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Harvesting Efficiency and Size Selectivity of 3.25 and 3.50 Inch Ring Sea Scallop Dredges : Final Cruise Report

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FINAL CRUISE REPORT

CRUISE NO.: 94-074 OPERATING INSTITUTION:
SHIP NAME: F/V Tradition Virginia Institute of Marine Science,
College of William and Mary

DATES: August 2-6, 1994

PROJECT TITLE: Harvesting Efficiency and Size Selectivity of 3.25 and 3.50 Inch
Ring Sea Scallop Dredges

CHIEF SCIENTIST: William DuPaul

CLEARANCE COUNTRIES: Canada, Fishing Zone 4; NAF0 5Ze.

FOREIGN PARTICIPANTS: None

PORT CALLS: None

DESCRIPTION OF SCIENTIFIC PROGRAM:

Sea scallop dredges constructed with 3.25 inch (82 mm) and 3.50 inch (87 mm) rings were towed side-by-side to assess differences in harvesting efficiency and size selectivity of sea scallops (Placopecten magellanicus). One hundred tows were made within the Canadian portion of Georges Bank from the northern edge eastward and south to the southeastern part near Corsair Canyon. Quantities of and size distribution of scallops harvested were assessed for each dredge. Data will be analyzed to assess size selectivity and technical efficiency of scallop vessels operating in both the U.S. and Canadian portion of Georges Bank and factors affecting the size of scallops that were retained or discarded by the crew. Additional information pertaining to scallop moisture and protein at harvest and at offloading was collected.

DATA OBSERVATIONS AND SAMPLES COLLECTED:

Data Observations:


- * Duration of tow
- * Location (Loran C)
- * Vessel Speed
- * Depth Range
- * Harvest of scallops for each dredge in baskets;
one basket = 1.5 bu.
- * Production of scallops for each dredge in bags;
one bag = 42 lbs. of scallop meats
- * Sea Conditions
- * Type and volume of by-catch
- * Size distribution of scallops (5 mm intervals) retained by crew
- * Size distribution of scallops (5 mm intervals) discarded by crew
- * Meat count (MPP) of scallops harvested by each dredge
- * Moisture and protein content of scallop meat at harvest and at
offloading.
- * Shell height-meat weight relationships (3 harvest areas)

Samples Collected:

- * Scallop meats for moisture and protein determination
- * Scallop meats for shell height-weight relationships

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William D. DuPaul

January 13, 1995
Date

FINAL CRUISE REPORT

Cruise No. 94-074: F/V Tradition
August 2-6, 1994

HARVESTING EFFICIENCY AND SIZE SELECTIVITY OF 3.25 AND 3.50 INCH RING SEA SCALLOP DREDGES

Fishery managers have increasingly sought to resolve the open-access and common-property problems in fisheries. Managers have been concerned, however, about age-at-entry or age-at-first-capture. Excessive harvesting of small fish causes economic waste and jeopardizes future stocks of fish. This was the case for the U.S. sea scallop, Placopecten magellanicus, fishery when meat count or size based regulations were imposed. Under Amendment #4, which eliminated meat count restrictions, fishery managers remained concerned about age-at-first-capture and recommended that the minimum size of dredge rings be increased from 3.00 to 3.25 inches between 1994 and 1996 and to 3.50 inches in 1996. Unfortunately, the New England Fishery Management Council (NEFMC) and the National Marine Fisheries Service (NMFS) had only limited information about the biological and economic ramifications of larger rings. As a consequence, NEFMC and NMFS supported a Virginia Institute of Marine Science research project, under a Saltonstall-Kennedy grant, on the efficiency and size selectivity of 3.50 and 3.25 inch rings relative to the standard 3.00 inch rings.

Cruise No. 94-074 was the fifth of seven research trips conducted on commercial scallop vessels to evaluate scallop gear selectivity and efficiency; one and

possibly two more trips will be conducted in 1995 to complete this particular study.

The request to conduct part of our research in the Canadian portion of Georges Bank stemmed from the fact that the sea scallop resources in the mid-Atlantic and on the U.S. portion of Georges Bank were insufficient to conduct a complete study and analysis of scallop dredge ring size changes.

The information provided in this report pertains primarily to the data obtained during four days of fishing in the Canadian portion of Georges Bank. This information will be incorporated into the final contract report(s) and research publications which will cover the entire project. There also is the good possibility that the information gained from this particular effort (Cruise No. 94-074) will be the framework for at least one stand-alone research publication.

Fishing Vessel Operations

Sea scallop dredges constructed with 3.25 inch (81 mm) and 3.50 inch (87 mm) rings were towed side-by-side to assess differences in harvesting efficiency and size selectivity of sea scallops. Scallop dredges were 15 feet (4.57 meters) wide and were configured with rock chains, 5.50 inch (137 mm) mesh twine tops and had split-tire chaffing gear on the bottom of the chain bag; no other chaffing gear such as do-nut spacers were used. One hundred tows were made within the Canadian portion of Georges Bank (Tows 44-143). Tow times, depth of water, towing speed, location in Loran coordinates, harvest, etc. are contained in the vessel tow log (Appendix 1). The F/V Tradition is a steel hull 104 feet (31.7 meters) 127 net ton commercial scallop vessel from New Bedford, Massachusetts. Fishing operations in Canadian waters were conducted over a period of four days from August 2, 1994 and August 6, 1994; all other fishing operations during the period from July 31, 1994 to August 11, 1994 were conducted in the U.S. portion of Georges Bank. During this period, additional studies were conducted to assess the harvest efficiencies between dredges constructed with 3 inch (75 mm) rings and 3.50 inch (87 mm) rings.

Harvest Data

Of the 237 tows conducted during this cruise, detailed harvest data was obtained for 69 tows. Of the 100 tows conducted within the Canadian portion of Georges Bank, detailed harvest information was collected for 33 tows. This information included quantity of scallop harvested,^{*} quantity and size distribution (shell height in 5 mm intervals) of scallops retained for shucking, quantity and size distribution of scallops discarded and shell height (SH): meat weight relationships for each of the three resource areas harvested within Canadian waters. Shell height:meat weight relationships were obtained by dissecting adductor muscles from scallops (N = > 15) for each 5 mm interval of SH to obtain an average meat weight for each SH interval. Shell height:meat weight relationships for the three harvest areas were combined to obtain production estimates for each dredge (Figures 1, 2, 3 and 4).

Production estimates for both dredges (Canadian portion of Georges Bank) indicated that the 87 mm ring dredge was more efficient than the 81 mm ring dredge (Table 1). Total harvest for the 87 mm dredge exceeded the 81 mm ring dredge by 94 kg or 4.5%. Other parameters of production including baskets of scallops harvested, number of scallops harvested and kg of meats per basket were all positive in favor of the 87 mm ring dredge (Refer to Table 1).

^{*}Quantities of harvested scallops were estimated by counting the number of baskets (± 0.1) for each dredge. Each basket contained about 1.5 bushels. The number of scallops in each basket varied with the size distribution of the scallops.

Shell height distributions of all scallops harvested for each dredge was used as an indicator of relative size selectivity. The data is separated into identifiable resource areas as they differ in bottom type, abundance of scallops and the size distribution of scallops within each population. The resource areas are identified as Georges Bank Northern Edge, Georges Bank Canadian Portion, Georges Bank Southeast Ports, Georges Bank Southeast Channel (Refer to Figures 5, 6, 7 and 8; Tables 2 and 3). Of particular interest for this report is the data pertaining to the Canadian portion of Georges Bank which was characterized by a relatively high abundance of large scallops greater than 100 mm and in most cases, relatively free of large rocks and cobbles. In contrast, the other resource areas were characterized as having a low abundance of scallops most of which were less than 100 mm and a greater frequency of rocks and large cobbles. Care must be exercised when comparing fishing gear performance between widely diverse conditions in resource abundance, size distribution, and bottom type as parameters of relative selectivity and efficiency of scallop dredges can be significantly altered in each case. Conditions in the Canadian portion of Georges Bank were ideal with high scallop abundance and multiple year classes. However, there appears that at least one and possibly two year classes were missing or in low abundance in this particular resource area; there were relatively few scallops in the 60-90 mm size range.

A major objective of the study, that was to evaluate the 81 and 87 mm ring scallop dredges in healthy resource areas, was accomplished. Selective equality between the two dredges was reached with scallops in the 90-95 mm size range (93

mm midpoint). As expected, fewer small (< 90 mm) scallops and conversely, more larger scallops (> 95 mm) were harvested by the 87 mm ring dredge. The superior harvesting efficiency of larger ring scallop dredges in resource areas dominated by large scallops has been previously documented (Bourne 1965; DuPaul et al 1989). Consequently, if management wishes to increase the ring size of scallop dredges to reduce the capture and delay the entry of undersized scallops, such changes should be implemented when the scallop resource is composed of multiple year classes and more so, if there is relatively high abundance of larger (> 100 mm) scallops.

Moisture (% water) and protein data were obtained for both freshly shucked scallop meats and or scallop meats at time of offloading. Moisture values ranged from 73.74 to 77.51 with an average of 75.82 (N = 6) and protein values ranged from 17.65% to 20.67% with an average of 19.29% (N = 6) for freshly shucked scallop meats. At offloading after five to nine days stowage, moisture values ranged from 75.08 to 77.15 with an average of 76.51 (N = 7). Protein values at offloading ranged from 17.59% to 19.23% with an average of 18.25% (N = 7). For each moisture and protein analysis, seven freshly shucked scallop meats were sealed in freeze-proof plastic, immediately frozen and returned to the laboratory (Virginia Institute of Marine Science, Nutrient Analysis Laboratory). Analyses were conducted on composite homogenates of each sample according to standard AOAC methodology (AOAC 1990). This information, along with the appropriate shell height:meat weight relationships, can be used to calculate catch estimates at point of harvest and at offloading.

Literature Cited

- AOAC. 1990. Official Methods of Analysis, 15th ed., Association of Official Analytical Chemists, Arlington, VA.
- Bourne, N. 1965. A comparison of catches by 3- and 4-inch rings on offshore scallop drags. *J. Fish. Res. Can.* 22:313-333.
- DuPaul, W. D., E. J. 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 Point, VA. 150 p.

APPENDIX 1.

