

1962

The Delaware oyster industry, past and present

Miller, Mary Emily

Boston University

<https://hdl.handle.net/2144/29691>

Boston University

BOSTON UNIVERSITY
GRADUATE SCHOOL

Dissertation

THE DELAWARE OYSTER INDUSTRY, PAST AND PRESENT

by

Mary Emily Miller

(B.A. with dist. in history, University of Delaware, 1955;
Cert. in Bus. Adm., Harvard-Radcliffe Program in Business
Administration, 1956; A.M., Boston University, 1959)

Submitted in partial fulfillment
of the requirements for
the degree of Doctor of Philosophy

1962

Copyright by
Mary Emily Miller
1962

7.12.1

1911

M.

Approved by

First Reader *Robert V. Bruce*
Associate Professor of History

Second Reader *Ernest M. Law*
Associate Professor of History

ACKNOWLEDGMENTS

As in any research project a list of friends and institutions hardly begins to repay the indebtedness the author wishes to express; however, there are a few without whose help this research would not have been possible.

I shall name only a few; first of all, Drs. Robert V. Bruce and Ernest Law of Boston University, who at all times gave me most constructive help in my work; Dr. Robert G. Albion, Harvard University and Mystic Seaport, without whose encouragement it is unlikely that the subject of this research would have been pursued to its conclusion; certain marine biologists, namely, Dr. Thurflow C. Nelson, deceased, of Rutgers University, who was undisputed dean of oyster research; Dr. Harold H. Haskin, Rutgers University; Dr. H. Melbourne Carriker, U. S. Bureau of Fisheries; Dr. Paul S. Galtsoff, U. S. Bureau of Fisheries; Dr. Carl N. Shuster, Jr., University of Delaware; Dr. John S. Rankin, Jr., University of Connecticut; all of whom gave of their valuable time to offer suggestions; Mrs. Marie Windell of Eleutherian Mills Historical Library; Leon deValinger, Public Archivist of Delaware; Mrs. H. Clay Reed, Historical Society of Delaware; Mr. Samuel Fox, Executive Secretary of the Delaware Commission of Shell Fisheries, who allowed me

free access to the Commission's files; Mr. W. H. T. Purnell, Sussex Society of Archeology and History; Mr. Valentine Massey, Delaware genealogist; Mrs. Doris M. Payne, artist; Mr. Richard A. Arlington, photographer; Mrs. J. A. Baker, typist; the staff of the Library of Congress, Mystic Seaport, New York Public Library, Pennsylvania Historical Society, Wilmington Free Institute, and the libraries of the University of Delaware, Yale University, Harvard University and Rutgers University.

Above all I wish to express my sincere appreciation to my parents, Dr. and Mrs. George R. Miller, Jr., without whose support and encouragement this research would never have been begun. To these and to many others I owe a debt of gratitude.

Mary Emily Miller

Frederica, Delaware, March, 1962

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGMENTS	1v-v
TABLE OF CONTENTS	vi-vii
LIST OF ILLUSTRATIONS	viii-xi
INTRODUCTION	1-4
Chapter	
I. HISTORICAL BACKGROUND	5-18
Prehistoric Oysters	
Old World Oysters	
The Oyster Industry in the United States to 1880	
The Oyster Industry in the United States Since 1880	
II. THE LIFE AND ENVIRONMENT OF THE OYSTER	19-51
The Life of the Oyster	
The Environment of Delaware Oysters	
III. ANCIENT TIMES TO THE NINETEENTH CENTURY	52-91
Ancient Remains	
The Delaware Indian Oyster Industry	
White Men in the Seventeenth Century	
The Eighteenth Century	
IV. THE NINETEENTH CENTURY TO THE CIVIL WAR	92-127
V. CIVIL WAR TO THE TWENTIETH CENTURY	128-158
VI. THE TWENTIETH CENTURY: TO THE DEPRESSION	159-197
VII. THE TWENTIETH CENTURY: FROM THE DEPRESSION TO THE PRESENT	198-228
VIII. JURISDICTION, INDUSTRIALIZATION AND CONSERVATION IN THE DELAWARE VALLEY	229-237
Industrialization and Jurisdiction	
Conservation	

