

Oyster Aquaculture on Florida's West Coast

Background, Status, Opportunities and Challenges



LESLIE STURMER
UNIVERSITY OF FLORIDA / IFAS
SHELLFISH AQUACULTURE EXTENSION
PROGRAM



Extensive Oyster Culture



Planting of cultch (shell) on bottom

- **Inputs –**

- Low oyster densities per area
- Reduced husbandry (management) demands
- Larger land requirements
- Low labor, overhead, and production costs



- **Outputs –**

- Poor control of stock management
- Low and non-reliable production
- Seed comes from wild populations
- Commodity or shucked meat markets
- On-bottom culture is traditional method of farming oysters in U.S.

Extensive Oyster Culture in Florida



Planting of cultch (shell) on bottom

- Extensive methods promoted and tolerated under changing laws for over 100 years
- Cultivation practices follow methods used by state agencies to enhance public oyster resources (shell cultching)
- In Franklin County, 8 shellfish cultch leases (Chapter 370, F.S.) utilize 600 acres of submerged lands
- 5 leaseholders reported \$78,900 in sales in 2012 (FASS survey)



Intensive Oyster Aquaculture

Off-bottom oyster culture



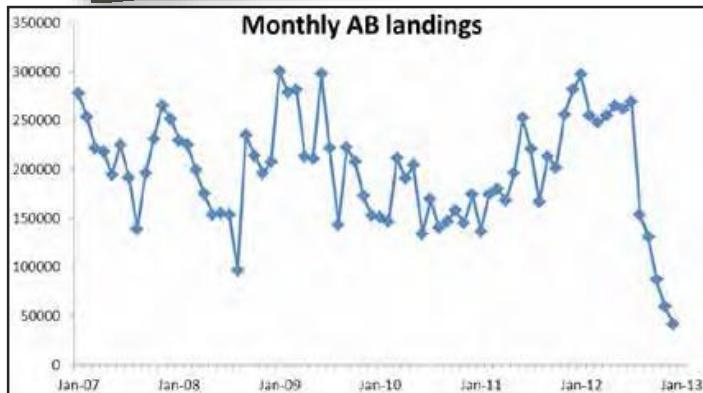
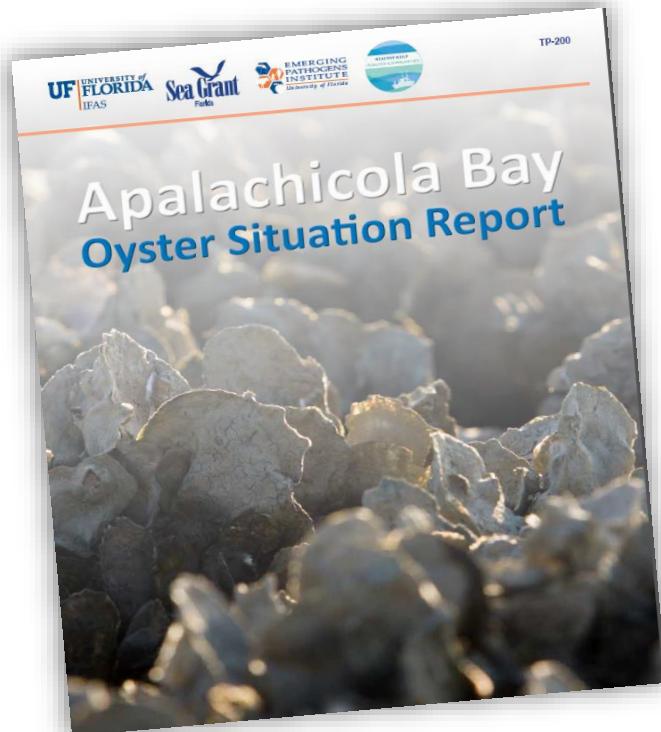
- **Inputs –**

- Higher stocking densities per area
- Husbandry demands are increased
- Gear provides predator control
- Less land requirements
- High labor costs
- High overhead & production costs

- **Outputs –**

- Better control of stocks
- Predator and fouling control
- Higher production
- Improved shell shape
- Premium (half shell) markets

Intensive Oyster Culture in Florida



- Oyster landings plummeted in 2012
- Excessive drought and lowest river flows on record
- Recruitment failure and severe decline in juvenile oysters
- Fishery failure declared for Apalachicola Bay in 2013, still has not recovered

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Commerce Secretary Pritzker declares fisheries disaster for Florida oyster fishery
August 12, 2013

U.S. Secretary of Commerce Penny Pritzker today declared a commercial fishery failure for the oyster fishery along the west coast of Florida. The fishery resource disaster resulted from excessive drought conditions in Apalachicola Bay and elsewhere in the Florida panhandle during the 2012 – 2013 winter fishing season.

