Northeast Regional Aquaculture Center

Razor Clam Production Workshop

May 2, 2012
Brooke Hall, Darling Marine Center, Walpole, ME

Participants:
Mike Pietrak - Univ. of Maine, PhD candidate
Anne Langston - Univ. of Maine, Aquaculture Research Institute
Paul Rawson - Univ of Maine
Nate Perry- Pine Point Oysters
Jesse Leach—Bagaduce River Oyster Company
Chantal Gionet - CZRI, Shippagan, New Brunswick
Chris Johnson—State Representative, Marine Resources Committee member
Chris Sewall – Hermit Island Lobster Pound
Muriel Hendrix –writer and reporter
Dale Leavitt, RI Roger Williams
Chris Scales-- hard clam grower, NJ
Jason Viggiano - Univ of New England student
Jay Letendre - UNE student
Russell Chandler, UNE student
Bob Boeri - Fat Dog Shellfish Farm, NH
Alex Boeri - Fat Dog Shellfish Farm, NH
Jay Baker - Fat Dog Shellfish Farm, NH
Hannah Annis - ME DMR Shellfish Program
Denis-Marc Nault - ME DMR Shellfish Program
Jock Carruthers - new aquaculturist, Maine
DMR-shellfish management program—state multispecies mngmnt
Lori Howell - Spinney Creek Shellfish
Bill House - Shellfish harvester
Robert Wallace - Shellfish harvester
Alisa Wallace - Shellfish industry
John Swenson - Oyster gardener
Tom Quaranto - Oyster gardener
Mark Brooks, Garth Hersey, Josh Callahan - Brooks Trap Mill
Dana Morse, Sarah Redmond, Maine Sea Grant and Univ. of Maine Cooperative Extension

Origin and Goals of the current project

Dale Leavitt, Roger Williams Univ. and Paul Rawson, Univ. of Maine Sea Grant

Paul summarized the work done at the DMC Shellfish hatchery: focusing on new species, breeding, and research. Species include: European oysters, scallops, razor clams, whelks, American oysters. For the current project – funded by Northeast Regional Aquaculture Center (NRAC) the rationale is that culturing razor clams may

grow market. The overall goal is to work on hatchery/nursery process, and then follow up with grow out phase proposals with interested farmers.

Overall, diversification of the shellfish industry is needed. We have 2-to-3 main species being grown in NE: oysters, quahogs and mussels. Other species with potential include: soft shell clam, bay scallop, surf clam, European oyster, and razor clams.

History of Razor Clam Research (D. Leavitt with P. Rawson – presentation posted to razor clam web page on ME Sea Grant site)

The overall goal of this work has been diversification for the aquaculture industry 2001-NRAC funded project, investigations in hatchery and growout. Growers from MA, RI and CT got razor clam seed, and tried different growout methods: covered raceways, lined wire-mesh boxes on the bottom, netted plots, etc. Best approach initially seemed to the wire mesh boxes (more trials needed!), and growth rates were good overall, indicate that about 2 growing seasons needed to raise a 4" animal. There was a small market study as well, indicating that a 4" shell was desirable, but some possibilities for smaller animals too. Hatchery runs were inconsistent, and more work is needed to make hatchery production consistent.

The current project, also funded by NRAC, focuses on optimization of hatchery and culture technology, with some outreach to industry (ie. This workshop). Goals and activities include:
-Hatchery production for a sustainable and reliable source of seed
-Bottlenecks during metamorphosis stage
-Grow out phase—technology, marketability, communication and development with industry
- 2 razor clam roundtable workshops:
- Introduce razor clam culture, share ideas about technology, make connections within industry
- Principal Investigator: P. Rawson, collaborating with Dale Leavitt, Diane Murphy (Cape Cod Cooperative Extension), Dana Morse. Hatcheries will be Darling Center (Mick Devin) and Roger Williams University (Rhode Island- Karen Tammi), and ARC (Massachusetts - Richard Krauss)

Some discussion followed, with the following items coming up:
- Transfer of shellfish within coastal waters, and concern about spread of disease
- Transportation of seed and adults within Maine
- Noted that hatchery produced seed has tested pathogen free
- Biosecurity overall is an important topic for producers

Life History and Current Fisheries

Razor clam fishery, harvesting methods include:
-spearing (used for bait)
-dry digging – low intertidal, limited opportunities to dig (very low tide)
- pumping – highly regulated

-salting –(MA harvesters) salt brine on hole, clam comes to surface
-electro-fishing (Ireland) –Electrodes apply current to stimulate clams to emerge (document posted to ME SG Razor clam page)

