

Off-bottom Oyster Culture in Florida



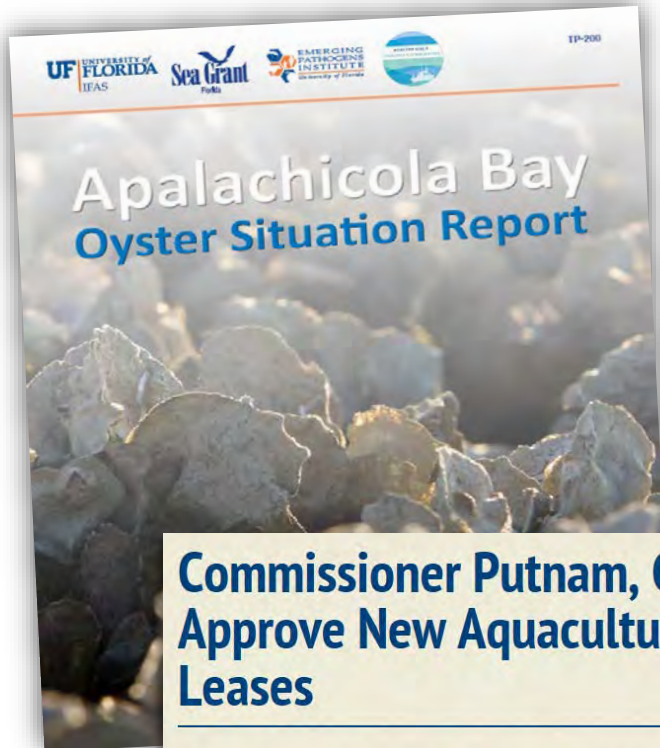
UF | IFAS
UNIVERSITY of FLORIDA

Leslie Sturmer
University of Florida / IFAS
Shellfish Aquaculture Extension
Cedar Key, Florida

Sea Grant
Florida

The impetus, 2012 to 2014...

- Oyster landings plummeted
- Fishery failure declared for Apalachicola Bay
- Water column leases approved
- Community college institute developed oyster aquaculture certification program



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 recent years. Spring Creek Oyster Company recently began cultivating oyster 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.

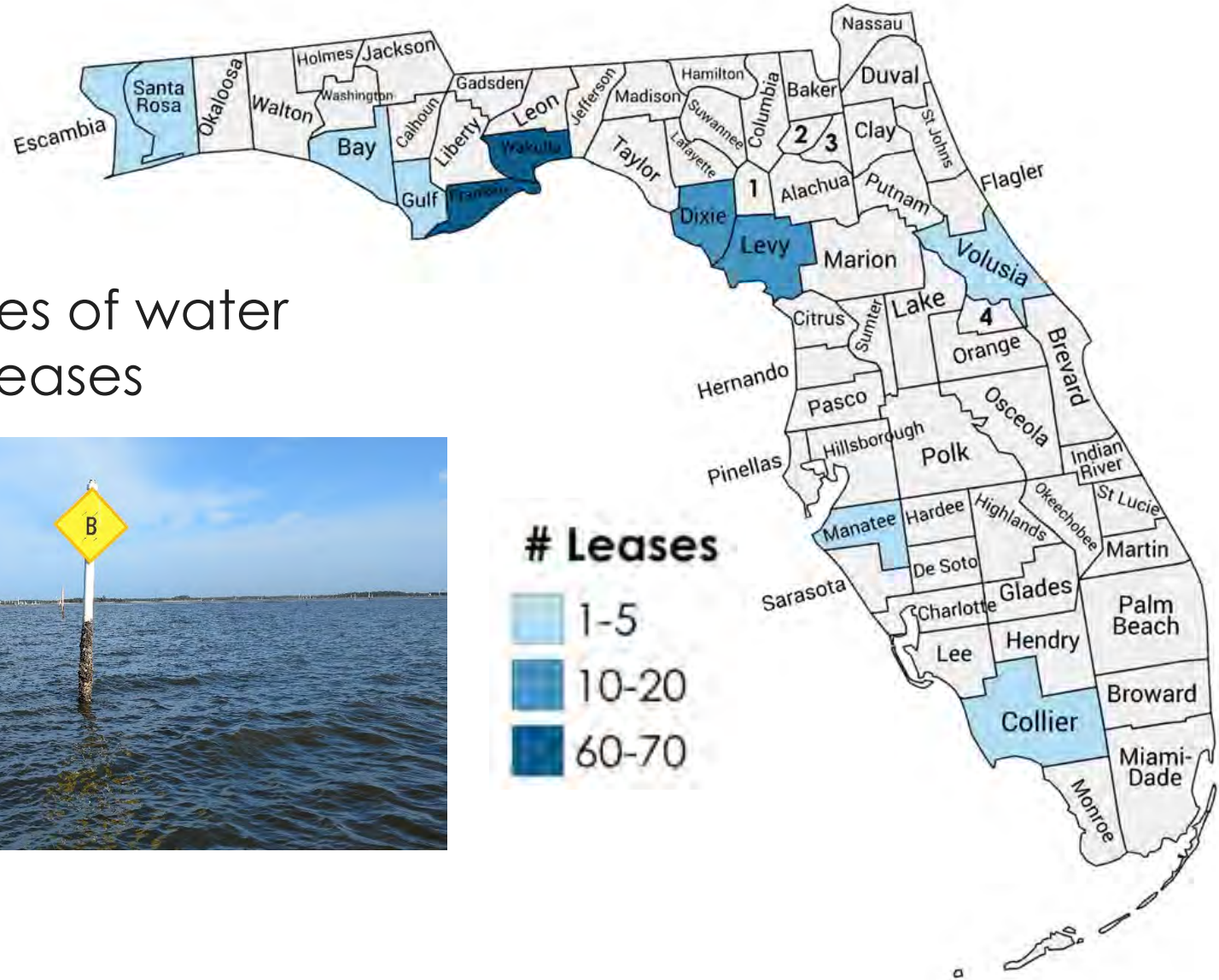


EDUCATION | CONSERVATION | RECREATION
Training Tomorrow's Environmental Workforce

