

BULLETIN

VIRGINIA INSTITUTE of MARINE SCIENCE

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Boat Owners Advised Not To Use DDT In Anti-Fouling Paint

The Ecology-Pollution Department of the Division of Applied Marine Science and Ocean Engineering at VIMS continues to receive reports of watermen mixing DDT with copper anti-fouling paint for use on boat bottoms to control scurf, borers (worms) and barnacles. This is an extremely dangerous practice because DDT is one of the most toxic pollutants that can be put in water. Further, its value in protecting boat bottoms has never been proven. It may, in fact, do more harm than good since the addition of DDT may change the characteristics of the paint and cause it to flake off, exposing bare wood to the infestation of worms.

Boat owners should be advised that shellfish, especially oysters, concentrate DDT in their bodies to levels approximately 10,000 times above that found in the water. One pound of DDT is sufficient to contaminate one billion pounds of water to such an extent that well over 100,000 bushels of oysters could contain enough DDT to justify seizure by health authorities.

The Virginia Institute of Marine Science recommends that if the usual "soft" copper anti-fouling paints are not giving the protection required, boat owners should use a better grade of copper rather than going to materials such as DDT. Some of the paints on the market today are formulated for tropical areas where fouling and worm problems are more

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(continued)severe than in Chesapeake Bay. The use of these materials on a properly prepared boat bottom should give the required protection without endangering the seafood products which the boats will harvest.

1969-1970

ANNUAL SURVEY OF PUBLIC OYSTER GROUNDS IN VIRGINIA

Each winter, personnel of the Virginia Institute of Marine Science (VIMS) inspect and record the status of the natural oyster bars of the Commonwealth. This survey activity can be broken down into two basic steps. First, an experienced tonger collects one-bushel bottom samples from representative locations in the James, York, and Rappahannock rivers.

Second, after the samples have been brought back to the Gloucester Point Laboratory, VIMS employees count the number of oysters, both living and dead, and determine the quantity of shell material present in each bushel sample collected.

This information is obtained regularly because of its usefulness to scientists studying shellfish and to those in the oyster industry who wish to know what size harvest to expect during the next season.

The results of the 1969-1970 survey are summarized and then presented in detail on the following pages. The locations where collections were made

are listed by river beginning upstream and proceeding downstream. Where a particular rock or bed is found can be determined from the maps.

This study was directed by Dexter Haven, Head, Applied Biology Department in the Division of Applied Marine Science and Ocean Engineering at VIMS.

Explanation of Terms

Number of Live Oysters Per Bushel

Market Oysters--3 inches long and over.

Small Oysters--Less than 3 inches long.

Includes small "flat" oysters (known as yearlings) measuring 1 to 2 inches long that are generally about 1 year old or older.

Spat--Young oysters which have set in the current year varying in size from just visible to the naked eye to about an inch long. Spat reported in this column may occur on oysters, shell, cinder, or anything in the bushel sample in contrast to the spat reported only on shell (in another column).

Number of Dead Oysters Per Bushel (Indicates present or past mortalities)

Market Boxes--A "box" is a dead oyster with the two shells still hinged together. A market box, like a market oyster, is 3 inches long or over.

Old Box--Has been dead long enough for shells to become fouled inside by marine organisms.

Recent Box--Inner side of shells still pearly white, which suggests that the oyster died recently. (This description holds especially true in summer when marine fouling is active. However, in winter when biological activity slows down, a clean white shell does not necessarily indicate that the box is

recent and it is more difficult to determine how long the oyster has been dead.)

Small Boxes--Less than 3 inches long.

Drilled Spat--Young spat killed by an oyster drill, which leaves a small hole in the shell as mute evidence of its work. Although counts are made of all drilled shells, these tallies actually underestimate damages because some drilled-spat shells are lost before collection.

Shell Material Per Bushel

Shells With Spat--Single shells with one or more attached spat.

Blank Shells--Single oyster shells with no spat attached.

Cinder--"Cinder" is composed mainly of small broken shell fragments.

