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Identification of Advanced Business Models and Financial Products for Louisiana Oyster Harvesters

Source: Miller

Prepared by Alex Miller

TruFund Financial Services
December 2015

trace register™

Executive Summary

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Industry Overview:

- Over the last decade, oyster harvesters in Louisiana have faced (and continue to face) a variety of challenges. These challenges are primarily a result of 1) freshwater flooding events related to natural and manmade disasters that have resulted in changes in salinity and subsequent declines in oyster populations and 2) regulatory changes that specify the amount of time oysters are required to be under mechanical refrigeration. Subsequently, these and other challenges such as changes in infrastructure after Hurricane Katrina, changes in perceptions concerning Gulf oysters after *Deepwater Horizon*, and increases in production of oysters from other regions, have led to a downward trend in US Gulf of Mexico and Louisiana oyster landings since about the early 2000's.

Source: In A Half Shell

Executive Summary (Continued)

Advanced Business Models:

- This project identified a myriad of potential advanced business models that could assist Louisiana oyster harvesters with overcoming these hurdles, better diversifying their businesses, reducing risk, and helping to differentiate their products to collectively improve their economic resiliency. The potential advancements identified include the following: 1) onboard mechanical refrigeration, 2) on-bottom remote setting (spat-on-shell), 3) cultch/bedding material, 4) off-bottom culture, 5) geographic branding and direct marketing, 6) improved standards and quality assurance, 7) alternative species: clams, 8) agri/ecotourism, 9) oyster cooperatives, and 10) ecosystem services: nutrient (N) removal. In the short term, onboard mechanical refrigeration and on-bottom remote setting (spat-on shell) appear to have the highest likelihood of feasibility, suitability, and scalability.

Source: Virginia Institute of Marine Science

Recommendations and Financial Products:

- While there are numerous organizations and government agencies in Louisiana and the greater Gulf coast region working toward a resilient oyster population and harvesting sector, TruFund Financial Services is uniquely positioned to offer tailored financial products to assist harvesters with making investments in the aforementioned advancements. Two potential financial products were identified: 1) an oyster business loan program and 2) an oyster business advancement grant and loan program. Compared to traditional financial channels, TruFund can make loans to businesses (harvesters) that could not otherwise access affordable financing. Trufund is also well-placed to educate and assist the industry with acquiring loans, conducting business planning, and implementing business advancements.

Introduction

TruFund Financial Services, Inc. is a wholly independent national non-profit Community Development Financial Institution (CDFI) with more than $55 million assets under management. Operating primarily in three markets (New York, Louisiana, and Alabama), TruFund is a hands-on, not-for-profit lender committed to growing underserved small businesses and helping their communities prosper.

Since 2008, through the Fisheries Assistance Center, TruFund Financial Services has helped stabilize and rebuild Southeast Louisiana, coordinating services and providing grants or loans, and technical assistance. FAC has:

- Facilitated access for loan recipients to more than $8.5 million in State-funded grants
- Approved loans for more than $6.5 million to commercial fishermen and dock owners
- Provided financial and technical assistance to nearly 700 small business owners in the fisheries industry
- Given direct one-on-one technical assistance to nearly 300 small business owners
- Received over 2,000 visits from individuals and business owners seeking help

Introduction

Trace Register completed this work given its history working with the seafood and food industry in over 40 countries with thousands of seafood companies to identify and implement successful business solutions. Specifically, Trace Register recently developed a unique business solution for oyster supply chains in the U.S. Gulf of Mexico and, in doing so, completed a successful digital traceability pilot project for the oyster industry. Throughout the pilot, Trace Register built relationships and alliances with the oyster industry and with regulatory and management agencies (e.g. Louisiana Department of Wildlife and Fisheries, Louisiana Department of Health and Hospitals—commercial seafood). The pilot focused on how the oyster industry, from harvester to consumer, could improve food safety, efficiency, and resiliency challenges. This previous work provided the foundation to executing the work herein. Additionally, the Principal Investigator, Mr. Miller, had a long history working with the business and financial aspects of the Gulf seafood industry, including the oyster industry and was well-positioned to complete the work.

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Introduction: Project Objective

Project Objective: Identify Advanced Business Models and Financial Products for Louisiana oyster harvesters

Part 1: (**Industry Overview**) Review the United States, U.S. Gulf of Mexico, and Louisiana oyster industry and the predominant business model currently employed by the oyster industry in Louisiana.

Part 2: (**Advanced Business Models**) Identify and evaluate advanced business models being developed and/or utilized that have potential application in the region. Evaluate advanced business models for Louisiana oyster harvesters.

Part 3: (**Recommendations and Financial Products**) Recommended advanced business models, identification of financial products for advanced business models, example financial products, and recommendations for the role of TruFund

Introduction: Interviews and Subject Matter Experts

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Jack Isaacs	Louisiana Dept. of Wildlife and Fisheries
Mark Schexnayder	Louisiana Dept. of Wildlife and Fisheries
Richard Williams	Louisiana Dept. of Wildlife and Fisheries
Steve Beck	Louisiana Dept. of Wildlife and Fisheries
Katie Semon	Louisiana Dept. of Wildlife and Fisheries
Byron Encalade	Louisiana Oystermen Association
Rusty Gaude	LSU/Louisiana Sea Grant
Julie Falgout	LSU/Louisiana Sea Grant
John Supan	LSU/Louisiana Sea Grant
Rex Caffey	LSU/Louisiana Sea Grant
Walter Keithly	Louisiana State University
Bill Walton	Auburn University
Steve VanderKooy	Gulf States Marine Fisheries Commission
Ian Jefferds	Penn Cove Shellfish
Bill Dewey	Taylor Shellfish
Laura Picariello	G.U.L.F. / Audubon
Jennifer Jenkins	Crystal Seas Seafood
Chris Nelson	Bon Secour Fisheries
Rosa Zirlott	Murder Point Oyster Company
Michael Oesterling	Shellfish Growers of Virginia
Tom Murray	Virginia Institute of Marine Science
David Buggage	TruFund Financial Services
John Dinh	TruFund Financial Services
Jane Mahoney	TruFund Financial Services
Matt Parker	University of Maryland Extension
Henry Mcanespy	Oyster Harvester
Tolar Nolley	Oyster Company of Virginia
Tyler Ortego	ORA Estuaries
Dan Kauffman	Virginia Seafood Agricultural Research and Extension Center

Part 1: Industry Overview: Macro

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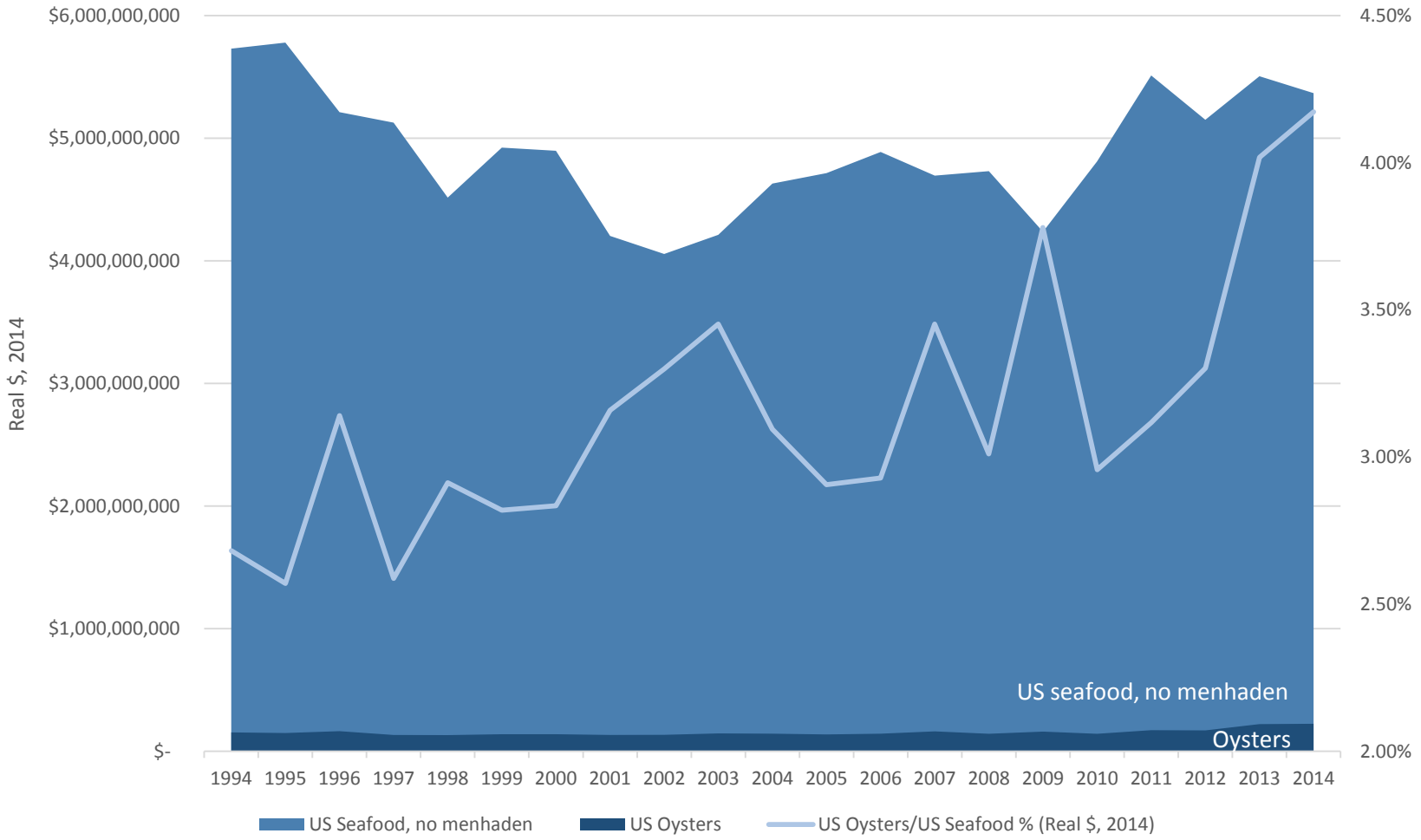
- Macro context
- Louisiana profile
- Profile of the fleet
- Profile of the dealer and processor sector
- Supply chain analysis
- Regulatory profile
- Ecological profile

US Oysters

The contribution of dockside revenue from US oysters to all US seafood dockside revenues has increased over the last two decades while dockside revenues for all US seafood has also increased, indicating a potential increase in demand for oysters in the US. An opportunity exists to meet the growing demand for oysters in the US using advanced business models.

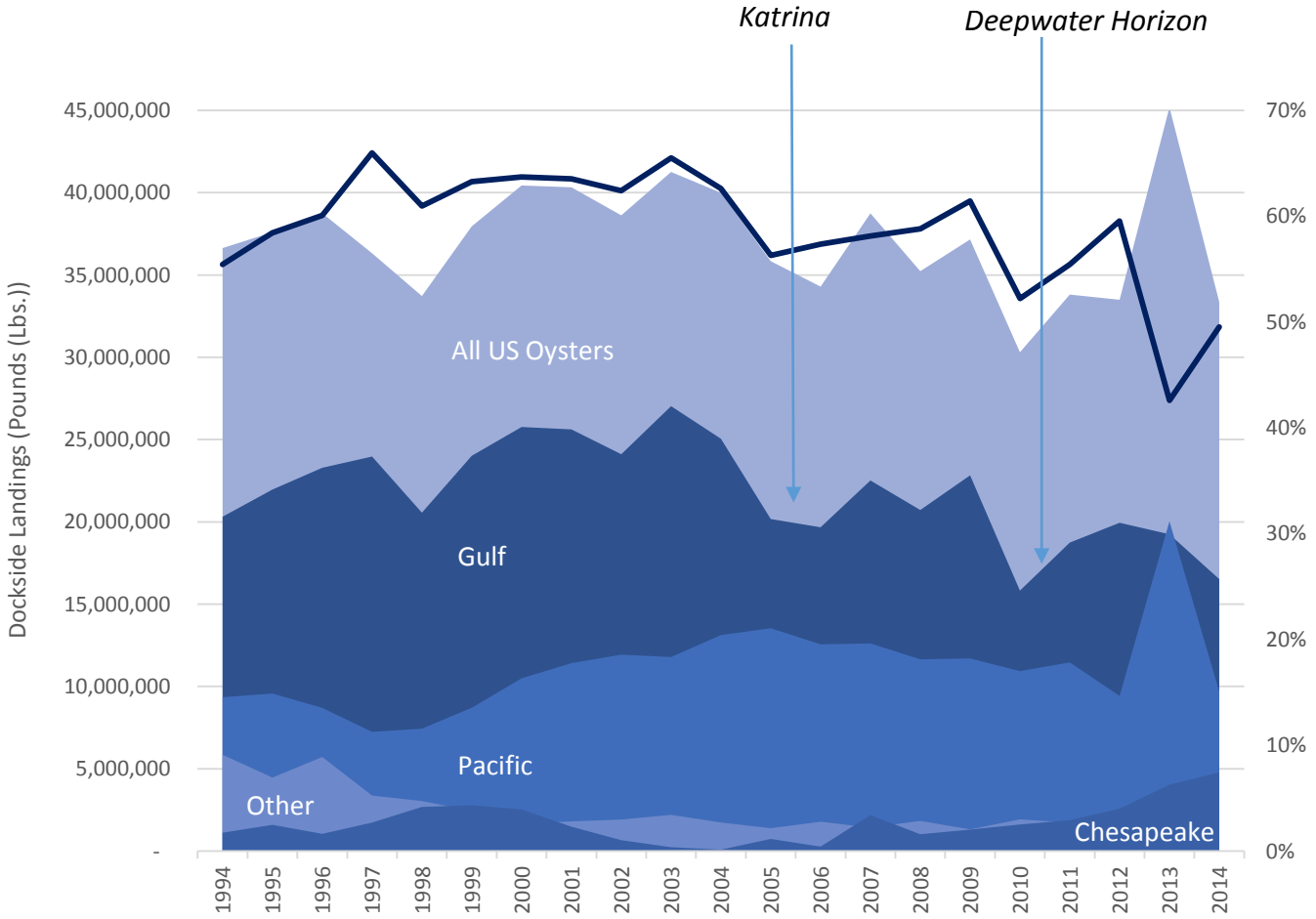


Source: NOAA Fisheries

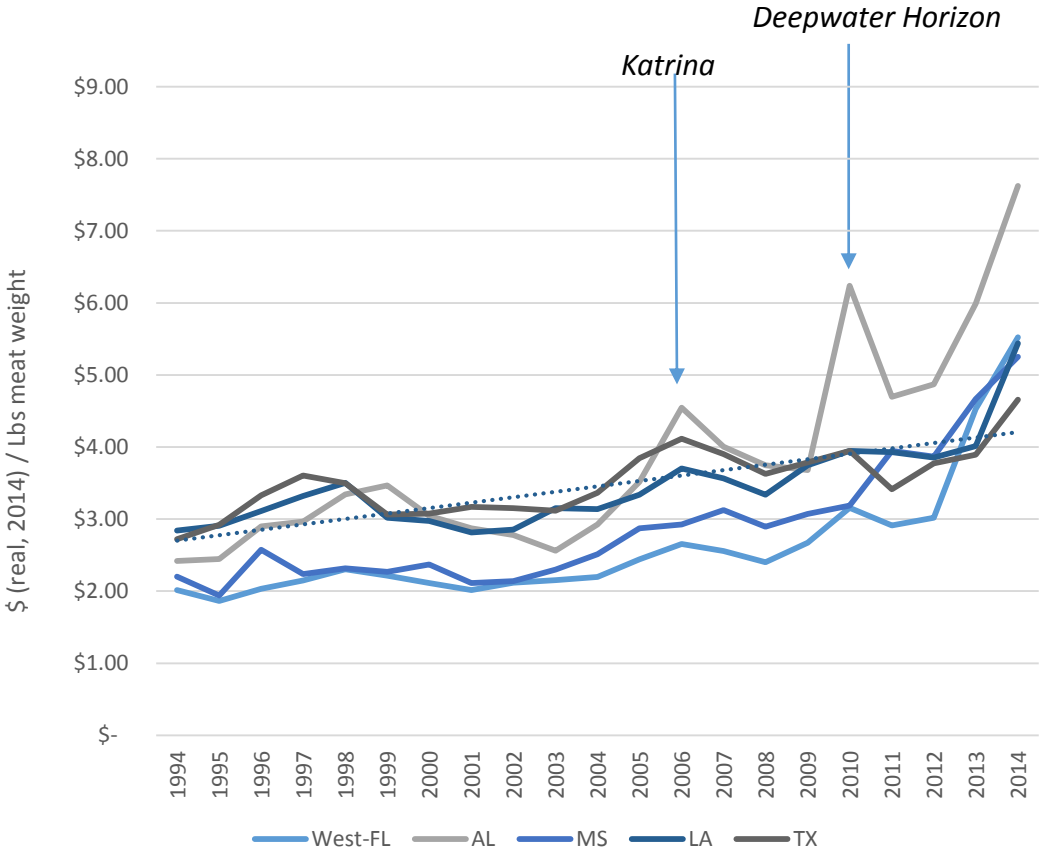
- In 2014, the US oyster industry (all oyster species) had dockside revenues of ~$224M, accounting for **4.2%** of all US dockside edible seafood revenues, **a 55% increase from 1994** when oyster landings accounted for only **2.68%** of all US seafood landings.

US Oysters

Gulf oyster harvest contributes significantly (~50-60%) to total US oyster harvest but has declined in recent years while other regions (e.g. Pacific and Chesapeake) have increased harvest. While US and Gulf oyster harvest has decreased, the price for oysters has increased throughout the Gulf states. Advanced business models could offer a means to regain market share for Gulf (Louisiana) oysters and increase production.