F/V Tradition Tow Log Data

Cruise No. 94-074

F/V Tradition Tow Log Data

Tow #	Date	Start time	End time	Loran Data				Speed	Depth (fm)	Baskets		Comments
				Start	Start	End	End			3.25"	3.5"	
1	7/31	3:56 pm	4:49 pm	13702.8	43664.6	13668.8	43669.5	5	47-50	0.58	0.5	
2		5:01	5:47	13662.1	43671.7	13632.7	43687.1	5.1	50-51	0	0.25	obj 3.25"
3		5:59	6:53	13626.1	43689.3	13592.7	43688.2	5	38-50	0	0.5	obj 3.25"
4		7:08	8:02	13585.2	43691.3	13550.8	43705.5	5	34-35	0.5	0.75	
5		8:14	8:58	13546.7	43704.4	13561.4	43689.1	5.2	32-35	0	0.5	drag broke 3.25"; dog leg tow
6		9:08	10:05	13564.5	43688.1	13548.1	43707.4	5	33-35	1.08	0.75	dog leg tow
7		10:16	11:05	13550.1	43706.4	13580.3	43682.7	5	33-35	0.92	0.75	sweep chain off 3.5"
8		11:20	12:12	13580	43683	13598.5	43660.2	5.1	30-34	1.08	0.5	long dog leg tow
9		12:22	1:19	13600.9	43687.3	13586.7	43671.4	5	30-34	0.92	0.83	turn wide tow
10		1:28	2:11	13584.4	43671.8	13564.9	43694.6	5	31-35	1.08	0.67	
11		2:23	3:15	13565.9	43694.9	13546.1	43710	5.2	33-36	0.58	0.5	
12		3:28	4:25	13545.9	43712.4	13511.5	43717	4.8	35-36	0.42	0.33	
13		4:37	5:27	13505.3	43719.3	13469.7	43721.8	5.7	34-36	0.58	0.33	
14		5:37	6:28	13466.3	43724.9	13450.3	43753.5	6	36-38	0.42	0.42	2.5 shackles added to 3.5"
15		6:38	7:26	13446	43756.2	13416.5	43764.6	4.5	40-43	0.5	0.17	slower speed no good?
16		7:51	8:51	13410.6	43766.9	13387.9	43795.7	6.1	40-25	0.75	0.5	3.5" less 20 minutes
17		9:00	9:51	13388.9	43793.6	13394.9	43784.8	6.1	25-26	0.58	0.5	turn around 13400.6, 43775.6
18		10:05	11:10	13394.5	43784.2	13372.2	43815.4	6	23-25	0.75	0.75	
19		11:20	12:11	13370	43818	13343.1	43838.3	5.7	47-50	0.25	0.25	big shell, small meats
20		12:23	1:26	13338.9	43839.6	13292.8	43848.1	5.6	40-42	0.67	0.3	big shell, small meats
21	8/1	1:42	2:40	13284.2	43844.8	13243.4	43848.5	5.8	30-33	1	0.83	better meats
22		2:48	3:48	13240	43848.7	13196.9	43855.2	5.7	29-32	0.42	0.25	
23		3:57	5:05	13192.5	43856.3	13142.8	43871.8	5.9	35-40	0.92	0.67	
24		5:14	6:10	13138.8	43872.7	13095	43880.8	6	31-33	0.5	0.5	
25		6:19	7:05	13090	43881.8	13058.6	43882	5.7	30-26	0.83	0.75	
26		7:18	7:45	13054.5	43881.5	13044.2	43884.2	3	21-25	0	0	rocks, no scallops
27		8:05	9:10	13035.6	43887	13001.9	43880.6	6	25-26	1.25	1.17	
28		9:31	10:30	13002.9	43880.8	12996.1	43882.6	5.8	25-26	1.42	1.25	turn around 13029.5, 43881.8
29		10:42	11:33	12996	43880.9	130088.5	43878.2	6.1	23-25	1.25	1.08	same as #28
30		11:44	12:58	13005.1	43880.1	12959	43899.3	6	23-43	1.5	1.08	acc time, 1 hour tow - hung up
31		1:10	2:09	12954.7	43899	12915.5	43898.4	5.8	43	1.75	1.5	start 12000, 43000
32		2:22	3:24	12911.6	43897.3	12901.9	43897.6	5.7	42-50	1.75	1.42	turn around 12888.6, 43897.7
33		3:38	4:24	12905.9	43898.5	12928.5	43903.2	5.7	45-47	1.5	1.08	
34		4:38	5:25	12925.1	43905.3	12900	43904	5	65-73	1.5	1.08	twine top fouled 3.5"
35		5:40	6:34	12898.2	43901.6	12869.3	43899.9	5.5	50-48	2	1.5	
36		6:48	7:38	128772.2	43897.9	12900	43900	5.5	50	1.25	0.92	

37	7:49	8:32	12896.9	43900.5	12871.4	43898.6	5.5	50-51	1.5	1.08	
38	8:44	9:34	12872.3	43898.1	12874.6	43897.7	5.5	50-56	1.08	0.75	add 6 links to 3.5" sweep
39	11:16	12:13	12874.5	43898.1	12875.6	43897.8	5.5	49-52	1.08	0.92	turn around 12891.1, 43899.2
40	8/2	12:26	12877.1	43897.1	12906.7	43904	5.8	52-60	1.08	1.25	
41	1:42	2:48	12910.2	43904	12896.3	43899.6	5.5	50-57	2.08	1.83	
42	3:02	4:05	12891.1	43898.6	12903.8	43902	5.8	55-59	2.08	1.25	turn around 12880.8, 43899.9
43	4:53	5:40	12903.3	43880.4	12876.9	43880.9	5.5	30-32	1.08	0.67	
44	5:52	6:28	12871.8	43551.6	12854	43876.4	5.5	30-32	5.75	4.5	over line - big stuff
45	6:35	7:13	12852.1	43875.6	12843.8	43864.7	5.5	30-34	6.5	4.75	
46	7:21	7:59	12841.5	43864	12831.2	43853.6	5.5	30-34	4.5	4.75	a.little smaller
47	8:08	8:45	12830.8	43852.1	128823.5	43844.8	5.5	40-38	6.75	6	
48	8:55	9:34	12824.2	43843.6	12818.5	43843.4	5.5	40-38	5.75	5.75	
49	9:42	10:21	12818.7	43841.6	12798.1	43844.8	5.5	36-40	6.5	6	rocks, gaffers
50	10:30	11:09	23795.6	43845.8	12773.4	43857.1	5.5	36-40	6	8	
51	11:19	12:00	12770.2	43856.3	12787.7	43843.1	5.5	40	6.5	7.5	
52	12:10	12:51	12790.7	43841.1	12788.5	43852.5	5.3	38-40	6.5	6.5	
53	1:01	1:44	12786	43853.8	12789.9	43849.7	5.3	38-40	8.75	7	turn around tow
54	1:52	2:33	12792.2	43848.3	12799.1	43844.3	5.2	36-39	4.5	5.5	seed
55	2:42	3:22	12797	43816	12777.1	43860.5	5	38-40	8	7.5	
56	3:39	4:22	12778.9	43857.4	12794.1	43843.8	5.2	38-40	7	7.5	
57	4:37	5:18	12796	43844	12780	43858.2	5	38-40	6	6.75	
58	5:26	6:02	12780.1	43857.2	12793.2	43855.9	5.2		5.5	5.5	
59	6:14	6:40	12792	438858.3	12793.8	43864.6	5.3	38-40	0	0	grass, starfish
60	6:50	7:10	12796.2	43864.4	12799.2	43859.4	5.5	37-40	4.08	4	
61	7:23	7:58	12808.5	43859.7	12824.3	43861.5	5.2	37-38	7	6.75	
62	8:11	8:52	12827.2	43862.1	12841.1	43868	5.3	35	5	flip	flip 3.5" drag
63	9:02	9:38	12838.1	43869.9	12828.1	43882.6	5.5	37-40	5	6.08	
64	9:46	10:26	12830.8	43879.7	12849.4	43862.1	5.5	34-40	6	8.08	
65	10:39	11:23	12847	43862.7	12828.5	43880.2	5	35	2.08	4	12000, 43000
66	8/3	11:39	12829	43877.2	12852.7	43858.8	5.5	35	6	8	
67	12:30	1:15	12853.8	43858.9	12850	43859	5.5	35	3.92	6.75	
68	1:25	2:08	12826.7	43878.9	12853.1	43857.9	5.5	35	3.08	4.08	
69	2:16	2:57	12827.9	43877.3	12846.6	43861.3	5.3	35	8	6.5	
70	3:06	3:47	12845.6	43862.8	12824.5	43878.6	5.5	35	8.5	8	
71	3:59	4:41	12826.7	438777.8	12846.8	43861.3	5.3	35	6.5	7.5	back job 3.5"
72	4:50	5:32	12845	43863.1	12821.1	43879.4	5.5	35	4	bj	
73	5:53	6:40	12820	43880	12843.9	43863.2	5.8	35	3.75	5.5	
74	6:47	7:29	12842	43864.9	12821.9	43881	5.5	35-40	5.75	5	
75	7:58	8:23	12821.7	43879.7	12848.9	43863.3	5.8	35-40	3.5	6	
76	8:34	9:18	12845.4	43864.4	12821.4	43882.3	5.5		5.75	6	
77	9:27	10:05	12820.4	43883.3	12830.2	43891.3	5	50-45	1	3.75	shoes starboard

