



Left to right:  
Hard clam, MxM  
Hybrid, MxC  
Hybrid, CxM  
So. Quahog, CxC

# THE BIVALVE BULLETIN

**April 2010**  
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## The new FDA takes a strong stance against raw molluscan shellfish

It has now been six months since the U.S. Food and Drug Administration (FDA) made a surprise announcement at the biennial meeting of the Interstate Shellfish Sanitation Conference (ISSC), a cooperative organization made up of FDA, state shellfish agencies, and industry, which has regulated molluscan shellfish for fifty years. The federal agency proposed to ban live, in-the-shell Gulf Coast oysters for up to eight months a year, allowing only the sale of post harvest processed (PHP) oysters during warm months. The unprecedented proposal violated the ISSC's risk management plan already in place by key states for *Vibrio vulnificus*, a naturally occurring bacterium that causes illness and potentially death in immunocompromised individuals. Shellfish industries, local governments, restaurants, shuckers and many other affected parties across the nation united. Their reaction resulted in the FDA temporarily backing off its position. It was later revealed that FDA had initially considered including all raw oysters in the proposed ban, but then limited it to Gulf of Mexico states.

In Florida, the Department of Agriculture and Consumer Services (DACS) is continuing to implement controls to reduce *Vibrio* illnesses. Beginning May 1, oysters must be delivered to certified dealers by 11:30am (May-June) or noon (July-October) unless on-board cooling options are used by harvesters. Dealers must also improve cooling times for shellstock. Contact DACS regarding Rule 5L-1 revisions.

A recent newsletter article by the East Coast Shellfish Growers Association (ECSGA) states that the new leadership at FDA has decided it is no longer adequate to minimize *Vibriosis* in shellfish, rather they should be eliminated through post harvest processing. There is a new group of food safety regulators with different ideas on how to regulate food in America. The FDA believes any avoidable risk should be eliminated. Once all shellfish are sterilized, the door will be opened to a flood of cheap imports (see related article on page 2). Raw bars will never serve dead shellfish and a key market segment will cease to exist.

Will clams be targeted next? More than likely, as FDA reports over the past 20 years there have been a total of 12 *Vibrio vulnificus* cases associated with clams harvested from Florida, Georgia, Virginia, New York, Connecticut, and Washington state (manilas), resulting in eight deaths. Although significantly lower than incidences associated with oysters (about 30 illnesses reported annually), consumption of raw clams is not without risk. According to Save Our Shellfish, FDA appears intent on regulating all raw shellfish. Further, FDA has indicated the PHP mandate would be extended to include any state that has experienced two or more illnesses since 1995.

What can be done? The ECSGA recommends that an aggressive campaign must be mounted by the entire shellfish community on several fronts simultaneously. Continued on page 4

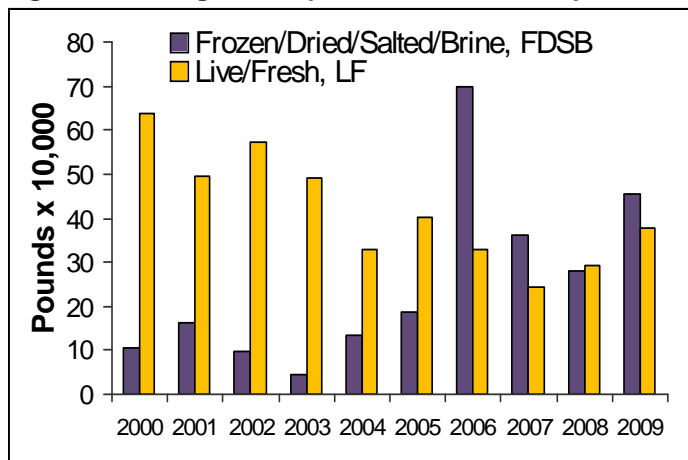
## Weather outlook for spring and summer 2010: Effects on planting clam seed

Since we began gathering water quality information at clam growing areas throughout the state in 2002, this past January was the coldest on record. During the first two weeks of January, water temperatures averaged 46°F at both the Alligator Harbor and Gulf Jackson lease areas, while the Indian River lease area averaged 52°F. Colder temperatures coupled with low salinities have delayed startup of land-based nurseries and planting of seed. Finally, spring has arrived and growers are anxious to make up for lost time. The Climate Prediction Center of NOAA's National Weather Service is still forecasting higher than normal precipitation for March through May in northern Florida and the Big Bend as El Niño is expected to continue and not transition to neutral conditions until summer. Fortunately, rivers have crested. Spring flood conditions should be behind us as water levels at river gaging stations have fallen sharply over the past few weeks. The 3-month outlook also calls for below normal air temperatures, which means cold fronts will continue to persist. Prevailing winds will also continue to influence salinity levels at leases affected by river discharges. Review local weather conditions and salinity information available at selected lease areas ([www.FloridaAquaculture.com](http://www.FloridaAquaculture.com)) before purchasing and planting seed. A word of caution—this month's forecast for the 2010 hurricane season predicts above-average activity as meteorologists are confident the current El Niño weather pattern will weaken.