"We understand the economic significance this historic oyster fishery has for fishermen and related businesses in the panhandle of Florida," said Secretary Pritzker. "Because the drought caused such a decline in oyster landings and a rather significant drop in revenue, the fishery qualified as a resource disaster under the nation's fishing law."

Oyster culture takes off...

Commissioner Putnam, Cabinet Approve New Aquaculture Leases

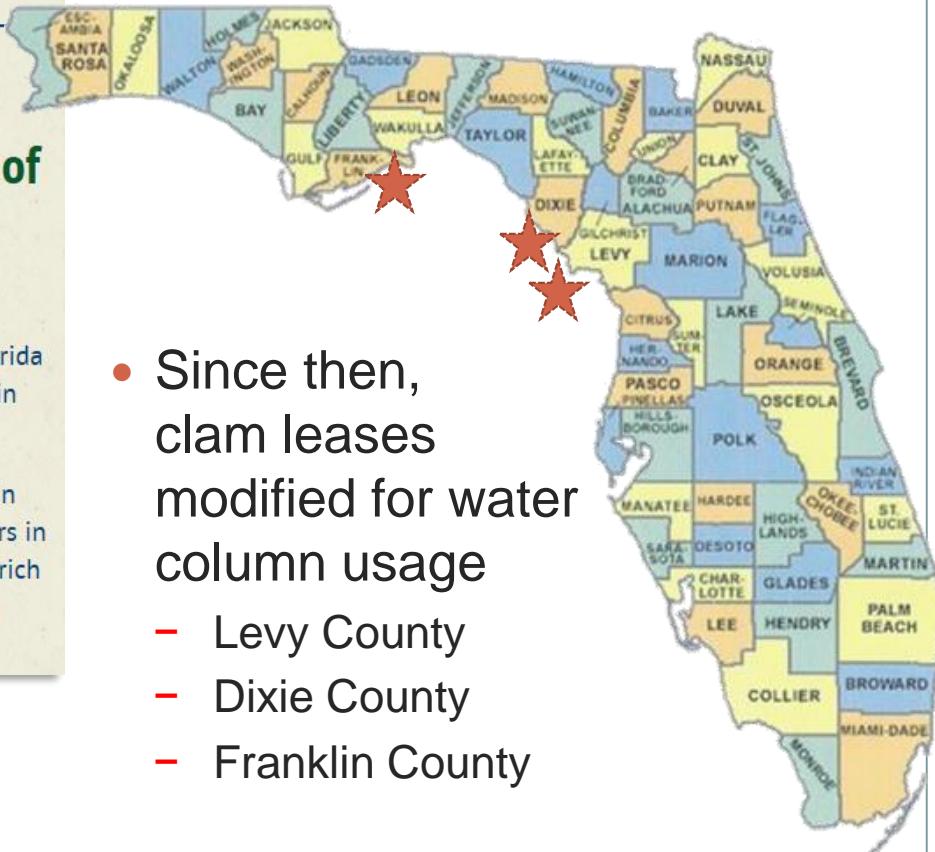
Expansion of Water Column Leases Brings Opportunity to Apalachicola Bay, Other Areas of the State

Oct 10, 2013

Tallahassee, FL – Commissioner of Agriculture Adam H. Putnam and the Florida Cabinet today voted unanimously to approve additional aquaculture leases in several parts of the state, primarily in Apalachicola Bay.

The wild oyster industry in the Apalachicola Bay has declined substantially in recent years. Spring Creek Oyster Company recently began cultivating oysters in cages in the full water column. This places the oysters in the most nutrient-rich part of the water, which reduces predators, shortens the grow-out time and improves survival rates.

