Role of Sea Grant Extension in Coastal and Offshore Aquaculture in the Gulf of Mexico & Caribbean Region

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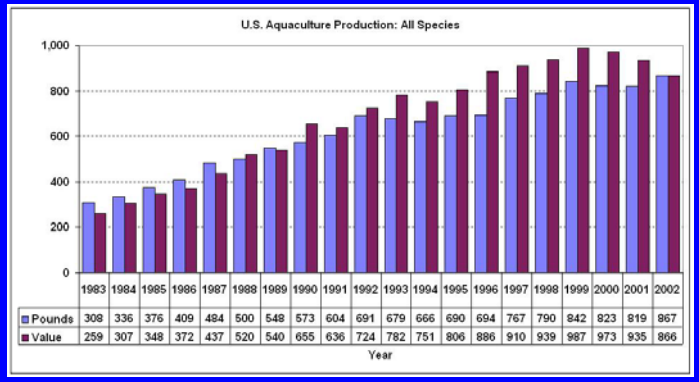
Objectives

- Describe industry economics in the region.
- Identify successful target species
- Describe status of open ocean aquaculture development
- Identify successful individual programs

Recent Economic Trends in U.S. Aquaculture

- With the rapid globalization of aquaculture markets:
  - Declining prices arising from increasing supply of aquaculture products from countries with competitive advantage
  - Increasing production costs arising from intensive use of inputs and government regulations
  - Negative net returns among inefficient farms leading to exit from industry

U.S. Aquaculture Production



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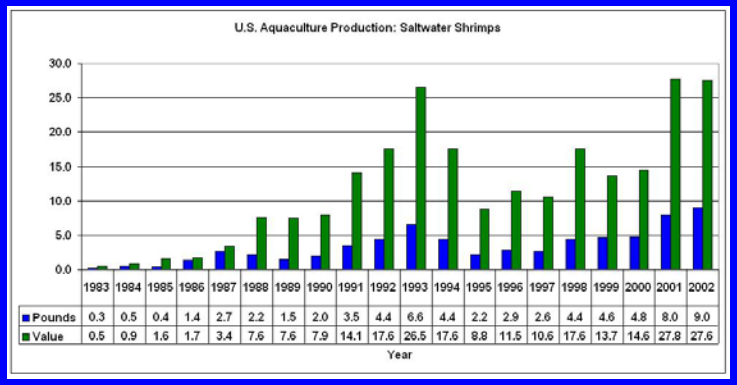

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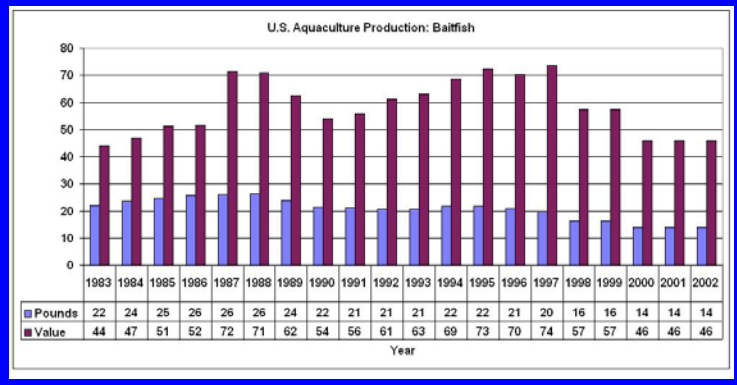

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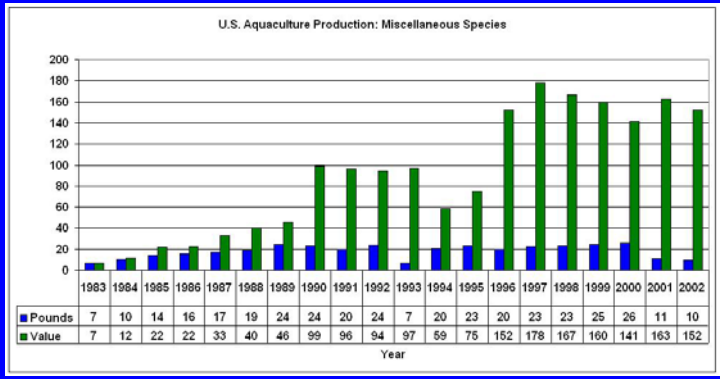

