


Dead & Dying Shellfish
Now what do I do?

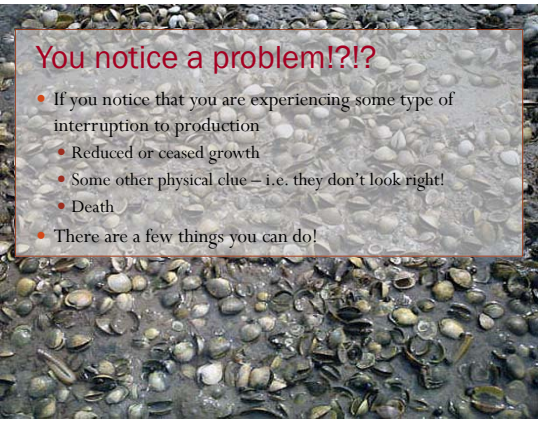


Dale Leavitt &
Roxanna Smolowitz

**Roger Williams
University**

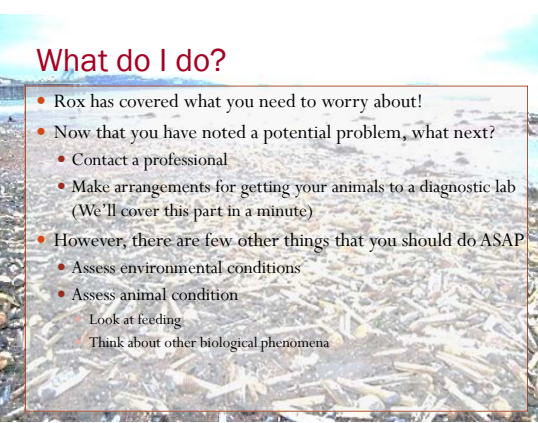
You notice a problem!?!?

- If you notice that you are experiencing some type of interruption to production
 - Reduced or ceased growth
 - Some other physical clue – i.e. they don't look right!
 - Death
- There are a few things you can do!



What do I do?

- Rox has covered what you need to worry about!
- Now that you have noted a potential problem, what next?
 - Contact a professional
 - Make arrangements for getting your animals to a diagnostic lab (We'll cover this part in a minute)
- However, there are few other things that you should do ASAP
 - Assess environmental conditions
 - Assess animal condition
 - Look at feeding
 - Think about other biological phenomena




Environmental Conditions

- Water Quality
 - A variety of important parameters to consider
 - Oxygen
 - Temperature
 - Salinity
 - pH
 - Collecting data – strategies
 - Single point in time
 - Preferably as you are collecting samples for diagnosis
 - Long-term condition monitoring




Point in time assessment

- Often requires specialized equipment
 - e.g. dissolved oxygen – chemical titration or electronic meter
- Usually your local aquaculture extension person can assist
 - Often local colleges or universities can also assist



Point in time assessment

- Sampling
 - For the most part, measurements must be made on site
 - Dissolved oxygen - temperature
 - For some analyses, you can collect water samples for later analysis
 - Salinity – pH
- Keep in mind that these noxious water conditions may be really transitory



Long term environmental history

- Numerous data sets of environmental conditions are available to help
 - Many bodies of water have water quality monitoring programs on-going
 - volunteer or otherwise



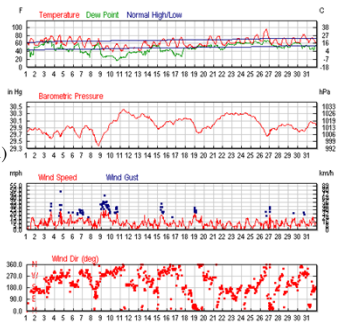
Water quality monitoring – state waters



<https://fortress.wa.gov/ecy/cap/riverwq/regions/state.asp?mode=statemap>

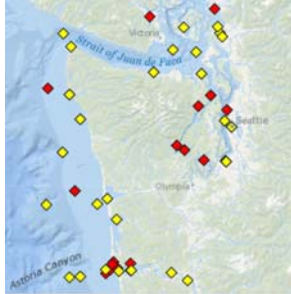
Long-term Data Sets

- Land-based weather monitoring
 - e.g. Weather Underground (http://www.wunderground.com)





Marine related stations

- NOAA Buoy data (<http://www.ndbc.noaa.gov/>)



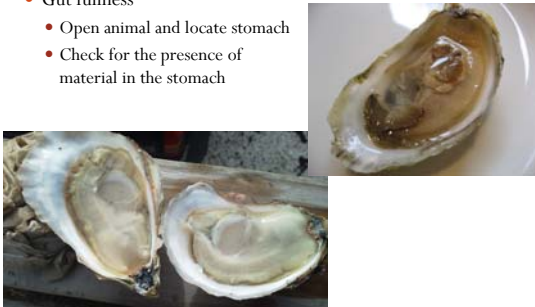
Food Quality & Quantity

- It is good to know what is in the water - can measure
 - Turbidity – Secchi disk 
 - Chlorophyll – higher tech instrument(s) required
 - Not always the best indicator of food
 - Particle size – specialized instrument or time consuming method
 - Microscopic examination of food
 - Concentrate with fine mesh screen
 - Small plankton net (20-50 μm mesh)
 - Observe in a Sedgewick-Rafter cell 



Food Quality & Quantity

- Gut fullness
 - Open animal and locate stomach
 - Check for the presence of material in the stomach



What do you think of these?

