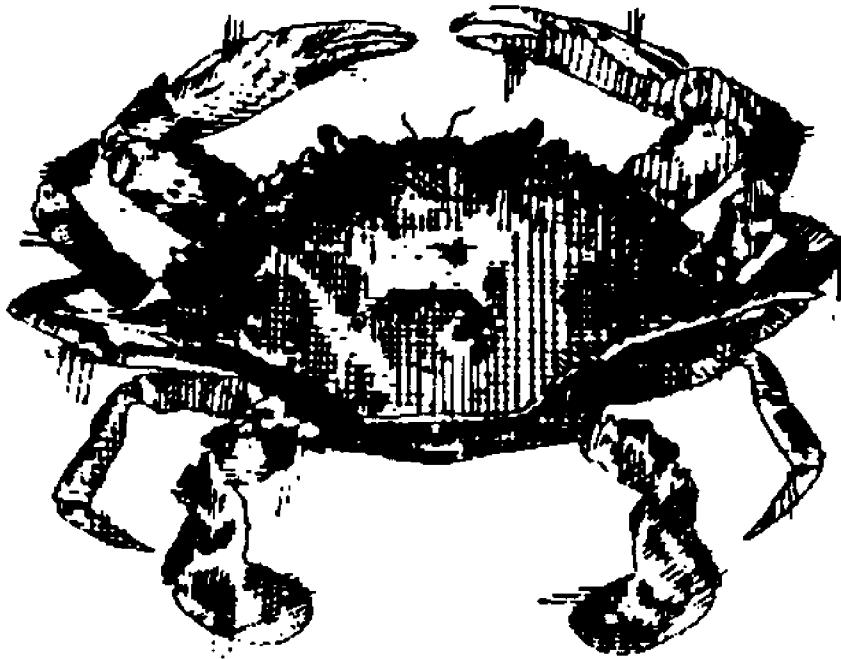


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THE LOUISIANA SOFT-SHELLED CRAB INDUSTRY

A Profile

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By

Rex H. Caffey
Dudley D. Culley
Kenneth J. Roberts

February 1993

LOUISIANA SEA GRANT COLLEGE PROGRAM

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February, 1993.

TABLE OF CONTENTS

	Page
Foreword	i
Executive Summary	ii
Introduction.....	1
Background	1
The Producer Survey	2
Objectives.....	2
Methods.....	3
Data Collection	3
Data Analysis	3
Results	5
Discussion	16
Conclusions.....	33
Economic Impact.....	33
Technology.....	34
Economic Requirements	34
Grading and Marketing.....	35
Problems and Research Needs	36
References	39
Addendum	40

LIST OF FIGURES

	Page
Figure 1. Coastal parishes involved in soft crab production	4
Figure 2. Seasonal fluctuations in production	5
Figure 3. How long have producers been in business?	6
Figure 4. Louisiana soft crab producers interviewed by region	7
Figure 5. Production methods among producers interviewed.....	8
Figure 6. Average investment for systems of various sizes.....	9
Figure 7. Average investment for various production methods	9
Figure 8. Average production for systems of various sizes	9
Figure 9. Average production for various methods.....	9
Figure 10. Most common problems and research needs.....	15

FOREWORD

This report presents information regarding the status of the Louisiana soft-shelled crab industry. Data were obtained from on-site interviews with 65 producers in 1991. At each interview, a questionnaire about soft-shelled crab production was completed; consequently, results especially apply to the 1991 production year. Basic characteristics of the industry are discussed throughout the report.

The purpose of the research was to define the technological, economic, and marketing characteristics of Louisiana's soft-shelled crab producers. The findings represent the industry at the producer level and do not depict activities of wholesalers, retailers, or restaurants. The report also identifies problems of soft-shelled crab producers and provides insights into the educational, research, and management needs of the Louisiana soft-shelled crab industry.

EXECUTIVE SUMMARY

An on-site survey of the Louisiana soft-shelled crab production industry was conducted from June 1991 through May 1992. Sixty five producers (approximately 21% of the industry) provided information on aspects of the production, technology, marketing, economics, and sociology of soft crab production. Responses to survey questions were organized with respect to region, technology, and system size. Results suggest a total farm-gate production value between \$4.3 and \$5.6 million in 1991. Although production was dispersed throughout the coastal parishes, the majority of producers were located within a 50-mile radius of New Orleans. Approximately 50% of the interviewed producers were operating with closed (recirculating) systems. The majority of producers used a basic shell filter system, but 10% employed more recently developed pressurized sand filter systems. Capital cost per unit was highest for producers using sand filter systems. In addition, these producers had the lowest yield of soft crabs. Results of a size and technology comparison indicated that the optimal production facility consists of a 250-square-foot (eight-tray) closed system using shell filters.

INTRODUCTION

Background

Production of soft-shelled blue crabs (*Callinectes sapidus*) is a well-established industry along the U.S. Atlantic coast and Gulf of Mexico. The majority of soft-shelled crab production is located in the Chesapeake Bay region of Maryland and Virginia; however, production in other states on the Atlantic Ocean and Gulf of Mexico has developed rapidly in recent years.

Louisiana is the oldest producer of soft-shelled crabs among the gulf states. Production in Louisiana has historically centered around the New Orleans and Lake Pontchartrain parishes of Orleans, St. Tammany, and Jefferson (Horst 1985). Early reports of soft-crab landings depict a decline in Louisiana production from a record 2,370,000 pounds in 1945 to 119,000 pounds in 1979 (Perry et al. 1979). The decline in production was attributed to such factors as disease and loss of habitat; however, the primary factor was the deterioration of water quality in traditional areas of soft-crab production.

In response to these problems, the Louisiana Sea Grant College Program at LSU sponsored research in the early to mid 1980s that yielded information which strengthened existing soft crab businesses and stimulated new operations. Much of the research consisted of developing closed soft-crab shedding systems with improved biological filtration (Malone and Manthe 1984, Manthe et al. 1984). The results of this research were presented at educational workshops to several hundred prospective and experienced soft crab producers. These workshops were conducted by the Louisiana Sea Grant College Program in cooperation with fisheries agents of the Louisiana Cooperative Extension Service (LCES).

Between 1979 and 1985, workshops and extension efforts resulted in a 300% increase in closed systems (Malone, 1985). The number of soft crab producers grew steadily during this period because the new technologies freed producers from the problems associated with deterioration of water quality in natural sources. Nontraditional regions of soft crab production evolved as the technology was dispersed over wider geographic areas of coastal Louisiana. By 1985, the industry had spread into the south central parishes of Lafourche, Terrebonne, St. Charles, and St. Mary (Horst, 1985).

Little interaction has occurred since 1985 between university scientists and the soft crab industry in Louisiana. By 1990 the status of the industry, its problems, and its needs were not well known and estimates of production relied on educated guesswork. At least in part, this shortcoming existed because there was no identifiable industry leadership or producer association. While marine educators saw evidence that the industry was changing, the direction and extent were unknown.

The Producer Survey

In 1991, the Louisiana Sea Grant College Program began a one-year study of the general characteristics of Louisiana's soft crab industry. The objectives of the study were:

- (1) To secure a current industry profile by surveying producers
- (2) To evaluate management needs and identify industry-enhancing educational and research programs

Preliminary meetings with industry-related persons were held to determine the best method of achieving the study's objectives. Participating in this process were representatives of the Louisiana soft crab industry, Louisiana Sea Grant College Program representatives, LCES fisheries agents, the Louisiana Crab Task Force, and researchers from the LSU School of Forestry, Wildlife, and Fisheries. A mail survey was not considered acceptable for obtaining the desired information because responses to previous mail surveys were poor. It was decided that personal interviews would be a more reliable method of surveying Louisiana's soft crab industry.

Working through LCES fisheries agents, a small group of soft crab producers was identified. Meetings with the first producers proved helpful in developing the questionnaire for the interview process. In addition, the original base group of producers provided the referrals for added interviews.

At each meeting, the standard survey was completed and the producer was asked for referrals. From June of 1991 to May of 1992, this "networking referral" process resulted in personal interviews with 65 soft crab producers, approximately 21% of an estimated 300 Louisiana producers.

OBJECTIVES

The major objective of this study was to develop a descriptive profile of production, technology, and marketing variables in the Louisiana soft-shelled crab industry by conducting personal interviews with producers. Specific goals were to:

- (1) Determine the current level of economic contribution of the industry by obtaining estimates of production and corresponding value
- (2) Characterize the industry's use of available technologies and determine the level of adoption of the new production techniques developed by Sea Grant in the 1980s.
- (3) Identify the economic requirements of various methods of soft crab production used in the state.

- (4) Compare the various marketing techniques employed and consider the effects of alternative marketing strategies on the industry.
- (5) Identify basic problems and opportunities within the industry and identify the corresponding areas of management, research, and education needed.

METHODS

Data Collection

In contrast to the regular coasts of some soft crab producing states, Louisiana's coast is an intricate network of marshlands. Relatively isolated, most fishing communities are situated at the ends of rural roads on coastal peninsulas. In data collection, this geographic constraint was compounded by an incomplete producer list. Although a small list was compiled in the early 1980s, its use was limited in this study because over 50% of the individuals were no longer producing soft crabs. This high turnover of producers is a common phenomenon of the Louisiana soft crab industry.

Approximately 60% of the interviewed producers were identified through the "network referral" process. The remaining 40% were contacted by "cold calls," a process by which the researcher drove through fishing communities, making inquiries wherever there was visual evidence of soft crab production. This evidence usually consisted of visible holding trays adjacent to waterways, piers with crab cars ("floats"), and signs advertising the sale of soft crabs.

Interviews generally lasted from one to two hours. Producers were informed of the study's purposes and assured of complete confidentiality in answering the questionnaire. In return for their cooperation, the conclusions of the study will be mailed to producers.

DATA ANALYSIS

Survey responses were analyzed using a computer database program and examined on a per-question basis to identify ranges, tendencies, and standards. In addition, many of the questions were cross-referenced to further estimate any characteristics and trends. In an effort to maximize the information from the data analysis, responses to certain questions were examined with respect to three variables: (1) the size of the system, (2) the technology employed in production, and (3) the location or region of the state.

1. System Size. It was suspected that the overall size of a soft crab operation has a bearing on its relative efficiency, costs, and productivity. Several survey questions were analyzed with respect to system size. The size of the system was determined simply by multiplying the number of holding tanks by

RESULTS

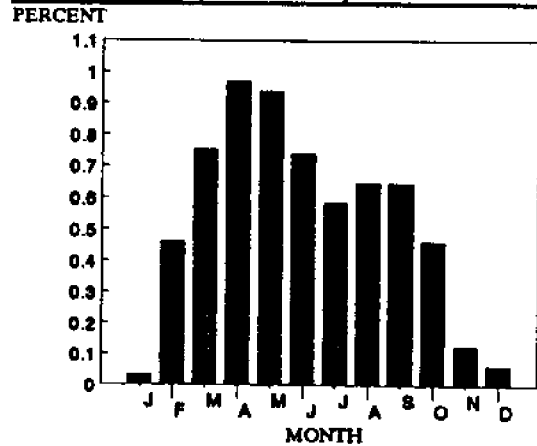
In this section, the responses to each survey question are presented in tabular form. Some tables combine the results of two or more questions. Response tables are sometimes augmented with graphic illustrations. The analysis format varies with each question but generally includes an analysis of averages, ranges, and distributions. In addition, certain questions are analyzed with respect to the previously mentioned classifications of size, technology, and region. These cross-sectional analyses allow for the deduction of trends, tendencies, and general industry characteristics.

