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ELIMINATION OF THE MEAT COUNT STANDARD ON SEA SCALLOPS

PLACOPECTEN MAGELLANICUS:

A PRELIMINARY ASSESSMENT

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DEPARTMENT OF MARINE ADVISORY SERVICES

VIRGINIA INSTITUTE OF MARINE SCIENCE

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A major problem with the proposed regulations is that they do not adequately address age-at-first-capture.<sup>1</sup> Given the previous history of regulatory compliance and violations of the meat-count standard, increased harvests and elevated meat counts, at least in the short-run, can be expected from elimination of the meat count standard. One only needs to examine landings and meat counts for vessels which have been exempted from the meat count standard during research activities to ascertain likely consequences of eliminating the meat count standard.

Data available in DuPaul et al (1989) indicate that landings and meat counts increased for vessels exempted from the meat count standard. Landings and counts, however, also varied with stock conditions, age composition, and attitudes and preferences of crew and captains. That is, all exempted vessels did not harvest and shuck the highest meat counts possible given available labor resources. Thus, the proposed regulations can be expected to result in a wide array of possible levels of landings and meat counts.

Unfortunately, data necessary for assessing the likely responses and impacts to the proposed regulations are not readily available. Analyses also require considerable research on the population dynamics of the scallop resource.

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<sup>1</sup>Regulations currently being considered by the New England Fishery Management Council include (1) a maximum crew size of 9, (2) maximum total dredge width of 30 feet, (3) layover days or minimum number of days required in port for 1-2 days at sea, (4) moratorium on entry, and (5) trip limits.

Thus, it is only possible to conduct a preliminary assessment of the likely short-run impacts given assumed stock conditions and industry responses.

This brief report provides a preliminary short-run assessment of the likely impacts to the proposed regulations. Analyses are based on data available in DuPaul et al (1989), personal observation, and other sources. An initial assessment is first provided. This assessment examines the impacts on 75-90 foot mid-Atlantic dredge vessels given average stock conditions prevailing in 1988 and no major departures in fishing practices in which average counts are 33-36 meats per pound (MPP). The initial assessment examines the imposition of all the proposed regulations except trip limits. The next assessment considers all the regulations given average stock conditions and average counts of 33-36 MPP. The last analysis examines all regulations except trip limits but permits increased harvesting of all size scallops.

Initial Assessment:

Examination of the potential effects of the proposed 9 man crew, 1:2 day layover, and 30 foot dredge restrictions is based on the following estimated catch-effort model:

$$\begin{aligned} \ln \text{CATCH} = & 1.63 \ln \text{DAYS} - .0355 \text{ DAYS} + 2.60 \ln \text{CREW} \\ & (3.73) \qquad (2.12) \qquad (4.71) \\ & - .16 \text{ CREW} + .59 \ln \text{STOCK}, N = 36, \bar{R}^2 = .91 \\ & (2.55) \qquad (4.07) \end{aligned}$$

where numbers in parentheses are the least-squares

t-statistics,  $\ln$  = natural logarithm, CATCH = catch per trip, DAYS = days per trip, CREW = number of crew, and STOCK = an indicator of stock size obtained from VIMS on-going research. The initial assessment assumes average stock size and average counts of landed product between 33-36 MPP. The initial assessment may, thus, be considered as the potential outcome of vessels which prefer to not alter their fishing practices in response to elimination of the meat count standard.

Impacts of the regulations could be quite severe as illustrated in Table 1. In this case, fuel and ex-vessel prices are critical parameters for the financial status of the vessel. Annual crew shares are typically low and less than incomes earned in other industries (Table 2). It is likely that vessels would have difficulty acquiring crew and remaining in operation given the outcomes in Table 1.

Assessment of All Proposed Regulations Given Average Stock Conditions and 33-36 MPP:

Assuming the same stock and meat count conditions of the initial assessment, imposition of trip limits is considerably more detrimental to vessel and crew earnings (Table 3). The most profitable level of activity occurs for 13 day trips with ex-vessel and fuel prices of \$4.00 per pound and \$.75 per gallon, respectively. At nearly all other combinations, however, annual crew share is considerably lower than incomes which could be earned in other types of employment.

