





2023 SHELLFISH COMMISSION GATHERING

CONNECTICUT DEPARTMENT OF AGRICULTURE, BUREAU OF AQUACULTURE

EMILY MARQUIS, ENVIRONMENTAL ANALYST II



OVERVIEW OF PRESENTATION

- Harmful Algal Bloom Update
- Statewide Shellfish Disease Update
- Per- and Polyfluoroalkyl Substances (PFAS) Update
- Vibrio Update

ANNUAL NUMBER OF HAB SAMPLES

| Year | 2019 | 2020 | 2021 | 2022 | |
|-----------------------------|------|------|------|------|--|
| Recreational HAB samples | 14 | 56 | 83 | 88 | |
| Total HAB samples | 179 | 226 | 244 | 217 | |

HAB MONITORING STATIONS (RECREATIONAL SHOWN IN RED)



FIRST STATEWIDE BIOTOXIN MONITORING



FIRST STATEWIDE TOXIN SCREENING 28 SHELLFISH SAMPLES TESTED FOR 14 TOXINS



WE NEED YOUR HELP TO COVER CT'S COASTLINE...

Please report discolored water, strange marine animal behavior and/or animal kills!

I) Take a sample; 2) take a photo; 3) call DA/BA



NEW FDA REQUIREMENT FOR HAB MONITORING (2019 NATIONAL SHELLFISH SANITATION PROGRAM MODEL ORDINANCE)

- In addition to the water quality (results and frequency) and shellfish testing and sanitary survey requirements...
- To open new growing areas where <u>historic HAB data is</u> <u>not available for a hydrographically linked waterbody</u>, the DoAG will comply with the newly required 36 samples over 3 years.

2022 SHELLFISH DISEASE UPDATE





SHELLFISH PATHOLOGY METHODS

1997-2016 Histology





2019-2022 Triplex PCR

Roger Williams University





PATHOLOGY DATA INTERPRETATION

- Prevalence: percent of animals positive in the population (each sample set was typically 30 shellfish)
- Weighed Intensity: total of the scores for each individual animal/total number of animals in the sample set. Weighed intensity is used to report findings from any pathology lab, regardless of the method used to do the evaluation, and provides an overall standardized score to assess the level of infection in each group of oysters by each of the parasites.
 - Dermo: Populations with weighed intensities above 2.0 usually show noticeable mortality.
 - MSX and SSO: Populations with weighed intensities of 2.0 and greater usually show noticeable mortality.

CT OYSTER DISEASE HISTORY: MSX



- The 1997 outbreak of MSX infection in market size oysters caused serious economic damage to the oyster industry.
- The following year, infection spread to seed oyster beds and caused devastating mortality.
- Populations began to recover after 2004.
- MSX-prevalence in Connecticut oysters has been in steady decline since the 1998 outbreak.
- MSX occurs in CT as a co-infection with another haplosporidian parasite, SSO.

ANNUAL AVERAGE PREVALENCE OF MSX AND SSO (1997-2022)

MSX prevalenceSSO prevalence



ANNUAL AVERAGE MSX WEIGHED INTENSITY (1997-2022)



Year

CT OYSTER DISEASE HISTORY: DERMO

- Dermo is a slow-killing disease.
- It takes up to three years in Connecticut after initial infection for parasite intensities to approach levels high enough to cause death of the oyster.
- Oysters are marketed when they are three to four years old. Consequently, Dermo has not caused significant mortalities in Connecticut's commercial oyster stocks.
- Dermo-associated mortalities have been detected in areas of unusually slow oyster growth or during restoration efforts when oysters are grown indefinitely.



ANNUAL AVERAGE DERMO PREVALENCE IN CT (1997-2022)



ANNUAL AVERAGE DERMO WEIGHED INTENSITY (1997-2022)



