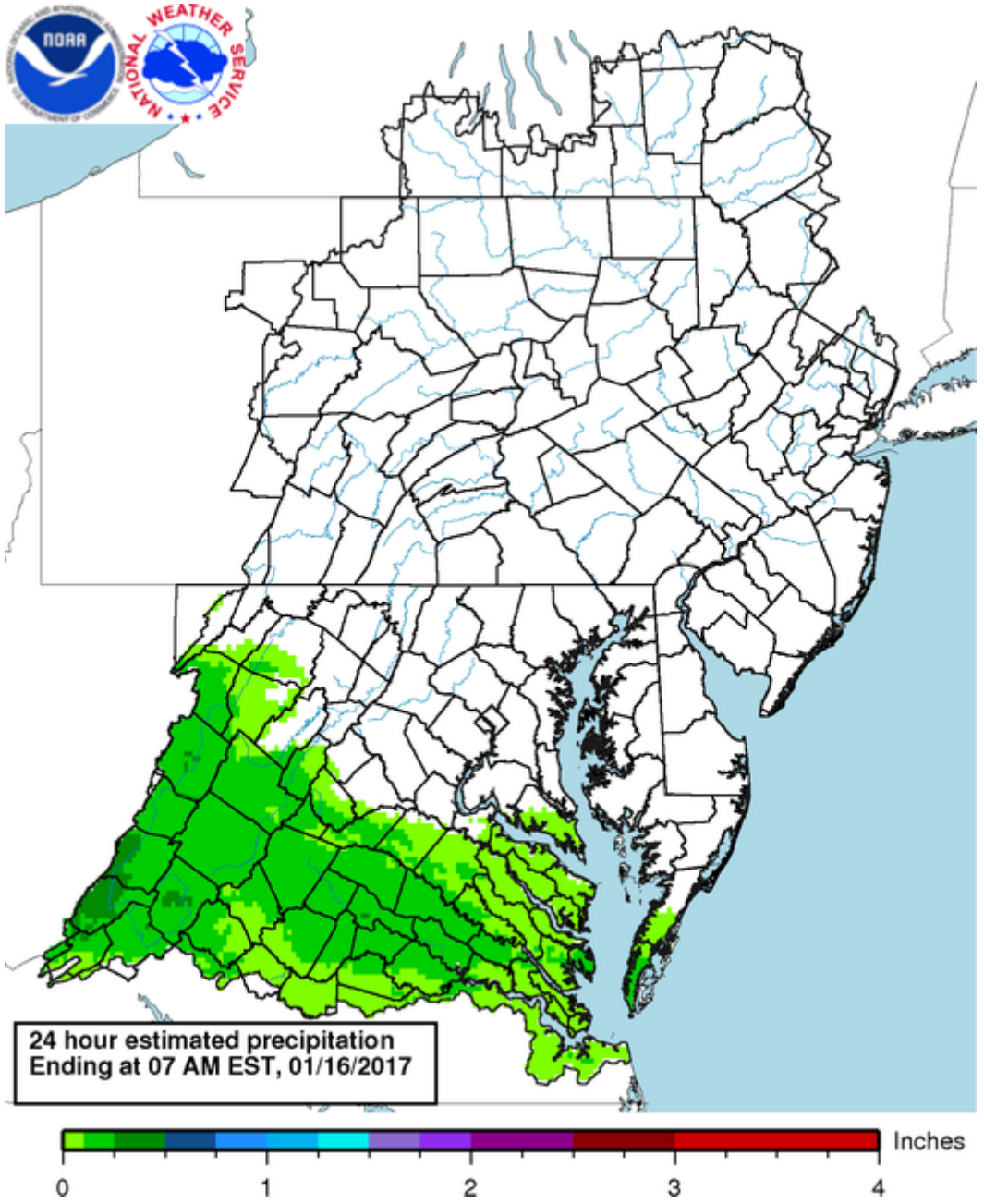
EDUCATION
NEWS
PODCASTS
VIDEO
IMAGES
ABOUT US
NOAA Ecological Forecasting
Protecting Human Health and Coastal Economies with Early Warnings



https://water.weather.gov/precip/index.php?analysis_date=1484870400&lat=44.3709870000&location_name=nerfc&location_type=rfc&lon=-72.1801760000&precip_layer=0.75&product=observed&recent_type=today&rfc_layer=-1&state_layer=-1&hsa_layer=-1&county_layer=-1&time_frame=1day&time_type=recent&units=eng&zoom=6&domain=current