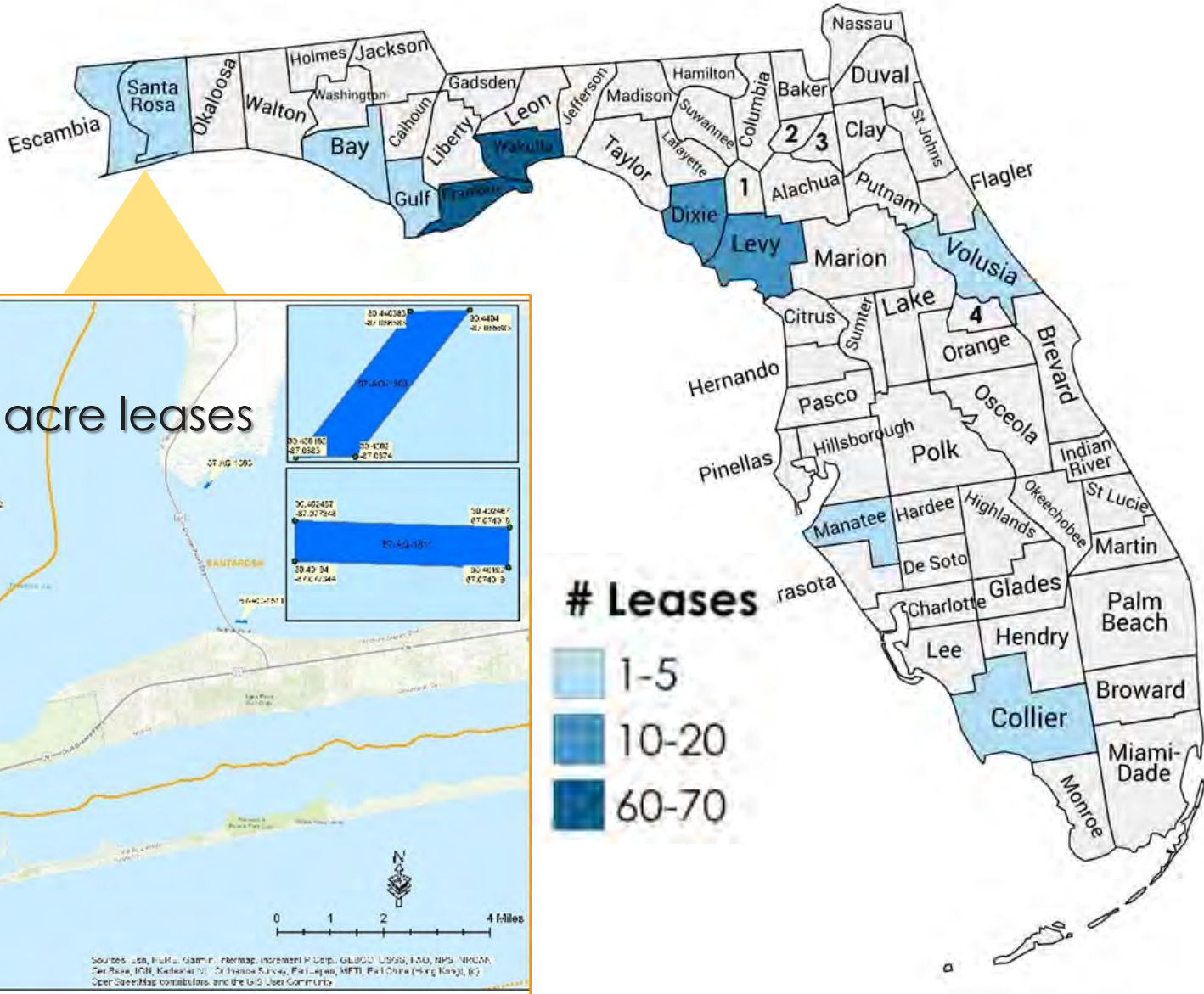


Oyster culture takes off...