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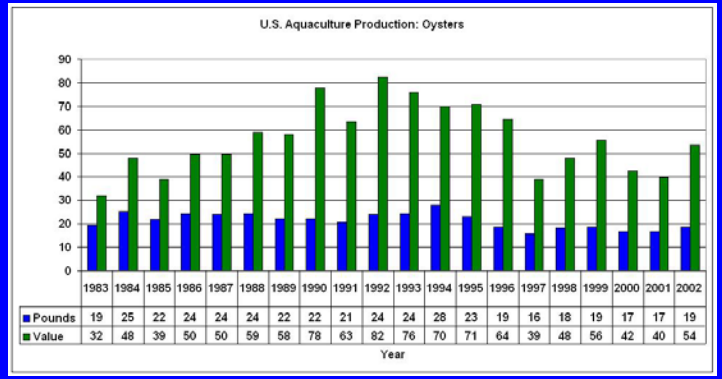

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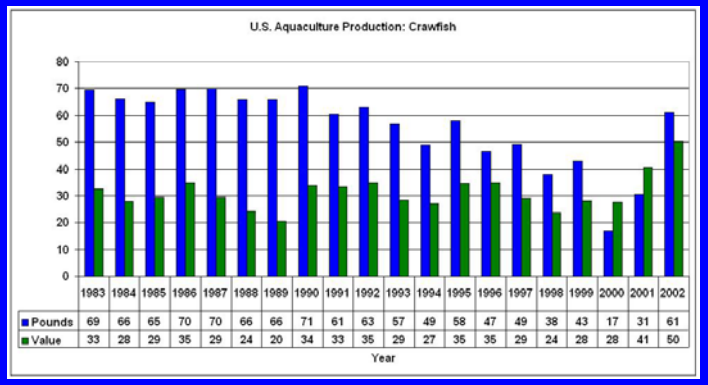

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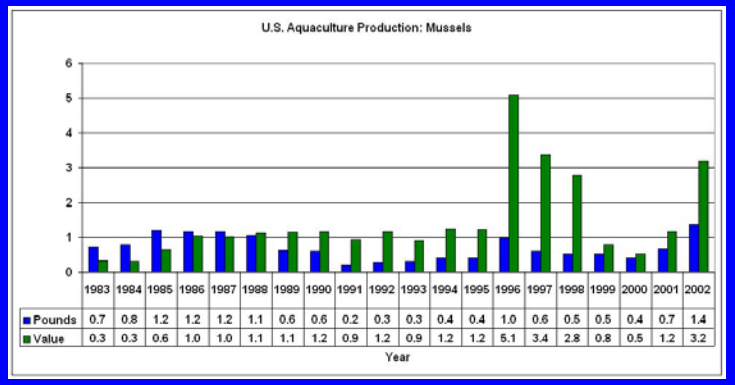

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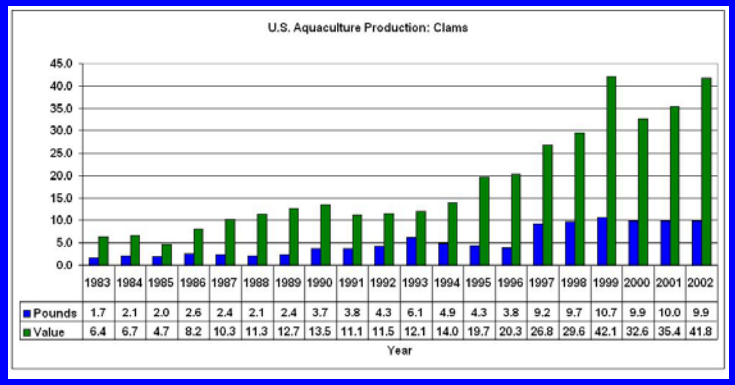