Source: NOAA Fisheries



Source: NOAA Fisheries

Industry Overview: Louisiana profile

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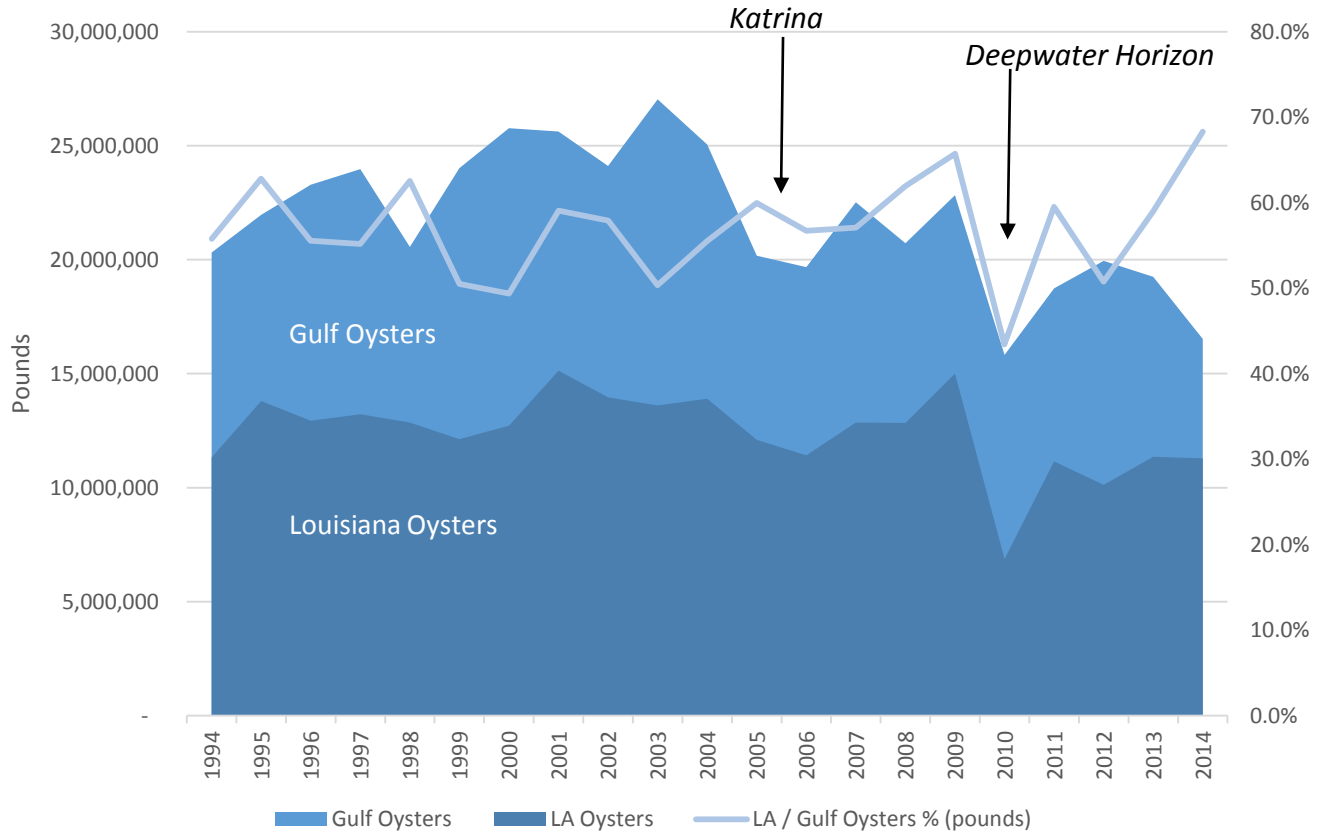
Louisiana Oysters

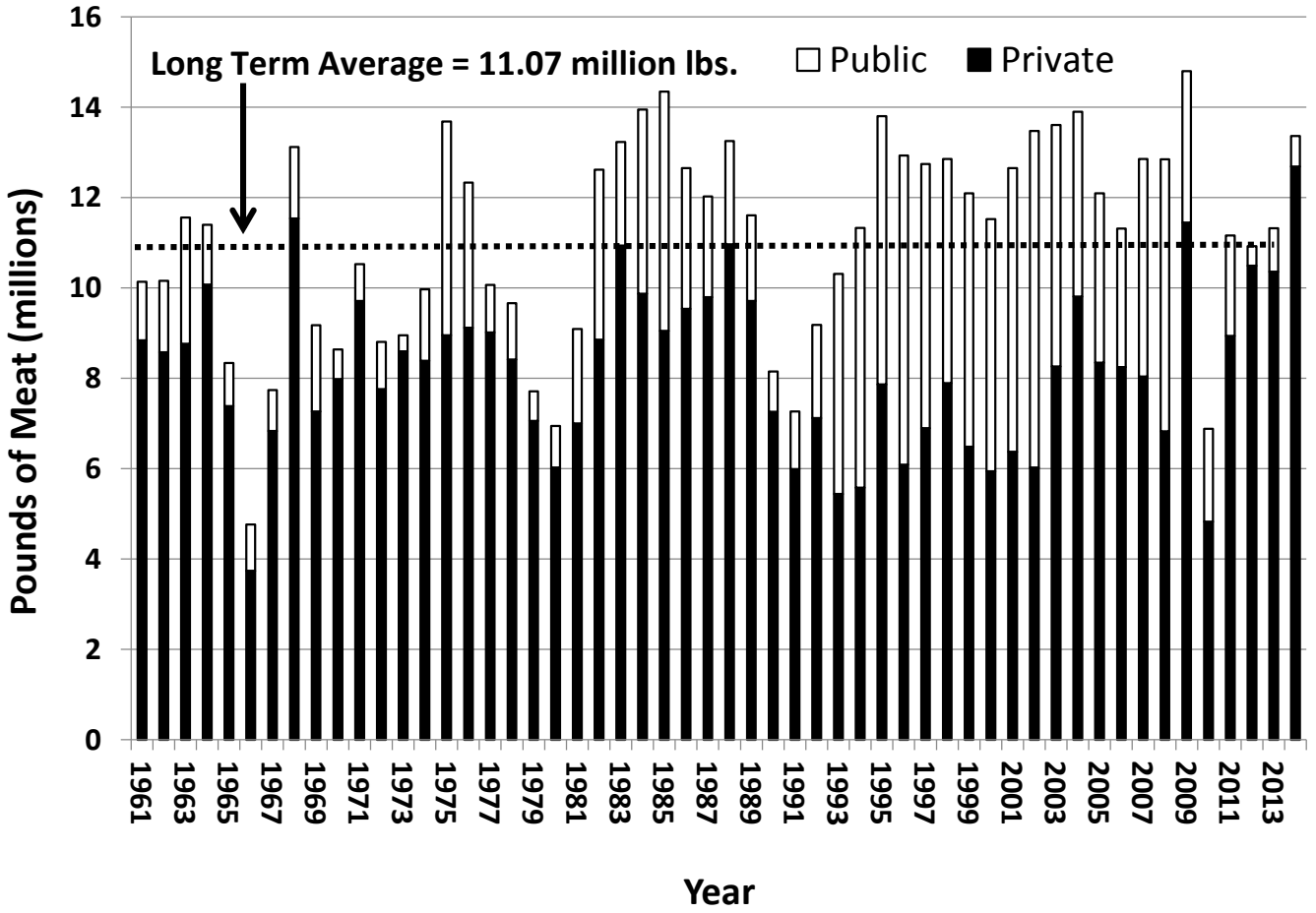
Harvest of Louisiana oysters has decreased by 25% from its peak harvest in 2001 due to challenges from Katrina, *Deepwater Horizon,* and freshwater impacts. While Louisiana has contributed significantly to total Gulf oyster harvest, total Gulf oyster harvest has also decreased by 38% from its peak in 2003. Advanced business models could offer solutions to increase the production of oysters in the Gulf and allow the industry to become more resilient in the face of future disasters and ecological and economic challenges.



Source: NOAA Fisheries

Louisiana Oysters

In recent years, landings of Louisiana oysters have shifted from a combination of harvest from public and private grounds to almost exclusive harvest from private grounds given the availability of oysters on public grounds. Advanced business models could mitigate reliance on variable public grounds for seed and market (sack) oysters and create a more resilient future for oyster harvesters.



Source: Louisiana Department of Wildlife and Fisheries

Louisiana Oysters

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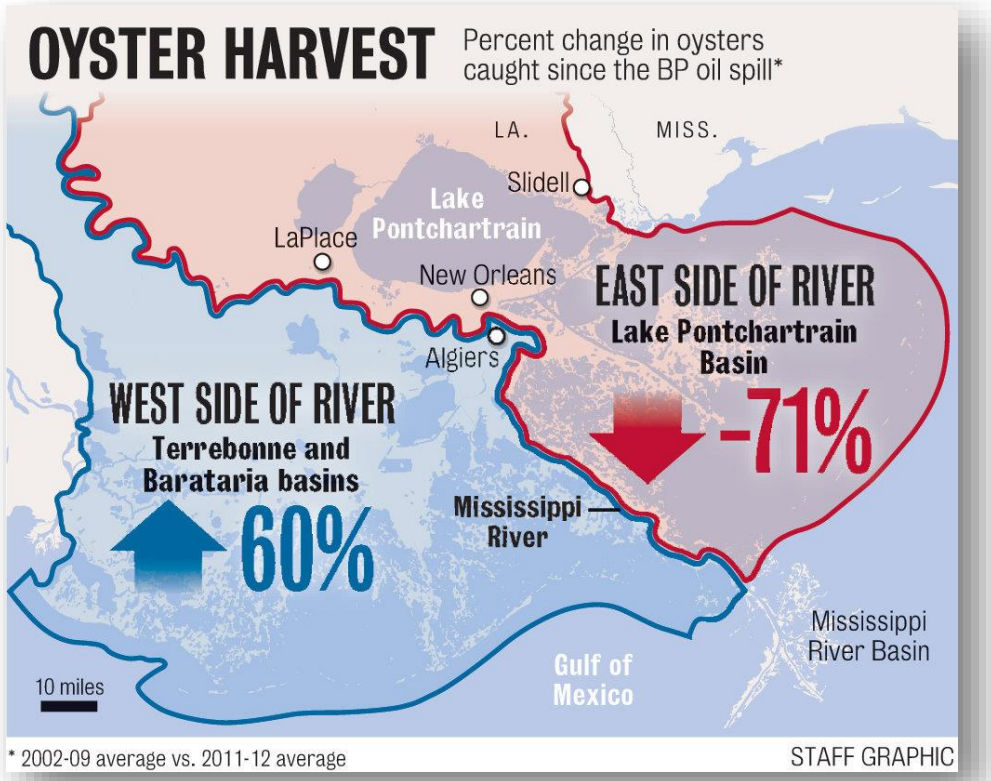
Oyster harvest on the east side of the Mississippi river significantly decreased (02-09 vs 11-12) while harvest on the west side increased considerably as the supply of "sought after oysters" from the east side decreased and demand shifted to the west side. The decrease in landings on the east side is thought to be caused by a myriad of factors including increases in freshwater and subsequent changes in salinity that are detrimental to oyster populations. Fluctuations in oyster populations and salinity are challenging to harvesters who own and cultivate private ground and are unable to move production. These changes have decreased landings for harvesters and/or resulted in harvesters traveling further distances to reach alternative public and private grounds. This has also made meeting time and temperature regulatory requirements difficult, especially in summer months. There are opportunities for advanced business models that can help mitigate these challenges.



Source: Louisiana Department of Wildlife and Fisheries, The Times-Picayune

West Side of River (Terrebonne & Barataria Basins)

2002-2009 Average Landings (Lbs)	2,544,704	% Change
2011-2012 Average Landings (Lbs)	4,023,755	60%

East Side of River (Lake Pontchartrain Basin)

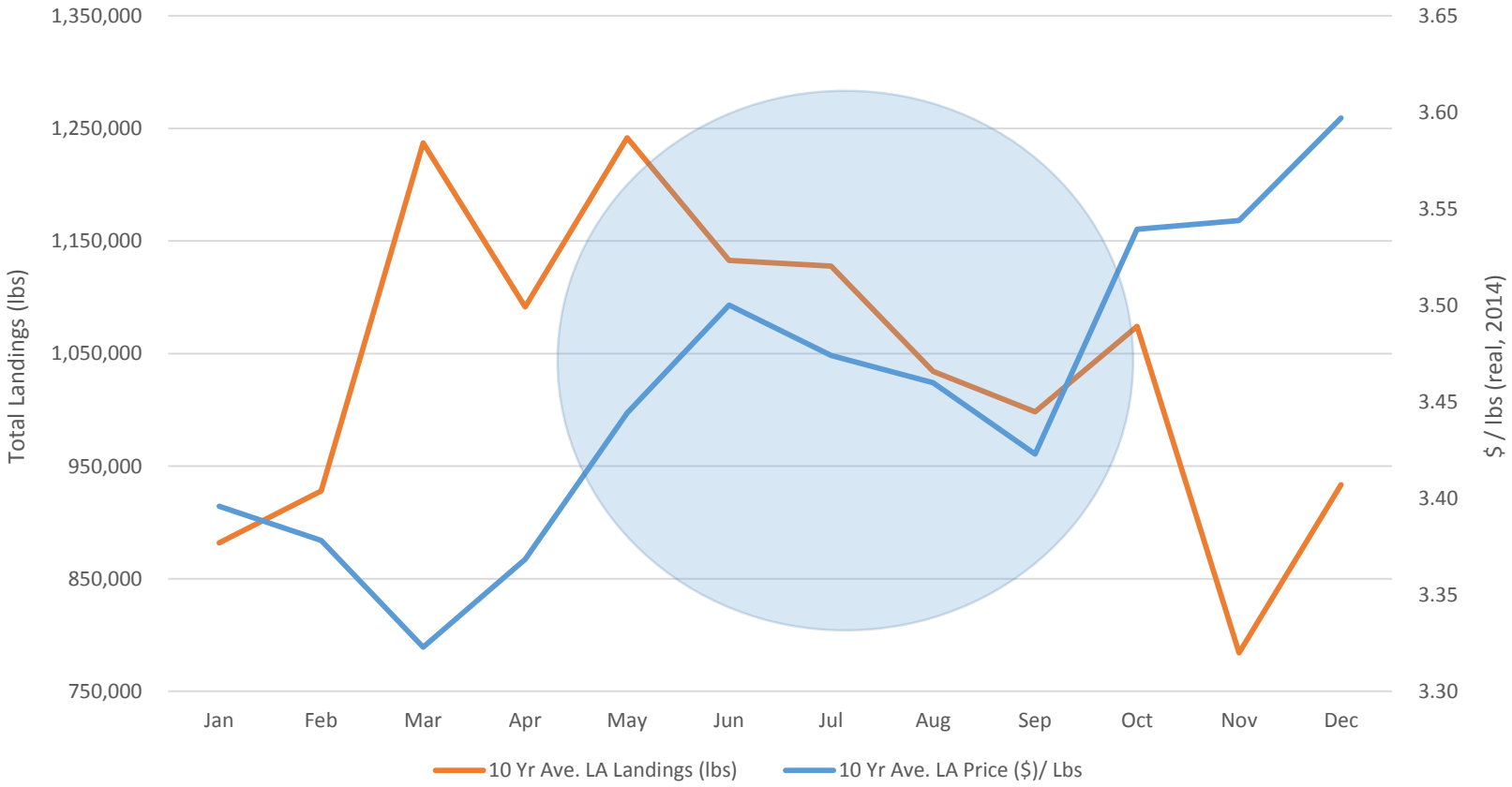
2002-2009 Average Landings (Lbs)	7,173,940	% Change
2011-2012 Average Landings (Lbs)	2,122,225	-70%

Source: Louisiana Department of Wildlife and Fisheries, The Times-Picayune

Comparing average oyster landings from 2002-2009 to average oyster landings from 2011-2012 resulted in a 70% decrease on the east side of the Mississippi and a 60% increase in oyster landings on the west side of the Mississippi river.

Louisiana Oysters

Oyster harvest in Louisiana decreases in summer months as a result of the typical oyster season on public grounds spanning September through April, less meaty oysters as oysters put more energy into reproduction, regulatory time/temperature constraints with warm air and water temperatures, and societal perceptions that oysters shouldn't be consumed in warm months. The price for oysters also decreases as the meat yield decreases. There is, therefore, an opportunity for advanced business models on private grounds to supply a meaty oyster that meets time/temperature regulations year round, both in Louisiana and throughout the US. This could, in turn, increase production and increase prices during the summer.



Source: NOAA Fisheries

Industry Overview: Profile of the fleet

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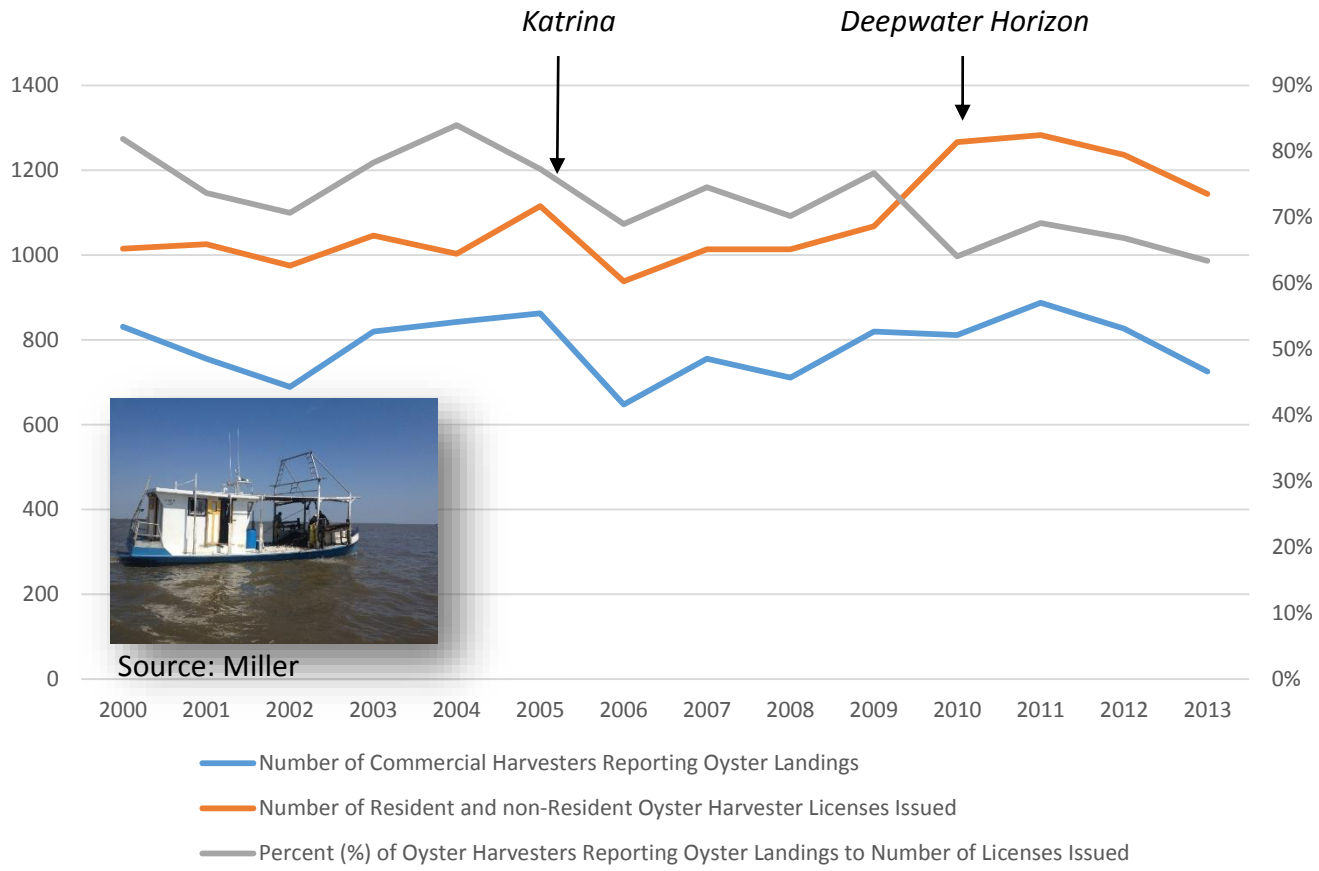
Louisiana Oysters

The percentage of oyster harvesters reporting oyster landings compared to the number of oyster harvesting licenses issued is at an all-time low of only 63% since 2000. The number of harvesters reporting oyster landings peaked in 2011 at 887 and declined to 725 in 2013, or by about 20%. Oyster dredge licenses have also decreased, down 35% from a peak in 2011. Advanced business models may offer opportunities for harvesters to become more resilient and subsequently increase participation in the fishery.