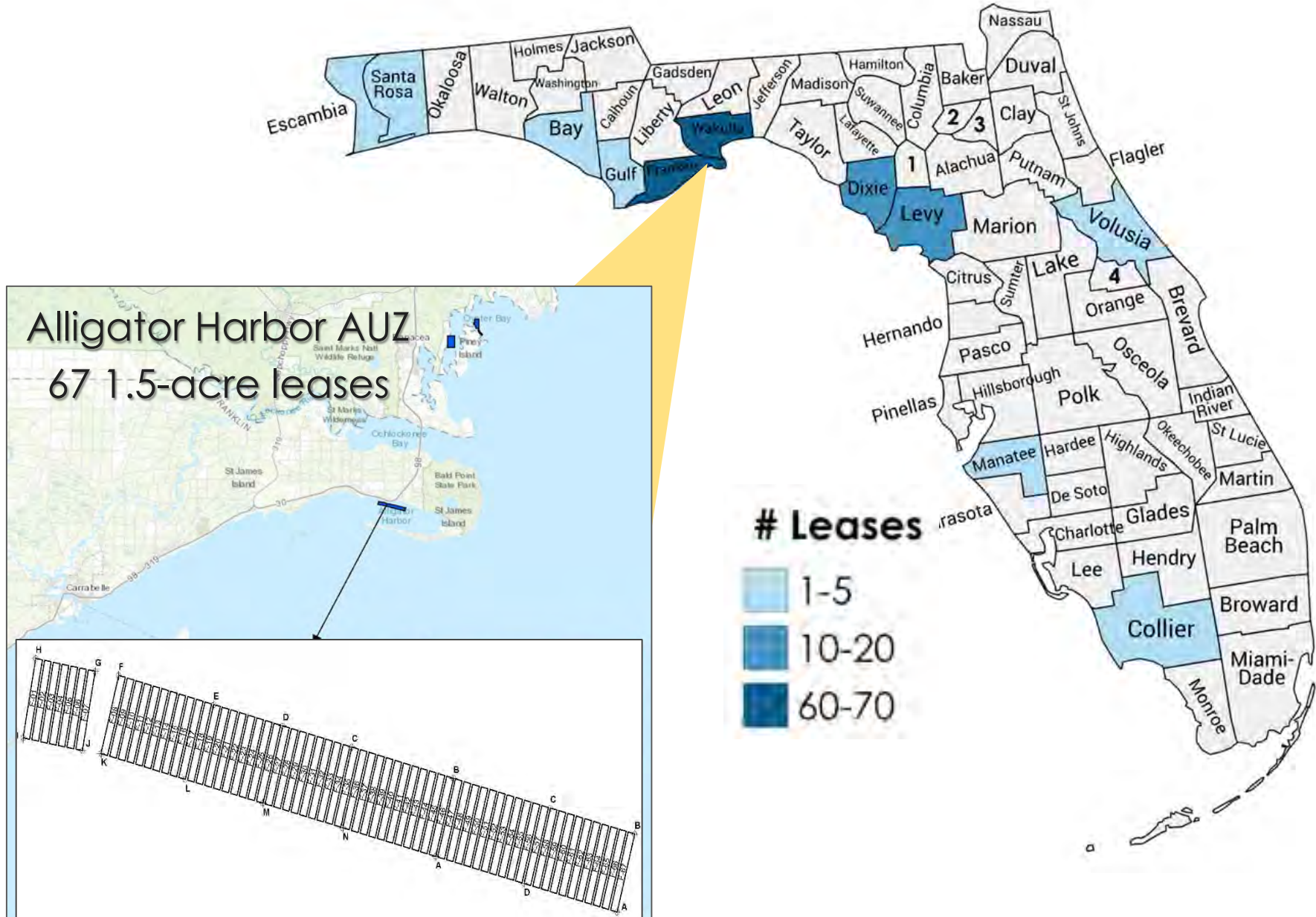
>350 acres of water column leases



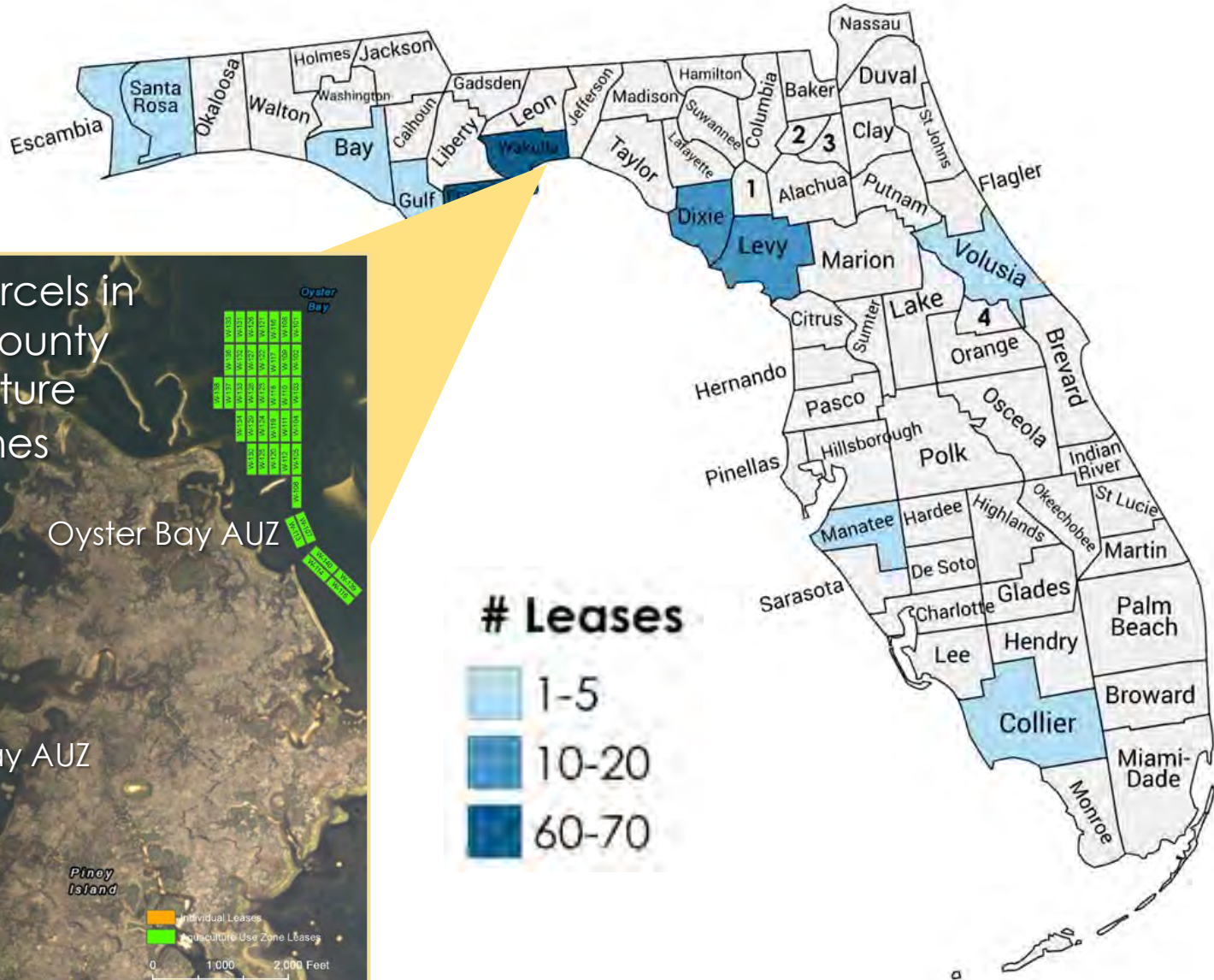
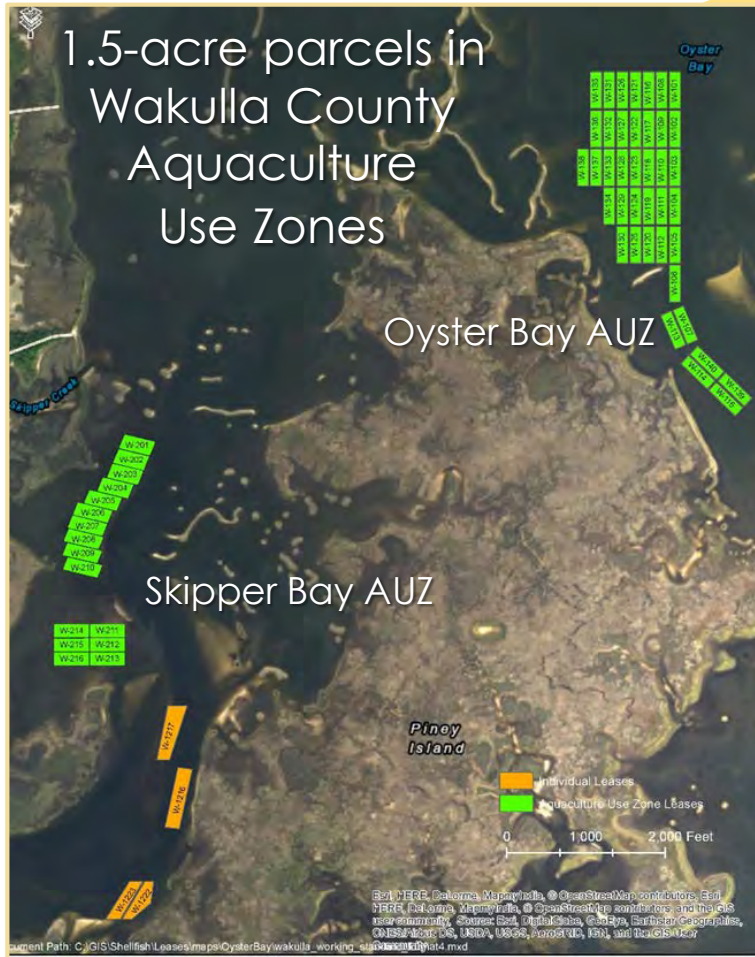
Oyster culture takes off...



Oyster culture takes off...



Oyster culture takes off...



Oyster seed availability...

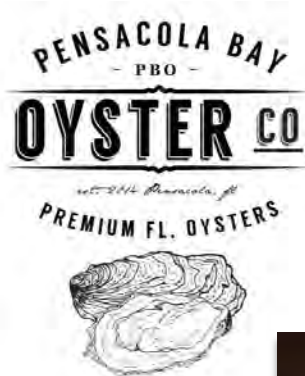


- Three clam hatcheries are also producing oyster seed
- Two new oyster hatcheries in Panhandle
- State rules allow out-of-state seed but with restrictions pertaining to disease prevention and genetic protection



Oyster culture gear...