37	7:49	8:32	12896.9	43900.5	12871.4	43898.6	5.5	50-51	1.5	1.08
38	8:44	9:34	12872.3	43898.1	12874.6	43897.7	5.5	50-56	1.08	0.75 add 6 links to 3.5" sweep
39	11:16	12:13	12874.5	43898.1	12875.6	43897.8	5.5	49-52	1.08	0.92 turn around 12891.1, 43899.2
40 8/2	12:26	1:29	12877.1	43897.1	12906.7	43904	5.8	52-60	1.08	1.25
41	1:42	2:48	12910.2	43904	12896.3	43899.6	5.5	50-57	2.08	1.83
42	3:02	4:05	12891.1	43898.6	12903.8	43902	5.8	55-59	2.08	1.25 turn around 12880.8, 43899.9
43	4:53	5:40	12903.3	43880.4	12876.9	43880.9	5.5	30-32	1.08	0.67
44	5:52	6:28	12871.8	43551.6	12854	43876.4	5.5	30-32	5.75	4.5 over line - big stuff
45	6:35	7:13	12852.1	43875.6	12843.8	43864.7	5.5	30-34	6.5	4.75
46	7:21	7:59	12841.5	43864	12831.2	43853.6	5.5	30-34	4.5	4.75 a little smaller
47	8:08	8:45	12830.8	43852.1	128823.5	43844.8	5.5	40-38	6.75	6
48	8:55	9:34	12824.2	43843.6	12818.5	43843.4	5.5	40-38	5.75	5.75
49	9:42	10:21	12818.7	43841.6	12798.1	43844.8	5.5	36-40	6.5	6 rocks, gaffers
50	10:30	11:09	23795.6	43845.8	12773.4	43857.1	5.5	36-40	6	8
51	11:19	12:00	12770.2	43856.3	12787.7	43843.1	5.5	40	6.5	7.5
52	12:10	12:51	12790.7	43841.1	12788.5	43852.5	5.3	38-40	6.5	6.5
53	1:01	1:44	12786	43853.8	12789.9	43849.7	5.3	38-40	8.75	7 turn around tow
54	1:52	2:33	12792.2	43848.3	12799.1	43844.3	5.2	36-39	4.5	5.5 seed
55	2:42	3:22	12797	43816	12777.1	43860.5	5	38-40	8	7.5
56	3:39	4:22	12778.9	43857.4	12794.1	43843.8	5.2	38-40	7	7.5
57	4:37	5:18	12796	43844	12780	43858.2	5	38-40	6	6.75
58	5:26	6:02	12780.1	43857.2	12793.2	43855.9	5.2		5.5	5.5
59	6:14	6:40	12792	438858.3	12793.8	43864.6	5.3	38-40	0	0 grass, starfish
60	6:50	7:10	12796.2	43864.4	12799.2	43859.4	5.5	37-40	4.08	4
61	7:23	7:58	12808.5	43859.7	12824.3	43861.5	5.2	37-38	7	6.75
62	8:11	8:52	12827.2	43862.1	12841.1	43868	5.3	35	5	flip flip 3.5" drag
63	9:02	9:38	12838.1	43869.9	12828.1	43882.6	5.5	37-40	5	6.08
64	9:46	10:26	12830.8	43879.7	12849.4	43862.1	5.5	34-40	6	8.08
65	10:39	11:23	12847	43862.7	12828.5	43880.2	5	35	2.08	4 12000, 43000
66 8/3	11:39	12:20	12829	43877.2	12852.7	43858.8	5.5	35	6	8
67	12:30	1:15	12853.8	43858.9	12850	43859	5.5	35	3.92	6.75
68	1:25	2:08	12826.7	43878.9	12853.1	43857.9	5.5	35	3.08	4.08
69	2:16	2:57	12827.9	43877.3	12846.6	43861.3	5.3	35	8	6.5
70	3:06	3:47	12845.6	43862.8	12824.5	43878.6	5.5	35	8.5	8
71	3:59	4:41	12826.7	438777.8	12846.8	43861.3	5.3	35	6.5	7.5 back job 3.5"
72	4:50	5:32	12845	43863.1	12821.1	43879.4	5.5	35	4	bj
73	5:53	6:40	12820	43880	12843.9	43863.2	5.8	35	3.75	5.5
74	6:47	7:29	12842	43864.9	12821.9	43881	5.5	35-40	5.75	5
75	7:58	8:23	12821.7	43879.7	12848.9	43863.3	5.8	35-40	3.5	6
76	8:34	9:18	12845.4	43864.4	12821.4	43882.3	5.5		5.75	6
77	9:27	10:05	12820.4	43883.3	12830.2	43891.3	5	50-45	1	3.75 shoes starboard

78	10:15	10:36	12828.6	43889.9	12824	43883.3	5.5	47-50	4.5	5.08
79	10:49	11:35	12825.7	43879.9	12833.1	43891	5.3	47-50	6.75	6 clean
80	11:47	12:10	12836.1	43890.4	12845.2	43891.2	5	45-47	2.75	2.58 clean
81	12:22	12:58	12845.5	43892.2	12854.6	43893	5.5	47-48	5	5.25 clean
82	1:14	2:11	12858.8	43896.2	12834.3	43890.9	5.2	49-51	6.75	6.75 clean
83	2:23	3:20	12829.6	43889.4	12812.4	43880.5	5.2	51-45	9.5	9.75
84	3:34	4:42	12816.3	43878.8	12840.8	43889.5	5	43-47	9.75	9.5
85	7:40	8:35	12831.77	43891.3	12828.3	43889.8	5	50-46	11	10.5
86	8:56	9:55	12825.7	43888.5	12832.6	43891.4	5.3	50-46	9	8.5
87	10:06	11:13	12830.6	43891.7	12830.8	43884.7	5.3	50-46	9.08	12
88	11:23	12:02	12832	43881	12828.1	43883.4	5.8	42	7.5	9 hotein 3.25"
89 8/4	12:13	12:57	12830.3	43883.8	12845.8	43892.4	5.3	42-45	5.83	7
90	1:07	1:47	12844	43892	12823.1	43888.5	5.5	48-50	8	7.5
91	2:05	2:51	12826.4	43887.5	12846	43892.9	5.3	48-50	7	7.08
92	3:04	3:52	12843	43893	12824.5	43885.4	5.5	48	8.25	7.33
93	4:04	4:51	12826.3	43886.1	12843.7	43892.7	5.5	48	7.83	5
94	5:07	5:58	12840.8	43892.5	12820.5	43883.1	5.5	45-48	6.17	6
95	6:10	7:15	12821.9	43882.8	12848.4	43892.3	5.5	44-48	11	9.83
96	7:27	8:17	12845.7	43891.9	12822.2	43886	5.5	44-48	7	7
97	8:36	9:29	12823.8	43884.6	12845.7	43886.3	5.5	42-46	6.5	7
98	9:39	10:10	12844	43888.5	12850.1	43869.3	5	32-34	6	6.5 steam 10 minutes to #99
99	10:42	11:20	12860	43859.9	12863.1	43840.9	5	25-32	0.5	0.5
100	1:30	2:04	12842.2	43749.7	12837.7	43739.9	5.5	39-40	4	3.92 SE part - gaffers
101	2:13	3:00	12837.5	43737.1	12842.1	43718.3	5.7	40-42	7	8.5
102	3:13	4:00	12844.2	43718	12840.2	43714.8	5.5	42-44	7	8.75
103	4:10	5:00	12842.1	43714.6	12836.1	43714.3	5.5	42-44	7.5	7
104	5:12	6:02	12837	43715.5	12843.4	43730.9	5.2	41-44	6.08	6.25
105	6:14	7:00	12840.2	43732.7	12835.4	43719.5	5.4	41-44	5.25	6.75
106	7:11	8:01	12835.2	43721.4	12856.3	43725.5	5.4	40-41	4.75	4.5 bigger meats, 30 ct 2lbs
107	8:12	8:58	12855.8	43724.9	12852.1	43709.7	5.3	40-44	4.5	4.08
108	9:10	10:01	12850.6	43711.7	12837.9	43732.7	5.4	40-42	8	7
109	10:14	11:06	12936.4	43731.8	12851.1	43710.9	5.4	40-42	7.5	6.92
110	11:18	12:08	12849.5	43712.4	12838.7	43732.8	5.1	40-43	7.75	7.75
111 8/5	12:19	12:28	12837.9	43730.7	12848.9	43714.8	5.5	40-43	8	7.25
112	1:08	2:00	12848.3	43714.5	12838	43735.1	5.5	40-43	7	9.5
113	2:12	3:01	12837.1	43736	12850.2	43713.3	5.5	40-43	7	7
114	3:10	4:02	12850.5	43713.8	12838.2	43735.1	5.5	40-43	7	6.75
115	4:12	5:14	12838	437734	12851	43711.1	5.5	40-43	9.75	10
116	5:23	6:25	12850.7	43712.5	12835.5	43736.3	5	40-43	8.08	7.75
117	6:36	7:39	12835.5	43736.4	12850.1	43712.7	5	40-43	7	6.75
118	7:52	8:52	12847.7	43715.5	12832.8	43739.7	5	40-43	8	7

