Safety in Shellfish Farming

Diane Murphy1,2, Josh Rotzama1,2, Abigail Archer1,2
1Cape Cod Cooperative Extension
2Woods Hole Sea Grant

Safety...

- ...on the job
- ...on the water
- ...in handling a food product

The work of shellfish aquaculture

- Physically demanding job
  - Lift & carry (&wear) heavy gear
  - Working in/on water
  - Sharp edges gear/oysters
  - Inclement weather
    - Rain, snow, wind
    - Temperature extremes
    - Biting/blood-sucking insects

SEMAC Mini-Grant
Milliken - 2011
Reality of Place

The work of shellfish aquaculture

- SEMAC Mini-Grant in 2011
  - John Milliken - awardee
  - Online survey to collect responses on the work, species grown, length of time in the aquaculture business, equipment used, and injuries or general disabilities resulting from the work.

Workplace
On-the-job injuries

Interesting to note
- majority of responding growers not directly hurt on the job
- though a relatively dangerous business – heavy materials and sharp implements, chances of crush injuries, etc.

Injuries – a closer look

Of the actual on-the-job injuries:
- Most had cuts, sprains, other joint injuries and similar
- Surprisingly, no crush injuries were reported
  - This may reflect the respondents more than the industry as a whole

Long term injuries & disabilities

In the long run, everybody has aches, pains and similar

Lower back problems are universal
- shoulders close behind – leg and shoulder problems account for at least half

Frequent heavy lifting contributes to this physically demanding business
What is the worst part of the work?

Typical survey responses:

- "Repetition with the hands during culling. During culling if you put one foot up on a milk crate, that helps with back issues. I also have my younger employees do more of the lifting."
- As time goes on, we develop several ongoing issues, like hand pain, arm pain and the like while culling. We also develop strategies to cope with them. But ways to prevent it in the first place are important.
- "If I were 30 years younger, all would be well!"
- Survey design did not include a question on Age. However, in general, many if not most growers on Cape Cod are in their forties or older, and that has its own set of problems, including more easily damaged joints and muscles and slower recovery.
- "Lifting trays of oysters up over my shoulders. I have not found a way to do this better and yet be time efficient."
- While this may seem to be one response to one situation, the response itself is telling: we accept injuries and strains in order to produce, to get the job done. Solutions to prevent or postpone injuries don’t get used often because they’re not time-efficient or cost-effective in the short run.

FUNDAMENTALS

I. Arrive home safely at the end of each day
   - Boating and water safety

II. Do no Harm
   - Safe handling and awareness

Boating Safety

Know your boat
- Every boat is a compromise
- Ability to handle waves/weather
- Speed
- Carrying capacity
- Reliability

Is your boat maintained?
Boating Safety
Some of the basics:
- Registration
- Life Jackets
- Anchor & rope
- Compass
- Fire extinguisher
- Paddle
- Visual Distress Signals
- Sound Producing Device
- Communication device

USCG
Required equipment by vessel size

Other important stuff to have
- First Aid kit
- Sunscreen
- Bug spray
- Drinking water
- Basic tools
  - Be able to do battery cables, hose clamps, etc.
  - Manual pump or bailer
  - Spare prop & wrench, pins?
  - Duct tape and zip ties
Boating Safety

Be a prudent mariner
- Observe weather conditions and forecast
- A lightning strike can ruin your day
  - Loss of life
- Ice sinks boats
- Carry enough fuel

Safe Operations
- Situational Awareness
- Carrying Capacity for the boat and sea conditions
- Is the load secured?
- Speed – “reasonable and proper”
- Wake – watch out for smaller vessels
  - Who is responsible ??
- Don’t forget to use your anchor……
- Take a class if uncomfortable

Trailering Safety
- Practice, practice…
  - “ramp buzzards” - elevate stress
- Equipment
  - Metal and seawater don’t mix
    - Then there’s electricity and seawater
  - A little maintenance can go a long way
  - Capacity – weight adds up
General Water Safety

Avoiding Darwin Awards
- Waders make fabulous sinkers
- Stranding crew members
- Hypothermia
- Heat Exhaustion
- Getting stuck in muck
- ALWAYS Carry plenty of drinking water
- NO alcohol

Have a plan for extremes
- What if a hurricane comes?
- What is the plan for winter?
- How much time do you need?
  - When do you need to make the call?

Is it a safe work environment?
- Not all days are workable at every site
- What conditions are not workable
- Is there an alternative?
  - Work floats
  - Off-site culling
    - More recordkeeping
    - Vibrio related concerns
    - More control of conditions
    - Less rushed
Product Handling Safety

- Basic food safety & temperature control
- Over 95% of MA cultured shellfish are consumed raw
  - Vibrio
  - Vp Control Plan

Regulating Shellfish Sanitation

**Federal:**
National Shellfish Sanitation Program (NSSP)
Guide for the Control of Molluscan Shellfish, "Model Ordinance", 2017 Revision

**State:**
Food Protection Program
105 CMR 533.000 Fish and Fishery Products

ISSC and NSSP

**What is the ISSC?**
Interstate Shellfish Sanitation Conference
- A federal cooperative body which manages the National Shellfish Sanitation Program. It was formed in 1982 to foster and promote the sanitation of shellfish through the cooperation of state and federal control agencies, the shellfish industry, and the academic community.
- The ISSC manages three task forces: the Growing Areas task force, the Processing and Distribution task force, and Administration task force. Committees are often appointed to assist task forces in developing recommendations. Delegates from each state shellfish control agency vote on recommendations submitted by the task forces.

