So you are thinking about growing shellfish?

_Things to consider..._

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Why?

Attributes

- Supports small business entrepreneurship
- Many farms are individual or family operated
- Size of commercial-scale farm relatively small, from 2 to 10 acres
- Relatively inexpensive start-up and operating costs in growout operation
  - Lease lands, do not purchase
  - No feed, aeration or pumping costs
- Provides independent lifestyle on the water
- Over 880 shellfish farms in U.S. with sales value of $442M (USDA 2018)
What shellfish to grow?

Species Selection

- Dependent on geographic area
- Supports existing culture operations
- Life history / biology well known
- Hardiness / tolerance to a wide variety of environmental conditions
- Established culture technology
- Reliable seed production / collection methods
- Minimal susceptibility to diseases
- Established markets and existing demand
- Marketable product at early life history stage
- Moderate to high unit sale price
Oysters

From left to right:
- Pacific oyster
  *Crassostrea gigas*
- Kumamoto oyster
  *Crassostrea sikamea*
- European flat oyster
  *Ostrea edulis*
- Olympia oyster
  *Ostrea lurida*
- Eastern oyster
  *Crassostrea virginica*
Clams

Manila clam
*Tapes philippinarum*

Pacific littleneck clam
*Protothaca staminea*

Hard clam, northern quahog
*Mercenaria mercenaria*
Mussels

Mussels:
- Mediterranean, *Mytilus galloprovincialis*
- California, *M. californianus*

Blue mussel
- *Mytilus edulis*
- *M. trossulus*
Other species

- Soft-shelled clam *Mya arenaria*
- Geoduck clams *Panopea abrupta*
- Scallops: Bay, *Argopectin irradians*
- Pink and Spiny, *Chlamys spp.*
- Rock, *Crassadoma gigantea*
- Sunray Venus *Macrocallista nimbosa*
Where to locate your farm?

- Open-water farming
  - Estuaries, bays, sounds, offshore

- Conducted on
  - State-owned (sovereign) leases
  - Grants / deeds
  - Privately-owned submerged lands

“Location, location, location…the most critical step!”
Where to site your shellfish farm?

THE FARM

Biology of the Species

Site / Physical Characteristics

Leasing / Permitting Requirements

Sociological / Operational Factors
Biological considerations

- Growth
  - Old shell / Live shell
  - Test plots

- Food (primary productivity)
  - Density - how much?
  - Diversity - what kind?

- Predators
  - Effect on survival
  - Abundance / species

- Fouling
  - Effect on flow, cleaning, equipment, product

- Prevalence of diseases – MSX, Dermo, QPX
- Prevalence of harmful algae blooms - red tide, PSP
Shellfish water classifications

- Mollusks require sanitary control
  - Filter feeders / Consumed raw
- Federal guidelines provided by ISSC National Shellfish Sanitation Program
- Established bacteriological standards
- Shellfish harvesting classifications
  - Approved / Conditionally approved
- SHA maps obtained from state shellfish regulatory authority
- Management plan of SHA
  - Rainfall, river stage, HABs, biotoxins
  - Number of annual closure days
Environmental (physical) factors

- Salinity
- Water depth and contour
- Substrate characteristics
- Sedimentation rate
- Turbidity

- Currents
  - Flow / circulation
- Tidal action
  - Flow / height / exposure
- Wind and wave direction
- Exposure
- Storm damage frequency
Other considerations

Sociological Factors

– Riparian and adjacent land owners
– Alternative usages
  • Fisheries / Recreational
– Pollution sources
– Future development

Operational Factors

– Upland access
  • Boat launching
  • Nurseries, sieving
  • Wholesalers, harvesting
  • Equipment storage
– Access to markets
– Security / surveillance
– Proximity to other farms
– Production expandability
– Manpower availability
Leasing requirements

– Contact state agency responsible for administrating leasing program

– Process includes
  
  • Nominate site / seek preapproved areas
  • Site undergoes inspection
    – Evaluation of natural resources
    – Compatibility with area
    – Must be nonproductive “bare” bottom
  • Submit and review of application and business plan
  • Public notification / Authorization
  • Survey and mark site
  • Application and annual rental fees
  • Cultivation requirements
Permitting requirements

– Other state agency permits
  • Leasing
  • Upland operations
– Federal agency permits / notifications
  • Army Corps of Engineers
  • U.S. Coast Guard
– Licensing
  • Harvesting
  • Shellfish wholesaler
  • Local occupational
How to grow your shellfish?