Question 1 **In what months did you produce soft crabs in 1991?**

Month	Number of Producers	Percent (%)
J	2	3
F	30	46
M	49	75
A	63	97
M	61	94
J	48	74
J	38	58
A	42	65
S	43	65
O	30	46
N	8	12
D	4	6

Figure 2

**Seasonal Fluctuations in Production
LA-SSC Survey 1991**



Question 4 How many people in your general area produced soft-shelled crabs in 1991?

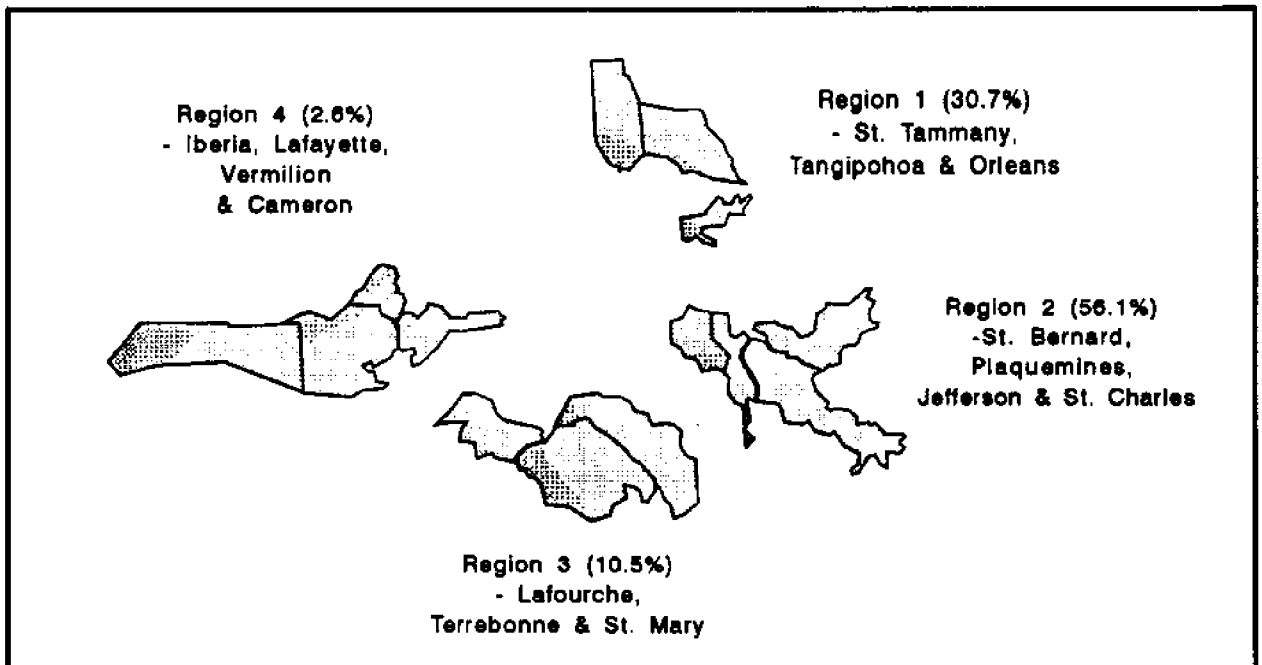
Region	Number of Producers Interviewed	Average Estimate	Range of Estimates	Trend*
Region 1				
Madisonville to Lacombe	5	25	6 - 30	n/a
North Shore & Rigolets	8	32	15 - 50	50% between 25 - 30
Irish Bayou to New Orleans	3	13	3 - 25	n/a
Total	16	70		
Region 2				
Delacroix & Hopedale	14	26	16 - 50	70% between 20 - 30
Barataria & Lafitte	13	90	50 - 150	50% between 100 - 125
Plaquemines Parish	1	1	n/a	n/a
DesAllemands	2	9	n/a	n/a
Total	30	128		
Region 3				
Raceland to Lower Lafourche	8	11	4 - 25	n/a
South of Houma	2	7	n/a	n/a
Morgan City to Jeanerette	2	6	n/a	n/a
Total	12	24		
Region 4				
Intracoastal City to Cameron	7	6	2 - 12	n/a
Total	7	6		

Total 65 228

* Trends occur where more than 50% of respondents answer within a margin \leq 30% of the total range
n/a - not available

Figure 4

**Louisiana Soft Crab Producers Interviewed by Region
LA-SSC Survey 1991**

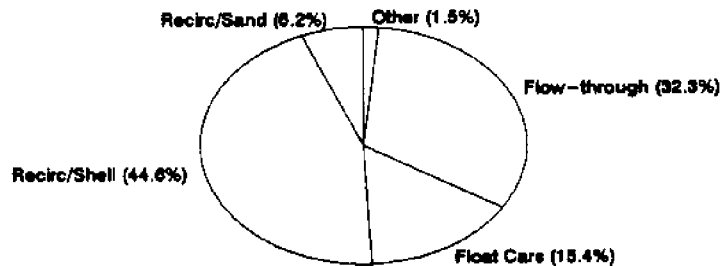


Question 5 Which of the following statements best describes your shedding operation?

	Number of Producers	Percent (%)
1. I produce most of my soft crabs in "crab cars" or "float cars".	10	15
2. I produce most of my soft crabs in an open or "flow-through" system.	21	32
3. I produce most of my soft crabs in a closed or "recirculating" system with a shell filter.	29	45
4. I produce most of my soft crabs in a closed or "recirculating" system with a sand filter.	4	6
5. Other (trawl, on-board shedding, etc...)	1	2
Total	65	100%

Figure 5

**Production Methods Among Producers Interviewed
LA-SSC Survey 1991**



Questions 6-8 How many trays or floats do you operate?
What are the average dimensions of your trays or floats?
What materials did you use to construct your trays or floats?

By Production Method:	Average Number of Trays or Floats	Average Dimensions			Average Size (Sqft)	Percent of Construction Materials Used (%)				
		Length	Width	Depth		Wood	Fiberglass	Plastic	Metal	Other
Float cars	3	11 ft.	6.5 ft.	6.5 in.	215	100	0	10	0	0
Flow-through	7	8'	4'	10"	224	81	76	5	0	14
Recirc/shell	10	8'	4'	12"	320	69	93	3	3	0
Recirc/sand	40	8'	4'	10"	1260	50	65	10	0	0

Question 9 In building your system, whom did you rely on the most for information regarding soft crab production?

Information Source	Number of Producers	Percent (%)
Family and Friends	41	63
Publications and Research Literature	8	12
A university researcher or extension agent	16	25
Total	65	100%

Questions 10-11

**What is the total amount of money you spent building your system?
What was your total production of soft crabs in 1991?**

By Production Method:	Number of Producers	Average Investment (\$/sqft)	Production (dozens)	Production/sqft (dozens)
Float cars	10	\$5	525	2.45
Flow-through	21	7	900	4.02
Recirc/shell	29	14	1231	3.85
Recirc/sand	4	29	2675	2.09
Other	1	-	-	-
Total	65	\$11.06 /sqft*	1085 doz/yr*	3.52 doz/sqft*

By System Size (sqft):	Number of Producers	Average Investment (\$/sqft)	Production (dozens)	Production/sqft (dozens)
50 - 125	10	\$10.99	199	2.68
125 - 150	9	9.01	452	3.46
150 - 200	15	9.32	768	4.15
200 - 300	11	8.67	1341	5.40
300 - 400	9	12.82	1823	5.01
400 - 650	5	19.35	1800	3.36
>650	6	21.8	2625	2.42
Total	65	\$11.83 /sqft*	1130 doz/yr*	3.94 doz/sqft*

By Production Region:	Number of Producers	Average Investment (\$/sqft)	Production (dozens)	Production/sqft (dozens)
Region 1	16	\$14.8	994	4.04
Region 2	30	8.39	1075	4.97
Region 3	12	13.9	1793	3.04
Region 4	7	27.4	203	0.70
Total	65	\$13.03 /sqft*	1093 doz/yr*	3.92 doz/sqft*

* Weighted averages will vary by category

Figure 6
Average Investment for Various Sized Systems
LA-SSC Survey 1991

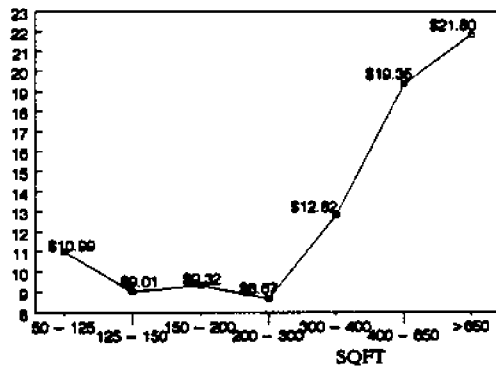


Figure 7
Average Investment for Various Production Methods
LA-SSC Survey 1991

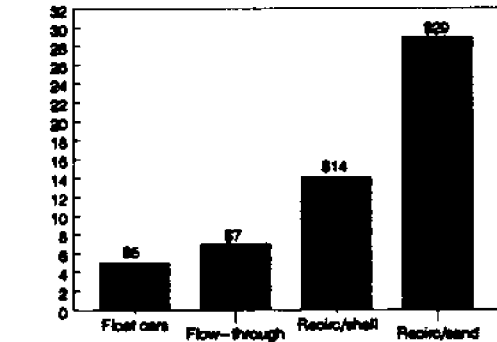


Figure 8
Average Production for Various Sized Systems
LA-SSC Survey 1991

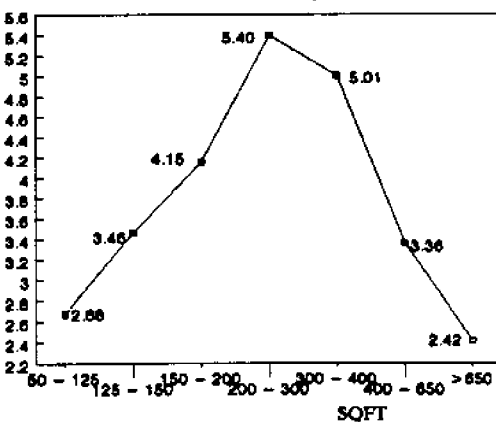
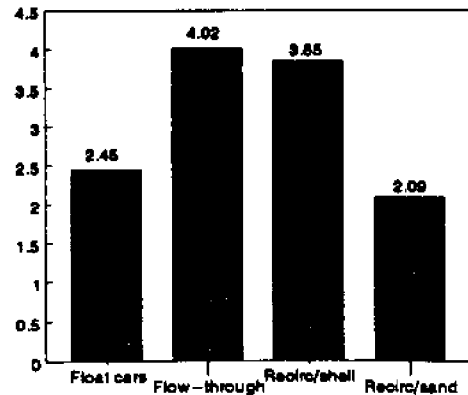


Figure 9
Average Production for Various Production Methods
LA-SSC Survey 1991



Question 12 What was your overall mortality in 1991?

