



4TH ANNUAL CAPE COASTAL CONFERENCE

Considerations for Scaling Shellfish Propagation for Nitrogen Management

Josh Reitsma, Diane Murphy, Abigail Archer
Cape Cod Cooperative Extension
& Woods Hole Sea Grant

Region Wide Issue

- Barnstable County Shellfish Advisory Group
  - Municipal shellfish program representatives from all 15 towns
  - Discuss issues common to all programs, since 1970’s
- Commonalities in concerns toward scaling up for water quality
  - General need to improve coastal water quality region wide
  - New direction for these programs
  - Opportunities and challenges

Municipal Shellfish Programs

- All 15 towns on the Cape have some form of program
  - Growing and managing shellfish resources for years
  - Each town has a shellfish constable (MA ch. 130)
- Staff have unsurpassed knowledge of local waters and what grows in them
  - Should be first line of information to a town considering scaling up shellfish propagation
- Also have responsibility for oversight of shellfish aquaculture

- Involve them early in the consideration process

Who Will do the Work?

- Municipal propagation programs, contractors, commercial growers
  - All may be capable but who is best suited to get desired result?
  - Volunteers too?
- Public or Private?
  - If improvement of water quality in the public trust is the goal need to make sure that is priority

Costs of Growing Shellfish

- Many ways to do it – variable costs
- Seed – recurring cost annually
- Initial gear cost can be big up front
  - Most gear should last 5-10 years
  - Gear storage – where smell is not an issue
- Nursery facility if scaling into the millions
    - Chatham estimates:
      - $150k annually
      - Facility cost today $500k-$1M
- Grow out
  - Variable
  - Labor to maintain is the biggest cost
    - Not a “set it and forget it scenario”
    - Hard to estimate – learning curve

Time Scale - Logistics

- Incremental scale up
  - Easier physically – allows some learning curve
  - Easier financially
- Shellfish growth rates vary
  - Oysters are usually fast, 2 growing seasons, ~18 months
  - Quahogs slower, minimum 2-3 years
- Culture operations will have to account for growth rate and multiple year classes as necessary

Space Needed

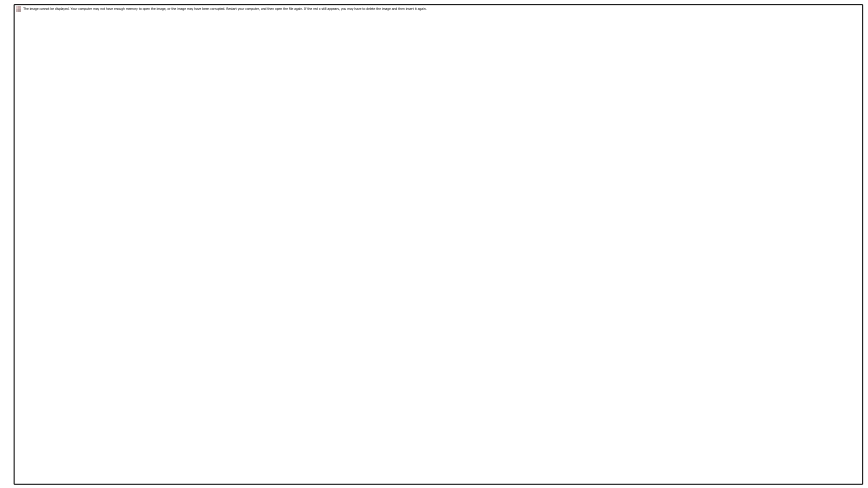
- MA growing area classifications (DMF)
  - Water quality classifications for harvest
    - Very important to public health - safety
  - Dictate where activities can occur
  - Waters degraded most often not open to harvest
- Can not use areas already supporting natural shellfish populations
- Is there enough habitat to support shellfish needed for WQ?
  - Habitats are degraded, increase in muddy bottom
    - Challenging to work with any shellfish in poor bottom conditions
  - Low oxygen, smothering conditions
  - Space for wintering, rotating crops

Logistical Oversight required by Town's

- Poaching prevention
- Harvest control
  - Sanitary considerations – raw bar products
    - Vibrio controls
  - Time of year limitations
  - Legal size
- Harvest quantification for N credits
  - Number and size, or biomass – neither currently recorded in full
  - Recreational can be especially challenging to quantify