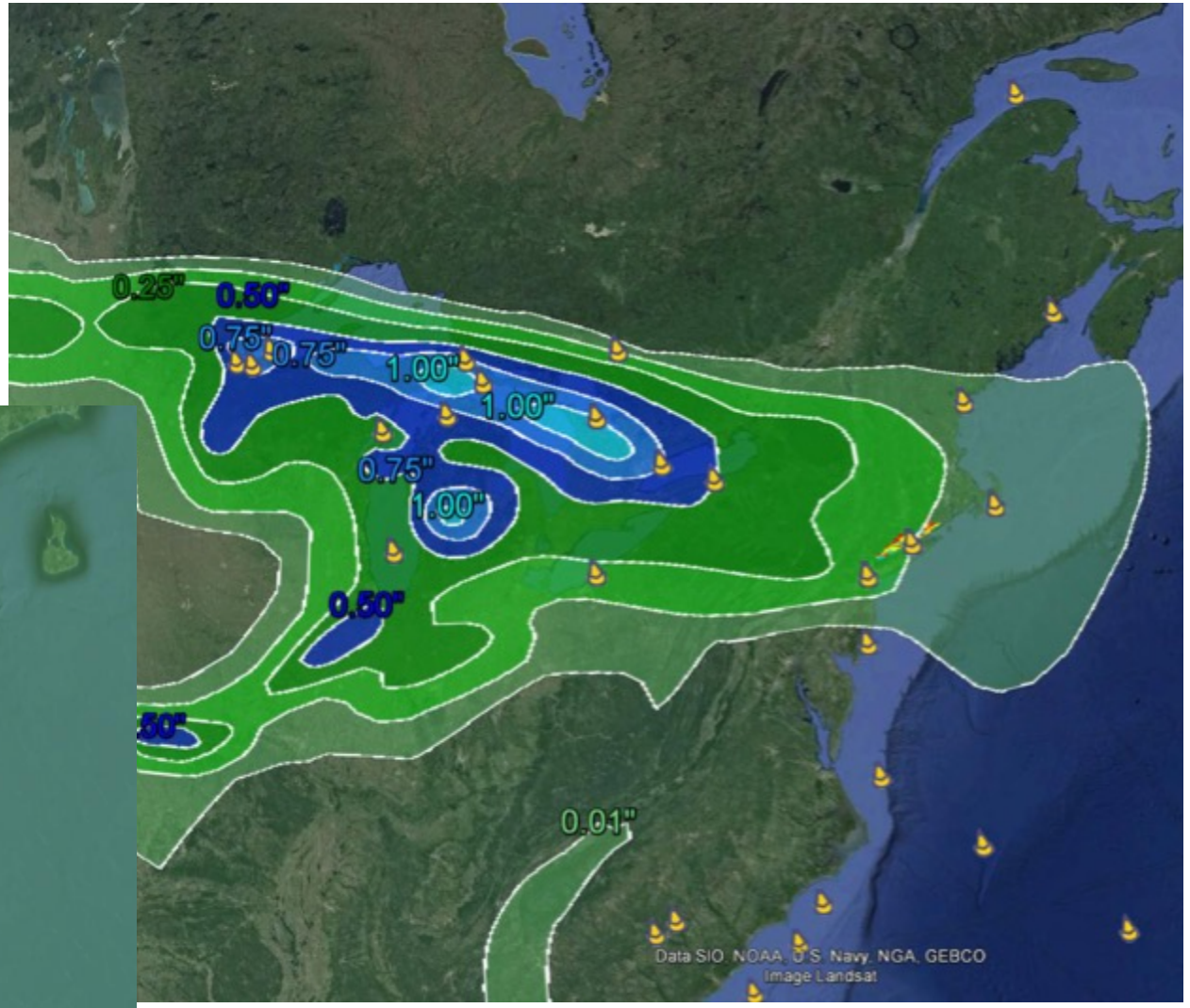
Multi-sensor Precipitation Estimates for Rainfall Trigger Closures



NOAA NWS
Multi-sensor Precipitation Estimation (MPE)

