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FEASIBILITY ANALYSIS FOR A PUBLIC CRAB SHEDDING FACILITY IN SALEM COUNTY, NEW JERSEY

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INTRODUCTION

A proposal to construct a public soft-shelled crab shedding facility in Salem County, New Jersey is under consideration by the County of Salem. This study contributes to an evaluation of the feasibility of such a facility by providing: 1) background on the blue crab industry; 2) an assessment of blue crab resource potential; 3) an evaluation of marketing opportunities for peeler and soft shell blue crab produced in south New Jersey, including direct sales to restaurant markets; 4) a determination of Salem County crabber interest in a centralized facility for Salem County; 5) general parameters for a shedding operation; and 6) and three options for County consideration.

BACKGROUND

Soft-Shelled Crab

A soft-shelled blue crab is produced when a blue crab sheds its existing hard shell in a process called molting. The underlying new and larger shell is soft but hardens after a brief period. If the crab is removed from the water just after shedding, its shell remains soft. While in the soft-shelled stage, the shell of the blue crab, as well as the meat, is edible. In its life cycle, a blue crab molts 18-22 times (Virginia Sea Grant, 1986).

Crabbers are able to identify crabs which are preparing to molt by certain physiological changes. Color changes along the edges of the swimming paddles indicate how close crabs are to shedding. When the paddle margins turn pink, a crab will molt in three to six days. A red color indicates that shedding will occur within one day. Crabs at the pink or red stage are called "peelers" or "shedders."

Fishing Methods

Landings of peeler crabs peak in spring and early fall. Peeler crabs can be harvested as a targeted catch. Fishermen target peeler crabs by placing live male crabs called "Jimmy's" inside their traps instead of edible bait. A high percentage of the crabs attracted will be

females which are just about to shed. This is consistently the case because crabs mate when females molt.

Peeler crabs also are taken incidentally in the fishery for hard-shelled blue crab. The New Jersey fishery for hard crab also is predominantly a pot fishery. Crabbing with self-trapping pots is the most important warm-season fishing method in Delaware Bay and elsewhere. In winter, toothed dredges are used to harvest blue crabs as they lay inactive in deep channels. The winter dredge harvests do not yield peeler crabs.

Hard and Peeler Crab Production

Salem County hard crab landings in 1994 were 490,840 lbs. During the past twenty years (1975-1994), County hard crab landings have ranged from 1,184,760 lbs. (1991) to 243,560 lbs. (1982) (Table 1).[1] Salem County's contribution to New Jersey total hard crab landings has ranged from a high of 37.3% (1981) to a low of 11.3% (1994). New Jersey crab landings in 1994 were 4,351,400 lbs. During the past 20 years (1975-1994), state landings ranged from 5,109,776 lbs. (1988) to 390,000 lbs. (1977).

Salem County peeler landings in 1994 were 65,798 lbs. During the past seven years (1988-1994), County peeler landings ranged from 145,032 lbs. (1992) to 21,634 lbs. (1991) (Figure 1 and Table 2).[2] The County's contribution to total New Jersey peeler landings in 1994 was 10.7% and ranged from 23.5% (1992) to 6.9% (1990).

New Jersey peeler landings in 1994 were 616,149 lbs. During the past seven years (1988-1994), state peeler landings ranged from 615,976 lbs. (1992) to 117,980 lbs. (1991). New

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[1] Salem County blue crab landings are not available for 1975-1978 and 1984-1987.

[2] A 20-year history comparable to hard crab landings for New Jersey and Salem County peeler crab landings is not available because NJDEP landing records are incomplete prior to 1988.

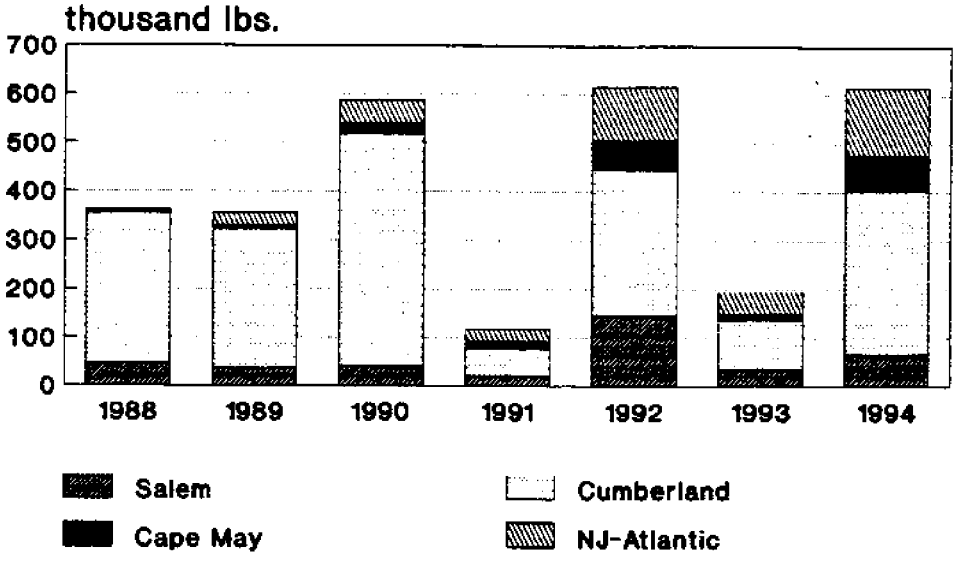
Table 1: New Jersey and Salem County Hard Crab Landings, 1975 - 1994

Year	New Jersey (lbs.)	Salem County (lbs.)	Salem Co./ New Jersey (%)
1994	4,351,400	490,840	11.3
1993	2,439,280	420,360	17.2
1992	4,417,280	1,176,320	26.6
1991	4,964,560	1,184,760	23.9
1990	3,538,100	784,800	22.2
1989	4,346,088	496,800	11.4
1988	5,109,776	592,000	11.6
1987	3,309,000	NA	NA
1986	2,605,000	NA	NA
1985	2,191,700	NA	NA
1984	1,601,000	NA	NA
1983	1,197,700	277,880	23.2
1982	873,100	243,560	27.9
1981	1,587,200	591,280	37.3
1980	1,901,000	373,160	19.6
1979	857,000	257,400	30.0
1978	898,000	NA	NA
1977	390,000	NA	NA
1976	2,696,000	NA	NA
1975	2,870,000	NA	NA

NA = Landing data not available.

Source: NJDEP Div.of Fish, Game & Wildlife

Figure 1: New Jersey Peeler Landings, 1988-1994



Source:NJDEP Div.of Fish,Game & Wildlife

Table 2: New Jersey, New Jersey-Delaware Bay, and Salem County Peeler Crab Landings, 1988 - 1994

Year	New Jersey (lbs.)	New Jersey-Delaware Bay (lbs.)	Salem County (lbs.)	NJ-Dela-ware Bay/ New Jersey (%)	Salem County / New Jersey (%)
1994	616,149	476,075	65,798	77.3	10.7
1993	196,352	148,883	35,050	75.8	17.9
1992	615,976	504,040	145,032	81.8	23.5
1991	117,980	92,140	21,634	78.1	18.3
1990	587,605	540,420	40,734	92.0	6.9
1989	356,605	328,172	37,181	92.0	10.4
1988	363,426	357,724	46,707	98.4	12.9

Source: NJDEP Division of Fish, Game & Wildlife

Jersey-Delaware Bay peeler landings in 1994 were 476,076 lbs. and ranged from 540,420 lbs.(1990) to 92,140 lbs.(1991). The contribution of New Jersey-Delaware Bay peeler landings to total New Jersey peeler landings dropped from almost 100% in 1988 to about 75% in 1993 and 1994. This apparent shift in peeler production is probably due more to a change in the management regime rather than a significant change in the operation of the fishery. NJDEP began licensing the blue crab fishery on the Atlantic coast (in contrast to Delaware Bay) in 1989. Landing data for blue crabs, including peelers, for Atlantic coastal counties subsequently improved.

Employment

Salem County crabbers accounted for 15% of the total commercial crab licenses issued in New Jersey in 1993 (Table 3). The number of New Jersey commercial crab licenses recently increased by 44%, from 319 in 1991 to 459 in 1993. Likewise, the number of licensed crabbers in Salem County increased by 97%, from 34 in 1991 to 67 in 1993.

Two factors have contributed to the increased number of licensed crabbers. In 1992, NJDEP announced that a limit would be placed on the number of commercial crab licenses. Although this policy was not implemented until the 1994 season, the early announcement encouraged more people to obtain crab licenses in order to preserve their right to crab in the future.[3]

[3] In the spring of 1994, crabbers who had held a license during the previous three seasons were granted a license upon application. Others participated in a lottery for the remaining licenses. The licenses are not saleable; they are transferable only to immediate family members.