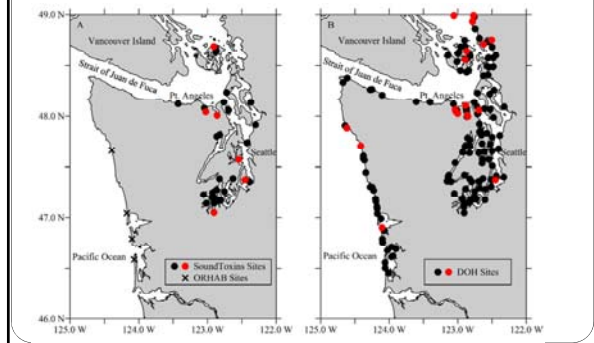


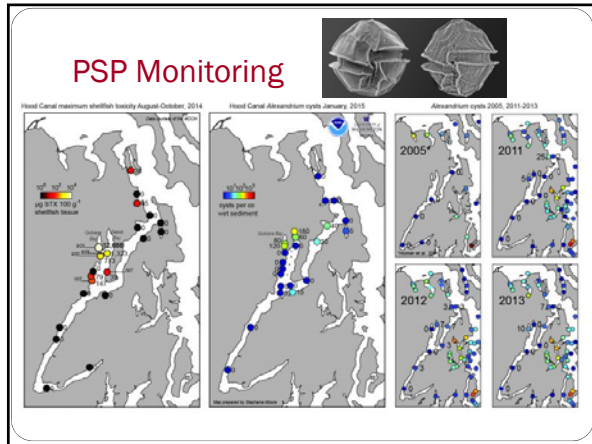
Shellfish Food Issues

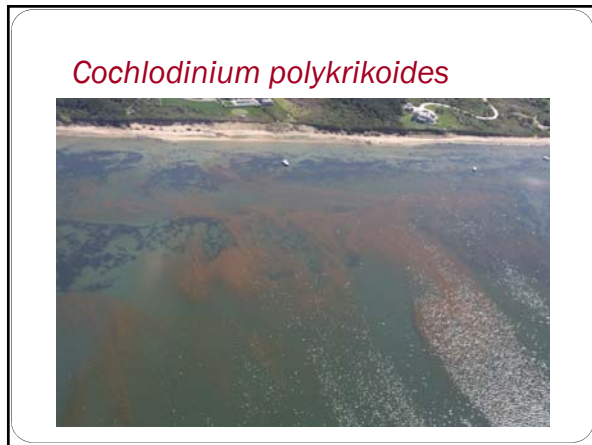
- Sometimes the food isn't all that one thinks it is
- Harmful Algal Blooms (HABs)
 - Some pose a human health risk and are carefully monitored by the state
 - Often health risk is not an issue for the shellfish – only for humans
 - Other noxious species can be lurking in the waters
- Effects
 - Can't be ingested – a physical deterrent
 - Won't be ingested – a chemical deterrent
 - Imparts some level of chemical toxicity

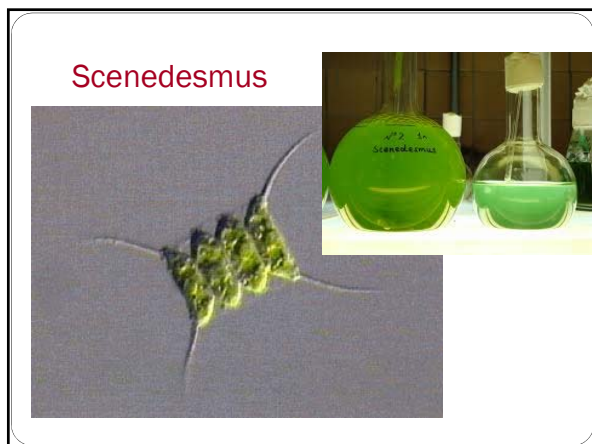


HAB Monitoring Stations









So what do I do if I can't figure it out?

- Consult someone with experience in shellfish problems
 - Another grower
 - Your local aquaculture extension agent
 - An aquatic animal health professional



So what do I do if I can't figure it out?

- Explain your problem with the best information that you can compile
 - Try to get a good estimate of level of the problem
 - Look carefully at water quality
 - Inspect the animals for basic changes in form
 - Mantle
 - Gills
 - Stomach, etc.



“Send me some samples”

- Your aquatic animal health consultant asks you to send some samples for analysis
- You ask:
 - What?
 - When?
 - How many?
 - How do I get them to you?



What?

- You want the professional to see an impacted animal
- Select those animals that look to be the most severely impacted **BUT NOT DEAD!**
 - We are not doing a scientific study where we need to randomly select animals
- Cool them down ASAP after collection
 - Leave them out of water
 - DON'T freeze them!



When?