By Production Method:	Number of Producers	Mortality (percent)
Float cars	10	29.5
Flow-through	21	27.6
Recirc/shell	29	19.8
Recirc/sand	4	17.7
Other	1	n/a
	64	23.3*

By System Size (sqft):	Total Number	Mortality (percent)
50 - 125	10	22.8
125 - 150	9	25.6
150 - 200	15	26.8
200 - 300	11	23.4
300 - 400	9	23.3
400 - 650	5	25.2
> 650	6	17.4
Total	65	24.1*

* Weighted average

Question 13 Please rank the following operating costs in order of importance from highest to lowest. (1 = highest cost and 6 = the lowest cost)

	Highest to Lowest					
	1	2	3	4	5	6
	% Response					
Catching Crabs	11	0	0	0	9	18
Buying Crabs	32	20	0	3	7	16
Labor	9	22	4	0	0	0
Electricity	0	5	22	22	6	0
Materials	2	0	12	31	0	0
Other	0	0	0	12	33	33
	100%	100%	100%	100%	100%	100%
	Highest % responses			Second highest % response		

Question 14 Which best describes the labor force of your operation?

	Number of Producers	Percent (%)
A totally family operated business with no outside labor	57	87.7
Some occasional part-time wage labor*	6	9.2
One or more full-time wage laborers*	1	1.5
Most of the labor is unrelated to the owners*	1	1.5
Other	0	0.0
	65	100%

* The average wage of the 8 people who reported paying wages was \$4.53 per hour.

Question 15 What percentage of buster or peeler crabs did you purchase from other fishermen in 1991?

By Production Method:	Number of Producers	Percent Purchasing All or Some Crabs: (%)	Average Percentage Purchased by Group: (%)
Float cars	0	0	0
Flow-through	14	88	47
Recirc/shell	13	45	27
Recirc/sand	4	100	83
Total	31		

By System Size (sqft):	Number of Producers	Percent Purchasing All or Some Crabs: (%)	Average Percentage Purchased by Group: (%)
50 - 200	12	34	24
200 - 400	12	60	55
400+	7	70	77
Total	31		

By Region:	Number of Producers	Percent Purchasing All or Some Crabs: (%)	Average Percentage Purchased by Group: (%)
Region 1	6	38	18
Region 2	10	33	19
Region 3	12	100	83
Region 4	3	45	25
Total	31		

* 31 producers (48%) reported that they purchased all or some of their buster crabs

Question 16 In some areas of Louisiana, the price paid for buster crabs changes greatly during the year. Please indicate the average price paid per buster crab for each month in 1991.

Month	Region 1				Region 2				Region 3				Region 4			
	Purch %*	Price per crab (\$)			Purch %*	Price per crab (\$)			Purch %*	Price per crab (\$)			Purch %*	Price per crab (\$)		
		High	Low	Avg.		High	Low	Avg.		High	Low	Avg.		High	Low	Avg.
J	19	0.50	0.50	0.500	33	\$0.50	0.50	0.500	0.08	0.50	0.50	0.500	0.14	0.40	\$0.40	0.400
F	18	0.50	0.50	0.500	40	0.50	0.40	0.491	0.58	0.50	\$0.35	0.482	0.43	\$0.50	0.40	0.433
M	37	0.50	\$0.40	0.483	50	0.50	0.30	0.480	0.83	0.80	0.40	0.475	0.57	0.45	0.40	0.412
A	43	0.55	0.40	0.492	53	0.50	0.25	0.453	1.00	0.80	0.40	0.491	0.57	0.50	0.40	0.425
M	43	\$0.60	0.50	0.500	50	0.50	\$0.25	0.447	1.00	0.85	0.40	0.516	0.43	0.50	0.40	0.433
J	37	0.50	0.40	0.483	47	0.50	0.40	0.492	0.83	\$1.10	0.40	0.555	0.43	0.50	0.40	0.466
J	43	0.50	0.40	0.485	47	0.50	0.40	0.492	0.83	1.00	0.40	0.535	0.43	0.50	0.40	0.450
A	43	0.50	0.40	0.485	47	0.50	0.40	0.484	0.75	1.00	0.40	0.544	0.29	0.50	0.40	0.450
S	37	0.50	0.40	0.483	43	0.50	0.40	0.491	0.67	0.90	0.40	0.512	0.29	0.50	0.40	0.450
O	12	0.50	0.50	0.500	40	0.50	0.40	0.491	0.50	0.55	0.40	0.458	0.14	0.40	0.40	0.400
N	12	0.50	0.50	0.500	37	0.50	0.40	0.491	0.17	0.50	0.45	0.450	0.14	0.40	0.40	0.400
D	12	0.50	0.50	0.500	37	0.50	0.40	0.491	0.08	0.50	0.40	0.500	0.14	0.40	0.40	0.400
				\$0.49				\$0.48				\$0.50				\$0.43

* Percent of individual who purchased any amount of buster crabs during a given month.

Highest and lowest prices in shaded areas

Question 17 What is the average distance in miles buster crabs must be transported to reach your facility?

	High	Low	Average
Region 1	50	4	23.5
Region 2	50	2	15.3
Region 3	37	2	14.3
Region 4	50	5	17.2
			17.3 miles*

* Weighted average by production region

Question 18 Which of the following statements best describes your soft-crab production in 1991?

Statement:	Region 1 (percent)	Region 2 (percent)	Region 3 (percent)	Region 4 (percent)
I produced more soft crabs than usual.	0	53	25	0
I produced an average amount of soft crabs.	29	7	17	25
I produced fewer soft crabs than usual.	71	40	58	75
Total:	100%	100%	100%	100%

Question 19 If you produced fewer crabs than usual in 1991, how many dozens could you produce in:
...a good year?....an average year?

	"Good Year" 1	"Average Year" 2	1991 3	1991 Production Expressed as a Percent of a "Good" and "Avg" year	
	Average production (dozens/producer)	Average production (dozens/producer)	Average production (dozens/producer)	3/1	3/2
Region 1	1818	1193	994	55%	83%
Region 2	1423	873	1075	76%	123%
Region 3	3841	2483	1793	47%	72%
Region 4	3250	1942	203	6%	10%
	2163 *	1364 *	1093 *		

* Weighted averages
 + The potential increase in production for a "good year" is 50% over 1991
 ++ The potential increase in production for an "average year" is 20% over 1991

Question 20 Soft crabs are sold in many different ways. For example, some people sell by the dozen, some sell by size from point to point, and some people combine these measurements into their own system. Please provide us with the various grades, sizes and prices that you sell.

Regional Prices Received by Producers:

Grade Name*	Size Range**	Average Size***	Region 1 Range (\$/dzn)			Region 2 Range (\$/dzn)			Region 3 Range (\$/dzn)			Region 4 Range (\$/dzn)		
			High	Low	Avg.	High	Low	Avg.	High	Low	Avg.	High	Low	Avg.
Pull-outs:	(all sizes)	(all sizes)	\$12.0	\$10.0	\$11.3	\$8.0	\$5.0	\$6.7	\$8.0	\$6.0	\$7.0	n/a	n/a	n/a
Small:	4.5 - 5"	4.8"	\$15.0	\$11.0	\$12.8	\$15.0	\$8.0	\$10.8	\$15.0	\$10.0	\$13.0	n/a	n/a	n/a
Medium:	4.5 - 6"	5.15"	\$18.0	\$12.0	\$15.7	\$18.0	\$12.0	\$13.8	\$18.0	\$14.0	\$15.8	n/a	n/a	\$12.0
Large:	5 - 7"	6.11"	\$24.0	\$15.0	\$20.3	\$20.0	\$15.0	\$17.1	\$22.0	\$15.0	\$18.8	\$15.0	\$15.0	\$15.0
X-large/Jumbos	6 - 9"	7.02"	\$25.0	\$20.0	\$22.7	\$24.0	\$17.0	\$19.7	\$20.0	\$16.0	\$18.8	\$16.0	\$15.0	\$15.0
Straight-Run:	(all sizes)	(all sizes)	\$18.0	\$16.0	\$17.7	\$18.0	\$12.0	\$15.4	\$18.0	\$16.0	\$16.7	\$20.0	\$15.0	\$17.6

* Most common name used
 ** Range of all sizes reported per grade. (inches point to point)
 *** Weighted average of all sizes reported per grade. (inches point to point)
 n/a Not available because of lack of estimates

Question 21 Do you believe that the industry would benefit from a common soft crab grading system?

	Number of Producers	Percent (%)
Yes	24	39
No	38	61
Total	62	100%

Question 22 Would you be willing to participate on a panel of producers to help develop a recommended grading system for Louisiana soft crabs?

	Total Number	Percent (%)
Yes	14	23
No	48	77
Total	62	100%

Question 23 How do you package your product?

	Packaging Methods							
	(% Frozen Whole)		(% Frozen Processed)		(% Live or "Fresh")		(% Other Methods)	
	1*	2*	1	2	1	2	1	2
Region 1	62	44	0	0	94	56	0	0
Region 2	46	10	13	4	97	85	0	0
Region 3	66	42	25	16	58	42	0	0
Region 4	8	76	0	0	20	4	20	20
Total**	32%		4%		62%		2%	

*1 The percentage of producers in the region who packaged all or part of their 1991 production by that packaging method

*2 The percentage of production packed by that method

** Total weighted average for the state

Question 24 How do you get your product to market?

	Product Distribution					
	(% Delivered by Producer)		(% Buyer Picks it up)		(% Other Methods)	
	1*	2*	1	2	1	2
Region 1	93	68	44	33	0	0
Region 2	76	75	37	25	0	0
Region 3	100	85	25	12	8	9
Region 4	60	47	60	47	20	7
Total**	72%		27%		1%	

*1 The percentage of producers in the region who used that distribution method

*2 The percentage of production distributed by that method

** Total weighted average for the state

Question 25 To what type of outlet do you sell your soft crabs?

	Seafood Wholesaler		Restaurants		Seafood Retailer		Out of State		Other Producers		Other		Overseas Markets	
	#*	%*	#	%	#	%	#	%	#	%	#	%	#	%
Region 1	11	69	10	83	1	8	2	18	0	0	2	13	0	0
Region 2	26	87	18	80	13	43	7	23	13	43	5	17	1	3
Region 3	10	83	8	67	4	33	4	33	1	8	1	8	1	8
Region 4	4	80	4	80	0	0	2	40	0	0	0	0	1	20
Total**		81%		64%		27%		24%		21%		12%		5%

#* Total number of people per region who sell to a particular type of outlet

%* Percentage of people per region who sell to a particular type of outlet

** Weighted Average for the state

Question 26 What is the average distance in miles (one way) that you travel to deliver your product to market?

	High	Low	Average
Region 1	45	1	20.56
Region 2	90	4	21.9
Region 3	65	10	41.25
Region 4	31	10	15.57
Total*			24.4 miles*

* Weighed average for the state

Question 27 Many people who produce soft crabs are also involved in other activities. Please tell us which of the following activities you also engage in.