## Trade Information on Clam Imports

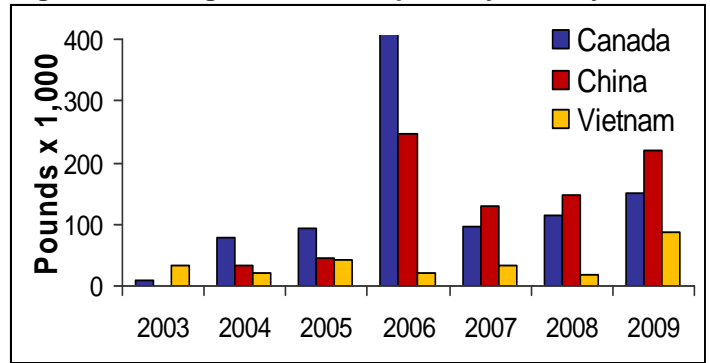
Examining trade data on goods brought into the United States allows us to determine what our products are competing with in the national marketplace. The U.S. Foreign Trade on-line website <http://www.st.nmfs.noaa.gov>, developed by the NOAA Fisheries Office of Science and Technology, follows trade of fishery products imports as well as exports. Information is provided on weight, value, destination, and type of clam products. The website separates geoducks and razor clams from all other clam species, which are grouped together and classified as NSPF (Not Specifically Provided For). Within each of these groups, products are designated into ‘preparation’ categories. One category is called ‘Frozen/Dried/Salted/Brine’ (FDSB), which includes product that is cooked then frozen, dried, salted, or packaged in a brine solution. Another is ‘Live/Fresh’ (LF), which is presumably a live chilled product or a fresh frozen raw product. Other categories are identified at the website; but the focus here is on products in these two as they represent potential sources of competition for our domestic clam culture products. When examining the total weight of both FDSB and LF products imported into the U.S. over the past ten years, we see a steady decline of LF coinciding with a steady increase of FDSB (Figure 1). In 2006, a significant change in the type of imported clam product shifted from a predominantly LF classification to a FDSB classification.

**Fig 1. Total weight of imported FDSB and LF products**



Within each category, we can deduce the amount each country is exporting into the U.S. The top three countries exporting FDSB products are Canada, China, and Vietnam (Figure 2). After 2007, Chinese exports were greater; however, a steady increase in production from all three countries has occurred over the last seven years. Canada, the top exporter from 2004-6, cultures mostly Manila clams *Ruditapes philippinarum*, and to a lesser extent varnish or savory clams *Nuttallia obscurata*, in British Columbia. They also have a developing basket cockle *Clinocardium nuttallii* industry. In Canada’s Maritime provinces, hard clams *Mercenaria mercenaria* and soft shell clams *Mya arenaria* are both cultured and fished. Manila clams are also grown in China as well as *Meretrix* spp., or the Asiatic hard clam. Vietnam predominantly grows the white clam *Meretrix lyrata*, which is increasingly seen in Florida restaurants.

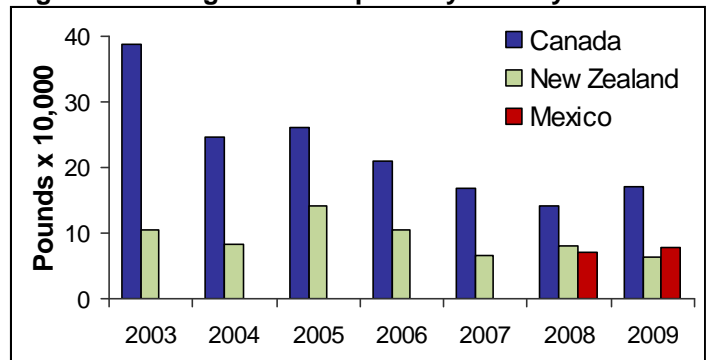
**Fig 2. Total weight of FDSB imports by country**



In order to import a LF product into the U.S., a country must be approved by the Interstate Shellfish Sanitation Conference. Canada, Chile, Korea, Mexico, and New Zealand are currently approved countries. Of these, Canada, New Zealand, and Mexico are the top exporters (Figure 3). Although in a steady decline, Canada has been the top exporter of this product type over the last decade. Mexico provided a significant amount from 1998 to 2000, and has, again, in the past two years. Mexico produces Manila clams and a *Chione* species, marketed as a hard clam. New Zealand, a steady exporter over the last ten years, produces a species of cockle *Austrovenus stutchburyi*, but markets it both cooked and live as a ‘New Zealand hard clam’ in the U.S. For comparison, let’s examine Florida’s hard clam production in 2007, the last year for which we have data. In that year, 184 million live clams were reported sold. Using an average of 18 clams/lb, that equates to ~10 million pounds, compared to 169 and 66 thousand pounds imported from Canada and New Zealand, respectively, in the same year.

