Shellfish Disease Status Review

Dr. Lydia M. Bienlien

20th Annual Gathering of Shellfish Commissions

February 3, 2023

Outline

- Introduction
- Diseases
- Shellfish Health
- Plans
- Questions

Introduction…to me!

- State: Department of Agriculture
  - Bureau of Aquaculture and Laboratory Services
- Title: The State Bivalve Shellfish Pathologist
- Role: All things shellfish health and disease
- Contact:
  - Lydia.Bienlien@ct.gov
  - 203-874-0696 ex: 120

Education

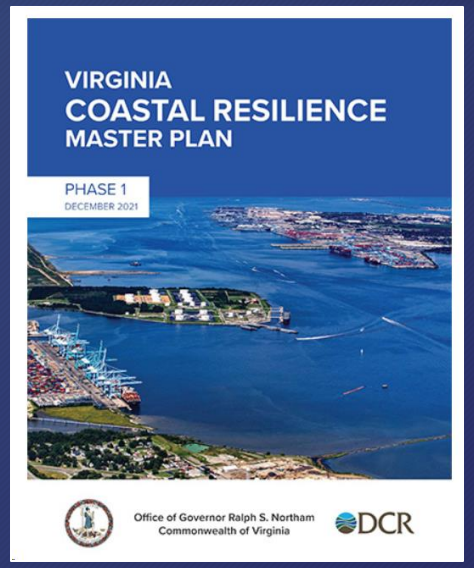
- Morningside College, IA
  - Bachelor of Science – Biology
  - Bachelor of Arts – Chemistry

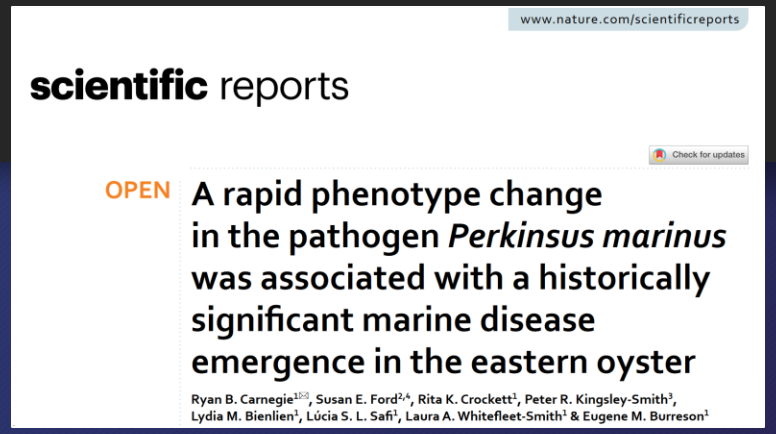
- William & Mary/Virginia Institute of Marine Science, VA
  - Master of Science – Marine Science
  - Doctor of Philosophy – Marine Science

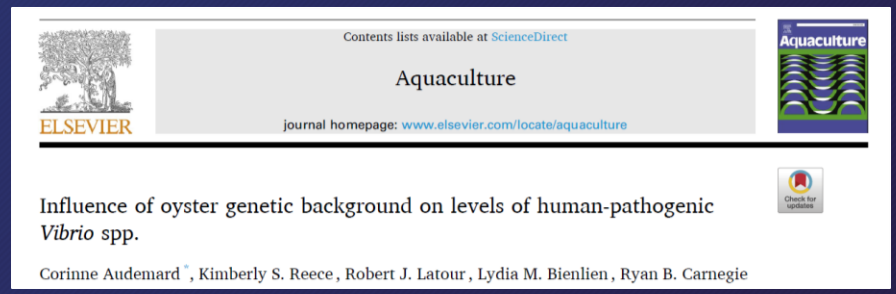
- Research – oyster diseases

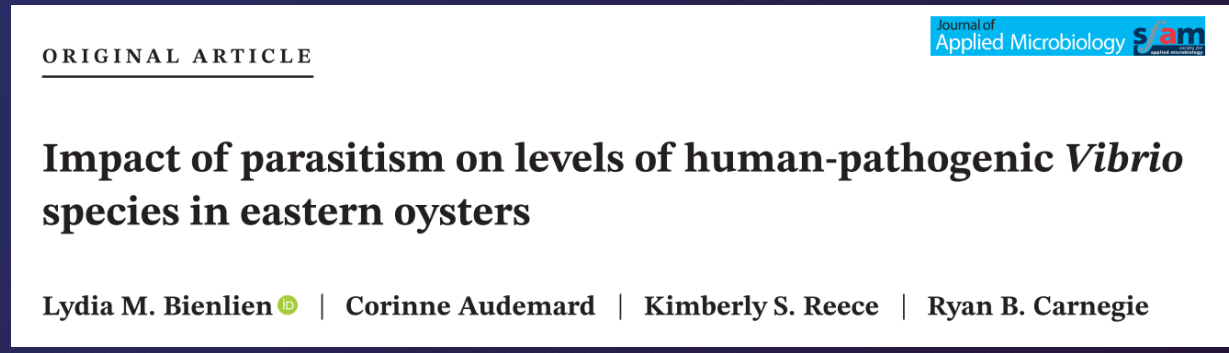
Other Experience

- Flooding
  - Virginia
- Writing
  - Papers and grants
  - Reviewer
- Working
  - East Coast Pathology Working Group
  - Biosecurity