- Studies have shown that algorithms which combine sensor inputs -- radar, gauge, satellite -- yield more accurate precipitation estimates than those which rely on a single sensor (i.e. radar-only, gauge-only, satellite-only)
- Hourly precipitation estimates from WSR-88D NEXRAD are compared to ground rainfall gauge reports, and a bias (correction factor) is calculated and applied to the radar field. The radar and gauge fields are combined into a "multisensor field", which is quality controlled on an hourly basis
- In discussions about applying the MPE and QPF to growing area closures and forecasting

Quantitative Precipitation Forecasts for Rainfall Conditionally Approved Areas

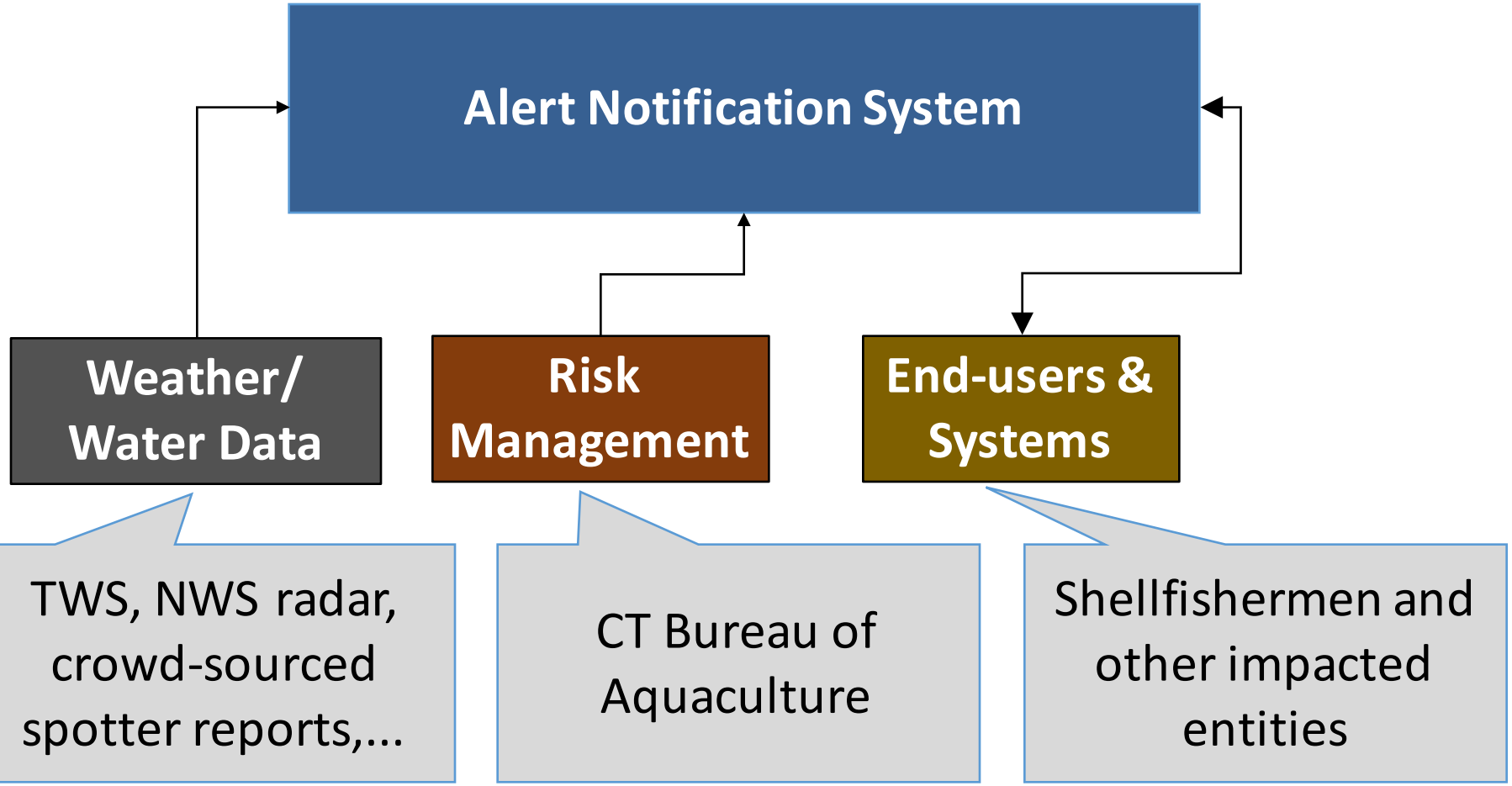


Aquaculture Weather and Water Decision-Support and Alert Notification System