	Commercial Crabber		Commercial Shrimper		Commercial Fisherman		Non-Seafood Related Job		Commercial Oysterman		Only Soft Crabs		Commercial Crawfisherman	
	#*	%*	#	%	#	%	#	%	#	%	#	%	#	%
Region 1	14	88	1	6	2	13	7	44	1	6	2	13	1	6
Region 2	25	83	24	80	21	70	7	23	9	30	3	10	1	3
Region 3	8	87	5	42	4	33	4	33	3	25	2	17	1	8
Region 4	5	71	4	57	3	43	1	14	2	29	0	0	0	0
Total**		80%		52%		46%		29%		25%		11%		4%

#* Total number of people per region by activity

%* Percentage of people per region by activity

** Weighted Average for the state

Question 28 Many soft-crab systems are currently out of operation. Which of the following tasks do you think a soft-crab system could be used for?

	Number of Producers	Percent (%)
As a purging system for crawfish	17	26
As a purging system for oysters	5	8
Holding live bait to sell to sport anglers	35	54
Other	15	23
None of the above	7	11

Question 29 Which statement best describes your opinion on the 4/12" minimum crab regulation and its effect on soft crab producers?

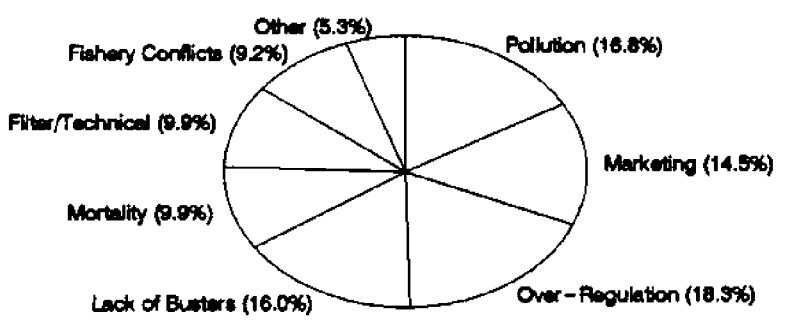
Statement:	Number of Producers	Percent (%)
I believe that the 4.5" rule limits profitability and I would like to see it abolished.	39	60
I believe it is a valuable regulation and should be kept.	16	25
I am undecided on the effects of the regulation.	5	8
I am unfamiliar with the regulation.	0	0
Other (specify)	5	8
Total:	65	100%

Question 30 We are interested in hearing your thoughts on the problems and research needs of this industry.

Commonly Listed Problems & Research Needs:	Frequency of Occurrence
Over-Regulation	24
Pollution	22
Lack of Busters	21
Marketing Problems	19
Mortality Issues	13
Technical Information Needed	8
Conflicts with other Fisheries	6
Over-Fishing	6
Filter Problems	5
Disease	2

Figure 10

**Most Common Problems and Research Needs
LA-SSC Survey 1991**



DISCUSSION

Following are discussions of the questionnaire results presented in graphic or tabular form in the previous section. In addition to quantitative findings, the discussion includes subjective observations gained during interviews and associated inferences about industry characteristics. A comprehensive interpretation of findings is provided in the conclusion of this report.

Question 1

Figure 2 shows two peaks in producer activity during 1991. These peaks occurred in the months of April and September, corresponding with the traditional seasonal fluctuations in the availability of buster crabs in Louisiana. These two periods are often referred to as the "spring run" and the "fall run". The spring run, traditionally more productive, is evident by the producer participation levels of 97% and 94% in April and May respectively.

It is important to note that in 1991, many of the interviewed producers (43%) remained in operation beyond the peak production periods to the mid-summer months. This phenomenon may be due to the growing number of producers using closed production systems instead of open ones (see Figure 5). Closed systems can require up to 30 days to reach full operation as populations of nitrifying bacteria in the biological fillers need time to grow. Many operators cited this time-lag as a reason for remaining in production during the summer season.

Question 2

Question 2 was intended to determine how long producers had been actively producing soft crabs. Figure 3 shows that the largest number of interviewed producers (49%) had been in business for less than five years. The next largest group (20%) had been in business for over 30 years. Another significant portion (15.4%) entered the industry between 1981 and 1986, a period characterized by several Sea Grant soft crab production educational workshops.

These results may indicate that the Louisiana soft crab industry has a very high producer turnover rate. Evidence can be found in evaluating the only available producer list for this industry. Constructed by an extension agent in 1985, the list contains the names of 35 producers, 50% of whom no longer operate.

High producer turnover rates can be attributed to an apparent industry size fluctuation corresponding with the seasonal abundance of buster crabs. Events that occurred in St. Bernard Parish in 1991 illustrate this. While the majority of Louisiana's producers suffered because buster crabs were less available (perhaps because of excessive spring rains), St. Bernard operators reported the best buster run in 50 years. During this period, the number of operators more than doubled in St. Bernard while the number sharply declined in the rest of the state.

Thirteen of the 65 producers interviewed (20%) had been in the business for over 30 years. No attempt was made to define any particular differences in production methods for this group as compared with the total.

Question 3

Producers were asked to designate themselves as either full or part-time operators. Thirty-four percent stated that they produced soft crabs full-time, operating six or more months per year. The highest number of full-time operators was found in Region 3, where much of the soft crab production occurs in closed systems. These often stay in operation for longer periods than open systems, requiring up to one full month for filter inoculation and preparation. In addition, the higher investment for closed systems may cause the operator to extend his production period in an effort to recapture his investment (see Figure 7).

Part-time operators produced for five months or less, although many of these operators produced only in the peak months, early spring and fall. The survey results indicate 30% of the operators in the remaining regions were full-time and 70% part-time.

Question 4

For this survey, producers themselves were assumed to be the best source of information on the number of operators in Louisiana. Each producer was asked for an estimate of the total number of operators in his general area. The table for question 4 shows the 11 communities visited by region and their responses to question 4. An estimate of total producers was calculated by averaging these responses and securing totals for each region. Highest and lowest estimates are provided to reveal the range of responses.

Trends occur where a majority ($\geq 50\%$) of respondents answered within a small margin ($\leq 30\%$) of the total range, indicating some degree of estimate reliability. Lack of trends, however, do not necessarily represent a lack of estimate reliability, as the researcher was unable to conduct more than two interviews in some communities.

The total number of producers estimated by this technique is 228; however, there are reasons to believe that the actual number may be higher in reality. Reasons for concluding that 228 is an underestimation are:

- (1) When interviewed, producers exhibited a general reluctance to make estimates and preferred to list the operators whom they knew personally.
- (2) Attempts to obtain a representative cross-section of producers may have fallen short as the largest group of producers is also the hardest to identify. This group operates fewer than three months of the year and only in years when buster crabs are plentiful.

- (3) A 1985 extension agent survey estimated that Louisiana had 425 soft crab operators (Manthe 1985).
- (4) In 1991 a scarcity in buster crabs may have caused many operators to temporarily abandon their shedding activities, resulting in an underestimation of industry participants. During the survey, many nonoperating systems were seen.

To account for the difficulty in making this estimate, the report will assume the number of producers in 1991 was between 228 and 300. While this range of uncertainty may seem high, it is considerably lower than the 1985 extension agent survey conclusion, as there is some evidence that the agents' report may have been optimistic.

In personal communication with established operators, an explanation for the discrepancy is provided. According to these producers, the research and extension efforts of the early to mid 1980s resulted in increases in the number of operators and production. Since that time, the number of producers has decreased. The "in and out" nature of operators, in combination with the 1991 buster scarcity, provide a credible explanation for a 1991 estimate that is 30 to 40% lower than the 1985 quote, or a range of 228 to 300 producers.

The geographic distribution of producers is easier to calculate. Figure 4 represents a credible approximation of this allocation with respect to the four production regions. The largest number of producers operates in Regions 1 and 2, which represent the historical Louisiana soft crab production zone. Approximately two-thirds of this production occurs in the parishes bordering Lake Pontchartrain and adjacent to New Orleans (Horst 1985).

Region 3 consists of a small, established group of operators situated south of Raceland along Bayou Lafourche to the gulf. In addition, a significant portion of Region 3 producers operates in Terrebonne and St. Mary parishes. These operators are not as well established, only operating during the last decade.

Region 4 comprises over 25% of the Louisiana coastline, yet it produces less than 3% of the annual soft crab production, possibly because of the lack of a large metropolitan market such as New Orleans. Sea Grant education efforts of the 1980s provided the impetus for this region's modest development. Consequently, systems in Region 4 tend to be larger and often incorporate closed system production methods typical of many of the producers who entered the industry in the past five years.

Question 5

Question 5 was designed to evaluate the level of adaptation of Sea Grant closed system production technologies. In addition to providing useful information, it also resulted in another cross-referencing category. Figure 5 shows that, of the 65 people surveyed, the most common form of production

(44.6%) was the original Sea Grant closed system with an oyster or clam-shell filter. Flow-through systems were the next most abundant at 32.3% ; float-cars and sand filter systems ranked third and fourth in use, at 15.4% and 6.2% respectively.

Are these figures truly representative of the state as a whole? Some might argue that the traditional float-car method is still employed by the largest group of producers, but they may no longer generate the largest production. Evidence suggests that this group may be larger than depicted by this report. Remember, many in the float-car group produce soft crabs depending on the availability of buster crabs. Because 1991 was an especially poor year for buster crabs, a large portion of the float car operators may have decided to forego production. In addition, float-car operators are the hardest to contact because of their "in and out" flexibility. Figure 5 presents data on the production methods of interviewed producers.

Deteriorating water quality was the catalyst that led many producers to adopt the Sea Grant closed system production technology. While use of the shell filter is increasing, use of the new pressurized sand filter remains quite low. Some possible reasons for the lack of enthusiasm about the new pressurized sand filter system are:

- (1) higher level of investment required
- (2) more technical skills and knowledge required
- (3) new technology only recently distributed
- (4) satisfactory performance of the shell filter system reduces or eliminates demand for an alternative

Some of the producers who expressed interest in using the new technology said they had been discouraged by rumors of high costs and low productivity. These reports may have been confirmed by this study (see Figures 7 and 9).

It is important to note that although Question 5 required the operator to choose one of the four main production methods, a considerable number of producers employ more than one type of production method in their systems. Several of the flow-through and closed system producers are located adjacent to brackish canals or bayous, where they keep large screened-in "crab boxes" for holding excess pink and white-sign crabs for their systems. In addition, many of the producers who described their operations as flow-through or recirculating still had functioning float-cars for periods when busters were abundant and space was limited.

Questions 6-8

Combining questions 6, 7, and 8 in one table describes the size and construction components of Louisiana soft crab systems. In addition, it shows an average square foot value for each of the four main production methods. According to the table, most holding trays are fairly uniform in size, having the dimensions of a standard 4' X 8' piece of plywood. The traditional float-car or "crab car" is usually much larger than free-standing tanks or trays on land. The large size of a float-car allows the operator to step down into the vessel and cull his crabs from inside.

The calculation of "average size" provides a third cross-reference category for the study. This standard unit of comparison is obtained by summing the areas of all production vessels used by a producer. The result is an average measurement of square footage that can be used for comparing systems of various styles.

Question 9

When constructing a crab shedding system, most producers (63%) relied on their family and friends for information. Extension agents were the information source for 25% of the interviewed producers. The use of publications, research literature and "how to" manuals was widespread; however, only 12% stated that they completely depended on these documents.

Questions 10 & 11

Questions 10 and 11 ask for an operator's investment cost and level of soft crab production. Although the sensitive nature of these questions sometimes required interpretation of an indirect answer, most producers were comfortable giving general estimates. Despite this difficulty, the responses analyzed in categorical form provide useful information.