Summary of Findings By River

JAMES RIVER

Oyster strike in the James was higher than it has been since 1966. The strike varied from 37 to 319 spat per bushel with highest values occurring in the mid-portion of the river in the vicinity of Wreck Shoals. Evidence based on shellstring strike suggests that most of the setting took place in September and October.

Although this year's strike was better than the last three years, it was still low in comparison to those of other years before 1960. For example, information on setting summarized for a seventeen year period from 1944-1960 (including an earlier 1931 sampling) reveals an average spat-per-bushel count of 1, 368 for Wreck Shoals. (These figures were compiled by Dr. J.D. Andrews, Head, Malacology Department at VIMS). This figure is in sharp contrast to our 275 spat-per-bushel count obtained in 1969 at

the same location.

The number of small oysters per bushel in the main portion of the James seed area varied from 776 in upper river to only 223 at the offshore edge of Wreck Shoals. These counts are much lower than those in previous years. For example, during 1947, 1948 and 1949 total counts of small oysters for the same region averaged from about 600 to 1500 oysters per bushel.

Box counts at Deepwater Shoals and Point of Shoals were slightly higher than usual. These figures probably reflect fresh-water kills caused by Hurricane Camille during last August (1969).

Drills were abundant in the lower James at Nansemond Ridge and at Brown Shoals and may now be present as far upriver as Wreck Shoals.

YORK RIVER

Setting has been very light in the York during the past six years, but was higher during the 1969-70 season, reaching a total of 67 spat per bushel at Aberdeen Rock. At Bells Rock small oysters were still fairly abundant. On the downriver bars, however, there were only a few market

oysters with counts ranging from 6 to 21 per bushel and an equal number of small oysters per bushel. Catch in the 1970-71 season will very likely be no larger in this river than that for 1968-69.

The number of boxes at Bells Rock was abnormally high reaching 110 boxes per bushel and reflecting death of oysters by fresh water (Hurricane Camille) during August 1969. Drills were active as far upriver as Aberdeen Rock.

RAPPAHANNOCK RIVER

Low spat counts in the Rappahannock ranging from 0 to 22 spat per bushel

were similar to those of the past year. Highest strike occurred at mid-river near Smokey Point. Typically, sets are much lower in this river than the James and the adult population in the Rappahannock maintains itself by an occasional year of heavy strike. In most locations there were more small oysters than market oysters with maximum number of small oysters being 183 per bushel at Morattico Bar offshore. However, it is noted that during the past three or four years total numbers of market and small oysters have remained at fairly low levels and numbers appear to be decreasing in the vicinity of Smokey Point, Hog House and Drummond Ground.

James River
 1969-1970 Annual Survey of Public Oyster Grounds
 Number of live oysters, dead oysters and shell in a one bushel sample

DATE	LOCATION	NUMBER OF LIVE OYSTERS IN ONE BUSHEL			NUMBER OF DEAD OYSTERS IN ONE BUSHEL			SHELL MATERIAL IN ONE BUSHEL		
		MARKET OYSTERS	SMALL OYSTERS	SPAT	MARKET BOXES	SMALL BOXES	DRILLED SPAT	No. SHELLS WITH SPAT	No. BLANK SHELLS	CINDER (quarts)
19 Nov 69	Deepwater Shoals	39	734	37	7 old	37 old 4 recent	0	9	146	9 qts.
20 Nov 69	Horse Head	9	776	56	1 old	7 old	0	17	171	10 qts.
20 Nov 69	Point of Shoals offshore	43	573	83	0	10 old 2 recent	0	38	145	8 qts.
20 Nov 69	Point of Shoals inshore	77	487	104	2 old 1 recent	20 old 1 recent	0	25	125	10 $\frac{1}{2}$ qts.
7 Nov 69	Wreck Shoals inshore	39	502	275	0	10 old	0	56	129	10 $\frac{1}{2}$ qts.
7 Nov 69	Wreck Shoals offshore	21	223	111	2 old	17 old 2 recent	1	43	138	9 qts.
5 Jan 70	Gun Rock	79	74	142	9 old 2 recent	2 old	0	41	149	10 $\frac{1}{2}$ qts.
5 Jan 70	Thomas Rock	118	82	133	7 old 1 recent	2 old	0	58	185	8 qts.
7 Nov 69	Brown Shoals	25	10	114	6 old	4 old	10	50	288	10 qts.
7 Nov 69	White Shoals	34	177	319	3 old 1 recent	3 old 1 recent	0	100	126	7 qts.