119	9:07	10:14	12830.8	43739.6	12847.2	43714.2	5.2 40-43	8	8.25
120	10:25	11:25	12846.8	43715.7	12834.4	43738.8	5 40-43	7.5	6
121	11:40	12:43	12834.9	43736.4	12851.4	43707.8	6 40-43	9	8.83 turn around 858.7, 697.6
122	12:54	2:00	12852.4	43704.8	12843.6	43717.6	5.5 40-44	8.92	9.17
123	2:16	3:20	12845.2	43719.2	12832.1	43743.6	5.5 40-44	8	6.75
124	3:34	4:28	12853.9	43741	12846.7	43714.7	5.5 40-44	7	6.5
125	4:37	5:40	12845.6	43716.1	12851.5	43697.8	5.3 44-45	8.75	9.25
126	5:51	6:36	12850.6	43696.77	12830.8	43698.8	5 45-47	4.08	4.08
127	6:47	7:33	12828.4	43699	12836	43685.8	5 48-50	5.25	5
128	7:45	8:30	12838.7	43685.1	12861.7	43676.4	5 48-50	4	3.5
129	8:41	9:34	12862.6	43678.6	12868	43692	5.5 48-45	6.5	8
130	9:42	10:39	12870.9	43695.5	12854.6	43710.9	5.8 44-42	3.5	4.08
131	10:49	11:54	12851.7	43710.4	12849	43704.9	5.5 40-44	9.5	9.08
132 8/6	12:06	1:06	12845.5	43707.1	12863.3	43698.4	5.5 40-44	8.92	8.5
133	1:16	2:22	12865.2	43695.5	12849	43708.3	5.5 40-44	8.75	10.08
134	2:38	3:47	12848.1	43710.5	122859.1	43703.1	6 40-44	8	9.5
135	3:59	5:00	12858	43703.8	12862.8	43705	6.2 40-44	5.08	flip flip 3.5" drag
136	5:18	6:12	12865.6	43702.1	12846.4	43708.4	5.5 40-44	7.5	8
137	6:28	7:31	12841.1	43712.4	12856	43698.4	5.5 40-44	5.5	7
138	7:40	8:33	12859.2	43695.8	12851.3	43687.3	5 45-47	7	8
139	8:46	9:00	12852.8	43686.5	12877.1	43681.3	5 47-49	6.5	7
140	9:10	10:41	12879.6	43670.4	12900	43682.5	5 48-49	3.5	4 ring out 3.25" gear bag
141	10:20	11:40	12899	43671.4	12892.7	43660.8	5 49-51	4.5	4.92
142	11:51	12:53	12889.2	43661.1	12908.7	43643.2	5 50-52	5.25	6.08
143	1:04	1:54	12911.4	43641.2	12937.1	43618.1	5 50-52	8	9
144	2:06	3:01	12938.4	43615.6	12943.9	43602.2	5 50-52	0.75	0.5
145	3:13	4:11	12946.1	43599.4	12976.2	43579.2	5.3 50-47	0	0 over Hague line, 13000; 43000
146	4:15	5:30	12981.6	43575.2	13017.9	43554.1	5.3 48-50	0	0
147	5:42	6:36	13022.7	43555	13051.6	43550	5.3 48-50	0	0
148	7:08	7:54	13053.9	43551.3	1348.6	43567.6	5.2 47	0	0
149	8:23	9:20	13051.9	43570.9	13081.4	43559.6	5 40-47	0.5	0.5
150	9:34	10:34	13086.2	43558	13121.4	43538.2	5.2 39-40	0.75	0.58
151	10:50	12:33	13126.7	43535.5	13133.5	43515.8	5 40-44	1	0.75
152 8/7	12:13	1:40	13130.9	43517.5	13091.2	43516.2	5.3 44-47	0.25	0.25
153	2:18	3:20	13101.6	43530.7	13125.7	43536.7	5.3 38-39	0.67	0.42
154	4:43	5:34	13194	43549.8	13209.3	43555.4	5 36-38	1.08	1
155	5:52	6:55	13222	43563.4	13261.3	43557.1	5 36-38	0.92	1.08
156	7:05	7:57	13268.5	43556.7	13292.7	43544.9	5 36-38	0.5	0.5
157	8:10	9:18	13300.3	43543.7	13335.8	43540.9	5 36-38	0.83	0.75
158	9:30	10:30	13335.8	43544.1	13352.7	43554.8	4.9 34-36	1.08	1.08
159	10:43	11:46	13350.5	43557.7	13316.9	43581.4	4.9 31-34	0.58	0.58

160	11:56	1:03	13313.4	43582.8	13277.2	43584.3	4.9 31-32	0.75	0.75
161	1:16	2:16	13280	43581.3	13307.1	43551.7	4.8 33-36	0.92	1
162	2:33	3:35	13313.9	43545.6	13317.6	43517.3	5.2 36-42	1.08	1
163	3:46	4:31	13320.7	43512.8	13310.8	43522.4	5 44-41	1.08	0.92
164	4:41	5:40	13311.5	43524.5	13337.8	43535.1	5 40-38	0.92	0.92
165	5:52	6:46	13339.5	43535.7	13366.6	43539.3	5 38-35	0.67	0.75
166	6:53	7:53	13369.3	43540.1	13401.3	43546.1	5.2 35-31	0.17	0.17
167 8/8	12:06	12:54	13714.9	43529.7	13743.7	43522.9	5 35	0.92	0.92
168	1:04	2:16	13747.5	43521.3	13783.4	43524.8	4.8 35-39	0.58	0.58
169	2:27	3:28	13783.6	43526.9	13760.6	43557.9	5 39-41	0.83	1
170	3:40	4:35	13761	43560.2	13747.2	43585.5	4.8 40-41	0.83	0.75
171	4:56	5:50	13747.5	43587.1	13722.1	43591.8	5 40-41	0.67	0.67
172	6:04	6:51	13725.7	43591.8	13729.3	43594.1	5 50-41	0.92	0.83
173	7:03	7:55	13728.1	43591.5	13727.3	43593.7	5 40-41	0.25	0.5 piggy back
174	8:13	9:07	13730.8	43592.4	13752.1	43573.7	5 44-40	0.75	0.5
175	9:14	10:14	13754.1	43572.5	13760	43542.3	5.2 40	1.17	0.92
176	10:23	11:28	13760.2	43540.8	13737.7	43526.2	5.5 '37-33	0.75	1
177	11:41	12:37	13733.7	43528.8	13699.2	43533.6	5.5 32-35	0.75	1
178	12:43	1:53	13700.6	43532	13745.7	43522.3	5.5 32-35	0.5	0.92
179	1:59	2:57	13747.5	43522.5	13759.3	43543.6	5.3 34-37	1	0.83
180	3:10	4:06	13759	43545	13752	43575.6	5.3 37-41	0.92	0.92
181	4:20	5:24	13752.3	43571.1	13765.1	43536.4	5 36-38	1.25	1
182	5:44	6:46	13767.6	43535.5	13754.8	43564.2	5 36-41	1.08	0.92
183	6:57	7:55	13756	43562.2	13728.3	43557.9	5 36-34	0.75	0.75
184	8:04	9:00	13727.6	43556	13755.5	43549	5 34-36	0.58	0.58
185	9:10	10:06	13756.5	43546.5	13755.9	43552.1	5 36-39	1.08	0.75
186	10:16	11:04	13757.9	43550	13775.7	43527.6	5 36-38	0.75	0.67
187 8/9	12:37	1:34	13771.3	43537.1	13791.3	43551.9	5.3 36-43	1.08	0.75 3" gear on starboard side
188	1:46	2:41	13793.3	43552.2	13825.9	43547.5	5.5 36-40	1.92	1
189	2:50	3:50	13828.4	43545.7	13857.6	43556.4	5.5 25-31	1.5	0.92
190	4:02	5:10	13961.9	43552.1	13843.4	43573	5 25-30	1	1.08 turn around
191	5:20	6:09	13844.9	43570.4	13848.7	43554	5.5 25-30	1.75	0.75
192	6:16	7:04	13849.7	43551.7	13856.5	43539.7	5.5 30-32	0.42	0.5
193	7:12	8:00	13855.4	43539.2	13830.6	43545.9	5 33-36	0.92	0.75
194	8:13	8:59	13829.1	43547	13802	43556.8	5.5 33-37	1.25	0.75
195	9:12	10:00	13799	43556.8	13763.3	43553.7	5 33-37	0.92	0.83
196	10:22	11:15	13760.4	43558.9	13739.6	43589.2	5 33-37	1.75	0.75
197	11:31	12:31	13731.7	43595.5	13702	43588.4	5.3 35-37	1.33	1.25
198	12:41	1:30	13701.6	43591.4	13666	43611.6	5.2 37-39	1.08	1.08
199	1:42	2:41	13667.4	43611.9	13665.8	43616.4	5.5 33-37	1.25	1
200	3:01	4:00	13662.1	43616.2	13645	43640.1	5.5 33-30	0.25	0.08

201	4:13	5:01	13641.2	43644.3	13612.6	43656.2	5.5 32-36	0.75	0.67
202	5:10	5:58	13610.1	43657.6	13579.7	43674.4	5.5 30-35	1.25	1
203	6:10	7:00	13581	43673	13556.7	43686.3	5.5 33-35	1.42	0.75
204	7:10	8:00	13559.2	43688.7	13542	43712.6	5.5 33-35	0.75	0.75
205	8:11	9:00	13543.9	43713.6	13534.1	43713.4	5.5 40-39	0.25	0.25
206	9:09	10:07	13535.8	43712.6	13568.5	43691	5.5 36-34	1	0.75
207	10:16	11:10	13566.6	43593.9	13563.7	43692.5	5 37	1	0.75
208	11:23	12:15	13564.7	43594.3	13533.3	43714.2	4.9 36-37	0.5	0.25
209 8/10	12:38	1:33	13530.8	43718.3	13559.1	43699.6	4.8 33-36	0.5	0.5
210	1:43	2:46	13561.3	43698.3	13556.3	43702.3	5 33-35	0.92	0.75
211	2:55	3:57	13556	43700.4	13542.9	43711.5	5 33-35	0.5	1
212	4:09	4:39	13545	43707.9	13557.1	43691.5	5 33-35	0.75	0.75
213	4:47	5:00	13560.1	43689.4	13558.1	43693.8	5 34	0.5	0.5
214	5:10	6:08	13558.6	43692.7	13535	43712.8	5 33-35	0.42	0.75 2 holes in 3" gear
215	6:24	7:30	13537.5	43709.5	13557.7	43692.9	5 31-35	1.75	1.08
216	7:42	8:59	13559.3	43691.3	13534.2	43711.8	5.5 33-35	1.58	1.42
217	9:10	9:55	13535.3	43712.3	13559.2	43694.2	5.5 33-35	0.92	0.67
218	10:07	10:45	13557.7	43696.9	13533.9	43712.5	5.5 33-35	1	0.67
219	10:54	11:55	13534.2	43713.7	13565.3	43690.8	5.5 33-35	1	0.67
220	12:05	12:51	13561.5	43693.8	13533.8	43711.6	5.5 33-35	0.92	0.83
221	1:00	2:10	13533.4	43711.9	13562	43690.4	5.5 33-35	1.42	1
222	2:18	3:35	13562.2	43689.5	13533.1	43712.3	5.2 33-35	1.75	1.08
223	3:41	4:48	13535.5	43710.3	13564.6	43690.3	5.1 33-35	1.25	1
224	4:58	6:08	13566.6	43688.2	13532.8	43712	5 33-36	1.5	1.5
225	6:17	7:35	13532.6	43709.3	13562.4	43687.4	5.2 33-36	1.33	1
226	7:45	9:00	13562.8	43688.9	13530.7	43712.8	5 33-36	1.25	1.25
227	9:10	10:30	13532.4	43713.2	13562.7	43689.7	5 33-36	1.25	1.08
228	10:41	11:47	13562.1	43692.8	1332.3	43712.3	5 33-36	1.75	1
229 8/11	11:56	12:56	13534.5	43712.7	13565.6	43698.7	5.2 32-35	0.75	1
230	1:04	2:03	13566	43700.7	13555.7	43719.1	5.2 39-40	0.08	0.5
231	2:13	3:16	13554.8	43720.3	13596.4	43711.9	5.2 39-52	0.08	0.25
232	3:30	4:51	13602	43707.2	13653.6	43692.7	5.5 52-56	3.08	0.75
233	5:01	6:03	13657.9	43691	13699.3	43681.9	5.2 56-52	2.75	0.25
234	6:14	7:08	13703.5	43681.4	13699.8	43681.8	5.2 50-54	2.08	0.75
235	7:16	8:18	13701.3	43682.2	13696.3	43683.7	5.2 50-54	2	0.5
236	8:30	9:34	13699.5	436882.7	13715.8	43685.2	5.2 45-54	1.42	0.5
237	9:46	10:45	13711.7	43685.4	13703.1	43713.7	5.3 47-54	2	0.75