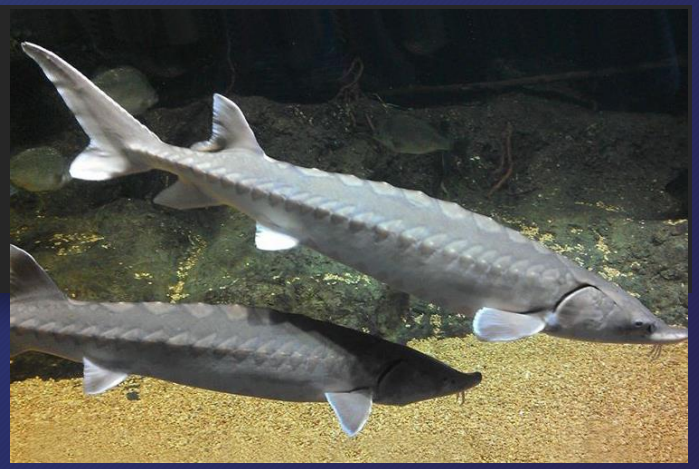






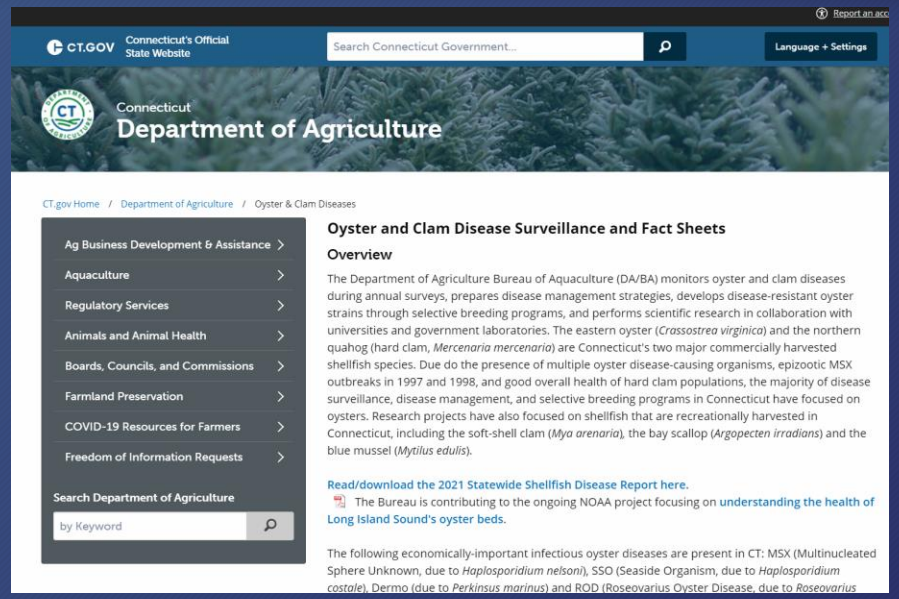
Plus…

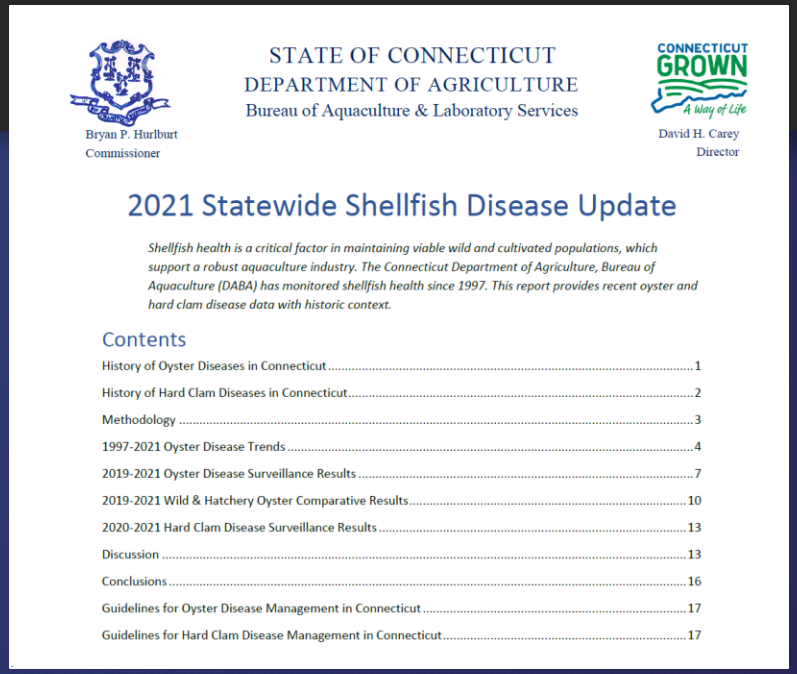
- Small projects
  - Sturgeon tracking
  - Cancer and marine genetics
  - HAB monitoring
  - Drones
    - Xploration Awesome Planet
- Scuba



Atlantic sturgeon swimming.
Credit: NOAA Fisheries

Shellfish Diseases




STATE OF CONNECTICUT
DEPARTMENT OF AGRICULTURE
Bureau of Aquaculture & Laboratory Services

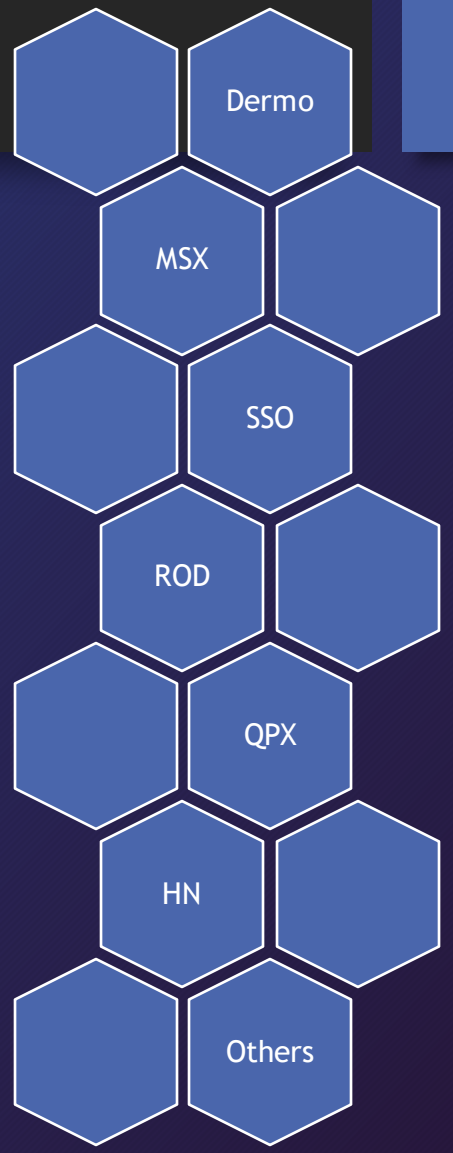
Bryan P. Hurlburt
Commissioner

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.

Contents

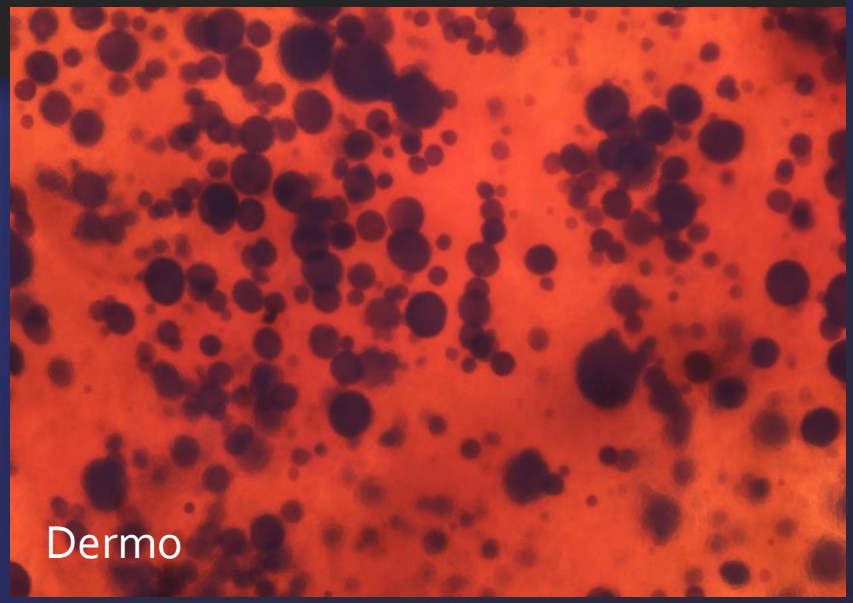


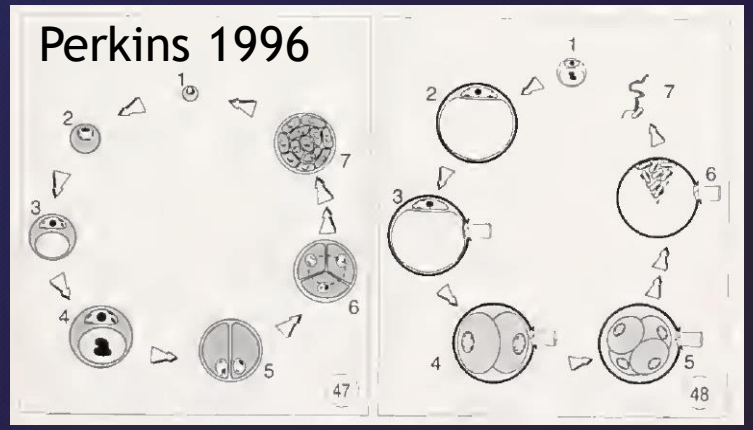
- https://portal.ct.gov/DOAG/Aquaculture1/Aquaculture/Oyster-and-Clam-Diseases
- 2021 Statewide Shellfish Disease Update