James River (continued)

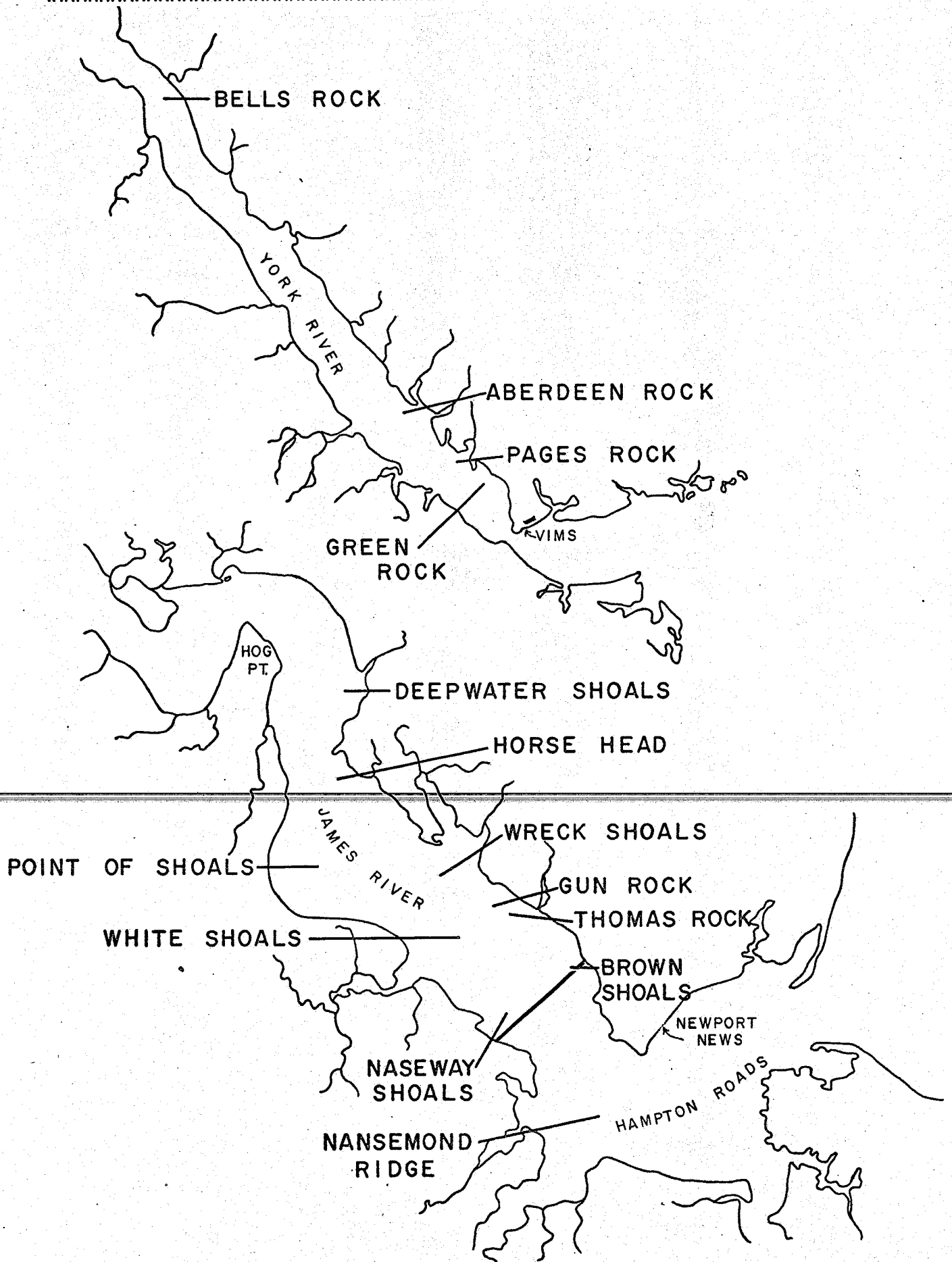
DATE	LOCATION	NUMBER OF LIVE OYSTERS IN ONE BUSHEL			NUMBER OF DEAD OYSTERS IN ONE BUSHEL			SHELL MATERIAL IN ONE BUSHEL		
		MARKET OYSTERS	SMALL OYSTERS	SPAT	MARKET BOXES	SMALL BOXES	DRILLED SPAT	No. SHELLS WITH SPAT	No. BLANK SHELLS	CINDER (quarts)
5 Jan 70	Naseway Shoals	27	42	113	3 old	3 old 1 recent	6	57	336	12 qts.
7 Nov 69	Nansemond Ridge	7	0	5	1 old	0	0	5	418	11 qts.