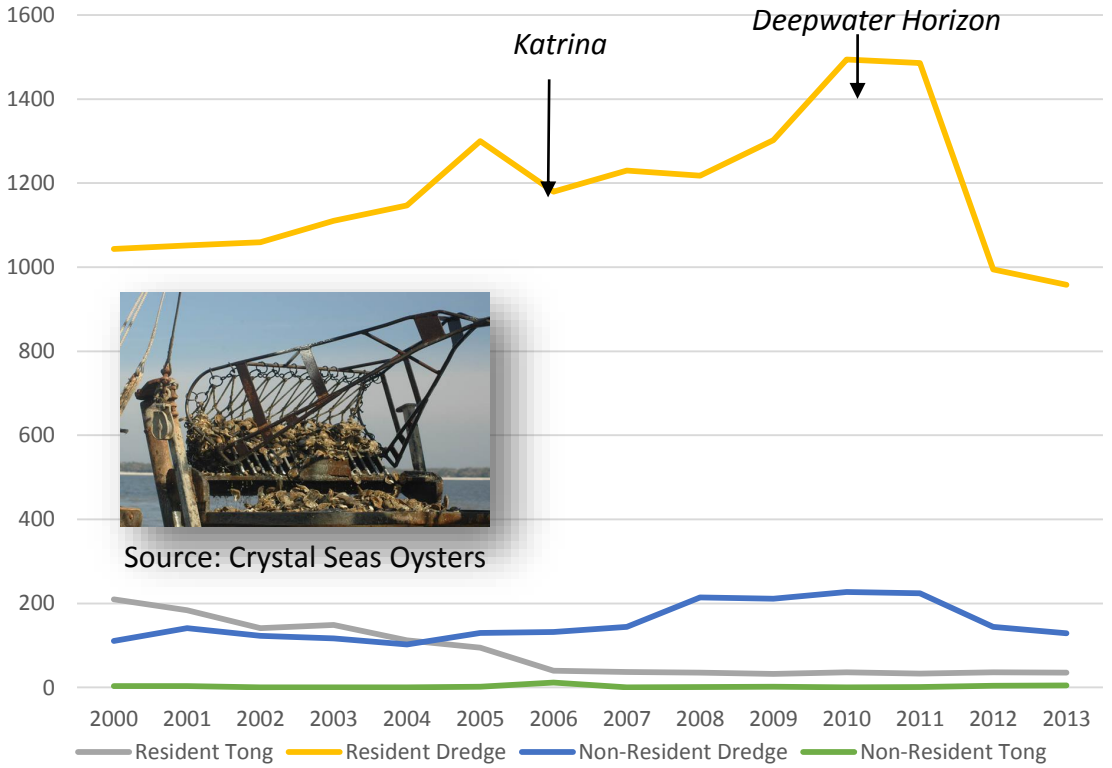
Number of Oyster Harvester Licenses Issued and Harvesters Reporting Oyster Landings: 2000 - 2013



Source: Miller

Source: Louisiana Department of Wildlife and Fisheries

Number of Oyster Dredge and Tong Gear Licenses, Per Piece of Gear: 2000 - 2013



Source: Crystal Seas Oysters

Source: Louisiana Department of Wildlife and Fisheries

Louisiana Oysters

Oyster harvesters typically work together with other harvesters, often with family members. An opportunity exists to further develop these relationships and solidify them into a more structured business arrangement through a cooperative, for example. There is also an opportunity for oyster harvesters, independently or through a cooperative, to improve the branding and marketing of oysters selected at the harvester level for the half shell (raw) market.

Source: Dickson

The average modern oyster harvester typically owns two to three vessels: one large vessel and one small vessel. Large vessels (40-60 in feet) have a captain and two to three deck hands on average. Some of these vessels have living quarters. Smaller vessels (16-24 in feet) have a captain and one deck hand. Sometimes small vessels are operated by only one harvester. Typically vessels are outfitted with a winch, motor, hydraulics, dredge, GPS, a VHS radio, and radar. Some vessels have onboard refrigeration.

Source: Louisiana Oystermen Association, Louisiana Department of Wildlife and Fisheries

Source: Crystal Seas Oysters

Dredges, scrapers, tongs, and "cooning" methods are used to harvest oysters. Cooning oysters is the practice of hand collecting oysters from areas where it is often too shallow for vessels to travel. Ninety percent of all oysters harvested in Louisiana are harvested using dredges.

Oyster vessels were historically used exclusively for harvesting oysters destined for the shucked (raw) market. Historically, shucking houses (processors) would select half shell oysters, while today, half shell oysters are often selected at the harvester level. Oyster vessels today harvest both shucked oysters and half shell oysters, but not on the same day in accordance with regulations.

Source: Louisiana Oystermen Association, Louisiana Department of Wildlife and Fisheries

Louisiana Oysters

Given significant declines in seed oysters from public grounds, further investments into bedding/cultch material by oyster harvesters could potentially spur production, assuming suitable ecological conditions (e.g. salinity, etc.).

Source: Miller

Oyster harvesters typically harvest oysters from either public or leased private grounds, or both. “Seed” oysters are often taken from public grounds and moved to a private lease and harvested approximately six to nine months later. On private leased oyster grounds, cultch or bedding material is normally planted in September, but can be planted year-round. Oyster harvesters plant cultch/bedding material when larvae is best and spawning is happening.

Source: Louisiana Oystermen Association, Louisiana Department of Wildlife and Fisheries, Louisiana State University

Source: The Times-Picayune

Contemporary approaches include “bedding” or laying cultch material (e.g. concrete) on private leases where oyster larvae can adhere and grow. When larvae attach to the bedding or cultch material, oysters are called spat. The State of Louisiana has also invested in cultch material for public grounds and routinely enhances these areas. Despite these efforts, the number of seed oysters has continued to decline.

Source: Louisiana Oystermen Association, Louisiana Department of Wildlife and Fisheries, Louisiana State University

Louisiana Oysters

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Annual Total Cost by Variable for Oyster Harvesters in 2008

Variable	Average	Percentage of Total
Total	$63,129	
Wages, Salaries, and Benefits to Crews and Other Employees	$26,918	42.60%
Replacement of Commercial Fishing Gear	$3,380	5.40%
Mortgage Paid on your Onshore Commercial Fishing-related Facilities	$179	0.30%
Note Payment on Commercial Fishing Vessel	$1,973	3.10%
Note Payment on Commercial Fishing Vehicle	$666	1.10%
Lease Paid on your Business Vehicle, Shop or office Space, etc.	$255	0.40%
Insurance Premiums	$966	1.50%
Repairs and Maintenance	$11,531	18.30%
Mooring / Dockage Fee	$399	0.60%
Cold Storage Cost	$149	0.20%
Onshore Commercial Fishing-related Transportation	$2,033	3.20%
Commercial Fishing Business Tax (Federal, State, and local)	$2,051	3.20%
Fishing Business-related Utilities (Telephone, Electricity, Fuel, etc.)	$10,278	16.30%
Professional Fees Accounting, Legal, Bookkeeping, Tax Filing, etc.)	$402	0.60%
Association's Membership Fees (Cooperative, Fishing Organization, etc.)	$60	0.10%
All Permit and Commercial License Fees	$503	0.80%
Other Expenditures	$1,385	2.20%

Source: Louisiana Department of Wildlife and Fisheries and Louisiana Oystermen Association

Historically, average oyster harvesters received $60-$100k in gross revenues annually and average total costs were $63K. Given these assumptions, historical average net cash flow ranged from around $-3K to $37K. The average total cost per trip for oyster harvesters in 2008 was $377 with fuel representing the largest trip cost at $163 or 43%. An opportunity exists to reduce fuel costs that would improve profitability and the resiliency of oyster harvesting businesses.

Average Total Cost and Trip Related Costs per Oyster Fishing Trip in 2008

Variable	N	Sum	Mean	Median	Mode	Min.	Max.
Average Total Cost Per Trip ($)	**281**	**105,872**	**376.8**	**248**	**300**	**20**	**3,000**
Sum of Itemized Costs ($)	281	82,258	292.7	200	150	20	2,410
Fuel Cost ($)	**272**	**44,238**	**162.6**	**120**	**100**	**12**	**750**
Oil Cost ($)	233	3,744	16.1	10	5	1	250
Sacks Cost ($)	47	2,734	58.2	30	10	2	400
Tags Cost ($)	206	4,816	23.4	12	10	1	525
Grocery Cost ($)	271	16,772	61.9	40	30	5	700
Launch Cost ($)	18	222	12.3	10	15	1	50
Other1 Cost ($)	60	7,565	126.1	20	12	3	1500
Other2 Cost ($)	20	2,057	102.9	23.5	5	5	997

Source: Louisiana Department of Wildlife and Fisheries and Louisiana Oystermen Association

Industry Overview: Profile of the dealer and processor sector

- Macro context
- Louisiana profile
- Profile of the fleet
- Profile of the dealer and processor sector
- Supply chain analysis
- Regulatory profile
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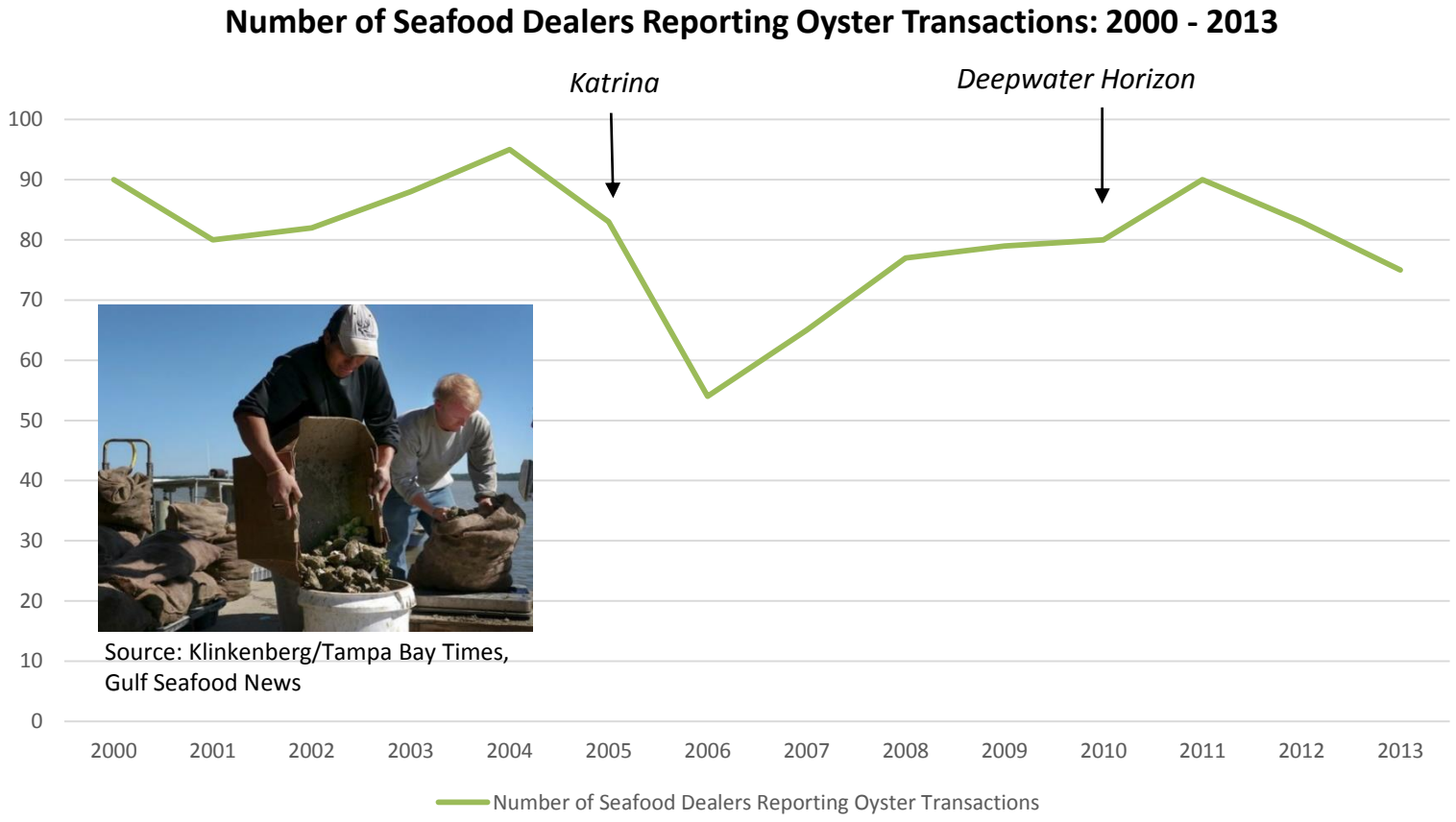
Louisiana Oysters

In recent years (2011-2013), the number of seafood dealers reporting oyster transactions has decreased from 90 to 75, or by 17%. This decline parallels the decline in active oyster harvester license holders reporting transactions and the number of dredge licenses in recent years. There may be opportunities for oyster harvesters to develop jointly-owned or vertically integrated business arrangements with oyster dealers to collectively improve profitability and resiliency.



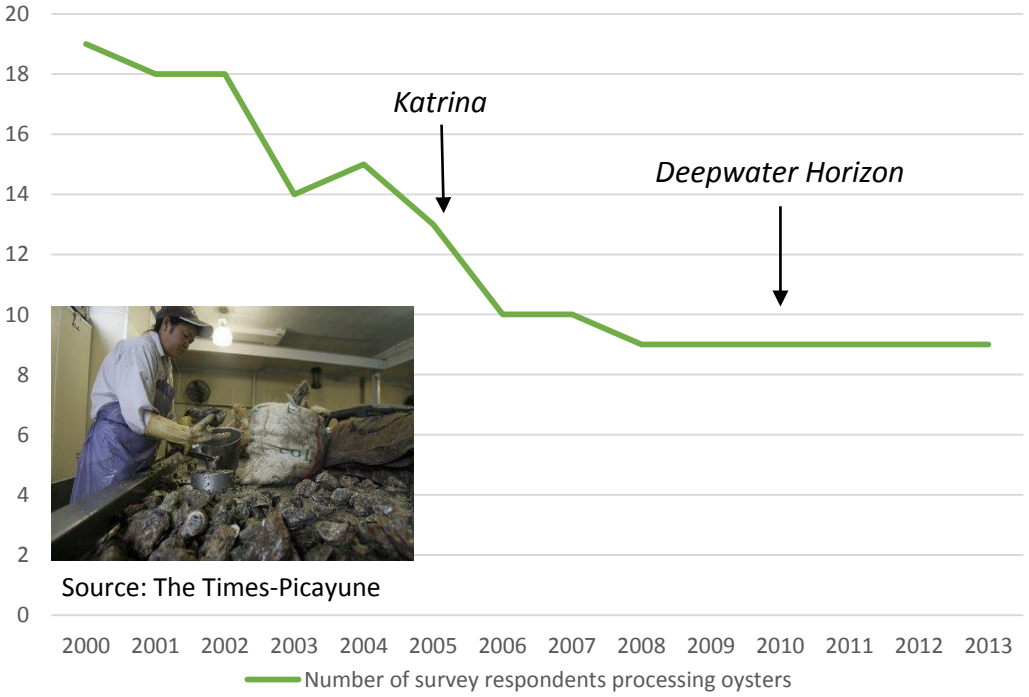
Source: Klinkenberg/Tampa Bay Times, Gulf Seafood News

Source: Louisiana Department of Wildlife and Fisheries

Louisiana Oysters

There may be opportunities for oyster harvesters to further develop mutually beneficial business relations with oyster processors outside of Louisiana. The number of seafood processors processing oysters in Louisiana has declined from 19 in 2000 to 9 in 2013 (a 53% decline) while processing in Alabama and Mississippi has grown. This shift is thought to be a result of the impact of hurricanes to infrastructure in Louisiana and processors wanting to be closer to the East Coast market.

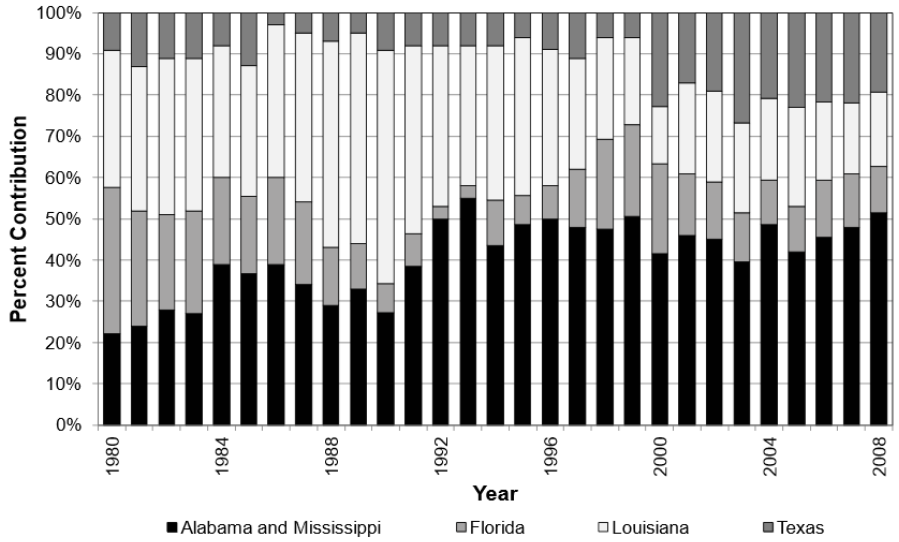
Number of NOAA Fisheries Processed Product Survey Respondents Processing Oysters in Louisiana: 2000 - 2013



Source: The Times-Picayune

Source: Louisiana Department of Wildlife and Fisheries, NOAA Fisheries

Share of Gulf oyster processing activities by state from 1980-2008

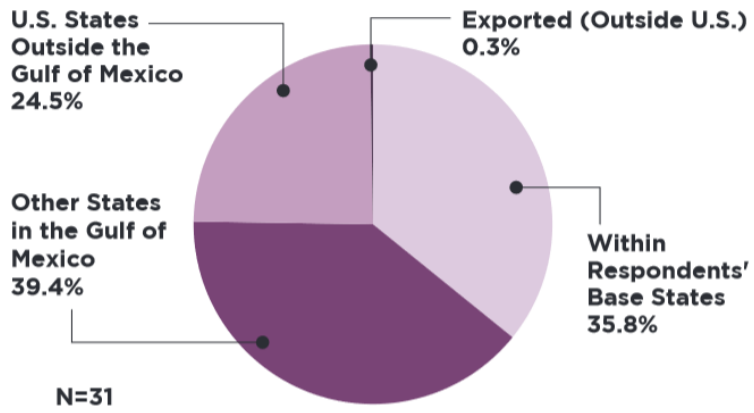


Source: Gulf States Marine Fisheries Commission

Louisiana Oysters

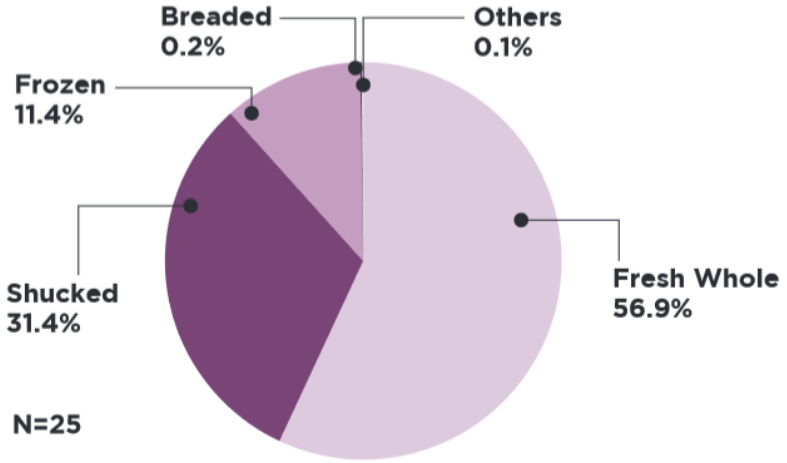
Oysters sold from processors in the Gulf states typically stay in the Gulf states with only about 25% of oyster processors shipping oysters outside of the five Gulf states. The product forms are typically fresh or whole (half shell), accounting for 57% of all oysters sold on average. Shucked or meat oysters are the second most common product form sold by oyster processors, accounting for 31% of oyster processor sales on average. Other oyster product forms include frozen oysters and breaded oysters.