FIGURE 1

Tows 49-54

Canadian portion of Georges Bank

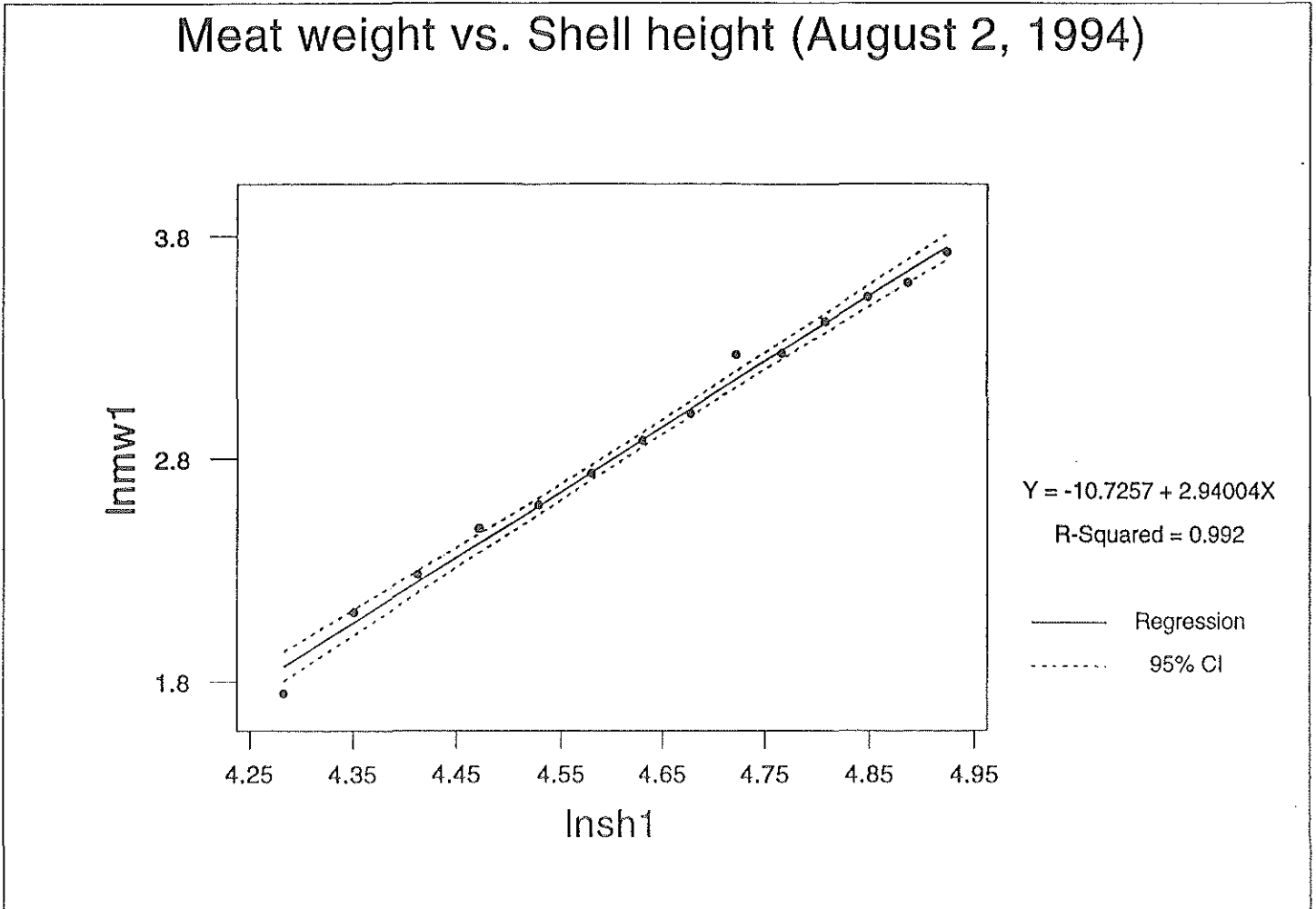


FIGURE 2

Tows 95-98

Canadian portion of Georges Bank

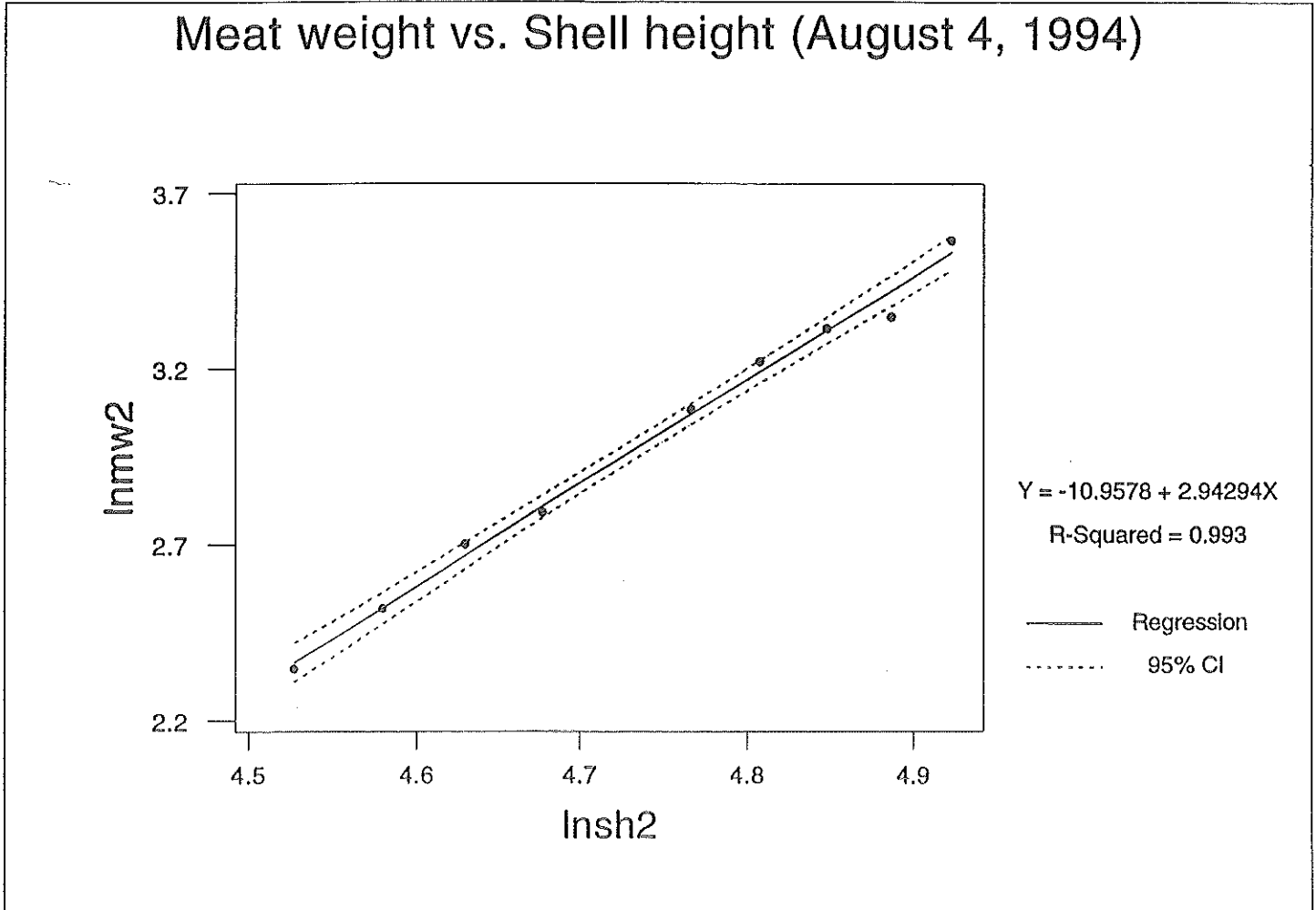


FIGURE 3

Tows 117-121

Canadian portion of Georges Bank

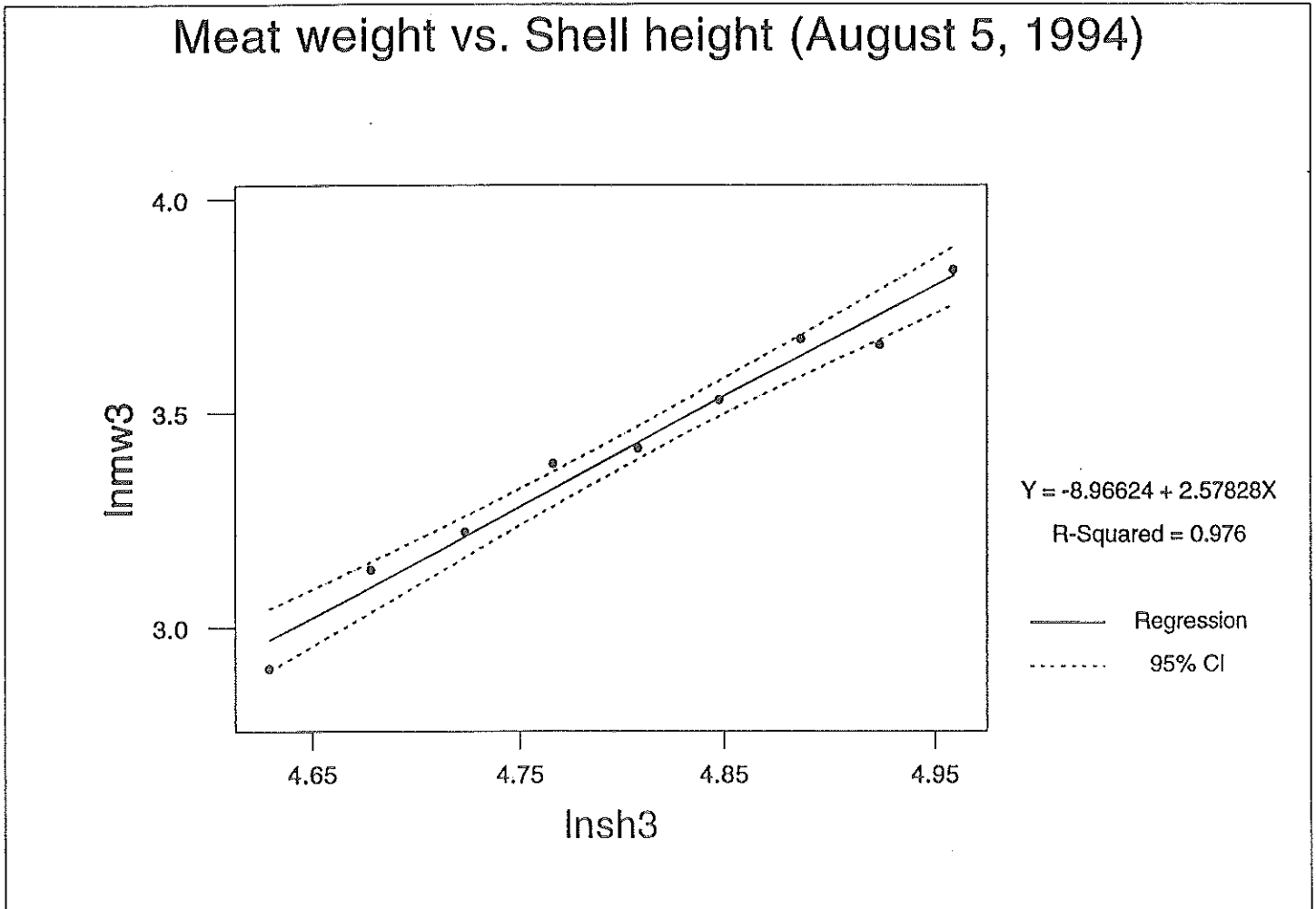


FIGURE 4

Canadian portion of Georges Bank