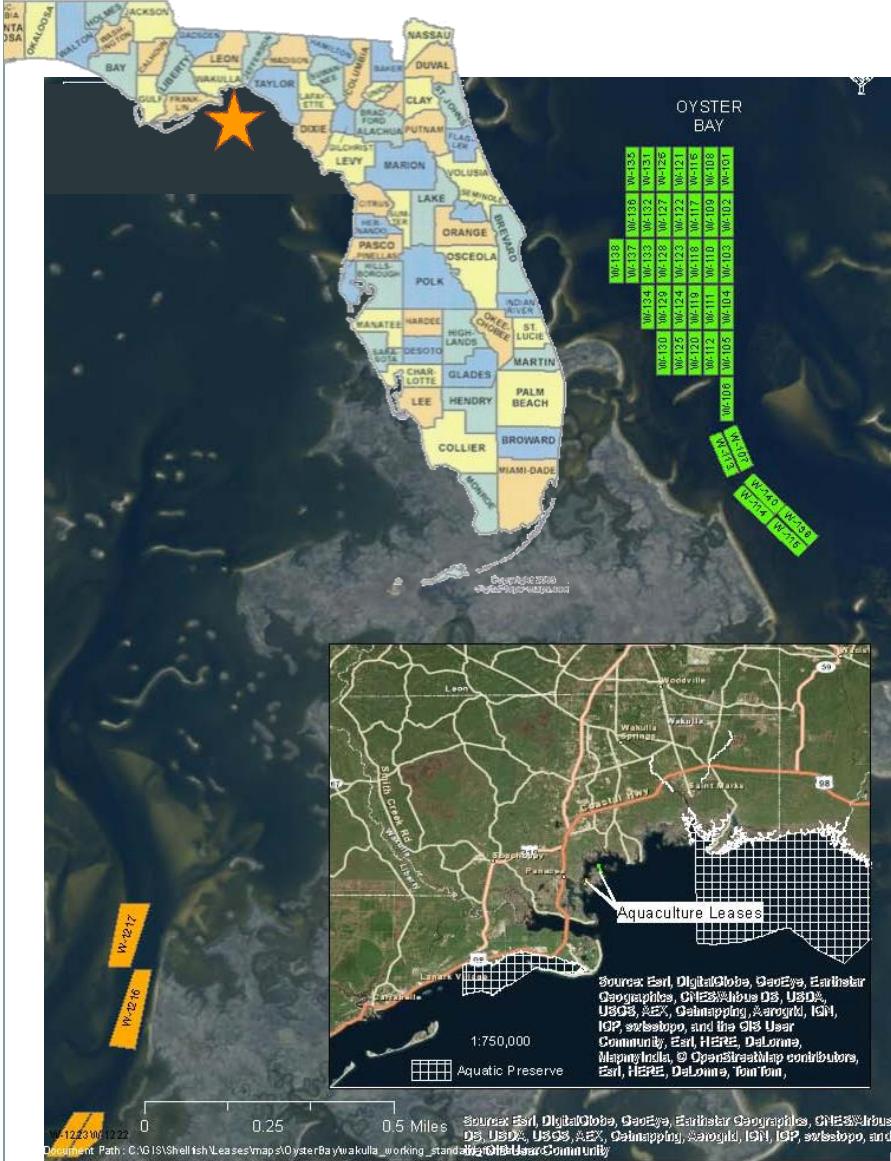
- FDACS approves modification of on-bottom clam leases for water column use in 2013



- Since then, clam leases modified for water column usage
 - Levy County
 - Dixie County
 - Franklin County



Oyster culture takes off...



- Environmental Institute develops oyster aquaculture certificate program in 2014
- Participants receive seed, gear, assistance in obtaining leases
- New oyster culture leases in Wakulla County



EDUCATION | CONSERVATION | RECREATION
Training Tomorrow's Environmental Workforce



Oyster Culture on Florida's West Coast: An Emergent Industry

STATUS

- 76 clam (bottom) leases modified for water column use
- 64 new oyster culture leases (128 acres)
- 106 certified oyster growers
- No production statistics

Oyster Culture Workshops and Videos

- A series of workshops held by UF and DACS to inform interested clam growers and others about advancements in culture gear and methods
- Videos of workshops are available

An Introduction to Intensive Oyster Culture

Thursday
September 26, 2013
FSU Coastal and Marine Laboratory
3618 Coastal Hwy 98
St. Teresa, FL

Friday
September 27, 2013
FWC Senator George Kirkpatrick Marine Lab
11350 SW 153rd Ct
Cedar Key, FL

Both workshops are from 2:00 to 5:00 PM.