All of these clam species present potential competition for Florida’s hard clams and should be considered when evaluating trade data. Canada and China provide a significant amount of product that may affect marketability of domestic hard clams. Unfortunately, detailed trade information is lacking. This restricts our ability to understand the amount of specific product types entering the country. For example, there is no record for how much LF hard clams are coming from Canada versus other clam species. The current designation also doesn’t separate live from frozen raw product. This is not the fault of the U.S. Census Bureau (who collects the data). Until now, there hasn’t been a need to know specific trade information. By expressing a desire to see designations for all categories, changes can be made to current procedures that will make this information available.

**Fig 3. Total weight of LF imports by country**



## Report from Aquaculture 2010 by Eric Cassiano, UF Shellfish Aquaculture Extension Program

Every three years the annual meetings of the World Aquaculture Society, National Shellfisheries Association, and American Fisheries Society are held simultaneously. This triennial meeting is the largest aquaculture conference in the world and provides an opportunity for researchers from various disciplines to interact and collaborate. Aquaculture 2010, held in San Diego last month, proved no exception providing a wide array of information. Much of the bivalve research presented can be applied to our industry in Florida. Here's a summary of several sessions that may be of interest.

### Certification Programs and Eco-labeling

The conference plenary speaker was Peter Redmond, Vice President of Development & Communications for the Global Aquaculture Alliance. Mr. Redmond developed Wal-Mart's seafood strategy for environmental sustainability. As making 'sustainability' profitable was the theme of this conference, his talk focused on the need for proper certification programs in the development of sustainable aquaculture practices. This entails instituting accountability in all phases of production, processing, and marketing to ensure an environmentally friendly, yet profitable, continuation for aquaculture. A session on eco-labeling in aquaculture that followed addressed this topic further. The focus of these talks was on how to implement regulatory standards that efficiently market aquaculture while alleviating social concerns, which include protecting the environment, ensuring food quality, and maintaining animal welfare in production. Universal certification programs must be developed with ideals, such as 'sustainable,' clearly defined and measurable. Further, in developing these programs, care must be taken to ensure all participants, from the farm to table, are equally represented.

### New Marketing Strategies for Bivalves

During a session aimed at the marketing potential of new aquaculture species, a strategy to market bivalves accenting their nutritional composition, particularly omega-3 fatty acids, was introduced. High levels of these fatty acids (including DHA) found in most bivalves, along with recent interest in products possessing them, could have beneficial marketing potential. In conjunction with a certification program, clams could be marketed as not only a nutritious food, but also sustainably produced. An appropriate label could be applied directly to the product container itself and/or through an advertisement scheme. In New Jersey, the use of labels on clam bags proved successful when marketed as a *Jersey Fresh* value-added product, a marketing strategy also very successful for mussels. We are just beginning to understand how the development of certification programs and eco-labeling can potentially benefit our bivalve culture industries.

### Ocean Acidification and Effects on Shellfish

One of the most recent catch phrases associated with global climate change is "ocean acidification." At the conference, a session was dedicated to the effects ocean acidification may have on shellfish. Many presentations reported on

the effects to oysters, as shell formation (calcification process) is dependent upon acidity (pH). However, all marine animals may be affected by this phenomenon. Although the timeline for such changes seems distant (~30-50 years), the need for preparation coupled with an understanding of how these changes will occur warrants current investigation.

Ocean acidification is described as increased acidity (decreased pH) correlated with increased absorption of CO<sub>2</sub> by oceanic waters. The amount of CO<sub>2</sub> absorbed by the ocean is further correlated to the amount present in the atmosphere. As absorbed CO<sub>2</sub> increases the acidity of the water, the availability of calcium carbonate (the basis of shell formation) also decreases. In short, as the oceans absorb more CO<sub>2</sub>, the ability of bivalves to make new shell (as larvae) or keep shells intact (as adults) is reduced. This dissolution of existing shell and inability to make new shell has bivalve culturists and scientists concerned.

Research efforts focused on shellfish larvae and their use of aragonite, a form of calcium carbonate initially utilized in shell formation, which is more susceptible to increased acidity. If unable to lay down this initial layer of aragonite,



the larvae cannot set and begin adding layers of calcite, another form of calcium carbonate used in shell formation that is less susceptible to increased acidity. However, evidence suggests that once larvae set and begin utilizing calcite, internal mechanisms maintain a proper pH for shell formation allowing the animal to persist within an acidified environ-

ment. Although larvae will be challenged, selective breeding for these compensatory mechanisms may allow for continued production as ocean acidification becomes a reality.

