The Economic Impact on Maryland's Crabmeat Processing Industry of Proposed Regulations: *A Possession Restriction on Sponge Crabs and Crabs Smaller than 5-¼ Inches*

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Executive Summary

An analysis of current crab processing practices in the state of Maryland finds that the regulations proposed by the Maryland Department of Natural Resources, restricting possession of sponge crabs and male crabs less than 5-¼ inches in carapace width, would result in annual lost sales to the Maryland processing industry of $13.5 million. Given that the regulations are intended to remain in effect indefinitely, the present value of these lost sales is an estimated $269 million. Additionally, some 459 processing jobs would be lost due to enactment of the regulations. These estimates are considered minimum impacts, since the financial viability of large (and some medium-sized) processing plants will be placed in jeopardy due to the magnitude of lost sales. Plant closings would make these figures significantly higher.

In addition to direct losses, indirect and induced effects of diminished spending by crab processing plants translates to additional losses of $4.4 million to the Maryland economy, and an additional 80 jobs lost.

Crabmeat processors are largely concentrated in one area, with 21 of the 30 active plants located in Dorchester County. Dorchester will absorb an estimated 76% of the direct losses to the industry. This represents a significant percentage of the County's manufacturing base (2%), and 3.3% of its labor force.

The proposed regulations appear to be a high-cost way of achieving the management goal of reducing the rate of fishing mortality by 15%, and appear to place an inequitable burden on the processing sector of the crabbing industry, and especially in one county.

The above calculations are based on current industry estimates of processing plants' reliance on sponge crabs and crabs smaller than 5-¼ inches. The data was collected in an annual survey of the processing industry conducted by the University of Maryland Sea Grant Extension Program since 1997. Twenty of the thirty plants thought to have processed crabmeat in 2001 responded to the survey, yielding a 67% response rate.

Background

The Maryland Department of Natural Resources (DNR) has proposed for the 2002 harvesting season and beyond raising the legal size of male crabs harvested in Maryland to 5-¼ inches, up from the current 5-inch limit. These regulations are being proposed to meet the goal of reducing the rate of fishing mortality on the spawning population by 15% over three years. While there is already a regulation in Maryland that restricts the harvesting of sponge crabs, the Commonwealth of Virginia, which fishes on the same Chesapeake Bay stock of blue crabs, allows harvest of sponge crabs, and is currently planning on maintaining its 5-inch size limit on male crabs. Sponge crabs harvested legally in Virginia are now allowed to be sold and processed in Maryland crab picking houses, and at certain times of the year are heavily relied on by Maryland processors for picking. Apparently, in order to make it easier to enforce the new Maryland size limit and the existing restriction on sponge crab harvests, DNR has also proposed making it illegal to possess in Maryland crabs that are smaller than 5-¼ inches or sponge crabs, beyond a modest allowance.

Over the past decade, the Maryland crabmeat processing industry has had to deal with a number of issues that have led to a reduction in this sector. The industry has faced expanded competition first from other regions of the United States, and more recently with imported crabmeat. At least some of the industry has struggled to maintain a labor supply, but they have been able to deal with this in some instances by bringing in alien workers under the H2-B Program. The increase in the basket trade market and the soft and peeler crab industry have increased the competition for the limited crab resource available from the Chesapeake Bay. Recent declines in Chesapeake Bay production over the past few years have further exacerbated the supply situation. The industry that remains in Maryland has survived through perseverance, ingenuity and adaptation. One of these adaptations has been to widen the geographic area from which crabs are purchased to meet market demand, so crabs harvested in other states, including the Gulf region, are imported into Maryland. Another innovation is the voluntary adoption of a quality control program coupled with marketing of Maryland crabmeat in specially marked containers. As a result, crabmeat processing remains by far the largest component of value-added seafood production from the Chesapeake Bay. In some rural communities, crabmeat processing provides significant employment and serves as a local income generator.