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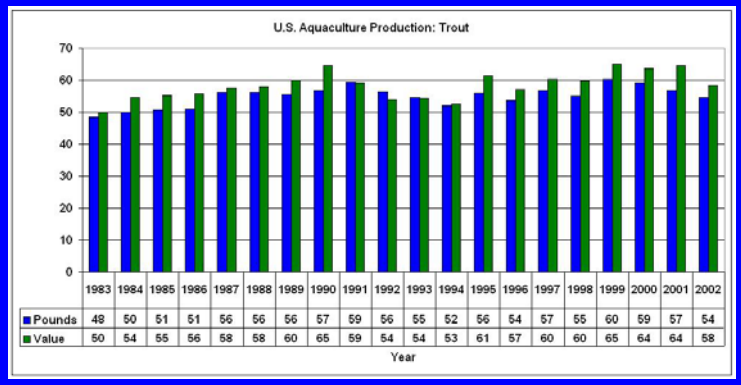

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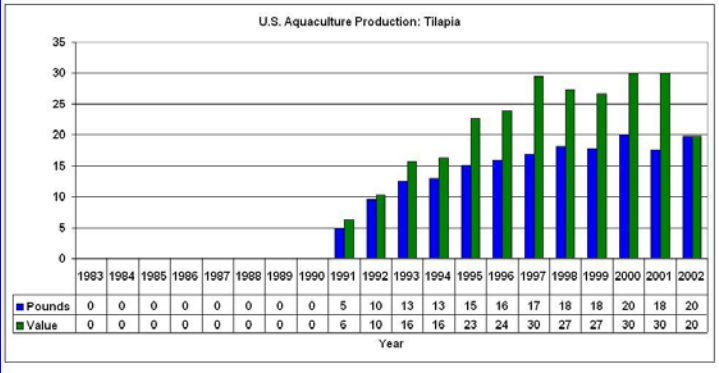

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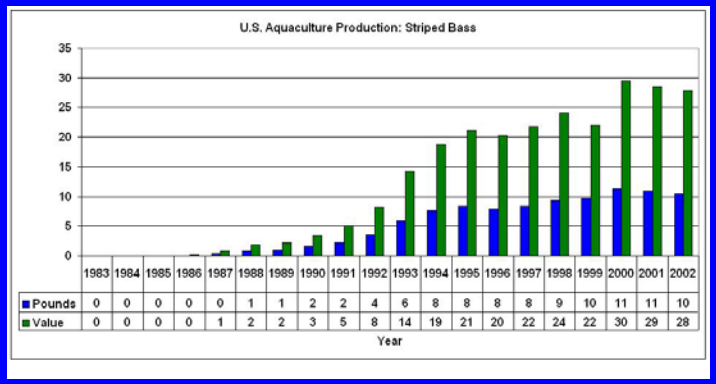

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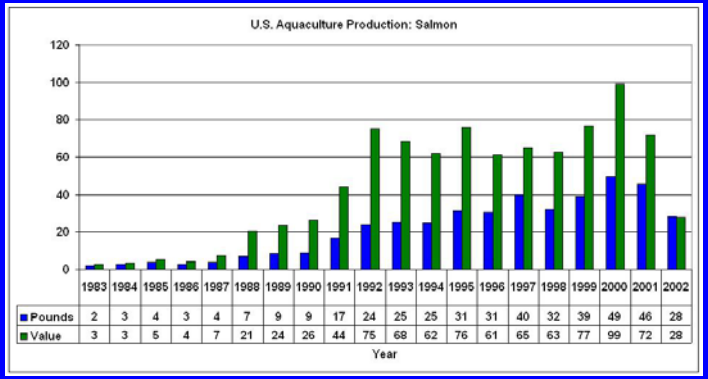