- **Culture methodology**
  - Extensive versus intensive
  - Intertidal, subtidal, or water column use

- Culture equipment / gear

“Start off small, allow time to move up the learning curve!”
Extensive versus Intensive Culture

- Seed collected from wild
- Usually little equipment involved
- Lower farm costs
- Lower labor input
- Lower production per acre
- High acreage required

- Hatchery-produced seed
- Equipment required for predator protection
- Higher capital costs
- Higher operating costs
- Higher labor input
- Higher production per acre
- Less acreage required

Oyster cultch lease, Apalachicola, FL
Oyster bags, Southern Cross SeaFarms, FL
Intertidal culture

Water column culture

Subtidal culture
Oyster culture

Cultch and seed plant, LA

Floating chub, NC

Flexible belt, FL
Oyster culture

Bag and rack, MA

Bag and stacked rack, FL

Bag and rack, MA
Oyster culture

Tray and lantern nets, MA, WA, AK and BC
Oyster culture

Floating Bags and Cages

Atlantic & Gulf of Mexico States
Suspended Oyster Culture

Flip Bags
Pacific NW Coast

Adjustable Long Lines
Atlantic & Gulf of Mexico States
Clam culture

Soft bottom bag, NC, SC, GA, FL

Bottom tray, FL
Clam culture

Bottom exclusion nets,
NC to ME
Mussel culture

Filling socks, ME

Hanging ropes, ME

Long lines, BC
Where to get your seed?

- Natural recruitment
- Collection from wild sources
  - Cultch, spat collectors, relay
- Hatchery production

“Start off small…you can learn as much by killing 10,000 seed as with a million seed!”
Hatchery production

Spawning

Larval rearing

Algal production

Post-set nursing
Where to buy seed?

National suppliers guide

Regional suppliers list

State suppliers list
What is a land-based nursery?

- Intermediate step
- Seed from hatchery is nursed to a field plantable size
- Simple in design and operation
- Consist of wellers and raceways
- Requires minimum maintenance
- Lowers initial seed costs
- Increases seed availability
Land-based nursery options

Upwellers

FLUPSY
Land-based nursery options

Raceways
How to sell your product?

- Sell to a shellfish wholesaler
- Become a shellfish wholesaler
  - How to become a wholesaler?
- Processing / Product forms
- Market channels / Distribution

“You don’t make money growing shellfish, you make money selling ’em…if you get a good enough price.”
Shellfish wholesaler requirements

– Harvesting, processing and shipping of mollusks highly regulated

– Accountability from point of harvest to consumer

– Federal oversight – ISSC National Shellfish Sanitation Program Guide

– State permitting / certification

– Plant inspections

– Approved plans

– Facility

– HACCP

– Sanitation
Shellfish product forms

Live shellstock

Shucked meats
Shellstock processing

Culling

Washing/tumbling

Tagging / Packaging

Grading

Transporting in refrigerated trucks
Shellstock market channels

Grower/harvester

Shellfish wholesaler

Wholesaler / Broker

Food service

Restaurant

Retail
What else?

❖ Develop a business plan
❖ Obtain adequate financing
  - Capital (it takes money, to make money)
  - Operating (for at least 2-3 years of operation)
❖ Gain practical experience
  - Initially grow a small plot of shellfish
  - Work with other shellfish farmers

“Approached in a well logical, well-informed manner, shellfish farming has the potential for returning a profit on your efforts. Likewise, done without adequate planning it is guaranteed to lose you money!”
How to get information?

- Aquaculture extension agents or Sea Grant marine agents
- USDA Regional aquaculture centers (NRAC, SRAC, WRAC)
- Internet / Industry, suppliers and association web sites
- Shellfish farmers

“It spite of available information, it will still be your time, money and dedication that will be required for a successful shellfish farm.”
Information sources
Shellfish farming... 
...a way of life