Regulation by committee, oversight of FDA
NSSP – National Shellfish Sanitation Program
Guide for the Control of Molluscan Shellfish updated March 2018

- NSSP is the federal/state cooperative program recognized by the FDA and the ISSC (Interstate Shellfish Sanitation Conference) for the sanitary control of shellfish produced and sold for human consumption.

- Purpose of the NSSP is to promote and improve the sanitation of shellfish moving in interstate commerce through federal/state cooperation & uniformity of State shellfish programs.

- Participants in the NSSP include agencies from shellfish-producing and non-producing states, FDA, EPA, NOAA and the shellfish industry.

- Document represents the Agency’s current thinking on the safe and sanitary control of the growing, processing, and shipping of molluscan shellfish for human consumption.


Keys to Keeping Shellfish Safe

- Harvest from Approved Source
  - licensed harvester, open and approved area

- Shellstock Identification
  - tags with harvest area and date, etc.

- Shellfish Transactions
  - traceability through transaction slip and tag retention

- Prevention of Adulteration
  - clean vehicles, no pets, etc.

- Time/Temperature Control
  - rapid cooling, minimal exposure to sunlight and other heat sources

Approved Source

- MA DMF - monitoring
  - Sanitary Survey
  - Fecal coliform sampling
  - Contaminant sampling
  - Follows NSSP guide

- See also MA DMF shellfish planting guidelines
Challenges to shellfish safety

Can cause closures so you want to be aware of what can happen and how to manage risk

Vibrio and the Control Plan

- What is Vibrio?
- Naturally occurring marine bacteria
  - *Vibrio parahaemolyticus* (Vp.)
- Occurs in shellfish
- Can grow rapidly
- Can cause gastro illness
- Control Plan is currently just for oysters
- More on this later…

Harmful Algal Blooms (HABs)

- Red tide – PSP
  - Paralytic Shellfish Poisoning
  - *Alexandrium fundyense*
- Amnesic Shellfish Poisoning (ASP)
  - genus *Pseudo-nitzschia*
  - Domoic Acid
- There are others…
- State does have a monitoring program
Norovirus

- Highly contagious virus
- 2016 closure in Wellfleet
- 75 people sick
- Most consumed oysters at wedding raw bars
- Major outbreaks in British Columbia shellfish
- If you’re sick don’t go to work!!!
  - A tiny drop can contaminate a whole growing area

Other causes of closures

- Rainfall
  - Most common
  - Precautionary
- Sewer overflow
  - Operators notify state
- Contaminating events
  - Spills, crashes, fires, etc.

Reducing risk of foodborne illness

- Shellfish must be from an approved source – is the source questionable?
- Bring cooler with adequate ice to immediately begin cooling process
  - Keep product cool/out of direct sun
  - Refrigerate as soon as possible
  - Keep oysters out of product to prevent drying out
  - Consume as soon as possible
- Do not consume raw shellfish if you are immuno-compromised
  - Includes conditions such as liver disease, diabetes, steroid use, chemotherapy, alcoholism, etc.
- Keep raw foods from touching other raw or cooked foods and surfaces used for cooking and eating
  - Avoid cross-contamination
Cooking is an alternative to raw

- Preparing oysters and other shellfish in the shell
  - **Before** cooking: Discard any with open shells or smell bad
  - **During** cooking: Boil for 3-5 minutes after shells open
  - **After** cooking: Discard any with shells that did not open

- Preparing shucked oysters
  - **Boil** or simmer for at least 3 minutes or until the edges curl
  - **Fry** at 375° Fahrenheit for at least 3 minutes
  - **Broil** 3 inches from heat for 3 minutes
  - **Bake** at 450° Fahrenheit for 10 minutes

Shellfish are nutritious and delicious

- Despite certain risks…
- Low in contaminants

<table>
<thead>
<tr>
<th>Test</th>
<th>Oysters</th>
<th>Quahogs</th>
<th>Softshell Clams</th>
<th>Bay Scallops</th>
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<tbody>
<tr>
<td>PAHs (ppb)</td>
<td>ND</td>
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<td>PCB Congeners (ppb)</td>
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<td>Pesticides (ppb)</td>
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<td>Metals (below, in mg/serving)</td>
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<td>Cadmium</td>
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Nutritional Profile of Shellfish from Massachusetts

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<tr>
<th>Type of Shellfish</th>
<th>Quahogs</th>
<th>Oysters</th>
<th>Soft Shell Clams</th>
<th>Bay Scallops</th>
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<tr>
<td>Calories</td>
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<td>63.6</td>
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<tr>
<td>Protein (g)</td>
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<td>11.1</td>
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<td>Carbohydrates (g)</td>
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<td>1.5</td>
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<tr>
<td>Fat (g)</td>
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<td>0.4</td>
<td>0.9</td>
<td>0.5</td>
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<tr>
<td>Cholesterol (mg)</td>
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<tr>
<td>Omega-3 (mg)</td>
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And good for you!
Next up:
Vibrio and the Control Plan

Vibrio Control Plan

- Control measures began for oysters in 2012 after 2 illnesses in 2011
- FDA has threatened mandating post harvest processing to control Vibrio or no harvest of oysters – mainly in more southern waters
- Several closures over the years
- Not fully understood and not going away

Its been a challenge

- Added significant burden to industry in icing of product for time to temperature control
  - Weight of harvest can be doubled or tripled
- But... an unsafe product has no value in the market... one bad harvest can shut down an entire area
**Vibrio Control Plan**

Training videos
https://www.mass.gov/service-details/watch-vibric-training-videos

Tools for proactive risk management
https://products.coastalscience.noaa.gov/vibrioforecast/northeast/default.aspx#MS

Current Water Temperature
https://v2.wmdatlive.com/public/103