Risks – Procuring Seed

- A recognized bottleneck by commercial industry
- What happens with even more demand???
- Seed supply is not always guaranteed
  - Hatchery failures
  - Environmental issues prevent sale
  - Volatility in demand from in and out of the region
  - Rising costs
  - Delivery failures
- 2014 example, no seed oysters – lost year class
- BMP – don’t rely on one source



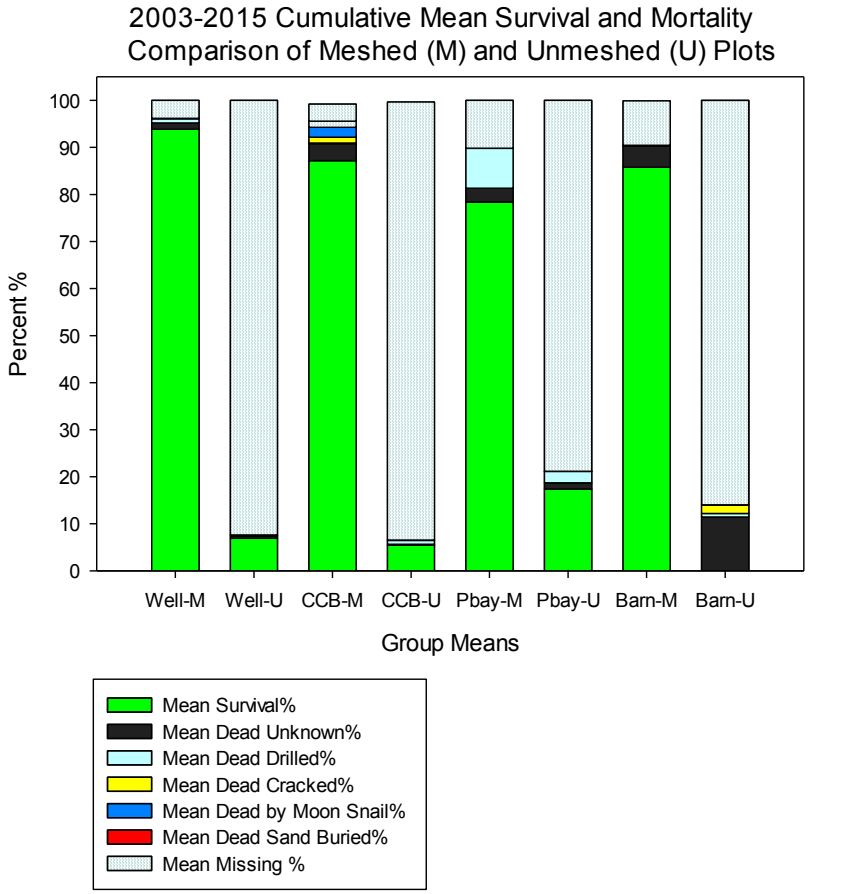
Risks - Disease

- Have diseases common to all commercially important shellfish
  - Oysters – Dermo, MSX, JOD
  - Quahogs – QPX, neoplasia?
- Fluctuate in presence – disease survey
- Present throughout the region - can spread
- Often cause large mortality events
  - QPX – Wellfleet 2005
  - MSX – Duxbury 2010-

- BMP – use “resistant” stocks (if available) and keep densities light

Risks – Poor Growth or Unexplained Mortality

- Still happens
- Harmful Algal Blooms – can stunt/kill shellfish
- Bad batch of seed
- Weird weather events
- New diseases emerging???
  - Oyster herpes virus example
  - Near 100% mortality
  - Decimated oyster production in Europe and now Australia
- Up’s and downs are an unfortunate part