It's a small-scale fishery in Mass., along the north shore, Duxbury Bay, and Cape Cod), with landed value of the product at approximately $2.00/lb

Culture considerations

Habitat prefererences are:
-extremely low intertidal to subtidal, cold water species (sensitive to heat)
-fine to medium sand, cleans sand, muddy sand, no silt
-high energy environments-unstable sand and dynamic areas
-moderate water flow (not static)

Population characteristics
- wild recruitment numbers have been estimated at 30,000/m2, dropped to 10,000 within 2 weeks (Luczak et al 1993)
-Chesapeake Bay—juveniles at 2,000/m2—low over winter survival, final density 4-6/m2
-other razor clam species—400/m2, 120/m2

Food
Suspension feeders, may be some deposit feeding (sand grains)

Growth
- Some growth data North Sea suggest 5" after 2 years
-3-4" market clam within 2 years appears to be feasible in this area

Predators include: Conch, Northern moon snail, ribbon worm, tautog (siphon nipping), birds (oystercatchers), crabs, starfish

Disease—none observed
- There has been a parasite observed on west coast: NIX (Nuclear Inclusion Unknown), but not a lot of information
- Large population crashes have been observed

Behavior
-Razors dig fast and can move rapidly across surface with foot
-Swim with foot (video in Dale's presentation)

Markets
- There is a demand for wild product, slow and steady, and the New York market could grow with consistent supply; supply seems to be an issue with most buyers, given the unsteady supply (need low tides and appropriate sites for decent populations). Overall though, buyers in many locations express interest for more product.

The live market focuses on clams bundled with elastic bands, to maximize shelf life. Italian and Asian markets require high quality, healthy, active clams. Preferred size ranges from 3 to 6 inches. The processed market is more traditional/historical, using clams to shuck and/or grind...canned products generally.

Review of Prior Work on Razor Clam Culture - D. Leavitt with P. Rawson
(presentation posted to Razor Clam web page)

2001-2004 NRAC-funded project, D. Leavitt was Principal Investigator
Project was to stimulate commercial aquaculture development, during the project, learned a lot about biology of the species, its' mobility, predators and disease, etc. They encountered overwintering, and summer mortality. This varied by location, tidal exposure, and sediment temperature

ARC of Dennis, MA, a commercial hatchery, produced juveniles—5mm year 1; year 2 & 3 unsuccessful hatchery attempts. Overall, there was

-poor survival and set
-seed placed in upwellers
-vibrio, ciliates, neglect, die offs

They did however get enough post-set to provide seed to industry, and to collect ideas from growers for technology, husbandry, etc. They provided seed and support to experiment with grow-out technology to 9 growers, in MA, RI, CT, NY, NJ. Growout methods tried were:

-bottom netted raceways
-boarded raceways with mesh on top
-steamer bottom tents - successful
-floating trays
-bottom trays with cover –best growth year 1 & 2
-bottom cages with sediment cloth, filled with sediment– successful
-upwellers appeared to be successful for the early nursery stage

They found that razors are sensitive to sediment type, need sediment at a certain size. In one or two cases, survival was over 100%, indicating natural settlement. Best equipment appeared to be the bottom cages with covers - Consult the presentation on the website for full data.

Growth: animals that were 20mm in Sept were 40-55mm by November, in year 1. In year 2, there was variable success—die offs, seed losses, some success, summer die offs. Year 2 seed reached 65-80mm (3 inches) by Oct.

Overall, in the hatchery stage, they were similar to other cold water bivalves. In the nursery stage, they were susceptible to microbial and predator problems. In the growout phase, there were some reports of growth through winter 3-4'' in 2 seasons. It's clear that temperatures, site selection, and containment are important

areas to work on, and that in MA and south, razors will likely need subtidal site for southern areas

Chantal Gionet - Coastal Zone Research Institute, Shippagan, New Brunswick, Canada - Razor clam fishery and research in Atlantic Canada. (Presentation posted to razor clam web page)

There is a recreational fishery, with 100 per day limit. In 2001, there was some interest from industry, and some hatchery work done. Nothing more done until 2010; the industry became interested in the market. Collected broodstock in New Brunswick, and conditioned in the hatchery. Broodstock conditioning: 5-6 weeks gonad development, at 20 degrees C, mixed algal diet. Broodstock were held in double bottom downweller, sand over rock - used silica sand (for sandblasting) 62-200 micron. Spawning was done with thermal stimulation, 13 to 20 degrees, or 20 to 27 degrees. Held for a 13-15 day larval cycle, with larval mortality of 22-50%. After metamorphosis, held in a downweller with sand. For larger juveniles, moved to and upweller with sand: shell length 15-20mm 94 days from egg, mortality, 1-5% but noticed low seawater pH/acidification losses.