Precision Forecasts and Alerts/Notification

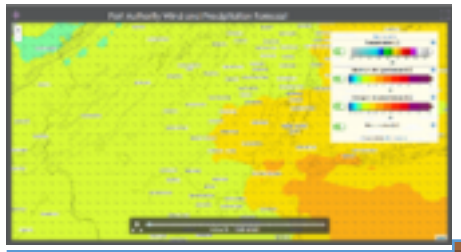
- Weather and water threats impacting aquaculture ecosystem fused with CT Dept of Agriculture notifications
- Focus on what matters to Shellfish Industry & Shellfish Commssions
- One-stop shop
- Via Webpage or mobile app

Hypertargeted, Agile Mobile Alerting System



Real-Time Alerts with Custom Data and Thresholds

Weather overlay



Contextual Notification System

Shellfishing Alert Control System Web Portal

TruWeather

NWS

Shellfishermenc crowdsourcing

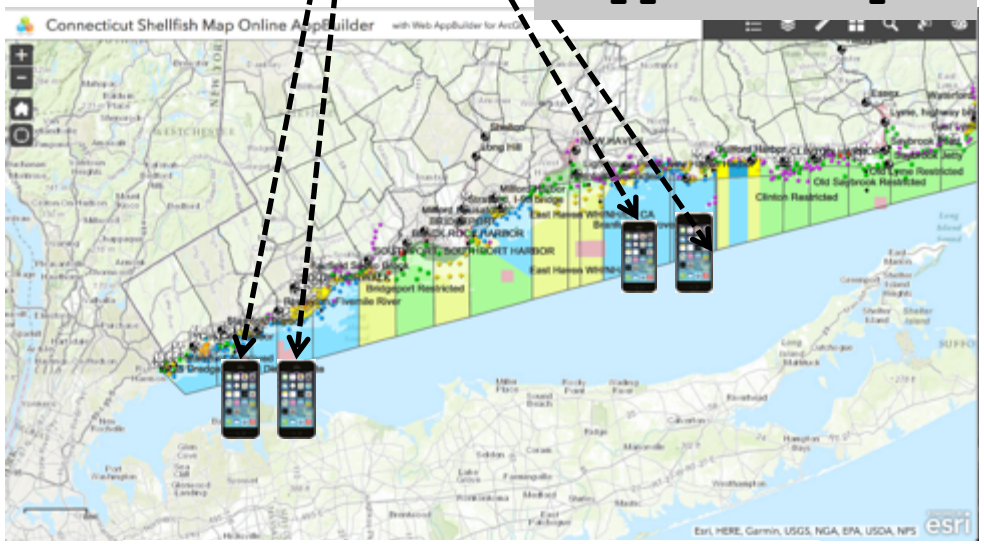
CT regulations

Lightning

Your data feed here

Norwalk Area A Closed

Branford Approved Open



National Weather Service

Advanced Hydrologic Prediction Service

Home | News

Local weather forecast by "City, ST"

