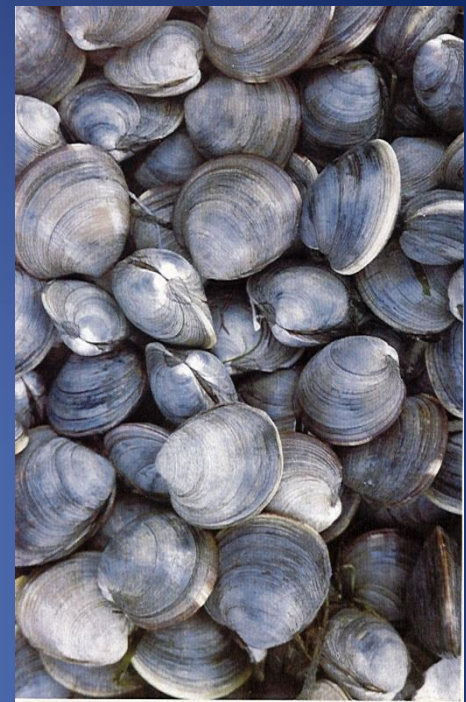


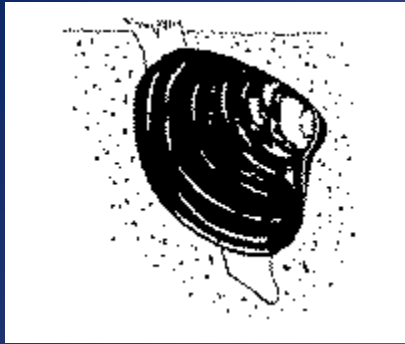


Clam Aquaculture

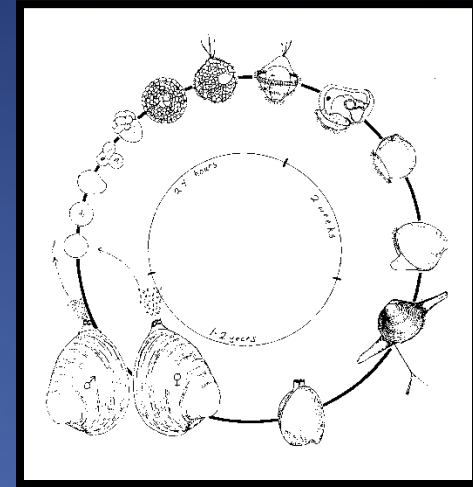
Josh Reitsma

Cape Cod Cooperative Extension and
Woods Hole Sea Grant





What are clams?



- Bivalve molluscs which live within the substrate of a waterbody – infaunal animals – many species
- Lifecycle - clams start their lives as planktonic larvae, but once they settled into the bottom, they stay in sediment often for many years
 - (some are mobile but still live in the bottom - razors)
- Siphons extend to the sediment-water interface to bring in water for feeding and respiration
- Marine varieties have more commercial value
- Species can be found from the intertidal estuaries to deeper offshore waters (some freshwater species)

What clams are farmed?

Many species of clams – 2 currently important to commercial aquaculture in the US

Other Species:
Razor & Soft-shell



- Northern Quahog or hard shell clam (*Mercenaria mercenaria*)
- Atlantic coast



- Manila clam (*Venerupis philippinarum*)
- Geoduck (*Panopea generosa*)
- Pacific coast



Photos: Taylor Shellfish farms

Industry Scale

Values based on the 2005 Census of Aquaculture by USDA (most recent #s available)

- East Coast
 - Maine to Florida
- Hard clams (quahogs)
- Production valued at over \$60,000,000
- West Coast
 - Largely Washington
- Manila clams
- Production valued at over \$19,000,000
- Geoducks - high value

Current Figures are probably much larger, Virginia to Florida have significantly increased clam aquaculture production



Starting out – find a site

- Intertidal or subtidal?
- Sediment type?
- Water quality characteristics?
 - Waters approved for harvest of shellfish
 - Food availability for the clams
 - Health of water body - DO, pH
- Ease of access?
- Potential for weather related damage?
- Get permits (a small line for what usually amounts to big job)
 - Consult your local authorities and extension personnel



How are clams cultured - Seed



- Specialized expertise and equipment are required to spawn clams and raise them through larval phases – hatcheries specialty
- Should be purchased from a reputable hatchery
 - Follow state and local guidelines to prevent disease transfer and illegal movements
- Smaller seed more fragile – must be handled very carefully
- Buy seed you are equipped to handle
 - Starting with larger seed is usually much easier

How are clams cultured – Nursery methods

- Upwellers are one option
 - Floating – FLUPSY
 - Land-based
- Advantage – lots of seed in small easy to access space
- Disadvantage – costly, require power source, require routine maintenance, may require additional permits