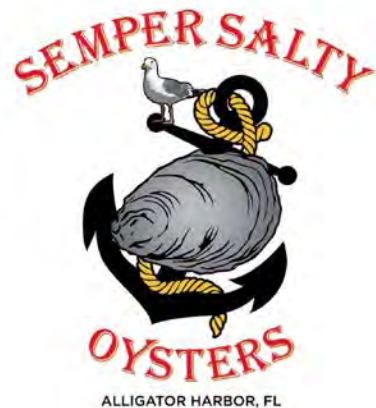




Saucy Lady



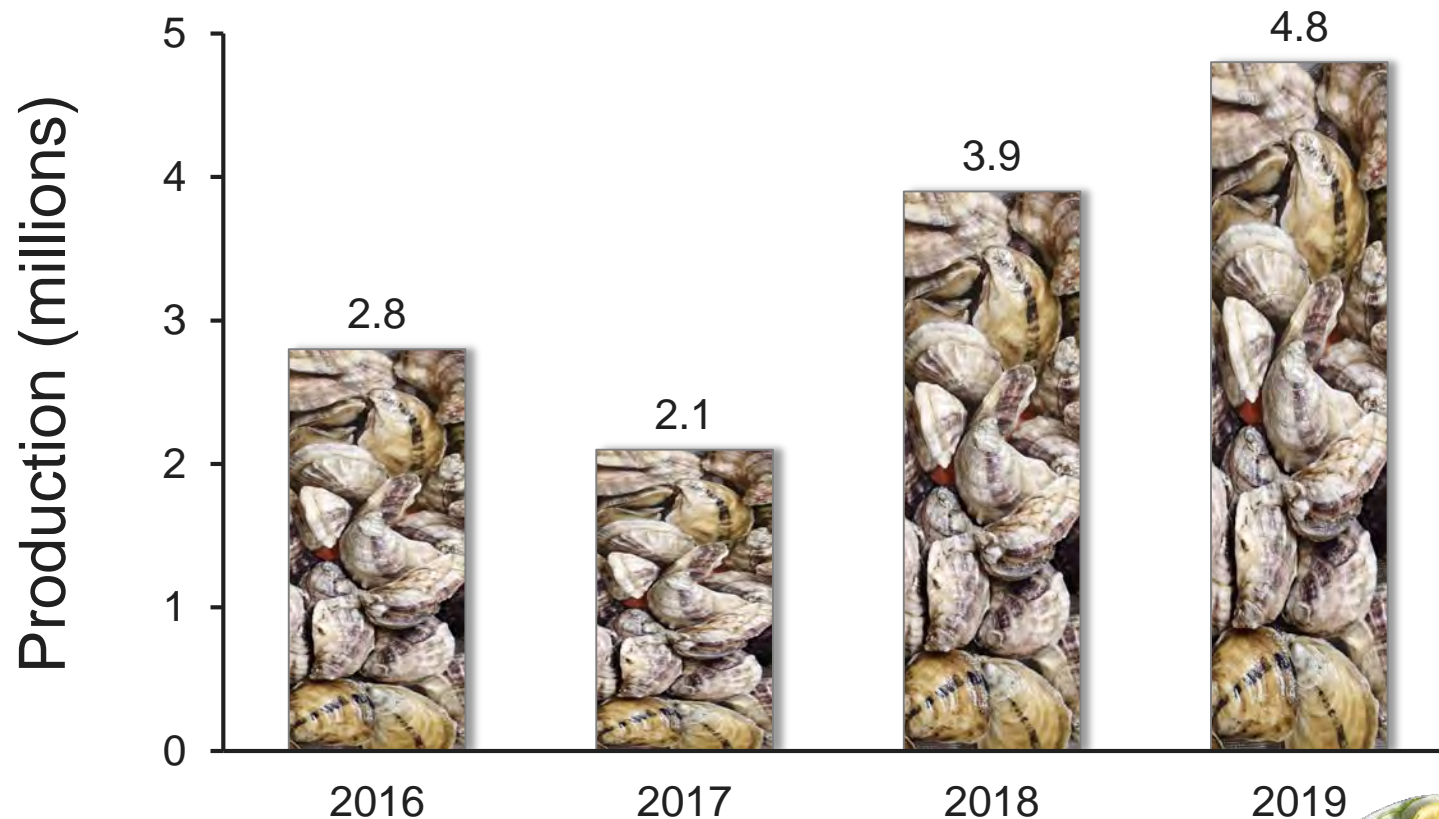
Oyster Company



>25 Shellfish
Wholesale Dealers



Florida off-bottom oyster culture today...



- ▶ 125 certified oyster growers
- ▶ 4.8 million oysters sold in 2019

FDACS internal data



Challenges of a new industry...



- ▶ Limited seed availability, need for Florida-specific tetraploids
- ▶ Recent unexplained mortalities in spring and summer
- ▶ Almost year-round need for biofouling and oyster overset control
- ▶ Risks (hurricanes, mortalities, etc.) and economic feasibility being assessed by emergent industry



Oyster culture workshops

A series of workshops (2013-19) held by UF and FDACS providing information on culture gear, methods, marketing, and hurricane preparation



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) 488-5471,
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. intensive oyster culture
- Rules of the Rose water column us permits, BMPs and regulations for oyster culture
- Development of the northern Gulf of Mexico

SPEAKERS INCLUDE:

- Leslie Sturmer, Shellfish Aquaculture
- Chris Brooks and Consumery
- William (Bill) and Alabama



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.

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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 the Oyster Culture Industry in the Northeastern U.S.

Thursday
April 3, 2014



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. Dale teaches a course on practical shellfish farming and conducts applied research for the advancement of shellfish aquaculture
- Rick Kamey, Director and Shellfish Biologist, Martha's Vineyard Shellfish Group, Oak Bluff, Massachusetts. For over 30 years, Rick and his shellfish group have sought to expand their island's shellfisheries through innovative aquaculture technologies
- Sandy MacFarlane, Coastal Resources Specialist, Massachusetts. Sandy, a renowned Cape Cod author, has three decades of experience in coastal resource management, shellfish aquaculture and restoration

SUPPORTED BY:



Portia Sapp, FDACS Division
of Aquaculture, (850) 617-7600,
portia.sapp@FreshFromFlorida.com
or
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Aquaculture Extension Program,
(352) 543-5057, LNST@ufl.edu

Introduction to Harvesting and Marketing Cultured Oysters

Over 290 oysters. What are your favorites?



TOPICS TO BE PRESENTED:

- Niche marketing cultured oysters for the raw bar—what top chefs demand and how to ensure you get paid for your hard work
- Learn to differentiate your product on qualities other than price in the marketplace and adapt your marketing pitch
- Marketing strategies to target key buyers and get maximum return
- Promotional materials available for marketing Florida oysters
- Rules of the Road: Harvesting and processing requirements for oysters during summer months

SPEAKERS INCLUDE:

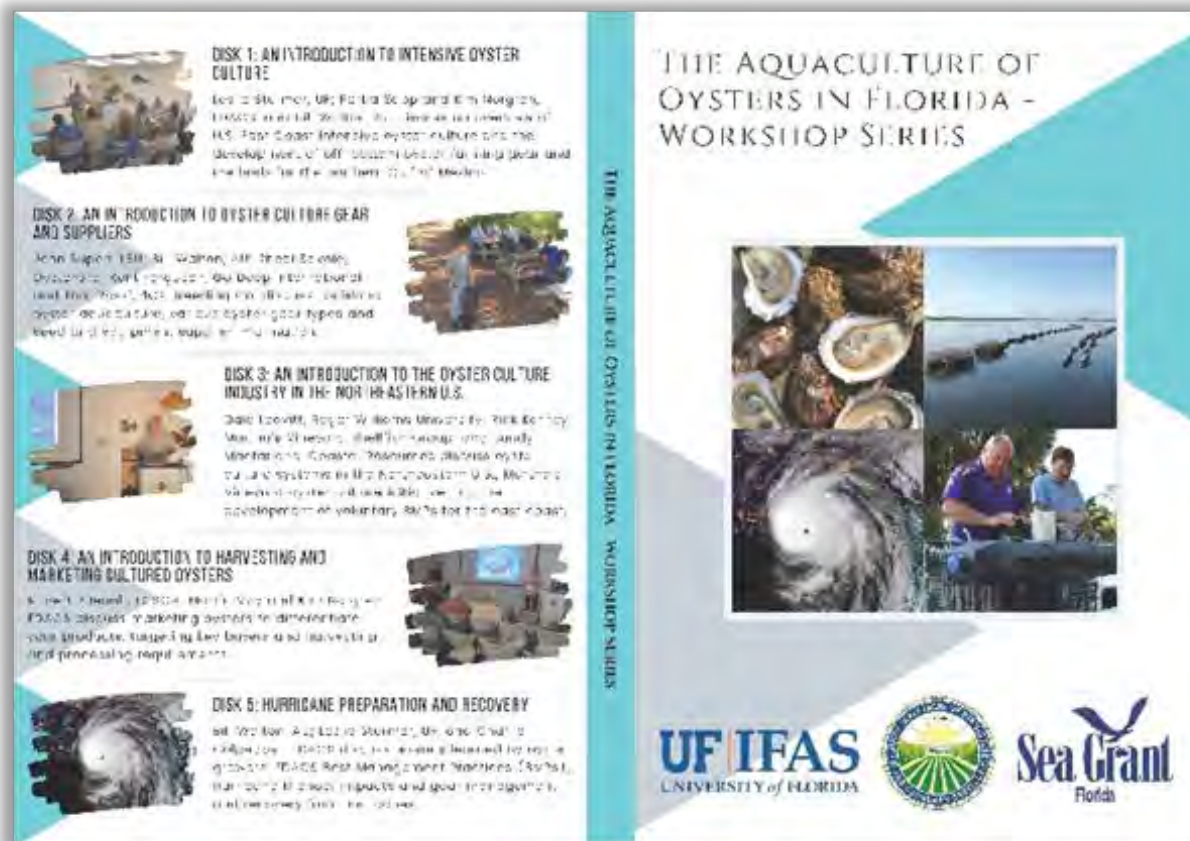
- Bob Rheault, PhD, Executive Director, East Coast Shellfish Growers Association (ECSGA). Bob started Macdonald's Oysters™ in 1986. His idea to joke that the only reason he survived was because he was a good salesman and located the highest priced oyster in the country for years. Bob helped start the ECSGA in 2004 and is a passionate advocate for the industry.
- Martin May, Bureau Chief, Florida Department of Agriculture and Consumer Services, Bureau of Seafood and Aquaculture Marketing
- Kim Nargren, Environmental Administrator, Florida Department of Agriculture and Consumer Services, Division of Aquaculture