- Immediately, if not sooner!
- Try for overnight shipping or direct delivery if you can arrange it



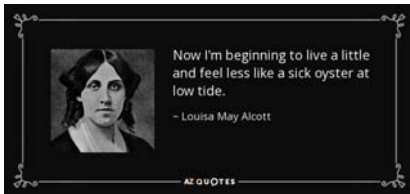
When?

- If you can't get them to the health specialist quickly
 - Open the clam or oyster but don't shuck the meat out
 - Store it in
 - Buffered formalin (if you have it)
 - Isopropyl alcohol (rubbing alcohol)
 - Denatured ethanol (methylated spirits)
 - Vodka



How Many?

- For a true diagnosis (5% detection level)
 - 65-70 animals – if large size (>1½")
 - 130-150 animals - if small seed (<1½")
 - If really small seed then get instructions first
- Cost may be a factor to consider.



What is the cost?

- Varies with the problem and the diagnostic method
 - If a full histopathological analysis is needed
 - Can run between \$400 & \$1,000 for 60 animals
 - Depending on tests requested/required



How?

- Pack live but sick animals in a cooler with ice
 - Make sure the animals are isolated from the ice melt!
 - Double bag with zip locks or some other means to keep them out of direct ice exposure
- Label everything carefully
 - Place double labels outside and inside of bags
 - Differentiate samples clearly (if sending multiple samples)
 - Include a written note providing details of the samples
 - What, where, when, who, problem, etc.
- Overnight ship or hand deliver



When do I get an answer?

- Diagnosis can be time consuming
- Molecular techniques – turn around of days
- Histopathology – turn around in weeks

ARE YOUR OYSTERS HEALTHY ENOUGH TO EAT?
I'VE NEVER HEARD ONE COMPLAIN.



What do I do in the meantime?

- You want to give the animals the best chance they have to fight through the problem
- In the field:
 - Do not cross contaminate sites with gear
 - Do not move your animals to an alternate location
- On the farm:
 - Reduce densities
 - Spread culture technology out
 - There may be some specific strategies if we can narrow down the possible causes
 - e.g poor feed at upweller

Health Certification

SHELLFISH PATHOLOGY REPORT		
RWU Case No. 4774		
Date of Report: April 1, 2016		
Source of Animals: Roger Williams Dock, Bristol, RI		
Species: <i>Crassostrea virginica</i>		
Collection Date: March 18, 2016		
Submitted by: Dale Leavitt		
Collected By: Matt Corfiliu		
Date Processed at RWU: March 17, 2016		
No. of animals examined grossly: 60		
No. of animals examined using:		
TaqMan qPCR for <i>Dermis</i> MSX and SSO: 60		
Gross description of animals:		
1. Weight averaged 4 g		
2. Shell height averaged 32 mm		
3. Gross appearance: No significant findings		
Results for <i>Dermis</i> Infection (using qPCR):		
Prevalence (percent of animals positive in the population): 0		
Weight Summary (weighted prevalence, total of the scores for each individual animal/total number of animals in the sample): 0		
Summary (total of the scores/number of positive animals): 0		
Note: Intensity ratings are: 0.5, very light; 1.0, light; 2.0, light to moderate; 3.0, moderate; 4.0, heavy; 5.0, very heavy. In the past, populations with weighted averages above 2.0 usually also show noticeable mortality in the population. Populations with averages above 2.0 show sporadic mortality.		
Disease Findings (using qPCR methods):		
Disease	Presence/Absence	Percent detected
Other Diseases	MSX	0%
	SSO	0%
Summary:		
Animals were examined using the highly quantitative PCR method. No animals were identified as infected with <i>Dermis</i> (<i>Perkinsus marinus</i>), MSX (<i>Haplosporidium nelsoni</i>), or SSO (<i>Haplosporidium costale</i>). Results from these test methods indicate the animals are negative for important infectious system cycle diseases.		
Ryan M. Smith, DVM Business Administrator, RWU Aquatic Diagnostic Laboratory PO Box 270-0200 Bristol, Rhode Island 02809		

Requirements for a health check

- Intra-state transport (RI)
 - If moving shellfish between Biosecurity Zones within RI
- Biosecurity Zones
 - Based on water circulation patterns
 - Health check required to move animals from one zone to another
- Does not apply to hatchery seed if from an approved hatchery
 - CRMC approval required
 - Biosecurity Board



Requirements for a health check

- Inter-state transport
 - Varies by state
 - All require some form of health inspection/certification
 - Varying levels of tolerance for import of seed
 - SC has Zero-tolerance to all pathologies
 - Others are less stringent
 - Often state maintains a list of qualified seed importers
 - Hatcheries primarily
 - Some will pre-qualify larger seed importations as well

Requirements for a health check

- International transport
 - Live animal import/export overseen by USDA - Animal and Plant Health Inspection Services (APHIS)
 - Assign their own health inspection
 - Also need to inspect culture facilities
 - Live animals as seafood overseen by NOAA Fisheries
 - In conjunction with FDA

Your Clammy hands



Are making me Sick

Timing for health certification

- If you are doing this for a health certificate to sell/transport animals
- Do not wait until the last minute as this takes time
- Plan on contacting laboratory at least 5 weeks before you need it



Questions?