Through the auspices of the Chesapeake Bay Industries Association, crabmeat processing industry members have expressed grave concern that the proposed possession regulations will deal a severe blow to the continued existence of their industry. The purpose of this report is to provide information on the size of the industry and the likely economic impacts, so that those responsible for adopting the proposed regulations can make a fully informed decision.

Industry Survey

For the past four years, the University of Maryland's Sea Grant Extension Program has conducted surveys of crabmeat production in Maryland with the intent of developing a long-term database of industry production and trends. The data have proved useful in a variety of settings and were a major component of the International Trade Commission's investigation into imported crabmeat conducted in 2000. The survey generally takes place in January each year, with data collected on production volume and value, production costs, sourcing of crabs and employment.

Given the nature of the proposed regulations, this year's (2001 season) survey was modified slightly. The main change was to obtain monthly data from each processor on the percentage of the crabs that they processed that were either sponge crabs or less than 5-¼ inches. This data has been collected after the fact, and represents each processor's best estimate of the makeup of the crabs that they process. There is currently no way to independently verify these numbers.

As in each of the past years that the survey has been conducted, the list of licensed processing plants were obtained from the Maryland Department of Health and Mental Hygiene, and a survey sent to each of the plants. In 2001, there were 35 plants licensed to process crabmeat, the same number as in 2000. Table 1 summarizes key

production and employment estimates from the crabmeat processing industry survey for the 1997-2001 period.

Table 1. Maryland Crabmeat Production, 1997-2001.

	1997	1998	1999	2000	2001
Licensed Plants	49	42	44	35	35
Survey Returns	27	27	16	7	20
Estimated Production Quantity (million lbs)	2.21	1.67	3.29	3.15	2.16
Estimated Production Value ($million)	$24.8	$19.2	$30.2	$29.6	$23.0
Average Price per Pound	$11.25	$11.50	$9.20	$9.37	$10.66
Total Employees	942	765	877	990	877
Non-Maryland Resident Employees	241	236	341	370	349

Calculating Impacts of the Regulations

To determine the impact of the proposed possession regulations on Maryland crabmeat processing plants, we divided the industry into three size categories. Small plants have up to 15 employees, medium plants have 16-40 employees and large plants have greater than 40 employees. For each of those plant groupings, we calculated from the reported data the mean percentage of crabs picked per month that were less than 5-$\frac{1}{4}$ inches or sponge crabs. Working with a group of industry members, we determined from the licensee list the total number of plants in each category. It was estimated that of the 35 licensed plants in Maryland in 2001, 5 held a license but did not operate. Of the remaining 30 operating plants, 11 were estimated to be small plants, 14 medium plants and 5 were large plants.

Table 2. Percentage of value of processed crabs less than 5-$\frac{1}{4}$ inches and sponge crabs (SC) and monthly percent of total annual production for all crabs.

	Apr	May	June	July	Aug	Sept	Oct	Nov
Small Plants								
<5-$\frac{1}{4}$	31%	32%	44%	44%	37%	33%	33%	0%
SC	0%	0%	0%	6.4%	6.4%	0%	0%	0%
Medium Plants								
<5-$\frac{1}{4}$	45%	43%	50%	54%	48%	40%	44%	36%
SC	0.7%	14%	16%	13%	6.7%	0%	0%	0%
Large Plants								
<5-$\frac{1}{4}$	78%	71%	45%	33%	33%	31%	22%	33%
SC	0%	13%	28%	52%	67%	3.6%	1.6%	0%
Monthly % of Annual Production	3%	5%	13%	17%	17%	17%	20%	8%

Table 2 summarizes the data by plant size used to determine the impact of the proposed regulation by month. The last row shows the monthly percentage of a processing plant's total annual production. To determine the impact of the regulation in any given month, we multiplied the percentage of monthly production times the percentage of crabs estimated to be below 5-$\frac{1}{4}$ inches, and multiplied that product times the estimated total industry production and value for the plant size category.

To determine the loss of jobs resulting from the proposed regulations, we calculated the ratio of crabmeat production to number of workers for the different plant size categories. We then assumed that the plants would continue to operate with the same worker-to-crabmeat production ratio, with and without the proposed regulations.