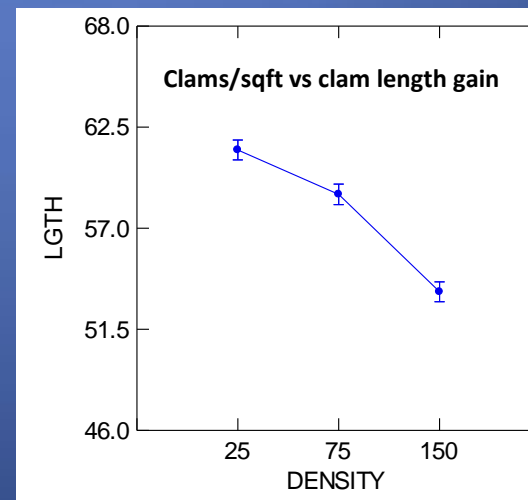
How are clams cultured – Nursery methods

- Field plant boxes or nursery trays
- Advantages: allow seed to be deployed in field, protected from predators, fairly inexpensive
- Disadvantages: not typically as easy to access, mesh must be maintained to keep water flushing



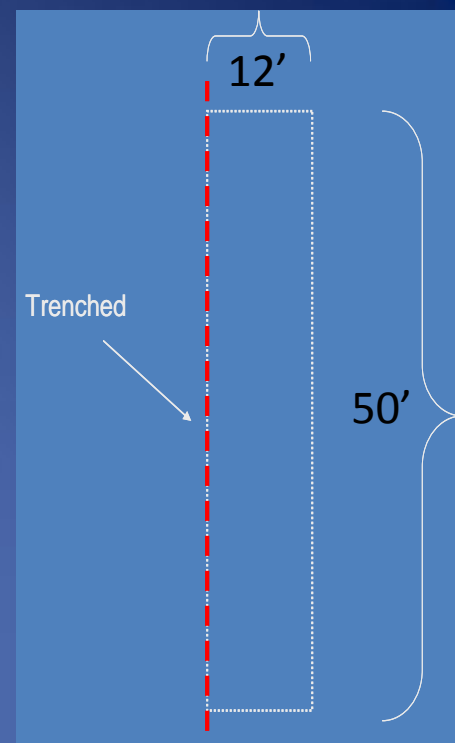
How clams are cultured – Grow out

- Typically ready for planting at about 12+ mm
 - Larger, thicker shelled animals are more hardy
- Should typically remain protected until at least one inch in length (depending on predation)
- Stocking densities are an important consideration, often site specific
 - Too many – growth slows, increased disease risk



Grow out – Netted runs

- Decide on size and layout for amount of seed to be grown
 - typically 12' x 50' or 12' x 100'
 - Nets secured with rebar and steel staple pins or sometimes weighted line
- Runs usually stocked at around 40-100 per square foot in New England
- Use largest mesh that will protect clams and prevent loss
 - Larger mesh will foul less quickly
- Nets can be raised slightly with small buoys, foam or PVC grids to reduce settling of nets and improve water exchange



Grow out - Planting a run

- Layout where nets will go
- Trenching (if necessary or possible)
- Rake site to remove crabs, rocks etc
- Lay one side of net and secure
- Seed
- Cover and secure run completely (before the tide!)



Grow out - Mesh Bags

- Florida bags - Very common method in Florida
 - Loaded with 850 seed/bag
 - Pinned down on farm bed
 - Hauled when ready for harvest
- Can be linked into trawls
- May require added protection over top in some cases



Maintenance - Labor

- Keep mesh/net/screen clean!
 - Clean mesh means water flow to your clams
 - Water flow brings food and oxygen
- Nursery - clean screens, rinse clams, grade
- Grow out – keep nets clean, maintain nets from tears/breaks, follow clam size to harvest



Predators – from the ground (Invertebrates)



Crabs



Moon snails



Starfish



Oyster drills



Whelk/conch

Predator – tell-tale signs

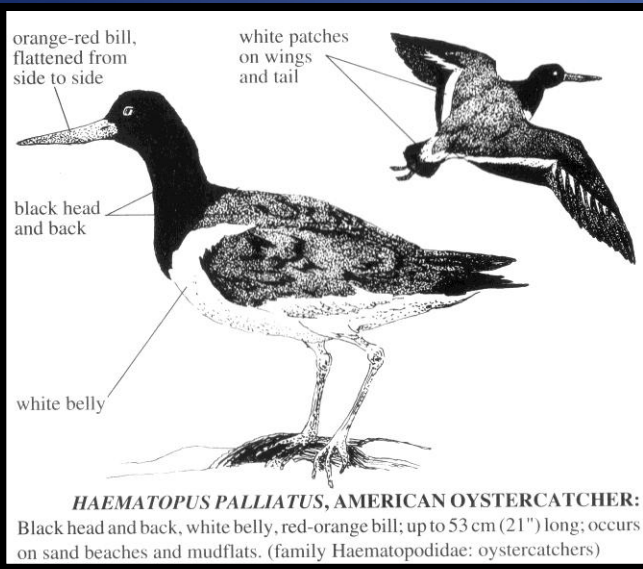
Oyster drills – small hole in shell, typically attack seed clams