SUPPORTED BY:



Oyster culture workshop videos

Now available as DVDs



and online at

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

Online Resource Guide for Florida Shellfish Aquaculture

The screenshot shows the homepage of the 'Online Resource Guide for Florida Shellfish Aquaculture' website. The header features the UF IFAS University of Florida logo and a navigation menu with links: HOME, ABOUT THE INDUSTRY, GETTING STARTED, RESOURCES, SUPPLIERS, EXTENSION, NEWS, ABOUT US, and TOPICS. A search bar is located on the right. The main banner is titled 'Florida Hard Clam Aquaculture' and includes the text 'Providing JOBS in rural coastal communities', 'ENVIRONMENTALLY BENEFICIAL ecosystem services', and 'HEALTHY, NUTRITIOUS and LOCALLY PRODUCED seafood'. It also features a central image of a clam field and the text 'A SUSTAINABLE INDUSTRY'. Below the banner, a welcome message states: 'Welcome to the new and improved Online Resource Guide for Florida Shellfish Aquaculture. This site provides, through the University of Florida IFAS Shellfish Aquaculture Extension Program, information about shellfish farming and related activities for the general public, growers, and others involved in the shellfish industry. A "news blog" is featured which provides current information on a timely basis and replaces The Bivalve Bulletin newsletter. This site also includes updates on research and extension projects, presentations from industry workshops, suppliers' lists, and pertinent publications. Read More'. The 'NEWS & EVENTS' section lists three items: 'Monthly Inventory Reports for USDA Farm Service Agency's NAP Program' (October 3, 2019), 'Financial Assistance Programs: Workshop Presentations, Handouts, and Video Recordings' (August 16, 2019), and 'Hurricane Workshop Presentations and Marker Tag Program' (August 2, 2019). The 'SHELLFISH' section displays images of 'Hard Clams', 'Oysters', and 'Sunray Venus'. The 'TOPICS' section includes links to 'Clam Workshops', 'Dr. Yang's Lab', 'Water Quality', 'Environmental Benefits', and 'Big Bend SHELLFISH TRAIL'.

UF IFAS
UNIVERSITY OF FLORIDA

Online Resource Guide for
Florida Shellfish Aquaculture

HOME ABOUT THE INDUSTRY GETTING STARTED RESOURCES SUPPLIERS EXTENSION NEWS ABOUT US TOPICS

Providing
JOBS in rural coastal communities

ENVIRONMENTALLY BENEFICIAL ecosystem services

HEALTHY, NUTRITIOUS and LOCALLY PRODUCED seafood

Florida Hard Clam Aquaculture

A SUSTAINABLE INDUSTRY

Welcome to the new and improved Online Resource Guide for Florida Shellfish Aquaculture.

This site provides, through the University of Florida IFAS Shellfish Aquaculture Extension Program, information about shellfish farming and related activities for the general public, growers, and others involved in the shellfish industry. A "news blog" is featured which provides current information on a timely basis and replaces The Bivalve Bulletin newsletter. This site also includes updates on research and extension projects, presentations from industry workshops, suppliers' lists, and pertinent publications.

Read More

NEWS & EVENTS

Monthly Inventory Reports for USDA Farm Service Agency's NAP Program
October 3, 2019
The USDA Farm Service Agency's Noninsured Disaster Assistance Program, or NAP, requires clam growers to provide
[Read More](#)

Financial Assistance Programs: Workshop Presentations, Handouts, and Video Recordings
August 16, 2019
A workshop on financial assistance programs for shellfish growers was held on August 15 at the
[Read More](#)

Hurricane Workshop Presentations and Marker Tag Program
August 2, 2019
A workshop on hurricane preparation and recovery for oyster growers was held Wednesday, July 31 in
[Read More](#)

Understanding Financial Assistance Programs for Shellfish Growers:
August 5, 2019