Figures 6 through 9 show investment and size of production cross-referenced by system size and production method. Combining the responses of all producers, Figure 6 displays an obvious trend in investment costs per square foot. As the size of a system increases from 50 to 250 square feet, the investment cost per square foot decreases. Above 250 square feet, the investment cost per square foot increases. In economic terms, this shows that Louisiana soft crab production appears to exhibit "economies of scale" up to a system size of 250 square feet. Since Figure 6 incorporates cost data from all production methods, the graph may be influenced by cost differences that occur as producers build more and more technically advanced systems.

Equally interesting are the results portrayed in Figure 8. In evaluating the average production with respect to system size (expressed in dozens of soft crabs per square foot per year), there is a similar trend. In this case, the average production per square foot increases for systems between 50 and 250 square feet in size. However, in systems larger than 250 square feet, the yield of soft crabs per square foot begins to fall. Therefore, we can conclude that, in 1991,

the average Louisiana soft crab system exhibited increasing returns to scale as systems increased from 50 to 250 square feet, and exhibited decreasing returns thereafter.

As previously mentioned, the larger systems tend to employ more technologically advanced production methods. Because these methods are relatively new to the industry, some of this inefficiency may be caused by the "learning curve," which is typically greater for new technologies.

Some producers say that the production of soft crabs does not easily lend itself to large scale operations. These systems are difficult to keep full of crabs and 24-hour surveillance is more difficult with the larger systems. Supporting this argument is the fact that most systems (87%) are small, family owned operations (see Results, Question 14).

Figures 7 and 9 also demonstrate the results of questions 10 and 11. In this analysis, the questions are cross-referenced with respect to the type of production method used. Figure 7 shows a steady increase in costs per square foot as investors build more sophisticated systems. The many components of a closed system with a pressurized sand filter are evident in its relatively high investment costs of \$29 per square foot. This value may be artificially high as only seven sand filter operations were included in the survey. A more comprehensive study of the characteristics of sand filter operations is needed to derive more accurate estimates on costs and production.

Figure 9 shows that flow-through systems are the most productive at 4.02 dozen per square foot. Closed systems that utilize shell filters produce almost as well, at 3.85 dozen per square foot. The cost and returns for the first three production methods show the expected results; however, it is interesting that the most expensive system (recirculating/sand) is also less productive. This situation probably reflects the producers' difficulties in proper filter operation, slower start-up, and the need to keep the filter system running when few buster crabs are available.

The most productive systems appear to be those that employ recirculating systems with shell filters at a production maximizing size of approximately 250 square feet (approximately 8 trays @ 4' X 8'). Although flow-through systems have a 5% higher productive capacity per square foot, they tend to have much higher mortality rates than the closed systems (see Results, Question 12).

Question 12

Responses to the question of mortality were evaluated with respect to system size and production method. The highest average levels of mortality were reported by the operators of open production systems using float cars (29.5%) and flow-through methods (27.6%). These operations are subject to fluctuations in water quality because they produce soft crabs inside holding containers situated in natural water systems, (bayous, canals, rivers, marshes, etc.). Water quality is constantly changing in these natural systems and

operators often expect mortality from the low levels of oxygen and salinity changes that occur during certain tides. In addition, heavy amounts of rainfall can cause upstream residential areas to flood, washing a variety of urban pollutants downstream and/or quickly altering salinity. Most of the operators in the fishing communities of Barataria and Lafitte listed upstream residential pollution as their largest problem. According to those producers, this problem has become worse in recent years and has led to a 30% to 50% reduction in soft crab producers. Pollution is apparently also prevalent in the north shore community directly south of Slidell.

Conversely, closed system operators reported considerably lower mortality levels than those with open systems. Recirculating systems with shell and sand filters had average mortalities of 19.6% and 17.7% respectively. The ability to control water quality in closed systems may account for the increased survival rate; however, there are still mortality problems that must be addressed with these systems. Buster crab overloading is the main cause of mortality in closed systems. The closed system operator is limited to the current carrying capacity of his biological filter. The supply of incoming buster crabs is not constant. The fluctuations in the filter's carrying capacity occur with respect to the amount of bioloading (addition of crabs). When an unexpected buster run occurs, the unprepared closed-system operator must increase his water exchange so that he can hold more crabs. In some respects, he must temporarily operate in flow-through mode. This option is not practical if the system is located too far inland or if the water quality of the external source is poor. When a good "run" of buster crabs occurs, the open system operator can double-stack crabs in his holding trays if he has a variable speed pump or back-up pump to increase flow.

To correct this deficiency, closed systems may be constructed with extra large reservoirs to maintain adequate water quality during incidents of shock-loading (quickly adding a large quantity of crabs). This recommendation only reduces the magnitude of the deficiency. Closed systems operating with large reservoirs are less flexible than flow-through systems in handling high levels of short-term bioloading. While these systems have proven to be successful in eliminating geographic and water quality constraints under normal circumstances, further research is needed to examine the potential for increasing the carrying capacity of these systems during peak periods of buster availability.

Responses to question 12 were also examined with respect to system size. The results table shows a slight increase in mortality as system size increases from 50 to 200 square feet. It is likely that this group represents many of the float-car and flow-through (open systems) facilities that are typically smaller than recirculating systems, and exhibit higher mortality levels. With open systems, the operator's management skills may become less effective in preventing mortality as his system size and crab volume increases. Mortality may increase if no additional help is available to monitor shedding progress. Systems between 200 and 400 square feet show a mortality level that is 3-4% lower than systems of 50 - 250 square feet. This system size range represents the best overall combination of production methods and tends to correspond with an overall weighted average mortality rate of 24.1%. Systems between 400 and

650 square feet exhibit a higher level of mortality (26.2%). No explanation can be given for this deviation. The largest systems (≥ 650 square feet) have the lowest mortality at 17.8%. As previously stated, the large systems are usually characterized by closed system technologies and all of the pressurized sand systems are in this group. Although costs and returns were less impressive for the larger systems, mortality levels were considerably less than smaller systems. This low mortality may be due to the difficulty in keeping these large systems fully loaded, a situation that indirectly results in less mortality because adequate water quality is maintained by the filter.

Question 13

Producers were asked to rank their costs in order to determine the relationships among various operating components. Fifty-seven percent of the respondents ranked the acquisition of buster crabs as their highest operating cost. Since 48% of the interviewed producers purchased busters (see Results, Question 15), buying crabs was listed as the largest cost by 32% of respondents. Only 9% of the operators listed labor as their largest operating cost; however, labor is clearly the second highest operating cost for 64% of the producers. Electricity for operating pumps, lights, freezer, etc. was selected as the third highest cost by 59% of the respondents; 47% indicated that operating materials represented the fourth highest cost.

Notice that catching and buying buster crabs received 18 and 16% of the lowest cost vote. These figures may represent two distinct groups of producers: (1) those who fish for most of their own crabs, yet occasionally purchase some busters; and (2) the group of producers who purchase most of their crabs but occasionally catch some of their own busters.

Question 14

No outside labor was employed in 87.7% of the shedding operations, which were totally family-run businesses. In the few operations with wage paid laborers, the average wage was \$4.53/hr.

Although not a formal survey topic, the practice of "Shedding on Shares" was noted by many of the interviewed producers. For example, fishermen who sell buster crabs are sometimes compensated with a portion or "share" of the revenue from crabs that are successfully molt and sold. In this arrangement, the operator pays only for the crabs that successfully molt. In other cases, the operator pays his helper with a percentage of the production from the system. This method provides an incentive to handle crabs with care that is not present when laborers are paid a flat wage rate. The fundamental basis of any "shares" method is that production and profits can be maximized by basing compensation on system performance.

Question 15

Question 15 was posed to categorize how many and what kinds of producers purchase buster crabs for their facilities. A total of 31 operators (48%) reported purchasing some number of buster crabs for their systems in 1991. The highest average of buster crab purchases (83%) was in Region 3, possibly because the operators of several large systems in this region acquire all of their crabs from fishermen. In addition, the larger systems (>400 square feet) had the highest average purchases at 77%. Many of these systems are based the premise of purchasing buster crabs and thus are not the typically small, income-supplementing operations of commercial crab fishermen.

Question 16

The prices paid for buster crabs can fluctuate widely at certain times. Results from question 16 show that for each production region, the average price paid per buster crab in 1991 was around 50 cents. Although average prices are relatively constant, the reported range of prices exhibited considerable variance. The results table for question 16 lists by region the high, low, and average price per buster crab reported for each month in 1991. The first column labeled "Purch. %" indicates the total percent of individuals in that region who purchased any number of buster crabs during a particular month. The highest and lowest prices are shaded in each region to emphasize the greatest variations that occurred. While there seem to be no significant cyclical price variations with respect to certain months, there are, however, some explanations for the large price variations in certain regions.

As in the rest of the production areas, buster crabs were scarce in most of Region 2 during 1991. However, in St. Bernard Parish producers experienced a bumper buster crop that forced the May prices for some sellers down to 25 cents. An enormous amount of spring rainfall may have caused a drop in the salinity of Lake Pontchartrain. Many operators believe that the unusually high level of fresh water forced the Lake Pontchartrain crabs to move out into areas of Lake Borgne and Chandeleur Sound, primary fishing grounds of St. Bernard crabbers. At the same time, commercial shrimp trawlers in deeper waters across the state were reporting unusually high catches of buster crabs. It is probable that the excess rainfall in the spring of 1991 somehow affected the typical migration and molting patterns of crabs; however, more data are needed to fully explain this phenomenon.

Another interesting price fluctuation occurred in Region 3, when the demand for buster crabs exceeded supply. The same weather conditions that caused a surplus in St. Bernard Parish apparently caused a shortage in St. Mary Parish. Region 3 producers are highly dependent on commercial crab fishermen to sell them buster crabs (see Results, Question 15). Many of these large systems have high levels of overhead and must stay fully loaded to maintain profitability. This situation led to a demand and supply condition that was most advantageous to buster crab suppliers. In a desperate attempt to supply their

systems, some operators were reported to be offering up to \$13 per dozen for busters and providing fishermen with complimentary beer!

Any new producer who plans to purchase all of the buster crabs for his system should be aware of the associated risk. In addition to price fluctuations, producers who purchase all their crabs may incur a higher mortality rate. A cross-reference of the producers purchasing 100% of their buster crabs shows that they reported an average mortality of 36%, approximately 12% higher than the study average. This high mortality rate may reflect careless handling when transporting busters to large shedding facilities. Note that a 36% mortality rate is associated only with those producers who purchased 100% of their buster crabs. It does not necessarily imply that these producers had larger systems with advanced production technologies. On the contrary, the largest, most technologically advanced systems reported the lowest mortality (17.5%).

Question 17

The average producer traveled 17.3 miles one way or just under 35 miles round trip to capture buster crabs for his facility. While many producers are situated in prime fishing areas, the waters are not always productive. The range of high and low mileage shows that in Regions 1 - 4, producers traveled from four to 100 miles round trip to harvest their buster crabs. The highest average distance was reported in Region 1, where producers must travel completely outside of the Lake Pontchartrain area when crabbing becomes unproductive in the lake.