Oysters – *Perkinsus marinus*

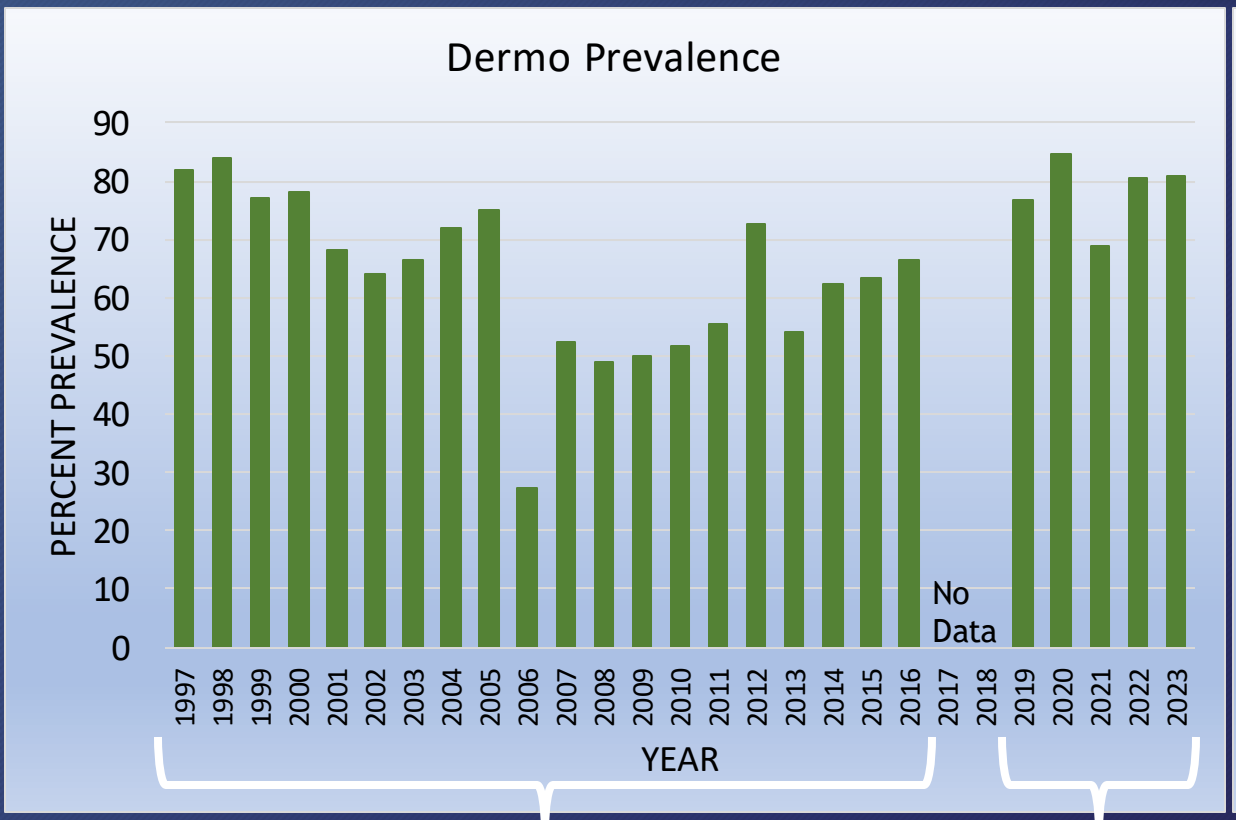
- Aka Dermo aka Perkinsosis aka Pmar
  - Wasting disease

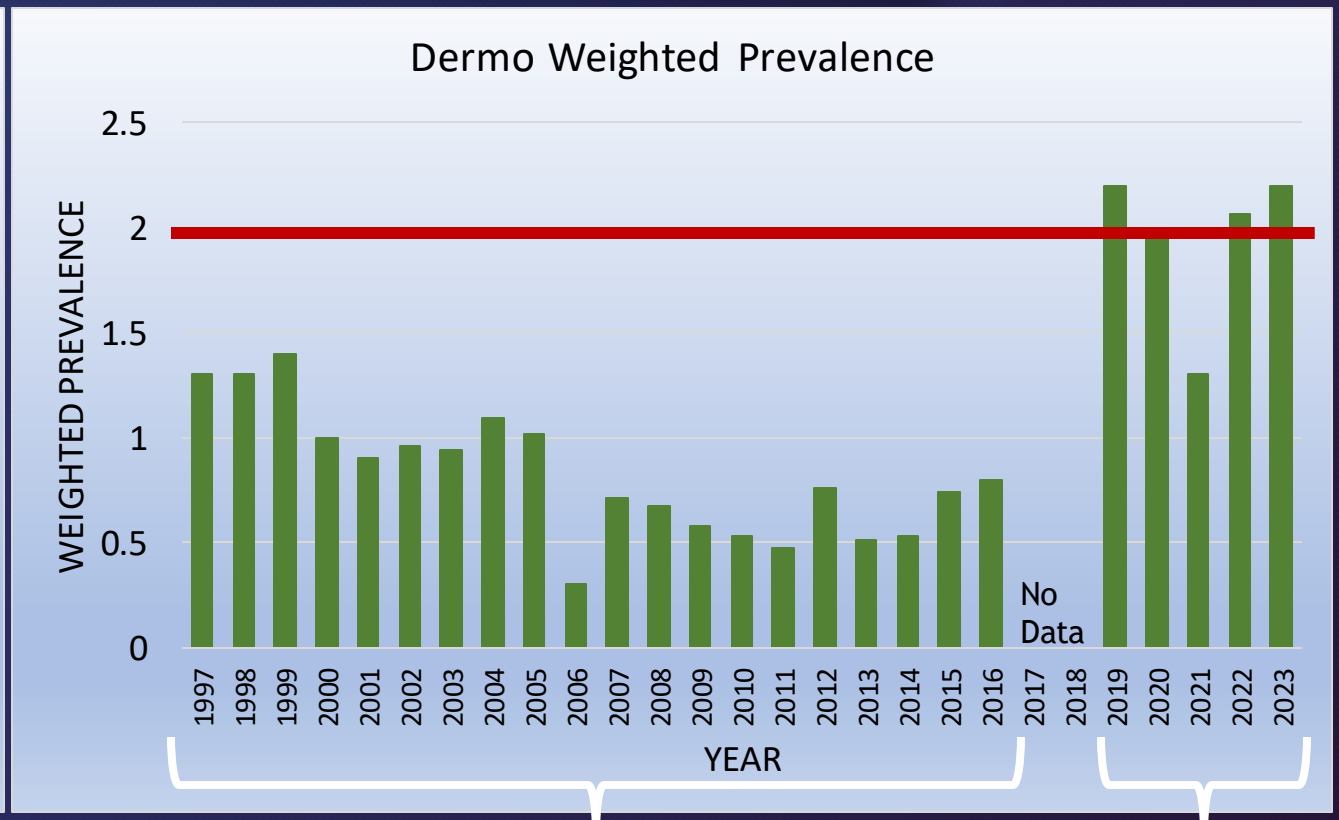
- Protozoan parasite
- Tiny
- Fun life cycle
- East Coast and Gulf of Mexico – native
- High prevalence
  - Quick note…





Oysters – *Perkinsus marinus*





Quick note on terms

- Prevalence
  - Proportion of infect individuals in a sample
- Intensity
  - Number of pathogens in an infected individual
- Weighted Prevalence
  - Combines prevalence and intensity

Examples

$$\frac{\text{7 infected individuals}}{\text{30 total individuals in the sample}}$$

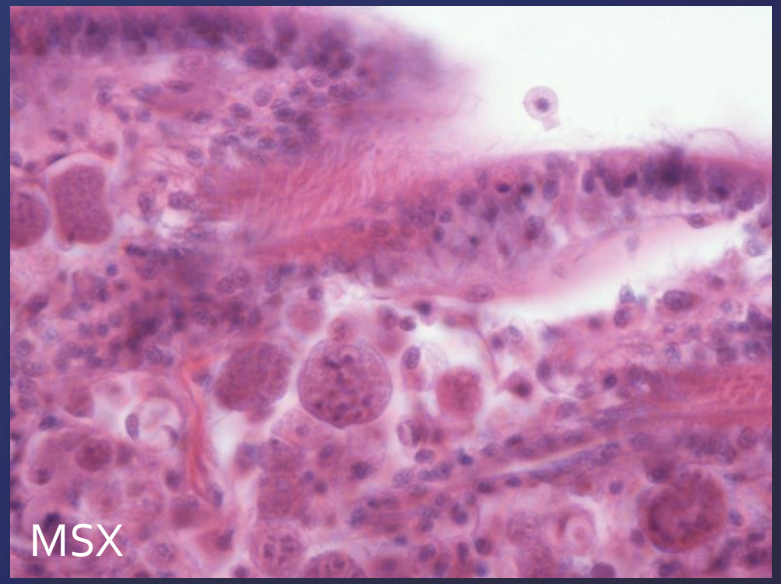
3 individuals had lots of pathogens (ranked 5)
8 individuals had some pathogens (ranked 3)
19 individuals had no pathogens (ranked 0)

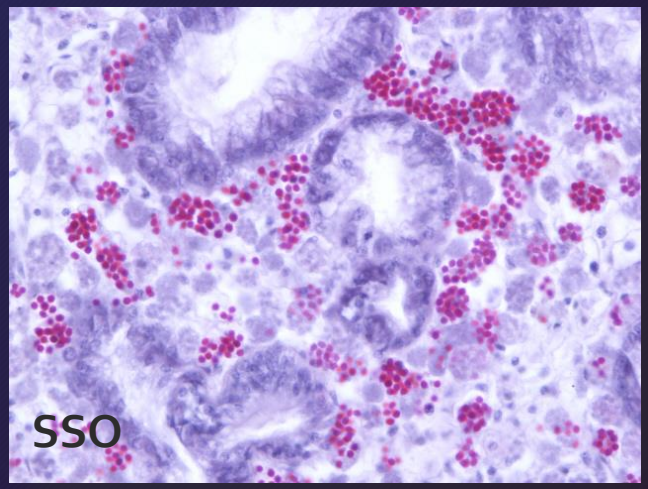
$$WP = [5*(\#\ Heavy) + 3*(\#\ Moderate) + 1*(\#Light\ and\ Rare)]\ /\ Sample\ Size.$$