City, ST Go

National Conditions
- Rivers
- Satellite
- Climate
- Observed Precip

Local Conditions
- Warnings
- Weather Forecast
- Radar

AHPS Documentation
- User Guide
- User Brochure

What is AHPS?
- Facts
- Our Partners

Feedback/Questions
- Provide Feedback
- Ask Questions

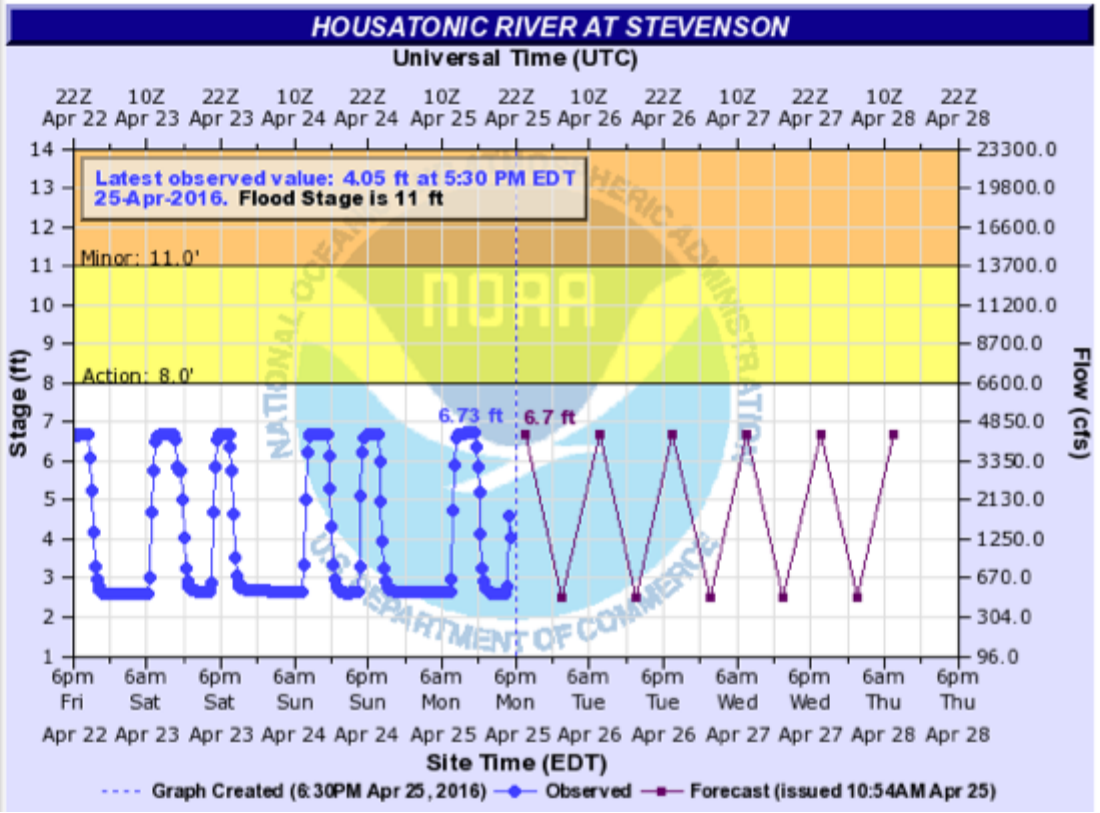
FLOODSMART.GOV

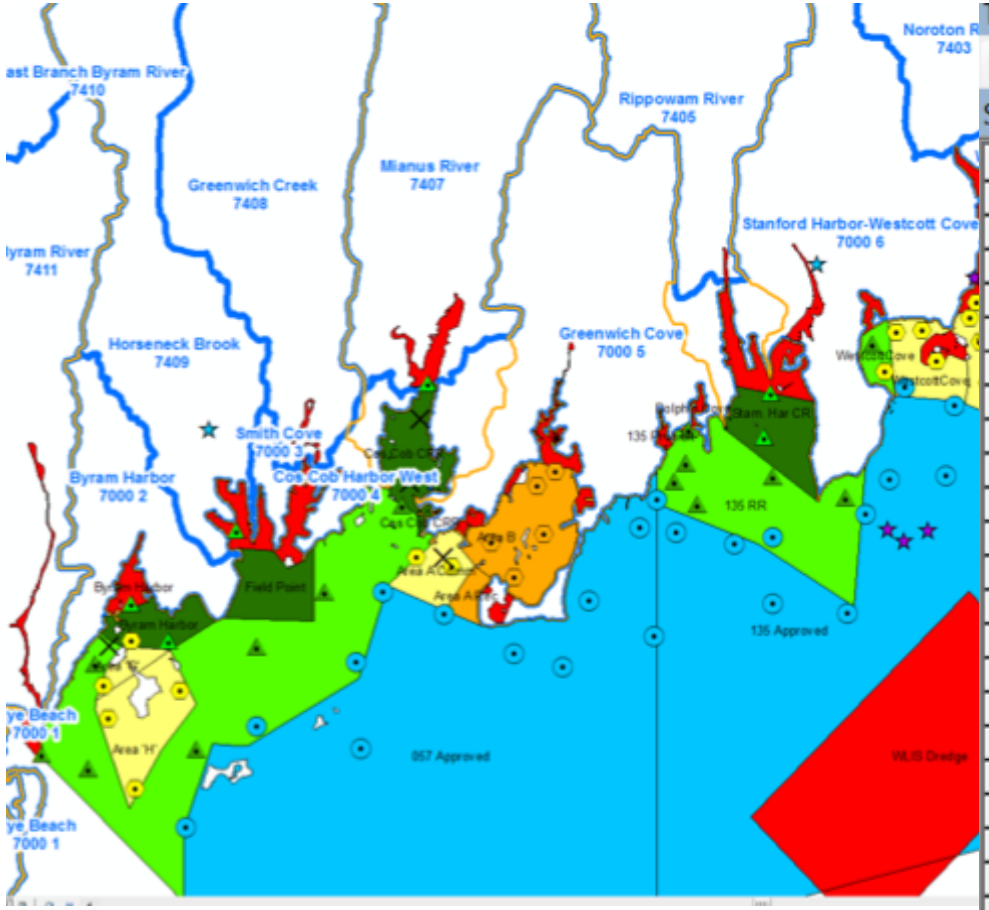
National Observations | WFO Observations | Hydrograph