Question 18

In order to evaluate the 1991 production season, operators were asked to choose from among three statements regarding their 1991 production. Twenty-nine percent of the operators said that they produced more than an average amount of soft crabs in 1991, and the majority of this group consisted of the Region 2 operators from St. Bernard Parish. However, 56% of the producers said that they produced less than an average amount of soft crabs in 1991. Question 19 was posed in anticipation of this second group, and its results present information on two potential production levels.

Question 19

The average production per producer for a "good year" is given in the first column of Question 19 and denoted by "1". The average production per producer during an "average year" is given in the second column and denoted by "2". In all regions, the actual 1991 soft crab production was considerably less than amounts quoted for "good" and "average" years.

Considering weighted averages, the producers estimated their potential production capacity at a much higher level than what they produced in 1991. According to the results of this question, the Louisiana soft crab industry could experience a 50% production increase over 1991 if everyone had a "good" year.

While it is unlikely that all regions would experience such production simultaneously, the increase in production resulting from an average year is 20% higher than that of 1991. In any case, there is potential for a substantial increase in production for any given year. It is unclear just how many soft crabs are imported to Louisiana from out of state, and it is, therefore, hard to determine what effect a "good" year would have on soft-crab prices. More information regarding prices of soft crabs is provided in the analysis of Question 20.

Question 20

Question 20 required more information than other questions in the survey because the operator was asked to describe all the components of his grading system and the resulting prices for each grade. The grading styles of the various producers were more uniform than expected. While the names of certain grades varied from community to community, there were essentially six grades reported: (1) pull-outs, (2) small, (3) medium, (4) large, (5) x-large, and (6) straight-run.

Pull-outs are crabs that are pulled out of their shells by the operator when complications occur during molting and death is imminent. Most operators saved these animals for personal consumption. A few operators in Regions 1, 2, and 3 sold their pull-outs for prices ranging from \$5 to \$12 per dozen. Most pull-out sales were to individuals, as pull-outs often have legs and claws missing and thus are usually not satisfactory for restaurant sales. Despite the appearance of a pull-out, most operators agreed that pull-outs were the best tasting of all available soft crabs. This quality may result because these animals do not have the opportunity to harden after being manually removed from their shells.

The next most common grade, "small," was used by fewer than one half of the producers interviewed, because the word "small" tends to indicate some type of inferiority. Comparable names are "mediums," "hotels," and "primes". These three in particular are also used in the Chesapeake Bay region of Maryland and Virginia. In the fishing communities of lower Jefferson Parish, small crabs were once called "3 for 1's" or "2 for 1's". These are very old grades that existed in the days when large soft crabs sold for \$1 each. Smaller crabs were sold "three for a dollar" or "3 for 1's," "two for a dollar" or "2 for 1's," and so on. Odd variations such as "2 for 3's" and "3 for 4's" have been developed to represent the higher prices demanded in recent years; however, the majority of producers in this area have abandoned this grading style as it tends to yield the operator lower prices than the one-word grades such as small, medium, or large. The average size of a "small" graded crab was 4.6 inches with a range of 4.5 - 6 inches. Prices for small crabs averaged \$10.80/dozen and ranged between \$8 and \$15/dozen. The minimum legal size for selling soft crabs is 4.5 inches; however, many producers feel that they could market even smaller crabs if they were allowed. Chesapeake Bay producers sell a significant portion of their soft crabs at a small size between 3.5 and 4.5 inches.

"Medium" grades averaged 5.15 inches and ranged from 4.5 to 6 inches. Prices for mediums began as low as \$12/dozen and reached as high as \$18/dozen. The weighted average price of the Louisiana medium grade was

\$14.40/dozen. Some other names used for medium included "prime," jumbo," and "2 for 3's".

The "large" grade is popular with Louisiana soft crab operators. The size of a large varied from 5 to 7 inches, and the average large grade crab was 6.11 inches from point to point. This grade has been referred to as "1 for 1's" and recently as "2 for 3's" or "1 for 2's". By the Chesapeake Bay grading standard this animal is labeled a "whale" and brings the highest price of all their grades. The price range reported for "large" grade crabs in Louisiana is from \$15 to \$24/dozen and the weighted average price is \$17.80/dozen.

Crabs over 6 inches are often called "jumbos" or "x-large". This grade brings the highest price of all Louisiana soft crabs at an average of \$19.70/dozen. Prices for these crabs have been reported to go as high as \$30/dozen or \$2.50 each when sold to individuals in Region 1. Though frequently found in Louisiana, soft crabs of this size are very rare in the Chesapeake Bay fishery. This characteristic is often touted by Louisiana producers when marketing their soft crabs to buyers who desire larger animals.

"Straight-run" is a grade in which the producer sells all sizes of crabs for one standard price. The average Louisiana straight-run price in 1991 was \$16.30/dozen. This price is sufficient even when compared with optimistic production levels. For example, if the average Louisiana producer sells equal portions of small, medium, large and x-large crabs, his overall average is only \$15.60/dozen (\$.70 less than the average straight-run price). Another advantage is that the work involved in the grading process can be shifted to the buyer when the straight-run process is used. Many times, the straight-run price is settled by the producer and the buyer before the season begins. But straight-run grading does not work well in isolated production areas such as Regions 3 and 4. Wholesalers there usually require large volumes to justify the extra work involved after purchasing straight-run soft crabs.

Region 1 consistently reported higher prices for all grades of soft crabs. This may be attributed to the large volume of producers selling directly to restaurants and individuals. Conversely, many communities in Region 2 have a tradition of selling to middlemen such as seafood wholesalers. As a result, the average prices received in Region 2 are lower. Regions 3 and 4 contain too few producers to make reliable observations on grading or pricing trends, but it is suspected that these producers have no central market and sell to a variety of outlets.

Questions 21 and 22

Sixty-one percent of the industry operators did not see the benefit of a common grading system. When asking the question, the researcher was always careful to emphasize that such a system would only be a recommended system and not a mandatory one. Nevertheless, many producers indicated that the mere idea of pursuing such a conventional system would result in a loss in overall prices at the market. Many of those who preferred a uniform grading system

assumed it would give them collective marketing power in dealing with buyers. However, it appears that most of those in favor were only mildly enthusiastic as only 23% agreed to help develop such a system.

Question 23

The results of Question 14 show that most production (60.8%) is sold in live, or "fresh," form. Fresh soft crabs are usually preferred by seafood wholesalers who purchase large volumes.

Approximately one third of Louisiana soft crabs are sold "whole frozen". These crabs are often frozen by producers when production is high. By freezing the crabs and accumulating inventory, the producer is assuming the risk that prices will rise in the future. In addition, some producers have buyers who specifically request whole frozen soft crabs. The lack of a large, central market has forced the few producers in Region 4 to use the "whole frozen" method.

Less than 4% of the interviewed producers cleaned or processed their crabs before freezing them. The "processed and frozen" method is usually employed when a producer plans to sell to restaurants or individuals who are willing to pay extra for a processed product. Breaking the skin of soft crabs puts a producer into the "seafood processor" category, requiring him to have an FDA-approved facility and a seafood processing permit.

Questions 24, 25, and 26

Seventy-two percent of the time, the producer assumes the responsibility to deliver his soft crabs to the buyer. Question 26 shows that producers drive from 1 to 90 miles to market but on average travel about 24 miles one way. In 27% of the cases, the buyer will pick up the soft crabs from the producers. In this situation, the buyer usually works in a particular community and collects from several producers at predetermined intervals. Individual buyers usually travel to the producer's location; however, producers deliver to restaurants. Most producers sell to a variety of outlets such as restaurants, individuals, and wholesalers. While no effort was made in this survey to determine relationships between prices and markets, most producers said that sales to restaurants and individuals yielded highest prices.

Seven categories in Question 25 were provided to determine where producers sold their soft crabs. Unlike questions 23 and 24, the producers were not asked to assign percentages to each category. As a result, it was impossible to assign weighted averages for each category. Despite the lack of weighted averages, the analysis of Question 25 gives valuable information on the most popular forms of marketing. Sales to wholesalers were dominant, with 80% of the operators selling all or part of their production to this type of outlet. Sixty-four percent of producers sold all or part of their production to restaurants. In Regions 1 and 4, sales to restaurants are at approximately the same level as sales to wholesalers.

Less than 30% of those surveyed sold to retail seafood outlets in 1991. Sales to other producers, reported at 22% participation, can be attributed to Region 2 where the only "producer-to-producer" sales were observed. Forty-three percent of the producers in Region 2 sold soft crabs to fellow producers in 1991. Just under 24% of the producers had some experience with out-of-state markets and less than 5% ever sold overseas. Twelve percent of the operators chose the "other" category. Although this category was left undefined, it includes institutional sales and value-added processing.

Question 27

To obtain more information on the employment activities of people involved in soft crab production, Question 27 asked producers to check off all the categories in which they were active. The vast majority (80%) of producers said that they were commercial crab fishermen. Approximately 53% of the interviewed producers were also involved in commercial shrimping. It is evident from the results of this question that the average operator is a commercial fisherman whose income is derived from a variety of activities in addition to the production of soft crabs. While most were commercial fishermen, 30% of the operators reported having a job unrelated to seafood in addition to their shedding operations. Ten percent were strictly involved in soft crab production.

Question 28

The most feasible second-use option for systems was the holding of live bait to sell to sports fishermen, according to those surveyed. Producers who used their systems for this function were located in areas near public or private boat launches. Sports fishermen pay 10 - 16 cents per animal for baits such as cocahoe minnows. Holding live bait-shrimp represents an alternative use for soft crab systems during the off-season, or when crabs are not readily available.

Approximately one quarter (26%) of the operators indicated that their systems could be used to produce soft-shelled crawfish. The "other" category was also a popular response. Twenty-three percent of the producers used their systems to experiment with everything from turtles to tomatoes.

Question 29

Louisiana Registered Statute Title 56 Section 326.A(1)&(2) states that hard-shelled crabs shall be . . . "5 inches in width as measured from point to point of the upper shell, except when held for processing as soft crabs or sold to a processor for the making of soft-shell crabs . . ." and soft-shelled crabs shall be . . . "4-1/2 inches in width as measured from point to point of the upper shell . . .".

Producers were asked to choose from among several position statements regarding this regulation. The majority of surveyed operators (60%) said they would like this regulation abolished. Many of these operators see a significant market for smaller soft crabs. In support of this idea, the Chesapeake Bay

fishery has an established grade at 3.5 inches, which is probably produced from a buster crab that is less than 3 inches. In addition, the smaller soft crabs are said to be faster molters, more abundant, and better tasting than the larger ones. Many operators indicated that harvesting crabs as small as 3.5 inches only in soft crab operations has no detrimental effects.

While 16% of the operators were unfamiliar with, undecided about, or indifferent to the regulation, 25% of the respondents stated that the regulation was valuable and should be kept. Among some of the reasons cited for this position was the opinion that a great deal of abuse would occur under any regulation that designated 3.5-inch crabs as "legal for shedding purposes only." Some of these producers suggested that it would lead to a break-down of the minimum size requirements for the hard crab fishery, and result in depressed prices and over-exploitation of the resource.

Question 30

Question 30 was intended as a general comment area, in which producers were asked for their suggestions on the research and management needs of the industry. Producers used this question as an opportunity to voice their opinions on several topics of interest to the soft crab industry. Question 30 categorizes these comments by order of importance to producers. The level of importance to producers was determined by the frequency with which an item was mentioned.