A likely consequence of imposing trip limits is

Table 1. Evaluation of proposed regulations: 9 man crew and layover of 1 day at the dock for every 2 days at sea given selected ex-vessel and fuel prices, average stock conditions, and landed counts of 33-36 MPP.<sup>a</sup>

Ex-vessel price	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00
Fuel price/gallon	.73	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25
Days at sea per trip	10	10	10	10	14	14	14	14	18	18	18	18
Number of trips	24.3	24.3	24.3	24.3	17.4	17.4	17.4	17.4	13.5	13.5	13.5	13.5
Landings-pounds	5849	5849	5849	5849	8789	8789	8789	8789	11492	11492	11492	11492
Gross stock	17547	17547	23396	23396	26367	26367	35156	35156	34476	34476	45968	45968
Lay system												
Boat-40%	7019	7019	9358	9358	10547	10547	14062	14062	13790	13790	18387	18387
Crew-60%	10528	10528	14038	14038	15820	15820	21094	21094	20686	20686	27581	27581
Expenses												
Food (\$9/man/day)	810	810	810	810	1134	1134	1134	1134	1458	1458	1458	1458
Fuel (510.6 gall/day)	3830	6383	3830	6383	5361	8936	5361	8936	6893	11489	6893	11489
Ice (average/trip)	668	668	668	668	668	668	668	668	668	668	668	668
Captain-5%	877	877	1170	1170	1318	1318	1758	1758	1724	1724	2298	2298
Crew share												
8 a	483	199	840	556	815	418	1353	955	1105	594	1807	1296
Captain	1360	1076	2010	1726	2133	1736	3111	2713	2829	2318	4105	3594
Annual												
Crew member	11737	4836	20412	13511	14181	7273	23542	16617	14918	8019	24395	17496
Captain	33048	26147	48843	41942	37114	30206	54131	47206	38192	31293	55418	48519
Vessel owner	170562	170562	227399	227399	183518	183518	244679	244679	186165	186165	248225	248225

<sup>a</sup>Assumes 75-90 foot vessels and 60/40% lay system; all crew and vessel expenses are not included. Proposed NEFMC regulations actually imposes an upper limit of 230 days per vessel per year; thus, there is actually about 1 trip less than indicated in the table. Food and fuel expenses are based on average values. The assumption of 33-36 MPP average counts generally imposes the condition that fishermen do not respond to elimination of the meat count standard.

Table 2. Opportunity cost considerations, annual wages given selected dockside hourly rates<sup>a</sup>

Hourly rate	Annual income (2,080 hours/year)
	-----Dollars-----
4.35	9,048
5.00	10,400
6.00	12,480
7.00	14,560
8.00	16,640
9.00	18,700
10.00	20,800

<sup>a</sup>Dockside jobs typically include benefits such as life and medical insurance, 1-2 weeks paid vacation, limited sick leave, and training. Overtime is normally at the rate of 1.5 times the hourly rate.

Table 3. Evaluation of proposed regulations: 9 man crew and layover of 1 day at the dock for every 2 days at sea and 8000 pound trip limit given selected ex-vessel and fuel prices, average stock conditions, and landed counts of 33-36 MPP.<sup>a</sup>