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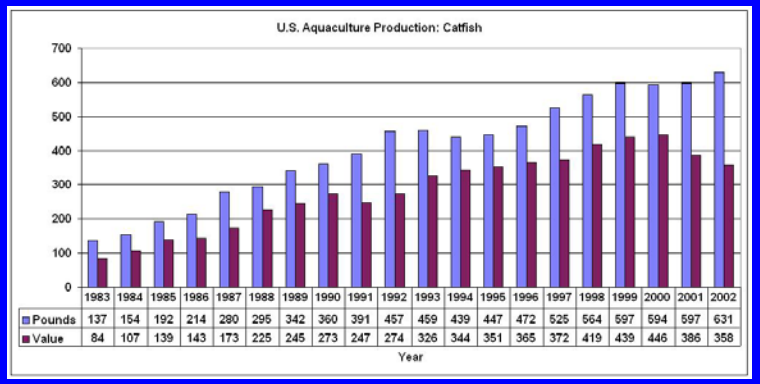

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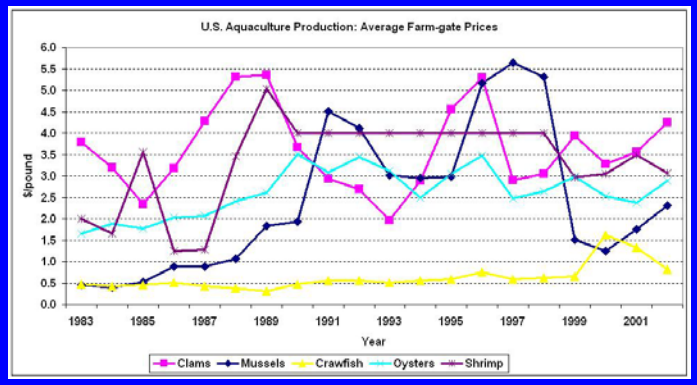

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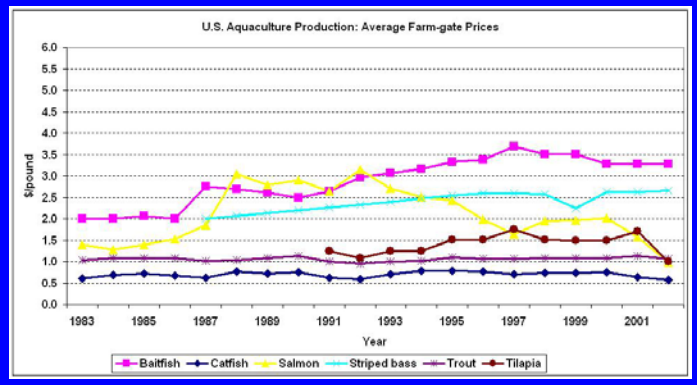


Open Ocean Aquaculture

- Texas – 1 permitted but not yet in operation
- Louisiana – use of decommissioned oil rigs for mariculture, release of liability
- Mississippi – recent permitted experimental cage culture grow-out operation
- Alabama
- Florida – permit application recently denied

Commercial Offshore Aquaculture Production System (COAPS)

- Aquaculture Service Vehicle (ASV)
- 3,000-m3 Ocean Spar Sea Station (OSSS) cages
- Moorings, feed distribution system and net cleaners
- Service boats

Land-based Support Facilities

- 2-ha base camp
- Office building and trailers
- Trucks and service vehicles
- Fish transport vehicle

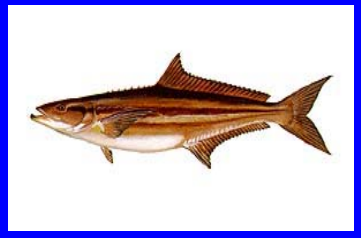
Initial Fixed Investment (12-cages or 36,000 m3)

Item	*Total Cost (US$)*	*US$/m3*
Onshore support facilities	0.33	9
Offshore facilities	3.52	98
Total investment	3.85	107