SHELLFISH

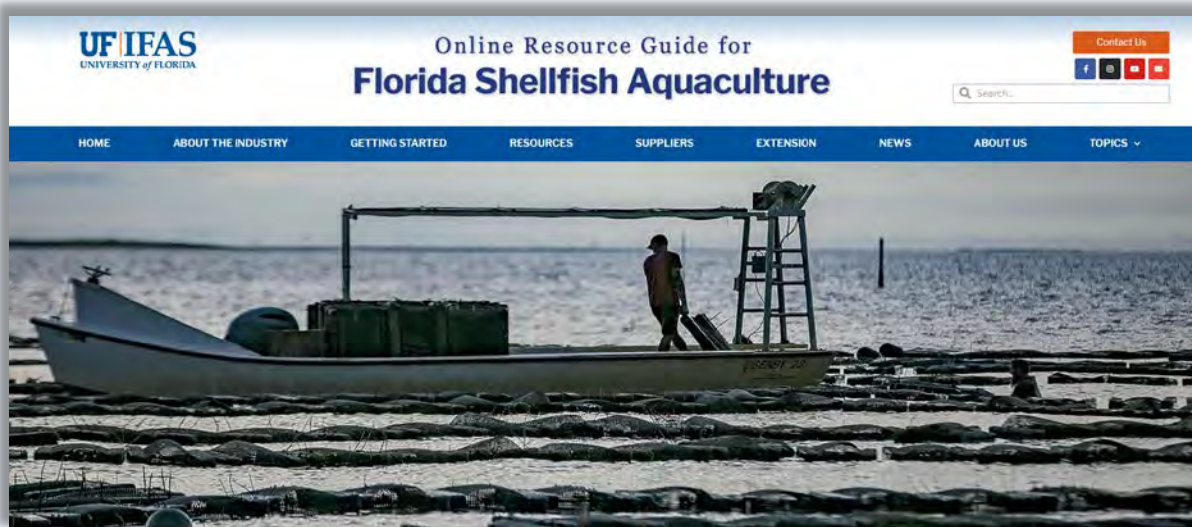
Hard Clams Oysters Sunray Venus

TOPICS

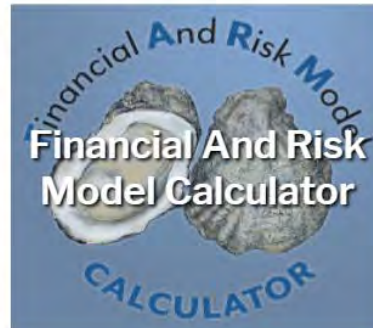
Clam Workshops Dr. Yang's Lab

Water Quality Environmental Benefits Big Bend SHELLFISH TRAIL

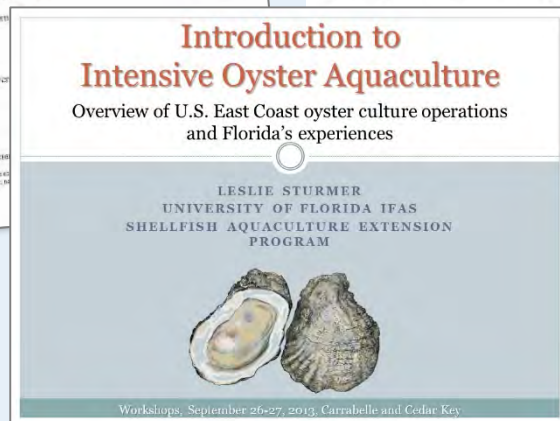
<http://shellfish.ifas.ufl.edu>



Oyster Culture



Oyster Culture Topic Page



Oyster Culture

A large decline in oyster landings was reported in 2012 and has continued through 2014 for Apalachicola Bay and other areas along the west coast of Florida where the state's oyster fishery is based. Efforts conducted through the University of Florida's **Oyster Recovery Team**, described conditions prior to and after the historic collapse of the oyster fishery. Their report reviews possible causes and outlines a plan for future monitoring, research, and fishery management. In August 2013, the U.S. Secretary of Commerce declared a commercial fishery failure for the Florida oyster fishery.

Shellfish farming was introduced on the west coast of Florida during the 1990s as part of retraining opportunities for seafood workers affected by increasing regulations. Although these programs demonstrated that oysters could be grown using on-bottom methods, they were not successful. Unlike cultivating hard clams, oysters proved too labor-intensive and costly to grow. Today, there is renewed interest in oyster culture. With decreased supplies from the fisheries and higher dockside prices, the economics may be more favorable. Further, the success of Florida's clam culture industry provides a model for the oyster industry in their recovery efforts.

Florida Governor and Cabinet approved modification of hard clam exempt only six inches above the bottom substrate for culture activities, to harbor (Franklin County) full use of the water column for culturing oysters. Since then, lease modifications for oyster cultivation have been approved



Oyster Culture

[Introduction](#)

[Culture Gear & Supplies](#)

[Northeast U.S. Industry](#)

[Lease Modification](#)

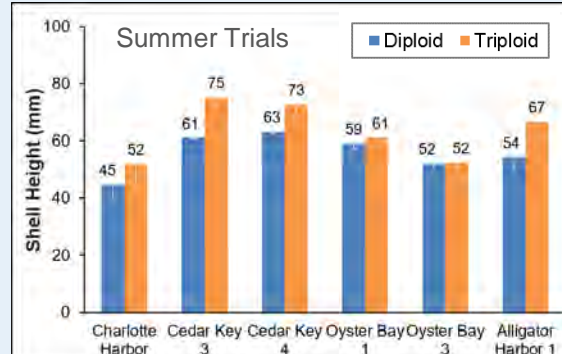
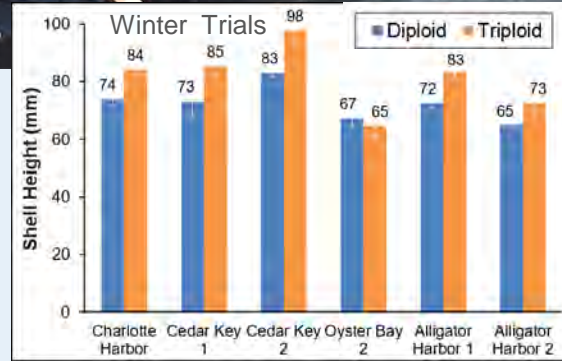
[Marketing](#)

- Workshop handouts
- Presentation files
- Presenter information
- Gear suppliers lists

Demonstration Project 2016-2017



- Documented seasonal growth, survival, and health of diploid and triploid oysters at commercial farms
- Evaluated gear and management practices in replicated field trials



UF IFAS Online Resource Guide for **Florida Shellfish Aquaculture**

Home | About the Industry | Getting Started | Resources | Suppliers | Extension | News | About Us | Topics

Home > Oyster Farming Demonstration Project

Oyster Farming Demonstration Project
Application of Triploidy to the Emergent Florida West Coast Industry

This project allowed for large-scale demonstration and evaluation of an oyster breeding process to local conditions on Florida's west coast by oyster growers. The objectives were two-fold:

1. Document production performance, assess health, and evaluate the quality (sensory characteristics) of diploid (2N) and triploid (3N) oysters under commercial conditions; and
2. Quantify the effects of different culture methods, salinity regimes, and seasonal harvests.

SDO's ON WORK: Oysters from two ploidy types (triploids – 3N and diploids – 2N) and two seasonal seasons (spring and fall) were provided to certified growers, who obtained approval from DACS to culture oysters on their shellfish aquaculture leases. Ten growers in the west coast counties (Charlotte, Franklin, Levy, and Volusia) used a variety of culture systems (floating bags, floating cages, bottom cages, and available low lines), which allowed for evaluation of site and gear interaction on ploidy type/seasonality.

FOLLOW THE PROJECT BY VIEWING THE NEWS ARTICLES BELOW:

Seed Provided to Growers in July
July 27, 2016
Single-seed triploid oyster seed were produced by crossing Cedar Key stocks with apert from intraploid stocks maintained at Louisiana Sea Grant's oyster hatchery. [Read more](#)

UF Plants Seed in August
September 14, 2016
Triploid and diploid oyster stocks were also planted by UF at their experimental lease located within the Dog Island Lease Area off Cedar Key on August 4. [Read more](#)

Hurricanes Impact Oyster Trials
October 7, 2016
After meandering around the Gulf of Mexico as a tropical depression, Hurricane Hermine gathered steam and headed straight for the Big Bend coast on September 2. [Read more](#)

UF Oyster Growout Study Initiated
November 1, 2016
This article summarizes the growth of diploid (2N) and triploid (3N) oysters cultured at the UF experimental lease within the Dog Island Lease Area near Cedar Key. [Read more](#)

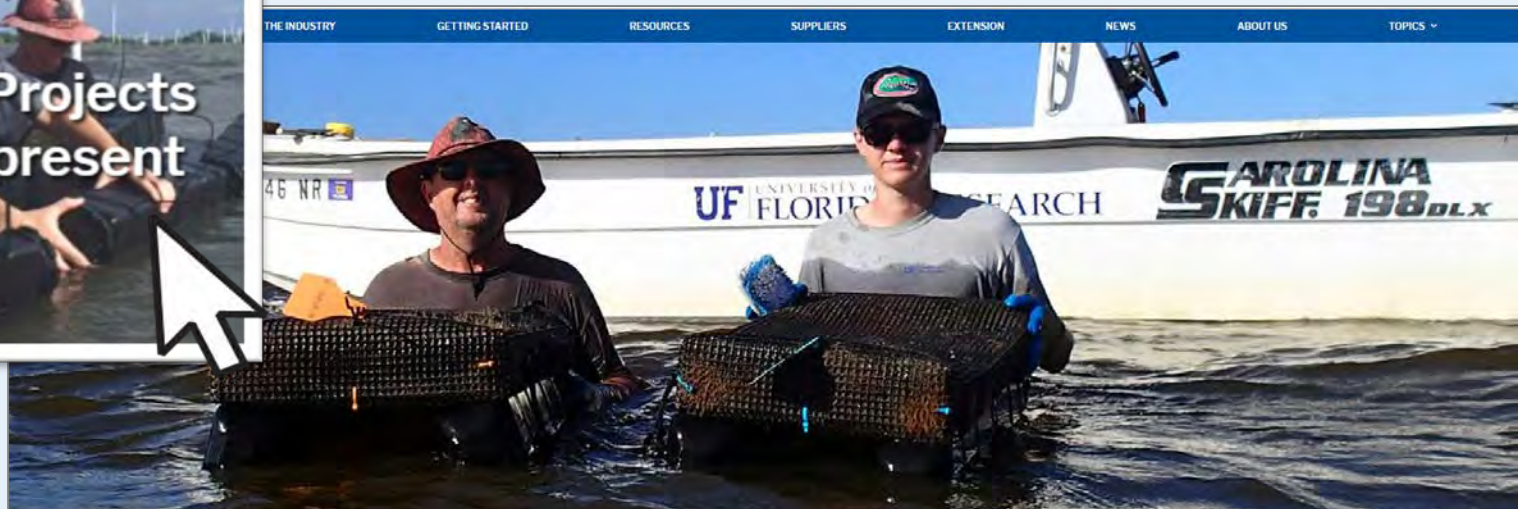
Financial Characteristics and Risks
January 2017
Another component of the Oyster Culture Demonstration Project is to document economic costs and benefits associated with diploid versus triploid oyster production along the west coast of Florida. [Read more](#)