The current population of active Salem County commercial crabbers is about 33. In 1991, prior to the NJDEP announcement, there were 34 licensed crabbers in Salem County. Although the NJDEP records indicate an increase in the number of commercial crabbing licenses issued during the 1992, 1993, and 1994 seasons, only 30 crabbers actually reported landings in Salem County in 1993 (July) and 33 reported landings in 1994 (August).[4]

Table 3: New Jersey Commercial Crab Licenses by County, 1991-1993

County	1991	1992	1993
Atlantic	45	43	67
Bergen	1	1	4
Burlington	2	1	0
Cape May	54	78	118
Cumberland	115	115	138
Gloucester	0	3	0
Middlesex	4	3	0
Monmouth	8	10	12
Ocean	56	48	50
Salem	34	55	67
Somerset	0	1	1
Total	**319**	**358**	**459**

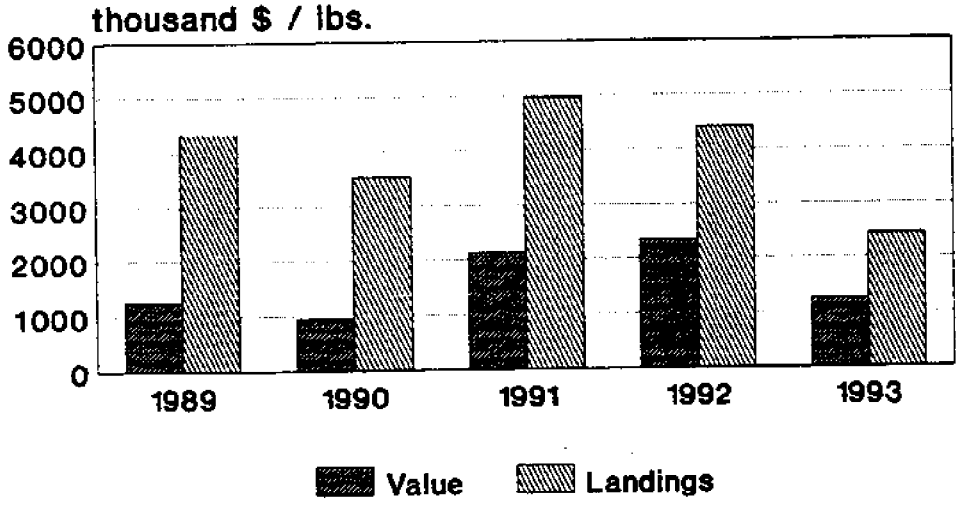
Source: NJDEP Div.of Fish, Game & Wildlife

[4] Joseph Dobarro, Principal Fisheries Biologist, Bureau of Marine Fisheries, Marine Fisheries Administration, Division of Fish, Game and Wildlife, New Jersey Department of Environmental Protection, personal communications.

Economic Value

The harvest of blue crabs is important to commercial fishermen in New Jersey and Salem County. From 1989 to 1993, an average of about 4 million lbs. of hard crabs, valued at $1.6 million, were landed annually in New Jersey (Figure 2).[5] During the same period, an average of 800,000 lbs. of hard crabs, valued at $350,000, were landed in Salem County (Figure 3).[6]

Figure 2: New Jersey Hard Crab Landings and Value, 1989-1993

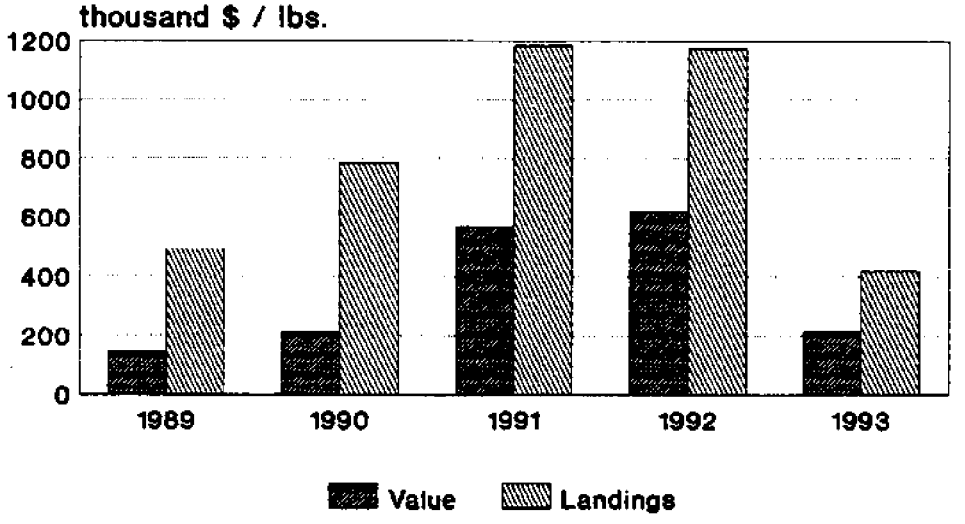


Source: NJDEP Div.Fish,Game & Wildlife
and National Marine Fisheries Service

[5] Reported total hard crab values for New Jersey were derived from NJDEP landing statistics and $/lb values based on National Marine Fisheries Service landing and value statistics.

[6] Reported total hard crab values for Salem County were derived from NJDEP landing statistics and $/lb values based on National Marine Fisheries Service landing and value statistics.

Figure 3:Salem County Hard Crab Landings and Value, 1989-1993



Sources:NJDEP Div.of Fish,Game &Wildlife and National Marine Fisheries Service

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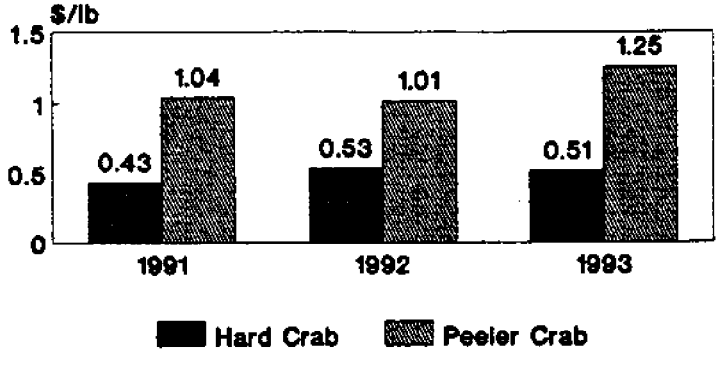
The sale of peeler crabs offers potential additional economic return to watermen. From 1991 to 1993, the price for hard blue crabs ranged from $.43 to $.53/lb., while the price for peelers ranged from $1.01 to $1.25/lb. (Figure 4).

Figure 4: Price per Pound of New Jersey Hard & Peeler Crab, 1991-1993



Source: NMFS

RESOURCE POTENTIAL

Resource potential is an important factor in determining the feasibility of a public crab shedding facility for Salem County. Status of stocks cannot be determined directly. Instead, fishery managers rely on historical harvest data and sampling efforts as indicators of resource abundance. Analyses of harvest data assume that catches are proportional to stock size if fishing effort is constant. With healthier stocks, the number of peelers landed would be expected to be relatively high so long as crabbers continued to operate as before.

Predictions of future fishery production is not an exact science. Stock abundance fluctuates considerably from year to year. Moreover, the mobile nature of crab stocks affects the availability of the resource in any given area. Predictions of the hard and peeler crab landings in Delaware Bay and Salem County can only be specified in ranges.

Environmental conditions have a primary influence on the abundance of blue crabs. In particular, salinity and temperature ranges at the earliest life stages and the severity of winters on adult survival have been shown to limit crab populations. At the same time, unregulated catches within small areas can severely reduce local populations (Dobarro and Figley 1981). Nevertheless, a female crab can produce up to 2 million eggs, so favorable environmental conditions could result in a large population even if the previous generation was small in numbers.

It should be noted that county landings do not necessarily reflect the relative number of crabbers or crabber fishing success for a given county. Both crab stocks and the fishery are mobile. Crabbers registered in one county may land crabs in another county. Therefore, it is necessary to examine landing data for Delaware Bay in addition to localized landings for Salem County.

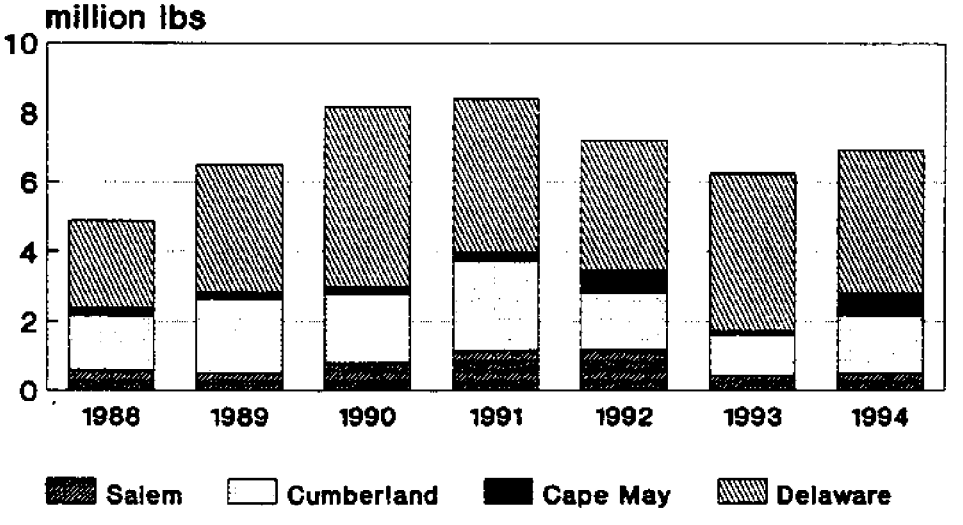
Delaware Bay Hard Crab Landings

Delaware Bay hard crab landings from 1988 to 1994 demonstrate the variability in hard crab

landings (Figure 5 and Tables 4 & 5).[7] During the past seven years, landings ranged from 8,425,880 lbs. (1991) to 4,885,040 lbs. (1988). New Jersey's share of total Delaware Bay hard crab production varies from year to year. New Jersey's share ranged from 48.5% (1988) to 27.7% (1993). New Jersey-Delaware Bay hard crab landings were 2,818,240 lbs. in 1994 and, from 1988 to 1994, ranged from 3,961,280 lbs. (1991) to 1,730,320 lbs. (1993).

New Jersey-Delaware Bay hard crabs are landed in Salem, Cumberland and Cape May Counties. Cumberland County is the leading New Jersey area for Delaware Bay hard crab

Figure 5: Delaware Bay Hard Crab Landings, 1988 -1994



Source:NJDEP Div.of Fish,Game & Wildlife
and Del.DNR, Div.of Fish & Wildlife

[7] The Delaware Department of Natural Resources, Division of Fish & Wildlife reports hard crab landings in bushels. Landings were converted to pounds, assuming 40 lbs./bushel, to be consistent with New Jersey Department of Environmental Protection, Division of Fish, Game & Wildlife landing reports.

Table 4: Delaware Bay Hard Crab Landings, 1988 - 1994 (lbs.)