Oysters – *Haplosporidium nelsoni*

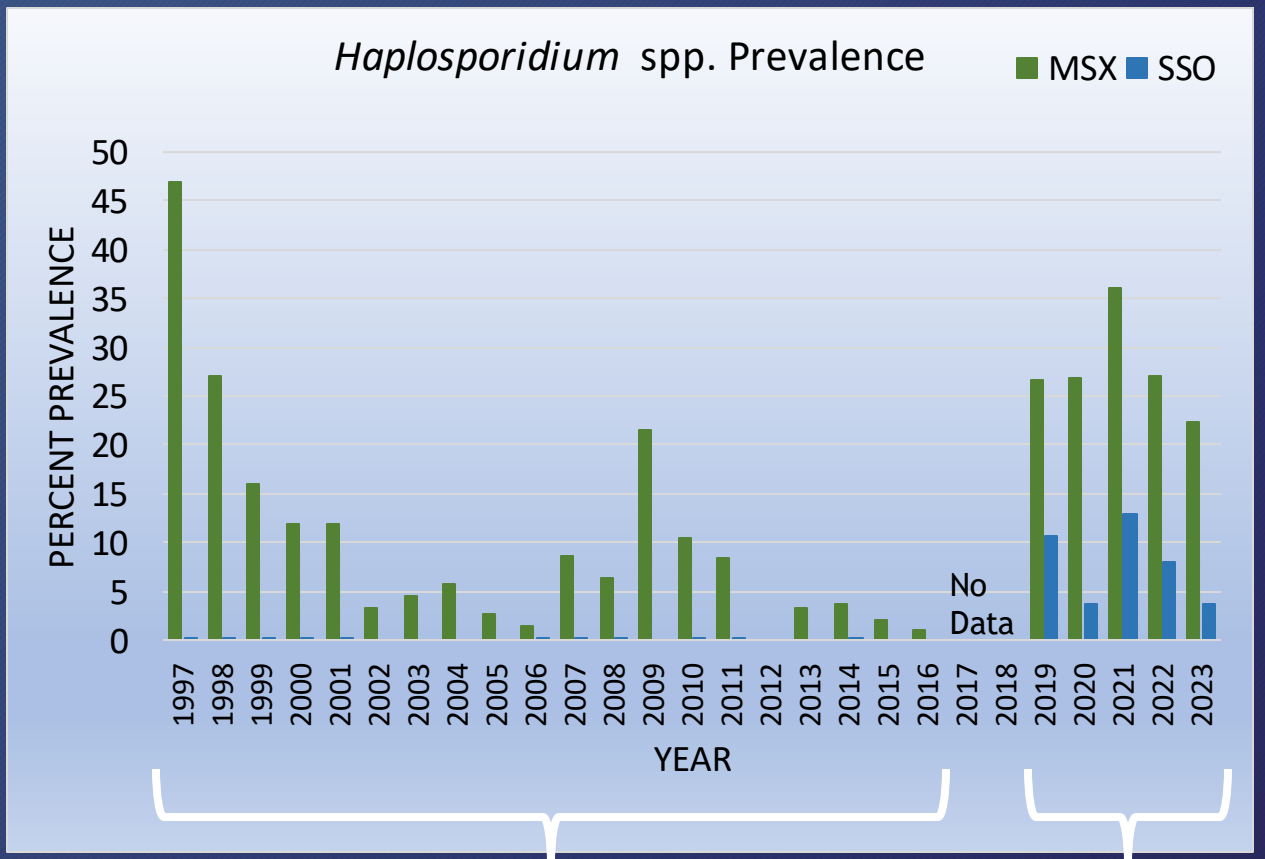
- Aka MSX
  - Quick mortalities

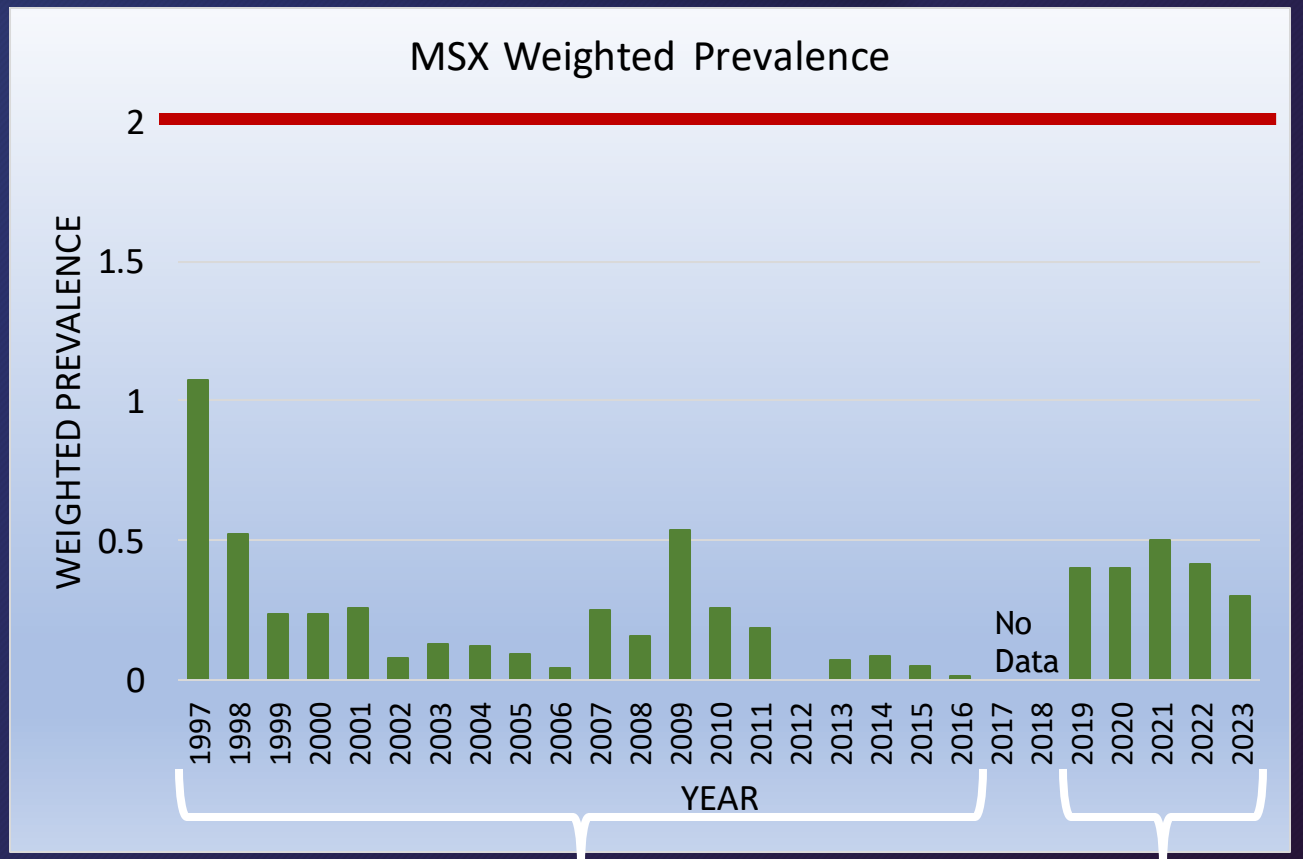
- Protozoan parasite
- Tiny
- Life cycle???
- East Coast – introduced
- Low prevalence
- Also, *Haplosporidium costale* aka SSO