Over-regulation was the most frequently listed problem facing operators. There are several topics that fall under this category including problems with enforcement of the 4.5-inch minimum on soft crabs; licensing and tagging requirements for commercial crabbing; and complicated and unnecessary regulations by the Louisiana Department of Wildlife and Fisheries.

In addition to regulation, many operators pinpointed the regulations imposed on their other commercial fishing activities. Opposition to the ban on commercial redfish harvesting was very high on this list. Many of the soft crab producers said they were once dependent on the redfish for income. In addition, over 50% of soft crab operators interviewed were also commercial shrimpers, voicing their opinions on a variety of regulatory problems from setting season dates to the description of a legal trawl. Although these topics were not anticipated, they were relevant to the operators. The fact that most operators are not merely soft crab producers but also commercial fishermen forced these issues into the discussion.

Pollution was the second most important topic to soft crab producers. Producers indicated that the level of pollution was decreasing in some areas around Lake Pontchartrain and that the lake is cleaner than it has been in several years. Most of the complaints of pollution came from operators in fishing communities adjacent to heavily populated residential areas. The two most notable problem areas were reported by the producers in the north shore community directly south of Slidell, and the Barataria and Lafitte producers directly south of New Orleans. According to these producers, when heavy rains

occur, urban pollution is carried through surface runoff by storm drains that dump directly into tributaries that flow into their communities. Some operators believe that these same rains cause sewerage facilities to overflow into the same tributaries.

Oil field runoff and insecticides sprayed by mosquito control units are also serious pollutants, the producers said. Most of the producers cited pollution and poor water quality as their reason for switching to a closed system. Several open-system operators expressed interest in the Sea Grant closed systems for the same reason. Several operators expressed a desire for increased regulatory and enforcement action by agencies such as Department of Environmental Quality and the Environmental Protection Agency.

Lack of buster crabs was an especially large problem in 1991. Unusually large amounts of rain in March and April may have caused salinity levels to drop in the marsh. Many producers believe that the buster crabs avoided this fresh water and made their spring "run" much farther out in the gulf. This theory is substantiated by reports that off-shore shrimpers caught high numbers of busters in their trawls during April and May. With the exception of St. Bernard Parish, the heavy rains caused a significant decrease in Louisiana soft crab production in 1991. Some concluded that low salinities in Lake Pontchartrain to the northwest forced the crabs to move south into the coastal waters surrounding St. Bernard Parish. While this theory seems feasible, no additional investigations were made to determine its validity, even though crabs have been known to live and successfully molt in waters with salinities of less than ten parts per thousand.

The lack of a dependable supply of buster crabs has contributed to the high turnover of the industry. However, shortages of buster crabs are not uncommon and according to the oldest producers (in business > 30 years), the successful operator does not totally depend on soft crab production for his income. According to these producers, soft crab production is only profitable when busters are plentiful.

A small number of operators expressed interest in determining the feasibility of holding white sign crabs and feeding them until they molt, an idea that usually involved some sort of comparison to the methods used in soft crawfish production. If successful, this method would considerably reduce the risk involved in soft crab production and result in a more stable supply.

Marketing problems composed about 15% of the topics discussed in response to Question 30. These problems included grading, pricing, and competition with Chesapeake Bay producers. While complaints on prices were often mentioned, none of the operators said that they were unable to sell their crabs. In fact, very few of the interviewed operators carried any long-term inventory (> 6 months). Some of the producers complained that the prices they received were being undercut by the "in-and-out" crowd. This group apparently gets in and out of soft crab production according to the level of busters available. It is not unusual to see many new, temporary systems being erected in years

when busters are abundant. A flood of production causes a temporary surplus and forces down prices. To offset this occurrence, many producers freeze their soft crabs and sell when prices are higher.

Freezing soft crabs presents a unique marketing problem in itself. While fresh soft crabs are easily inspected, frozen ones are difficult, if not impossible, to inspect. Unscrupulous operators will sometimes sell frozen paper-shell crabs or spoiled crabs. According to one operator, these producers give the industry a "black-eye" and force buyers to look for good-quality crabs outside of Louisiana.

Finally, several producers expressed concern that many Louisiana restaurants are purchasing frozen cased, graded, and cleaned soft crabs from the Chesapeake Bay region at two-thirds of the cost of local product. The majority of producers indicated that it is unfair to forbid the sale of 3.5 -inch soft crabs, yet this size is imported and served in local restaurants.

Mortality issues included all comments regarding the death of crabs in traps, on the way to systems, and at systems. Most of the problems with mortality are occurring in open systems because of urban sprawl and pollution. However, many of the producers with closed systems noted losses from filter failure. Many of these failures were caused by overloading during peak periods of buster availability. When busters are abundant, closed system producers are heavily tempted to overload their trays or tanks. These closed system operators see a need to develop methods to capitalize on buster abundance without overloading their systems and killing crabs. Increasing the size of filter systems and blending in water to create a partial flow-through/recirculation system are two suggested alternatives.

A significant number of operators requested **more technical information** regarding filters, water chemistry, and handling and general care of crabs. Many of these requests were made by individuals who found current publications too technical to read.

Conflict with other fisheries was mentioned by approximately 5% of the producers. These may represent the operators who are commercial crabbers as well as soft crab producers. These operators complained that the shrimp trawlers are constantly dragging up their crab traps. In many areas this has led to heated disputes, as some crabbers are forced to completely remove all of their traps before the shrimping season begins or risk losing many of them.

Over-fishing is a problem that most commercial fishermen understand. The ease of entry into commercial crabbing has contributed to this problem. The capital requirements for commercial crabbing are lower than for most other Louisiana commercial fisheries. Some crabbers blame the depressed oil and gas industry for the sharp increase in competition. Limited entry was an alternative suggested by many of the older, established operators. Over-fishing problems seem to be more relevant to the commercial crab fishermen. The effects of over-fishing on soft crab production are not as clear.

Filter problems were cited by very few operators and many expressed satisfaction with the performance of their shell filter systems. The biggest problem with the closed systems was the limited production capacity. Some producers sought research to develop a closed system that can handle a heavier load without requiring a larger system size.

CONCLUSIONS

Economic Impact

The study attempted to estimate the number of soft crab producers in Louisiana by employing the aid of actual producers. The resulting estimate of 228 producers was low in comparison with previous estimates. Further evaluation revealed that the total number of operators is probably between 228 and 300. While a 1985 survey by extension agents listed the total number of producers at 425, there is some evidence that this estimate was optimistic. The following factors support the estimation of 228 to 300 producers:

- (1) When interviewed, producers exhibited a general reluctance to make estimates and preferred rather to list the actual operators whom they knew personally.
- (2) Attempts to obtain a representative cross-section of producers may have fallen short because the most abundant group of producers is also the hardest to identify. This group operates fewer than three months of the year and only in years when buster crabs are plentiful.
- (3) A 1985 extension agent survey estimated that Louisiana had 425 soft crab operators (Manthe 1985).
- (4) Weather conditions in 1991 caused a scarcity in buster crabs, which may have caused many operators to temporarily abandon their shedding activities.
- (5) By assuming a minimum of 228 producers, predictions made in the lower end of the range will be conservative; however, allowing for up to 300 will account for any underestimations that may have resulted in Question 4.

In summary, the assumptions made in calculating the Louisiana farm-gate value of soft crab production in 1991 are: (1) an estimated range of 228 - 300 producers; (2) an average production per producer of 1100 dozen soft crabs per year; and (3) an average price of \$17/dozen. Therefore, total production of the industry in 1991 was between \$4.3 and \$5.6 million. According to producers, 1991 was not an average production year for soft crabs. Because of widespread buster crab scarcity, production was below average for most producers. The potential increase in production over 1991 can be from 20 to 50% higher for an "average" or "good" year, respectively.

Technology

The use of Sea Grant production technology is increasing. Over 50% of the interviewed operators were using closed systems with shell or sand filters. While this sample distribution may not be truly representative of the entire state, a weighted average of technology use by region estimates that as much as one-third of all production in 1991 was from closed systems. The use of the shell filter system is growing, but the use of the more advanced sand filter is limited. The reasons for this include:

- (1) higher level of investment required
- (2) more technical skills and knowledge required
- (3) new technology only recently distributed
- (4) satisfactory performance of the shell filter system reduces or eliminates demand for an alternative

Many fishing communities are reporting increased pollution levels from nearby residential communities. In these areas, some producers are being forced to adopt closed-system production methods. While closed systems allow the continuance of soft crab production in these areas, the limitation of these systems is a significant concern. The availability of buster crabs fluctuates and the temptation to overload closed systems can be great when large quantities of busters are available.

There are several regional differences in technology and production methods. Regions 3 and 4, the south-central and southwestern parishes of Louisiana, are relative newcomers to soft crab production. Closed-system production methods are almost exclusively used in these regions. Many of these producers went into business because of Sea Grant's educational efforts of the mid 1980s.

Closed systems were found to be two to three times larger than open systems although no reason could be identified for this phenomenon. These closed systems were found to operate for longer periods than open systems. Larger size and longer operational periods may lead one to expect higher yields; however, the performance of these large systems is far behind that of the smaller family-operated units. This lower performance may be caused by technology. Filter preparation must be completed before these systems can be fully loaded. The closed-system operators often continue running longer to offset their higher capital costs, and at times it is difficult to keep the system loaded with crabs.

Economic Requirements

Producers were asked to give a general estimate of the cost of building their shedding operations. Results from this question showed that optimal size with respect to investment per unit area was 250 square feet (eight trays). In

addition, producers were also asked to give general estimates of their 1991 production. Answers to this question were similar, with production per unit area being maximized at 250 square feet. These two questions were also cross-referenced with the type of production method used. As expected, the capital investment rises with the level of technology used. Sand filter systems exhibited an investment cost per unit that was four times higher than that of the next highest category.

The yield of soft crabs per square foot was evaluated with respect to production method. The order of productivity from high to low was: (1) flow-through systems, (2) shell filter systems, (3) float cars, and (4) sand filter systems. This study showed that the sand filter system is the most expensive and least productive of all methods. This may be attributed to the effects of a longer learning curve, longer start-up periods for proper filter operation, and the dilution of management over the typically large systems characterized by this technology.

Very little use of outside labor was reported; the average soft crab production system is family owned and operated. The cost of catching or purchasing buster crabs was perceived to be the highest operational cost, followed by labor and electricity. Only 48% of the operators reported purchasing buster crabs. Most producers (80%) are already commercial crabbers who produce soft crabs to supplement their incomes. The price of buster crabs can fluctuate greatly in times of scarcity or abundance but usually averages \$.50 per crab or \$6/dozen. Producers who purchase 100% of their buster crabs assume much greater risk from price fluctuations and mortality resulting from improper handling.

Grading and Marketing

A comprehensive evaluation of the various grading techniques revealed that there are six basic grades: (1) pull-outs; (2) small; (3) medium; (4) large; (5) x-large; and (6) straight-run. Prices reported for these grades varied from region to region, with Region 1 reporting the highest overall prices per grade. Straight-run grading averaged \$16.30/dozen, which compared favorably with the average price received in an optimistic production scenario. When asked if a uniform grading system would be beneficial, 61% of producers said "No". Of the 39% who said "Yes," only 14% indicated interest in helping to develop such a system. Complaints about competition usually centered around the problems associated with the increase in producers and production in years when buster crabs are plentiful. Despite this problem, few producers admitted holding inventory for over six months and many stated that they held none at all.

