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 900 shellfish farms in U.S. with sales value of $203M (USDA 2005)
What shellfish to grow?

Species Selection
- Dependant 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:
Mediterranean, *Mytilus galloprovincialis*
California, *M. californianus*

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

Geoduck clams
*Panopea abrupta*

Soft-shelled clam
*Mya arenaria*

Scallops:
- Bay, *Argopectin irradians*
- Pink and Spiny, *Chlamys spp.*
- Rock, *Crassadoma gigantea*
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?

- Biology of the Species
- Site / Physical Characteristics
- Socio-Operational Factors
- Leasing / Permitting Requirements

THE FARM
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 area (SHA) 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

*Cedar Key Shellfish Harvesting Area, Classification Map

*Interstate Shellfish Sanitation Conference
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 racks, Moonstone Oyster Farm, RI
Oyster culture

Cultch and seed plant, LA

Floating chub, NC

Flexible belt, FL
Oyster culture

Bag and rack, MA

Bag and stacked rack, FL
Oyster culture

Tray and lantern nets, NJ, RI, MA and BC
Clam culture

Pen system, SC

Soft bottom bag, FL

Bottom tray, FL
Clam culture

Bottom exclusion nets, VA and MA
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
- Post-set nursing
- Algal production
Where to buy seed?

- National suppliers guide
- Regional suppliers list
- State suppliers list
What is a land-based nursery?

- Intermediate step
- Seed obtained from a hatchery is nursed to a final plant or 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

Raceways

FLUPSY
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 molluscs highly regulated
- Accountability from point of harvest to consumer
- Federal oversight – FDA and ISSC National Shellfish Sanitation Program
- State permitting / certification
- Plant inspections
- Approved plans
  - Facility
  - HACCP
  - Sanitation

http://www.issc.org
Shellfish product forms

Shucked meats

Live shellstock

Tomahawk Oysters
Shellstock processing

- Culling
- Washing/tumbling
- Grading
- Tagging / Packaging
- Transporting in refrigerated trucks
Shellstock market channels

Grower/harvester

Shellfish wholesaler

Wholesaler / Broker

Food service

Retail

Restaurant

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

“What 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

[Images of people engaged in shellfish farming activities, including sorting, netting, and handling fish or mussels.]