Sampling UF Field Trials
February 2017
A similar number of oysters provided to project participants were also cultured at the UF experimental lease off Cedar Key so that growth and survival could be documented monthly during growout. [Read more](#)





**Other Projects
2018-present**



Other Oyster Culture Projects

During 2017 – 19, applied field trials were conducted by University of Florida/IFAS to continue 1) evaluating various gear types and management practices and 2) documenting annual and seasonal oyster production on an experimental lease off Cedar Key. In collaboration with Sea Grant agents and industry partners from the Southeast US and Gulf of Mexico, effects of biofouling control methods for floating cages, such as flipping regimes and biocide-free, antifouling coatings, were evaluated. Oyster performance and biofouling control using floating cages and floating bags were also compared. In another replicated study, survival and growth of oysters stocked from 175 to 250 per floating bag were documented.



Biofouling Control



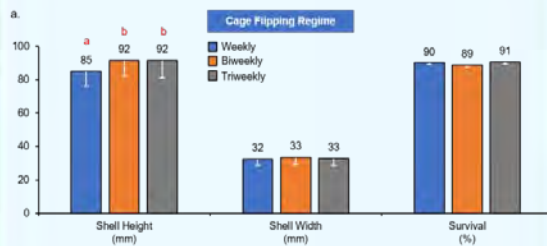
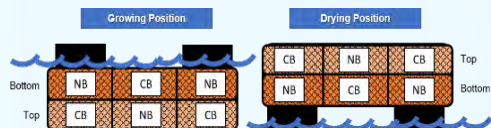
Gear Comparison



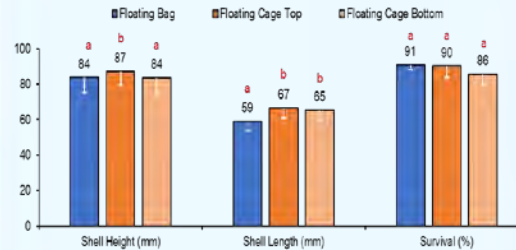
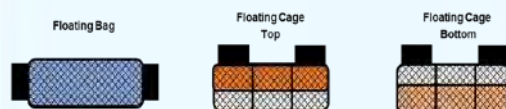
Stocking Density

Other Oyster Culture Projects

Biofouling Control



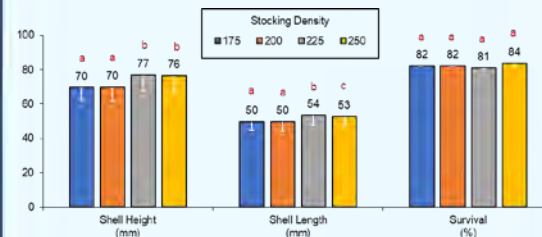
Gear Comparison



Stocking Density



Ploidy Type	# Oysters per Bag	# Bags
Triploid (3N)	175	4
Triploid (3N)	200	4
Triploid (3N)	225	4
Triploid (3N)	250	4





Oyster Culture Videos

Oyster Resources

Hatchery

- Oyster Hatchery Manual: Protocols for North Carolina Oyster Hatchery Operations (Cartersville, NC: NCDA&CS, 2007)
- Oyster Hatchery Techniques (SRAC 4302)
- Hatchery Culture of Bivalves: A Practical Manual (FAO Fisheries TP 471)
- Installation and Operation of a Modular Bivalve Hatchery (FAO Fisheries TP 492)
- A Regional Shellfish Hatchery for the Wider Caribbean (FAO Fisheries & Aquaculture Proc 100)
- Eastern US Interstate Shellfish Seed Transport Workshop Abstracts (SCSG)
- Lipid Enrichment of Oyster Broodstock Using Commercially Available Emulsions (NRAC 00-002)
- Evaluation of Eastern Oyster Spat Collectors for Whitehouse Seafood (UGMES Vol. 13, 2007)
- Wild Eastern Oyster Spat Collection for Commercial Grow-out in Georgia (UGMES Vol. 2008)

Nursery

- Nursery Growout Methods for Aquacultured Shellfish (NRAC 00-002)
- Shellfish Upweller Silo Construction: 101 (NRAC 212-2010)
- Producing Oyster Seed by Remote Setting (NRAC 220)
- A Low Cost Floating Upweller Shellfish Nursery System Construction and Operation (NRAC 220)
- Construction and Operations Manual for a Tidal Powered Upwelling Nursery System (NRAC 220)
- Shellfish Upweller Nurseries (Roger Williams University)
- High-Density Rearing of Oyster Larvae in Flow-Through Systems (SRAC 4311)

Algae Culture

- Growing Microalgae to Feed Bivalve Larvae (NRAC 160)
- Phytoplankton Culture for Aquaculture Feed (SRAC 5004)
- Plankton Culture Manual (Florida Aqua Farms order information)
- Use of Microalgae Concentrates for Rearing Oyster Larvae (MASG-12-048)

Oyster Production

- The Cultivation of the American Oyster (SRAC 0432)
- Extensive Culture of *Crassostrea virginica* in the Gulf of Mexico Region (SRAC 4300)
- Off-Bottom Culture of Oysters in the Gulf of Mexico (SRAC 4308)
- Off-bottom Oyster Farming (ACES)
- Off-bottom Oyster Culture Gear Types (MASGP 12-013-04)
- Reference Manuals for Oyster Aquaculturists (New Brunswick University Pub)
- Non-Commercial Oyster Culture or Oyster Gardening (SRAC 4307)



Introduction to Harvesting and Marketing Cultured Oysters

May 2015

Robert Rheault, ECSGA; Martin May and Kim Norgren, DACS



An Introduction to Intensive Oyster Culture Workshop

September 2013

Leslie Sturmer, UF; Portia Sapp and Kim Norgren, DACS; Bill Walton, AU



An Introduction to Oyster Culture Gear and Suppliers Workshop

December 2013

John Supan, LSU; Bill Walton, AU; Rheel Savoie, OysterGro; Kent Ferguson, Go Deep International; Tom Rossi, 4Cs Breeding Company