### Environmental Effects of Geoduck Clam Production

An entire day was dedicated to geoduck clams and studies examining the effects of their culture on the environment. Scrutiny over the growout and harvest techniques for this high-value bivalve from both public and private agencies as well as individuals has spurred an integrated research program in Washington state. Talks included genetic interactions of wild and cultured animals, ecosystem changes due to increased presence of geoducks and their culture equipment, and proper methodology in the examination of large farm sites. Quite a few talks focused on the effects of harvesting techniques, which entail the use of a high pressure hose to liquefy the substrate and then remove the massive animal (roughly 3 feet). Sediment analyses included grain size, silt/clay content, organic matter (OM) content, and sulfide. Seeding had no effect on these parameters; harvesting impacts on contents of silt/clam and OM were found at 0 feet but not radiating out from the site. After 123 days, these values returned to background levels. Nutrient dynamics in the sediment were examined by pore water analyses of ammonia (N), soluble phosphorous (P), and silicates in culture beds. N and P outputs were related to septic tank loadings from human daily output. Continued on page 4

## Aquaculture 2010 (continued from page 3)

Initial analysis of benthic (bottom) invertebrate communities revealed that densities were lowered in harvest areas while diversity remained relatively similar when compared to non-commercial use areas. Additional analysis of the suspension of sediment on nearby waters as well as culture sites showed minimal, if any, effect on natural bottom communities or cultured geoducks. The patterns of planting and harvesting impacts were described as pulse disturbances to the ecosystem, with significant variation occurring among sites and with recruitment patterns of bottom-dwelling organisms.

Overall, the conference was beneficial providing information we can apply to our industry as well as sharing accomplishments in Florida bivalve aquaculture. Conference abstracts can be found on-line at the World Aquaculture Society's website, <http://www.was.org>.

## Clam Marketing Materials Available

The DACS Bureau of Seafood and Aquaculture Marketing has a large supply of promotional materials for farm-raised clams available at no charge. The following colorful materials are helpful marketing tools: recipe brochures, posters on storage and handling guidelines for retail/food service staff, ice pick display tags, and waterproof flyers on storage tips for retailers that can be included in shipments. To order, go on-line to [http://www.fl-seafood.com/industry/fapc\\_retail.htm](http://www.fl-seafood.com/industry/fapc_retail.htm). Additional materials, such as *Fresh from Florida* truck decals and *Dive In* supplies, are available only to Florida Agricultural Promotion Campaign members. Join at [http://www.fl-seafood.com/native/fapcjoin\\_contact.htm](http://www.fl-seafood.com/native/fapcjoin_contact.htm). There is a \$50 annual FAPC membership charge.



## FDA and raw shellfish (continued from page 1)

Lawmakers must be educated so they understand that consumers prefer choices and locally produced, unprocessed, natural foods. They also need to understand that FDA's regulations will result in thousands of lost jobs and will have a huge economic impact on harvesters, growers, dealers and restaurateurs. Shellfish safety must be improved! Keeping shellfish cool at every step from farm to fork will eliminate most *Vibrio* illnesses. **Anyone who allows shellfish to warm up in summer needs to change their ways.** If industry can reduce the risk, then PHP regulations the FDA is drafting for *Vibrio parahaemolyticus* on the East and West Coasts might be avoided. At-risk, immune-compromised consumers must be educated that it is not safe for them to eat any raw foods, especially shellfish. They can still enjoy cooked shellfish. Other control mechanisms must be examined that reduce *Vibrios* to safe levels, but do not require killing the shellfish (such as depuration). Better detection methods are needed to rapidly identify pathogenic *Vibrios* in shellfish before they get to the consumer. There is much work to be done and little time to do it. The FDA has given Gulf Coast harvesters one additional year to reduce illnesses before they intend to mandate PHP. **How will you get involved to save your business?**

## WWF moves forward with Bivalve Dialogue



The deadline for reviewing the latest version of the standards document in the Bivalve Aquaculture Dialogue, which focuses on clams, oysters, scallops, and mussels, was April 1. Representatives from the Florida clam culture industry met in Orlando two years ago in an initial dialogue with the World Wildlife Fund (WWF), the conservation organization spearheading this effort. Input from meetings in North America, Europe, New Zealand, and China was used in creating the first draft of standards. Since then, a global steering committee has worked to develop the current version. The standards are expected to be finalized latter this year. When finalized, the standards will be given to a new organization, the Aquaculture Stewardship Council, that will be responsible for working with independent, third-party entities to certify farms in compliance with the standards.

The key environmental and social issues related to bivalve production being addressed by WWF are ecosystem integrity, genetics, biosecurity, disease/pest management, farm maintenance, and multi-user cooperation. The goal of the Dialogue is to create performance-based standards that will minimize these issues. The following seven principles provided the framework in developing the criteria, indicators and standards for "responsible" bivalve farming. 1) Obey the law and comply with all applicable legal requirements and regulations. 2) Avoid, remedy or mitigate significant adverse effects on habitats, biodiversity, and ecological processes. 3) Avoid adverse effects on the health and genetic diversity of wild populations. 4) Manage disease/pests in an environmentally responsible manner. 5) Use resources efficiently. 6) Be a good neighbor and conscientious coastal citizen. 7) Develop and operate farms in a socially, culturally responsible manner.