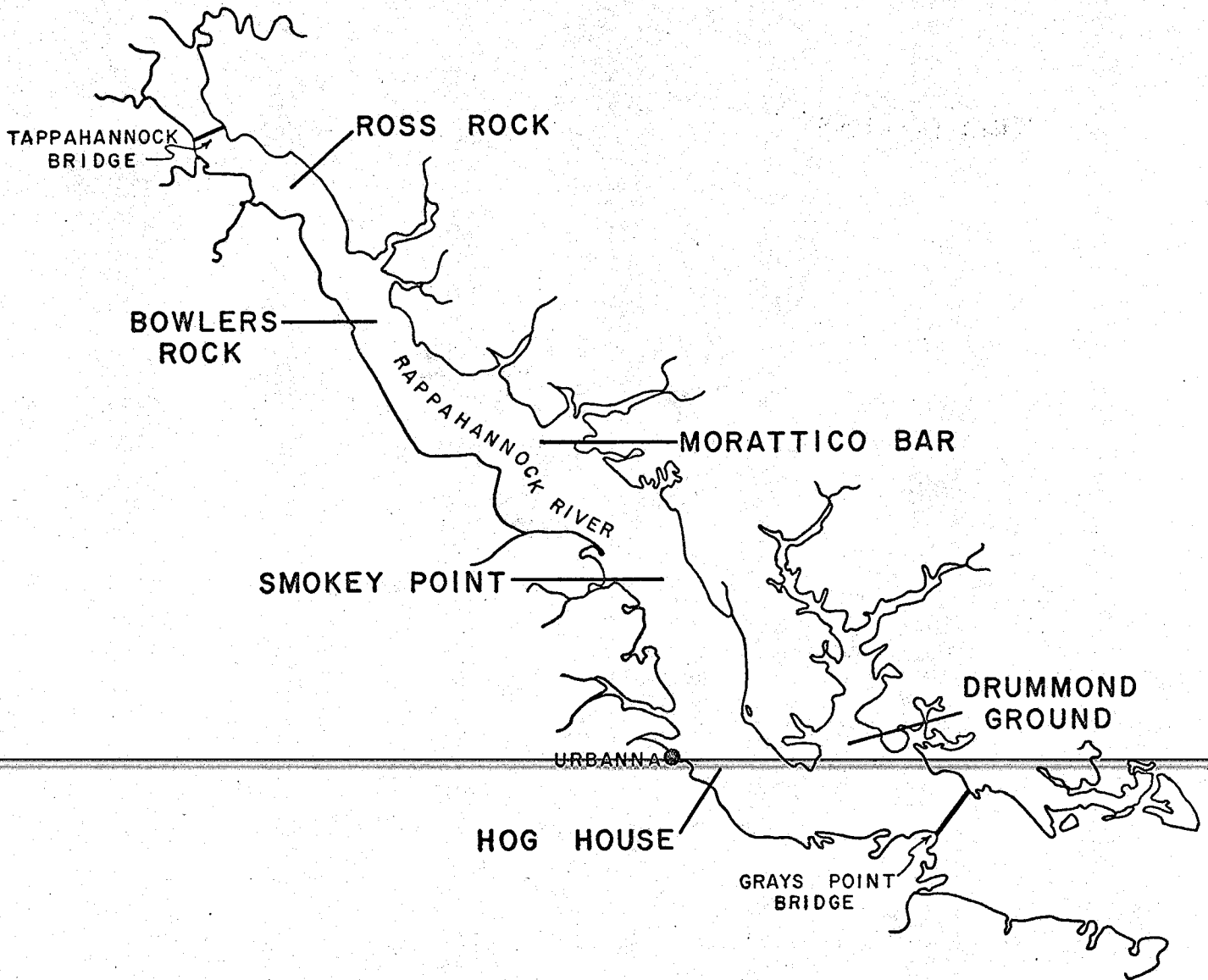
York River
 1969-1970 Annual Survey of Public Oyster Grounds
 Number of live oysters, dead oysters and shell in a one bushel sample