Year	Delaware	Cumberland County	Cape May County	Salem County	Delaware Bay Total
1994	4,121,240	1,672,480	654,920[1]	490,840	6,939,480
1993	4,523,840	1,203,480	106,480	420,360	6,254,160
1992	3,761,960	1,631,600	644,880[1]	1,176,320	7,214,760
1991	4,464,600	2,553,000	243,520	1,164,760	8,425,880
1990	5,220,080	1,985,240	197,760	784,800	8,187,880
1989	3,693,760	2,138,520	190,080	496,800	6,519,160
1988	2,515,760	1,537,880	239,400	592,000	4,885,040

[1] Includes Atlantic as well as Delaware Bay landings.

Sources: Del.DNR Div.of Fish & Wildlife
and NJDEP Div.of Fish, Game & Wildlife

Table 5 - New Jersey, Cumberland County, and Salem County Share of Delaware Bay and New Jersey-Delaware Bay Hard Crab Landings, 1988 - 1994

Year	New Jersey / Delaware Bay (%)	Cumberland County / Delaware Bay (%)	Cumberland County / NJ-Delaware Bay (%)	Salem County / Delaware Bay (%)	Salem County / NJ-Delaware Bay (%)
1994	40.6	24.1	59.3	7.1	17.4
1993	27.7	19.2	69.6	6.7	24.3
1992	47.9	22.6	47.3	16.3	34.1
1991	47.0	30.3	64.4	13.8	29.4
1990	36.2	24.2	66.9	9.6	26.4
1989	43.3	32.8	75.7	7.6	17.6
1988	48.5	31.5	64.9	12.1	25.0

landings. Cumberland County's share of total Delaware Bay hard crab landings was 24.1% in 1994 and ranged from 32.8% in (1989) to 19.2% (1993). Cumberland County's share of New Jersey-Delaware Bay hard crab landings was 59.3% in 1994 and ranged from 75.7%(1989) to 47.3% (1992).

Salem County's hard crab landings were 490,840 lbs. in 1994 and, during the past seven years (1988-1994), ranged from 1,184,760 lbs. (1991) to 420,360 lbs. (1993). Salem County's share of total Delaware Bay hard crab landings was 7.1% in 1994 and ranged from 16.3% (1992) to 6.7% (1993). Salem County's share of New Jersey-Delaware Bay hard crab landings was 17.4% in 1994 and ranged from 34.1% (1992) to 17.6% (1989).

Delaware Bay Peeler Crab Landings

Peeler crab landings in Delaware Bay were 901,462 in 1994 and ranged from 1,211,018 lbs. (1992) to 129,608 lbs. (1991) (Figure 6 and Tables 6 & 7).[8] New Jersey-Delaware Bay peeler landings ranged from 540,420 lbs. (1990) to 92,140 lbs. (1991). New Jersey's share of total Delaware Bay peeler crab landings was 49.4% in 1994 and ranged from 71.1% (1991) to 32.9% (1993).

As with hard crab, Cumberland County led neighboring counties in landings of peeler crabs. Cumberland County peeler landings were 318,596 lbs. in 1994 and ranged from 476,875 lbs. (1990) to 54,619 (1991). Cumberland County's share of New Jersey-Delaware Bay peeler landings was 70.7% in 1994 and ranged from 88.2 (1989) to 59.3% (1992). Cumberland County's share of total Delaware Bay peeler landings was 34.9% in 1994 and ranged from 55.9% (1990) to 22.6% (1993).

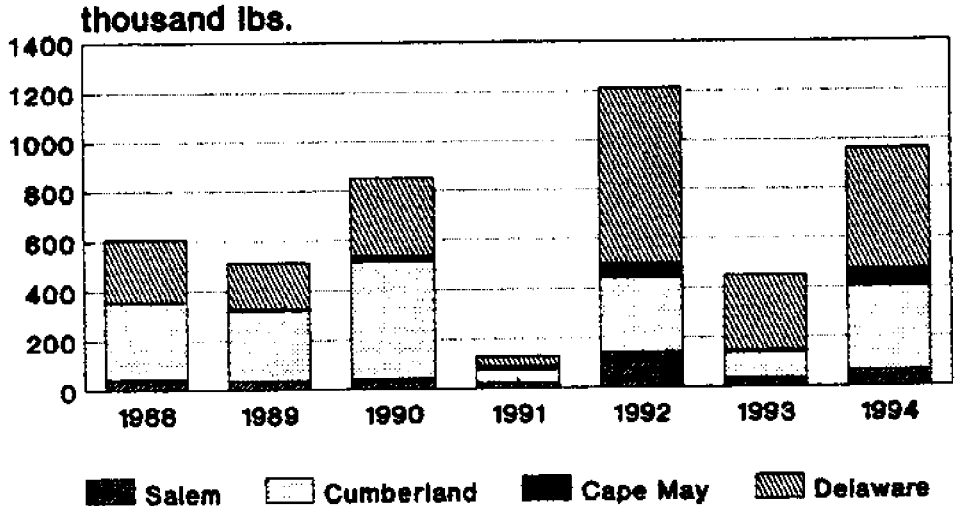
Salem County peeler landings were 40,780 lbs. in 1994 and ranged from 145,032 lbs. (1992)

[8] The Delaware Department of Natural Resources, Division of Fish & Wildlife and New Jersey Department of Environmental Protection, Division of Fish, Game & Wildlife report peeler landings in number of crabs. Peeler landings are converted to pounds assuming 120 crabs/bushel and bushel/40 pounds.

to 21,634 lbs. (1991). Salem County's share of New Jersey-Delaware Bay peeler crab landings was 13.8% in 1994 ranged from 28.8% (1992) to 7.5% (1990). Salem County's share of total Delaware Bay peeler landings was 6.8% in 1994 and ranged from 16.7% (1991) to 4.8% (1990).

Based on recent landing records, peeler landings in Salem County may be expected to range from 21,000 to 47,000 lbs. The quantity of shedders available to a central facility will depend upon options available to watermen. It depends on whether the Salem County shedding facility and Handy's Cumberland County shedding facility are operational, and, therefore, provide leasing opportunities. It also depends on the relative strength of alternative markets for peelers as bait or sale to shedding operations in and out of New Jersey, and markets for soft crabs shedded by the crabbers themselves. As discussed previously, fishermen can control to some degree the proportion of their catch made up of peelers by using peeler pots.

Figure 6: Delaware Bay Peeler Crab Landings, 1988-1994



Source:NJDEP Div.of Fish,Game & Wildlife
and Del.DNR Div.of Fish & Wildlife

Table 6: Delaware Bay Peeler Crab Landings, 1988 - 1994 (lbs.)

Year	Delaware	Cumberland County	Cape May County	Salem County	Delaware Bay Total
1994	487,743	318,596	54,343	40,780	901,462
1993	303,072	102,164	11,669	35,050	451,955
1992	706,978	300,434	58,574	145,032	1,211,018
1991	37,468	54,619	15,887	21,634	129,608
1990	312,164	476,875	22,811	40,734	852,584
1989	185,635	284,699	6,292	37,181	513,807
1988	251,215	307,814	3,203	46,707	608,939

Sources: Del.DNR Div.of Fish & Wildlife
and NJDEP Div.of Fish, Game & Wildlife

Table 7 - New Jersey, Cumberland County, and Salem County Share of Delaware Bay and New Jersey-Delaware Bay Peeler Crab Landings, 1988 - 1994

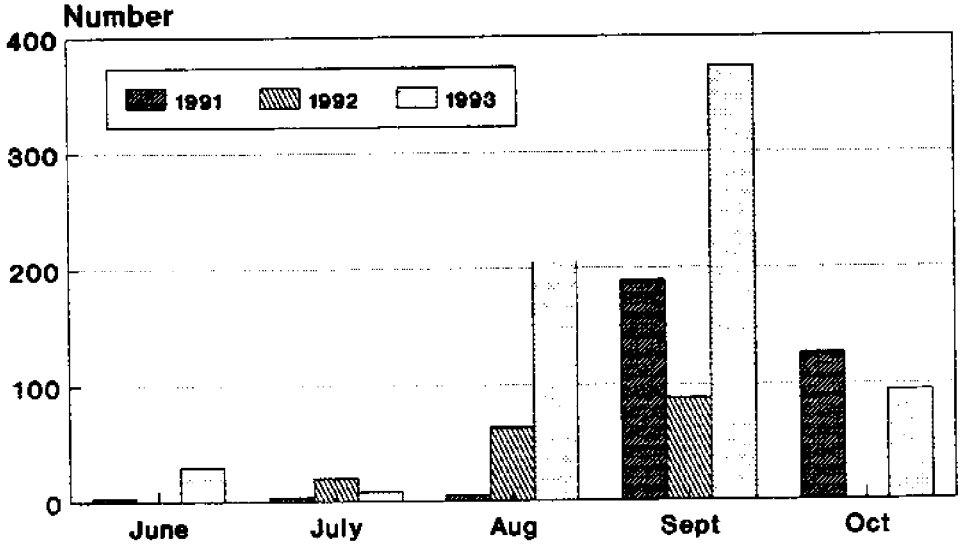
Year	New Jersey / Delaware Bay (%)	Cumberland County / Delaware Bay (%)	Cumberland County / NJ-Delaware Bay (%)	Salem County / Delaware Bay (%)	Salem County / NJ-Delaware Bay (%)
1994	49.4	34.9	70.7	6.8	13.8
1993	32.9	22.6	68.6	7.8	23.5
1992	41.6	24.8	59.6	12.0	28.8
1991	71.1	42.1	59.3	16.7	23.5
1990	63.3	55.9	88.2	4.8	7.5
1989	63.9	55.4	86.8	7.2	11.3
1988	58.7	50.5	86.0	7.7	13.1

Sampling Program

Because blue crab is a short-lived species and populations are highly variable, harvest analysis only can indicate long-term trends in resource abundance. In order to more reliably to provide insights into the year-to-year changes in Delaware Bay stocks, NJDEP Division of Fish, Game, & Wildlife has conducted an estuarine sampling program since 1991. This program provides a time series of data from which to assess trends in blue crab population relative abundance. The sampling program uses relative abundance of young crabs in sample catches to predict whether or not a strong "year-class" will be reaching harvestable size the following year and, therefore, be recruited to the commercial fishery. Presuming that the winter kill is not significant, relative abundance of blue crabs in the sample is a good predictor of relative recruitment to the fishery in the following summer.