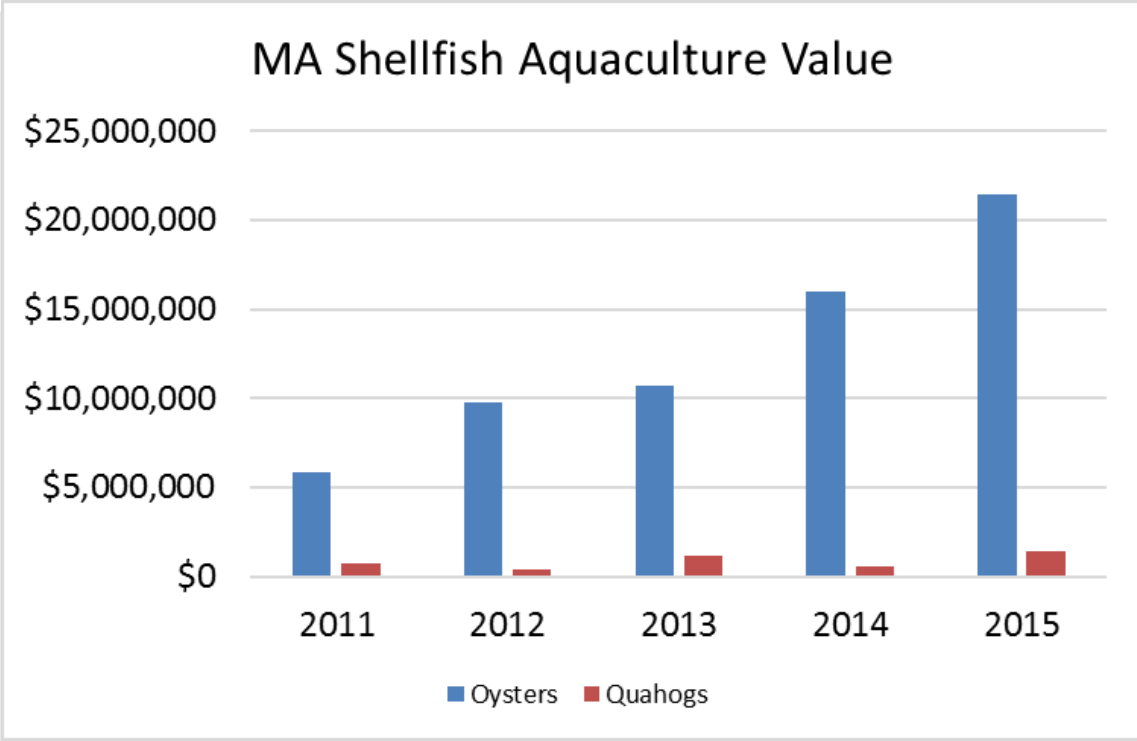

2003-2015 Cumulative Mean Survival and Mortality
Comparison of Meshed (M) and Unmeshed (U) Plots
Percent %
100
90
80
70
60
50
40
30
20
10
0
Well-M
Well-U
CCB-M
CCB-U
Pbay-M
Pbay-U
Barn-M
Barn-U
Group Means
Mean Survival%
Mean Dead Unknown%
Mean Dead Drilled%
Mean Dead Cracked%
Mean Dead by Moon Snail%
Mean Dead Sand Buried%
Mean Missing %

Risks – Harvest Related

- Sometimes conditions require closing an area to harvest - safety
  - Harmful Algal Blooms (HAB) – 2016 ASP, 2005 red tide
  - Sanitary conditions – Norovirus 2016
    - Rainfall closures
  - Vibrio – oysters – 2013, 2015 certain areas
- Extreme winter cold and ice
  - Winter 2014-15 cold/ice prevented harvest in most areas for months
- Market dynamics…