There are opportunities to market and grow the demand for Louisiana oysters outside of the Gulf states. Marketing, branding, and producing a high-quality uniform oyster year-round that meets time and temperature requirements could help accomplish this. There are also opportunities for harvesters to work with processors and dealers to accomplish this.



PERCENTAGE OF OYSTER SALES DISTRIBUTED TO CUSTOMERS IN SPECIFIED GEOGRAPHIC AREAS

Source: Gulf States Marine Fisheries Commission



PERCENTAGE OF OYSTER SALES IN SPECIFIED FORMS

Source: Gulf States Marine Fisheries Commission

Industry Overview: Supply chain analysis

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Louisiana Oysters

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Oysters are sold to various components of the supply chain throughout the Gulf and the US. In 2013, there were about 700 oysters harvesters, 75 docks/dealers, and about 9 oyster processors in Louisiana. There may be opportunities to improve the business relationships throughout the supply chain that would also improve harvester profitability and resiliency.

Note: Dashed lines indicate less common channels.

Source: Miller

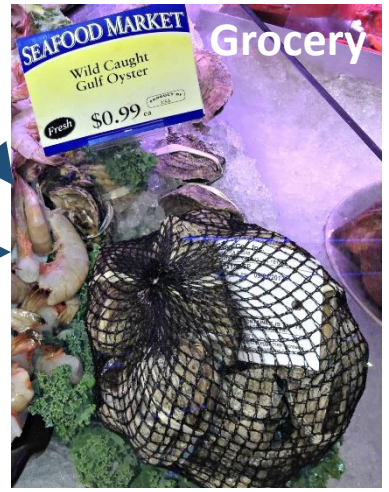
Consumers

Source: The Times-Picayune

Source: Wang

Source: Klinkenberg/Tampa Bay Times, Gulf Seafood News

Source: Wikipedia



Source: Miller

Export Market

Source: Gulf States Marine Fisheries Commission, Louisiana Department of Wildlife and Fisheries , Louisiana Oystermen Association

Source: Louisiana Direct Seafood

Fresh Products Dealer License

In some cases, oyster harvesters sell oysters directly to consumers via a fresh products dealer license. The license only covers the sale of a single oyster harvester's catch and not the catch of other harvesters. The license doesn't allow harvesters to sell to consumers located outside of Louisiana. Given the 700-800 harvesters from 2000-2013, there were only a few fresh product dealer license holders (~11) in Louisiana who reported having oyster transactions. The historical structure of the supply chain, time and temperature regulatory constraints, and the challenges for a harvester to market and sell their own oysters make the use of a fresh products license difficult. There may be opportunities for oyster harvesters to further develop direct sales to consumers in Louisiana given advancements in mechanical refrigeration, marketing resources, and oyster culture.

Source: Louisiana Department of Wildlife and Fisheries

Industry Overview: Regulatory profile

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Regulatory Profile

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Oyster harvesters are required to tag all oysters sold to market. The tags are colored-coded based on their intended use (and subsequently the price received) and the refrigeration required for each type of tag. Oysters destined for the half shell raw market (white tag oysters) receive a higher price than those intended for the green tag or shucked market. White tag oysters pose a challenge to harvesters as they are required to be under mechanical refrigeration within one hour from May to October. Further investments in mechanical refrigeration could improve the profitability of oyster harvesters and their ability to meet future changes in regulations.

White Tag

Description & Use

For raw consumption. During March to November, you MAY NOT also possess green tag oysters unless you follow white tag time / temperature requirements for all oysters.

Refrigeration Air Temperature

Less than or equal to 45° F.

Requirements

Months	Hours Until Refrigeration	Internal Meat Temperature
Dec, Jan, Feb	36	10 hrs to 55° F
Mar, Apr, Nov	8	10 hrs to 55° F
May - Oct	1	6 hrs to 55° F

Green Tag

Description & Use

Must be consumed fully cooked. For shucking or Post-Harvest Processing (PHP) ONLY. During March to November, you MAY NOT also possess white tag oysters unless you follow white tag time / temperature requirements for all oysters.

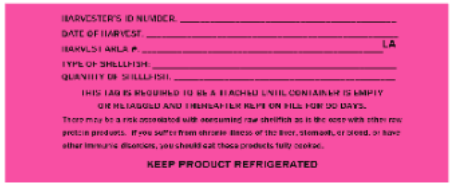
Refrigeration Air Temperature

Less than or equal to 45° F.

Requirements

Months	Hours Until Refrigeration	Internal Meat Temperature
Dec, Jan, Feb	24 hours	May not ship until internal temp. is 50° F or less, unless trip is under 4 hours. If temp. is not met, shipment can occur with a time / temp monitoring device.
Mar - May & Oct - Nov	18 Hours	
Jun - Sept	12 Hours	

Pink Tag



Description & Use

For use in Louisiana ONLY. Sacked, boxed, shucked, or frozen oysters with pink tags MAY NOT leave the state of Louisiana. MAY NOT possess white or green tag oysters during the same harvest period.

Refrigeration Air Temperature

Less than or equal to 45° F.

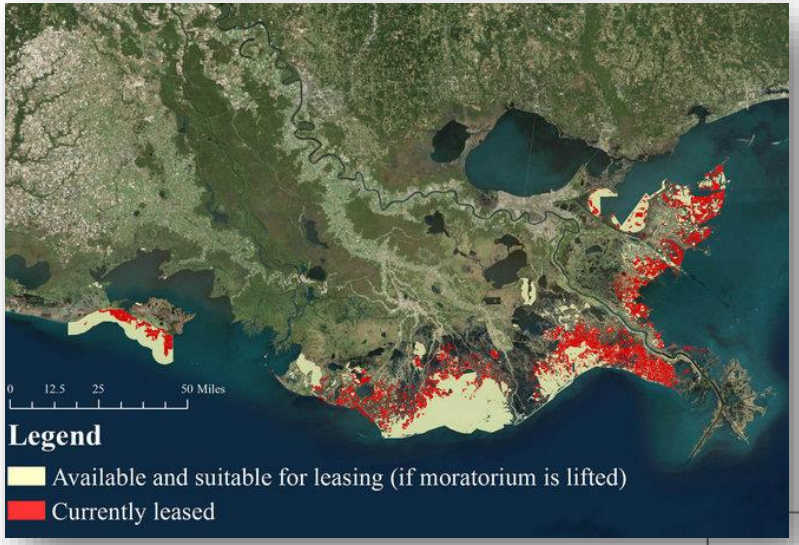
Requirements

Before leaving to fish pink tags, fishermen must call 800-442-2511 and press "0" for dispatch.

Months	Hours Until Refrigeration	Internal Meat Temperature
All	5	NONE

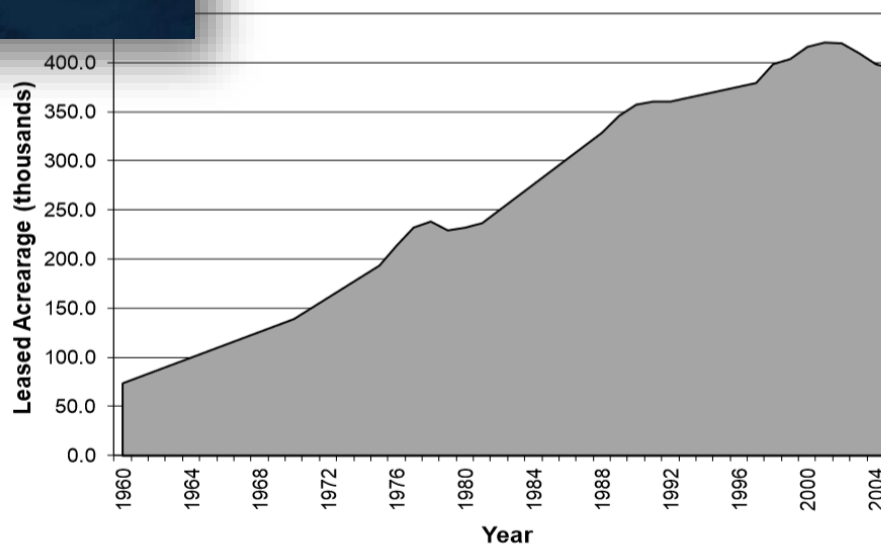
Source: Louisiana Department of Wildlife and Fisheries

Regulatory Profile



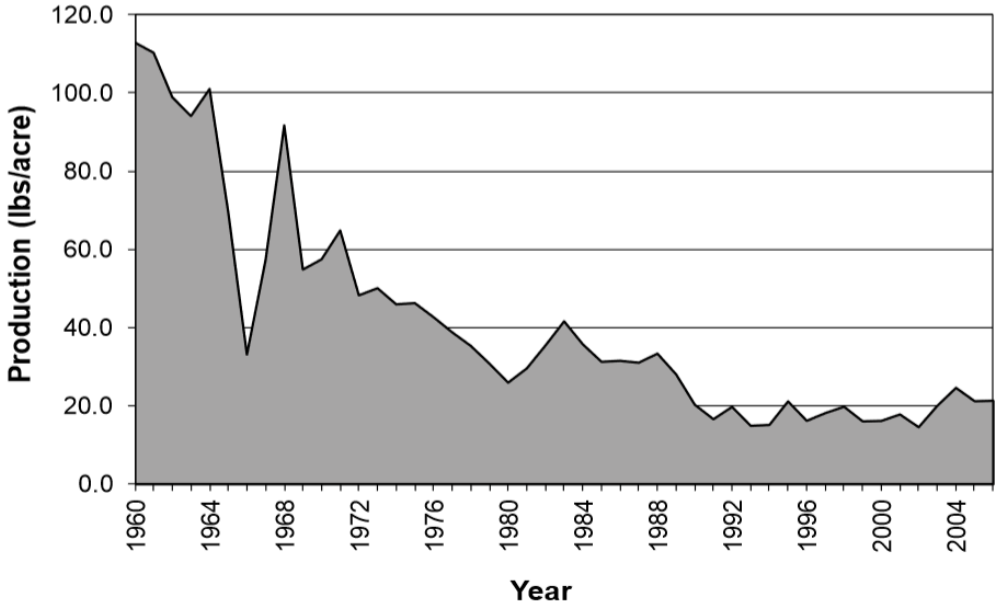
Source: The Times-Picayune,
Louisiana Legislative Auditor

There has been a significant increase in total leased (private) water-bottom acreage. However, production per acre from Louisiana oyster leases has significantly decreased. This considerable increase in leased bottom is likely a result of harvesters looking to receive compensation from non-oyster production, such as payments from oil and gas activities. Investments in alternative oyster culture may be forthcoming if additional leased bottom was permitted to allow alternative oyster aquaculture. Production may also increase if the moratorium on acquiring new private leased grounds was lifted. As ecological conditions (e.g. salinity) continue to change, diversifying oyster ground locations and culture techniques may allow harvesters to become more profitable and resilient.



Total leased water-bottom acreage (in thousands) for the production of oysters in Louisiana, 1960-2008.

Source: Gulf States Marine Fisheries Commission



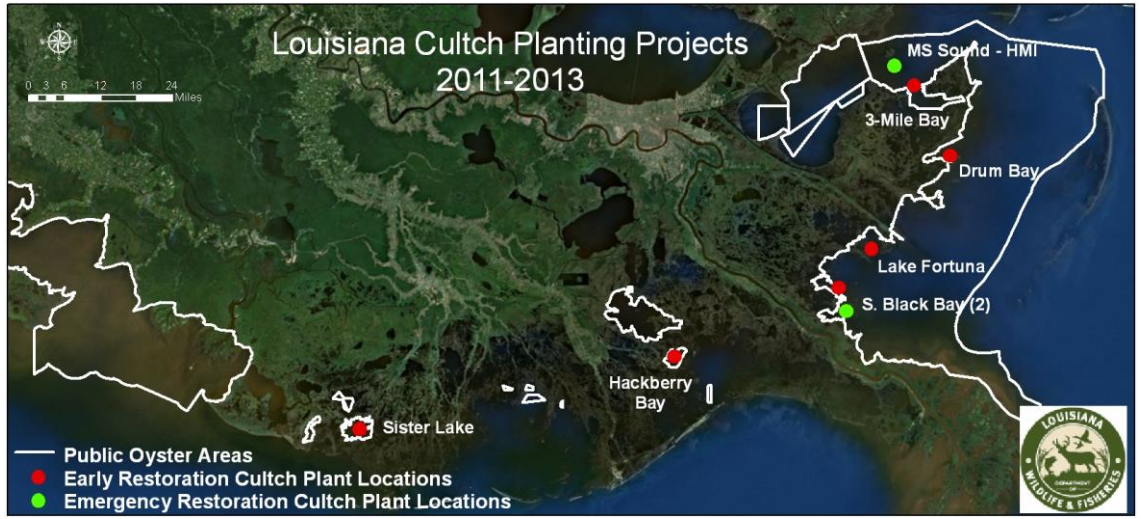
Production per acre from Louisiana oyster leases (lbs), 1960-2008.

Source: Gulf States Marine Fisheries Commission

Industry Overview: Ecological profile

- Macro context
- Louisiana profile
- Profile of the fleet
- Profile of the dealer and processor sector
- Supply chain analysis
- Regulatory profile
- Ecological profile

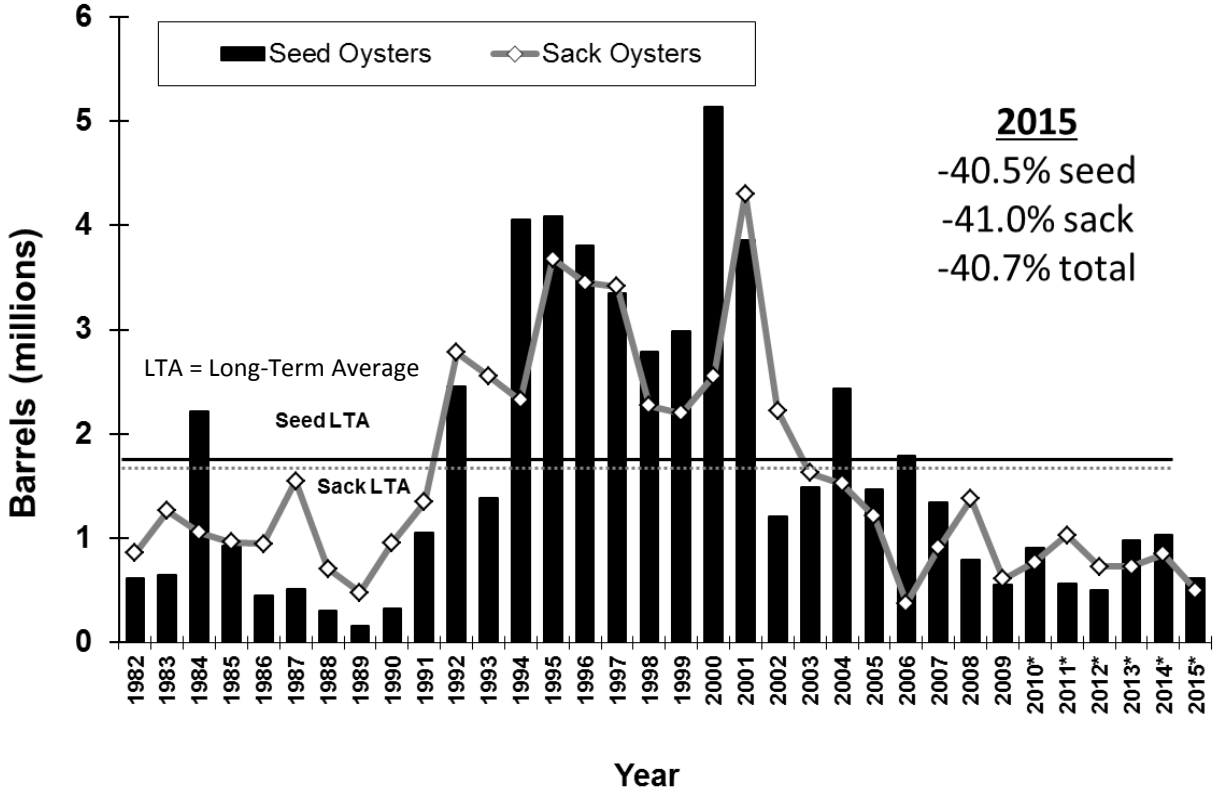
Ecological Profile



Source: Louisiana Department of Wildlife and Fisheries

Oyster stock assessments for public grounds in Louisiana continue to show declining seed and sack oyster estimates, well below the seed and sack oyster long-term average (LTA) estimates. This is likely a result of changing ecological conditions and the size and scope of investments in cultch materials on public grounds. There is an opportunity to invest in culture techniques (off- and on-bottom culture) where all aspects of production can be controlled. Investments in cultch materials for private leased grounds, where they can be continually maintained and enhanced, may also help increase production.

Louisiana Oyster Stock Assessment Results for Public Grounds



NOTE:1994-2004 includes CSA I data revision
* 2010 to present data includes Sabine Lake data.

Source: Louisiana Department of Wildlife and Fisheries

Ecological Profile

Freshwater intrusions are a significant challenge to sustaining robust oyster populations. Oyster harvesters have an opportunity to become more resilient and profitable by investing in business models where all aspects of production can be controlled and oysters can be relocated in times of freshwater intrusions or disasters.

Salinity, or the salt content of the water, is important to the lifecycle of oysters in Louisiana. When salinity drops to low levels (e.g. around 10ppt), the food supply for oysters dies, thus impacting the oyster population. In 2010, freshwater diversions were used to keep oil out of the bayous in Louisiana. In 2011, the Bonnet Carre Spillway opened to divert the Mississippi river flood, again sending millions of gallons of freshwater over immobile, rich oyster grounds.

The Bonnet Carre Spillway merges with the fresh water from the Mississippi river on May 16, 2011.