Ex-vessel price	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00
Fuel price/gallon	.75	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25
Days at sea per trip	13	13	13	13	14	14	14	14	18	18	18	18
Number of trips	18.7	18.7	18.7	18.7	17.4	17.4	17.4	17.4	13.5	13.5	13.5	13.5
Landings-pounds	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Gross stock	24000	24000	32000	32000	24000	24000	32000	32000	24000	24000	32000	32000
Lay system												
Boat-40%	9600	9600	12800	12800	9600	9600	12800	12800	9600	9600	12800	12800
Crew-60%	14400	14400	19200	19200	14400	14400	19200	19200	14400	14400	19200	19200
Expenses												
Food (\$9/man/day)	1053	1053	1053	1053	1134	1134	1134	1134	1458	1458	1458	1458
Fuel (510.6 gall/day)	4978	8297	4978	8297	5361	8936	5361	8936	6893	11489	6893	11489
Ice (average/trip)	668	668	668	668	668	668	668	668	668	668	668	668
Captain-5%	1200	1200	1600	1600	1200	1200	1600	1600	1200	1200	1600	1600
Crew share												
8 @	722	354	1211	842	671	274	1160	762	465	---	953	443
Captain	1922	1554	2811	2442	1871	1474	2760	2362	1665	----	2553	2043
Annual												
Crew member	13501	6620	22647	15745	11675	4768	20184	13259	6276	----	12866	5981
Captain	35941	29060	52566	45665	32555	25648	48024	41099	22478	-----	34466	27581
Vessel owner	179520	179520	239360	239360	167040	167040	222720	222720	129600	-----	172800	172800

<sup>a</sup>Assumes 75-90 foot vessels and 60/40% lay system; all crew and vessel expenses are not included. Proposed NEFMC regulations actually imposes an upper limit of 230 days per vessel per year; thus, there is actually about 1 trip less than indicated in the table. Food and fuel expenses are based on average values. The assumption of 33-36 MPP average counts generally imposes the condition that fishermen do not respond to elimination of the meat count standard.



shorter and more frequent trips. The typical 18 day trip of Virginia vessels is cost prohibitive. Another possible consequence is that crew may frequently switch vessels to maximize their income. Even this scenario does not prevent fishing in excess of the proposed 19,900,000 pound target level. Given 13 day trips and 17 trips per year, a fleet of 150 full-time vessels can harvest 20.4 million pounds.

Probable Short-run Impact of Eliminating the Meat Count Standard:

Actual impacts of the proposed regulations depend on stock conditions and economic parameters. High stock sizes and trip limits will shorten days at sea per trip and increase the frequency of trips. Elimination of the meat count standard can be expected to increase both landings and average meat counts. However, the level of landings and meat counts will depend on shucking capacity, stock size, age composition, and crew and captain attitudes and preferences.

Data available in DuPaul et al (1989) and from other research for which vessels were exempted from the meat count standard indicate that average meat counts might be as low as 38 MPP or as high as 65 MPP without the meat count standard. Captain and crew of some vessels explicitly indicated they would not cut 45+ MPP scallops. Alternatively, captain and crew of other vessels demonstrated that they would harvest and cut all that was possible given available on-board resources. Without further study, it is not possible to

accurately predict the average meat count likely to occur as a result of eliminating the meat count standard.

Production as high as 48-50 pounds per hour was similarly observed for these vessels. However, production as low as 38 pounds per hour was also observed. Crew sizes varied between 9 and 11 men per vessel but there was typically free time for crew. An exception being for one vessel with daily average production of 1275 pounds per day and having counts as high as 79 meats per pound. Production for this vessel appeared to be limited by available shucking capacity and the large number of small scallops.

Recent at sea observations by DuPaul and Fisher indicate a daily target harvest of 1000 pounds per day. This is a reasonable level for a 9 man crew. Landings of 1000 pounds per day can be realized by harvesting approximately one 40 pound bag per hour or 6-9 baskets of 40-60 MPP scallops for a 40-50 minute tow.

Given a target value of 1000 pounds of meats per day, the short-run impacts of the proposed regulations are evaluated (Table 4). The regulations will likely reduce the typical 18 day trips of Virginia vessels to approximately 10 days per trip; it is assumed that 2 days of steaming are required per trip. At a 1000 pounds per day, crew and owner shares are sufficient to maintain labor and the vessel. More important, however, is the likely potential to exceed the 19.9 million pound annual target proposed by the New England Fishery Management Council (NEFMC). At 23 ten-day trips per

Table 4. Evaluation of proposed regulations: 9 man crew and layover of 1 day at the dock for every 2 days at sea given selected ex-vessel and fuel prices, average stock conditions, and vessel realization of 1,000 pounds per day of fishing<sup>a</sup>