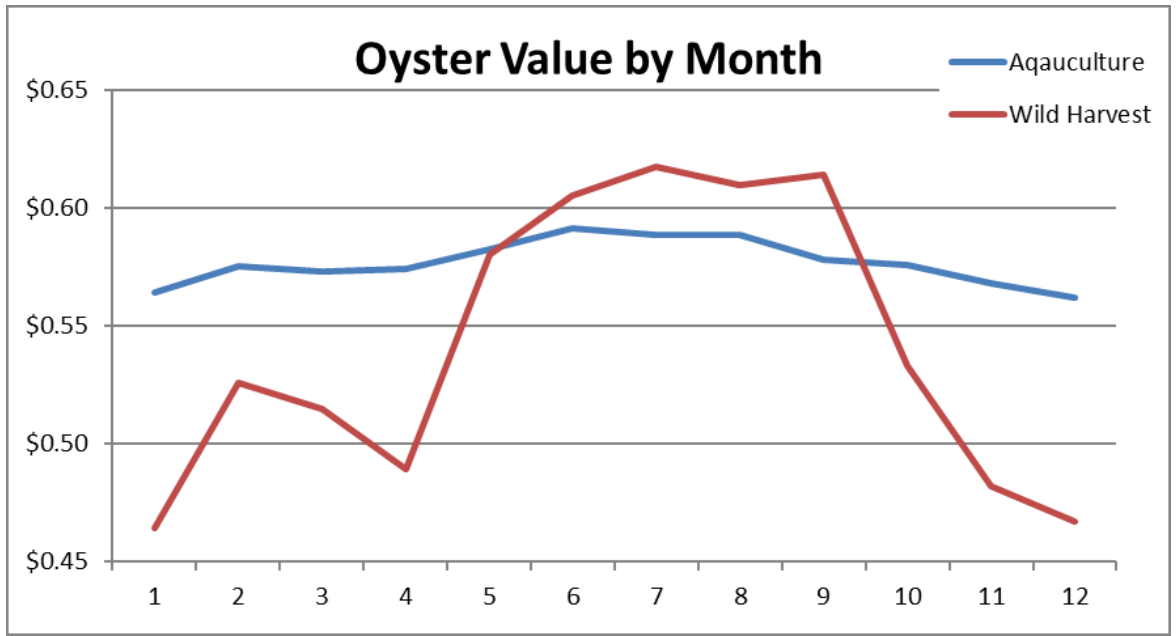
Assumed Market

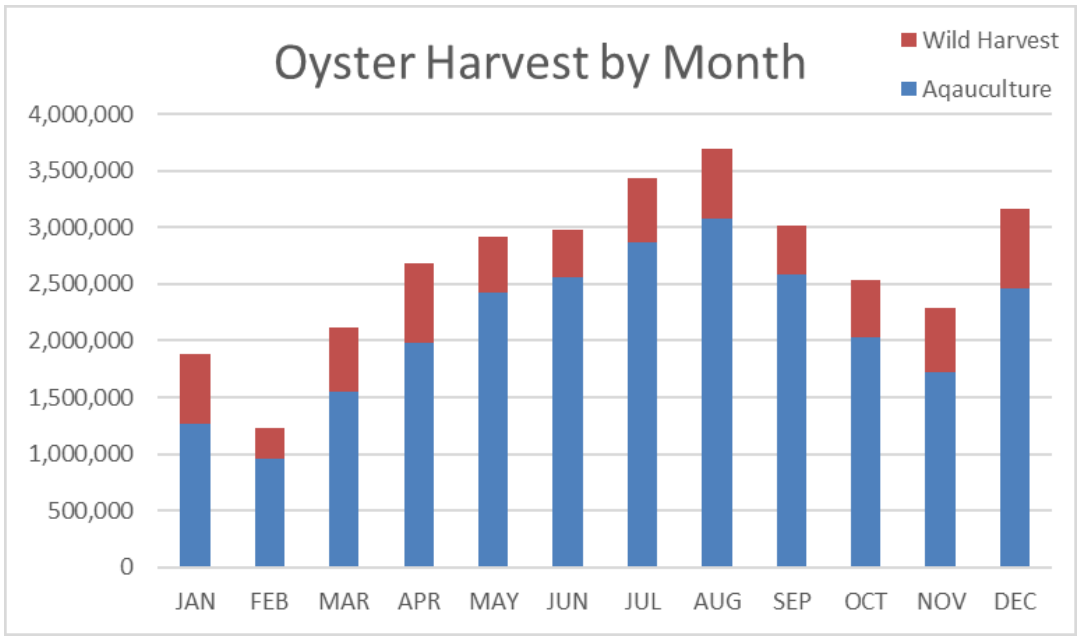
- Oyster aquaculture is growing in MA
  - Steady growth
  - 90+% of cultured shellfish are oysters
  - Steady market that has been built for high end raw bar
- Similar growth up and down East Coast
- Will there be a saturation point???