Workshops are FREE.
To ensure there are enough handouts available, please confirm your attendance with:
Portia Sapp, FDACS Division of Aquaculture, (850) 486-5471, Portia.Sapp@freshfromflorida.com or Leslie Sturmer, UF IFAS Shellfish Aquaculture Extension Program, (352) 543-5057, LNST@ufl.edu

TOPICS TO BE INTRODUCED:

- Overview of U.S. East Coast intensive oyster culture operations and Florida's experiences
- Rules of the Road: Conversion of shellfish aquaculture leases to water column usage, navigational marking requirements, other permits, BMPs pertaining to seed sources, and public health regulations for oyster harvesting and processing
- Development of off-bottom oyster farming gear and methods for the northern Gulf of Mexico

SPEAKERS INCLUDE:

- Leslie Sturmer, University of Florida IFAS and Florida Sea Grant, Shellfish Aquaculture Extension Program
- Chris Brooks and Portia Sapp, Florida Department of Agriculture and Consumer Services (FDACS), Division of Aquaculture and Consumer Services
- William (Bill) Walton, PhD, Auburn University Shellfish Laboratory and Alabama Cooperative Extension Service

SUPPORTED BY:

An Introduction to Intensive Oyster Culture Workshop
September 26, 2013

Topics covered:

- Overview of U.S. East Coast intensive oyster culture operations and Florida's experiences
- Conversion of shellfish aquaculture leases to water column usage, navigational marking requirements, Federal permits, Best Management Practices pertaining to seed sources, and public health regulations for oyster harvesting and processing
- Development of off-bottom oyster farming gear and methods for the northern Gulf of Mexico

UF IFAS
UNIVERSITY OF FLORIDA 

An Introduction to Oyster Culture Gear & Suppliers

Wednesday
December 4, 2013
1:00-4:00 pm
FSU Coastal and Marine Laboratory
3618 Coastal Hwy 98
St. Teresa, FL

Thursday
December 5, 2013
1:00-3:00 pm
FWC Senator Kirkpatrick Marine Laboratory
11350 SW 153rd Ct
Cedar Key, FL

The workshops are FREE.
To ensure there are enough handouts available, please confirm your attendance with:
Portia Sapp, FDACS Division of Aquaculture (850) 486-5471 or Leslie Sturmer, UF IFAS Shellfish Aquaculture Extension Program (352) 543-5057 LNST@ufl.edu

TOPICS TO BE COVERED:

- "Hands-on" discussion of oyster culture gear types—advantages, disadvantages, costs, and considerations for siting, deployment, and operational management
- Where to buy culture gear? Information on equipment suppliers
- Where to buy oyster seed? Information on seed suppliers
- Overview of oyster aquaculture activities in Louisiana (only at the December 4th workshop)

SPEAKERS INCLUDE:

- William (Bill) Walton, PhD, Auburn University Shellfish Laboratory and Alabama Cooperative Extension Service
- John Supan, PhD, Louisiana State University and Sea Grant (only at the December 4th workshop)
- Time will be allotted for equipment and seed suppliers to present their products and services

SUPPORTED BY:

An Introduction to Oyster Culture Gear & Suppliers
December 4-5, 2013

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- "Hands-on" discussion of oyster culture gear types—advantages, disadvantages, costs, and considerations for siting, deployment, and operational management
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- Time will be allotted for equipment and seed suppliers to present their products and services

SUPPORTED BY:

An Introduction to the Oyster Culture Industry in the Northeastern U.S.

Thursday
April 3, 2014
FSU Coastal and Marine Laboratory
3618 Coastal Hwy 98
St. Teresa, FL

Friday
April 4, 2014
FWC Senator George Kirkpatrick Marine Lab
11350 SW 153rd Ct
Cedar Key, FL

Both workshops are from 2:00 to 5:00 PM.

Workshops are FREE.
To ensure there are enough handouts available, please confirm your attendance with:
Portia Sapp, FDACS Division of Aquaculture (850) 486-4033, Portia.Sapp@freshfromflorida.com or Leslie Sturmer, UF IFAS Shellfish Aquaculture Extension Program, (352) 543-5057, LNST@ufl.edu

TOPICS TO BE PRESENTED:

- Introduction to on-bottom oyster culture systems and methods used in small farming operations in the Northeastern U.S.
- Start-up of a private oyster culture initiative in Martha's Vineyard—from training and seed development to marketing and promotion
- Development of best management practices for the east coast shellfish aquaculture industry

SPEAKERS INCLUDE:

- Dale Leavitt, PhD, Associate Professor and Aquaculture Extension Specialist, Roger Williams University, Bristol, Rhode Island
- Rick Kamey, Director and Shellfish Biologist, Martha's Vineyard Shellfish Group, Oak Bluff, Massachusetts
- Sandy Macfarlane, Coastal Resources Specialist, Massachusetts Department of Fish and Game, Cape Cod National Seashore
- Leslie Sturmer, UF IFAS Shellfish Aquaculture Extension Program, (352) 543-5057, LNST@ufl.edu