The NJDEP sampling program is conducted from June to November and April-May of the following year (Dobarro 1994). The relative monthly abundance of blue crab for 1991 to 1993 is presented in Figure 7. In 1993, blue crab were most abundant in August and

Figure 7: Relative Monthly Abundance for Blue Crab - Otter Trawl Survey Results 1991 - 1993



Source:NJDEP Div.of Fish,Game,& Wildlife

September. The 1993 sampling data indicates a significant increase in the relative abundance of blue crabs in the estuary in 1993 compared with the previous two sampling years, 1991 and 1992. The data further suggests a strong recruitment phase during the months of August and September.

Data from the 1991 and 1992 sampling programs suggested a decline in the abundance of harvestable stocks beginning in the fall of 1993 and carrying over into the spring and early summer of 1994. These data further suggested that the fishery would be supplemented thereafter by the 1993 year class. Crabs from the strong 1993 year class would be expected to become available to the fishery by late summer 1994 and the harvest of blue crabs should increase appreciably by the fall of 1994.

The expected increase in blue crab landings was not particularly evident in the pot fishery, but there was an increase in crab landings in the dredge fishery in early November. The 1994 sampling data is currently being analyzed. However, the strength of the early winter dredge fishery suggests that the 1994 year class is strong and the spring and early summer 1995 harvest will be relatively strong.

The NJDEP Division of Fish, Game, & Wildlife sampling program and recruitment predictions can be useful information in the planning and management of a crab shedding facility. Facility expansion may be appropriate when a strong year class is predicted for the following season, but should probably not be planned if a weak year class is identified by the sampling program.

Two limitations of Delaware Bay blue crab predictions should be noted. The NJDEP sampling program has been implemented for only 4 seasons; its predictive accuracy is in the process of being tested. Furthermore, evaluation of the NJDEP sampling data at best provides insights into the strength of the fish for only 1 year ahead.

MARKETS FOR SOUTH JERSEY PEELER AND SOFT-SHELLED CRAB

Salem county crabbers have several market alternatives for their peeler crab catch. There is a strong bait market for peelers in south Jersey. Recreational fishermen buy peeler crabs as bait at fishing supply stores. Peelers command as much as $1.50 - $1.75/crab from recreational fishermen.

The market for peelers as a food product developed in the Chesapeake Bay region as the technology improved for assuring quality soft crabs. Demand for New Jersey peelers in New Jersey increased as soft-crab shedding operations in Maryland and Virginia sought to augment local supplies. The shipping of peelers from New Jersey to Chesapeake Bay shedding plants often resulted in significant losses due to crab mortality.

The John T. Handy Company of Crisfield, Maryland, one of the primary buyers of New Jersey peelers, sought to alleviate this problem by establishing a shedding operation in south Jersey. Following an evaluation by New Jersey Sea Grant Marine Advisory Service of the geographic distribution of licensed commercial crabbers, water quality parameters, and alternative sites, the Handy Company established a shedding facility in Cumberland County, New Jersey in 1989.[9] Numerous south Jersey commercial crabbers leased tanks at the Handy facility to shed their crabs. Crabbers living and working in Salem County, however, reportedly found that commuting to the Handy Company facility to tend their tanks was a hardship.

In 1993, Salem County crabbers obtained a new market for their peelers when the Mad Horse Crab Company established a new private shedding operation in Salem County. At their facility in Canton, Mad Horse purchases peelers from Salem and Cumberland County crabbers, sheds them, and sells soft crab to wholesalers. Mad Horse operated 60 tanks

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[9] Stewart Tweed, marine extension agent, New Jersey Sea Grant Marine Advisory Service and Rutgers Cooperative Extension of Cape May County, personal communications.

during the 1993 and 1994 seasons, and planned production for 1995 is at the same level. Production may increase in the future through the acquisition of peelers from outside the state.[10] During the 1994 season, approximately 10-12 Salem County crabbers sold their peelers to Mad Horse.

Salem County crabbers who choose to shed their own crabs have several production options. They can lease tanks from the Handy facility in Cumberland County or construct their own float or on-land tank system. Crabbers can sell their soft-crabs through several marketing channels. They can sell them to New Jersey dealers servicing restaurants and wholesalers in Philadelphia and New York, to the Handy Company in Crisfield, Maryland which markets both fresh and frozen soft-crab nationally and internationally, to other out-of-state buyers, and directly to restaurants.

The demand for soft-shelled blue crabs has consistently exceeded the supply, and, therefore, soft crabs are relatively easy to sell. Soft crab prices vary with the quality, size and availability of the crab (Oesterling 1988). Top quality soft crabs which have the desired degree of softness and all their appendages bring a better price than those of lower quality. Soft crabs are graded by size and sold by the dozen rather than by weight. Crabs measuring 3.5 to 4.0 inches from shell point to shell point are called "mediums," crabs 4.0 to 4.5 inches are called "hotels," crabs 4.5 to 5.0 inches are called "primes," crabs 5.0 to 5.5 inches are called "jumbos," and crabs over 5.5 inches are called "whales." Prices on all sizes of fresh, live crabs will be higher at the beginning of the shedding season when inventories of frozen crab are at their lowest. As the season progresses and soft crab become more available, prices tend to drop.

Live soft crab are packed in shipping boxes which measure approximately 23" x 18" x 10." The boxes are made of corrugated cardboard, wax-dipped for water resistance. Each box contains three nesting trays. The crabs are placed belly down facing in the same direction.

[10] Alan Shimp, Marketing Director, Mad Horse Crab Company, personal communications

Each crab rests partially on the crab in front of it and is angled slightly upward. A single tray can hold 5 or more dozen mediums, 5 dozen hotels, 4 dozen primes, 3 dozen jumbos and 2 dozen whales (Oesterling 1988). Live soft crabs which have been properly handled and packed can survive 4 or 5 days when stored at temperatures of 48 to 50 F.

Another shedding option would become available if the proposed Salem County crab shedding facility is built. The facility would provide centralized production through the leasing of shedding tanks to independent crabbers. It is expected that only fresh, live soft-crab will be produced during the first phase of operation because the investment in freezing and cold storage equipment is outside the start-up investment envisioned by the County. It is further anticipated that Salem County crabbers will sell most of their soft crab production to local dealers to whom they sell hard and peeler crabs. However, some crabbers may be interested in augmenting these sales with direct sales to restaurants in areas where they would not compete with their own dealers. Therefore, a survey of south Jersey restaurants was conducted to determine the potential for direct sales to this potential market.

SOUTH JERSEY RESTAURANT MARKETS FOR SOFT-SHELLED CRAB

A restaurant market study was conducted in 1993 to identify opportunities for direct sales of soft-shelled crabs to south Jersey restaurants.

Methods

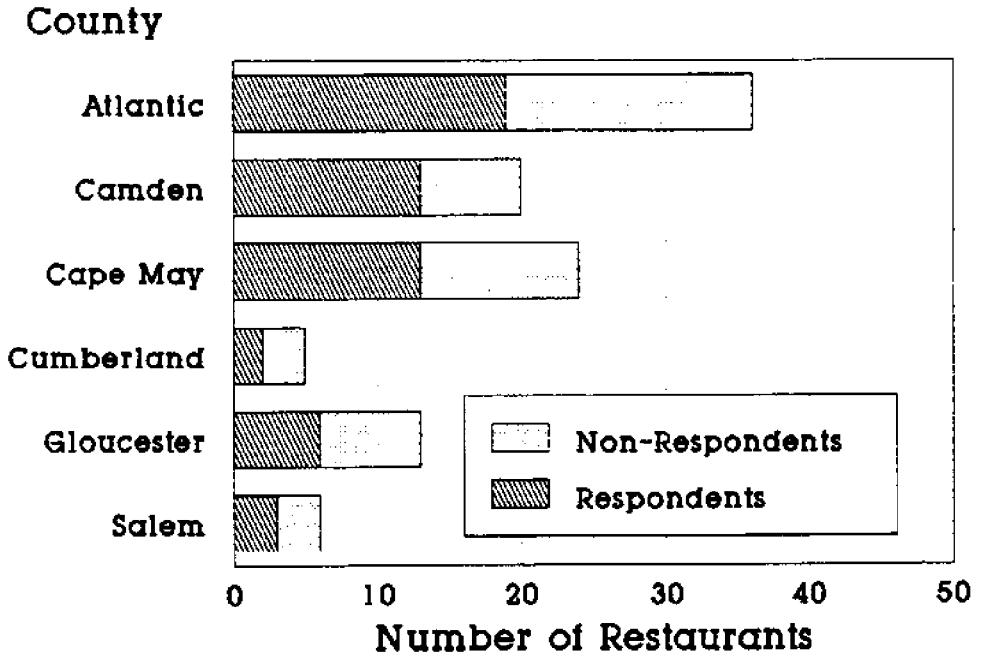
A telephone survey was designed to identify specific restaurants which purchase soft-shelled blue crab and to which crab produced at the proposed shedding facility in Salem County could be sold. The market area was defined by a limit of one hour's driving time from the proposed facility. The two hour round-trip driving time to market was assumed to be the maximum available to crabbers who must also tend their crab pots and shedding tanks. By this reasoning, the market area included restaurants in six southern New Jersey counties: Atlantic, Camden, Cape May, Cumberland, Gloucester and Salem.

Restaurant names, locations, and telephone numbers were obtained from the yellow pages of area telephone books. Restaurants selected met at least one of the following criteria: 1) business name contained a seafood-related term (e.g, Captain Wally's, The Wharf, etc.), 2) "seafood" featured in its advertisement, and/or 3) restaurant listed under "seafood" in the restaurant guide. Large seafood chain restaurants, such as Red Lobster and Long John Silver, were excluded because they have centralized sourcing and do not buy direct from fishermen. All relevant restaurants in the market area were contacted by telephone and seafood buyers for each of the restaurants were interviewed. The target response rate was at least 50 percent of relevant restaurants.