Criteria are the areas to focus on to address the issues, indicators are what to measure in order to determine the extent of the issue, and standards are the numbers and/or performance levels that must be reached to determine if the issue or impact is being minimized. Some of the standards are straight forward (i.e., evidence of compliance, such as permits and licenses, with applicable legal requirements in principle #1). Some will require extensive documentation (at the expense of the grower). For example in principle #2, one criterion is benthic (bottom) effects. The indicator is organic enrichment and standards include bottom video/imaging and sulfide analysis. (Coincidentally, UF soil scientists begin this year measuring sediment types as well as chemical composition, including sulfide, of clam leases to determine optimal following time after harvest as well as differences between low, medium, and high use areas.) To review the final standards draft, go on-line to <http://www.worldwildlife.org>.

At an Aquaculture 2010 session, discussion led to proposed certification costs and perceived benefits. It was suggested that certification may run \$1,000-2,000 per farm depending on operations, which would not include assessment or monitoring costs. The prospects of receiving a premium price for certified products was nixed. It was recognized that certification may provide market access and be required of some buyers and countries in the future.

# 2010 Florida Clam Seed Suppliers

These hatchery and nursery operations are supplying hard clam, *Mercenaria mercenaria*, seed to Florida growers this year.\* Contact suppliers for information on seed sizes, price, color variation, and availability.

## Bay Shellfish Co. - H, N

Terra Ceia, FL 34250  
Contact: Curt Hemmel  
(941) 721-3887 or 722-1346 (Fax)  
[bayshellfish@tampabay.rr.com](mailto:bayshellfish@tampabay.rr.com)

## Blue Acres - N

Palm Bay, FL 32907  
Contact: Kevin Reinecke  
(321) 243-2526 (cell) or  
(321) 733-2704 (home)

## Blueswater Shellfish Inc. - H, N

Melbourne Beach, FL 32951  
Contact: Steve Woodford  
(321) 726-0523 or  
(321) 848-4839 (cell)

## Cedar Creek Shellfish Farm - H, N

New Smyrna Beach, FL 32168  
Contact: Mike Sullivan  
(386) 426-0113 or 847-3202 (cell)  
[cedarcreekshellfish@gmail.com](mailto:cedarcreekshellfish@gmail.com)

## Clamtastic - H, N

Cedar Key, FL 32625  
Contact: Chris Topping  
(352) 213-5999 or 949-2233

## Cole's Clam Nursery - N

Placida, FL 33946  
Contact: Dot Cole  
(941) 697-3181

## Ewan Leighton - H, N

Melbourne Beach, FL 32951  
Contact: Ewan Leighton  
(321) 288-8201  
[sleighton1@cfl.rr.com](mailto:sleighton1@cfl.rr.com)

## Linda Lee Seafood - H, N

Port Canaveral, FL 32920  
Contact: Rose Cantwell  
(352) 543-6346 or 215-6341(cell)  
[cantwellrr@bellsouth.net](mailto:cantwellrr@bellsouth.net)

## Orchid Island Shellfish Co. - N

Sebastian, FL 32958  
Contact: Ed Mangano  
(772) 589-1600 or 589-5080 (Fax)

## Pelican Inlet Aquafarms - H, N

Cape Coral, FL 33914  
Contact: Edwin or Michael Connery  
(239) 549-8014 or  
(239) 246-5820 (cell)  
[highimage@mac.com](mailto:highimage@mac.com)

## Research Aquaculture - H, N

Hutchinson Island, Stuart, FL 34996  
Contact: Tom McCrudden  
(561) 702-8159  
[raiclams@bellsouth.net](mailto:raiclams@bellsouth.net)

## Southern Cross Seafarms - H, N

Cedar Key, FL 32625  
Contact: Shawn Stephenson or  
Johnny Gill  
(352) 543-5980 or 543-5982 (Fax)

## Out-of-State Seed Suppliers\*\*

To obtain a list of shellfish seed suppliers along the East Coast, Contact: Gef Flimlin  
Rutgers Cooperative Extension  
Toms River, NJ 08755  
(732) 348-1152  
[flimlin@aesop.rutgers.edu](mailto:flimlin@aesop.rutgers.edu)  
Or go to [www.ecsga.org](http://www.ecsga.org), click on Resources in the left-hand menu



\* This list is provided as a service of the UF/IFAS Shellfish Aquaculture Extension Program. We do not sponsor or endorse any of these suppliers over any others. \*\* Clam seed obtained from out-of-state suppliers must meet best management practices pertaining to genetic protection and disease prevention. Seed must be accompanied by documentation from a licensed veterinarian certifying stocks do not show clinical signs of any diseases that may pose a threat to natural shellfish populations. For more information, go to [www.FloridaAquaculture.com](http://www.FloridaAquaculture.com), click on Aquafarm Program, then Best Management Practices, or contact Mark Berrigan, Florida Department of Agriculture and Consumer Services, at (850) 488-4033.