Source: The Times-Picayune

Ecological Profile

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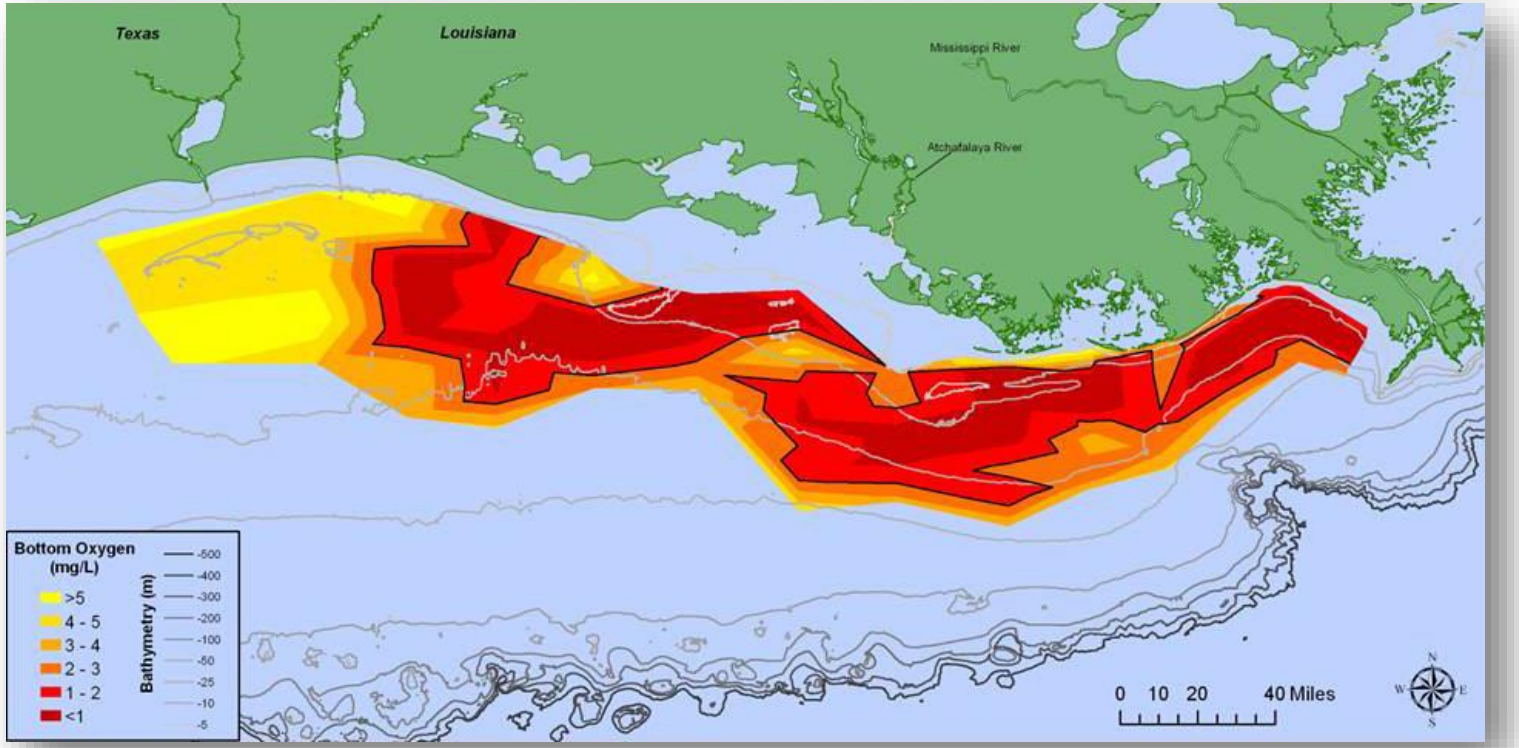
Low oxygen levels, as a result of the Gulf dead zone for example, also present a challenge to sustaining robust oyster populations. In 2015, the Gulf dead zone was above average, representing 6,474 square miles. Oyster harvesters have an opportunity to increase oyster production by investing in advanced business models that allow oysters to be moved in times of low oxygen, etc. In turn, oyster harvesters will be better equipped to manage risks such as low oxygen and similar ecological challenges going forward.



Source: NOAA

"If you get a dead zone over your bed, it'll wipe you out. You'll see the water is a brownish color or there's algae on top. Maybe you'll see some fish floating on the water or dead crabs. When you start to see some dead oysters, you get out."

-John Tesvich

Source: National Geographic

Part 2: Advanced Business Models—Introduction

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- The overall objective of this project was to identify advanced business models that offer Louisiana oyster harvesters an opportunity to improve their resiliency and that TruFund Financial Services could help the industry adopt with financial products and educational/business resources.
- The main methods of identifying and evaluating such business models were interviews, a review of existing models, and a review of advanced business models used in other shellfish/oyster fisheries in the United States.
- Advanced business models were evaluated based on the following criteria: feasibility of implementation, scalability, competitive advantage (impact on profits), affordability, market conditions, ecological conditions, regulatory environment (likelihood of success), harvester enthusiasm, resiliency enhancement (risk management), current initiatives in Louisiana, proven success (or lack thereof) elsewhere, and the role for TruFund Financial Services (loan product suitability).

Advanced Business Models—Identified Potential Options

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1. Onboard Mechanical Refrigeration

2. On-Bottom Remote Setting (Spat-on-shell)

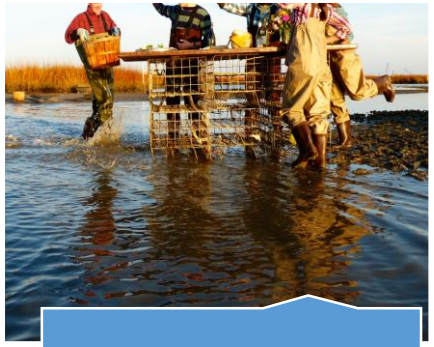
3. Cultch / Bedding Material

4. Off-bottom Culture

5. Geographic Branding and Direct Marketing

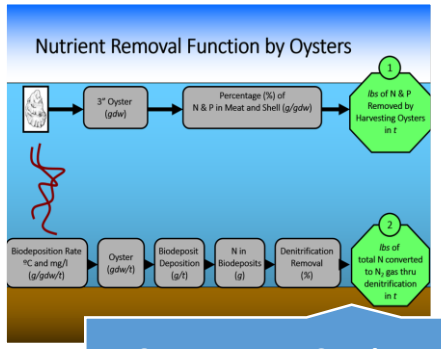
6. Improved Standards and Quality Assurance

7. Alternative Species: Clams



8. Agri/Ecotourism

9. Cooperatives



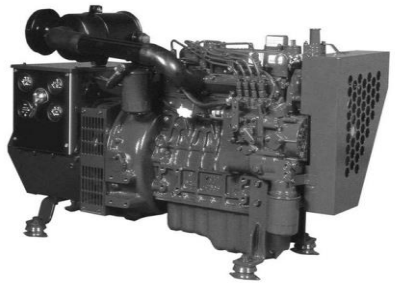
10. Ecosystem Services: Nutrient (N) Removal

Source: 1) Magic-Pak, 2) Virginia Institute of Marine Science, 3) The Times-Picayune, 4) Bay Journal, 5) Motivatit Seafoods, 6) Gulf States Marine Fisheries Commission, 7) Louisiana Sea Grant, 8) Pleasure House Oysters, 9) Ocean State Shellfish Cooperative, 10) Virginia Tech/Miller

1. Onboard Mechanical Refrigeration

- ✓ Onboard mechanical refrigeration provides an opportunity for oyster vessel owners/harvesters to more easily meet regulatory time and temperature requirements and produce/sell a higher quality and consistent product that can result in a higher price and demand. With only 37 applicants reimbursed through the LWDF oyster refrigeration program, there are still a lot of opportunities for additional vessels to install mechanical refrigeration equipment.

- ➢ **Suggested Resources:** Next Generation Power sells marine generators used to power condenser and refrigeration units, and Magic-Pack sells condensers and refrigeration components. LeBlanc and Associates also sells and installs refrigeration equipment.



Source: Next Generation Power

Source: Magic-Pak

Source: LeBlanc and Associates

LDWF Oyster Refrigeration Program

- ➢ In 2012, LDWF provided financial assistance to oyster harvesting vessel owners to upgrade or install refrigeration equipment needed to meet post-harvest time and temperature requirements and help produce higher quality products. Compliance with regulations included those of the Food and Drug Administration (FDA). The program also better positioned vessel owners to participate in the Louisiana Wild Seafood Certification Program. Eligible equipment included insulated cooler boxes, generators, and refrigeration units.
- ➢ During the program, 37 applicants were reimbursed for their costs to install or upgrade onboard mechanical refrigeration equipment.
- ➢ The smallest vessel that received funding was 38 feet, and the average reimbursed amount was $8,400.

Source: Louisiana Department of Wildlife and Fisheries

1. Onboard Mechanical Refrigeration

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Concept: With regulations requiring oysters to be refrigerated within one hour of harvest from May to October, non-mechanical refrigeration and delayed shore-based refrigeration are costly and impede operating an efficient and profitable business model because of the down time and fuel costs to transport oysters. Mechanical refrigeration onboard oyster harvesting vessels allows oyster harvesters to meet this requirement, pass inspections, and deliver a high-quality product.

Feasibility of Implementation: Feasibility of installing onboard refrigeration units on oyster harvesting vessels depends on the size of the vessel and vessel configuration. It may be challenging to install onboard mechanical refrigeration on vessels less than 38 feet in length.

Scalability: Could be installed on any vessel that could handle and support onboard refrigeration units.

Competitive Advantage (Impact on Profits): Ensuring compliance with time and temperature requirements for handling oysters is critical to the profitability of the oyster harvesting business. Refrigeration also reduces risk and can help deliver a quality and consistent product.

Affordability: The cost to install onboard mechanical refrigeration units averages about $8,400 based on experiences with LDWF.

Market Conditions: The demand for a consistent and high-quality oyster that meets time and temperature requirements is high.

Ecological Conditions: No reliance on ecological conditions is needed.

Regulatory Environment (Likelihood of Success): There are no regulatory hurdles to implementing onboard refrigeration. Onboard refrigeration will assist in meeting current time and temperature regulations.

Harvester Enthusiasm: There is a lot of interest from oyster harvesters to install onboard refrigeration equipment. Harvesters and the industry have also been interested in developing vessels with mechanical refrigeration for the sole purpose of holding and transporting refrigerated oysters. Some vessels may not be suited for mechanical refrigeration due to their size. During the 2012 LDWF oyster refrigeration program, 37 applicants were reimbursed for installing onboard refrigeration units.

Resiliency Enhancement (Risk Management): Utilizing onboard refrigeration would improve the resiliency of oyster harvesters, allowing them to meet time and temperature requirements and deliver a high-quality and consistent product to the market.

Current Initiatives in Louisiana: In 2012, LDWF organized and sponsored an oyster refrigeration program where 37 eligible participants were reimbursed for installation of onboard refrigeration equipment.

Proven success (or lack thereof) elsewhere: There are oyster vessels in Texas and New England that use onboard mechanical refrigeration.

Role for TruFund (Loan Product Suitability): TruFund is well positioned to provide a loan product to oyster harvesters for the installation of onboard refrigeration equipment. There are also opportunities for TruFund to partner with organizations such as the Louisiana Department of Wildlife and Fisheries and Louisiana Sea Grant.

2. On-Bottom Remote Setting (Spat-on-shell)

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- ✓ The use of on-bottom remote setting provides an opportunity for oyster harvesters to overcome the challenges with relying on seed from public grounds. The combined use of triploid oysters also provides an advantage to historical oyster production in Louisiana, and the new hatchery in Grand Isle is well-positioned to produce these triploids. The hatchery can also supply significant quantities of diploid larvae. Challenges related to access to shell, infrastructure, saline water (for spat set) still need to be overcome, however.

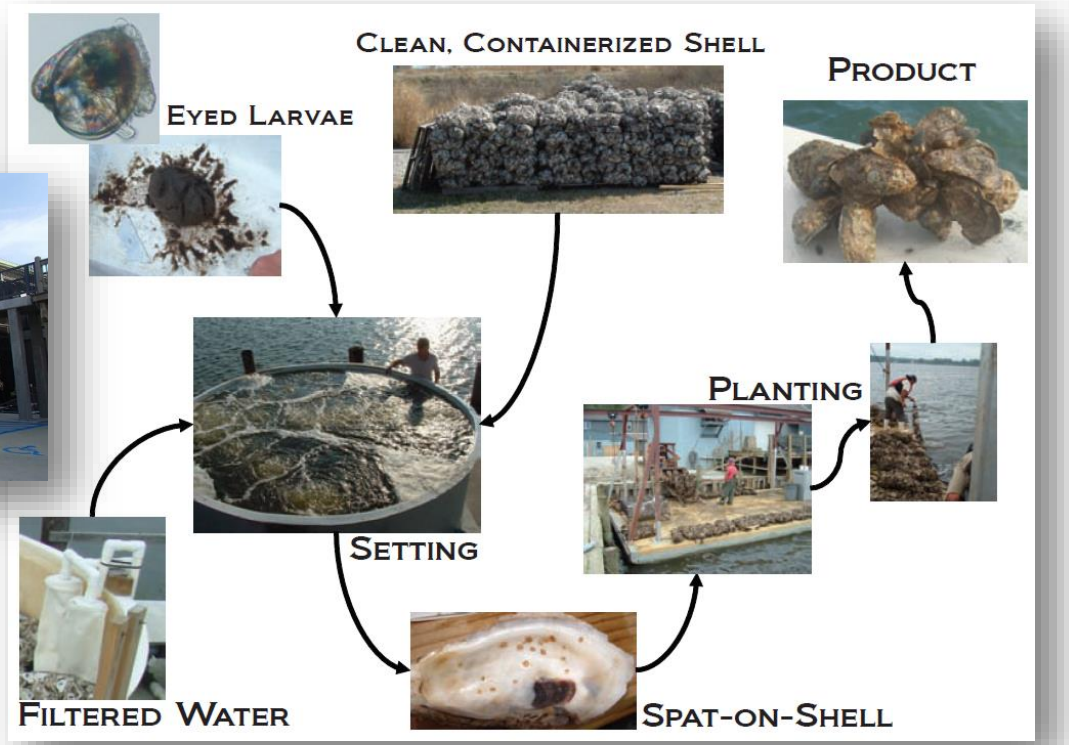
Source: Louisiana Sea Grant

Diploid | Triploid

"Normal" diploid oysters have two sets of chromosomes, while triploids have three and are sexually sterile. Without having to put energy into reproduction, triploids can put energy into growth. This is especially the case from June to November when diploids are expending energy to spawn and triploids are putting energy into growth, which creates a meaty and plump oyster for summer/fall months when "normal" diploids are less meaty. Triploids also grow faster and are more disease resistant and can outgrow disease.

Grand Isle Oyster Hatchery

Source: The Times-Picayune



Source: Virginia Institute of Marine Science

Suggested Resources:

- Using Remote Setting to Produce Seed Oysters in Louisiana and the Gulf Coastal Region
- A Practical Manual for Remote Setting in Virginia
- Oyster Research Lab | Louisiana Sea Grant

2. On-Bottom Remote Setting (Spat-on-shell)

TruFund FINANCIAL SERVICES
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Concept: Because public grounds have poor oyster populations to seed and enrich private lease grounds oyster harvesters would become more resilient and profitable if they produced spat-on-shell remotely and planted them on private lease grounds.

Feasibility of Implementation: It is feasible for oyster harvesters to "spat" oysters and plant spat-on-shell using diploid and triploid oysters. There are current challenges however with acquiring shell and where the infrastructure is located in order to "set" or attach larvae to oyster shell given the salinity requirements needed for this approach.

Scalability: If the equipment and infrastructure were in place, this advanced business model could be scaled throughout Louisiana, as it was in other parts of the country such as Virginia. Access to shell and private bottom with good ecological conditions (e.g. salinity) may be a challenge.

Competitive Advantage (Impact on Profits): By placing less reliance on seed from public grounds and utilizing the benefits of triploid oysters, remote setting technologies could allow businesses to be far more competitive than the traditional approach to oyster production in Louisiana by providing a more consistent production/supply and a meaty oyster year round.

Affordability: The cost for a remote setting facility can run from $3,000 to $14,000. Operating costs can run from about $19 -$22 a bushel.

Conditions: The market conditions are good to supply oysters from on-bottom remote setting technologies. Particularly the ability to supply triploid oysters in the summer when the meat yield remains high compared to wild diploid oysters.

Ecological Conditions: The success of this advanced model is dependent on the ecological conditions of where oysters are "spatted" and where they are grown, as the salinity of the water is critical to a successful harvest.

Regulatory Environment (Likelihood of Success): If the business is using a non-containerized approach to on-bottom remote setting, the current regulatory environment is favorable to this advanced business model assuming the business has access to private bottom. The current moratorium on accruing new private bottom may present challenges.

Harvester Enthusiasm: Remote setting approaches are on the rise in other regions, and harvesters in Louisiana have shown a lot of interest in this approach. There are currently no oyster harvesters utilizing on-bottom remote setting approaches to advance their businesses in Louisiana, however.

Resiliency Enhancement (Risk Management): Using a spat-on-shell approach with triploids greatly improves the resiliency of the business as the business isn't reliant on public ground seed, and triploids are more disease resistant and can supply a higher yield oyster during summer months.

Current Initiatives in Louisiana: Spat-on-shell technologies continue to advance in Louisiana with the opening of an oyster hatchery and research into using salted seawater for spat-on-shell.

Proven success (or lack thereof) elsewhere: There have been significant investments in on-bottom remote setting using diploids and triploids in the Chesapeake Bay. The success of these investments has varied given challenges with predation, for example.

Role for TruFund (Loan Product Suitability): TruFund could provide loans to support investments in on-bottom remote setting. Loans could cover the costs of shell, tanks, pumps, plumbing, air blowers, shell washers, vessel modification, etc. Educational resources and assistance with business planning could also be offered by TruFund.

3. Cultch / Bedding Material

TruFund FINANCIAL SERVICES
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- ✓ Given the limited availability of seed from public oyster grounds, traditional methods of transferring seed oysters from public grounds to private grounds have been challenging. Oyster harvesters have an opportunity to advance their businesses by planting and investing in their own cultch and bedding material. While there are challenges with this approach, such as immobility of planted material in the time of disasters and ecological change (e.g. salinity), it provides an advancement from the status quo approach.

- ✓ The three main cultch and bedding materials are crushed concrete, limestone, and oyster shells. In 2003 oyster shells were the lowest cost per cubic yard; however, concrete had the highest seed oyster per dollar.

Seed Oysters per Dollar: Three Cultch Materials (2003 Prices)				
Row		Crushed Concrete	Crushed Limestone	Crushed Oyster Shell
1	Average Seed Oysters per 0.33 in^2 Sampling Portion	141.2	103.6	28.8
2	Seed Oysters per Test Plot (6,070.3095 x Row 1)	869,268.3	628,884.1	174,825
3	Cost per Cubic Yard (Low Cost Estimate 2003)	$38.71	$39.71	$35.71
4	Cost per Test Plot (66.6 x Row 3)	$2,578.09	$2,644.69	$2,378.29
5	Seed Oysters/Dollar (Row 2)/(Row 4)	337.18	237.79	73.09

Source: Louisiana Department of Wildlife and Fisheries

Suggested Resource: Louisiana's Oyster Shell Recovery Pilot Project

Concrete

Source: The Times-Picayune

Limestone

Source: The Times-Picayune

Oyster Shells

Source: The Advocate

3. Cultch / Bedding Material

Concept: Investing in cultch or bedding material to enhance private oyster bottom can be profitable given robust ecological conditions. With a decline in seed oysters on Louisiana public grounds and the historical approach of harvesting seed oysters and planting them on private grounds, investments in cultch/bedding material on private grounds can help ensure a consistent supply of oysters to harvest and sell to the market.

Feasibility of Implementation: This approach is working in Louisiana and other Gulf states and is dependent on ecological conditions.

Scalability: Possible for any oyster harvester with a large enough vessel and private lease ground.