CANDIDATE FISH SPECIES

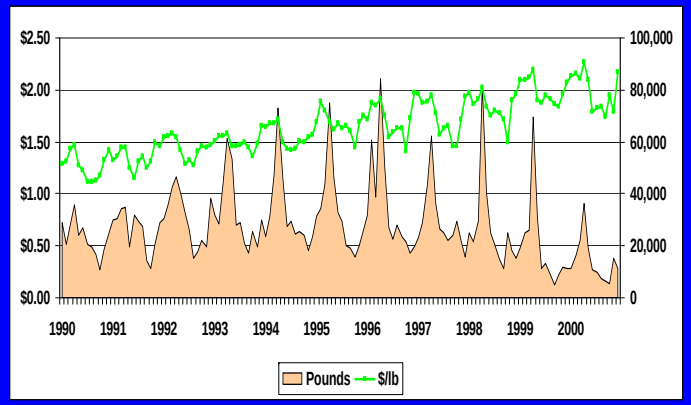
- Culture characteristics
  - Spawning and hatching
  - Growth potential
  - State and federal regulations
- Commercial Harvest
  - Landings
  - Ex-vessel Prices
  - South Atlantic
  - Gulf of Mexico

Cobia or Lemon Fish or Ling
Rachycentron canadum



- Successfully cultured in ponds and cages in Taiwan and Puerto Rico.
- Can be grown to at least 5 kg in 12 months.
- Successfully spawned in USA.
- Commercial harvesting is subject to state and federal regulations

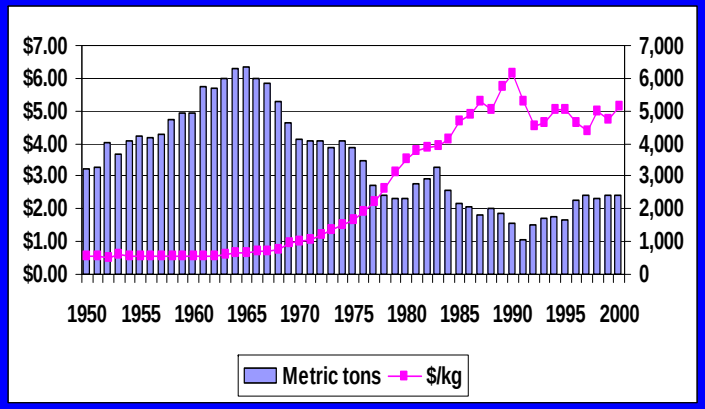
Monthly U.S. Commercial Cobia Landings



Red snapper
Lutjanus campechanus

- **Experimental results in Alabama showed growth rate of 1.23 g/day.**
- **Commercial harvesting is subject to state and federal regulations**

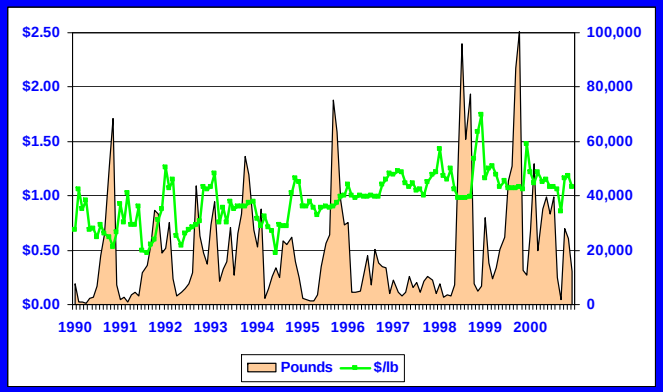
Annual U.S. Commercial Red Snapper Landings



Red drum or Redfish *Sciaenops ocellatus*

- Successfully cultured in ponds and offshore cages in the Gulf of Mexico.
- Can reach 1 kg in 12 months
- Commercial harvesting is subject to state regulations
- Illegal to harvest or possess in federal waters