## 2010 Bag Suppliers

Remember every bag must be tagged  
for crop assistance programs!

### Island Bags

Cedar Key, FL 32625  
Contact: Carla and Ray Ermel  
(352) 543-5231 or 949-1869 (cell)  
[isbags@svic.net](mailto:isbags@svic.net)

### M&R Seafood

Cedar Key, FL 32625  
Contact: Rick Viele  
(352) 543-9395 or 215-3121 (cell)

### Playing Hooky Enterprises

Crawfordville, FL 32327  
Contact: Sharon Scarborough  
(850) 508-0981 [sharon@clambags.com](mailto:sharon@clambags.com)

### Southern Belle Bags

Old Town, FL 32680  
Contact: Faith van Orden  
(352) 542-2508 or 542-5288 (cell)  
[ospreyf@bellsouth.net](mailto:ospreyf@bellsouth.net)

### Chris Vandenberg

Cedar Key, FL 32625  
Contact: Chris Vandenberg  
(352) 543-9355

For information on **Fabric, Thread, Net Coating and Tag Suppliers**, contact the UF Shellfish Aquaculture Extension Office at (352) 543-5057 or [LNST@ufl.edu](mailto:LNST@ufl.edu).

## RESEARCH UPDATE: Clam Hybrid Culture—Results of Growout Production Trials

**Background:** The hard clam culture industry, which extends from Massachusetts to Florida, is based on the ‘notata’ strain of the northern hard clam *Mercenaria mercenaria*. Florida provides an excellent environment for accelerated growth of hard clams. However, the hard clam may not be ideally adapted for our prolonged hot summer months with crop losses often occurring during this period. The southern quahog *Mercenaria campechiensis* may be better suited for these hotter climates and readily hybridizes with the northern species, but is known to gape in refrigerated storage.

**Objectives:** Hybridization is a common breeding technique in which offspring may have superior traits than either parent species. Clam hybrid studies conducted by Winston Menzel at Florida State University in the 1960-70s showed hybrids had improved growth; but little data was reported on the merit of hybrids for improved survival. This project allowed for a rigorous examination of clam hybridization to improve production and to assure product quality.

**Methods:** Cultured hard clams and wild southern quahogs were used as broodstock. Single-parent crosses resulted in three replicate families (A, B, C) for each of these stocks:

- Female hard clam x male hard clam (MxM),
- Female southern quahog x male southern quahog (CxM),
- Hybrid: female hard clam x male southern quahog (MxC),
- Hybrid: female southern quahog x male hard clam (CxM).

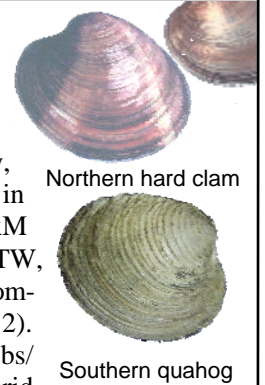
These families were reared under commercial conditions during 2008-9. Differences in growth and survival were not evident during the land-based and field nursery stages. About 248,000 seed were planted in the fall (2008) in bottom bags at 1150/bag (72/ft<sup>2</sup>) for replicated comparison of stocks at a Cedar Key site. In addition, seed were provided to growers in three counties for site comparisons. Harvesting occurred after 12-13 months. At harvest, parental stocks and their hybrids were evaluated for shell width (SW), shell length (SL), total weight (TW), dry meat weight (MW), condition index, survival, and commercial grade size. A measure of production (PRD) was also evaluated as pounds per bag (lbs/bag).

**Results:** Since CxC consistently performed poorly, comparisons reported here are only between the hybrids and northern hard clam. When examining combined results for all families, the MxC hybrid had significantly higher SW and MW when compared to the hard clam (MxM); these values did not statistically differ from the CxM hybrid. Genetic background played a major role as was seen in family effects on stock responses. In Family A, the MxC hybrid was significantly higher in SW, TW, MW, % 1” clams, and PRD, when compared to the hard clam (MxM) (Table 1).

**Table 1. Harvest results (12 months) - Family A**

Stock	SW (mm)	TW (g)	Survival (%)	1” clams (%)	PRD (lbs/bag)
MxM	22.6	25.8	81.8	11.4	53.0
MxC	24.5	31.0	96.8	32.6	75.8
CxM	20.7	19.4	68.4	6.1	34.4

Production of the MxC hybrid averaged 76 lbs/bag versus 53 lbs/bag for the hard clam (MxM). Oddly, the CxM hybrid performed poorly in Family A. However in Family C, the CxM hybrid had significantly higher SW, TW, MW, % 1” clams, and PRD when compared to the hard clam (MxM) (Table 2). Production of the CxM hybrid was 95 lbs/bag versus 80 lbs/bag for the MxC hybrid and 70 lbs/bag for the hard clam (MxM). No differences were found between parental stocks and hybrids in Family B.