MSX

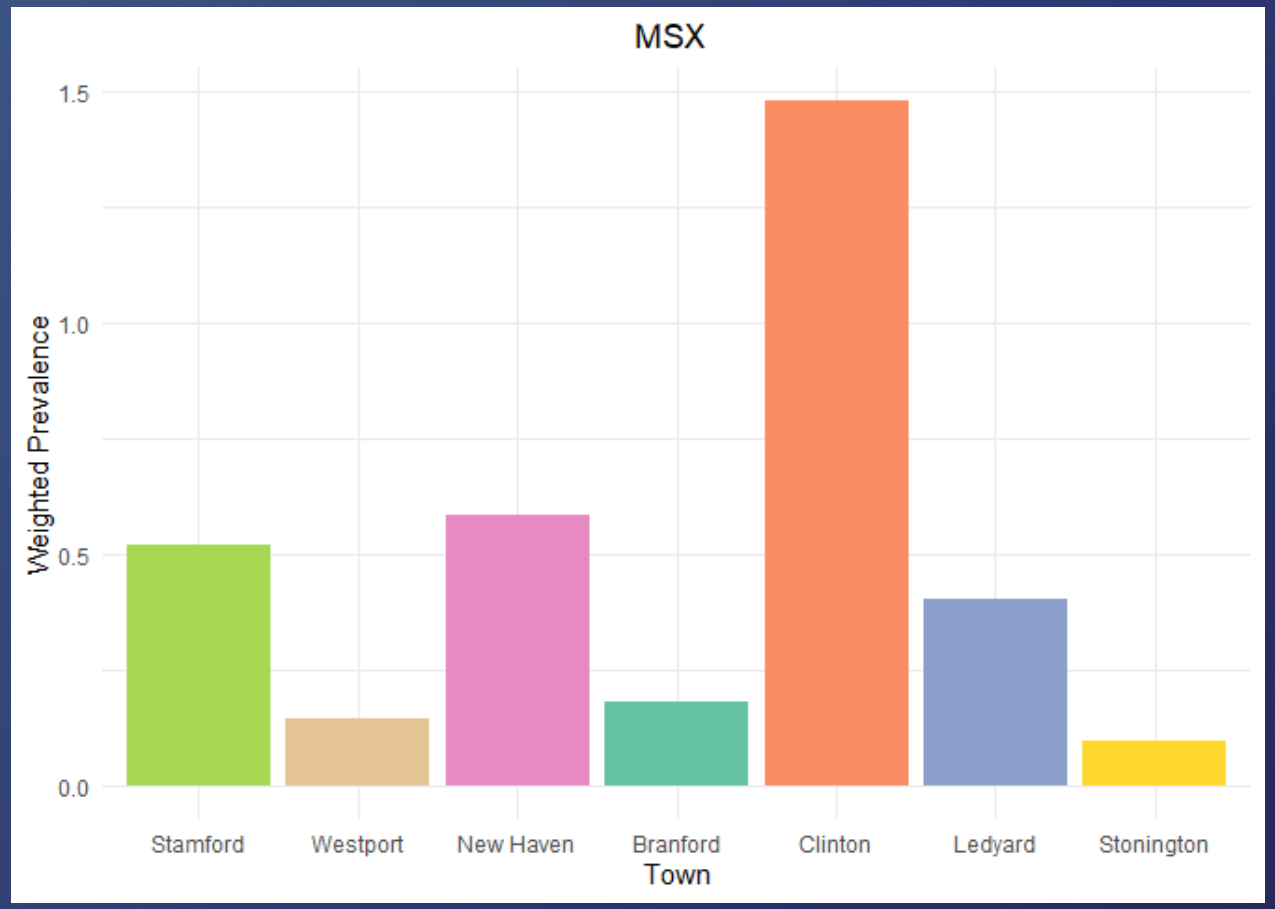

SSO

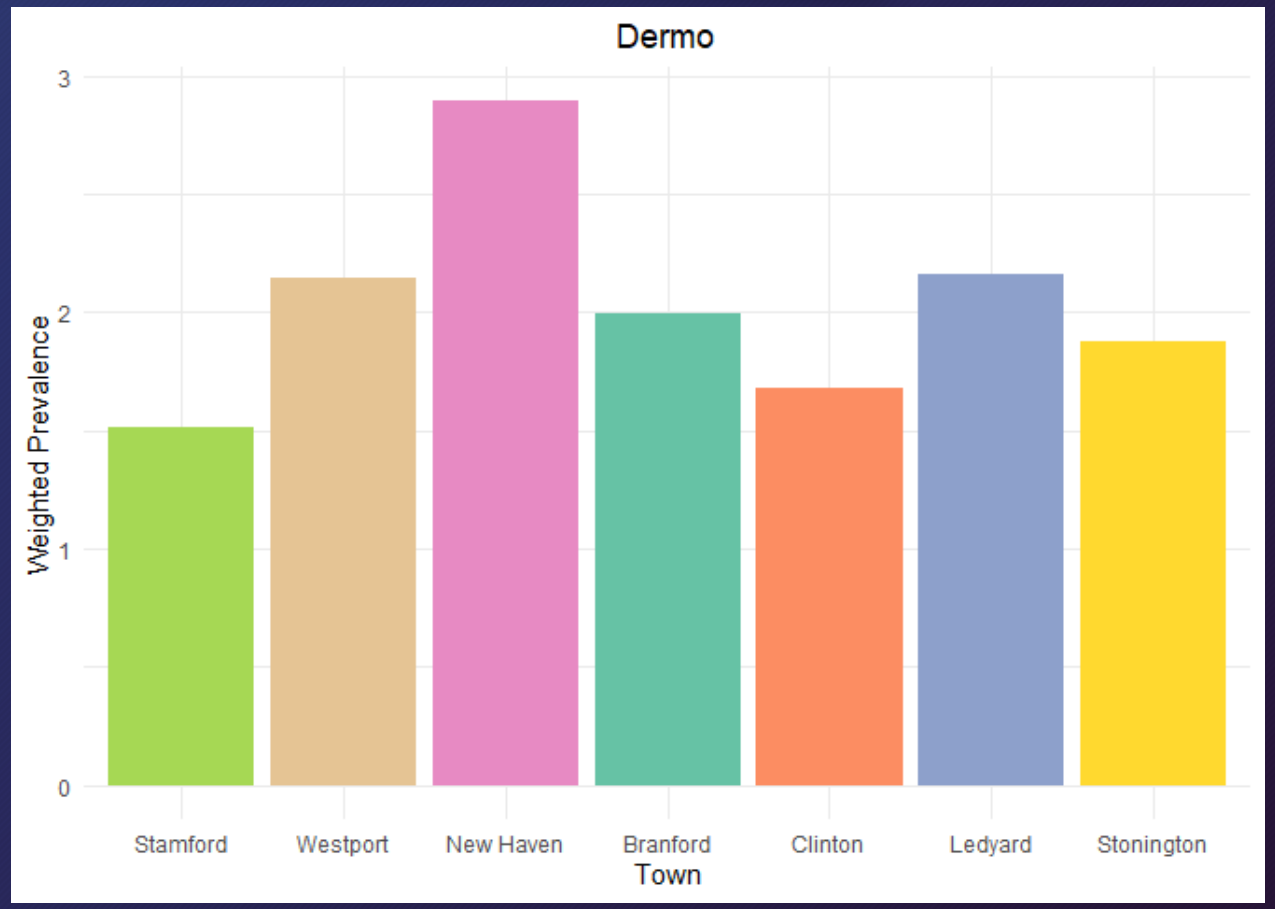
Oysters – *Haplosporidium nelsoni* and *H. costale*