Competitive Advantage (Impact on Profits): Given the right ecological conditions, production and harvest can increase and positively impact profits.

Affordability: Cultch materials average around $30 per cubic yard with average plantings of around 2,000 – 3,000 cubic yards.

Market Conditions: The demand for oysters in the US continues to grow and the market is strong for half-shell fresh oysters.

Ecological Conditions: Proper salinity, limited predators, and good oxygen conditions are necessary and are perhaps the most limiting factors. These conditions vary throughout Louisiana.

Regulatory Environment (Likelihood of Success): The regulatory environment is favorable to oyster harvesters improving their private lease grounds with additional cultch and bedding material.

Harvester Enthusiasm: Harvesters are familiar with the practice of enriching their grounds with cultch material and seem interested to make further investments in cultch and bedding material but are sometimes reluctant because of the expense.

Resiliency Enhancement (Risk Management): With limited seed availability from public grounds, investments in cultch and bedding material would enhance harvester production for years to come given good ecological conditions. Future natural and manmade disasters would be challenging to mitigate against with this approach, however.

Current Initiatives in Louisiana: Harvesters are currently enriching their private grounds with cultch and bedding material with success typically dependent on ecological conditions.

Proven success (or lack thereof) elsewhere: Cultch and bedding materials have been used extensively in areas such as the Chesapeake Bay with success dependent on ecological conditions, predation, and disease.

Role for TruFund (Loan Product Suitability): There are opportunities for TruFund to offer a loan product to assist harvesters with making investments in cultch and bedding material such as purchasing crushed concrete, limestone, and oyster shells. Loans could also be made to purchase or retrofit vessels.

4. Off-bottom Culture

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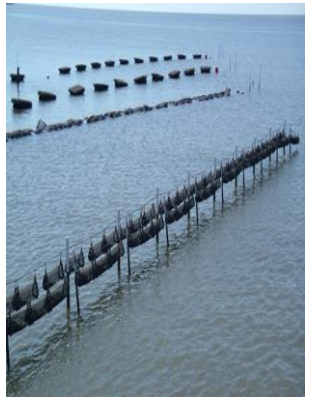
- ✓ While there are regulatory and permitting challenges, off-bottom culture of oysters offers an opportunity for traditional oyster harvesters to move to an advanced business model where nearly all aspects of production can be controlled, thus greatly mitigating ecological and natural and manmade disasters. As with on-bottom remote setting, triploid oysters can also be utilized. Four primary off-bottom culture techniques are **1) the Australian long-line system, 2) off-bottom cages, 3) the floating cage system, and 4) floating bags**.



- ✓ The **Australian long-line system** consists of suspending oysters in baskets in an in-line configuration.

Suggested Resources:

- ***Australian Long-line System***
- ***Off-bottom culture in the Gulf of Mexico***

Source: Auburn / MS/AL Sea Grant

Australian Long-line System

Sample Budget & Income for ALS Oyster Farm

ONE RUN	YR 1	YR 2	YR 3	YR 4	YR 5	TOTAL
Amortized Gear Cost	$957	$957	$957	$957	$957	$4,781
# Oysters Stocked	15,000	15,000	15,000	15,000	15,000	75,000
# To Market	13,500	13,500	13,500	13,500	13,500	67,500
Sale Price (per oyster)	$0.35	$0.35	$0.35	$0.35	$0.35	
Labor Cost	$1,415	$1,415	$1,415	$1,415	$1,415	$7,075
Seed Cost	$600	$600	$600	$600	$600	$2,250
Harvest Tag Cost	$17	$17	$17	$17	$17	$85
Maintenance Equipment Cost	$60	$135	$135	$135	$135	$600
GROSS per run	$4,725	$4,725	$4,725	$4,725	$4,725	$23,625
NET per run	$1,676	$1,601	$1,601	$1,601	$1,601	$8,081
Gross Margin (%)	35.5	33.9	33.9	33.9	33.9	
Production Cost (per oyster)	$0.23	$0.23	$0.23	$0.23	$0.23	
1-ACRE FARM						
# of runs (per acre)	8	8	8	8	8	
Total expense (per acre)	$23,970	$24,045	$24,045	$24,045	$24,045	$120,152
Potential annual net income (per acre)	$13,409	$12,809	$12,809	$12,809	$12,809	$64,648

Pros	Cons
Easy handling and inventory control	Limited to shallow water (≤6 ft)
Ability to adjust growing position throughout the water column	Pilings and pipes in the water that extend above the water line
Oysters get naturally tumbled with baskets in in-line configuration	Heavy equipment needed for installing pilings
Fouling on oysters and baskets addressed with routine air-drying	Gear installation more labor intensive than other gear types
Automated grading and loading equipment available	

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- ✓ Another option for off-bottom culture is placing oysters into cages raised slightly off the bottom, called **off-bottom cages**. A float identifies the location, and cages are lifted out of the water using a davit via a barge or vessel.

Source: Bay Journal

Source: Auburn / MS/AL Sea Grant

Suggested Resources:

- ***Bottom Cages on the Gulf Coast***
- ***Cultchless (Single seed) Oyster Crop Budgets for Virginia***
- ***Bottom cage oyster farming in Chesapeake Bay***

Off-Bottom Cages

Sample Budget & Income for Off-Bottom Cage Oyster Farm

ONE RUN	YR 1	YR 2	YR 3	YR 4	YR 5	TOTAL
Amortized Gear Cost	$1,385	$1,385	$1,385	$1,385	$1,385	$6,924
# Oysters Stocked	24,000	24,000	24,000	24,000	24,000	
# To Market	12,000	12,000	12,000	12,000	12,000	
Sale Price (per oyster)	$0.35	$0.35	$0.35	$0.35	$0.35	
Labor Cost	$1,300	$1,300	$1,300	$1,300	$1,300	$6,500
Seed Cost	$960	$960	$960	$960	$960	$4,800
Harvest Tag Cost	$27	$27	$27	$27	$27	$135
Maintenance Equipment Cost	$295	$295	$295	$295	$295	$1,475
GROSS per run	$4,200	$4,200	$4,200	$4,200	$4,200	$21,000
NET per run	$278	$278	$278	$278	$278	$1,388
Gross Margin (%)	5.88	5.88	5.88	5.88	5.88	
Production Cost (per oyster)	$0.33	$0.33	$0.33	$0.33	$0.33	
1-ACRE FARM						
# of runs (per acre)	8	8	8	8	8	
Total expense (per acre)	$29,574	$29,574	$29,574	$29,574	$29,574	$147,870
Potential annual net income (per acre)	$2,221	$2,221	$2,221	$2,221	$2,221	$11,106

Pros	Cons
Cage concept (i.e. crab pot) familiar to local residents	Davit necessary for lifting cages out of the water
Only a small marker buoy on the water's surface	No frequent air-drying method
	Pressure washing of cage is the only way to control fouling
	Cages close to bottom-dwelling predators (i.e. oyster drills)

Source: Auburn / MS/AL Sea Grant

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- ✓ The **floating cage system** is similar to the off-bottom cage technique, but instead of sitting slightly off the bottom, the cages are floating on the surface of the water.

Source: Auburn / MS/AL Sea Grant

Suggested Resource:
Floating Cage System

Floating Cage System

Sample Budget & Income for 6-Bag FCS Oyster Farm

ONE RUN	YR 1	YR 2	YR 3	YR 4	YR 5	TOTAL
Amortized Gear Cost	$905	$905	$905	$905	$905	$4,527
# Oysters Stocked	18,000	18,000	18,000	18,000	18,000	90,000
# To Market	16,200	16,200	16,200	16,200	16,200	81,000
Sale Price (per oyster)	$0.35	$0.35	$0.35	$0.35	$0.35	
Labor Cost	$1,415	$1,415	$1,415	$1,415	$1,415	$7,075
Seed Cost	$720	$720	$720	$720	$720	$3,600
Harvest Tag Cost	$20	$20	$20	$20	$20	$101
Maintenance Equipment Cost	$60	$135	$135	$135	$135	$600
GROSS per run	$5,670	$5,670	$5,670	$5,670	$5,670	$28,350
NET per run	$2,121	$2,058	$2,058	$2,058	$2,058	$10,355
Gross Margin (%)	44.9	43.6	43.6	43.6	43.6	
Production Cost (per oyster)	$0.19	$0.20	$0.20	$0.20	$0.20	
1-ACRE FARM						
# of runs (per acre)	5	5	5	5	5	
Total expense (per acre)	$15,363	$15,438	$15,438	$15,438	$15,438	$77,116
Potential annual net income (per acre)	$10,605	$10,290	$10,290	$10,290	$10,290	$51,765

Pros	Cons
Adaptable to variety of water depths	Fewer runs per acre due to allowance for scope on long-line
Cages are easily transported by floating once in the water	Two people needed to flip cages for routine air drying
Fouling on oysters & baskets addressed with routine desiccation	Reliant on air-filled pontoons which could be punctured
Can be sunk in place in preparation for hurricanes & returned to floating position afterwards	

Source: Auburn / MS/AL Sea Grant

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- ✓ The fourth and final off-bottom culture technique, referred to as the **floating bags** method, floats oysters in bags on the surface of the water.

Source: Auburn / MS/AL Sea Grant

Suggested Resource:
Floating Bags

Floating Bags

Sample Budget & Income for Floating Bag Oyster Farm

ONE RUN	YR 1	YR 2	YR 3	YR 4	TOTAL
Amortized Gear Cost	$1,000	$1,000	$1,000	$1,000	$4,001
# Oysters Stocked	30,000	30,000	30,000	30,000	
# To Market	27,000	27,000	27,000	27,000	
Sale Price (per oyster)	$0.35	$0.35	$0.35	$0.35	
Labor Cost	$708	$708	$708	$708	$2,832
Seed Cost	$1,200	$1,200	$1,200	$1,200	$4,800
Harvest Tag Cost	$34	$34	$34	$34	$135
Maintenance Equipment Cost	$60	$135	$135	$135	$465
GROSS per run	$9,450	$9,450	$9,450	$9,450	$37,800
NET per run	$3,207	$3,170	$3,170	$3,170	$12,716
Gross Margin (%)	67.9	67.1	67.1	67.1	
Production Cost (per oyster)	$0.11	$0.12	$0.12	$0.12	
1-ACRE FARM					
# of runs (per acre)	5	5	5	5	
Total expense (per acre)	$14,770	$14,845	$14,845	$14,845	$59,305
Potential annual net income (per acre)	$16,035	$15,850	$15,850	$15,850	$63,585

Pros	Cons
Many configuration options	Materials less durable than other gear types (4 year depreciation vs. 5 years for other gear types)
Due to growing position at water's surface oysters are naturally tumbled	No in-water hurricane plan for sites <8' deep
Many different suppliers for bags	Only fouling on gear is addressed with routine air drying; oysters remain submerged

Source: Auburn / MS/AL Sea Grant

4. Off-bottom Culture

Concept: Historical methods of oyster production and harvest are hard to control and are more susceptible to inconsistency and disasters, and the premium half shell market is demanding a consistent, uniform, and deep-cupped, high-quality oyster with unique flavor profiles and a "story". Off-bottom culture (e.g. oysters produced in a cage) offers a means to produce this type of oyster and improve the resiliency and profitability of oyster production in Louisiana.

Feasibility of Implementation: It is currently feasible for oyster harvesters to make investments in off-bottom oyster culture as the technology and science currently exists and has been well demonstrated in other regions of the United States.

Scalability: Off-bottom oyster culture could be scaled given advancements in access to seed, eligible oyster culture ground, and the permitting process related to alternative oyster culture areas. Theft is also a challenge that needs to be overcome.

Competitive Advantage (Impact on Profits): Oysters produced via off-bottom culture offers a unique competitive advantage over traditional production techniques in Louisiana, as nearly every aspect of production can be controlled to produce a consistent and high-quality oyster year-round.

Affordability: The fixed and operating costs for off-bottom culture ranges from about $75,000 - $250,000 in total or about $25,000 to $30,000 an acre. Labor costs are viewed by harvesters as a challenge.

Market Conditions: The demand for single oysters with good length, cup, and fan continue to increase and can command a premium price ($1 plus at retail).

Ecological Conditions: Ecological conditions (e.g. salinity) are critical to the production of oysters using off-bottom culture. If bottom is available (owned), off-bottom culture (e.g. cages, bags, floats) allows oysters to be moved to locations where ecological conditions are optimal.

Regulatory Environment (Likelihood of Success): The State of Louisiana has identified certain areas of private leased oyster grounds as suitable for Alternative Oyster Culture (AOC). The amount of eligible grounds for AOC is limited, and the process to obtain an AOC permit is challenging and can take a lot of time.

Harvester Enthusiasm: Interest in off-bottom culture is growing but is still limited among harvesters. Challenges with investment costs, labor costs, obtaining seed, overcoming the regulatory and permitting aspects, and theft have deterred businesses from adopting this approach.

Resiliency Enhancement (Risk Management): With the ability to control the entire production process, off-bottom culture can significantly enhance the resiliency of oyster harvesters.

Current Initiatives in Louisiana: There are currently three off-bottom culture businesses operating in Louisiana.

Proven success (or lack thereof) elsewhere: The Chesapeake Bay, East Coast, and West Coast have experienced success using off-bottom culture. In Alabama, investments in off-bottom culture have grown to 13 commercial private businesses farming oysters, of which only two were previously traditional oyster harvesters and six had previously worked in the commercial seafood industry.

Role for TruFund (Loan Product Suitability): Oyster harvesters and others in Louisiana would benefit from having a loan product available to make investments in off-bottom oyster culture. Loans could be made to cover the cost of equipment such as cages or floats, vessels/barges, legal/permitting, upwellers, sorters, etc. TruFund could also assist with education and permitting.

5. Geographic Branding and Direct Marketing

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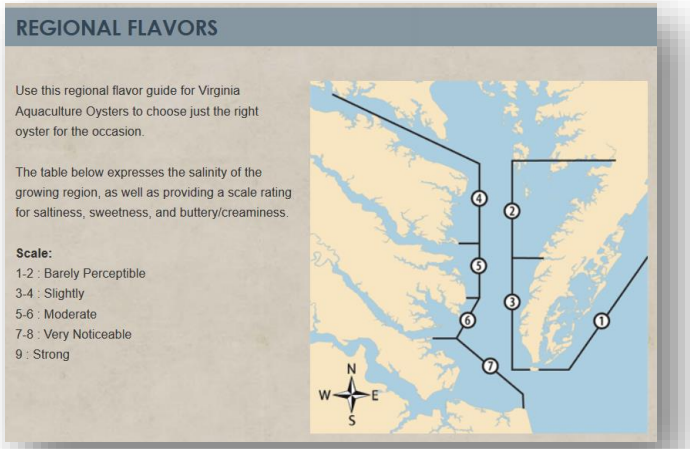
- ✓ Oyster harvesters can advance their business by working with dealers and processors, etc., or individually, to develop a geographic brand for their oysters or advance an existing brand. There are currently a few geographic brands in use today in the Gulf at both the processor and farm/harvest levels.

Source: Motivatit Seafoods

Source: Murder Point Oysters

Source: Gulf Seafood News

- ✓ Regions such as the Chesapeake Bay and Puget Sound are capitalizing on the benefits of geographic branding of oysters based on different flavor profiles and "the story."



Source: Virginia Aquaculture Oyster Growers

Source: The Oyster Guide

- ✓ Combining the benefits of geographic branding with direct marketing can further enhance the consumer experience and demand for oysters by retailers, restaurants, and consumers.

Source: Louisiana Direct Seafood

5. Geographic Branding and Direct Marketing

Concept: Louisiana oysters have a unique opportunity to be branded and differentiated by harvesting/culturing regions, and can be communicated to customers and consumers who are eager for the "story". Differentiating oysters reduces their substitutability and can improve the resiliency of the businesses. There are also opportunities to direct market oysters to consumers, retailers, and restaurants using geographic brands and stories.

Feasibility of Implementation: Geographic branding could be expanded via current relationships with dealers or processors, or independently. It is also feasible to diversify a harvesting business by direct marketing a brand to restaurants and consumers using required licenses (e.g. a fresh product license).

Scalability: Oysters marketed from unique areas/regions could be scaled and used throughout Louisiana from the harvester/farmer to the processor and beyond. Given the small number of geographic brands in use today, and the limited number of harvesters with fresh product licenses, there are potential opportunities to expand this approach.

Competitive Advantage (Impact on Profits): Geographic brands allow oysters to be differentiated from the competition and marketed based on unique features such as flavor, quality, and the story. This changes the consumer experience and can drive price and demand. Direct marketing also changes the consumer experience and can improve revenues and yield a higher price.

Affordability: Simple approaches, such better marketing of current geographic areas where oysters are harvested, could be done a minimal cost. More expensive approaches could also be employed, such as working with a marketing agency to develop a brand. Direct marketing approaches can also vary in their expense based on restructuring the business (e.g. trucking capabilities, online sales, etc.).

Regulatory Environment (Likelihood of Success): There are no known regulatory restrictions to developing geographic brands for oysters in Louisiana. A fresh product license is required, however, for harvesters to sell oysters directly to consumers.

Market Conditions: The market for geographically branded oysters and direct marketing continues to grow as consumers are eager to learn the story of their food, know the source, and meet the harvester.

Ecological Conditions: Geographic branding and direct marketing activities are not reliant on ecological conditions, except for influencing flavor profiles and supply.

Harvester Enthusiasm: With the limited number of geographic brands in use in Louisiana and few direct marketing activities, enthusiasm by harvesters currently appears to be scant given current supply chain channels.

Resiliency Enhancement (Risk Management): Improving the reputation and demand for oysters by differentiating and direct marketing can improve the resiliency of oyster businesses.

Current Initiatives in Louisiana: There are only a few examples of where Louisiana oysters have been geographically branded. These include Wine Island oysters and Camindada Bay oysters. Direct marketing of oysters has also occurred via Louisiana Seafood Direct and farmed oyster brands (e.g. Camindada Bay).

Proven success (or lack thereof) elsewhere: There has been extensive growth in the use of geographic brands, flavor profiles, etc. on the east coast (e.g. Chesapeake Bay) and west coast (Puget Sound).

Role for TruFund (Loan Product Suitability): TruFund can help educate oyster harvesters and others about the benefits of changing the consumer experience by geographically branding and/or direct marketing oysters. Loan products could be used to hire a marketing firm and/or PR firm and support investments in direct marketing distribution activities (e.g. trucks, retail locations, etc.).