For growout: rebar tables with cloth and sand or trays, cages - all trials are done in sediment-filled container of some sort.

Generally, they used technology similar to that for geoduck: sand in downweller, shallow sand trays with laminar flow in the nursery, eventually place on surface of sand-filled trays. Larve and post-set prefer downweller, can handle more larvae.

Darling Marine Center Hatchery Activities - Mick Devin and Paul Rawson
2010 Work: found a natural set of razor clams in DMC tanks, now about 8-9mm length. The set was prevalent in tanks with sand. He collected juveniles, placed in flat trays in tanks, changed sand twice. He observed very fast initial growth, but it slowed down, growth could be influenced by size of container. This year, he and Dana collected wild razor clams by salting, and digging with a clam rake: placed adults in shortened 5 gallon buckets in tanks, filled with sand from the harvest site and some with sand from hardware store. Some individuals seemed to never move, just remain at surface and filter. Temp at April harvest was 4.5 degrees C, brought up slowly to 16 degrees C. Adults held in 2000L tank (3'x3'x6'). Fed three strains tetraselmis, 2 spec diatoms, T-iso, flagellate, fed often, held 4 weeks. The clams spawned spontaneously - he collected gametes but the cultures were pretty dirty from the start, and survived about a week.

For later in 2012, he will condition and spawn another group - will work on the process with intern this summer for better larval culture and settlement.

He notes that others have experience with uncontrolled spawning in culture too, and would like to try more wild collection of adults soon, work on culture in hatchery this summer.

General notes or questions from Mick Devin, from the hatchery perspective:
Influence of light levels? Observed uncontrolled spawn at 2pm.
Observed feeding day and night
New Brunswick constant daylight in lab
Diet effect on egg quality? Spawning seems easy
Silica based sand is washed before use, what are the effects of sharp vs. rounder sand particles, and do you need a bacterial community in the sand?

Audience Discussion

During the facilitated discussion that followed the presentations, the items below came up from the audience and presenters, as areas needing attention as we continue to progress toward growout and sales. The points have been grouped into general topics, with some specifics under each one.

<u>Leasing/Licensing/Permitting</u>

- In Maine, the Limited Purpose Aquaculture license (LPA) would be a good route to allow people to try growing razor clams. Can LPA's be sited intertidally? Are razor clams approved in LPA's, or do they need to be added to the approved species list?
- Intertidal leases would be needed to accurately test the likely growout methods, few or no intertidal leases in Maine presently
- Noted that Maine towns can lease up to ¼ of their intertidal area for shellfish aquaculture
- Would a special license in Maine be a mechanism to secure some area in the intertidal? Is this a preferred mechanism, for any reason?
- Time to make sure that razors could be tried intertidally, using an LPA.

<u>Equipment and Husbandry:</u>

- Subtidal culture should be looked at too: suspended trays
- Clam nets or clam tents could be used intertidally, or in the near subtidal
- Sediment-filled trays for early nursery phase; just post-settlement?
- Would like to have researchers meet with growers again, when it's time to design and deploy cages, to share ideas about what might work best.
- In general, containment technology will continue to need work, and is a big area of need.

<u>Siting:</u>

- Must take winter weather into account
- Sand is a good substrate, but if it's shifting sand, it indicates a high energy site; maybe too rough?
- We need more info on preferred habitat: grain sizes and shapes, substrate depth, etc. A survey of wild populations would be helpful to understand this. Related topic: what types of sediment will the clams tolerate, and which ones are most preferred?
- Can unused lobster pounds be used for a growout area?

Biology and Other:

- Would like to know the effects of sediment depth on growth
- How do razor clams deal with red tide toxins? Do they depurate quickly? Do they become very toxic?
- Really need to nail down the hatchery production, so that growers can get seed and experiment with it for best equipment, siting and husbandry.
- A review of hatchery and growout techniques worldwide would be helpful, for growers, researchers and others to learn from.
- Worthwhile to develop some marking technology for seed?
- Plenty to be learned in the growout cycle; harvesting, maintenance, etc

Respectfully submitted,
Dana Morse and Sarah Redmond
Maine Sea Grant and University of Maine Cooperative Extension