Year

EXPECTED MORTALITY FOR 2019-2022 OUT OF 62 SAMPLES RESULT INTERPRETATION (MORTALITY) PROVIDED BY CONSULTING PATHOLOGIST

| Type of expected mortality | 2019 | 2020 | 2021 | 2022 | Total | |
|-------------------------------|---|---|---|---|---------------|--|
| Expected Dermo mortality | (61. %) | 8 (57.14%) | 3 (20%) | 10 (62.5%) | | |
| | Calf Island, Greenwich; Fords Beach, Stamford; Outer Norwalk Harbor; Wilson Cove, Norwalk; Westport Cockenoe; Sasco Beach, Fairfield; Housatonic River; West Shore, Milford; Quinnipiac River; Jarvis Creek, Branford; Mystic River, Stonington | Fords Beach, Stamford; Outer Norwalk Harbor; Wilson Cove, Norwalk (2 samples);Westport Cockenoe; Stratford North; Quinnipiac River; Stony Creek, Branford | Greenwich Cove; Hammonasset River (wild); Mystic River, Stonington | Greenwich Cove; Stamford Shippan Point; Outer Norwalk Harbor; Stratford North; Housatonic River; West Shore, Milford; Quinnipiac River; Outer Branford Harbor; Thames River; Mystic River, Stonington | 32 (51.6%) | |
| Expected MSX mortality | I (5.56%) | I (7.14%) | 2 (13.33%) | 2 (12.5%) | | |
| | Hammonasset River | Hammonasset River | Hammonasset River (2 samples) | Wilson Cove, Norwalk; Niantic Bay, East Lyme | 6 (9.7%) | |
| Expected Dermo | I (5.56%) | I (7.I4%) | 2 (13.33%) | l (6.25%) | | |
| and MSX mortality | Thames River | Stamford Shippan Point | Wilson Cove, Norwalk; Bear Island, Branford | Hammonasset River | 5 (8.1%) | |
| Expected Dermo | I (5.56%) | 0 | 0 | 0 | | |
| and SSO mortality | Stony Creek, Branford | | | | I (I.6%) | |
| Total | 2019:14 (77.78%) | 2020: 10 (71.43%) | 2021:7 (46.67%) | 2022: 13 (81.3%) | 44 (71%) | |

2019-2022

Commissions who are experiencing noticeable or significant mortality in their growing area(s) should report this finding to the Bureau's pathologist.



Dr. Bienlien





- 98.4% of shellfish samples were infected with Dermo
- Dermo prevalence and weighed intensity were significantly higher for wild than hatchery samples
- In Connecticut this level of infection has not historically caused significant mortalities in our commercial oyster stocks.
- Individual reports have not indicated a high level of mortality despite this moderate to high prevalence of disease.

- 87% of shellfish samples were infected with MSX
- Hatchery populations had higher MSX prevalence and weighed intensity, but not significantly higher than wild oysters
- The current prevalence of MSX may be causing low levels of background mortalities in CT populations (e.g. the Hammonasset River)

IMPORTATION POLICY

https://portal.ct.gov/DOAG/Aquaculture1/ Aquaculture/Shellfish-Importation



Eastern oyster: The Bureau of Aquaculture does not allow the importation of oysters with the exception of hatchery stock from RI and MA, or stock from NY and Long Island Sound.

Bay scallops: The Bureau of Aquaculture does not allow the importation of scallops from outside of Long Island Sound.

Prior to all importations:

Prior to any shellfish importation, the source must be approved by the Bureau of Aquaculture.

The applicant must arrange with Bureau of Aquaculture for a sample of live animals to be tested.

The source of product is not guaranteed to be approved and should be a consideration in any project plans.

2021 STATEWIDE SHELLFISH DISEASE UPDATE



STATE OF CONNECTICUT DEPARTMENT OF AGRICULTURE

Bureau of Aquaculture & Laboratory Services



David H. Carey Director

2021 Statewide Shellfish Disease Update

Shellfish health is a critical factor in maintaining viable wild and cultivated populations, which support a robust aquaculture industry. The Connecticut Department of Agriculture, Bureau of Aquaculture (DABA) has monitored shellfish health since 1997. This report provides recent oyster and hard clam disease data with historic context.

https://portal.ct.gov/-/media/DOAG/Aquaculture/Pathology/2021-Statewide-Shellfish-Disease-Update.pdf

2022 PFAS UPDATE





WHAT ARE PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)?

- PFAS are a group of 5,000+ man-made chemicals that are persistent in the environment.
- PFAS were widely used in manufacturing, non-stick products and food packaging, and fire fighting foam, to name a few sources.
- Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are 2 of the most widely used and studied PFAS chemicals.
- Scientific studies have demonstrated PFAS have reproductive, developmental, carcinogenic, immune, and hormonal effects on humans.
- The EPA began establishing PFAS health advisories for drinking water in 2016.
- Additional information is available on www.epa.gov/pfas

PFAS HISTORY IN CONNECTICUT

- 2013-15 EPA-mandated testing confirms that none of Connecticut's large public drinking water systems contain elevated PFAS levels.
- 2016 DPH adopts the EPA drinking water action level (70 ppt for sum of 5 PFAS chemicals).
- 2019 PFAS Action Plan released, listing evaluating food sources, including shellfish, as PFAS exposure pathways as a key recommended action.
- 2020 DEEP develops GIS map of PFAS sources, and establishes a PFAS takeback program.
- 2020 & 2022 Select <u>fish</u> consumption advisories issued for Connecticut rivers
- June 2022 New, lower drinking water action levels announced for 4 PFAS chemicals.
- December 2022 PFAS Task Force Action Plan Update: <u>https://portal.ct.gov/-</u> /media/DEEP/PFASTaskForce/PFAS-Task-Force-Action-Plan-Update_8December2022.pdf

GREENWICH 2020 PFAS TESTING IN WATER, SHELLFISH, AND SEDIMENT SAMPLES

All samples were non-detectable for 14 PFAS chemicals!