DATE	LOCATION	NUMBER OF LIVE OYSTERS IN ONE BUSHEL			NUMBER OF DEAD OYSTERS IN ONE BUSHEL			SHELL MATERIAL IN ONE BUSHEL		
		MARKET OYSTERS	SMALL OYSTERS	SPAT	MARKET BOXES	SMALL BOXES	DRILLED SPAT	No. SHELLS WITH SPAT	No. BLANK SHELLS	CINDER (quarts)
8 Dec 69	Bell Rock up river	29	129	2	8 old 6 recent	4 old 14 recent	0	1	151	10 $\frac{1}{2}$ qts.
8 Dec 69	Bell Rock down river	45	129	3	7 old 6 recent	16 old 12 recent	0	1	128	10 qts.
8 Dec 69	Bell Rock inshore	127	352	2	2 old 12 recent	6 old 88 recent	0	0	135	3 qts.
1 Dec 69	Aberdeen Rock up river	19	53	67	6 old 1 recent	14 old	9	27	251	19 qts.
1 Dec 69	Aberdeen Rock down river	21	16	14	2 old 1 recent	1 old 1 recent	3	8	320	20 qts.
1 Dec 69	Pages Rock up river	5	7	20	2 old	5 old	4	13	215	16 qts.
1 Dec 69	Pages Rock down river	8	7	25	1 old	1 old 1 recent	5	17	273	19 qts.
1 Dec 69	Green Rock	6	3	7	1 old	0	0	4	204	20 $\frac{1}{2}$ qts.

Rappahannock River
1969-1970 Annual Survey of Public Oyster Grounds
Number of live oysters, dead oysters and shell in a one bushel sample

DATE	LOCATION	NUMBER OF LIVE OYSTERS IN ONE BUSHEL			NUMBER OF DEAD OYSTERS IN ONE BUSHEL			SHELL MATERIAL IN ONE BUSHEL		
		MARKET OYSTERS	SMALL OYSTERS	SPAT	MARKET BOXES	SMALL BOXES	DRILLED SPAT	No. SHELLS WITH SPAT	No. BLANK SHELLS	CINDER (quarts)
27 Oct 69	Ross Rock	30	160	0	0	3 old	0	0	82	19 qts.
27 Oct 69	Bowlers Rock inshore	29	64	7	1 old	0	0	4	155	20 qts.
27 Oct 69	Bowlers Rock offshore	20	99	9	0	2 old	0	5	140	18 qts.
27 Oct 69	Morattico Bar inshore	42	81	3	1 old	4 old	0	2	170	8 qts.
27 Oct 69	Morattico Bar offshore	38	183	10	4 old	5 old	0	2	115	3 qts.
27 Oct 69	Smokey Point inshore	14	51	8	5 old	2 old 2 recent	0	6	179	15 qts.
27 Oct 69	Smokey Point offshore	30	131	22	1 old 1 recent	6 old	0	12	104	7 qts.
27 Oct 69	Hog House offshore	21	70	9	4 old	15 old 3 recent	0	6	279	12 qts.
23 Dec 69	Drummond Ground	13	13	5	17 old	19 old	0	4	382	9 qts.