An Introduction to Oyster Culture in the Northeastern United States

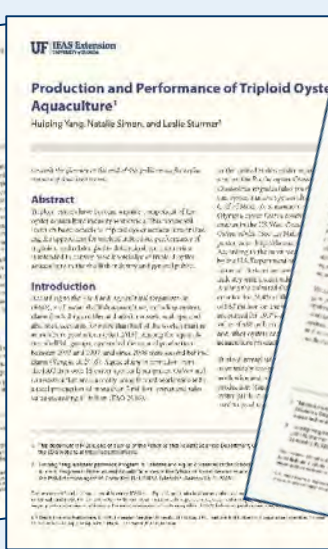
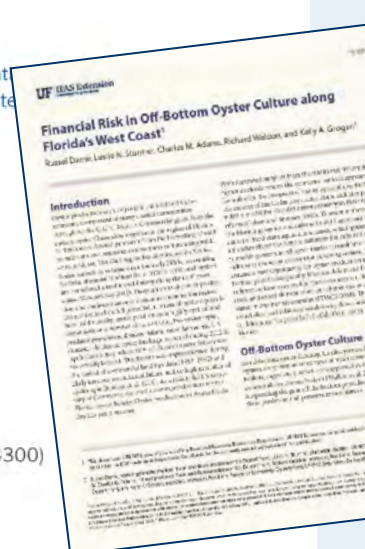


Application of Triploidy to Oyster Culture on Florida's West Coast

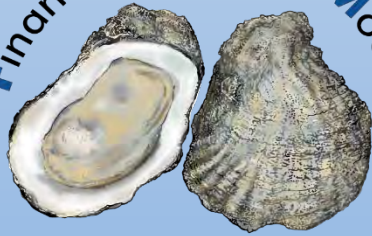


Gear Management Workshop

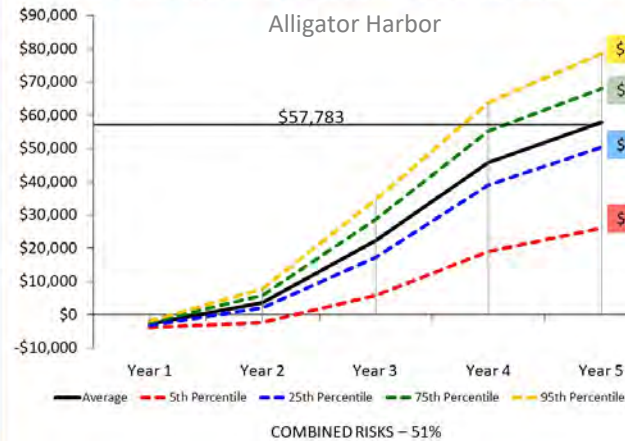
September 2018



Financial And Risk Model CALCULATOR

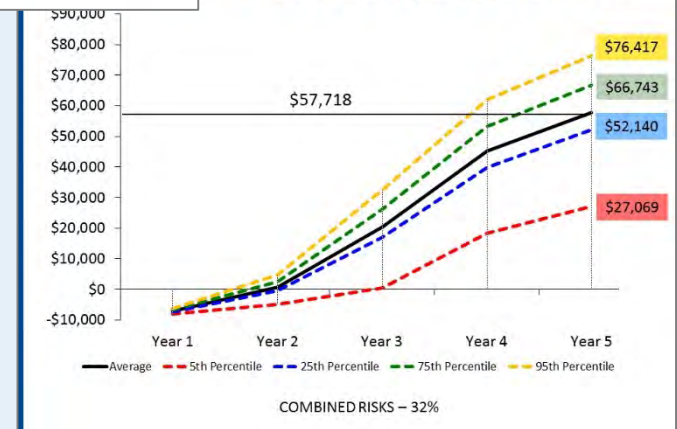


NET INCOME RESULTS: FRANKLIN COUNTY



- Determined net income for a hypothetical small-scale oyster farm over 5-years based on combined risks

NET INCOME RESULTS: WAKULLA COUNTY

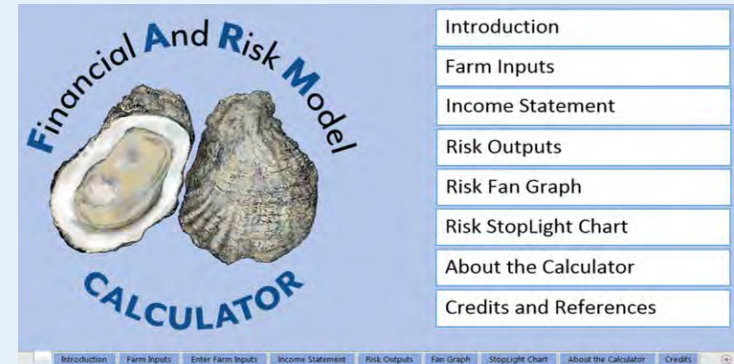


Environmental Risk	County	Probability
Major Storms	Escambia	11%
	Franklin - AH	19%
	Levy	19%
	Wakulla	16%
High Salinity Event (>30 ppt for 2 months)	Escambia	0%
	Franklin – AH	30%
	Franklin - AB	2%
	Levy	0%
	Wakulla	0%
Low Salinity Event (<10 ppt for 2 months)	Escambia	50%
	Franklin - AH	0%
	Franklin - AB	18%
	Levy	0%
	Wakulla	11%

- Identified environmental and economic risks to oyster culture in four counties
- Assessed risk probabilities based on long term data sets

Financial And Risk Model CALCULATOR

- Developed tool for growers to input their own costs and culture methods to generate their farm's income statement and financial risk situation



Enter Your Farm Inputs					
	Year 1	Year 2	Year 3	Year 4	Year 5
Where is your lease located?	Levy County - West				
What are your annual certification and lease rental fees?	\$ 156.00	\$ 156.00	\$ 156.00	\$ 156.00	\$ 156.00
How many oysters are you planting each year?	50,000	100,000	200,000	350,000	500,000
What is the cost per 1,000 oyster seed?	\$ 15.00	\$ 20.00	\$ 20.00	\$ 20.00	\$ 20.00
What is your average market price per oyster?	\$ 0.40	\$ 0.45	\$ 0.45	\$ 0.50	\$ 0.50
What percentage of oysters brought to market are able to be sold?	90%	90%	85%	85%	85%
What culture method do you use?	Floating Bags				
What mesh size bag/baskets do you use each year?					

Farm Income Statement					
	Year 1	Year 2	Year 3	Year 4	Year 5
Total Fixed and Variable Costs	\$ 14,456.00	\$ 22,046.00	\$ 28,876.00	\$ 39,156.00	\$ 57,856.00
Additional Costs Due to All Risks					
Labor Wages	\$ 9.66	\$ 11.23	\$ 10.28	\$ 11.00	\$ 11.81
Capital Costs	\$ 8.68	\$ 50.77	\$ 43.19	\$ 11.29	\$ 8.79
Total Additional Costs Due to All Risks	\$ 18.34	\$ 62.00	\$ 53.47	\$ 22.29	\$ 20.60
Total Farm Costs	\$ 14,474.34	\$ 22,108.00	\$ 28,929.47	\$ 39,178.29	\$ 57,876.60
Oyster Plantings and Mortalities					
Number of Oysters Planted	50,000	100,000	200,000	350,000	500,000
Normal Mortality	20%	20%	20%	20%	20%
Mortality from Major Storms	1%	1%	1%	1%	1%
Mortality from an Extended Low Salinity Event	0%	0%	0%	0%	0%
Mortality from an Extended High Salinity Event	0%	0%	0%	0%	0%
Marketable Oysters	35,644	71,131	134,503	235,493	334,908
Farm Revenues					
Market Price per Oyster	\$ 0.40	\$ 0.45	\$ 0.45	\$ 0.50	\$ 0.50
Total Farm Revenue	\$ 14,257	\$ 32,009	\$ 60,526	\$ 117,747	\$ 167,454
Profitability (Pre-tax Net Income)	\$ (216.86)	\$ 9,901.08	\$ 31,596.85	\$ 78,568.30	\$ 109,577.37

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