Study performed by UConn CESE (Willig, Perkins, and Provatas)



| SAMPLING LOCATIONS IN GREENWICH WATERS OF LONG ISLAND SOUND | | | | | | | |
|--|--------------|----------------|------------------|-----------------------|----------------|------------|----------|
| | Byram Harbor | Cos Cob Harbor | Greenwich Harbor | Greenwich Cove | Protected Area | Trip Blank | Total |
| Water samples per site | 3 | 3 | 2+1 dup | 3 | 1 | 1 | 13+1 dup |
| Sediment samples per site | 3 | 2 | 2+1 dup | 3 | 0 | 0 | 10+1 dup |
| Oyster samples per site | 1 | 3 | 3+1 dup | 4* | 1 | 0 | 11+1 dup |
| Total number of samples | 7 | 8 | 7+3 dups | 10 | 2 | 1 | 38 |
| Note: * a separate oyster and hard shelled clam sample was collected and anlayzed from the Greenwich Cove 2 site | | | | | | | |

PFAS WORK

UConn has an ongoing study in Groton, CT using deployed shellfish.

- The Bureau of Aquaculture submitted 2 hard clam samples from Groton Area P (Groton-New London Airport) and I oyster and two hard clam samples from outside of Tweed New Haven Airport → below the level of detection for 28 PFAS chemicals!
- Shucking and analysis performed by UConn for consistency in result interpretation, processing, testing method, and limits of detection.

2022 VIBRIO UPDATE



WHAT ARE VIBRIO?

- Vibrio are naturally-occurring brackish-salt water bacteria that can be pathogenic.
- Exposure to Vibrio can occur through consumption of raw seafood or direct wound contact with seawater.
- Globally, Vibrio parahaemolyticus is the leading cause of seafood-associated gastroenteritis.
- Vibrio vulnificus can cause life-threatening illness, including sepsis, through seafood consumption or wound infection (salt water contact). Commonly sensationalized by the media as "flesh-eating bacteria."
- Vibrio cholerae causes cholera, which is rare in the US and other industrialized nations.
 Cholera can be life-threatening but is easily prevented and treated.

PREDISPOSED RISKS

- Keep in mind that some people are at greater risk for foodborne illness, and should not eat raw or partially cooked fish or shellfish.
- Susceptible groups include:
 - Pregnant women
 - Young children
 - Older adults
 - Persons whose immune systems are compromised
 - Persons who have decreased stomach acidity
 - Persons who have chronic liver disease or reduced liver function
- If you are unsure, ASK YOUR HEALTHCARE PROVIDER

CONFIRMED CONNECTICUT VIBRIO PARAHAEMOLYTICUS SHELLFISH ILLNESSES (DOAG) AND VIBRIO VULNIFICUS WOUND INFECTIONS (DPH)



*2021 and 2022 Vv wound cases not yet released by Connecticut Department of Public Health

2022 VIBRIO MONITORING

| Town | Species | Total Vibrio parahaemolyticus (MPN/gram) | Two pathogenic Vp markers (MPN/gram) | Vibrio vulnificus |
|-----------|-----------|---|---|----------------------|
| Stamford | Oyster | 211 | <3/<3 | Negative |
| Westport | Oyster | 195 | <3/<3 | Negative |
| Westport | Oyster | 74 | <3/9.2 | Negative |
| Norwalk | Oyster | 147 | <3/<3 | Negative |
| Milford | Oyster | 286 | <3/<3 | Negative |
| Branford | Hard clam | 15 | <3/3.5 | Negative |
| East Lyme | Oyster | <3 | <3/<3 | Negative |
| Groton | Oyster | <3 | <3/<3 | Negative |

WEBSITE RESOURCES

Welcome to the Bureau of Aquaculture

David H. Carey, Bureau Director

Staff & Contact Us

Follow us on Instagram: @aquaculture_ct | Read about CT Aquaculture in the News

General information about the Bureau

Shellfish Sanitation Program Laboratory Services Shellfish Area Classifications and Maps Harmful Algal Bloom Monitoring

Recreational Shellfishing

Recreational Shellfishing and Shellfish Handling Guidance — Recreational Shellfish Growing Area Contacts, Hotlines, and Maps Shellfish Commission Guidance Documents

General Information about Connecticut Shellfish Aquaculture

Environmental Benefits of Shellfish & Shellfish Aquaculture

- Oyster & Clam Disease Fact Sheets
 - Shellfish Handling and Guidance
 - Importation Policy
 - Related Links | Definitions and FAQs

2020 Guidance for Recreational Shellfish Harvesting in Connecticut



STATE OF CONNECTICUT

DEPARTMENT OF AGRICULTURE BUREAU OF AQUACULTURE & LABORATORY



Recreational Shellfish Harvesting and Vibrio: Vibrio parahaemolyticus Background and Summer Harvest Precautions

https://portal.ct.gov/DOAG/AquacultureI/Aquaculture/Aquaculture-Home-Page



THANKYOU

GROWN A Way of Life

Roger Williams University