Economic Impacts

One of the difficulties of predicting economic impacts of the proposed regulations is determining the base period used to calculate losses. In Table 3 we show the losses that would have occurred in 2001 had the possession limits been enacted in that year. However, 2001 was an extremely poor year for blue crab production in the Chesapeake region, and had the lowest processing output since we began collecting production data.

A more valid approach is to base losses on an average year. Based on our previous surveys, we were able to adjust the data in Table 3 to reflect what losses would be in a more typical production year. As shown in Table 4, estimated annual losses from the possession limit would be a reduction of 1.2 million pounds of crabmeat valued at $13.5 million, and a loss of 459 jobs. The illegality of processing plants possessing sponge crabs or crabs smaller that 5-$\frac{1}{4}$ inches caught legally in other states, accounts for 68% ($9.2 million) of the annual losses. The remaining 32% results from Maryland harvest regulations.

Table 3. Estimated losses in production, sales and jobs for proposed regulations based on 2001 production data.

	2001 Base Lost Production	2001 Base Lost Sales	Lost Jobs
Small Plants	45,316	$654,000	20
Medium Plants	595,742	$7,430,000	217
Large Plants	475,735	$4,180,000	216
TOTAL	1,116,793	$12,264,000	453

Table 4. Estimated losses in production, sales and jobs for proposed regulations based on an average production year (1997-2001).

	Annual Lost Production	Annual Lost Sales	Lost Jobs
Small Plants	52,365	$721,106	20
Medium Plants	688,413	$8,192,383	220
Large Plants	549,738	$4,608,904	219
TOTAL	1,290,516	$13,522,393	459

Calculation of the present value of lost sales due to the possession limits assumes that the limits will remain in effect indefinitely, and an annual discount rate of 5% is applied. The total present value loss of revenue to the processing industry is $269 million. A net (revenues minus cost) present value calculation of the loss would require information on the profit structure of the industry, information currently not available. The net present value loss represents the amount that the industry would have to be compensated to make up for the impact of the regulations. For example, if industry profits are 20% of revenues, the net present value of the loss would be 20% of the $269 million, or $53.8 million.

Indirect and Induced Losses (Multiplier Effects)

The Maryland crabmeat processing industry is one that adds value to a raw material (live crabs), by purchasing goods and services from other Maryland industries and by providing income to its employees. The losses measured above represent the direct losses due to the proposed regulations and include lost purchases from these industries and workers. What is not included however, are the indirect impacts that reduced sales have on industries that support the suppliers of goods and services. For example, the lower sales volume for the supplier of cans to the processors means that the can manufacturer will purchase fewer supplies and materials from their suppliers. Additionally, induced multiplier effects — that result from spending in Maryland by wage earners and business owner profits — are also lost.

To determine these indirect and induced impacts, we decomposed the annual $11.1 million loss into its value-added components based on cost data we have collected from the processing industry since 1997. The total multiplier (the sum of indirect and induced effects) for Maryland were then obtained from IMPLAN, a computer software program and database designed to determine the total financial impact on the Maryland economy. There are also indirect and induced employment effects in addition to the direct lost employment measured above. These employment multipliers are also obtained from the Maryland IMPLAN data.

Table 5 provides the multipliers and resulting impacts based on the categories of value- added spending by Maryland processors. The direct annual loss of $13.5 million leads to an additional $4.4 million loss in economic activity in Maryland, for a total loss of $18.0 million per year. In addition to the 459 jobs lost directly in the processing industry, an additional 80 jobs are lost due to the reduced spending by these processors, bringing the job loss total to 539 jobs.

Local Impacts (Dorchester County)

Table 5. Value-added and indirect and total multipliers for Maryland crabmeat processing.