Chapter	<u>Page</u>
IX. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . .	238-245
Summary and Conclusions Recommendations	
APPENDIX A. GLOSSARY, PHRASES AND WORDS DESCRIPTIVE OF OYSTERS IN 1880	246-262
APPENDIX B. LIST OF OYSTER REVENUE COLLECTORS IN DELAWARE, 1871-1958	263
APPENDIX C. THE MEMBERS OF THE DELAWARE COMMISSION OF SHELL FISHERIES, 1944-1961	264-266
APPENDIX D. DELAWARE MEMBERS OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION, 1942- 1961	267-269
APPENDIX E. LIST OF TABLES	270-276
Table 1. Population of the State of Delaware, 1790-1960.	
Table 2. United States Oyster Catch by Region for Selected Years, 1880-1959.	
Table 3. Oyster Catch in Delaware, Pennsylvania and New Jersey, 1880-1960.	
Table 4. Delaware State Revenue from Oyster Industry, 1890-1944.	
Table 5. Delaware State Revenue from Oyster Industry, 1945-1960.	
BIBLIOGRAPHY	277-325
The Literature of the Delaware Oyster Industry Sources	

LIST OF ILLUSTRATIONS

<u>Figure</u>	<u>Page</u>
1. Internal Anatomy of Commercial Oyster (<u>Crassostrea virginica</u>)	20a
2. Exterior and Interior Surface of Commercial Oyster Shell, Right Valve, Delaware Bay Oysters	23a
3. Development of the Oyster from Egg to Youngest Spat	25a
4. Delaware Bay Oysters on a Clam Shell, a Few Hours Old and a Few Months Old	27a
5. Cluster of Market Type Delaware Bay Oysters Still Attached to a Clam Shell, Two-year Olds	29a
6. Generalized Cross-Section of an Oyster Bed .	38a
7. Delaware Wetlands Preservation, 1959	43a
8. Major Fish and Wildlife Habitat Areas in the Delaware River Estuary, June, 1960	46a
9. Natural and Planted Oyster Beds in Delaware Bay, Rehoboth Bay and Indian River Bay, Delaware	50a
10. Two Types of Extinct Oysters Found in Delaware	53a
11. Delaware or Lenni Lenape Indians Diving for Oysters	60a
12. Delaware or Lenni Lenape Indians Smoking Oysters	64a
13. Delaware or Lenni Lenape Indians at an Oyster Feast	67a
14. Nova Suecia: Eller the Swenkas Revier in India Occidentali (New Sweden or the Swedes' River in the West Indies), Peter Lindeström, 1654-1656	70a

<u>Figure</u>	<u>Page</u>
15. Tongs Designed for Use in Delaware Waters . . .	77a
16. Map of New Jersey, 1797	90a
17. Map of Delaware and the Eastern Shore, Maryland, 1799, 1800, 1801	93a
18. Bill from Ezekiel Macier and Company to E. I. duPont de Nemours and Company, May 23, 1808	95a
19. An Act for the Preservation of Oysters, Ter- rapins and Clams, February 12, 1812, Dela- ware General Assembly	99a
20. Map of Pennsylvania, 1822	103a
21. Page from Ledger of duPont Household Accounts, "Dépense de menage," for the month of March, 1828	105a
22. Philadelphia Taste Displayed, or, Bon-Ton Below Stairs, Lithograph Oyster Cellar Caricature, 1830	108a
23. Page from Ledger of duPont Household Accounts, "Household expenses," for the month of March, 1839	111a
24. Page from Ledger of duPont Household Accounts, "Household expenses," for the month of December, 1840	112a
25. Map of Pennsylvania, 1849	114a
26. The Oysterman, 1850 Lithograph	118a
27. Fine Oysters, 1856 Lithograph	121a
28. Oysterman Tonging in Shallow Water	130a
29. Petition from Oystermen to Governor Cochran of Delaware, January or February, 1875 . . .	141a
30. Petition from Oysterman to Governor Hall of Delaware, December 14, 1878	143a
31. Bugeyes at Rest in Harbor	146a

