Delaware Bay 1994 Random Sampling of Oyster Seed Beds

by

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with

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### Summary of the 1994 Random Sampling of the Delaware Bay Seed Beds

Attached is a summary of the 1994 seedbed sampling data with similar data for 1993 and 1992. All data were collected between October 31 and November 3, 1994 using a boat and captain donated by Bivalve Packing. This information is provided based on a stratified random sampling of grids from the seed beds. The strata (groups) from which the samples were selected are: Test area, general bed, marginal areas. One sample was taken from one of the 4 test area grids, and no more than two samples were taken from the marginal areas of the beds. The remainder of the samples were from the general bed. All data were adjusted to a 37 quart bushel.

The data format is the same as in the past years. Data are displayed from the farthest up bay beds to those down bay. For each bed the percentage of oysters for each sample is presented, with rankings from highest to lowest. Percentage of oyster is based on volume of oyster (exclusive of spatted shell) in the sample divided by the total volume of the shell, oyster and debris in the sample. Those samples that have over 40% oyster are underlined. The test area is a small area of 4-6 grids that has been sampled consistently as representative of the better areas of the bed. The test area sample is indicated by an \*. Oysters per bushel, yearlings per bushel and spat per bushel are based on actual counts adjusted to 37 quarts.

Due to the influence of Dermo on the industry we have continued the new set of columns for Percentage Mortality and added data on Weighted Prevalence and %Prevalence of Dermo. The Percentage Mortality figure is based on the number of boxes that were counted in the samples. Prevalence is the percentage of oysters with detectable infections. Weighted Prevalence is the average infection intensity (scored from 0 to 5) of all infected and uninfected oysters.

The major points of interest this year are:

- o There was no seed bed harvest in 1994. This means that all changes in the numbers of oysters are due to additions from the past setting and losses due to mortality.
- o Number of oysters per bushel remain low on all beds below Bennies Sand.
- o The number of oysters per bushel has generally declined on most beds for the past 3 years.
- o The number of oysters in market size categories on most beds has increased due to good growth.
- Mortalities based on box counts declined from at least 45% last year to 30% or lower on all beds below Bennies Sand with the exception of Egg Island and Ledge. Low numbers of oyster collected make data from these beds subject to large probability of error.

- o Spat setting was greatly improved over last year, but was low on most beds. Good set (over 200 per bushel occurred on Cohansey, New Beds, and Beadons).
- o Dermo remains about the same as last year on beds below Arnolds. Prevalence is higher than last year on Arnolds and Round Island. Prevalence is 90 to 100 % on most beds. The 30% result on Beadons is a sample from one grid and likely to underestimate abundance. Weighted Prevalence (a measure that indicates infection intensity) seems to have declined slightly from last year, but remains high on all beds from Middle throughout the rest of the bay. This should be carefully considered in any decision to move oysters.

The size distribution data, Table 3 have been used to estimate the numbers of oysters in each size group for a 37 quart bushel dredge sample for all sampled beds. These data can provide an estimate of the numbers of oysters in each size class. We have highlighted (bold) and summed the number of 2.5 inch long oysters per average bushel of material expected from each of the beds. If you want to find out how many 3 inch or larger oysters per bushel you would simply sum beginning at the bottom (110 mm) to the approximately 3 inch size (75 mm). A summary of 1993 and 1994 data for selected beds is provided in Table 2 below. Although there appeared to be a general decline in numbers of oysters, the remaining oysters have grown so there are more market sized oysters on most beds.

Please remember that these data do not provide an estimate of the numbers of oysters on the seed beds, but provide a relative assessment of what could be expected from a dredge haul on a paarticular bed. I urge you to read this information in conjunction with Dr. Ford's analysis of disease on the seed beds.

These data are available because of the generous support of Bivalve Packing, a grant from the State of New Jersey, and the dedication of many individuals at the Haskin Shellfish Research Laboratory.