Ex-vessel price	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00	3.00	3.00	4.00	4.00
Fuel price/gallon	.75	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25	.75	1.25
Days at sea per trip	10	10	10	10	14	14	14	14	18	18	18	18
Number of trips	24.3	24.3	24.3	24.3	17.4	17.4	17.4	17.4	13.5	13.5	13.5	13.5
Landings-pounds	8000	8000	8000	8000	12000	12000	12000	12000	16000	16000	16000	16000
Gross stock	24000	24000	32000	32000	36000	36000	48000	48000	48000	48000	64000	64000
Lay system												
Boat-40%	9600	9600	12800	12800	14400	14400	19200	19200	19200	19200	25600	25600
Crew-60%	14400	14400	19200	19200	21600	21600	28800	28800	28800	28800	38400	38400
Expenses												
Food	810	810	810	810	1134	1134	1134	1134	1458	1458	1458	1458
(\$9/man/day)												
Fuel	3830	6383	3830	6383	5361	8936	5361	8936	6893	11489	6893	11489
(510.6 gall/day)												
Ice	668	668	668	668	668	668	668	668	668	668	668	668
(average/trip)												
Captain-5%	1200	1200	1600	1600	1800	1800	2400	2400	2400	2400	3200	3200
Crew share												
8 @	877	593	1366	1082	1404	1007	2137	1740	1931	1421	2909	2358
Captain	2077	1793	2966	2682	3204	2807	4537	4140	4331	3821	6109	5558
Annual												
Crew member	21311	14410	33194	26293	24430	17522	37184	30276	26069	19184	39272	31833
Captain	50471	43570	72074	65173	55750	48842	78944	72036	58469	51583	82472	75033
Vessel owner	233280	233280	311040	311040	250560	250560	334080	334080	259200	259200	345600	345600

<sup>a</sup>Assumes 75-90 foot vessels and 60/40% lay system; all crew and vessel expenses are not included. Proposed NEFMC regulations actually imposes an upper limit of 230 days per vessel per year; thus, there is actually about 1 trip less than indicated in the table. Food and fuel expenses are based on average values. Personal observation by DuPaul and Kirkley and DuPaul and Fisher suggest that vessels are capable of harvesting 1000-1275 pounds per day when exempted from the meat count standard. A harvest of 1,000 pounds a day of fishing is, thus, a reasonable target level for vessels. Landings are estimated by multiplying 1000 pounds per day times the days at sea less two days assumed to be required to steam to the grounds. Landings are assumed to reflect increased harvesting of 40-65 MPP scallops; actual vessel counts resulting from the elimination of the standard, however, cannot be ascertained with available data.

year, a fleet of 150 full-time vessels can harvest approximately 27.6 million pounds per year.

This high level of production, however, may not be sustainable. Increased mortality on all size scallops would be expected. As a consequence, future stocks and recruitment would likely decrease. Thus, the proposed regulations offer little or no conservation of the resource and no controls on age-at-first-capture. In fact, the proposed regulations offer an opportunity for increasing fishing mortality beyond current levels, at least in the short-run.

Preliminary analyses contained in this brief addendum indicate a need for considering alternative regulations. The proposed regulations, even with trip limits, appear to be inadequate for controlling total and juvenile mortality. In fact, if vessels are able to obtain a target value of 1000 pounds of meats per day, the proposed regulations, which eliminate the meat count standard, will likely increase vessel landings over their current levels. The preliminary analyses also indicate a need for considerable research on likely responses by fishermen to elimination of the meat count standard. Data available from previous research suggests the average meat count for landed product will increase. Average counts per vessel may range anywhere from a low of 38 to a high of 65 MPP. The New England Fishery Management Council has indicated that high counts, particularly counts exceeding 45 MPP, would warrant either lowering trip limits or initiating meat count restrictions.

CITED REFERENCE

DuPaul, W.D., E. Heist, and J.E. Kirkley. 1989. Comparative Analysis of Sea Scallop Escapement/Retention and Resulting Economic Impacts. College of William and Mary, Virginia Institute of Marine Science, Gloucester Pt, VA.