Results and Discussion

The total number of relevant restaurants identified was 104. As shown in Figure 8, 35 percent were found in Atlantic County. Eight of the 36 restaurants in Atlantic County were casino restaurants in Atlantic City. Cape May, Camden, and Gloucester Counties contained 23, 19, and 12 percent respectively of total relevant restaurants. Salem and Cumberland Counties contained many fewer restaurants; together these counties contributed only 11

Figure 8: Survey Response Rate



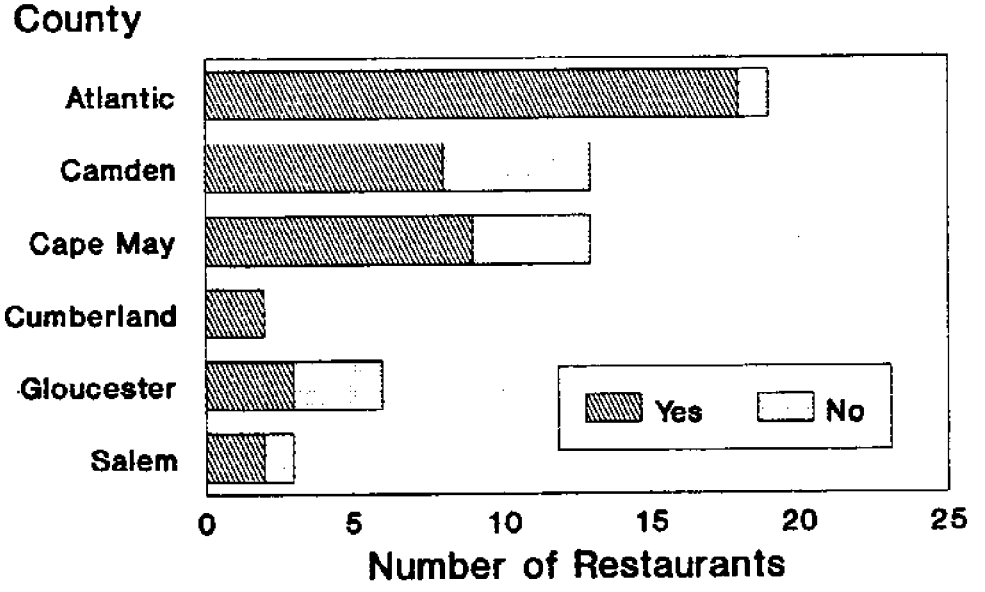
N=104, n=56

A total of 56 surveys was completed for an overall response rate of 54 percent. By county, response rates varied from 40 percent in Cumberland County to 65 percent in Camden County. There were few outright refusals to participate in the survey. Non-responses were more a function of inability to find a convenient and sufficient time within the busy schedules of the seafood buyers to conduct the interview.

Forty-two of the 56 restaurants surveyed (75%) served soft-shell crab (Figure 9). However, these positive responses were not distributed uniformly within the market area. Restaurants serving soft-shell crab were concentrated along the coast in Atlantic and Cape May Counties and in Camden County. The very few seafood restaurants in Salem and Cumberland Counties do not present significant opportunities for sales.

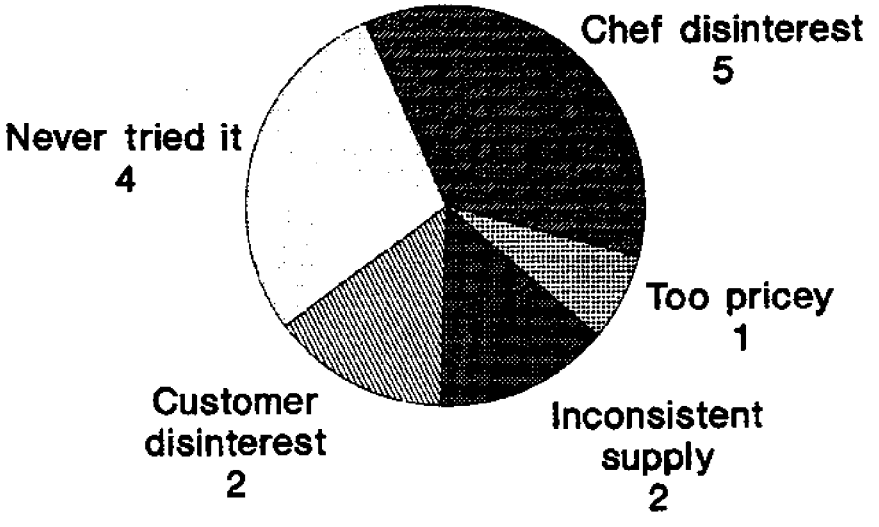
Fourteen seafood restaurants (25%) did not serve soft-shell crab (Figure 9). Five of these were found in Camden County, four in Cape May County, three in Gloucester County, and one each in Atlantic and Salem Counties. The reasons reported by restaurants in Camden

Figure 9: Do you serve soft-shell blue crab?



n=56

Figure 10: Why don't you serve soft-shelled blue crab?

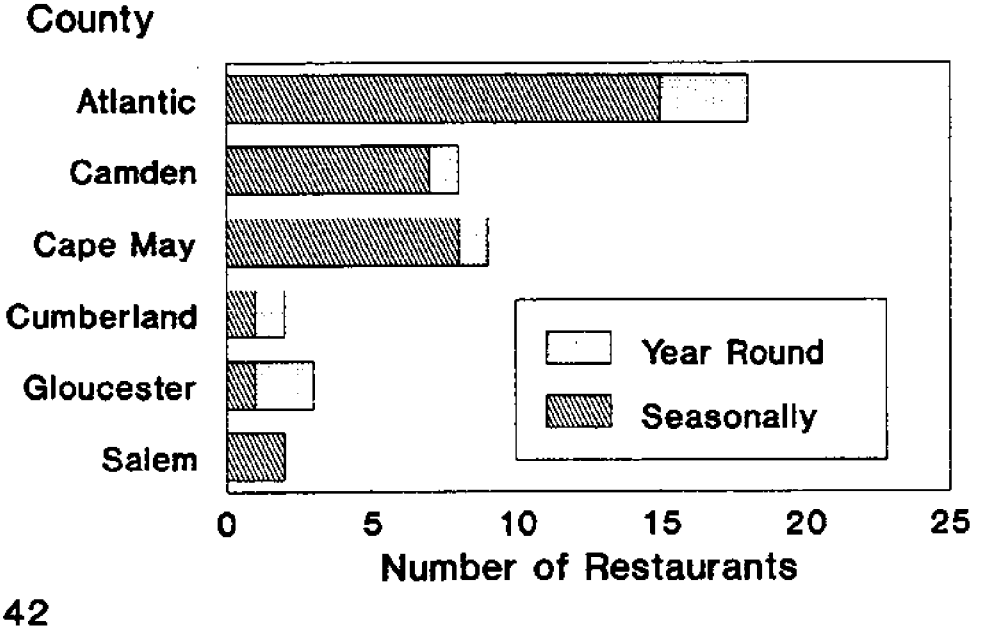


n=14

County for not serving soft-shell crabs were "never tried it" and "customer disinterest" (Figure 10). In coastal counties, restaurants not serving soft-crab reported that their "chef's are not interested." Only three restaurants reported that "price" and "inconsistency of supply" kept them from serving soft-shelled crab. None reported that "poor product quality" was a reason.

Restaurants also were asked whether they served soft-shelled crab seasonally or year-round. Of the 42 restaurants which served soft-shell crabs, all serve it during the summer season (Figure 11). Only 8 (19%) offer soft-shelled crab year-round by using frozen product in the off season. Those which serve soft-crab year-round are evenly distributed throughout the region and tend to be larger seafood restaurants with year-round clientele. The reason that there are not more restaurants in Cape May and Atlantic Counties which serve soft-crab year-round is that most restaurants in Cape May and Atlantic Counties rely heavily on summer tourist clientele and many close during winter months.

Figure 11: What part of the year do you serve soft-shell blue crab?



n=42

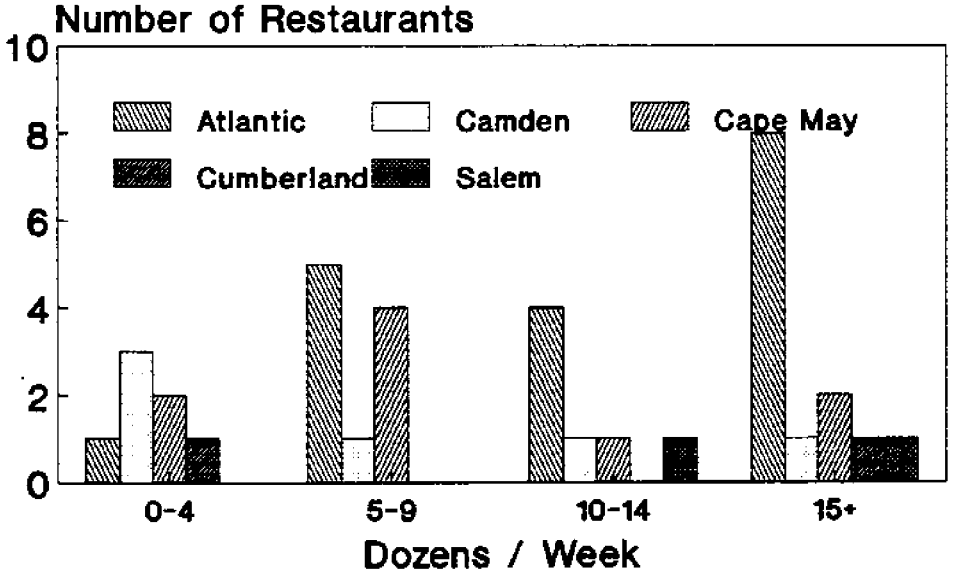
Thirty-four restaurants reported their weekly demand for fresh soft-shell crab during the summer season. The total weekly demand for fresh soft-shell crab by these respondents amounted to 663 dozen (see Table 8). Eighty-six percent of this total weekly demand for fresh soft-shelled blue crab comes from restaurants in Atlantic and Cape May Counties. The average weekly demand for fresh soft-shelled crab during the summer season for the 34 restaurants reporting their weekly demand was 20 dozen per week. Average weekly demand for fresh soft crab was highest in four casino restaurants located in Atlantic County (35 dozen/week) and 11 Atlantic County restaurants (24 doz./week). It was lowest in five restaurants located in Camden County (4 doz./week).