Category	Direct Impact	Output Multiplier	Job Multiplier	Additional Jobs Lost	Total Impact on MD
Live Crabs	$6,872,080	1.294926	3.829377	26.32	$7,326,583
Labor	$4,154,330	1.604146	8.263302	34.33	$6,664,152
Packaging	$455,705	1.429408	4.816495	2.19	$651,388
Management	$549,009	1.604146	8.263302	4.54	$880,691
Transportation	$389,445	2.014919	12.81382	4.99	$784,700
Profit	$248,812	1.604146	8.263302	2.06	$399,131
Other	$883,012	1.423033	5.960821	5.26	$1,256,555
TOTAL	$13,522,393			79.69	$17,963,200

Of the 30 active processing plants in Maryland in 2001, 21 of them are located in Dorchester County. The breakdown of plants by size for Dorchester County is 7 small plants, 9 medium-sized plants, and all 5 of the large plants. We used this distribution of plant sizes in the County to pro rate the losses calculated above, and determined that 76% of the direct economic impacts would accrue in Dorchester County. This translates into a direct loss within the County of $10.3 million in revenues and 349 jobs.

According to the Bureau of the Census, these crabmeat processing plants represent almost 3% of all the business establishments in Dorchester County. Based on our survey data of crabmeat processors compared with Census data for the County as a whole, the sales volume of these plants represents 2% of all manufacturers shipments from the County, and the employment represents 3.3% of the County's total.

Discussion

The $13.5 million annual loss or $269 million present value loss due to the regulations should be viewed as minimum estimates of losses to the Maryland processing industry. Negative changes of this magnitude, particularly over a short period of time, are sure to diminish the financial viability of individual firms within the industry. The larger (and some of the medium) plants, aside from being most directly affected by the proposed regulations, have the least flexibility to adjust to changes, and a greater overhead to cover with production volume. It is reasonable to assume that many — if not all — the large plants would be forced out of business, due to a 61% reduction in annual sales volume. A high percentage of medium-size plants would also be forced out of business, with a 52% reduction in sales volume. Although some of the production of these closed plants would be picked up by those remaining in the industry, additional losses would be added to those already calculated above. It is not possible without detailed financial data for individual firms to determine how many would survive predicted revenue losses and what percentage of their production would be picked up by surviving plants.

Given the short time frame to prepare this study and the lack of data on the industry, a number of other impacts have not been included in the analysis. For example, upstream impacts from the processing sector to the retail market provides one illustration of potential losses. It is anticipated that some losses would be filled by crabmeat processors in other states, who would process crabs otherwise picked in Maryland, though is not it possible to predict the extent to which this would occur. Another unknown impact is the effect of the loss of market capacity to process crabs after labor day, when demand for basket crabs drops compared to the summer months. A high volume of crabs are usually caught during this period, and a large percentage are sold to the picking houses at this time. If the proposed regulations lead to a decline in the number of picking establishments, watermen will have a harder time marketing these crabs. At the very least, the price received for crabs by watermen during this active period will be lowered, due to the lack of picking capacity.

One of the goals for performing economic analyses is to look for efficient ways of achieving objectives. In the case of the blue crab fishery, where the objective of reaching a 15% reduction in the fishing mortality rate has been adopted, efficiency entails finding the least-cost means of achieving the given objective. The analysis performed

here suggest that the possession law for sponge crabs and male crabs less than 5-¼ inches is an extremely high-cost way of enforcing a harvest limit. The interstate commerce of live crabs to picking houses complicates enforcement, but there exist numerous alternative enforcement mechanisms that could achieve the same level of compliance with the harvest goals at lower costs, such as a requirement for tagging the harvest origin of crabs.

One of the consensus statements of the Bi-State Blue Crab Advisory Committee calls for equitably distributing the costs of regulations among industry sectors:

> "Fishing mortality must be reduced and fishing effort must be controlled in all sectors of the fishery to ensure long-term sustainability of the crab stock and increase income in the fishery. Management programs to control effort that distribute impact equitably, protect crabbers from the risks of reducing effort, and facilitate entry into and exit from the fishery should be developed." (See: Taking Action for the Blue Crab: Managing and Protecting the Stock and Its Fisheries, Bi-State Blue Crab Advisory Committee, p. 11.)

It appears that the proposed regulations will result in a markedly inequitable impact on the region's blue crab processing sector.

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