SUPPORTED BY:

An Introduction to the Oyster Culture Industry in the Northeastern U.S.
April 3-4, 2014

Topics covered:

- Introduction to on-bottom oyster culture systems and methods used in small farming operations in the Northeastern U.S.
- Start-up of a private oyster culture initiative in Martha's Vineyard—from training and seed development to marketing and promotion
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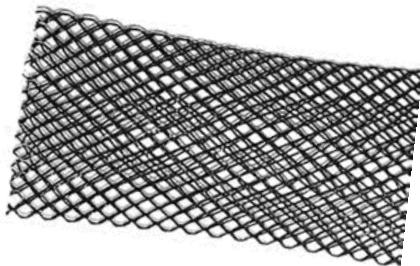
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SUPPORTED BY:

Posted at <http://shellfish.ifas.ufl.edu/oyster-culture>

Oyster Culture Gear

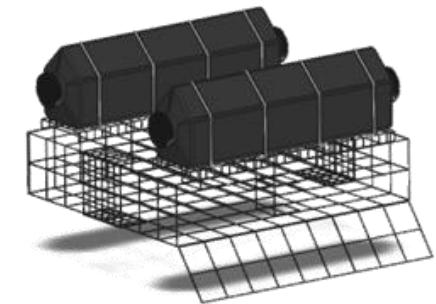


- Many growers using floating Vexar bags long-lined together
- Local distributor of bags and gear
- Initial gear investment low
- Fouling control being evaluated by float design and placement, flipping and aerial drying

Oyster Culture Gear



- Other culture gear being evaluated
 - Adjustable longline
 - Bottom cages
 - Floating cages



Oyster Seed Availability



- Several Florida clam hatcheries providing single set seed
 - Triploid oyster seed produced by using tetraploid sperm from LSU
 - Currently working on developing Florida specific brood stocks to produce native triploids
-
- FDACS BMPs (rules) on oyster seed
 - Disease prevention – Culture of oyster stocks from Atlantic coast waters prohibited in FL Gulf waters
 - Genetic protection – Limits source of broodstock to be specific to either FL Atlantic or FL Gulf coasts
 - Allowance for GoM tetraploid and triploid stocks



Application of Triploidy



- Assessing ploidy type on production performance, health and product quality over seasonal harvests, sites, gear types and salinity regimes

- Advantages of triploids versus diploid oysters being evaluated by growers and UF research and extension faculty

Application of Triploidy to an Emergent Oyster Culture Industry on Florida's West Coast

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Leslie Sturmer¹, Carter Cyr¹, Reggie Markham¹, Hulping Yang², Susan Laramore³
¹University of Florida / IFAS Extension and Florida Sea Grant, Shellfish Aquaculture Extension Program, Cedar Key, FL
²University of Florida / IFAS School of Forest Resources and Conservation, Fisheries and Aquatic Sciences Program, Gainesville, FL
³Florida Atlantic University, Harbor Branch Oceanographic Institute, Aquaculture and Stock Enhancement, Fort Pierce, FL

HARBOR BRANCH
FAU FLORIDA UNIVERSITY

INTRODUCTION

The goal of this project is to provide the necessary infrastructure via a public-private partnership to commercialize the eastern oyster, *Crassostrea virginica* through large-scale demonstration and evaluation of a breeding technique to local growers on Florida's west coast. The addition of triploid oysters to production will expand triploid oysters may increase the prospects for commercially viable, small-scale oyster farms, create jobs and provide a sustainable domestic oyster supply.

The objectives of the work plan are to:

- Evaluate triploid oyster performance, assess health and evaluate the quality (sensory characteristics) of diploid and triploid oysters under commercial conditions;
- Characterize growth and mortality methods; salinity regimes and seasonal harvests;

What is Triploidy?

Oysters found in nature normally have two sets of chromosomes and are diploid (2N). Triploidy is a genetic manipulation (no modification) that can be used to prevent animals, like oysters, from reproducing. If they are triploid (3N), they cannot mate with diploid (2N) oysters and cannot reproduce, creating potential production advantages. The value of triploid oysters has been demonstrated in many coastal states; potential exists for triploids throughout the range of the eastern oyster.