<u>Figure</u>	<u>Page</u>
32. Plantation Grant for Planting Oysters from Governor Hall, Delaware, to Captain Christian Johnson and David Smith of Philadelphia, September 15, 1879	148a
33. A List of Boats and Names of Captains Licensed on the Western Shore (of Delaware Bay) to Dredge and Plant Oysters for the Year 1880	150a
34. Map of Natural Oyster Beds of Delaware, 1910	169a
35. Chart of Leased Oyster Bottoms, Delaware Bay, Delaware, 1910	173a
36. Oyster Knife	176a
37. Oyster Fleet at Little Creek, Delaware, April 27, 1924	179a
38. Oyster Schooners, Gracie and Ishmael, Working in Delaware Bay, April 28, 1924 . . .	181a
39. Oyster Vessels at Work, Delaware Bay, April 29, 1924	183a
40. Oyster Vessel Deck, Dredge Full Coming Aboard, April 29, 1924	185a
41. Oyster Vessel Deck, Shovelling Away Oysters, April 29, 1924	188a
42. Oyster Vessel Deck, Dredge Used in Getting Oysters, April 29, 1924	190a
43. Oyster Vessel, Deck Load of Oysters, April 29, 1924	192a
44. Oysters from Delaware Bay, Clusters of Market Types, April 30, 1924	194a
45. Chart of Areas Leased for Planting of Shellfish in Rehoboth Bay, Delaware, April 12, 1948 revised	209a

<u>Figure</u>		<u>Page</u>
46.	Chart of Areas Leased for Planting of Shellfish in Indian River Bay, Delaware, April 10, 1948, revised	210a
47.	Delaware Seed Beds, Delaware Bay Survey, Spring, 1952	217a
48.	Old Schooners Converted to Modern Oyster Boats Docked Next to Newer Vessels in the Oyster Fleet, September 1952	219a
49.	Old Oyster Schooner Converted to Power Vessel	221a
50.	Bowsprit Removed When Sailing Schooner Converted into Power Vessel	223a
51.	Chart of Delaware Bay Showing East Line Dividing Natural Oyster Beds from Planting Grounds on the Delaware Side of the Bay, 1961	225a

Introduction

The Problem

One of the critical phenomena of our times is the population explosion. Although some experts have been looking for this growth to reach a plateau, the number of people born each year continues to increase more rapidly. How is this explosion affecting man? It has brought changes in the way that men earn a living, in their mode of living and in the use of their leisure time. These facts are most dramatically illustrated in the oyster industry in the State of Delaware, which at various stages in Delaware's history supplied a substantial living for a number of people, but which presently gives every indication of becoming defunct unless profitable ways of reviving the industry can be found.

This industry also reflects the age-old role of man as the hunter and then as the ruthless exploiter. The supposedly inexhaustible resources that are to be found in the oceans and their tributaries have been wantonly expended through man's carelessness and disregard for those who come after him.

In the days ahead greater quantities of food and raw materials must be obtained from the seventy-one per cent of the world covered by water,¹ so that the increasing population may have sufficient food. The waters of the world have for the most part been tapped only so far as naturally available food is concerned, and the fact that, in converting microscopic food into animal proteins and fats, marine life is far more efficient than life on the land suggests that the waters around us can provide vast new sources of food.

The Purpose and Scope of the Investigation

This investigation of the oyster industry in the State of Delaware, both past and present, is an effort not only to present an accurate historical record, but also to discover how the changes in the industry over the years have marked those who were part of it and to forecast what may lie ahead for it.

The emphasis of this study is upon the State of Delaware; however, since the oyster industry in Delaware has felt the impact of the industry along the entire Atlantic Coastal Region and since it is estuarine in character, one must

1. Harden F. Taylor, Survey of Marine Fisheries of North Carolina, (Chapel Hill: The University of North Carolina, 1951), p. 301.

understand what elements in the growth or decline of the industry affected the Delaware scene.

Delaware was chosen, rather than other states, because it is a more manageable area of study. In other states, furthermore, responsibility for regulation has been divided, whereas in Delaware it has rested with the General Assembly alone, at least until 1943. Its effects, therefore, can be more readily evaluated. At the same time, despite its smaller extent, the Delaware oyster industry reflects the problems which have beset the industry in other areas.

There is no previous comprehensive history of the Delaware oyster industry. What studies have been made have been biological or legal rather than historical. Studies of the oyster industry from a national point of view have paid little attention to the Delaware industry, largely because it represents a small percentage of the total.

Methods and Sources

The sources employed in this study are historical and biological records, interviews and personal correspondence. The historical data were selected from records and reports, travel accounts, private documents, family and industrial records and newspapers.