Weather Forecast Office Albany, NY — Northeast River Forecast Center

Hydrograph | River at a Glance | Download | Probability Information

Auto Refresh: OFF





Table

SamplingStations

STATION_	TOWN	SBAS_Coded	HUC_12	USGS_Stream
057-18.2	GREENWICH	7000 5	011000060405 03	01212500
057-17.4	GREENWICH	7000 5	011000060405 03	01212500
057-17.2	GREENWICH	7000 5	011000060405 03	01212500
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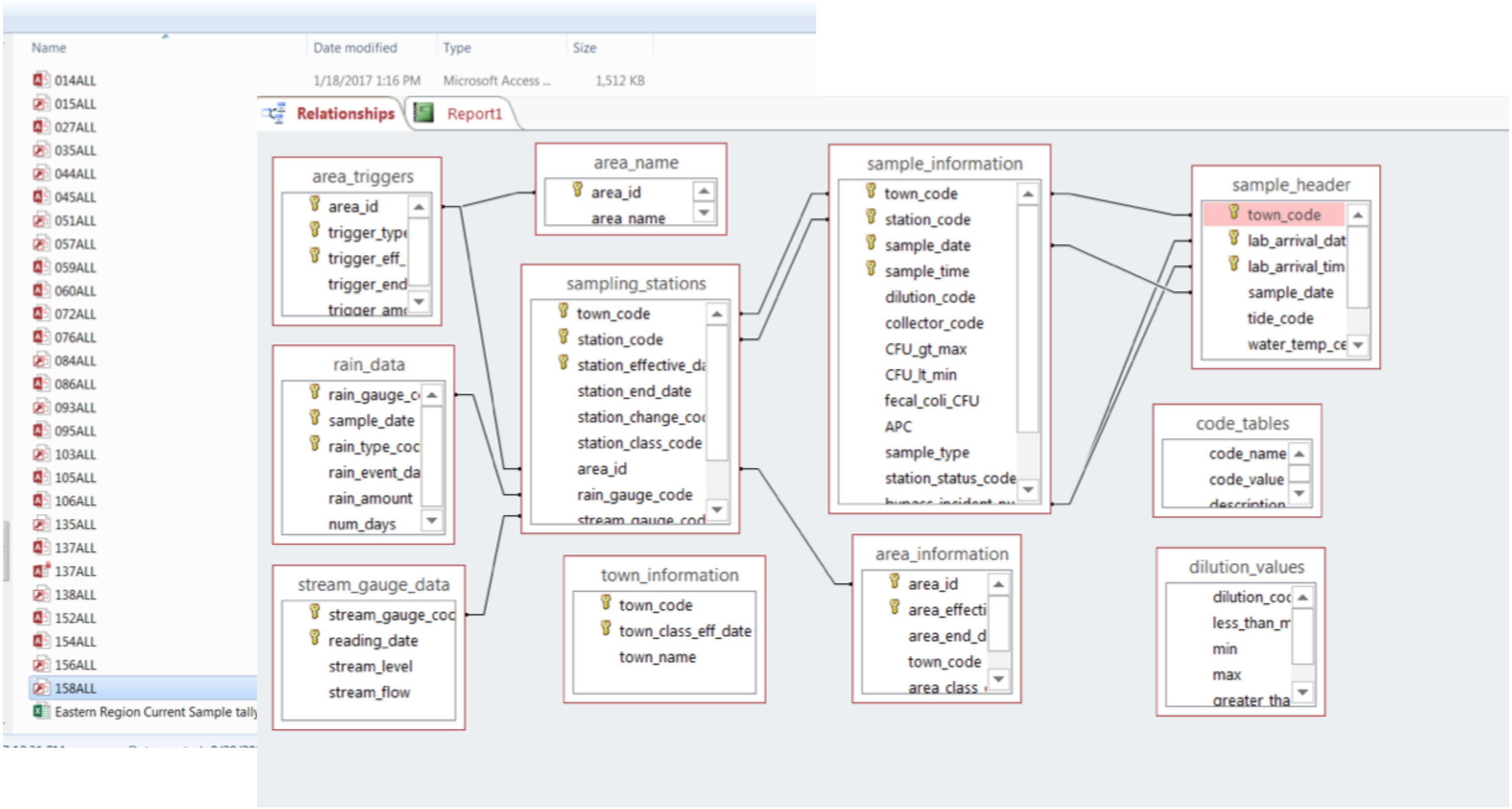
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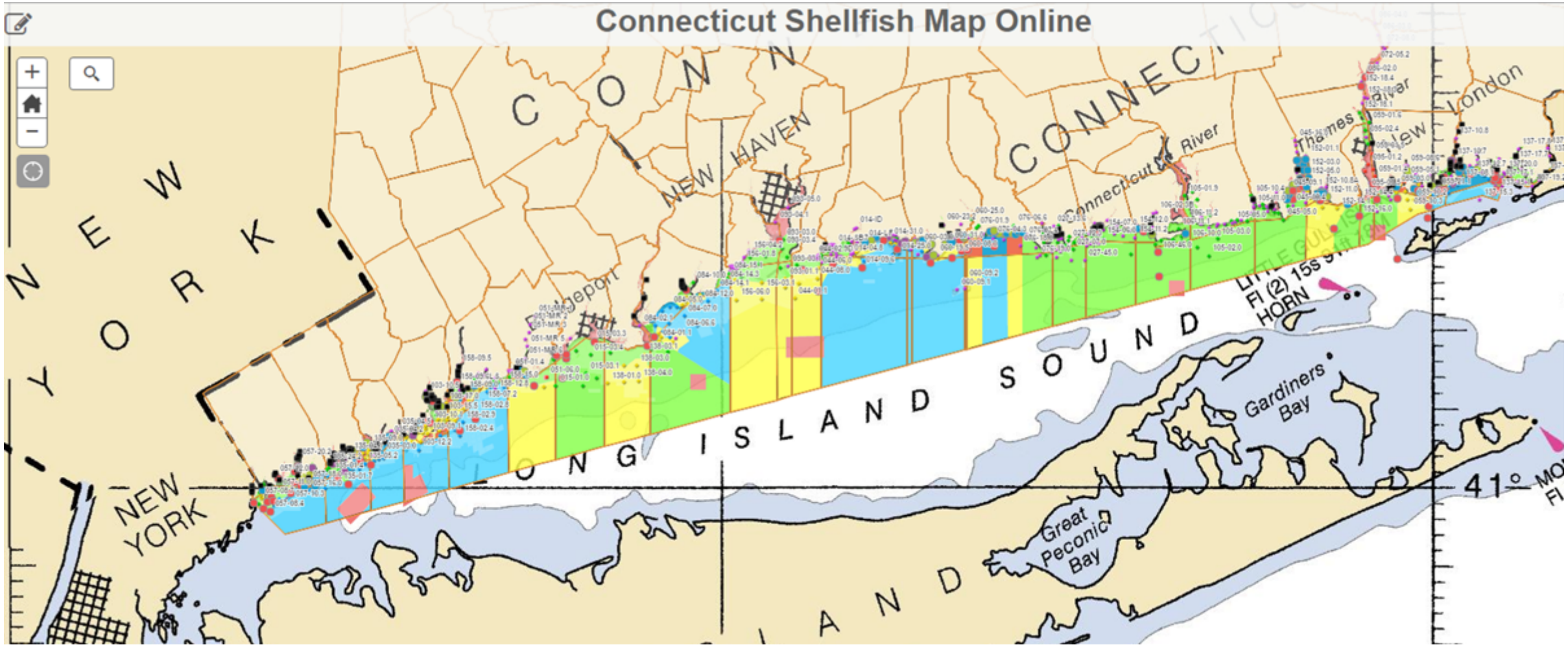

