



ECONOMIC AND MARKETING CONSIDERATIONS OF OFFSHORE AQUACULTURE IN THE GULF OF MEXICO

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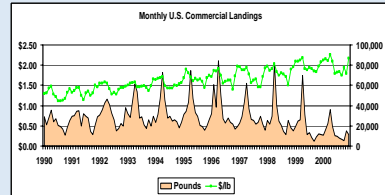
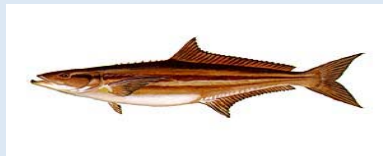


Commercial Offshore Aquaculture Production System (COAPS):

- Aquaculture Service Vehicle (ASV)
- 3,000-m³ Ocean Spar Sea Station (OSSS) cages
- Moorings, feed distribution system and net cleaners
- Service boats
- 2-ha base camp
- Office building and trailers
- Trucks and service vehicles
- Fish transport vehicle

Cobia or Lemon Fish or Ling *Rachycentron canadum*

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

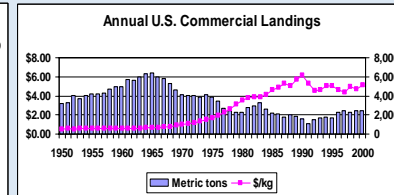


COAPS Initial Fixed Investment: (12-cages or 36,000 m³)

Item	Total Cost (US\$)	US\$/m ³
Onshore support facilities	0.33	9
Offshore facilities	3.52	98
Total investment	3.85	107

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

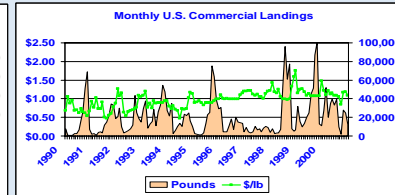


COAPS Investment Analysis:

- ❖ Base model assumptions
- ❖ 12-cages, one crop per year
- ❖ Enhanced Market Model
- ❖ Farmgate price = \$1/kg more
- ❖ Improved Growth Model
- ❖ Growth rate = 25% more
- ❖ Enhanced market + improved growth
- ❖ Increased or reduced capital outlay

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



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 (& marketing) are subject to regulations governing capture fisheries

Technical, Biological, Marketing and Economic Limitations:

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

12-CAGE RISK-FREE COAPS BASE MODEL

Item	Unit	COBIA12	SNAP12	DRUM12
Stocking density	Fish/m ³	7	83	41
Growth rate	G/month	583	37	80
Ex-vessel price	\$/kg	4.25	4.50	3.75
Harvest size	Kg/fish	5.25	0.45	0.97
Fish production	1000 mt/yr	1.08	1.08	1.08
Net returns	\$M/yr	0.8	<0	<0
Payback period	yr	5.6	Undefined	Undefined
NPV	\$M	2.56	<0	<0
IRR	%	26	<0	<0
Investment decision		Feasible	Infeasible	Infeasible

12-CAGE RISK-FREE COAPS ENHANCED MARKET MODEL

Item	Unit	COBIA12	SNAP12	DRUM12
Stocking density	Fish/m ³	7	83	41
Growth rate	G/month	583	37	80
Ex-vessel price	\$/kg	5.25	5.50	4.75
Harvest size	Kg/fish	5.25	0.45	0.97
Fish production	1000 mt/yr	1.08	1.08	1.08
Net returns	\$M/yr	1.84	<0	0.17
NPV	\$M	7.84	<0	-0.45
IRR	%	53	<0	7
Investment decision		Feasible	Infeasible	Infeasible

12-CAGE RISK-FREE COAPS IMPROVED GROWTH MODEL

Item	Unit	COBIA12	SNAP12	DRUM12
Stocking density	Fish/m ³	6	67	33
Growth rate	G/month	729	46	100
Ex-vessel price	\$/kg	4.25	4.50	3.75
Harvest size	Kg/fish	6.57	0.56	1.21
Fish production	1000 mt/yr	1.14	1.08	1.08
Net returns	\$M/yr	1.0	<0	<0
NPV	\$M	3.4	<0	<0
IRR	%	32	<0	<0
Investment decision		Feasible	Infeasible	Infeasible

12-CAGE RISK-FREE COAPS ENHANCED MARKET & IMPROVED GROWTH MODEL

Item	Unit	COBIA12	SNAP12	DRUM12
Stocking density	Fish/m ³	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

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