The restaurants differed markedly in the quantity of fresh soft-shell crab purchased, ranging from a few dozen to as much as 90 dozen per week. As shown in Figure 12, most restaurants purchase less than 10 dozen per week of either fresh or frozen form. Larger quantities (10-14 and 15+ doz./week) were concentrated in Atlantic County. Only one or two restaurants in the other five counties reported placing large weekly soft-crab orders.

Table 8: Reported Summer Weekly Demand of Fresh Soft-Shelled Crab by County

County	Number of Respondents	Total Fresh Demand (doz.)	Average Fresh Demand (doz.)
Atlantic			
Casinos	4	142	35
Other	11	269	24
Camden	5	20	4
Cape May	9	157	17
Cumberland	2	28	14
Gloucester	2	30	15
Salem	1	19	19
Total	**34**	**663**	**20**

Figure 12: Restaurant Demand for Soft-Shell Crab in South Jersey



n=40

Table 9: Product Forms of Soft-Shelled Crab Used by South Jersey Restaurants (Number of Restaurants)

County	Fresh Only	Frozen Only	Both	Total
Atlantic	13	3	2	18
Camden	6	1	1	8
Cape May	5	0	4	9
Cumberland	1	0	1	2
Gloucester	1	1	1	3
Salem	1	1	0	2
Total	27	6	9	42

Twenty-seven restaurants reported that they serve fresh soft-shell crab exclusively (Table 9). In contrast, only six restaurants surveyed used frozen product exclusively. Nine additional

restaurants used frozen soft-shell crabs as well as fresh. The total weekly demand for frozen soft-shell crab reported by 14 restaurants was 274 dozen.

Twelve (29%) of the restaurants which serve soft-crab were buying directly from fishermen (Table 10). Five of these purchase soft-crab from wholesalers as well. The restaurants which bought directly from fishermen were concentrated in Atlantic and Cape May Counties. None of the restaurants surveyed in Camden and Gloucester Counties bought direct. Several indicated that they had never been contacted by a crabber. However, 79 percent of all restaurants which serve soft-shelled crab expressed an interest in buying soft crab from local producers, including two of the Atlantic City casino restaurants (Figure 13).[11]

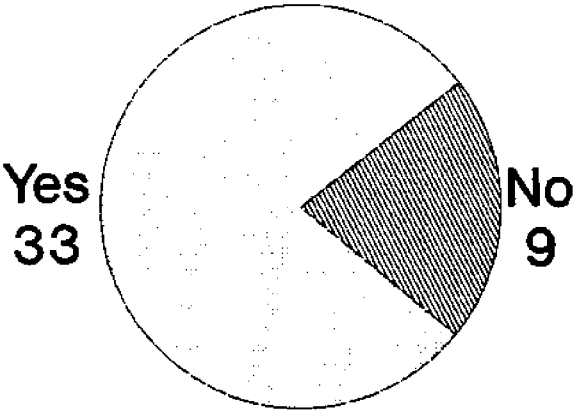
The majority (81 percent) of the restaurants said they had no problems with their existing soft-shell crab supply (Figure 14). Although four complained of "poor product quality" and three of "inconsistent supply," only one had a problem with "high price."

Table 10: Source of Soft-Shelled Crab for South Jersey Restaurants (# of Restaurants)

County	Wholesaler Only	Fishermen Only	Both	Total
Atlantic	13	4	1	18
Camden	8	0	0	8
Cape May	4	1	4	9
Cumberland	1	1	0	2
Gloucester	3	0	0	3
Salem	1	1	0	2
Total	30	7	5	42

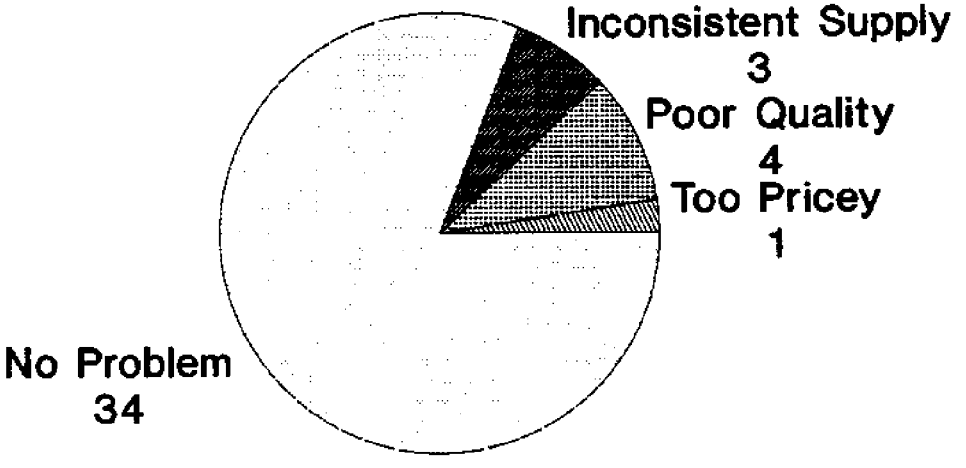
[11] It should be noted that a special license is required to supply Atlantic City casinos. If Salem County fishermen want to sell to casinos, they will have to obtain a license from the Casino Control Commission.

Figure 13: Are you interested in buying locally produced fresh soft-shell crab?



n=42

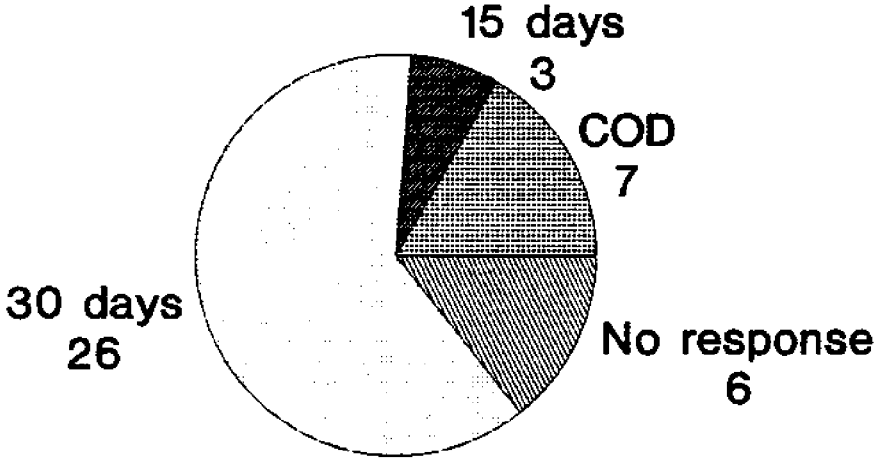
Figure 14: What problems do you have with your soft-shell crab supply?



n=42

Most restaurants surveyed had a 30-day payment policy (Figure 15). These terms may not be acceptable to most fishermen. Restaurants which had bought soft-crab directly from fishermen reported that they pay on delivery. A number of restaurants who had not previously purchased from fishermen volunteered that more rapid payment could be negotiated.

Figure 15: What are your payment terms?



n=42

Conclusions

This market survey describes the existing demand for soft-shell blue crabs at South Jersey seafood restaurants. Because of the low refusal rate and high total response rate, it is reasonable to assume that the study's 56 survey respondents were representative of all south Jersey restaurants. Under this assumption, the total estimated summer weekly demand for fresh soft-crab by a projected 78 restaurants serving on average 18 dozen weekly would be 1,560 dozen. The highest demand and largest restaurant buyers for fresh soft-shell blue crab in southern New Jersey are found in ocean resort towns in Atlantic and Cape May Counties. Current demand in other parts of this region is considerably less.

Twenty-eight percent of restaurants in Atlantic County and fifty-six percent of restaurants in Cape May County which served soft crab already buy direct from fishermen. This direct market is likely to be highly competitive, however. The survey found general satisfaction with traditional suppliers; only a minority of restaurants reported any complaints. The market is dominated by wholesalers. Particular attention, therefore, must be paid to consistency in deliveries. Size grading and dependable shipments will be the minimum expectations of these restaurants. The one area of dissatisfaction which might provide a competitive opening is product quality.

The standard payment terms of 30 days could be a cash flow problem for fishermen. Most restaurants indicated, however, a willingness to negotiate shorter payment terms. Opportunities to increase the demand for fresh soft-shelled crabs within the market area appear to be most promising in southern Camden and Gloucester County. The study found as many restaurants in this area serving soft crab as in Cape May County, but the quantities purchased were either small or dominated by frozen crab. The proximity of this market and the existing acceptance of the product favor the potential success of promotional efforts.

Efforts in support of establishing the proposed facility should include promotional funding to increase consumer interest in and restaurant demand for locally-produced soft-shelled crab. The relative merits of joint versus individual promotional programs need to be explored.

EVALUATION OF SALEM CRABBER INTEREST

An important factor in the potential success of a centralized soft-crab shedding facility in Salem County is fishermen interest in leasing tanks from such a facility to shed their crabs. Crabber interest in the proposed facility was evaluated by means of a survey conducted during the fall 1994.

Methods

The survey which included questions related to current crabbing operations, crab shedding needs, experience with the Handy facility in Cumberland County, and informational needs was mailed to licensed Salem County crabbers at the end of the 1994 crabbing season. A November 1993 NJDEP Division of NJ Fish, Game & Wildlife list of licensed Salem County commercial crabbers was used to identify eligible respondents.