Value

- Will high volumes of shellfish grown for water quality dilute value?
- Farms grow product under controlled conditions specific for high end raw market
- Farmed oyster product vs wild product
  - Lack control over growth/size and appearance



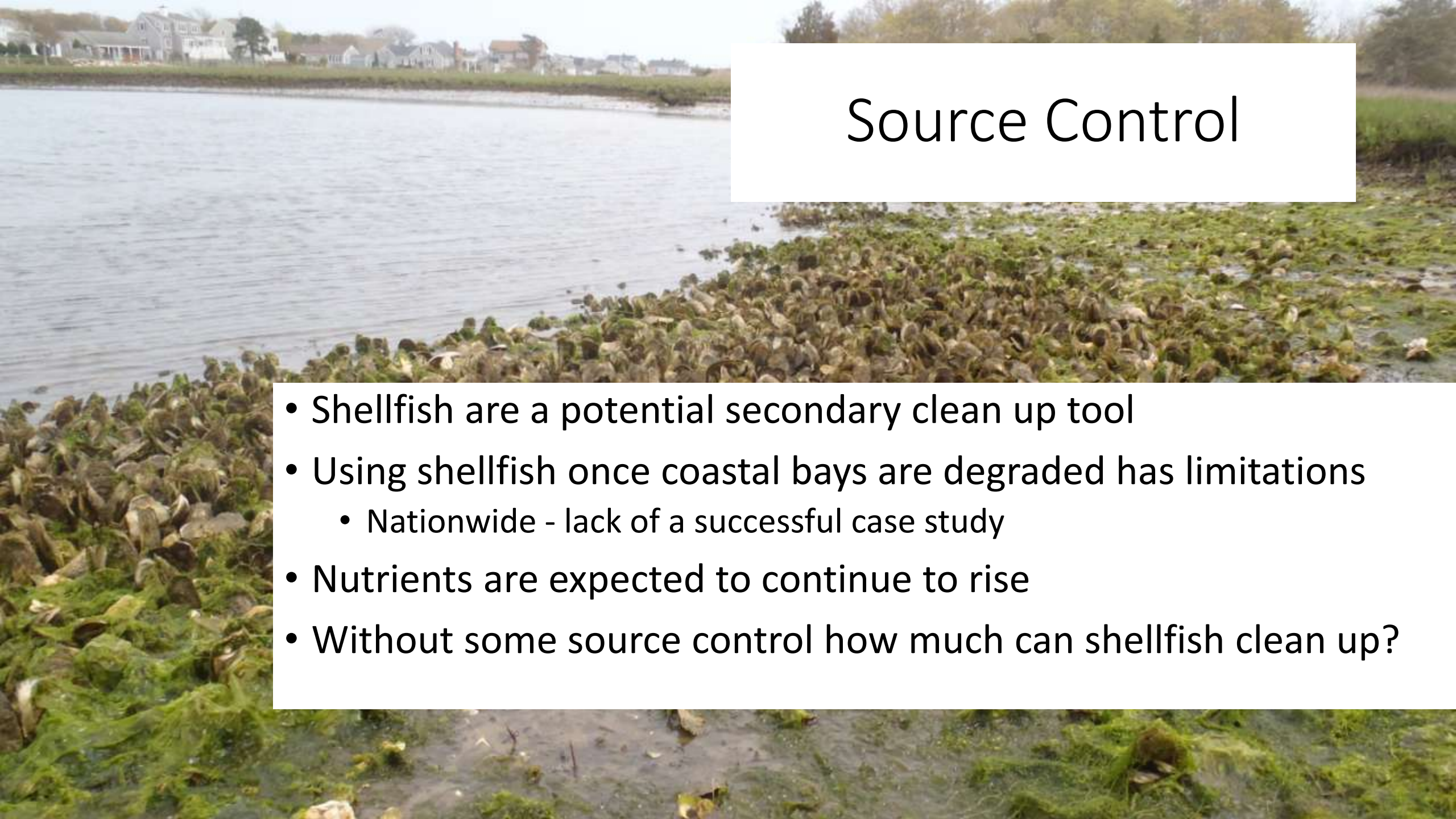


Consideration for diversifying markets…

- Shucked oyster product – none currently
  - Avoid diluting the growing farmed oyster industry
  - Can harvest at larger sizes
    - More Nitrogen removed
    - Less concern over time of year
  - Less stringent Vibrio controls

- Increased volume of nitrogen remediation oysters could provide alternate market!

Cape oysters in a jar!



Source Control

- Shellfish are a potential secondary clean up tool
- Using shellfish once coastal bays are degraded has limitations
  - Nationwide - lack of a successful case study
- Nutrients are expected to continue to rise
- Without some source control how much can shellfish clean up?

Questions?