6. Improved Standards and Quality Assurance

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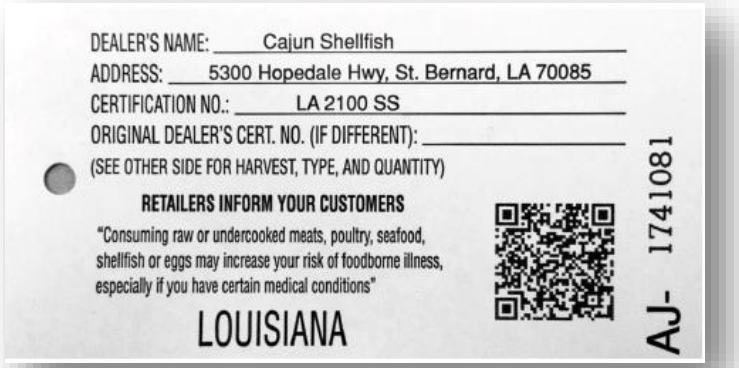
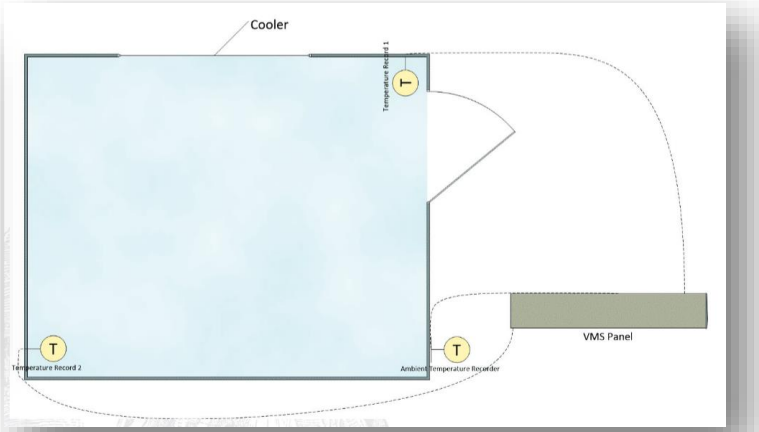
- ✓ By developing improved standards and quality assurance initiatives, oyster harvesters could create a competitive advantage, better manage their risk, and separate themselves from their competition. Improved standards and quality assurance to buyers could include electronic traceability systems to communicate and provide assurances of consistency and regulatory compliance (time and temperature). These approaches could also integrate with onboard systems and the existing paper tag and trip ticket system through the use of a digital element (QR codes) and handheld scanning devices.



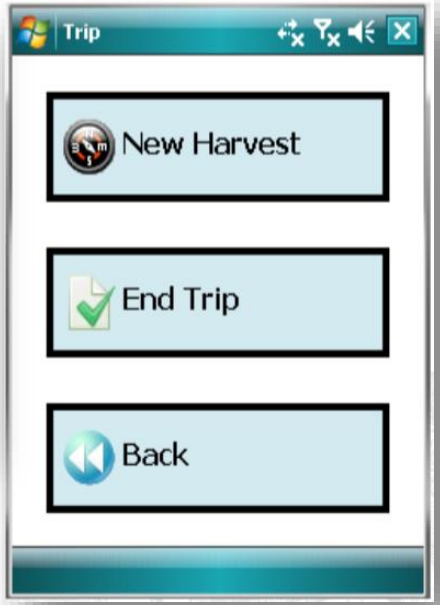
Source: Gulf States Marine Fisheries Commission

[Suggested Resource: Digital Traceability for Oyster Supply Chains]

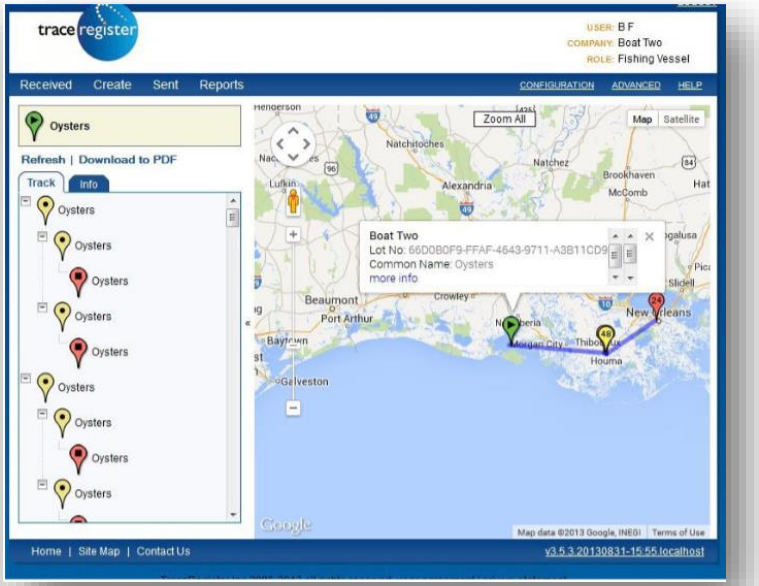
Source: Later Direct Seafood



Source: Gulf States Marine Fisheries Commission



Source: Gulf States Marine Fisheries Commission



Source: Gulf States Marine Fisheries Commission

6. Improved Standards and Quality Assurance

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Concept: Oyster harvesters need to ensure their customers that they are buying a consistent and high-quality product, as inconsistent sacks and poor quality impact sales and the reputation of the business, and do not meet requirements. Improved standards and quality control for oyster harvests would improve quality and consistency and in turn develop a more resilient and profitable business model.

Feasibility of Implementation: Developing and implementing an improved standard and quality control measures are feasible options for oyster harvesters.

Scalability: All oyster harvesters have the ability to self-impose a higher standard and use quality control measures such as improved culling and cleaning techniques, improved measurement, and an improved means (e.g. electronic reporting and traceability) to communicate standards and quality to buyers.

Competitive Advantage (Impact on Profits): Producing and selling a high quality and consistent oyster would improve the reputation of the business, increase demand, help reduce costs, and improve the profitability of the business.

Affordability: The cost to implement this advanced business model varies depending on approaches and equipment used.

Market Conditions: The market is eager for a consistent and uniform, high-quality product, particularly downstream components of the supply chain such as processors, retailers, restaurants, and consumers.

Ecological Conditions: This advanced business model does not directly rely on ecological conditions.

Regulatory Environment (Likelihood of Success): There are no foreseen regulatory obstacles for oyster harvesters to adopt self-imposed improved standards and quality control measures for their businesses.

Harvester Enthusiasm: There are a limited number of traditional oyster harvesters who have developed and implemented various levels of improved standards and quality control measures for their oyster businesses. The status quo may be challenging to overcome in the short-term. Oyster farmers may show more excitement to embrace self-imposed standards and quality assurance measures.

Resiliency Enhancement (Risk Management): Improved standards and quality control procedures for oyster harvesters would help businesses enhance their reputation and demand for their product, and subsequently improve the resiliency of their business.

Current Initiatives in Louisiana: The Louisiana Department of Wildlife and Fisheries and Louisiana Sea Grant have developed and administrated various programs such as the Louisiana Fisheries Forward program to advance the industry.

Proven success (or lack thereof) elsewhere: Shellfish businesses in other regions have implemented standards (e.g. size and grade) and quality control measures, coupled with advanced culling/grader technologies.

Role for TruFund (Loan Product Suitability): Offering a loan product to oyster harvesters to develop an improved standard and control program for their businesses would be beneficial, and there are opportunities to do so.

7. Alternative Species: Clams

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- ✓ There are opportunities for oyster harvesters to diversify the species they handle, such as with clams.
- ✓ Louisiana is one the last, if not the last, underutilized fishery for clams.
- ✓ The market and culinary options for clams are expanding as consumers continue to diversify their appetites.
- ✓ Recent changes to Louisiana's commercial harvest regulations now allow for the take of clams as incidental bycatch when harvesting oysters.

Source: Louisiana Sea Grant

Source: Louisiana Sea Grant

Examples from other Regions

Because of the risk of investing in one species given environmental changes (ocean acidification with oysters, etc.), changes in market demand, and associated regulatory challenges, shellfish farming businesses on the West Coast have added multiple species to their businesses to mitigate their risk. These include mussels, clams, oysters and geoduck.

Oysters

Clams

Mussels

Geoduck

Source: Penn Cove Shellfish and Taylor Shellfish

7. Alternative Species: Clams

Concept: Clam harvest and culture offers oyster harvesters the ability to diversify their business model, reduce risk, and become more profitable. Oyster harvesters are well placed to harvest and/or culture clams given their history with oyster production.

Feasibility of Implementation: The harvest of additional species such as clams in Louisiana is feasible via incidental bycatch to oyster harvesting and is recognized on LDWF trip tickets under bivalves. Clam culture in Louisiana is feasible given suitable ecological conditions but would require permitting and regulatory changes.

Scalability: Given many overlaps with traditional oyster harvest in Louisiana, the incidental harvest could be wildly adopted and embraced as an additional revenue stream to the oyster harvesting business. If the regulatory process authorized clam culture and there were suitable locations for clam culture, this advanced business model could be scaled.

Competitive Advantage (Impact on Profits): Supplying additional shellfish species such as clams could offer a competitive advantage in the market, as customers could develop a direct source for both oysters and clams. Clam harvest and/or culture would also offer an additional revenue source for the business in addition to revenues from oysters or when oysters are not available.

Affordability: The incidental harvest of clams adds minimal costs to the existing harvesting techniques employed by oyster harvesters today. Capital investment startup costs for intensive clam culture average around $60,000 an acre.

Market Conditions: With consumers continuing to expand their culinary palates, the demand for alternative shellfish such as clams from Louisiana continues to grow.

Ecological Conditions: Similar to oysters, clams also require certain ecological conditions such as salinity.

Regulatory Environment (Likelihood of Success): Currently, clams can only be harvested as incidental catch to the harvest of oysters. Regulatory changes would be needed for harvesters to directly target clams. The culturing or farming of clams in Louisiana would also require regulatory and permitting changes.

Harvester Enthusiasm: With the incidental take of clams recently allowed, the number of oyster harvesters landing clams is unknown and potentially limited. Markets would need to be developed to sell species such as clams at a good price, which may deter harvesters. Harvesters would be interested if they could make money at it. The number harvested might not be enough to make it worthwhile.

Resiliency Enhancement (Risk Management): As opposed to disregarding clams through traditional oyster harvest, clams can provide an additional revenue stream to the oyster harvesting business and improve the resiliency of the business.

Current Initiatives in Louisiana: Changes to commercial harvesting regulations in Louisiana now allow the incidental take of clams.

Proven success (or lack thereof) elsewhere: The harvest and culture/farming of clams is well practiced and successful in Florida (e.g. Cedar Key) and in other regions of the United States such as Chesapeake Bay.

Role for TruFund (Loan Product Suitability): In the short term, TruFund is well placed to educate harvesters on the opportunities of incidental clam harvest. Assuming regulatory changes allow targeted clam harvest and/or clam farming, TruFund is well-placed to offer loan products to support investments in equipment or marketing activities.

8. Agri/Ecotourism

- ✓ There are opportunities for oyster harvesters and farmers to diversify and advance their current business models by developing additional avenues for revenue by offering agri/ecotourism activities

- ✓ Agri/ecotourism allows a business such as an oyster harvester or farmer to offer a different experience to consumers and an opportunity for businesses to share their passion for the products (oysters) they produce and sell by giving tours and hosting special events

- ✓ Traditional agricultural businesses have utilized agri/ecotourism activities for decades that have recently expanded to include shellfish and oyster business on the West and East Coast.

- ✓ For the East and West Coast oyster industry, agri/ecotourism has typically included tours of oyster farms, oyster tastings, and special events that sometimes include chefs and pairings with other products (e.g. wine). Some oyster farms have charged as much as $75 a person for a tour or event.

Source: Pleasure House Oysters

Suggested Resource:
[A new agricultural business enterprise: Agritourism]

Source: In A Half Shell

8. Agri/Ecotourism

Concept: Agri/Ecotourism business activities such as offering tours and special events could provide additional revenue for oyster harvesters and/or farmers.

Feasibility of Implementation: Aside from any potential challenges with acquiring insurance and licensing, it is feasible for oyster harvesters and/or oyster farmers to offer agri/ecotourism activities as part of their businesses. It may be more feasible for oyster farmers to offer these experiences.

Scalability: The scalability of agri/ecotourism by oyster harvesters is limited, at least in the short term, as traditional business would find it challenging to find time to offer these services and at the same time produce and harvest oysters.

Competitive Advantage (Impact on Profits): This advanced business model would help oyster businesses promote their products and develop relationships with their customers. The publicity value would also help expand their business and increase revenue. Additional revenue could also come from the sale of tours and events. Some oyster farms on the West and East coast charge as much as $75 for a tour or event.

Affordability: Efforts to adopt agri/ecotourism in the shrimp harvesting industry have identified that the cost of insurance is high and a barrier to entry.

Market Conditions: Consumers and tourists continue to increase their demand for new experiences and agri/ecotourism, especially from unique sectors such as the oyster industry.

Ecological Conditions: While oyster production is directly tied to ecological conditions such as salinity, agri/ecotourism activities (tours and events) are not directly related to ecological conditions. Significant changes to ecological conditions, however, would impact this advanced business model. Ecological disasters such as flooding events would also impact the ability to offer agri/ecotourism activities.

Regulatory Environment (Likelihood of Success): Proper permitting and licenses would be required for businesses. These include permits related to transporting paying passengers on vessels, food handling permits and licenses, etc.

Harvester Enthusiasm: Oyster harvester enthusiasm for agri/ecotourism is limited. Deterrents to this approach include the cost of insurance, required licenses to take paying customers on board, and impeding their business operations (e.g. being onboard during oyster harvest). This approach may be better suited for harvesters/farmers to offer land-based experiences (oysters tastings, etc.) .

Resiliency Enhancement (Risk Management): Additional revenue from agri/ecotourism activities would help to improve the resiliency of the business and help to mitigate fluctuations in cash flow throughout the year as demand and production change.

Current Initiatives in Louisiana: There are currently no known oyster harvesters or farmers offering ecotourism experiences or tours through their current business models. There has been interest from shrimp harvesters to implement this approach. It is unknown how many shrimp harvesters have included this in their businesses.

Proven success (or lack thereof) elsewhere: Traditional agricultural business and shellfish/oyster farms have continued to incorporate agri/ecotourism into their business models.

Role for TruFund (Loan Product Suitability): TruFund could offer educational resources and loans to support agri/ecotourism related activities (e.g. vessels, vessel modifications, trucks, event equipment, etc.).

9. Cooperatives

- ✓ Oyster harvesters have an opportunity to diversify their risk, reduce costs, and improve market share by developing an oyster cooperative.
- ✓ While no formal seafood cooperatives currently exist in Louisiana, some oyster harvesters work together as family or friends by role specialization.
- ✓ Members can benefit from better marketing of their product, reducing business operating costs by buying supplies in bulk, and collectively using certain types of equipment, etc.
- ✓ The two most common types of agricultural cooperatives are 1) Marketing Cooperatives and 2) Purchasing Cooperatives.

Suggested Resources:

National Cooperative Business Association

- ✓ Shellfish cooperatives, including oysters, have been implemented in states such as Rhode Island, Virginia, New York, Connecticut, and Alaska.
- ✓ Cooperatives, such as the ones listed below, have been successful at sharing resources such as marketing and offering a variety of oysters to the market that have a range of appearance and taste.

Source: Ocean State Shellfish Cooperative

Kachemak Shellfish Growers Co-op

Source: Kachemak Shellfish Growers Co-op

NAC
THE NOANK AQUACULTURE COOPERATIVE

Source: The Noank Aquaculture Cooperative

Source: The Oyster Company of Virginia

9. Cooperatives

Concept: Developing and implementing a cooperative, or a business that is jointly-owned and democratically-controlled in order to benefit those using its services (e.g. marketing, purchasing, processing, etc.), could help oyster harvesters become more resilient and profitable.

Feasibility of Implementation: Oyster cooperatives and agricultural cooperatives have worked elsewhere and are a feasible option for oyster harvesters in Louisiana. Through a cooperative, oyster harvesters could better leverage resources (e.g. vessel types, marketing and standardization efforts, transportation of product, etc.) and, in turn, become more profitable and resilient.

Scalability: In many cases, oyster harvesters currently work together with friends and family members, specializing in different roles and sharing resources. This approach could be expanded, more formally structured, and scaled. Seafood-based cooperatives in Louisiana, however, have had resistance in the past and may be challenging for the industry to formally adopt.

Competitive Advantage (Impact on Profits): Cooperatives typically achieve higher quality products, better bargaining and purchasing power, better market access, and ultimately more profitability for members.

Affordability: Cooperatives are typically structured as either a marketing or purchasing cooperative and can vary in their size and resources they provide to members, thus dictating their cost. Start-up capital is often challenging for new cooperatives and businesses but is necessary to support purchasing equipment, hiring professionals, etc.

Market Conditions: Demand for high quality and consistent oysters with geographic branding, etc. continues to increase, and cooperatives have a unique opportunity to collectively produce and supply this type of oyster.

Ecological Conditions: Ecological conditions are not required to develop and structure an oyster cooperative. The cooperative would be influenced, however, by ecological conditions and their effect on the production and supply of oysters.

Regulatory Environment (Likelihood of Success): There are no known regulatory barriers to oyster harvesters developing and implementing a cooperative in Louisiana.

Harvester Enthusiasm: With the lack of any known oyster (or seafood) cooperatives in Louisiana, it appears that harvester enthusiasm is limited. Previously attempts to organize seafood cooperatives in Louisiana have been met with resistance and negativity.

Resiliency Enhancement (Risk Management): Cooperatives can provide more stability and longevity than independent businesses given multiple member-owners that can reduce individual member risk.

Current Initiatives in Louisiana: There are currently no known formally structured oyster cooperatives in Louisiana.

Proven success (or lack thereof) elsewhere: An oyster cooperative has been set up in Virginia. There are also many small seafood-based cooperatives throughout New England and in Alaska and the Bering Sea region.

Role for TruFund (Loan Product Suitability): Loan products offered by TruFund could help support a developing oyster cooperative via financing for equipment, marketing, professionals, etc. TruFund could also provide educational resources related to cooperative development and management.