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Bed		Percer	t Oysta	1000		Oyster	s/Bush	BI	Spat/	Bushel	1000		Yearlin	gs/Bus	hel		Percer	nt Morta	lity	P	ercen	t Preva	lence	16	Weight	ted Prev	valence
		1994	1993	1992		1994	1993	1992	1994	1993	1992		1994	1993	1992		1994	1993	1992	1.1	1994	1993	1992		1994	1993	1992
Round Is		80 1	64.9	74.4	-	-	-	-		-	-	-	-	-	1000	-	-	-	-	-	-	-	-	-	-		
Round Is.		40.4	60.2	66.5																							
Round Is.		34.9	41.6	66		252	440	FAR	87	10	24		40		04			10				-					
Round Is		28.3	41.5	50 7		200	449	540	57	19	21		10	0	04		8	12	11		60	25	50		0.5	0.1	0.3
Round le		10 1	83	51 3																							
Round Is.		11.3	0.0	01.5																							
rtouria is.		11.0		0.0																							
Up, Arnolds		1200	62.5	_																							
Up. Arnolds			3.1	-		-	282	-	1	26	-		-	A	-		2	14	100			30				0.2	
			0.1				202			20			-	-			- 2	14	-		-	30	-		2	0.2	-
Arnolds		81.7	72.6	70.1																							
Arnolds		58.3	72.6	60.2																							
Arnolds	*	58	71.3	49.5		301	395	536	78	26	46		32	9	81		7	10	12		100	63	15		10	0.6	0.1
Arnolds		47.6	58.2	42.5						20	10	1			1			10	12		100	05	10		1.0	0.0	0.1
Arnolds		22.6	57.1	33.3																							
Arnolds		0	0	21.6																							
Un Middle		25	5	0																							
Up Middle		0.6	-	õ		47		0	47		14		2		0				0								
ef: mane		0.0					1.1			-	14		-		U			-	U		-	-	-		-	-	-
Middle	*	51.2	58.7	53.9																							
Middle		43.2	51.1	42.8																							
Middle		40.5	45.1	42.2																							
Middle		37.1	40.5	39.7																							
Middle		35.6	38.4	21.5		138	163	114	142	40	13		26	5	19		30	23	26		80	97	65		2.3	3.4	1.1
Middle		33.3	30.1	18.5																							
Middle		26.7	0	0.3																							
Middle		13.2	0	0																							
Middle		6	0	0																							
Cohansev		43.1	46.9	53.4																							
Cohansey		42.5	39.4	48.4																							
Cohansey	*	40	37.7	37.9		152	177	190	302	31	30		44	7	54		22	20	24		05	100	07			25	24
Cohansey		39.9	30.8	27.8				100		01	00		-	'	54		44	23	34		20	100	0/		2.1	3.5	2.1
Cohansey		37.5	28.4	15.2																							
Shin John		-	48.2	68.0																							
Ship John		45.0	46.6	63.0																							
Ship John		37.8	45.2	57.7		140	267	450	100	69	25		44		17							100					1
Ship John		30.3	44 3	54		140	201	452	123	00	35		41	11	4/		24	21	18	10	100	100	68		3,4	4	1.2
Ship John		20.6	42 9	33 3																							
Ship John		20.0	20.5	00.0																							
only oonin		_	20.5	-																							

	Percent Oveter								-			Dermo			Dermo							
Bed		Percer	nt Oyste	r Loop	Oyster	s/Bush	əl	Spat/ E	Bushel	0000	Yearlin	gs/Bus	hel	Percer	nt Morta	lity	Percer	nt Preva	lence	Weight	ted Pre	valence
		1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992
Shell Rock		47.5	40.4	63,4																		
Shell Rock	2	46.7	38.9	51.3																		
Shell Rock		43.6	36.8	51.2				1421	1045		100						Tax an					
Shell Rock		40.6	35.5	40.9	134	151	218	88	102	47	30	12	60	22	36	36	90	100	98	2.9	3	3.2
Shell Rock		30.3	28.1	24.2																		
Shell Rock		3.1	20.8	4./																		
Shoil NOCK		0.4	4.3	0.5																		
Ben Sand		9.4	46.8	21.1																		
Ben Sand		3.3	14.2	16.6																		
Ben Sand		1.2	3.5	6.5	14	72	47	55	40	9	4	4	3	28	46	55	100	100	100	2.7	4.1	2.9
Ben Sand		0.3	0.7	0.4																		- <del>2</del> 7/20
Bennies		42.3	46 1	53 1																		
Bennies		40.5	35.8	47																		
Bennies		40	26.2	45.5																		
Bennies		39	24.1	44.6																		
Bennies		34.4	10.7	34.5																		
Bennies		17.1	9.2	6.6																		
Bennies		5.9	6.6	2.3	75	66	120	68	32	35	20	4	5	30	45	35	90	100	97	29	32	28
Bennies		3.7	3	1.7					10.00	1.2	-							100			0.2	2.0
Bennies		2.6	3	1.6																		
Bennies		0.3	0.4	0.9																		
Bennies		0.3	0.3	0																		
Bennies		0.3	0	0																		
Nantxt Pt		-	21	-																		
Nantxt Pt		-	12.9	-																		
Nantxt Pt		-	3.1	-	-	30	-	-	31	-		1	-	-	52	-	-	100			45	1.22
Nantxt Pt		-	0.5	-					240						-			(00			4.0	
Nantxt Pt		-	0	-																		
Nantxt Pt			0	-																		
Hog Shi			29.9	1																		
Hog Shi		-	26.8	1																		
Hog Shi		-	21 1	-	-	48	100	-	49	-	1.0	4	-		50			100			-	
Hog Shl		-	03	19		40	-	-	40	5	-			-	52	-	-	100	-	-	3.0	-
Hog Shl		-	0.3																			
Hog Shl		-	0	-																		
			-																			