qPCR Data: Weighted Prevalence

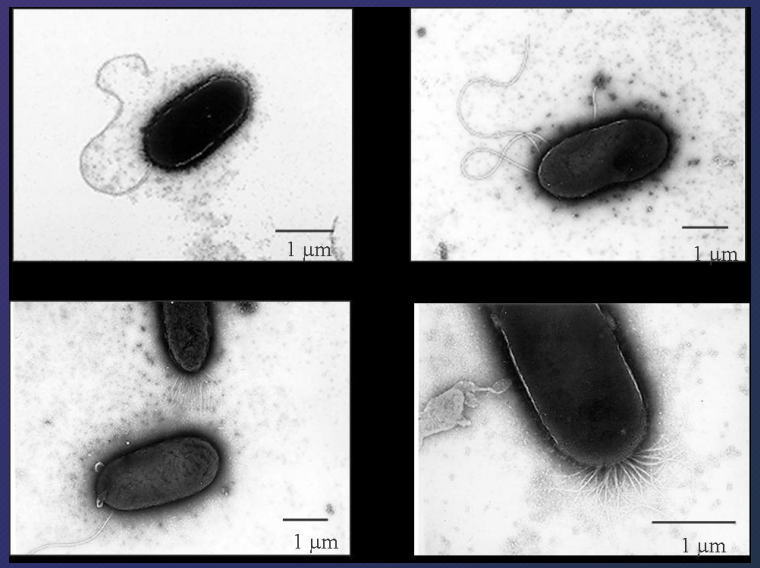




Oysters – *Roseovarius crassostrea*

- Aka ROD aka JOD

- Bacteria
- Hatchery seed
- East Coast
- Sporadic



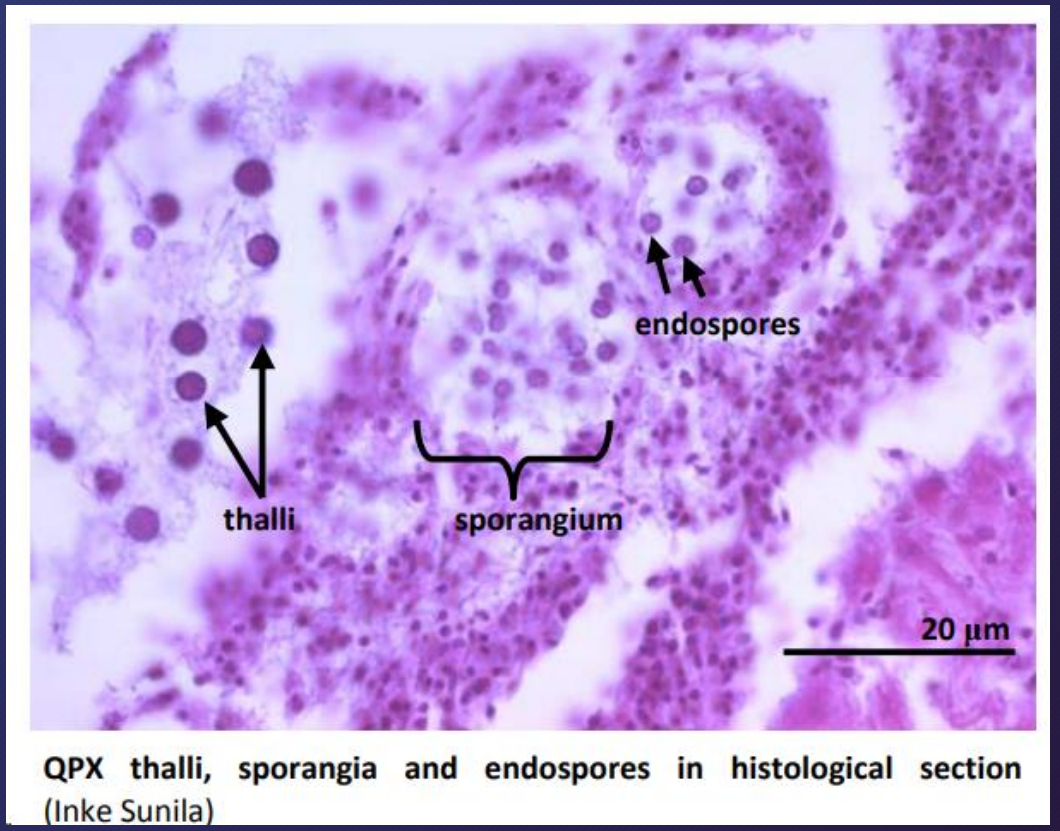
Deformed shells of ROD-infected seed oysters. (Inke Sunila)

Conchiolin rings on shells of ROD-infected seed oysters. (Inke Sunila)

Clams – *Mucochytrium quahogii*

- Aka QPX

- Marine fungus-like protist
- Facultative parasite
- Tiny
- Difficult life cycle
- Upper East Coast
- Low prevalence



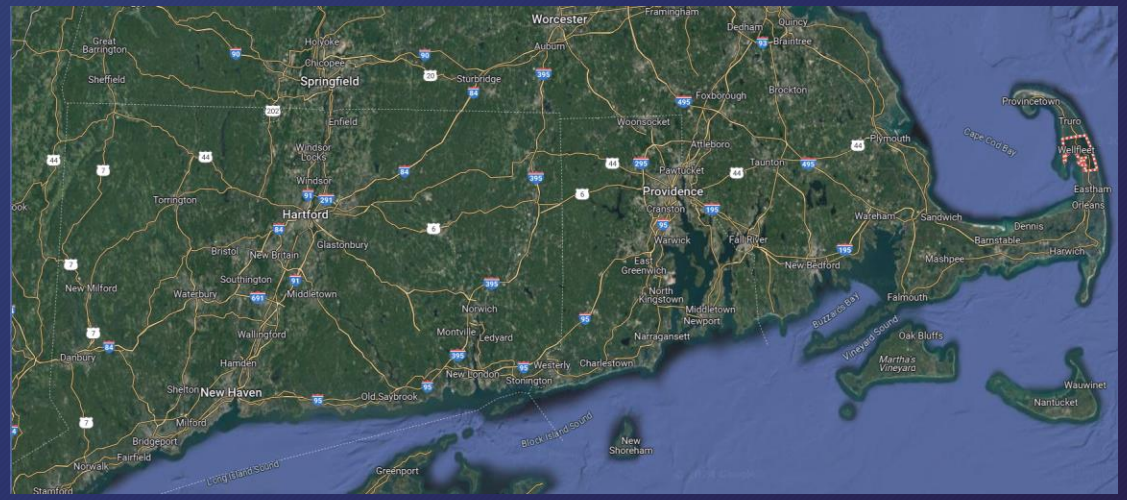
QPX thalli, sporangia and endospores in histological section (Inke Sunila)

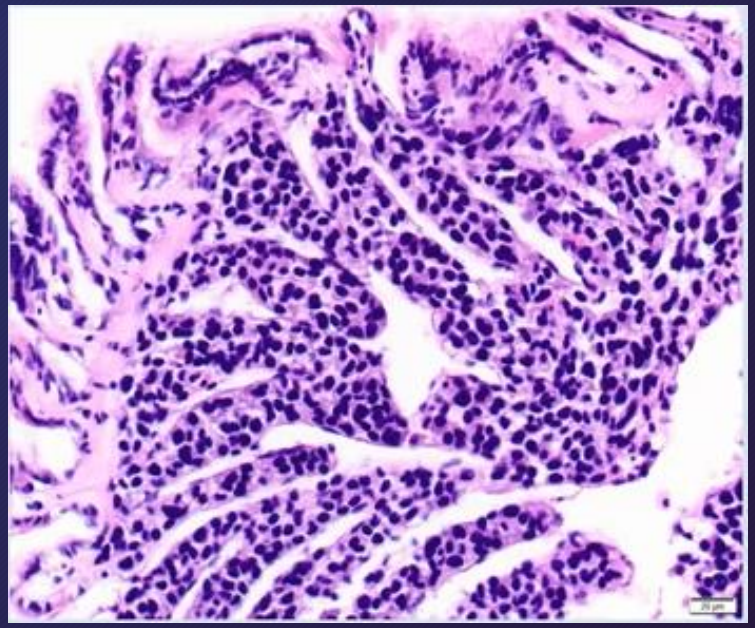
Clams – Hemocytic neoplasia

- Aka HN aka disseminated neoplasia aka DN

- Cells
- Wellfleet, MA

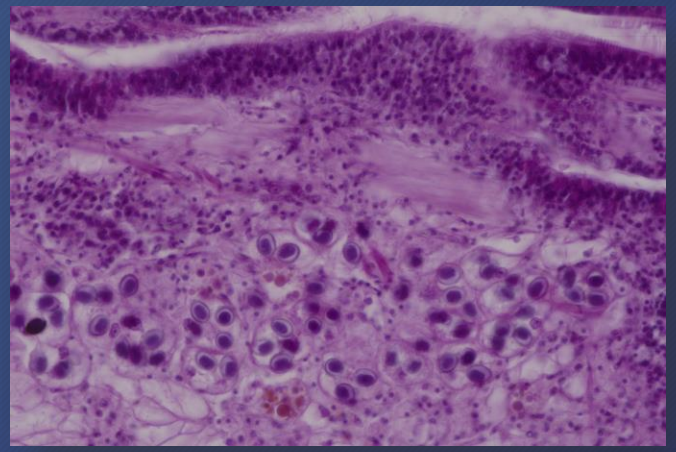
- ONE clam!
  - Imported



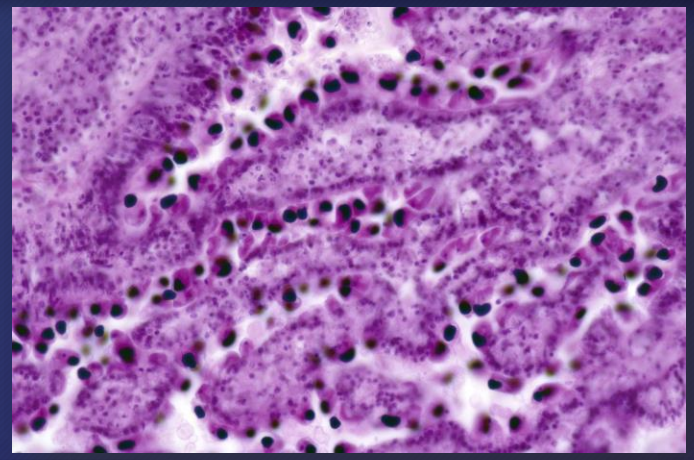


Hemocytic neoplasia in hard clam tissue. Photo by Dr. Smolowitz (all rights reserved).