**Table 2. Harvest results (12 months) - Family C**

Stock	SW (mm)	TW (g)	Survival (%)	1” clams (%)	PRD (lbs/bag)
MxM	24.1	29.8	92.9	31.2	70.1
MxC	24.3	30.5	104.1	30.2	80.4
CxM	25.6	34.4	110.2	53.9	95.3

These trials were conducted at the Dog Island High-density Lease Area (HDLA), east of Cedar Key. Salinities during June and July 2009 averaged 21 ppt. At the Pelican Reef HDLA, west of Cedar Key, salinities were lower, averaging 19 ppt during the hottest period of the year. Table 3 provides results from a participating grower (Grower A) at a Pelican Reef lease, where MxM and MxC from Family A and MxM and CxM from Family C were cultured. In Family A, the MxC hybrid had greater SW, TW, survival, % 1” clams, and PRD than the hard clam (MxM). In family C, the CxM hybrid had greater SW, TW, survival, % 1” clams, and PRD than the hard clam (MxM). Hybrid production almost tripled that of the hard clam in Family A and doubled that of the hard clam in Family C.

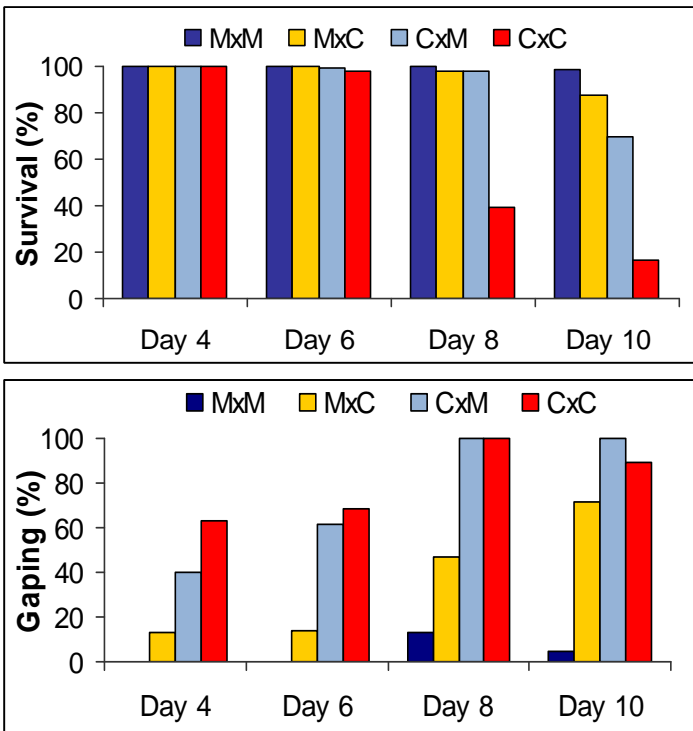
**Table 3. Harvest results (13 months) - Grower A**

Stock-Family	SW (mm)	TW (g)	Survival (%)	1” clams (%)	PRD (lbs/bag)
MxM-A	21.9	22.7	52.2	5.2	31.3
MxC-A	25.7	34.5	90.2	43.3	82.0
MxM-C	23.3	25.0	49.9	14.1	33.2
CxM-C	24.6	28.8	86.2	38.2	65.1

At the conclusion of these trials, clam stocks were evaluated for shelf life (survival and gapping in refrigerated storage), a key reason why the southern quahog is not used in commercial shellstock production. Stocks were assessed every other day over a 10-day period (Figure 1, Page 7). At day 8, survival of CxC declined to 39%, while survival of the hybrids and hard clam was >98%. At day 10, hybrid survival was 88% for MxC and 70% for CxM, while the hard clam (MxM) survival was 99%. Continued on page 7

## Clam Hybrid Production Results (continued)

Figure 1. Shelf life (survival & gaping) results at 45°F



At day 6, the number of live CxM hybrids gaping (open valves or shells) was greater than the hard clam (62% versus 0%), while gaping in the MxC hybrid was 14%. At day 8, gaping in the MxC hybrid was 47%, while gaping in the hard clam was 13%. Interestingly, hybrids seemed to resemble the maternal parent in their shelf life responses. This shelf life trial was initiated on September 9 when water temperatures at harvest were 85°F. Performance of hybrids improved in shelf life trials conducted in October and November 2009.

A consumer acceptance study consisted of a blind taste test of cooked clams. Responses (n=90) indicated no differences among the stocks in acceptability, flavor, or taste. When participants were forced to rank in order of preference, the MxC hybrid ranked higher than the others. Sensory attributes for all stocks were also characterized at the UF Aquatic Food Products Lab. Results are available upon request.

Overall, hybridization resulted in improved clam production performance. Further, genetic background played a role in different family responses. Neither hybrid clam performed poorly when compared to the hard clam, except CxM of Family A, which was similar to CxC. Although shelf life results for the CxM hybrid were not commercially acceptable, results for the MxC hybrid may be (up to 6-7 days). Currently, the project team is evaluating another breeding technique, in which hybrids produced in these production trials are being “backcrossed” with the hard clam in an effort to further improve shelf life while maintaining the advantages in production seen in the original hybrids. Alternative processing (freezing) and packaging methods (modified atmospheric ) may make the use of hybrids with reduced shelf life capacity more practical; but this must be explored further.