GROWERS TRIALS

Single-set triploid oyster seed were produced in April 2016 by crossing Cedar Key stocks with sperm from tetraploid stocks obtained from Louisiana Sea Grant's oyster hatchery. Diploid were also produced by crossing diploid stocks. The triploid seed was reared at a commercial land-based facility in a barrel drum system.

When seed reached about one inch (20-22 mm) in size (shell height, SH), oysters (250 of each ploidy type) were distributed to participating growers (Cedar Key, Anna Maria Island, Englewood, Punta Gorda, Punta Levy and Wal-Mart) are using a variety of culture systems (floating bags, bottom cages and adjustable line lines), which allows for evaluation of all gear types and growing conditions. Diploid seed will be distributed to growers in February 2017 to assess seasonal differences in diploid and triploid oyster production.

**To learn more about this project, visit the website:
<http://shellfish.ifas.ufl.edu/oyster-demo-project>**

UF FIELD TRIALS

Triploid and diploid oyster stocks were also planted by UF at their experimental lease off Cedar Key on August 4. Detailed information is being collected to document practices, production and labor requirements of each ploidy type were planted. Triploid oysters are being bagged at a smaller size (15 mm) than diploid oysters and are held for less time.

In October, oysters were resorted into thirty-six 12 mm mesh bags to continue evaluating triploid types in replicated field trials. The bags were supported by two 15-mm-diameter square floats. In addition, six bags were suspended by two 15-mm-diameter triangular "bullet" floats were attached on both sides of these bags.

The following management practices are being tested:

- Stocking densities of 125, 150 and 175 oysters per bag;
- Floating bag sizes of 12, 15 and 18 mm;
- Bioturbation control (vertical stirring versus flipping);

Results To Date

Half of the replicate bags were sampled during December 13-16. After sampling, triploid and diploid oysters averaged 14.0 mm and 59.1 mm in SH, respectively. Total weight of triploid oysters (44.6 grams) differed significantly from diploid oysters (30.8 grams). During this period, water temperature ($\sim 15^{\circ}\text{C}$) and incidence of *Dermocystidium marinum* was zero for both ploidy types. Oysters will be sampled again in February and harvest is anticipated in April.

Growth (Avg±SD) of Diploid and Triploid Oysters, 4 Aug-15 Dec 2016

The graph shows two data series: Diploid (2N) represented by blue squares and Triploid (3N) represented by orange squares. The Y-axis has two scales: Shell Height (mm) on the left and Total Weight (grams) on the right. Both axes range from 0 to 60. The Triploid (3N) series starts at approximately 14 mm in August and increases steadily to about 59 mm in December. The Diploid (2N) series starts at approximately 30.8 grams in August and increases steadily to about 44.6 grams in December.

ACKNOWLEDGEMENTS

This project was funded by the NOAA National Sea Grant Aquaculture Extension and Technology Transfer Program. Thanks to the participating Florida oyster growers.

NOAA Sea Grant Florida

See more at Oyster Culture Demonstration, <http://shellfish.ifas.ufl.edu>

Marketing Cultured Oysters



Pelican Reef Oysters
Cedar Key, FL



Oysterater
kiss and tell

Rowan Jacobsen

March 12, 2015 at 2:17 pm Rating 4

These will blow the minds of anyone who doesn't think the Gulf Coast makes great oysters. Beautifully shaped and striped shells, plump meats, and all the sweet-corn goodness of a Cape Cod oyster in late fall (yet this was March). The salinity was strong without being harsh, and the flavor was super clean. **This, to me, is further evidence that in March and April, when northern oysters can be so skinny, one should look to the south first.**

- Distributed via existing clam market channels – local, state and regional
- Cooperative developed in Wakulla County
- Targeted half-shell markets
- Wholesale prices vary
 - \$0.30-.60 apiece
- Some branding occurring



Florida Summary:

Opportunities

Attributes



- Existing shellfish aquaculture industry infrastructure supports development and diversification
- Favorable state regulatory framework and leasing program
- Oysters reach market size in less than a year from spawn in warm, productive waters
- Decline in “wild” oyster landings has resulted in increased prices
- Existing market channels for cultured mollusks in Florida

Florida Summary:

Challenges

Threats



- Limited seed availability – need in-state hatchery expansion
- Demand premium prices for cultured warm water oysters
- Overcome perception that Gulf oysters unsafe for raw consumption
- Need for biofouling and oyster overset control year-round
- Risks (hurricanes, diseases, etc.) and economic feasibility still being assessed by emergent industry