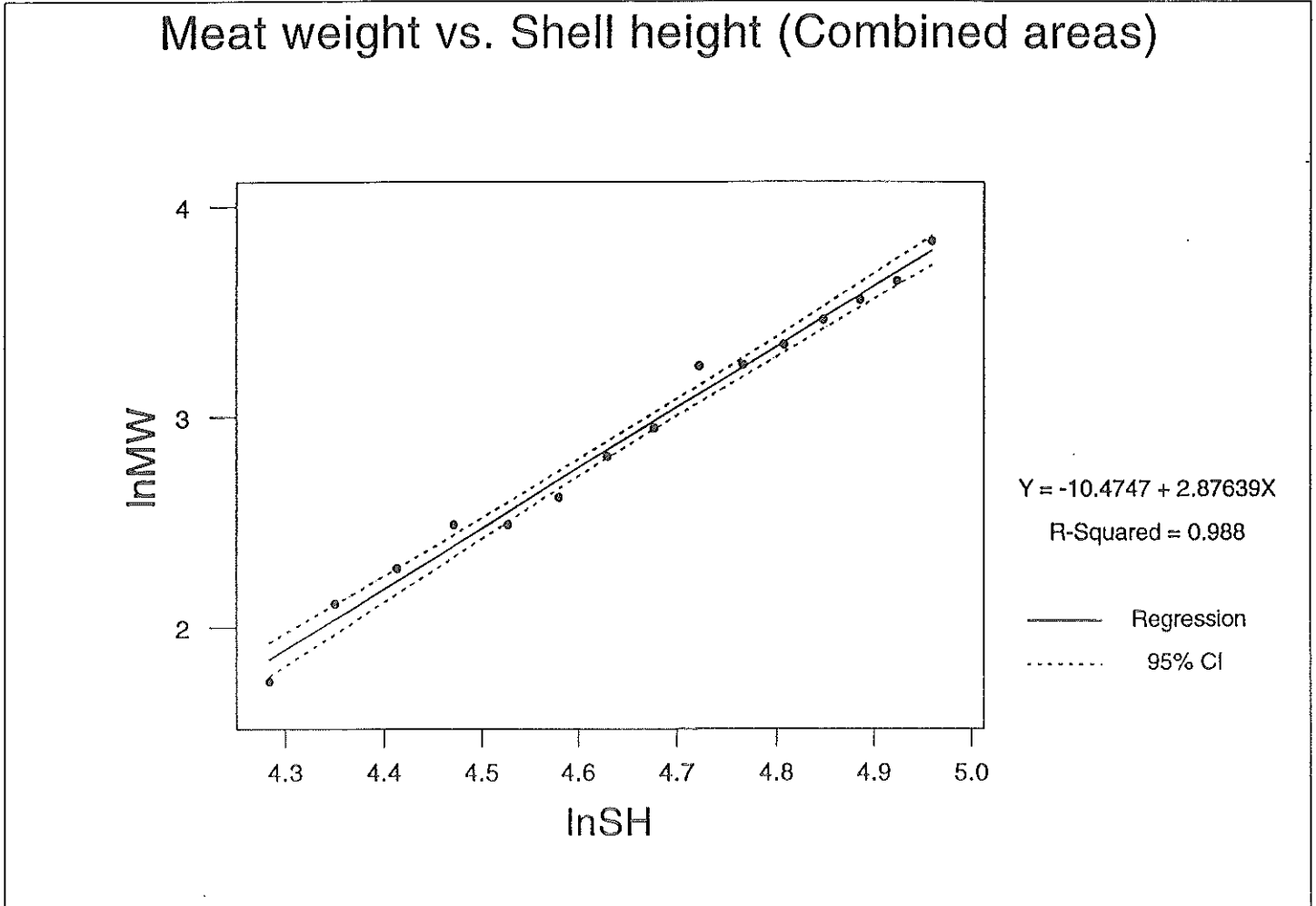


FIGURE 5

Shell height frequency distribution of sea scallops harvested with a 3.25 and 3.50 inch ring scallop dredge

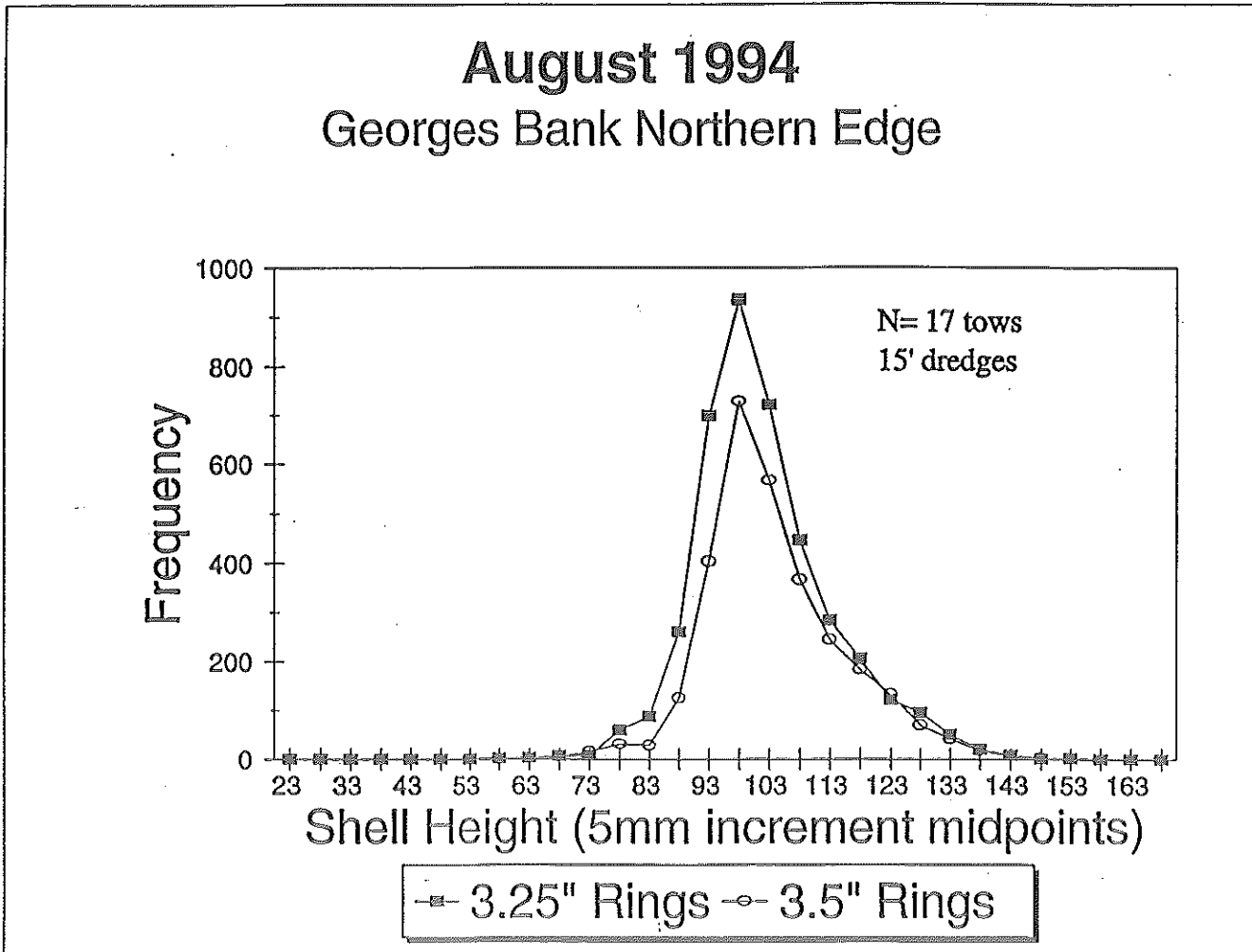


FIGURE 6

Shell height frequency distribution of sea scallops harvested with a 3.25 and 3.50 inch ring scallop dredge