For more information, contact Dr. John Scarpa, Harbor Branch Oceanographic Institute at FAU, (Phone No.: 772-465-2400, extension 404; or Email: jscarpa1@hboi.fau.edu) or Leslie Sturmer, UF Shellfish Extension. This work was supported by the USDA CSREES Special Research Grant Program.



Sunshine Clam, MxC hybrid



## Sunray Venus Clams: Eliminating barriers to commercial production

The Florida clam culture industry has dramatically grown over the past 20 years. Yet, the industry is built on a single clam species. Diversifying our industry by developing farming technology and markets for other bivalve species and products may lessen production and market risks, thus enhancing economic stability and growth. Florida Sea Grant-funded research conducted over the past four years showed that an attractive native clam, the sunray venus, was able to be grown on an experimental basis and found acceptable by consumers. The project team recently targeted information gaps and potential barriers to commercialization of this species. By developing simultaneously the technology with industry sectors alongside, the potential for failure as occurred with the angel wing clam (brittle shell, no shelf life), scallops (water-column leases, off-bottom culture methods), and ark clams (setting problems, niche ethnic markets) may be reduced.

With additional Florida Sea Grant support, UF and Harbor Branch Oceanographic Institute-FAU research and extension faculty propose that enhanced hatchery production through broodstock development, growout site selection, and deter-

mination of wholesale market-related product attributes may 1) eliminate barriers to commercialization of this new aquaculture species, 2) facilitate technology transfer to the Florida clam industry, and 3) head start market development. The objectives of this project to be conducted in 2010-12 are to:

- Create initial founder broodstock lines for FL hatcheries;
- Demonstrate to hatchery operators the proper development of broodstock lines for seed production;
- Determine production performance of sunray venus clams for field-based nursery and growout culture at multiple existing commercial lease areas on FL’s west coast;
- Establish a relationship between aqueous soil (bottom substrate) and sunray venus clam productivity at multiple lease areas using a soils-based approach;
- Define salinity and soil preferences for selection of future lease sites for sunray venus clam culture;
- Determine the sensory, microbial, and nutritional profiles of cultured sunray venus clams; and,
- Examine product attributes of sunray venus clams with respect to wholesale market and product distribution standards for molluscan shellfish. Continued on page 8

### Sunray Venus Project (continued): Need Growers to Participate

So how can you get involved in this project? To start off with, we need growers at commercial lease areas, who are willing to participate in the field growout evaluation. These areas include Alligator Harbor in Franklin County; Pelican Reef, Gulf Jackson, Dog Island, and Corrigan's Reef in Levy County; and Pine Island in Lee County. Grower selection will be based on ensuring we have representation at each lease location. Sunray venus seed produced at the HBOI-FAU hatchery will be available in late spring/early summer of this year. Seed amounts provided to each grower will depend on the number nursed, but it is projected that 10-15,000 seed will be made available to at least 18-24 growers. Culture guidelines (gear, stocking densities, handling protocols) based on results from previous trials will be provided. Growers will be asked to duplicate protocol with a portion of the seed, allowing for comparison of results among the various growing areas. Remaining juveniles may be used by growers to experiment and evaluate bag modifications or other growout methods tested in prior trials. At the end of this study (12-14 months), a minimum of three bottom bags will be sampled by the project team. Growers will be instructed and provided with data sheets to record results and their observations. Further, soils at each growing site will be sampled for analyses. If you are interested in participating in this growout study, notify the UF Shellfish Extension Office.



### 2010 Clam School Invitation September 15-16 Cedar Key, Florida

The UF Aquatic Food Products Lab extends an invitation to seafood buyers and retailers to participate in an informative workshop that includes lectures, hands-on sessions and tours. In conjunction with shellfish processors, state and federal regulators, and university scientists, the workshop will feature topics from safety concerns to sustainable harvest and production of clams in Florida. The school is limited to 25 participants on a first-come, first-serve basis. There is no registration cost, but participation must be confirmed with Victor Garrido or Steve Otwell at 352-392-1991 or 392-4221.

### SURE Crop Disaster Assistance Program Administered by the USDA Farm Service Agency Applications being accepted for 2008 program year

The new Supplemental Revenue Assistance Payments (SURE) program provides benefits for farm revenue losses due to natural disasters during crop years 2008 through 2011. To be eligible for SURE, growers must have suffered at least a 10% production loss in a county covered by a qualifying natural disaster declared by the USDA. Further, growers must meet the risk management purchase requirement. To sign-up or find out more about SURE, contact your Farm Service Agency county office or go to [www.fsa.usda.gov](http://www.fsa.usda.gov).

2010 Florida clam seed suppliers and bag suppliers are listed inside.

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through the University of Florida

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