Others

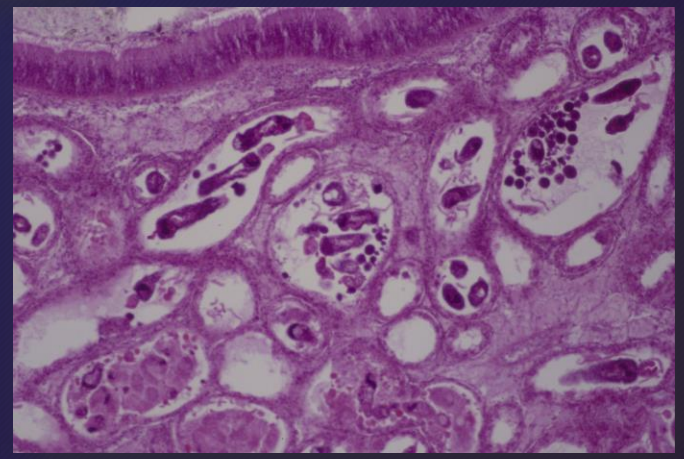


Nematopsis



Ciliates

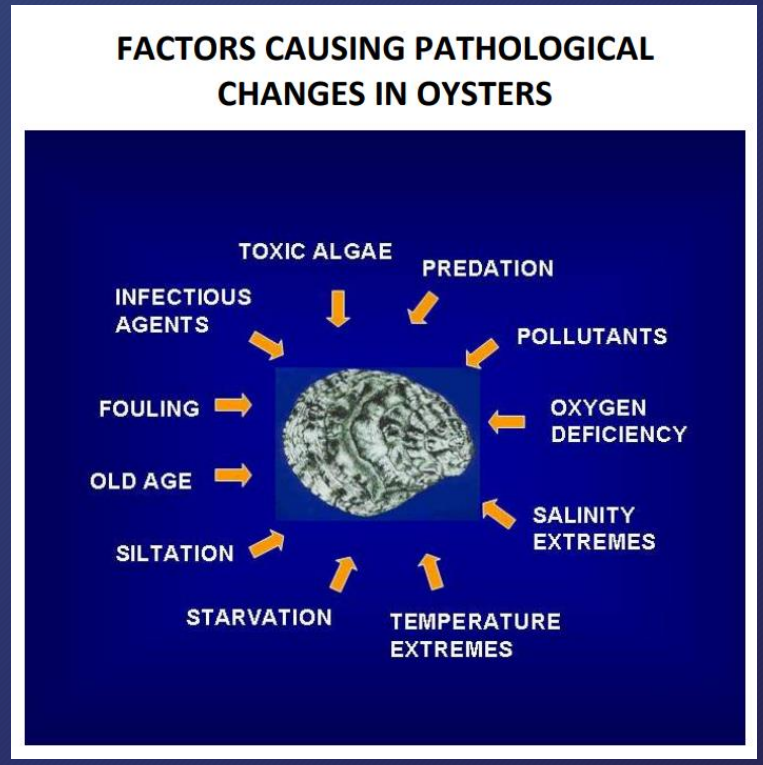
Turbellaria

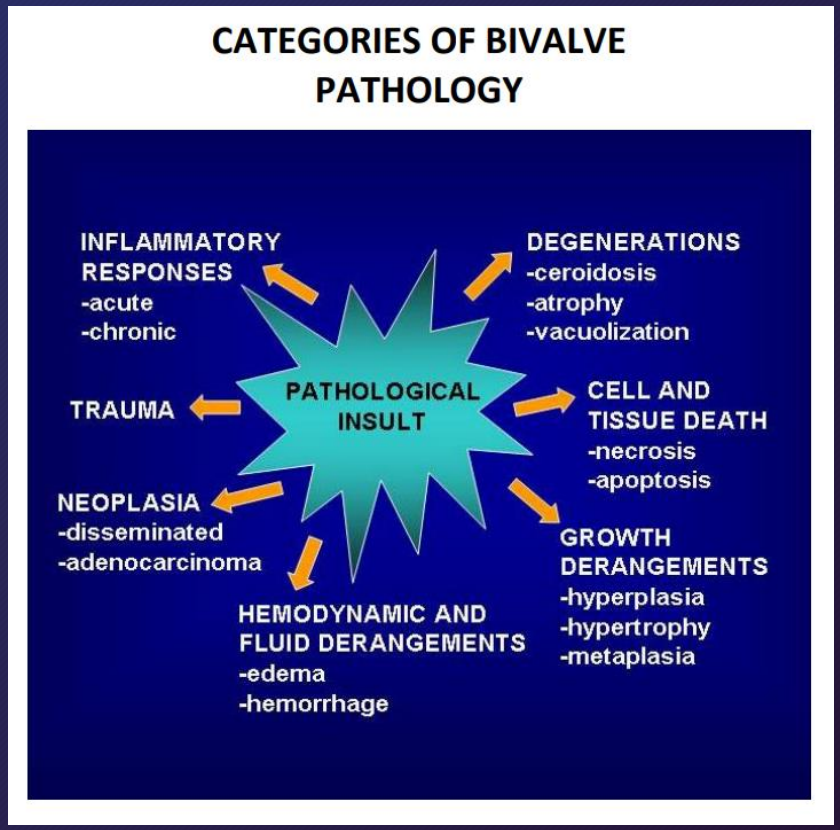


Trematoda

Health

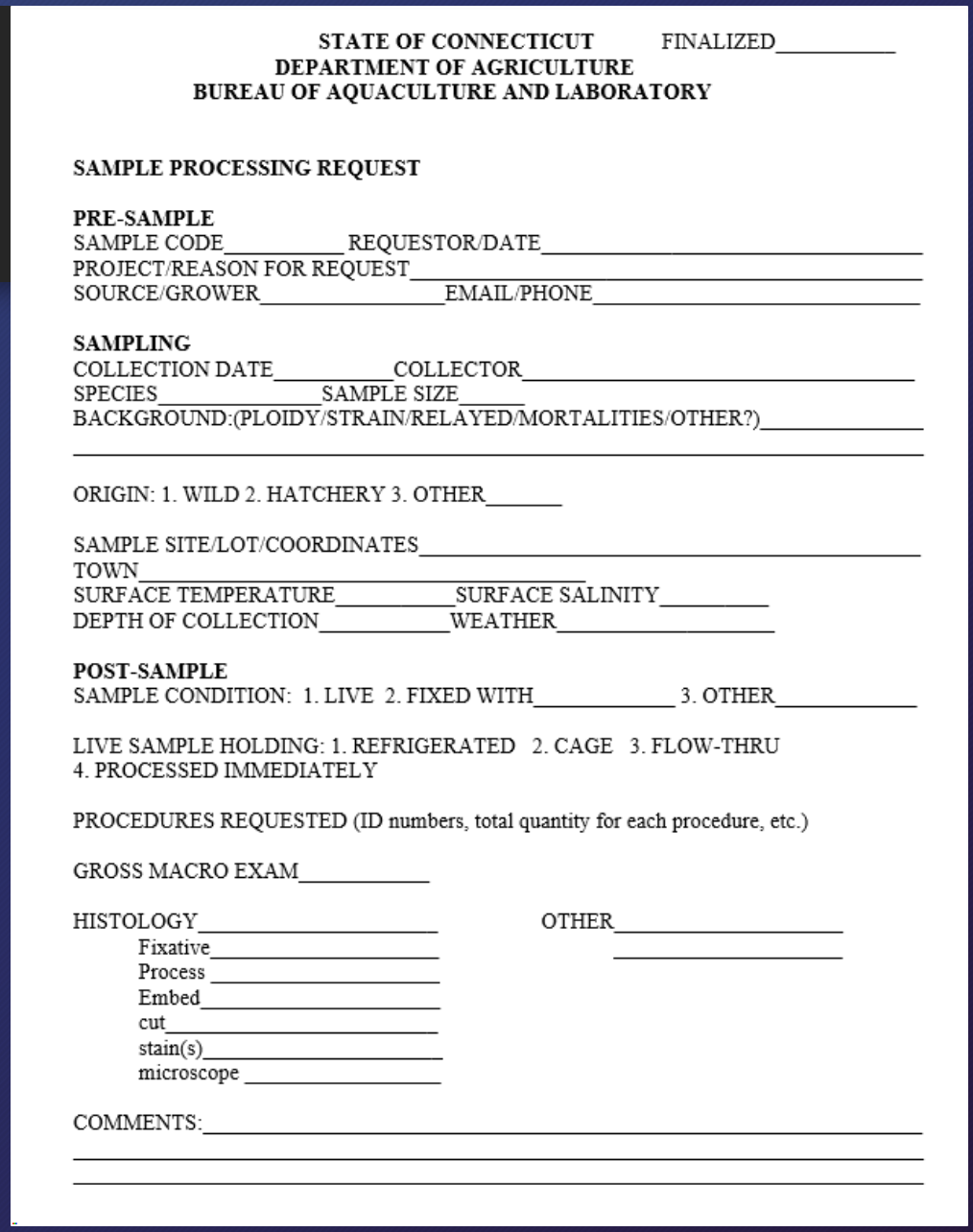
- Pathology
  - Causes
  - Responses
- Food
- Reproduction