Numerous interviews were held and personal correspondence was conducted with oystermen in Connecticut, Delaware, New Jersey, Maryland; brokers in Philadelphia; businessmen in Delaware; ship model builders and ship riggers, welders, manufacturers, bankers, marine biologists, plant foremen, boat captains, public officials and proggers.

Definition of Terms

The term "industry" is interpreted as including all aspects of oystering from casual, non-commercial gathering to the refined details of marketing. For specific definitions of biological terms and colloquialisms reference may be made to the Glossary, pages 246-262.

Chapter I

Historical Background

Oysters are invertebrates with a soft body protected by a hard shell, belonging to the phylum Mollusca. They are bivalves in the group called Lamellibranchs, headless with gills for breathing and two valves closed by a powerful hinge to form the shell. The shells are not equal in shape, the left one being more deeply cupped than the right. There are two families of oysters: the Pteriidae, which includes the pearl oyster and is found only in tropical and subtropical seas; the Ostreidae, which lacks the mother-of-pearl layer on the inner shell surface and produces pearls of no value. These latter oysters are edible, range from tropical to subarctic areas and are estuarine, living mainly in brackish water found in estuaries. They are divided into two genera: the *Ostrea*, with a deeply cupped left valve or shell, one passage for excurrent water, retention of eggs in the gill chamber for fertilization and development into shelled swimming larvae, a procedure designated as larviparous or incubatory; and the *Crassostrea* with a more deeply cupped left valve, two passages for

excurrent water, spawning eggs and sperm into the water where all larval development takes place, a procedure designated as oviparous. Oysters in the genus *Ostrea* grow best in water which is salty as true ocean water, while those of the *Crassostrea* with extra cleansing mechanisms occupy areas of lower salinity in estuaries with their rich food sources. There are at least sixty species which have been described, some of which have been extensively cultivated.

Prehistoric Oysters

Molluscs are represented in the earliest rocks bearing fossils. It is in the Cambrian period, early Paleozoic, that the fossilized remains of animals appear. This fact seems to indicate a chemical change in sea water permitting the production of calcium carbonate and calcium phosphate skeletons at that time. However, the predation hypothesis proposed by Brooks and Hutchinson offers the conclusion that the appearance of fossilizable skeletons indicated a rise of predation and that many animals of various sizes were affected at the same time, assuming

that the earlier predators did not fossilize.² Bivalve molluscs first appeared in the Ordovician period, immediately following the Cambrian. During all the Paleozoic period fossil remains continue to grow in numbers, so that by the following Mesozoic period bivalves show increased importance, an importance which continued through the Tertiary period into modern times.³

In the upper Triassic period of the Mesozoic, species of the Ostreidae can be identified, growing more and more abundant in the Jurassic and Cretaceous periods, middle and late Mesozoic.⁴ During these years oysters evolved to meet the changing conditions. Some species evolved themselves right into extinction and many samples of these have been found.

The oyster shells found in quantity in the kitchen middens of prehistoric times indicate the value and extent of this bivalve as food for early man, along with other shellfish. There are shell mounds in Denmark, Ireland,

-
2. G. E. Hutchinson, "The Biologist Poses Some Problems," Oceanography, Mary Sears, ed., Invited Lectures Presented at the International Oceanographic Congress held in New York, 31 August-12 September 1959. Publication No. 67, (Washington: American Association for the Advancement of Science, 1961), pp. 90, 92, 93.
 3. C. M. Yonge, Oysters, (London: Collins, 1960), pp. 131-132.
 4. Ibid., p. 132.

Brittany, southern Greece, Japan, Australia and the United States.⁵ In the United States shell mounds of Crassostrea virginica can be found in New England, notably the ones near Damariscotta, Maine.⁶ Near San Francisco Bay mounds of Ostrea lurida have been found.⁷ Sometimes with these shells pottery shards and primitive utensils of stone have been discovered.