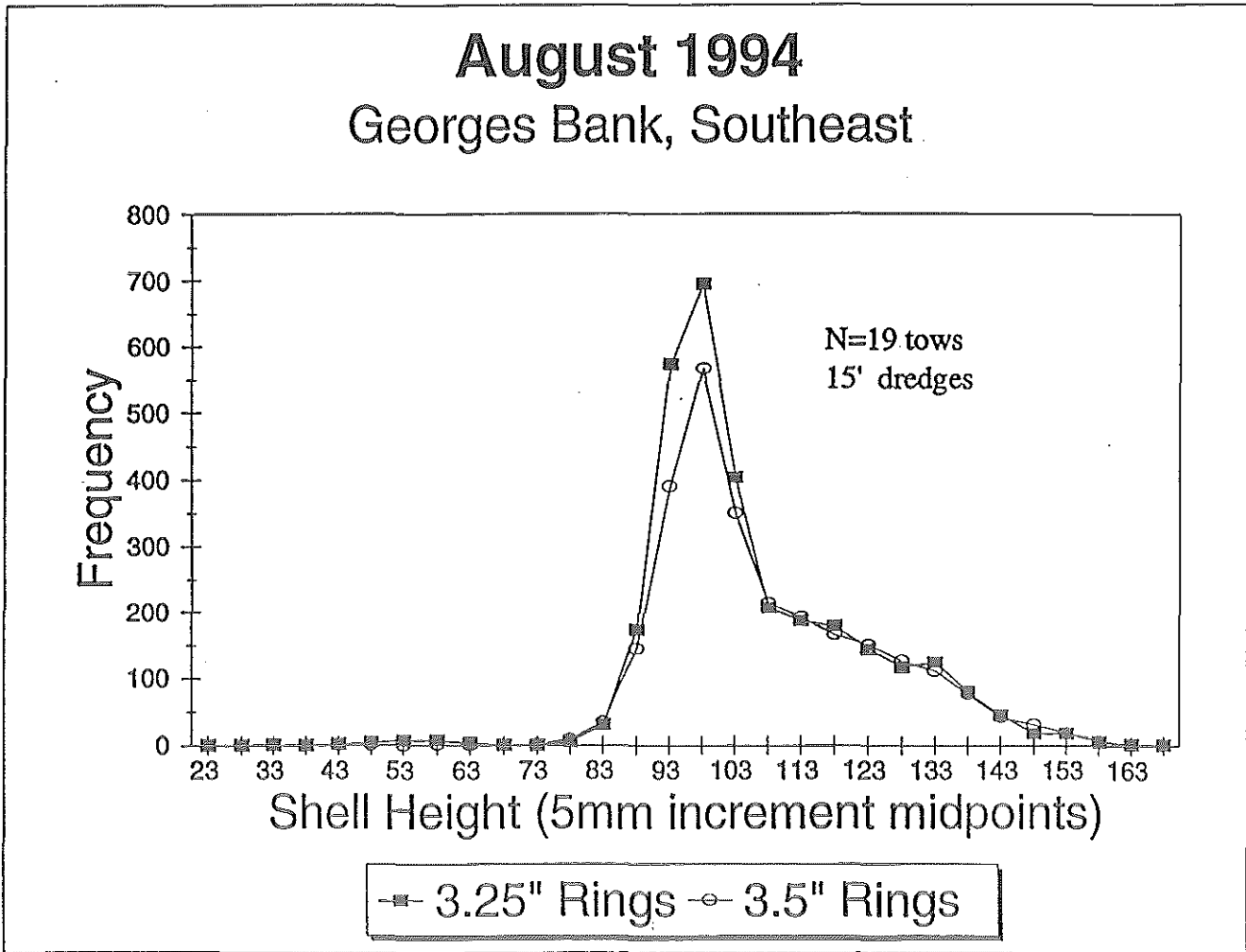


FIGURE 7

Shell height frequency distribution of sea scallops harvested with a 3.25 and 3.50 inch ring scallop dredge

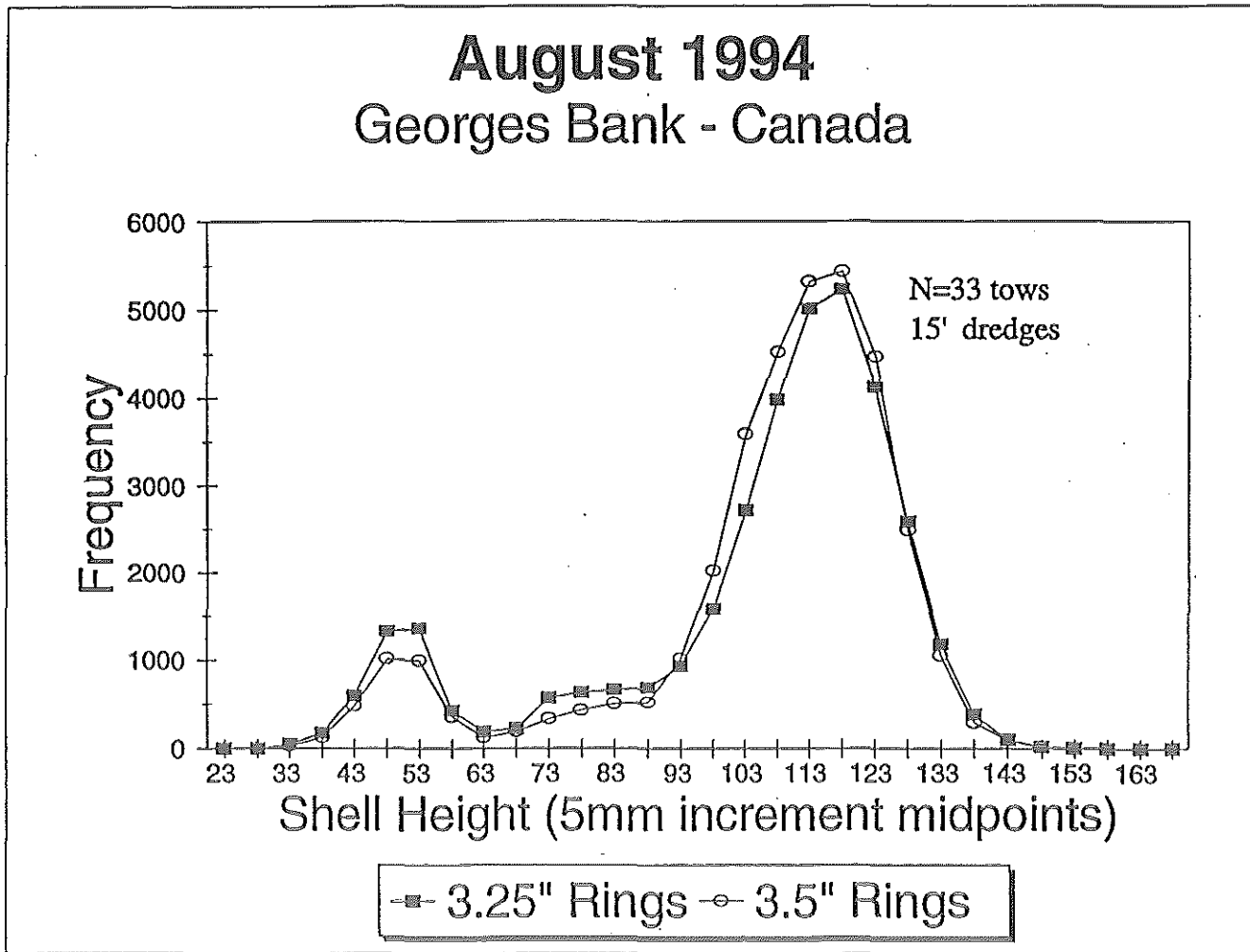


FIGURE 8

Shell height frequency distribution of sea scallops harvested with a 3.00 and 3.50 inch ring scallop dredge

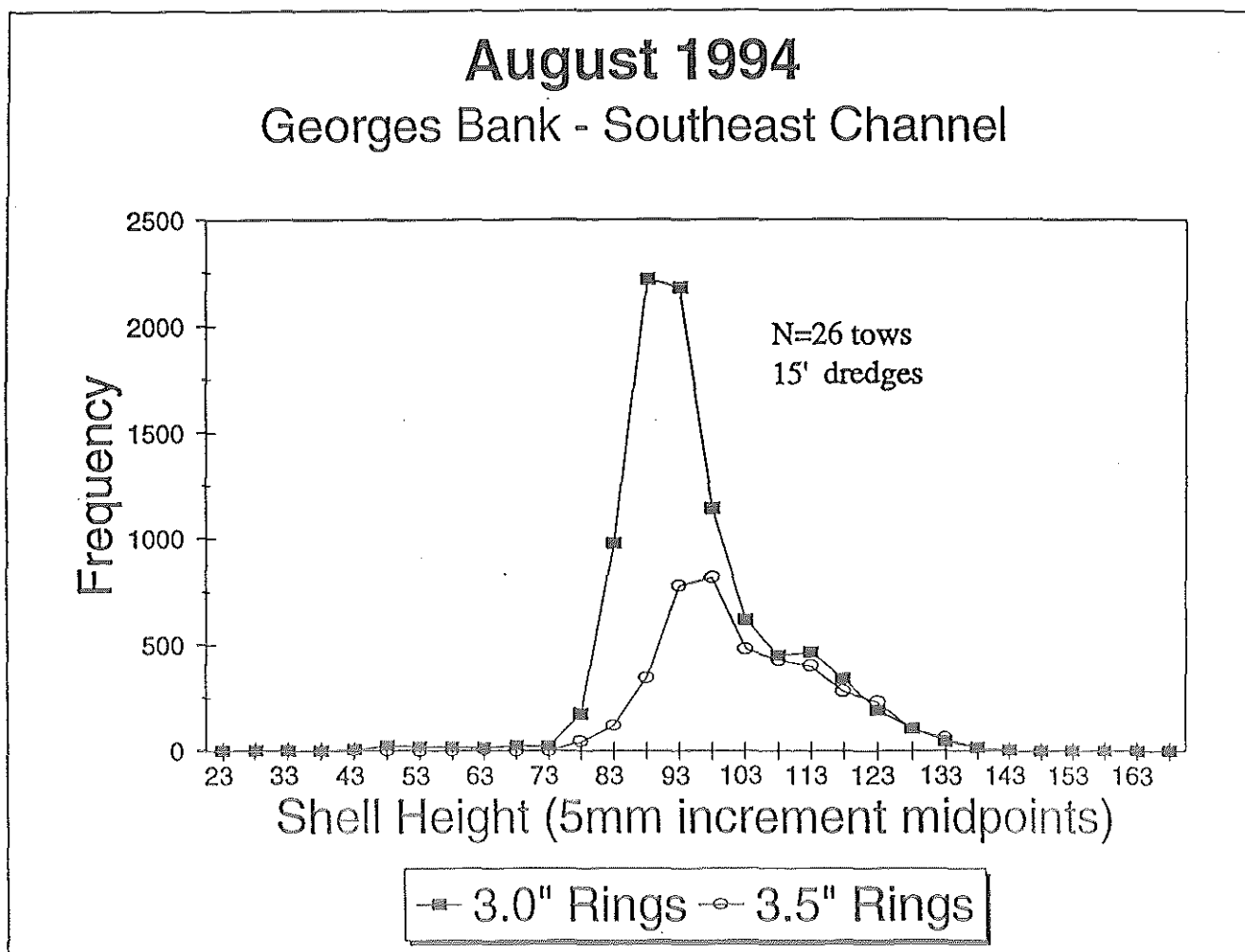


TABLE 1

Harvest efficiency of 3.25 and 3.50 inch ring scallop dredges.
 Data is inclusive to scallops retained or shucking (> 70-75 mm)
 and does not include discarded scallops (< 70 mm).
 Canadian portion of Georges Bank, Tows 44-143.