10. Ecosystem Services: Nutrient (N) Removal

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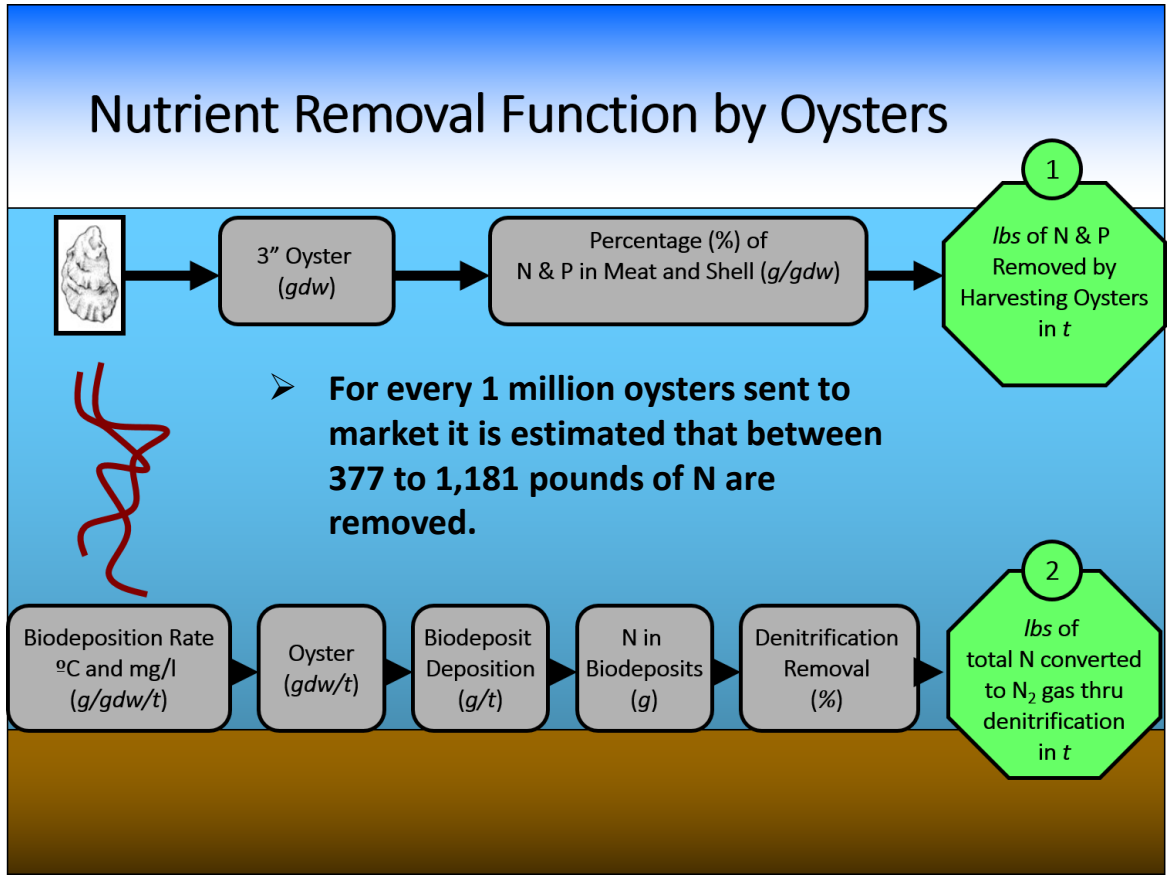
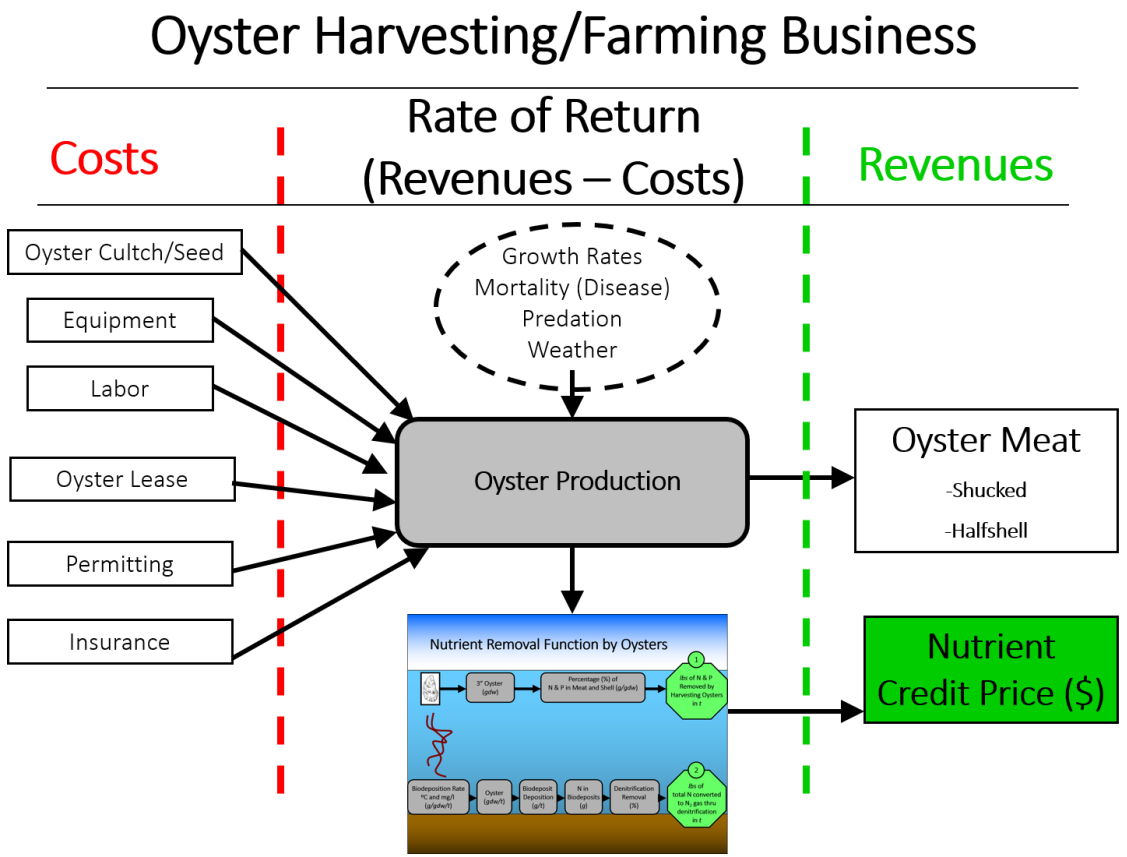
- ✓ The filtering and nutrient removal services that oysters provide may one day serve as an additional revenue stream for oyster harvesters/farmers when oysters are sold to market.
- ✓ Under a range of reasonable assumptions about oyster prices, mortality/growth, and input costs, revenue from nutrient credits could range from $5 - $50 per pound removed.



Source: Virginia Tech / Miller



Source: Virginia Tech / Miller

10. Ecosystem Services: Nutrient (N) Removal

Concept: Oyster harvesters and farmers could be compensated for the nutrient removal services oysters provide when oysters are removed and sold to the market. The scope and scale of nutrients (N) entering Louisiana waters provides ample opportunity for nutrient removal. If a market were developed, an additional revenue stream could aid in the resiliency and profitability of oyster harvesting/culturing businesses.

Feasibility of Implementation: It is not currently feasible for oyster harvesters to be compensated or receive additional revenue for the ecosystem services (e.g. nutrient removal) they provide.

Scalability: Assuming a market and regulatory oversight (e.g. verification of pounds of N removal) were developed, it is possible that all oyster harvesters could receive payments for the oysters sold to market and the N removed.

Competitive Advantage (Impact on Profits): An additional revenue stream for oyster harvesters for the ecosystem services (N removal) that they already provide could increase the profitability of their businesses.

Affordability: It is conceivable that the cost to oyster harvesters to receive compensation for N removal would be minimal as they would only need to demonstrate to authorities the number of oysters and subsequent pounds of N removed. Governmental enforcement and oversight costs would be greater than those of the harvester. There may be ways that existing trip tickets could aid in documentation and verification.

Market Conditions: There is not currently a market in Louisiana or in the Gulf for N removal.

Ecological Conditions: With the Gulf dead zone fueled by historic levels of nutrients from the Mississippi River, there are significant opportunities for nutrient removal.

Regulatory Environment (Likelihood of Success): Currently, there are not any known regulations related to compensation for providing ecosystem services and N removal. Regulations would need to be developed, primarily to verify the N removal by oyster harvesters/farmers.

Harvester Enthusiasm: With the absence of compensation for N removal, enthusiasm from harvesters is limited. It is expected that enthusiasm for additional revenue for the services already provided would be high given the creation of a market.

Resiliency Enhancement (Risk Management): Additional compensation and revenue to the oyster harvesting business would greatly improve the resiliency of oyster harvesters.

Current Initiatives in Louisiana: There are no known initiates in Louisiana related to compensation for ecosystem services (N removal) by shellfish or any other type of assimilative N removal approach.

Proven success (or lack thereof) elsewhere: The Chesapeake Bay states have implemented nutrient credit trading programs that assist wastewater treatment plants in meeting nutrient discharge goals. Development of nutrient credits from shellfish has been explored and proposed, but compensation for these services has not happened.

Role for TruFund (Loan Product Suitability): TruFund could offer educational resources to oyster harvesters, policy makers, and governmental agencies related to this advanced business model. At this time, it is unlikely that loan products would be needed, as a market for N removal services from oysters does not exist.

Part 3: Recommendations and Financial Products—Introduction

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- Following the identification of potential advanced business models for Louisiana oyster harvesters, recommendations for adoption and potential financial products to support investments in these advanced models are presented hereafter.

- Building on TruFund's successful Fisheries Gear Investment Loan Program that has primarily been utilized to retrofit and make investments in gear for shrimp harvesting vessels, Trufund is well-placed to expand its suite of financial products to oyster harvesters, etc. and assist the industry with adoption of some of the potential advanced business models identified herein.

Recommendations and Financial Products

- Recommended potential advanced business models and outreach and education
- Identified financial products
- Example financial products
- Identification of financial resources, business planning resources, follow-up and future contact

Recommendations and Financial Products

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It is recommended that TruFund move forward with the following:

- **In the short term, develop educational resources related to the following advanced business models, which appear to be the most feasible and practical at this time:**
  - Onboard Mechanical Refrigeration
    - This advancement is particularly feasible and suitable and has received considerable support from harvesters. This model also works well with TruFund's experience providing loans for equipment and vessel retrofit.
  - On-Bottom Remote Setting (Spat-on-shell)
    - Harvester support and interest for remote setting is high and this advancement is a feasible and suitable option to improve their businesses. The new oyster hatchery in Louisiana can also help support this.

Onboard Mechanical Refrigeration

On-Bottom Remote Setting (Spat-on-shell)

Source: Magic-Pak and Virginia Institute of Marine Science

- **Develop and Conduct Outreach to Educate and Gauge Interest from Oyster Harvesters**
  - Develop educational resources (e.g. packets) related to the most feasible and practical potential advanced business models
  - Conduct focus groups with oyster harvesters to educate oyster harvesters about advanced business models, gauge their level of interest, and determine an approximate number of harvesters who might be interested in moving forward
  - Partner and coordinate with agencies and organizations such as the Louisiana Department of Wildlife and Fisheries (LDWF), Louisiana Sea Grant (LA Sea Grant) and Audubon Nature Institute's Gulf United for Lasting Fisheries (G.U.L.F.). These organizations frequently engage and work with the oyster industry on harvester professionalism programs (LDWF/LA Sea Grant) and initiatives such as Marine Advancement Plans (Audubon G.U.L.F). It is likely that these organizations would welcome partnerships with TruFund and TruFund's capacity to offer loans that support business advancements.

Recommendations and Financial Products

- Recommended potential advanced business models and outreach and education
- Identified financial products
- Example financial products
- Identification of financial resources, business planning resources, follow-up and future contact

Recommendations and Financial Products

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It is not recommended that TruFund develop specific loan products tailored to each of the identified potential business advancements. It is advised that TruFund develop and administer one or more of the following potential financial loan products to offer greater flexibility to the business advancements and the investments that can be made:

1. Oyster Business Loan Program (OBLP)

2. Oyster Business Advancement Grant and Loan Program (OBAGLP)

Potential Financial Product 1: Oyster Business Loan Program (OBLP)

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- **Oyster Business Loan Program (OBLP)**
  - Provide a $15-$250K loan for 3 years at an interest rate of 7-9%
  - Note: TruFund has the ability to currently offer this loan product (modeled after the existing TruFund Fisheries Gear Investment Loan Program (FGLP)) and is now well-positioned with the research and information provided herein. While loans made under the FGLP have historically been made to harvesters, TruFund also has the capacity to make loans to other components of the supply chain (e.g. dealers, processors, etc.)
- **Proposed Requirements:**
  - Development of an Oyster Business Plan using resources such as FishBizPlan or an Oyster Crop Budget for a new business endeavor (e.g. remote setting or off-bottom culture). A full business plan would not be needed for equipment (e.g. onboard refrigeration). TruFund does not currently require a business plan for loans under the Fisheries Gear Investment Loan Program. Note: The Trade Adjustment Assistance (TAA) business plan materials developed and used by shrimp harvesters in Louisiana could be modified for the oyster industry and used to meet the business plan requirement.

  AND one of the following:

  - Has held an oyster harvesting license and harvested and sold oysters commercially any time during the past five years (must provide trip tickets and tax returns for 3 of the last 5 years)

  OR

  - Has held a Wholesale/Retail Seafood Dealer License or Retail Seafood Dealer License AND has documented sales of oysters (must provide oyster sales documentation for 3 of the last 5 years)

  OR

  - If new to the oyster industry, present 3 years of tax returns and a credit score > 650
- **Assumptions:** TruFund will provide and administer funding similar to the current FGLP.

Potential Financial Product 2: Oyster Business Advancement Grant and Loan Program (OBAGLP)

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- **Oyster Business Advancement Grant and Loan Program (OBAGLP)**
  - Provide $15-$250K grant/loan with 20% grant and 80% loan with no interest for 2 years, thereafter 4% interest—specifically tailored for individual Louisiana oyster businesses
- **Proposed Requirements:**
  - Development of an Oyster Business Plan using resources such as FishBizPlan or an Oyster Crop Budget

  AND one of the following:
  - Has held an oyster harvesting license and harvested and sold oysters commercially any time during the past five years (must provide trip tickets and tax returns for 3 of the last 5 years)

  OR
  - Has held a Wholesale/Retail Seafood Dealer License or Retail Seafood Dealers License AND has documented sales of oysters (must provide oyster sales documentation for 3 of the last 5 years)

  OR
  - If new to the oyster industry, present 3 years of tax returns and a credit score > 650
- **Assumptions:**
  - Funding will be acquired by TruFund and administrated by TruFund. Acquired funding will provide grant and loan funds, subsidize the interest rate, and cover administrative (business planning) costs.
- TruFund is well-positioned to provide and administer a grant and loan program following TruFund's (Seedco Financial at the time) experience as an intermediary to underwrite and distribute grant and loan funds made available by the Louisiana Recovery Authority with the United States Department of Housing and Urban Development.

Recommendations and Financial Products

- Recommended potential advanced business models and outreach and education
- Identified financial products
- Example financial products
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Example Loan 1: Maryland Agricultural and Resource-Based Industry Development Corporation

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MARBIDCO
growing rural ventures™

Source: marbidco.org

Acquiring loans for shellfish (oyster) aquaculture from traditional commercial lenders can be challenging for harvesters and others that often do not meet equity and collateral requirements. To overcome this and to spur economic development, the Maryland Agricultural and Resource-Based Industry Development Corporation (MARBIDCO) partnered with the Maryland Department of Natural Resources to offer cost-effective loan products to harvesters and other interested entities looking to invest in commercial shellfish aquaculture. The following two loan funds were created: **1) Shellfish Aquaculture Loan Fund**, and **2) Remote Setting Aquaculture Loan Fund.**

- Overview
  - Non-collateralized
  - 10% Owner equity required
    - Boats, work trucks, etc. meet this requirement
  - Business plan required
  - 620 Credit Score

- Funding Sources:
  - Federal Blue Crab Disaster money awarded to the Maryland Department of Natural Resources
  - Maryland State Capital Funds

Source: University of Maryland Extension / Maryland Agricultural and Resource-Based Industry Development Corporation

Example Loan 1: Maryland Agricultural and Resource-Based Industry Development Corporation

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MARBIDCO
growing rural ventures™

Source: marbidco.org

The specifications for the Shellfish Aquaculture Loan Fund and the Remote Setting Aquaculture Loan Fund administered by MARBIDCO were as follows:

Shellfish Aquaculture Loan Fund

- Terms of the program
  - Projects $5,000-$100,000
  - 5-year term
  - Interest only for years 1-3 (3% APR)
  - If in good standing, loan forgiveness in years 4 & 5
  - Remaining balance amortized over 2 years (5% APR)

Remote Setting Aquaculture Loan Fund

- Eligible Expenses: Seed, Shell, Remote Setting Equipment
- Projects $5,000-$30,000
  - $5,000-$15,000: 5-year term
  - $15,001-$30,000: 6-year term, year 1 interest only
- 5% APR
- Final year of payments forgiven for loans in good standing

Source: University of Maryland Extension / Maryland Agricultural and Resource-Based Industry Development Corporation

Example Loan 2: Semi-Pelagic Doors & Fuel Flow Meter Purchase and Installation Package Loan Program

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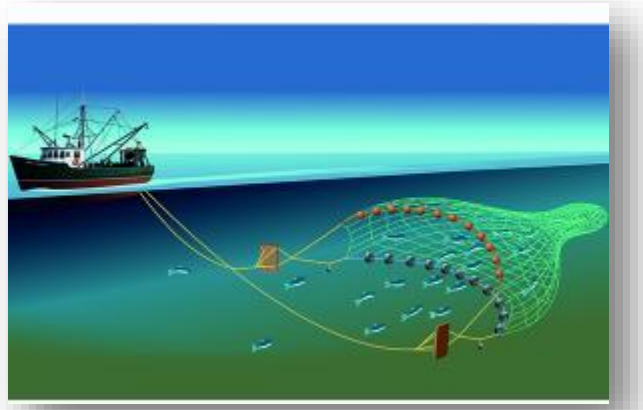
Overview:
In an effort to reduce fuel costs and impacts to the seabed from groundfish harvester gear in New England, a new system was developed using semi-pelagic otter trawl doors instead of standard doors on vessels. These advancements resulted in an average of 10% fuel savings and up to a 95% reduction in impact to the seabed. With interest by the fleet, adoption of the new technology was limited given the cost. To mitigate cost challenges NOAA, the Northeast Groundfish Gear Conservation Engineering and Demonstration Network, the Alex C. Walker Foundation, Coastal Enterprises Inc. (a CDFI similar to TruFund Financial), and the Gulf of Maine Research Institute developed a loan program to finance the gear. The details of the loan program are as follows:

Amount of Loan: Up to $25,000 for the semi-pelagic doors, fuel flow meters, and labor to install, and up to $40,000 for acoustic trawl monitoring gear

Interest Rate: Fixed 5-6% APR (5% for Maine residents and 6% for non-Maine residents)

Terms: 3-5 years with monthly payments equal to or less than the savings calculated by the reduction in fuel by utilizing semi-pelagic doors (10% annually). No penalty for paying down the loan ahead of time.

Rebate: A $2,000 rebate off the cost of the gear and labor to install for a limited number of harvesters.



Source: Gulf of Maine Research Institute

Source: NOAA / Northeast Fisheries Science Center

Recommendations and Financial Products

TruFund FINANCIAL SERVICES
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- Recommended potential advanced business models and outreach and education
- Identified financial products
- Example financial products
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Recommendations and Financial Products (Continued)

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It is recommended that TruFund move forward with the following:

- **Acquire or Allocate Financial Resources to Support the Potential Financial Loan Products**
  - Financial resources will need to be identified to support the identified financial products

- **Develop and Offer Business Planning Resources and Assistance with Loan Applications**
  - Assist oyster harvesters with business planning resources to guide and ensure their success in acquiring a financial loan product
  - It is suggested that TruFund utilize resources such as FishBizPlan and oyster crop enterprise budgets and work with oyster harvesters to develop industry specific business plans

- **Stay in Contact and Hold Frequent Round-Table Discussions with Oyster Harvester Clients**
  - This allows for TruFund to stay in contact and to learn what is working and not working
  - Round table meetings will also help oyster harvesters discuss with one another what's working and what isn't

Conclusion

The oyster industry in Louisiana has a long history dating back to the 1860's. Louisiana oysters have been and continue to be an integral part of the economy and rich culture of south Louisiana. While the last 150 years have brought a myriad of challenges from devastating hurricanes to freshwater flooding events and regulatory changes, the Louisiana oyster can still offer consumers and buyers an exceptional product in flavor, quality, and story. To ensure the future of the Louisiana oyster, oyster harvesters, like any business, will need to continue to innovate and strengthen their ability to remain resilient in the face of ever-changing ecological and economic constraints.

The advanced business models identified herein offer potential options for oyster harvesters to mitigate current and future challenges. Financial loan products and the business services offered by TruFund Financial Services can make this possible. By embracing and implementing these potential business advancements, Louisiana oyster harvesters will increase their opportunities to supply Louisiana oysters for the next 150 years and beyond.

Source: In A Half Shell

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