Results and Discussion

Response Rate

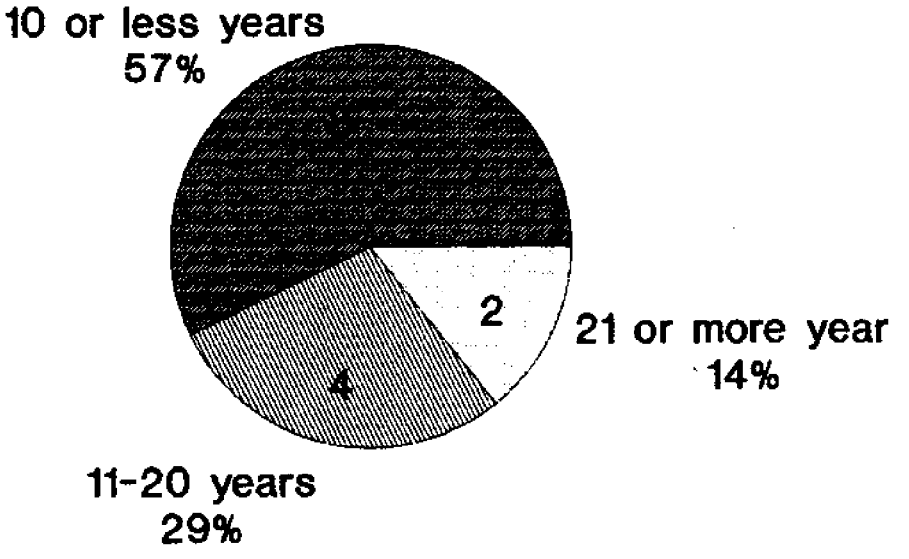
Fourteen crabbers returned completed surveys. As discussed previously, although a total of 67 licenses were issued to Salem County crabbers in 1993, only 33 were active in 1994. Therefore, survey respondents represent 42% of active crabbers in Salem County.

As the purpose of the survey was to determine interest in participation in a proposed soft-crab shedding facility in Salem County, the responses are likely to be more representative of "interested" crabbers than the Salem County crabber population as a whole. Crabbers who are interested only in hard crabs or in selling their peeler catch for bait, and, therefore, are not interested in shedding crabs, are less likely to have responded to the survey than those interested in shedding.

Crabber Characteristics

The crabbers surveyed are experienced crabbers; all had at least 3 years crabbing experience. Fifty-seven percent had 10 or less, twenty-nine percent had 11 to 20, and fourteen percent

Figure 16: How many years have you been a commercial crabber?



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had 21 or more years of crabbing experience (see Figure 16).

Seventy-nine percent (11) of the crabbers sold peelers in 1994. Peelers comprised about 10% of the total catch of three crabbers, 20-25% for four crabbers, and 50-100% of the total catch of two crabbers.

Peeler pots, baited with Jimmy's, are an effective means of increasing the catch of peeler crabs. Use of peeler pots indicates active commercial harvest and potential for commercial shedding. Sixty-four percent (9) of the crabbers used peeler pots; thirty-six percent (5) did not. Five have been using peeler pots for 3 to 7 years, and three have used them for 12 to 15 years. The nine crabbers who use peeler pots reported that from 10 to 50% of their total crab catch is peelers. Of the five who do not use peeler pots, four indicated that peelers were a small percentage (less than 2%) of their crab catch. Only a single crabber who did not use peeler pots reported significant peeler catches (25%).

Current Distribution Channels

In 1994, crabbers utilized a variety of distribution channels for their peelers. Several of the crabbers utilized more than one channel. Five crabbers sold from 10 to 50% of their peeler crabs to local bait stores and directly to fishermen for bait. For three crabbers, bait sales are their primary market. For the other two, bait sales are secondary to sales to New Jersey, Maryland and Virginia dealers.

Six crabbers sold to New Jersey dealers. For half, peelers comprise 10% or less of their total catch, while for the other half, peelers comprise 20-50% of their total catch. Five crabbers sold all of their peeler catch, while the sixth crabber sold only a small proportion of his catch to New Jersey dealers. Two crabbers sold all of their 1994 peeler catch to the Mad Horse Crab Company, a private shedding facility in Salem County. None reported selling to the Handy Company in Cumberland County in 1994.

Two crabbers sold 95-99% of their peeler catch to Maryland and Virginia dealers with the remainder going to New Jersey dealers. Two crabbers shed a portion of their total peeler catch.

Experience Shedding at Handy Facility

Only two of the crabbers had experience shedding at the Handy facility in past years. Both indicated that they had problems with: lease rates, the requirement that all production go to Handy, commute time involved, and lost crabs due to technical breakdowns. Additionally, one of the crabbers indicated that there were problems with the management and that it had been difficult to get hired help to assist with tank tending. Neither shedded at the Handy facility in Cumberland County in 1994.

Twelve crabbers indicated that they had no experience with the Handy facility. Nine of the twelve indicated their reasons for not shedding at the Handy facility. Five reported that the distance was too great, two that they have their own shedding facilities, one that he was unaware of the opportunity, and one that he is not interested in shedding.

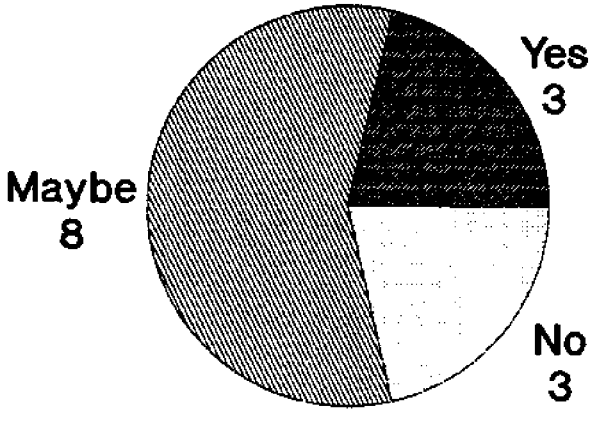
Shedding Needs

Only two of the fourteen crabbers surveyed shedded peeler crabs in 1994. One shedded in his own tanks or floats and the other used tanks of another crabber. The two crabbers who had leased tanks from the Handy facility in years prior to the 1994 season had used a total of 64 tanks, but neither used Handy tanks in 1994.

Crabbers were asked to indicate whether they would lease tanks at a public shedding facility in Salem County (Figure 17). Three of the crabbers surveyed are definitely interested and eight are potentially interested in leasing tanks from such a facility. The three definitely interested crabbers indicated that they would require a minimum of 15 tanks total. The eight potentially interested crabbers indicated that they could require as many as 88 tanks.

Three crabbers reported that they would not lease tanks from a Salem County shedding facility. These crabbers do not use peeler pots to target peelers, peelers are an insignificant

Figure 17: Would you lease tanks from a Salem County shedding facility?



n=14

portion of their catch, and they did not sell peelers in 1994. These crabbers are considered as not interested.

Relative Importance of Factors Affecting Participation

The relative importance of factors which would determine whether interested crabbers would lease at the proposed Salem County shedding facility was measured on a three point scale: *very important*, *important*, and *not important*.

Two factors: "proximity of shedding facility to crabber's home" and "proximity to crabber's boat dock" are related to travel distance. All eleven of the interested crabbers rated the two travel factors as *very important*. Five of these crabbers had indicated that distance to the Handy facility in Cumberland County was a deterrent to their using that facility.

"Favorable lease rates" was rated *very important* by the two crabbers who had previous leased tanks from Handy, and all but one of the eight potentially interested crabbers. Interestingly, only one of the three definitely interested crabbers rated "favorable lease rates" as *very important*.

All eleven interested crabbers rated the "flexibility to sell soft-crabs to whomever I want" as *very important*. The value attached to the "option to sell soft crabs to the facility operator" is more mixed than other factors. The three definitely interested crabbers do not consider this option as *very important*; one reported that this option is *important* and two that it is *not important*. Of the eight potentially interested crabbers, five rated this factor as *very important*, two as *important*; and one as *not important*.

All eleven of the interested crabbers reported that a "reliable pumping system" is *very important*. One crabber indicated additionally that "water quality" is *very important*.

Information Needs

The primary informational needs of the Salem County crabbers interviewed are facility design and filter system design and operation. Of secondary importance are information on market leads, catching techniques, low interest loans, peeler identification and handling, permitting process, and crab population estimates. Water quality and labor were suggested by crabbers as two additional informational needs.

Conclusions

The survey results demonstrates clear interest by Salem County crabbers in the proposed public shedding facility. The eleven respondents who rated themselves as definitely or potentially interested represent one-third of the active crabbers in the County.

Responses indicates a range of familiarity with crab shedding and this is reflected in how crabbers envision using the facility. Respondents with experience shedding crabs stated that they would need 30 to 50 tanks each. Respondents without shedding experience were much more conservative, estimating that approximately 3 to 10 tanks per crabber would be sufficient.

To be conservative, it is assumed that all interested Salem County crabbers returned surveys. For crabbers with an established bait market who sell peelers to bait shops and fishermen for as much as $1.50 to $1.75/crab, the additional return of selling soft crab to wholesalers at $2.00/crab may not be sufficient to persuade them to take on the added cost and energy involved in shedding. Of the 10 to 12 crabbers who sell peelers to the Mad Horse Crab Company, several participated in the survey and indicated an interest in shedding at a public facility. However, most of these crabbers did not respond to the survey and are apparently satisfied with their current arrangement.

Under the assumption that all interested crabbers returned surveys, total initial demand lies somewhere in the range of 15 to 103 tanks. The three definitely interested crabbers indicated that their minimum need would be 15 tanks. Eight potentially interested crabbers

would require as many as 88 additional tanks.

The desires of the crabbers for the size of the facility would become more specific as planning proceeded. As costs and management requirements become determined, the crabbers would be able to make more tangible commitments.

Consideration also should be given to potential expansion of the facility. If initial users are successful, it is likely that they will want more tanks and additional users would be attracted. This need for flexibility could be much better accommodated with a flow-through design than with a closed system.

Proximity and reasonable lease rates are two key factors which would determine crabber use of the facility. The two Salem County crabbers who leased tanks at the Handy facility in Cumberland County had difficulty with the commuting time and lease rates. Distance was the primary factor cited by other crabbers which discouraged them from using the Handy facility. Lease rates and the flexibility to sell soft-crabs to whomever the crabber chooses are very important to crabbers as is a reliable pumping system.

Having the option to sell soft crabs to the facility operator was not rated as highly as other factors. Crabbers who elect to shed at a Salem County public facility may continue to utilize Mad Horse and other local dealers as a market outlet for the soft crabs they produce because of the considerable time involved in harvesting and shedding of their crabs.