	3.25"	3.5"
Total # scallops sampled	18490.35	19090.82
Total # baskets sampled	136.74	135.75
Total # baskets harvested	638.48	646.13
Per cent of baskets sampled	0.214165	0.210097
Total # of scallops harvested	86336.99	90866.69
Total harvest of scallop meats (kg)	2084.885	2178.003
Avg harvest of meats per basket (g)	3265.388	3370.843

TABLE 2

Size distribution and yield of scallops retained for
shucking harvested by 3.25 inch and 3.50 inch ring scallop dredges.
Canadian portion of Georges Bank, Tows 44-143.

3.25" rings

Shell height midpoints	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.7	57.5	62.5	67.5	72.5	77.5	82.5
Shell heights	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Tot retained in hauls sampled	0	0	0	0	0	0	0	0	0	0	0	16.875	91.45	267.9233
Per cent composition	0	0	0	0	0	0	0	0	0	0	0	0.000913	0.004946	0.01449
Tot retained	0	0	0	0	0	0	0	0	0	0	0	78.79443	427.0074	1251.014
Production (g)												499.4002	3278.684	11498.12
Production (kg)												0.4994	3.278684	11.49812
Production/basket (g)												0.782171	5.13514	18.00858

3.5" rings

Shell height midpoints	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.7	57.5	62.5	67.5	72.5	77.5	82.5
Shell heights	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Tot retained in hauls sampled	0	0	0	0	0	0	0	0	0	0	0	0	67.5	211
Per cent composition	0	0	0	0	0	0	0	0	0	0	0	0	0.003536	0.011052
Tot retained	0	0	0	0	0	0	0	0	0	0	0	0	321.2801	1004.298
Production (g)													2466.88	9230.54
Production (kg)													2.46688	9.23054
Production/basket (g)													3.817931	14.28589

87.5	92.5	97.5	102.5	107.5	112.5	117.5	122.5	127.5	132.5	137.5	142.5	147.5	152.5	157.5	162.5	167.5
85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125	125-130	130-135	135-140	140-145	145-150	150-155	155-160	160-165	165-170
444.1417	595.2833	777.0517	1370.117	2222.745	3009.822	3401.762	3071.912	1984.01	888.305	271.3383	68.00667	9.61	0	0	0	0
0.02402	0.032194	0.042025	0.074099	0.120211	0.162778	0.183975	0.166136	0.1073	0.048042	0.014675	0.003678	0.00052	0	0	0	0
2073.83	2779.556	3628.287	6397.485	10378.66	14053.76	15883.84	14343.68	9263.937	4147.762	1266.96	317.5435	44.87197	0	0	0	0
22575.71	35502.71	53920.04	109781.9	204249	315212	403726.6	411007.6	297823.9	148946.4	50611.7	14057.57	2193.625				
22.57571	35.50271	53.92004	109.7819	204.249	315.212	403.7266	411.0076	297.8239	148.9464	50.6117	14.05757	2.193625				
35.35852	55.60504	84.45063	171.9426	319.8988	493.6912	632.3247	643.7282	466.4577	233.2828	79.26905	22.01725	3.435699				

87.5	92.5	97.5	102.5	107.5	112.5	117.5	122.5	127.5	132.5	137.5	142.5	147.5	152.5	157.5	162.5	167.5
85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125	125-130	130-135	135-140	140-145	145-150	150-155	155-160	160-165	165-170
325.125	528.86	912.375	1762.087	2386.38	3151.173	3579.567	3184.845	1936.077	789.1333	194.8933	50.89	9.416667	1.5	0	0	0
0.01703	0.027702	0.047791	0.0923	0.125001	0.165062	0.187502	0.166826	0.101414	0.041336	0.010209	0.002666	0.000493	7.9E-05	0	0	0
1547.499	2517.218	4342.636	8387.013	11358.47	14998.66	17037.68	15158.92	9215.154	3756.042	927.6348	242.2214	44.82056	7.139558	0	0	0
16846.07	32151.91	64536	143922.6	223531.3	336405.1	433054.3	434367.9	296255.7	134879.7	37056.56	10723.08	2191.112	384.1514			
16.84607	32.15191	64.536	143.9226	223.5313	336.4051	433.0543	434.3679	296.2557	134.8797	37.05656	10.72308	2.191112	0.384151			
26.07226	49.76075	99.88082	222.7455	345.954	520.6461	670.2278	672.2608	458.5078	208.7501	57.35156	16.59586	3.391131	0.594542			

TABLE 3

Size distribution of scallops retained for shucking and discarded
harvested by 3.25 inch and 3.50 inch ring scallop dredges.
Canadian portion of Georges Bank, Tows 44-143.

3.25" rings

Shell height midpoints	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.7	57.5	62.5	67.5	72.5	77.5	82.5
Shell heights	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Tot retained in hauls sampled	0	0	0	0	0	0	0	0	0	0	0	16.875	91.45	267.9233
Per cent composition	0	0	0	0	0	0	0	0	0	0	0	0.000913	0.004946	0.01449
Tot retained	0	0	0	0	0	0	0	0	0	0	0	78.79443	427.0074	1251.014
Total discarded in hauls sample	0	0	0	50	173	593	1322	1364	418	184	222	546	537	350
Total discarded	0	0	0	151.5152	524.2424	1796.97	4006.061	4133.333	1266.667	557.5758	672.7273	1654.545	1627.273	1060.606
Total caught	0	0	0	151.5152	524.2424	1796.97	4006.061	4133.333	1266.667	557.5758	672.7273	1733.34	2054.28	2311.62
Per cent composition of total	0	0	0	0.001453	0.005028	0.017233	0.038419	0.039639	0.012148	0.005347	0.006452	0.016623	0.019701	0.022169

3.5" rings

Shell height midpoints	17.5	22.5	27.5	32.5	37.5	42.5	47.5	52.7	57.5	62.5	67.5	72.5	77.5	82.5
Shell heights	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85
Tot retained in hauls sampled	0	0	0	0	0	0	0	0	0	0	0	0	67.5	211
Per cent composition	0	0	0	0	0	0	0	0	0	0	0	0	0.003536	0.011052
Tot retained	0	0	0	0	0	0	0	0	0	0	0	0	321.2801	1004.298
Total discarded in hauls sample	0	0	4	20	124	475	1011	998	357	120	182	330	358	281
Total discarded	0	0	12.12121	60.60606	375.7576	1439.394	3063.636	3024.242	1081.818	363.6364	551.5152	1000	1084.848	851.5152
Total caught	0	0	12.12121	60.60606	375.7576	1439.394	3063.636	3024.242	1081.818	363.6364	551.5152	1000	1406.129	1855.813
Per cent composition of total	0	0	0.000116	0.000582	0.00361	0.013829	0.029433	0.029055	0.010393	0.003494	0.005299	0.009607	0.013509	0.017829

87.5	92.5	97.5	102.5	107.5	112.5	117.5	122.5	127.5	132.5	137.5	142.5	147.5	152.5	157.5	162.5	167.5
85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125	125-130	130-135	135-140	140-145	145-150	150-155	155-160	160-165	165-170
444.1417	595.2833	777.0517	1370.117	2222.745	3009.822	3401.762	3071.912	1984.01	888.305	271.3383	68.00667	9.61	0	0	0	0
0.02402	0.032194	0.042025	0.074099	0.120211	0.162778	0.183975	0.166136	0.1073	0.048042	0.014675	0.003678	0.00052	0	0	0	0
2073.83	2779.556	3628.287	6397.485	10378.66	14053.76	15883.84	14343.68	9263.937	4147.762	1266.96	317.5435	44.87197	0	0	0	0
125	24	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
378.7879	72.72727	33.33333	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2452.618	2852.283	3661.62	6397.485	10378.66	14053.76	15883.84	14343.68	9263.937	4147.762	1266.96	317.5435	44.87197	0	0	0	0
0.023521	0.027354	0.035116	0.061353	0.099533	0.134778	0.152329	0.137558	0.088843	0.039778	0.01215	0.003045	0.00043	0	0	0	0

87.5	92.5	97.5	102.5	107.5	112.5	117.5	122.5	127.5	132.5	137.5	142.5	147.5	152.5	157.5	162.5	167.5
85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125	125-130	130-135	135-140	140-145	145-150	150-155	155-160	160-165	165-170
325.125	528.86	912.375	1762.087	2386.38	3151.173	3579.567	3184.845	1936.077	789.1333	194.8933	50.89	9.416667	1.5	0	0	0
0.01703	0.027702	0.047791	0.0923	0.125001	0.165062	0.187502	0.166826	0.101414	0.041336	0.010209	0.002666	0.000493	7.9E-05	0	0	0
1547.499	2517.218	4342.636	8387.013	11358.47	14998.66	17037.68	15158.92	9215.154	3756.042	927.6348	242.2214	44.82056	7.139558	0	0	0
81	15	3	1	2	1	0	0	0	0	0	0	0	0	0	0	0
245.4545	45.45455	9.090909	3.030303	6.060606	3.030303	0	0	0	0	0	0	0	0	0	0	0
1792.954	2562.672	4351.727	8390.044	11364.53	15001.69	17037.68	15158.92	9215.154	3756.042	927.6348	242.2214	44.82056	7.139558	0	0	0
0.017225	0.02462	0.041808	0.080605	0.109182	0.144125	0.163686	0.145636	0.088532	0.036085	0.008912	0.002327	0.000431	6.9E-05	0	0	0