The most common form of soft crab marketing is usually fresh product delivered by the producer to the buyer. Several market outlets were identified, but seafood wholesalers and restaurant sales were the most prevalent markets. Sales to restaurants and individuals accounted for the highest prices received.

Problems and Research Needs

A variety of problems and research needs was identified in the study. Although specific examples are mentioned throughout the discussion section, some of the more important problems and research needs are summarized below.

Pollution. Closed systems have been a solution for many producers faced with deteriorating water quality; however, just under half of the producers still use open systems such as float-cars and flow-through systems. Many of these individuals can no longer supplement their income with soft crab production because of the poor water quality in their areas. These problems exist particularly in the Barataria/Lafitte community below New Orleans and the north shore community south of Slidell. Producers in these two areas specifically requested that this problem be addressed.

Size Restrictions and Regulatory Issues. Most of the producers interviewed (80%) were also commercial crabbers. In addition, many of them relied on their skills in other commercial fisheries such as shrimping and fishing. As a result, many of the regulatory issues discussed involved problems with these industries and were not specifically related to soft crab production. A soft crab exemption from the 4.5-inch minimum crab law should be evaluated. Sixty percent of the soft crab producers concluded that the law was unnecessary and only allowed out-of-state producers to capture market territory in Louisiana. More research is needed to determine the economic potential and impact on natural crab resources of legalizing a small-grade soft crab (3.5+) in Louisiana. There appears to be an untapped market as evidenced by the local consumption of imported Chesapeake Bay crabs of this size.

Stabilizing Buster Supply. The lack of buster crabs is probably the biggest problem facing producers. A record year for hard crab production in Louisiana, 1991, was one with a severe shortage of buster crabs. Many times when hard crabs are abundant, the soft crab producer cannot locate buster crabs. A detailed study of the migratory patterns of these animals would be useful to soft crab producers. Ideally, such a study would produce a more scientific approach to determining when and where buster crabs are abundant.

Several producers suggested that the Louisiana Sea Grant College Program investigate the potential for feeding crabs in captivity. This concept has proven to be successful in soft crawfish production and may have some applications for soft crabs. The development of such techniques would allow producers to spread out production and help the industry by stabilizing supply. In addition, cultivated crabs may represent a potential recruitment source for these systems. Thus further study in the culture of the blue crab is warranted.

Marketing Strategy. Producers expressed little interest in a state-recommended grading system. Perhaps a more appropriate direction for such interests would be further evaluation of the various markets used by producers to

stimulate price uniformity. Prices received in the same region can vary greatly within a few miles.

"Straight-run" selling is a viable option for many producers. When and where feasible, the straight-run method should be promoted.

Methods of reducing operating costs should include education on efficiency-based techniques such as "shedding on shares". Louisiana producers have the opportunity to sell directly to end-users (i.e., restaurants and individuals); however, most of the East Coast production is purchased by large packing houses whose activity creates product uniformity at the cost of lower prices to the producer.

Mortality. Mortality in closed systems was lower than in open systems; however, the ability to load these systems is limited compared with that of open systems. Because the availability of buster crabs is sporadic, there is need for more research into furthering the shock-loading capacity of closed systems.

Researchers know that there is no such thing as a "truly closed system". Future efforts to educate producers should emphasize the integration of production techniques. Producers need more information on the potential for combining the best attributes of open and closed systems.

The pressurized sand filter that is popular in soft crawfish production has not been well accepted by the soft crab industry. This technology is fairly new and is likely to become more prevalent as more producers switch to closed systems. Further refinement is required. Producers are spending too much money for too little production with this technology.

Enhancement of Extension. Finally, there is a need for the development of an equitable method of keeping track of the industry. Sea Grant's ability to satisfy any of the previously stated problems and needs would be greatly enhanced if there existed a two-way communication link between researchers and producers. Researchers need to be able to track the industry's progress in order to identify the appropriate areas of research and resource management needs. The results of this survey are only a cross-sectional view of the industry in 1991. The cooperation of 65 producers generated a significant amount of information; however, the volatile nature of this industry lends a short life to the information's credibility. The ability to conduct research that will aid producers is limited by the fact that the identity of the industry is constantly undefined. There is a genuine need for a technique that will enable researchers to keep track of this industry without imposing additional licenses or fees on producers. One solution might be to "piggy-back" on commercial crab licenses by requiring producers of soft crabs to identify themselves by checking a box provided on their commercial crabbing licenses. Ideally, such a policy would result in no additional license fees for producers while providing valuable means for researchers to maintain a current picture of the industry without resorting to months of networking to locate producers.

Soft crab producers could greatly aid their industry by forming an association or some other reliable means of communicating with researchers and each other. Researchers have no effective means of tracking the industry's problems or progress. For example, this study was conducted primarily because of the interest expressed by a Sea Grant administrator, one researcher, and two extension agents. The soft crab industry can expand, but two-way communication is needed to develop a program of expansion.

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ADDENDUM

Louisiana Soft-Shelled Crab Survey

Q1. What months did you produce soft crabs in 1991?

Jan Apr Jul Oct
 Feb May Aug Nov
 Mar Jun Sep Dec

Q2. How long have you been in soft crab production?
(Check all periods you produced soft crabs.)

1991 1985 greater than 10 yrs
 1990 1984 greater than 20 yrs
 1989 1983 greater than 30 yrs
 1988 1982 greater than 40 yrs
 1987 1981
 1986

Q3. Which best describes your situation? (Choose the one best answer.)

I am a full-time producer and operate most of the year (≥ 6 months).
 I am a part-time producer and I operate less than half of the year
(≤ 5 months).

Q4. How many people in your general area produced soft crabs in 1991
(both full time and part time)?

Number of people who shed crabs _____

Q5. Which of the following best describes your operation?

I have one or more float cars and I run bush lines and/or crab traps.
 I operate a flow-through system.
 I operate a recirculating system with a shell or gravel filter.
 I operate a recirculating system with a sand filter.
 Other (please describe) _____

Q6. How many trays or floats do you operate?

_____ Number of trays or floats

Q7. What are the average dimensions of your trays or floats?

Length_____ (ft) Width_____ (ft) Depth_____ (inches)

Total production space_____ (sq ft)

Q8. What materials did you use to construct your trays or floats?
(Choose more than one if necessary.)

_____ Wood

_____ Fiberglass

_____ Plastic

_____ Metal

_____ Other (describe) _____

Q9. In building your shedding system, whom did you rely on the most for information on soft crab production? (Choose the one best answer.)

_____ My family or my friends

_____ Publications and research literature

_____ A university researcher or extension agent

Q10. What is the total amount of money you spent building your system (construction costs)?

Total construction costs: \$ _____

Q11. What was your total production of soft crabs in 1991?

Total number of soft crabs _____ (dozens)

Q12. What was your overall average mortality in 1991?

Percent mortality _____ %

Q13. Which of the following is the greatest cost in operating your system?
(Please rank in order of importance, 1 = the highest cost and
6 = the lowest cost.)

- Catching crabs for my system
- Buying crabs for my system
- Labor
- Electricity
- Materials (operating supplies)
- Other _____.

Q14. Which best describes the labor force of your operation?

- A totally family-operated operation with no outside labor
 - Some occasional part-time paid labor
 - One or more full-time paid laborers
 - Other (please specify) _____
-

Q15. What percentage of buster or peeler crabs did you purchase from other fishermen in 1991?

Percent purchased _____ %

Q16. In some areas of Louisiana, the price paid for buster crabs changes greatly during the year. Please indicate the average price paid per buster crab for each month in 1991.

\$ () Jan	\$ () Apr	\$ () Jul	\$ () Oct
\$ () Feb	\$ () May	\$ () Aug	\$ () Nov
\$ () Mar	\$ () Jun	\$ () Sep	\$ () Dec

Q17. What is the average distance in miles that buster crabs must travel to reach your facility?

_____ average distance (miles)

Q18. Which of the following best describes your soft crab production in 1991?

- I produced more soft crabs than usual
- I produced an average number of soft crabs
- I produced fewer soft crabs than usual

Q19. If you produced fewer crabs than usual this past year, how many dozens of crabs could you produce in:

a good year? _____ (dozen)

an average year? _____ (dozen)

Q20. Soft crabs are sold in many different ways. For example, some people sell by the dozen, some sell by size from point to point, and some people combine all of these measurements into their own grading system. In the space below please tell us about all the grades of soft crabs that you sell.

	<u>Name of Grade</u>	<u>Inches Point to Point</u>	<u>Price \$/Dozen</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____

Q21. Do you believe that the industry would benefit from a common soft crab grading system?

_____ Yes _____ No

Q22. If you answered yes to Q21, would you be willing to participate on a panel of producers to develop a recommended grading system?

_____ Yes _____ No

Q23. How do you package your product? (Choose one or more and tell what percent of each is packaged this way.)

____ Whole frozen _____ %
____ Cleaned and frozen _____ %
____ Live or "fresh" _____ %
____ Other (please specify) _____

Q24. How do you get your product to market?
(Choose one or more and tell what percentage of each.)

- I deliver it myself _____%
- The buyer comes for it _____%
- Other (please specify) _____

Q25. To what type of outlet do you sell your soft crabs?
(Choose as many as necessary.)

- A wholesale distributor/seafood buyer
- To local retail seafood markets
- Directly to restaurants
- To another soft crab producer
- To out of state markets
- To overseas markets
- Other (please specify) _____

Q26. What is the average distance in miles that you travel to deliver your product to market?

_____ average distance (miles)

Q27. Many people who produce soft crabs are also involved in other activities. Please check all the businesses you engage in.

- I am a commercial crabber
- I am a commercial shrimper
- I am a commercial oyster fisherman
- I fish commercially for various fish (mullet, trout, drum, flounder, etc.)
- I am a commercial crawfisherman
- I have a nonseafood related job
- I only shed soft crabs

Q28. Many soft crab systems are currently out of operation. Which of the following tasks do you think a soft crab system could be used for? (Choose more than one if necessary.)

- As a purging system for crawfish
- As a purging system for oysters
- For holding live bait to sell to sport fishermen
- Other _____
- None of the above

Q29. What is your opinion of the 4.5-inch minimum crab regulation and its effect on soft shell producers?

- I believe that the 4.5-inch rule limits my profits and I would like to see it abolished.
- I believe it is a valuable regulation and should be kept.
- I am undecided about the effects of this regulation.
- I am unfamiliar with this regulation.
- Other (please specify) _____

Q30. We are interested in hearing your thoughts on the needs that exist within this industry. If you have any comments for soft or hard crab research or management we would appreciate your writing them below.

If you would like a copy of the results of this study, please fill in the information below. If not, please check "No results requested" and simply write in your five-digit zip code so that your answers will be reported in the correct area of the state.

Name _____

Address _____

City _____ Parish _____ Zip _____

Phone number _____

*No results requested _____ Zip Code _____

Your cooperation with this survey is greatly appreciated. By finding out more about the soft crab industry, LSU will be better prepared to perform research and assist in resource management that will benefit Louisiana's soft-shell crab producers.