OYSTER FARMING AND ITS ROLE IN TEXAS COASTAL RESILIENCE

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TExAS OYSTER FISHERY

- 2,300 acres of private lease, only Galveston Bay
- 23,000 public, subject to season
- About 300 active boats and employing some 1,200 – 1,500 individuals
- $70 M economic impact to Texas
- Annual oyster harvest fluctuates: Last 10 yrs:
  high of 6.1 M lbs (2013) to low of 1.6 M (2015)
- A shadow of its former self
LEGISLATION: CULTIVATED OYSTER MARICULTURE

• Texas was the last holdout in the U.S. – that’s changed!
• HB 1300 and SB 682
• Authored by Rep. Todd Hunter (District 32) and Sen. Lois Kolkhorst (District 18), et al.
• Partners: TPWD, CCA, Texas Restaurant Association
• Empowered TPWD Commission to serve as regulatory body
• Regulations now in place (as of July 1st, 2020)
• Oyster farming starting in Fall, 2020
Supplies of Texas oysters on general downward trend, sometimes not available

Reefs declining due to freshwater inflow, commercial fishing issues, storms

50-85% loss of oyster reefs in Texas

Warmer waters = faster growth = more oysters

1.5 million acres of bay water

One oyster cage has potential to spare several square meters of reef

OYSTER AQUACULTURE IN TEXAS – WHY?

Credits: CCA
ADVANTAGES OF OYSTER AQUACULTURE

- MUCH HIGHER SURVIVAL THAN IN WILD
- STOCK EASILY QUANTIFIABLE
- HIGHLY SUPPORTIVE OF HALF-SHELL TRADE
- SIMILAR ECOSYSTEM SERVICES AS REEFS
- HIGH POTENTIAL FOR BRANDING
- YEAR-ROUND EMPLOYMENT AND SUPPLY OF OYSTERS
- LOWER EQUIPMENT DEPRECIATION, OPERATING COSTS
ECOSYSTEM SERVICES  
– OYSTER FARMING

• 375 metric tons of nitrogen removed
• 110 metric tons of phosphate removed
• 51,559 tons of carbon sequestered
• $1.7 \times 10^{15}$ larvae released each year
• 94 million cubic meters of water filtered DAILY
• One cage of oysters spares 5-10 m$^2$ of reef from fishing
• Shellfish farmers are passionate environmental stewards

Sources: ECSGA, Murder Point Oysters
OYSTER AQUACULTURE AND ECONOMIC RESILIENCE

- Oyster farming has emerged as an alternative ocean-based livelihood for fishermen whose work has changed due to negative impacts.
- Texas coastal fishing communities were hit hard by Hurricane Harvey.
- To equal current Texas oyster fisheries production levels would require thousands of acres of farmed oysters.
- However, a high percentage of public fishing grounds in Texas are often closed and private leases are vulnerable to closure.
- So, at times Texas restaurants cannot provide Texas oysters and must import a high percentage of oysters from out of state. Not so with aquaculture which distributes risk across entire coast.
- Texas oyster farming could eventually provide hundreds of new jobs in direct farming, hatcheries, processing, supply side, and retail sectors.
- Overall economic benefit to Texas could be in the tens of millions of dollars per year.
OYSTER AQUACULTURE:
ECONOMIC RESILIENCE

• Creating jobs in a new industry requires workforce development
• All areas: hatchery, nursery, grow-out
• RESTORE Act facility in Corpus Christi
• Also needed: hatchery (nothing happens without seed)
MARKETING/ECONOMIC RESILIENCE

- **Biofouling**: Texas has really warm waters. Right now, we are at 31°C. Due to warmer waters, the Gulf of Mexico is more conducive to bio-fouling of cages and other production-related gear. This reduces water flow and food supply to oysters. This increases labor cost and weight to cages, presenting a technical challenge.

- **Summer Conditioning**: The condition (i.e., meat weight & appearance) of oysters declines after spawning season, especially in warmer waters, reducing market price and marketability. Strong interest in use of triploid oysters. Texas is hot.

- **Branding**: To enter into the highly competitive premium half-shell market, Gulf oysters need a strong identity. Much progress being made, Texas still behind.
Oyster aquaculture, like any farming industry, is vulnerable to the impacts of global climate change.

However, unlike land-based farming, ocean-based industries are less dependent upon freshwater and fertilizers that would be required to produce an equivalent on land.

Climate change will have less impact on oyster farming through smart site selection, improved animal health programs, selective breeding, and other advanced husbandry approaches especially related to ocean acidification.

Climate change creates an increasing need for diversification of food production systems, one of which is oyster aquaculture.
OYSTER AQUACULTURE AND ECOSYSTEM RESILIENCE

• The complex three-dimensional structure of oyster reefs provides habitat for a diversity of benthic organisms.

• These benthic species, in turn, provide prey resources for finfishes and other mobile consumers.

• The restoration of oyster beds may thus have both fishery-related and ecological benefits.

• Aquaculture cages are also complex structure. Can act in similar manner as reefs, especially for rocky substrate-dwelling finfish.
ECOSYSTEM RESILIENCE: CAGES PROVIDE HABITAT

• Structure provided by aquaculture appears functionally similar to eelgrass for small benthic infauna and mobile epibenthic fauna.

• Some species of finfish such that occupy rocky reefs (e.g., seabass) equally occupy cages, some prefer cages, others don't – very site and species-specific.

• A study by Obeirne et al. (2004) showed more than 27 species of aquatic organisms associated with oyster cages in Virginia.

• “Cage” habitat appears to be especially beneficial to the early life history of recreational fishes and, unlike other benthic or water column features doesn’t change with the seasons.

• Ultimately, oyster aquaculture does not remove area from the estuary or degrade water quality like other human-related activities.
CURRENT OYSTER-RELATED PROJECTS

• **Copano Bay cage biofouling**
  - Stocking density × cleaning method × frequency of cleaning
  - ALS cages

• **Copano Bay seagrass impact**
  - Aerial coverage
  - Sediment impact
  - Seagrass health

• **Copano Bay farm site modeling**
  - Synoptic mapping of bay for oyster farming
  - Aquaculture Suitability Index
  - Capacity predictions using FARM modeling

• **Federal Fisheries Disaster Relief**
  - Matagorda Bay
  - ALS and floating cages (200)
  - Management project

• **Palacios Marine Agriculture Research**
  - Non-profit oyster hatchery
  - Eyed larvae, seed oysters, spat on shell
  - Commercial/conservation

• **Oyster Resource and Recovery Center**
  - RESTORE Act award
  - Workforce development
  - Training in hatchery and nursery/farm operation
  - Marketing/business component
Development of a comprehensive siting model – not just where, but how much per site/bay

Evaluation of cage type for specific locations, improved habitat/biodiversity

Development of a Texas tetraploid oyster line

Oyster breeding program for selected traits such as salinity tolerance, disease resistance, etc.

Methodology to develop year-round conditioning-spawning of oysters

Inland production of oysters (seed or market) in ponds to avoid storms, loss of infrastructure

Detailed cost analyses of various methods of oyster culture.

Marketing and branding strategies.
TEXAS OYSTER FARMING WISHLIST

- Agency coordination
- Texas Aquaculture Permitting Plan
- Texas Aquaculture Plan, in general
- Growers groups
- Training programs
- Revise Texas Shellfish Management Plan (1988)
Thank you!