Old World Oysters

Westerners first heard of oysters from Aristotle (384-322 B. C.) in his Historia Animalium. This descriptive work on animals and plants explored the function and structure relationship, describing the plants and animals from actual specimens.⁸ More information on Ostrea edulis appeared in Pliny the Elder's (23-79 A. D.) Natural History. It is from this account that the knowledge of European oyster culture is gathered. Sergius Orata had the first

5. Yonge, op. cit., p. 137.

6. Ernest Ingersoll, The History and Present Condition of the Fishery Industries, The Oyster-Industry, Prepared under the direction of Professor S. F. Baird, U. S. Commissioner of Fish and Fisheries, by G. Brown Goode, Assistant Director U.S. National Museum, and a Staff of Associates, (Washington: Government Printing Office, 1881), p.11.

7. Yonge, op. cit., p. 137.

8. Ibid., also notes from a lecture on Aristotelian Biology by Dr. Mendelsohn in History of Science course, Harvard University, October 14, 1960.

artificial beds at Baiæ, Italy, in the time of Lucius Crassus before the Marsic War (about 95 B. C.).⁹ There were two reasons given for his enterprise: one, the love of the food and, two, the love of the money he could make. The Lucrine oysters became well known for their flavor, and oysters were sent from Brindisium in southern Italy to feed in Orata's beds to acquire the distinct flavor of Lake Lucrinus. There are two glass vases in museums, one found at Piombina which shows buildings along what may be the coast between Puteoli and Baiæ, a famous resort area for well-to-do Romans. The second glass vase is in the Museo Borgiano at Rome. Both show oyster culture (ostriaria), with oysters suspended on ropes from a platform.¹⁰ A sketch of the designs of these vases can be

-
9. Hector Bolitho, ed., The Glorious Oyster, (London: Sidgwick and Jackson, 1960), p. 25; M. Coste, "Report on the Oyster and Mussel Industries of France and Italy," U. S. Fish. Comm. Report 1880, Extracted from "Voyage d'Exploration sur le littoral de la France et de l'Italie, par M. Coste, membre de l'Institut, professeur au Collège de France. Deuxième édition, suivie de nouveaux documents sur les pêches fluviales et marines. Publiée par ordre de S. M. l'Empereur sous les auspices de S. Exc. le Ministre de l'Agriculture, du Commerce et des travaux publics." (Paris: Imprimerie Impériale, MDCCCLXI), pp. 825-830; T. C. Eyton, A History of the Oyster and the Oyster Fisheries, (London: John van Voorst, 1858), pp. 1-2; John R. Philpots, Oysters and All About Them, 2 vols., (London: John Richardson and Company, 1890, 1891), vol. I, pp. 32-52; C. M. Yonge, op. cit., p. 138.
10. Coste, op. cit., pp. 825-830; Yonge, op. cit., pp. 149-151.

seen in Yonge's Oysters, Fig. 56, p. 150. In the recent exploratory diving near Baiae, Italy, no new material has as yet been discovered.¹¹

Others wrote of the oyster in Roman times, among them Cicero, Horace, Juvenal, Macrobius, Pliny the Younger and Seneca. Later writers have also written about Roman feasts, and in all accounts oysters are a prominent feature on the menus. In 50 B. C. Sallust wrote, "The poor Britons-- there is some good in them after all--they produce an oyster."¹² These oysters were called Rutupian oysters and were exported from Kent, England, to Rome for many years. Juvenal wrote:

And in our days none understood so well
The science of good eating; he could tell
At the first relish, if his oysters fed
On the Rutupian or the Lucrine bed;
And from a crab or lobster's colour, name
The country, nay the district, whence it came.¹³

It has been stated that from the fourth century until the reign of Louis IV of France, King of the West Franks, 936-954, there was little written on the oyster. With the conquest of England a little over a century after Louis IV,

-
11. Letter from Dr. Lionel Casson, Professor of Archeology, New York University, December 12, 1961.
12. T. C. Eyton, op. cit., p. 2.
13. Bolitho, op. cit., p. 33.

the Normans revived the popularity of Kentish oysters. For the next two or three centuries there is another hiatus in writing on the subject. Except for the Bestiaries or Books of Beasts, the age was truly a dark one for knowledge of the oyster. With the Renaissance came a new look, but not until well into the seventeenth century did scientific knowledge of the oyster expand further.¹⁴ From the sixteenth century to the present, artists have captured the oyster on their canvases. Some excellent black and white reproductions of English, Dutch, French and American paintings can be found in The Glorious Oyster, edited by Hector Bolitho. Some of the scientific contributions are examined by Yonge.¹⁵ Of these the discovery that the white- and black-sick oysters were really oysters containing the incubating larvae was interesting and is probably one of the bases for the long standing idea that oysters can only be eaten in months with an R.