OYSTER MEATS QUALITY INDEX FOR FEBRUARY 1970

(listed by river, proceeding upstream)

	Dec. 1969	Feb. 1970
JAMES RIVER		
Nansemond Ridge	5.0	6.8
Brown Shoals	5.0	6.4
White Shoals	6.1	7.2
Wreck Shoals		
shallow	7.4	8.1
deep	4.9	7.6
Point of Shoals	5.6	8.1
Horsehead	4.6	4.7
Deepwater Shoals	5.6	5.7
YORK RIVER		
Green Rock	6.6	7.2
Pages Rock	6.4	7.3
Aberdeen Rock	7.0	7.1
Bells Rock		
deep	7.8	8.4
shallow		12.4
RAPPAHANNOCK RIVER		
Drummond Ground	10.3	
Urbanna	13.2	12.5
Smokey Point		
shallow	10.2	11.7
deep	8.6	8.9
Morattico Bar		
shallow	11.7	11.9
deep	11.1	11.2
Bowlers Rock		
shallow	13.8	12.2
deep	11.6	10.3
Ross Rock	10.8	

KEY

3.0 to 5.5 = POOR

5.6 to 7.5 = FAIR

7.6 to 12.0 = GOOD

EXPLANATION OF OYSTER MEATS QUALITY INDEX*

"High quality meats," i.e., those which are plump with a creamy white color, generally fill the shell cavity of an oyster. In contrast, "low quality meats," which have a high water content and a transparent or "see-through" appearance, are shrunken and do not fill the shell cavity. Because of these facts, an acceptable measure of quality and relative yield has been developed that compares the actual size of meats with the space inside the shell cavity. This measure is called the "Oyster Meats Quality Index."

For oysters with the same shell size (for example, three-inch shucking oysters) this index indicates relative difference in meat size due to season, type of growing area, age, disease, nutrition, crowding and other natural factors. The index does not reflect differences in yields per bushel of oysters caused by the amount of clumping in a particular bushel nor does it reflect differences resulting from shucking or processing methods. The higher the index number, the greater the amount and quality of meats that can be expected from a bushel of oysters. (Whether an oyster is small or large has no effect on the index number because meats of small oysters can fill shell cavities as completely as meats of large oysters.)

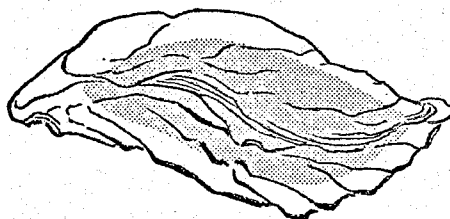
Chief value of this index is to provide industry with a useful tool for comparing the potential yield of oysters of the same size from different growing areas and from one season to the next.

*Surveys to determine the condition of oysters in Virginia rivers are directed by Dexter Haven, Head, Department of Applied Biology in the

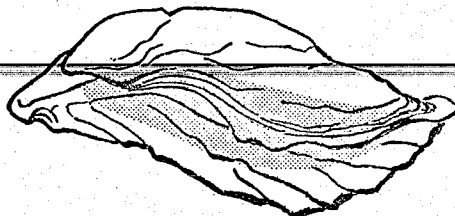
Division of Applied Marine Science and Ocean Engineering (DAMSOE) at VIMS. Representative stations on public rocks are established and sampled, beginning at the mouth of each river and proceeding to the transition zone between fresh and salt water. Oysters on private beds are not examined for this survey.

ILLUSTRATION OF OYSTER MEATS QUALITY INDEX

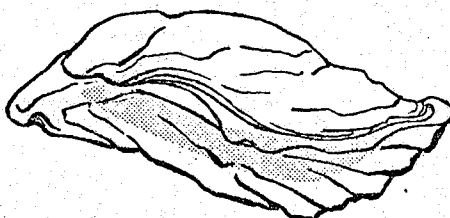
Three oysters of same size shown here illustrate three different grades of meats in VIMS index. Note degree to which meat fills the shell cavity of each oyster. Shaded area represents meat.



High index number from 7.6 to 12.0 for good quality oyster



Medium index number from 5.6 to 7.5 for fair quality oyster



Low index number from 3.0 to 5.5 for poor quality oyster

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