GENERAL PARAMETERS FOR A SHEDDING OPERATION[12]

The technology of shedding blue crabs primarily is concerned with economically providing the peelers with an environment for molting which minimizes physiological stress. This entails providing high quality water within temperature and salinity ranges acceptable to the crab. Research has determined that shedding is most successful when system temperature and salinity closely approximate the water conditions of the water from which the crabs have been taken. A typical land-based shedding system consists of 4' x 8' tanks constructed of plywood with about 4" of water. About 250 peelers can be kept in a standard-sized (4' x 8') tank.

Shedding systems require frequent tending and close management. The tanks must be "fished up" or checked every 4 to 6 hours to insure the best quality soft-crab and to remove the dead or hard crabs that might be in the tanks. Crabbers must remove soft-crabs soon after molting to produce a peak quality product. Removal of post-shed crabs reduces cannibalism from hard crabs.

Salem County crabbers who leased tanks in Cumberland County discontinued the practice when it became too difficult and expensive for them to commute several times a day to tend their tanks. Survey responses clearly indicate that crabbers recognize that frequent tank tending and high quality soft-crab production can best be accomplished with a nearby facility.

Two types of tank systems are commonly used in the mid-Atlantic region. The open, or flow-through, system utilizes water constantly drawn from coastal waters. Materials for the open system cost about $100 per tank. The closed, or recirculating, system, is essentially an aquarium; sea water is filtered and returned to the shedding tanks. The cost of setting up

[12] Stewart Tweed, Marine Agent, New Jersey Sea Grant Marine Advisory Service and Rutgers Cooperative Extension, personal communications.

an individual closed system is approximately $150 to $175 per tank, including the filtration system.[13]

The shedding system, whether open or closed, is designed to maintain an optimum environment for peelers. This requires the removal of ammonia wastes that each peeler produces. In an open system these wastes are flushed out of the tank by water flowing through the tank. Closed systems utilize a biological filter - a system of bacteria growing on a variety of substrates - to convert the toxic ammonia to less toxic nitrates.

Water flow requirements for the system can be calculated based on three to five exchanges per hour in each tank. A standard tank with 4" of water, represents about 80 gallons. To exchange this water 5 times, will require a pump with 400 gallons per hour capacity. A larger number of tanks will require a multiple of this pump size. Natural water sources may require sand filters to remove sediment and a back up system while one pump system is shut down for maintenance and cleaning. Closed systems require a back up system and a large reservoir of seawater to reduce fluctuations in water quality.

The primary advantages of a closed system is that it can be sited away from expensive water-front property and may be more convenient for the crabber to tend regularly. However, system failure risk are high in closed systems because of dependence on proper functioning of filters. Closed systems are particularly affected by variable loading. The water quality system does not adjust instantaneously to changes in demands placed on it by variability in the number of crabs in the tanks. Variable loading is a common condition in commercial operations.

An open shedding system is preferable to the closed system. The construction, operating, and maintenance costs are less for opened systems than for closed systems. In addition, the

[13] Mike Oesterling, Marine Extension Agent, Virginia Sea Grant Marine Advisory Service, personal communications.

level of management skills required for closed systems is higher. An open system offers the best solution for a multi-user facility. Without the flow through capabilities, each crabber would have to design and maintain their own filter system. However, use of an open system requires a waterfront location with adequate water quality.

The Handy Company, a widely-recognized leader in the soft-shelled crab industry, could have established their shedding facility anywhere in south Jersey, but they chose the waterfront. Handy determined that proximity to a water body and use of an open system outweighed the advantages of a closed system in siting its Cumberland County facility.

One of the limits to soft-crab production in Salem County has been the lack of waterside facilities for crabbers. The PSE&G power plant site in Lower Alloway Creek offers one of the few waterfront accesses to good quality and abundant water for an open flow through facility in Salem County. A large proportion of the Salem County production comes from pots fished just downriver from the power plant. In addition to the convenience of a short commute for crabbers, the location of the power plant on the Delaware River has several physical advantages in contrast to the Handy site on the Maurice River. The Maurice River, being a smaller river, experiences greater variability in temperature and salinity. Turbidity also is more of a problem on the Maurice River. In order to eliminate sedimentation in shedding tanks, Handy was required to make a significant investment in filtration.

OPTIONS

Three options are proposed for Salem County consideration. The range of options reflect various degrees to which the County versus individual crabbers would bear the risk of financial investment and operational responsibility.

Option 1 - Salem County Constructs Shedding Facility

Under Option 1, Salem County would construct a crab shedding facility in Salem County and lease shedding tanks to local crabbers. This option offers Salem County crabbers several advantages. It would reduce the commuting time and cost for Salem County crabbers who have leased tanks from the Handy Company in Cumberland County. Travel distance was a significant problem identified by the Salem County crabbers surveyed who have leased tanks from Handy. Travel distance also was a primary reason that more Salem County crabbers have not taken advantage of the opportunity to lease tanks from Handy. The availability of a local shedding facility would provide an opportunity for other crabbers who have not shedded peelers in the past. This option eliminates the necessity of a crabber having to make a capital investment to try shedding. Furthermore, operating costs would be shared, improving profit margins of the crabbers. Under this option, Salem County would play the strongest role in fostering the expansion of a local shedding industry within the County.

Option 2 - Salem County Secures Shedding Site for Facilities Constructed and Operated by Crabbers

Under Option 2, Salem County would act as mediator in securing a site for a centralized shedding facility within the County. The County would not construct a shedding facility, but, rather, crabbers would construct and operate their own shedding tanks at the site. It would be up to individual crabbers whether they would undertake independent or cooperative shedding operations.

The existence of a site at which to develop a shedding operation would provide Salem County crabbers with a new business opportunity. Crabbers who are interested in shedding crabs but do not have an appropriate site to do so will be able to embark on the venture. Decisions to construct and improve the facility would rest entirely with private enterprise. Crabbers who are required to make a capital investment in the facility will have increased incentive to make the operation a success.

The primary advantage of this option for the County is that no significant capital investment would be required. The County would still play an instrumental role in facilitating the expansion of crab shedding within the County by securing the site. This would provide a common service to the industry which individual crabbers are unlikely to undertake. The County could provide other services, such as assistance in obtaining low-cost financing.

Option 3 - Crabbers Independently Pursue Shedding

Under Option 3, Salem County would not assist crabbers in establishing a shared shedding facility within the county. The responsibility for carrying forward such an initiative would reside with the fishermen.

Several Salem County crabbers, including two survey respondents, already have their own shedding tanks. The presence of the Mad Horse Crab Company in Salem County provides an additional market for peelers and reduces the need for a county-sponsored shedding facility. Mad Horse reports that 10 to 12 Salem County crabbers supplied them with peelers in 1994. As there were 33 active commercial crabbers in the County in 1994, approximately one-third are selling at least a portion of their peeler catch to Mad Horse.

At the same time, however, the Mad Horse Company does not offer an opportunity for leasing tanks. Therefore, crabbers interested in shedding crabs would have to set up their own operations. The primary impediment to crabbers setting up their own shedding tanks is the lack of access to waterfront property with adequate water quality. Crabbers lacking

a waterfront site who are interested in shedding crab would required a closed system. Design parameters for closed, recirculating systems are readily available in the literature and technical assistance in setting up such a system is available through New Jersey Sea Grant Marine Advisory Service and Rutgers Cooperative Extension. However, as discussed previously, a closed system requires a greater capital investment and more management expertise than an open system. These factors are likely to continue to be an impediment to the expansion of individual crab shedding operations in Salem County.

CONCLUSIONS

This report presents a cautiously optimistic assessment of Salem County increasing opportunities for Salem County crabbers to produce soft-shelled crabs. Such development would contribute to local employment and provide additional revenues to crabbers from a value-added product. The major factors considered in making this assessment included natural resource availability, markets, crabber interest, and technical requirements. None of these factors present a serious impediment to pursuing more concrete plans for a crab shedding facility.

Peeler crab harvests from Delaware Bay and Salem County is a traditional fishery and production of peelers for shedding could be augmented with more targeted fishing effort using peeler pots or by diverting peelers from competing markets for bait and out-of-state shedding. While crab populations in the Bay will vary considerably with changing environmental conditions and some locales have been sensitive to fishing pressure, this is mainly a reason to be cautious in deciding upon the appropriate size of a shedding facility.

Markets for soft crabs are well-developed and demand consistently exceeds supply. Requirements for size and other quality measures are known and can be met by conscientious tending of peeler pots and shedding tanks. The existing demand for peelers as bait allows for an alternative market for lower quality product. A survey of southern New Jersey restaurants indicated potential for market development through direct sales. Promotional efforts to strengthen demand in neighboring areas appear to hold some promise.

A survey of Salem County crabbers conducted in the fall of 1994 indicated that approximately one-third of active Salem County crabbers are interested in leasing tanks at a public shedding facility. At this initial planning stage, there is definite interest on the part of 3 crabbers to lease 15 tanks. Other crabbers would be expected to lease additional tanks as planning continued.

There are no technological barriers to the establishment of a shedding facility in Salem County. The design parameters and operating procedures for both open and closed systems are well-developed and available in the literature. Technical support for Salem County blue crabbers interested in shedding is available through the New Jersey Sea Grant Marine Advisory Service and Rutgers Cooperative Extension.

If waterfront property with adequate water quality can be secured, the open system is recommended. This offers flexibility and potential sharing of production costs by crabbers as well as being relatively inexpensive to build and maintain. If waterfront property is not available, a closed system would be required. The design of a closed system would require separate water filtration systems for each crabbers tanks to reduce conflicts due to potential risks and the need for closer management.

This study has suggested three options for Salem County to consider: 1) construction of a shedding facility and leasing of tanks to local crabbers; 2) negotiation of long-term site lease where local crabbers could construct and operate shedding tanks of their own; and 3) the status quo situation in which crabbers pursue shedding individually, if they choose. This range of options reflect various degrees to which the County versus individual crabbers would bear the risk of financial investment and responsibility for facility operation.

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