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Ded		1004	1002	1002	Oyster	S/BUSIN	1000	Spat/ I	Jushel	1000	Yearlin	igs/Bus	hel	Percei	nt Morta	ality	Percer	nt Preva	lence	Weigh	ted Pre	valence
New Bods		66.7	1995	50.2	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992
New Beds		55 7	20.2	47.0																		
New Beds		45	30.3	42.0																		
New Bods		44.7	56	93.3																		
New Bede		32.0	5.0	27.7	404	07	170		70	-		1				-	122	135	115	3.5	1.20	3.1.
New Bods		18.9	2.2	0.9	124	0/	1/6	248	18	26	28	4	25	24	47	28	100	100	100	3.3	3.2	2.6
New Beds		03	2.1	0.0																		
New Beds		0.3	03	0.3																		
New Beds		0.5	0.5	0.5																		
How Dous		U	U	U																		
Strawbrry		30.8	-	44.2																		
Strawbrry	*	53	-	11.8																		
Strawbrry		0.3	-	5	19	-	30	184	1	13	18	-	20	24		64	80		00			~ ~
Strawbrry		0.3		27	10	~~~	00	104		15	10	-	29	24	-	04	80	-	90	2.1	-	2.8
Strawbrry		0	-	2																		
Strawbrry		0	-	0.3																		
Hawks Nest		28.6	1.2	42.8																		
Hawks Nest		22.5	-	37																		
Hawks Nest		12.8	-	25.6																		
Hawks Nest	*	8.1		16.1	50	-	127	193	-	36	26	-	14	24	-	41	80	-	100	33		28
Hawks Nest		5.5	-	2.7							. 4.5		1.1	12.1		2.0			100	4.0	120	2.0
Hawks Nest		0	( <del></del> )	0.3																		
Beadons		26.5	20.7	31																		
Beadons		12.1	10.2	21.6																		
Beadons		9.7	9.8	8.6																		
Beadons		8.8	5.5	8.4																		
Beadons	*	6	3.9	5.4	28	23	41	270	56	9	29	5	4	17	72	57	30	100	94	1.1	46	29
Beadons		3.2	2.9	2.9											12	174		,			4.0	2.0
Beadons		3.1	2.7	2.8																		
Beadons		0.4	2.5	0.8																		
Beadons		0.4	0.4	0.3																		
Beadons		0.3	0	0																		
Vexton			25	-																		
Vexton			17.5	-																		
Vexton			15.6	10 mm																		
Vexton		-	13.1	-																		
Vexton		-	8.1	-		81	-	-	37		-	5	-	-	47	-	-	-	-		-	-
Vexton		-	1.6	-																		
Vexton		-	0																			

Ded		10.1															Dermo			Dermo	).
Bed	1004	1002	1002	Oyster	s/Bush	81	Spat/ E	Bushel	4000	Yearlin	gs/Bust	nel	Percer	t Morta	ity	Percer	nt Preva	lence	Weigh	ted Pre	valence
Fools	20.6	10.2	26 4	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992	1994	1993	1992
Egg is.	16	19.2	30.1																		
Egg is.	10	13.5	33.9																		
Egg is.	3.0	4	10.2																		
Egg is.	2.9	2.1	10.3		244				100	1.1	6		25	1.1		100.0					
Egg is.	2.8	0.7	0.4	16	17	60	26	29	10	4	6	1	51	58	45	100	100	94	3.9	3.8	3.5
Egg Is.	0.3	0.3	0.4																		
Egg Is.	0.3	0.3	0.3																		
Egg is.	0	0	0																		
Egg Is.	0	0	0																		
Egg Is.	0	0	0																		
Ledge	43.1	-	35.6																		
Ledge	0.4	-	0.5																		
Ledge	0.3	-	0.4																		
Ledge	0.3	-	0.4	18	-	18	5	-	25	2	-	3	35	-	28	100	1.00	25	2.8		
Ledge	0	-	0			19.95						Ģ			20	100		20	2.0	_	
Ledge	0	-	0																		
Ledge	0	-	0																		
Ledge	0	-	0																		