Moon snails – large hole with a beveled edge

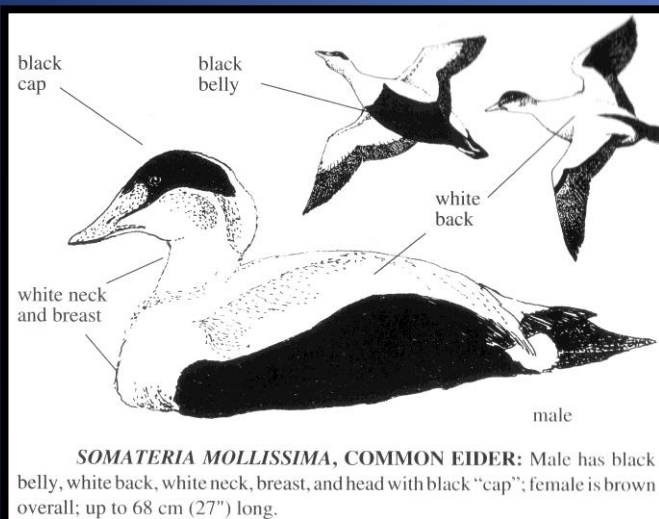


Predators – from above (Vertebrates)



Birds/Sea ducks

Poachers! Fish/Rays



Predators – and even from below

- Infaunal predator
- Mostly hits clams that can't completely close their shell
 - Soft shell clam - most preferred species
 - Also observed attacking razor clams
- Though may prey on seed quahogs



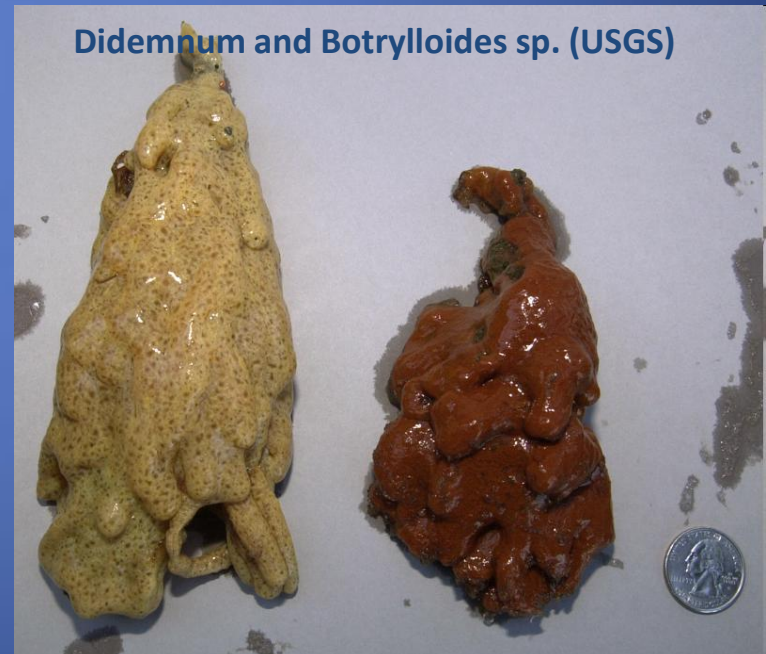
Diseases

- QPX (Quahog Parasite Unknown)
 - Slows growth and can cause mortality
- Mortality often seen in spring and late summer
- Chipped shell and nodules are signs of the disease (often in its late stages)



Pests

- Do not directly harm clams, but can cause issues like fouled nets



Other Potential Pitfalls

- Storms
- Ice
- Sedimentation
- Freshwater
- Harmful algal blooms



Harvest

- Ideally when at least 50% are harvestable
- Bull raking – helps to have some water on site
- Hand scratching – when site is dry
- Hydraulic dredges
- Size sorting – size class for market
 - Replant the sub legal clams





Market



- Northern quahog worth more sold when sold at small size classes – don't hang on to them
 - Littlenecks – 10-12/lb., <2" in length
 - Countnecks, topnecks
 - Cherrystones – 3-5/lb., ~2-3" in length
 - Chowders – 1-2/lb., >3"
- Raw bars or for restaurants and retail
- May require different licenses and added record keeping for direct marketing
 - Need to decide at what level you'd like to sell

Economics



http://shellfish.ifas.ufl.edu/getting_started.html

- Will vary greatly by location and site specifics
 - Time to market will vary by geographic regions
 - As little as 12-18 months or 3 years +
 - Also time to first potential income
 - Clam value will also vary by region
 - \$0.09-\$0.30 per littleneck clam
- Business plans will help focus your efforts and determine if a business venture is worthwhile
- If possible talk to other growers to figure out what methods have worked and what have not
 - Start small and determine best methods to scale up
- Economies of scale – improved profitability
- Mechanize labor intensive tasks if possible

Other items to be aware of...

- Insurance
 - Liability
 - Injury to employee or public
 - Shellfish consumption
 - Crop insurance
 - Cultivated Clam Crop Insurance Pilot Program
 - AGR-Lite
 - Noninsured Crop Disaster Assistance
- Record keeping is important!
- Be a good neighbor
 - Clean up old nets/gear



Acknowledgements

- Material for this presentation came from the work of a number of folks: Diane Murphy, Bill Walton, Bill Burt, and Henry Lind
- As well as from many of the hard working clam aquaculturists