Monthly U.S. Commercial Red Drum Landings



12- Cage COAPS Enhanced Market & Improved Growth Model

Item	*Unit*	*COBIA12*	*SNAP12*	*DRUM12*
Stocking density	**Fish/m3**	**6**	**67**	**33**
Growth rate	**G/month**	**729**	**46**	**100**
Ex-vessel price	**$/kg**	**5.25**	**5.50**	**4.75**
Harvest size	**Kg/fish**	**6.57**	**0.56**	**1.21**
Fish production	**1000 mt/yr**	**1.08**	**1.08**	**1.08**
Net returns	**$M/yr**	**1.89**	**0.22**	**0.43**
NPV	**$M**	**7.36**	**<0**	**0.75**
IRR	**%**	**52**	**8**	**15**
Investment decision		**Feasible**	**Infeasible**	**Infeasible**

Implications

- COAPS modeling was based on experimental or recommended management practices.
- Economic viability of COAPS depends on the combination of:
  - better fish
  - faster growing fish
  - lower costs of production
- Harvesting (and marketing) are subject to regulations governing capture fisheries

Biological, Economic and Marketing Limitations

- COAPS model assumptions not verified:
  - logistical problems: fingerlings, feed, fish, manpower, supplies
  - pilot scale experiments: fish growth, feed type, feeding, FCR, treatment, stocking, harvest, transport
- Not incorporated in the COAPS model:
  - Broodstock, hatchery and nursery components
  - Processing and distribution components
    - product forms and yields
    - packaging and pricing

Technical Limitations

- ASV is still under development:
  - capacity and purchase & operating costs
- Feeding system
- Environmental monitoring:
  - procedures, equipment, supplies and manpower and costs
- Permitting process:
  - forms, agencies, length of time and costs

Commercial Coastal Aquaculture

- Texas – redfish, catfish, saltwater shrimp, water gardens, tilapia
- Louisiana – baitfish, catfish, crawfish, oysters (?)
- Mississippi – catfish, tilapia, hybrid striped bass, freshwater prawn
- Alabama – catfish, tilapia, saltwater shrimp
- Florida – live rock, clams, ornamental fish, saltwater shrimp

Partial Vertical Integration Success Stories

- Broodstock & Hatchery
- Nursery
- Grow-out
- Processing – IQF, value added products
- Storage
- Distribution

Management Flexibility

- Over-all approach in managing aquaculture operations in response to rapidly changing global and domestic markets of cultured species
  - Stock species in demand
  - Stock multiple species

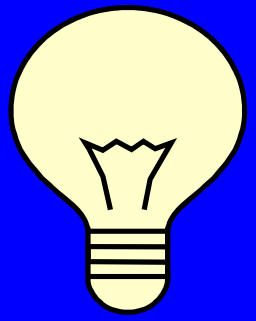
Product Cycle of Selected Species

- Soft-shelled crawfish (1987-1990)
  - At $8.00/lb farm-gate prices, several growers entered the industry
  - With the increase in supply, prices dropped below average production cost ~ $6.50/lb.
- Live tilapia – between 1995-1998
- Hybrid striped bass – recently in TX FGP dropped from $2.50 to $1.75

Successful Fish Marketing

- Redfish
  - Grower responds to market demand
  - If a buyer wants 10,000 pounds are delivered every Tuesday, then the grower makes sure that the boxed fish are ready on the specified date and time.
- Trout
  - If it takes for the grower to regularly call on his buyers to get the added $0.10/lb, then he makes sure that somebody from his farm makes that call, e.g., birthdays, anniversaries.

The Future of Sea Grant Extension Program on Aquaculture in the Region



Aquaculture Research & Extension Program Template

- Sea Grant Marine Baitfish Initiative in Feb 2004
  - 2-day workshop of industry, researchers and extension personnel dealing with marine baitfish species
  - White paper outlining a road map toward developing the industry
    - Identify species
    - Define research needs
    - Outline outreach program
- Regional “think tanks” consisting of industry and Sea Grant personnel
  - Competitive market-oriented production strategies
  - Flexible mix of primary and value added products
  - Aquaculture risk management