Since the oyster remains stationary and grows in shallow water, it lends itself to culture by man. Oyster culture is a world-wide industry which has borrowed techniques from one area to another and has adapted them to various conditions and resources. It is believed that China has the oldest

14. Bolitho, op. cit., p. 37; Philpots, op. cit., vol. I, pp. 53-62; Yonge, op. cit., pp. 138-140.

15. Yonge, op. cit., pp. 142-147.

culture record for oysters. The West did not know about it, and it has had little effect on present western developments. For the present the industry in China seems to have declined for much the same reasons that it has declined in other parts of the world.¹⁶ In China, as in Japan, France and elsewhere, a great deal of the work is done by hard labor.¹⁷

Dr. P. Coste, the French embryologist, in an attempt to revive the shrinking French industry, made an extensive study of oyster culture, beginning in 1853 in Italy. His results were published in 1861. From then on many other countries studied culture techniques: Germany, England, Holland, Scandinavian countries, the United States, Japan and China.¹⁸

The work of Brooks of Johns Hopkins in 1879 on artificial fertilization of eggs of the Crassostrea virginica, with application by Rice, Winslow, Ryder, Nelson and others

-
16. T. P. Chen, "The Oyster Industry of Chung-Shan," Lingnan Sciences Journal, vol. 14, no. 1, January 1935, (Canton, China: Chen at Fisheries Experiment Station, 1935), pp. 69-70.
 17. Alvin Robert Cahn, Oyster Culture in Japan, General Headquarters, Supreme Commander for the Allied Powers, Natural Resources Section, Report No. 134, (Tokyo: General Headquarters, 1950).
 18. H. A. Cole, Oyster Cultivation in Britain, A Manual of Current Practice, (London: Her Majesty's Stationery Office, 1956, Reprinted 1960); Joseph Stafford, The Canadian Oyster, Its Development, Environment and Culture, (Ottawa: The Mortimer Company, Ltd., 1913); Yonge, op. cit., pp. 151-194.

made possible oyster culture in America.¹⁹

Although not as old as in some other parts of the world, the New World oyster industry soon overtook that of the old. For the last one hundred years writers have warned of total destruction of this industry if proper procedures were not followed, citing the European experience as evidence. It was in fact the drastic reduction of the natural supply of oysters that led to the development of interest in culture.

The Oyster Industry in the United States to 1880

The story of the oyster industry in North America was reported in detail by Ingersoll for the years up to 1880.²⁰ This is the classic study of the industry, but it is out-of-print and existing copies are most difficult to obtain. Most indications have been that the first white settlers in North America did find oysters, some in great quantities. These settlers were familiar with edible shellfish. Throughout Ingersoll's study there is evidence that oyster beds

19. Stafford, op. cit., pp. 3, 114.

20. Ingersoll, op. cit. The material on North America is taken from Ingersoll. This is the classic study, perhaps the only work which collected scattered information on the industry up to 1880.

became extinct from time to time. The reasons assigned were several in number: (1) the Indians consumed all of the oysters, (2) pollution of the water by mills and manufacturing plants killed off the oysters, and (3) the steady elevation of the coast produced unfavorable conditions for continued growth and development of the oyster. Another cause for the continued decline of oyster beds was increased sedimentation. This was caused by the loss of native vegetation and resulted in erosion of soil into drainage areas.²¹

Early attempts at "fattening" oysters may have been by Indians near Damariscotta, Maine, while later attempts were made by the early settlers in the New England area as the natural supply declined. However, these were unsuccessful except at Wellfleet, Massachusetts, where the death of local oysters sometime between 1770 and 1780 made it necessary to import seed oysters from nearby Cape Cod oyster beds and "relay" them at Wellfleet.²² About 1845 or 1850 the Wellfleet seed trade began to be confined to Virginia seed.²³ Similar situations arose in other New England and Middle Atlantic States. As the local beds became depleted, due to population increases and increased oyster consumption per capita, seed oysters were imported, first from nearby areas

21. Ingersoll, op. cit., pp. 16-18.

22. Ibid., p. 18.

23. Ibid., p. 24.

and then from areas further south, notably Virginia. In New York State both Virginia seed and Delaware seed were employed for "relaying."²⁴ Thus many of the trade names associated with oysters sold in markets in New England and New York were not native to the area, the name of which they bore, but were transplanted oysters which acquired the characteristics and flavor of the localities in which they spent several months growth. In addition these oysters benefited from the reputation, resulting in the various name brands oysters had acquired.