Table 2. Average number of oysters per bushel based on samples from selected seed beds in 1993 and 1994. The values indicate the numbers of oysters greater than 2.5 and 3 inches in length that could be expected if a bushel of oyster and shell was removed directly from the dredge (no pre-sorting). Note the greater number of large oysters even though the total numbers per bushel generally declined.

		1994		1993							
Bed	greater than 2.5 inches (63.5mm)	greater than 3 inches (76.2mm)	Number/Bu.	greater than 2.5 inches (63.5mm)	greater than 3 inches (76.2mm)	Number/Bu.					
Arnolds	91	23	301	28	8	395					
Middle	67	29	138	14	4	163					
Cohansey	76	34	152	19	6	177					
Ship John	71	27	149	31	7	267					
Shell Rock	55	27	134	18	6	151					
Bennies	34	19	75	14	6	66					
New Beds	50	30	124	12	3	67					

Table 3. Size frequency distributions of oysters collected on Delaware Bay seed beds in the Fall of 1994. All data have been adjusted to reflect the average numbers of oysters per bushel collected on the bed during the random sampling. These data can be converted to the numbers of oysters above a certain size by adding the numbers in the Bushel Frequency column beginning at the Bottom of the column. For instance Arnold's 1994 data.

#### Sample Calculation:

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There are 25.4 mm per inch. Two inch oysters are 50.8 mm (so everything in the 50 mm and larger categories would be larger than 2 inches).

Three inch oysters are  $25.4 \times 3 = 76.2 \text{ mm}$ . In 1994 there were 1+2+1+1+6+12 = 23 oysters larger than 75 mm (approximately 3 inches).

### Table 3. Size/Frequency distribution of oysters from Delaware Bay seed beds, 1994

Total = Average number of oysters per bushel. No. measured = Number of oysters measured from that seed bed.

Greater than 2.5"/bu = Average number of oysters larger than 2.5 inches to be expected per bushel of material dredged. (Sum of the bold numbers on the table)

Size (mm)	Round Is	Amolds	Up.Middle	Middle	Cohansey	Ship John	Shell Rock	BenSand	Bennies	NewBeds	Strawberry	Hawksnest	Beadons	Egg Island	Ledge
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	2	1	0	0	1	1	1	1	0	0
30	1	1	0	1	0	6	1	0	1	3	1	1	3	0	0
35	5	5	0	5	4	8	2	2	2	4	1	2	3	0	0
40	16	17	12	6	12	9	9	2	4	10	2	6	4	1	0
45	23	24	0	9	14	12	17	1	9	14	2	9	4	1	1
50	38	47	12	13	15	12	19	2	10	20	2	8	4	2	2
55	43	59	0	15	13	11	17	1	7	10	2	5	3	1	1
60	44	59	0	21	18	19	14	0	8	10	2	4	2	1	3
65	30	33	24	20	20	22	13	0	7	10	2	4	1	1	2
70	21	35	0	18	22	22	15	1	8	10	1	3	1	2	1
75	17	12	0	15	15	10	10	1	7	10	2	3	0	2	2
80	9	6	0	7	8	7	4	2	5	10	0	2	0	1	2
85	4	1	0	4	5	6	6	1	4	5	1	2	0	1	1
90	1	1	0	1	4	2	4	0	2	2	0	0	0	1	2
95	0	2	0	2	1	1	1	1	1	2	0	1	0	0	1
100	0	1	0	0	1	1	1	0	0	1	0	0	0	0	1
105	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	253	301	47	138	152	149	134	14	75	124	19	50	28	16	18
No. Measured	547	498	4	647	500	483	494	52	593	595	163	290	366	190	106
Greater than 2.5"/bu.	82	91	24	67	76	71	55	7	34	50	6	15	2	8	12