Samples – Collection

- Collection Date/Collector
- Species
- Background/Origin
- Location
  - Specific as possible
  - Temperature
  - Salinity
- Transport
  - In cooler
  - On ice
  - Separated from ice
- More information is better!



STATE OF CONNECTICUT FINALIZED_____
DEPARTMENT OF AGRICULTURE
BUREAU OF AQUACULTURE AND LABORATORY

SAMPLE PROCESSING REQUEST

PRE-SAMPLE
SAMPLE CODE_____ REQUESTOR/DATE_____
PROJECT/REASON FOR REQUEST_____
SOURCE/GROWER_____EMAIL/PHONE_____

SAMPLING
COLLECTION DATE_____COLLECTOR_____
SPECIES_____SAMPLE SIZE_____
BACKGROUND:(PLOIDY/STRAIN/RELAYED/MORTALITIES/OTHER?)_____
_____

ORIGIN: 1. WILD 2. HATCHERY 3. OTHER_____

SAMPLE SITE/LOT/COORDINATES_____
TOWN_____
SURFACE TEMPERATURE_____SURFACE SALINITY_____
DEPTH OF COLLECTION_____WEATHER_____

POST-SAMPLE
SAMPLE CONDITION: 1. LIVE 2. FIXED WITH_____ 3. OTHER_____

LIVE SAMPLE HOLDING: 1. REFRIGERATED 2. CAGE 3. FLOW-THRU
4. PROCESSED IMMEDIATELY

PROCEDURES REQUESTED (ID numbers, total quantity for each procedure, etc.)

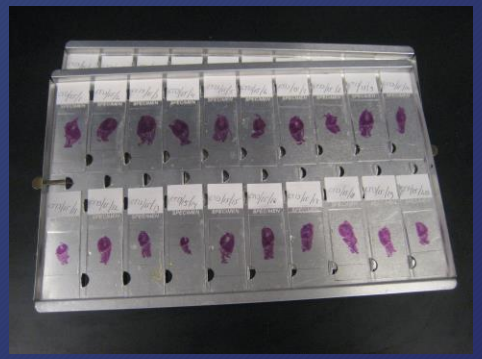
GROSS MACRO EXAM_____

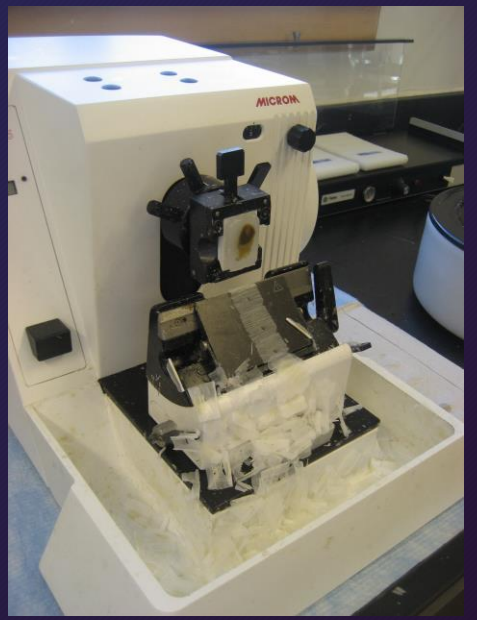
HISTOLOGY_____ OTHER_____
Fixative_____ _____
Process _____
Embed_____
cut_____
stain(s)_____
microscope _____

COMMENTS:_____
_____
_____

Samples – Tests

- Histology
- RFTM
- qPCR
  - future

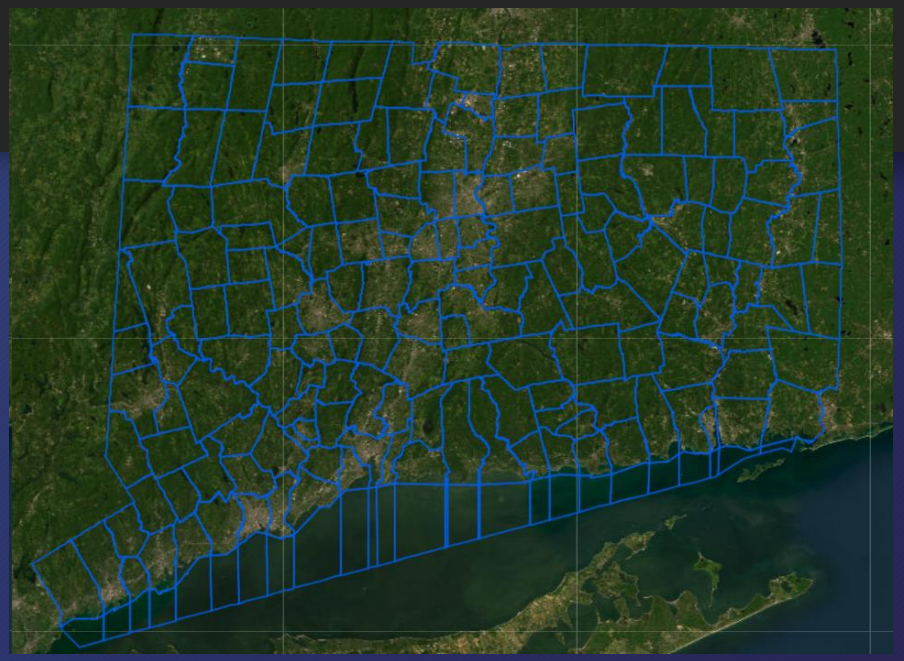


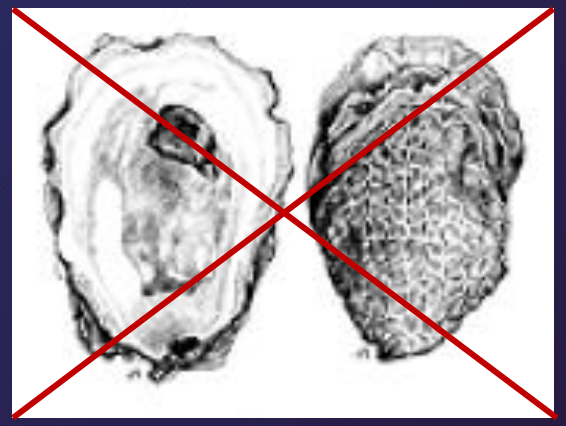


Future

- Collaboration
  - Getting access to sites
- Training

- Emerging disease





→ ?

Question?

- Website: https://portal.ct.gov/DOAG/Aquaculture1/Aquaculture/Aquaculture-Home-Page

- Contact:
  - Lydia.Bienlien@ct.gov
  - 203-874-0696 ex: 120
  - Business cards