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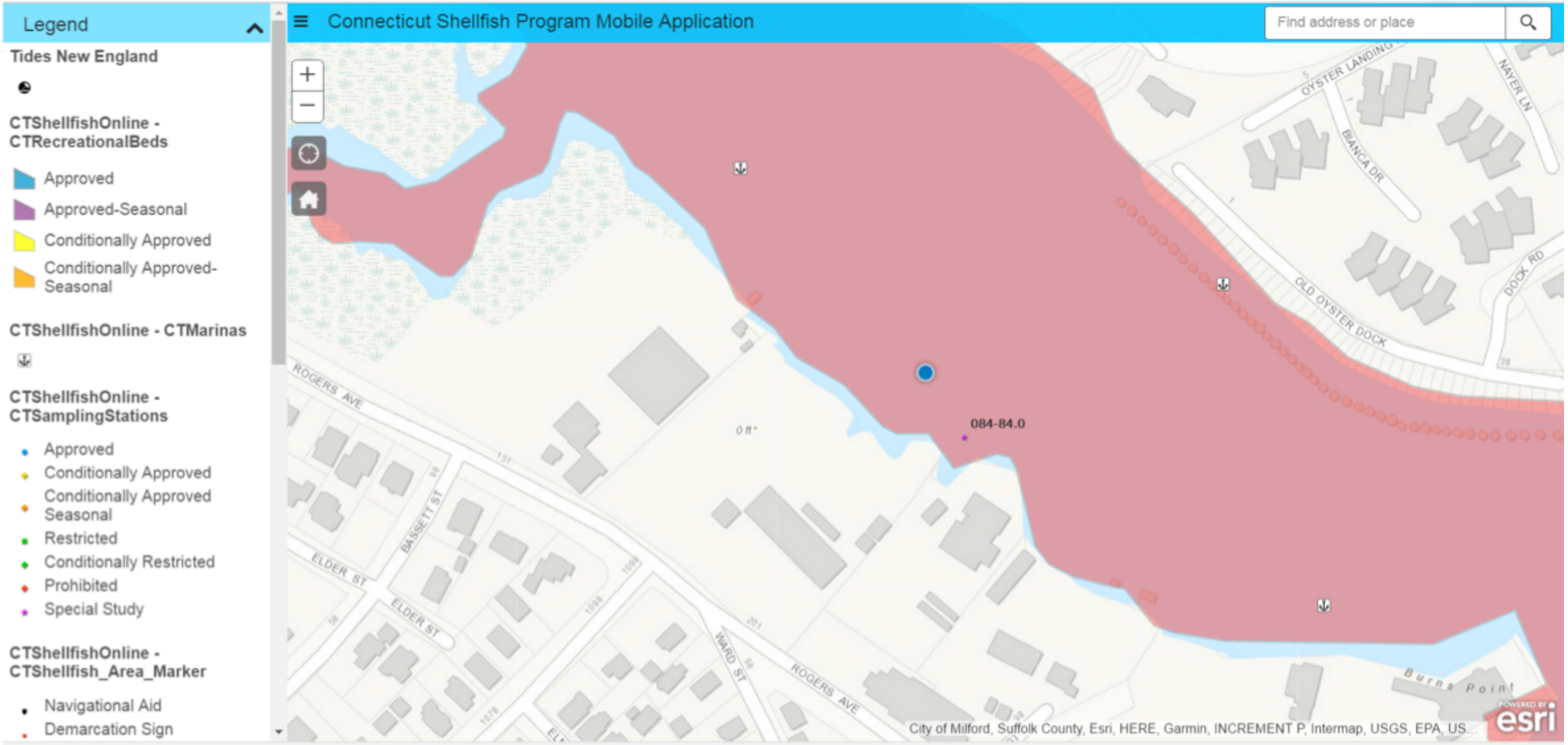

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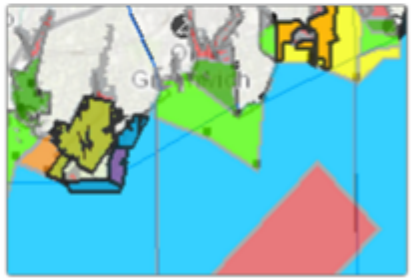

Connecticut Shellfish Map Online

CTShellfishOnline

USFDA

Amy Fitzpatrick, Greg Goblick, John Veazey: growing area classification training slides

NOAA

John Jacobs (NCCOS), Robert Alix (NWS): forecasting tool development

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