Although these early attempts were called oyster culture the more accurate term would be "relaying." The oysters were imported by sailing vessels in the latter part of the winter. Smaller boats were then used to take the cargo to the marked areas where the oysters were shoveled out of the boat and into the water. In some states the beds could be raked at low tide to distribute the new oysters evenly. In the late summer and early fall those oysters laid down at the end of the winter were gathered and marketed. In some years there would be good growth and in others there would be heavy losses from sand, frosts, disease and natural enemies.

The number of vessels engaged in the oyster trade before the Civil War gave indication of the importance of the indus-

²⁴. Ibid., p. 114.

try during that period. These vessels were of different types, regular oyster sloops or cat boats, skiffs which were clinker-built, shallow-draft keel-boats, bateaux with flat bottoms and straight sides like the Connecticut sharpies.

The Civil War caused a great decline in the oyster industry, since the trade relation between southern and northern ports was cut off. This situation made it impossible to obtain southern seed oysters for northern beds. The development of a canning industry centered in Baltimore, Maryland, in the second quarter of the nineteenth century, together with the improvement in rail and water transportation, population growth and western expansion, all conspired to produce a boom in the oyster industry after the Civil War. The boom in the industry was centered in the Chesapeake Bay area in the post Civil War period.

The Oyster Industry in the United States Since 1880

Despite the forecast about the decline of natural beds throughout different parts of the United States, huge crops of oysters were taken from the waters, the quantity reaching a peak in 1890.²⁵ Between 1908 and 1929 oysters had

25. Taylor, op. cit., p. 500.

dropped from top place to eighth in production of the leading nine commercial edible types of fish in the United States. During that same time oysters remained the top money earner of those nine commercial types of fish, with the production of shrimp rapidly closing the gap.²⁶

World War I had its effect upon the oyster industry in reduced production. By 1920 the amount of oysters consumed by the growing population on the East Coast had declined sharply, with production reduced to less than half of that in 1890.²⁷ After World War I there was a short upswing in the industry, followed by the depression of 1929 which affected the oyster industry as it did the entire economy. The fact that prices of oysters did not respond to the normal economic law of supply and demand suggests that something must have happened to the demand for oysters in that period.²⁸ Lack of supply of oysters does not provide the entire answer for the situation. Some tentative reasons are as follows: the demand for shrimp and crabmeat, competitive seafoods; the development of more efficient methods of fishing to provide seafood products cheaper than oysters; the slowness in

26. Taylor, op. cit., pp. 497-498.

27. Ibid., p. 414.

28. Ibid., pp. 414-415.

application of efficient methods in all phases of the oyster industry.²⁹ Although by 1938 oysters were no longer among the top nine commercial edible types of fish in production, they still held their monetary supremacy.³⁰

Connecticut in the last eighty years has become the leading New England producer of seed oysters. New Jersey and Virginia also made large seed shipments over the years. Since the Second World War the Chesapeake, South Atlantic and Pacific areas have become more important in the production of oysters, while the Middle Atlantic States have declined in importance because of the increasing industrialization of that area. There is evidence to indicate that complete reliance upon public grounds has led to a decline in the oyster industry. It has also been shown that without public seed bar areas, protected by the state from irresponsible depletion, the industry will lack the necessary seed to produce market oysters. By 1950 production had declined almost to one-third of its former level,³¹ with shrimp surpassing oysters in monetary value.³²

-
29. Dr. Charles L. Quittmeyer, "The History of the United States Oyster Industry," unpublished manuscript, p. 53.
30. Taylor, op. cit., pp. 414, 496-499.
31. Quittmeyer, op. cit., Table 8, pp. 45-46.
32. John J. Wheatley, The Economic Implications of the York River Oyster Industry, (Charlottesville: Bureau of Population and Economic Research, University of Virginia, 1959), p. 60.

Chapter II

The Life and Environment of the Oyster

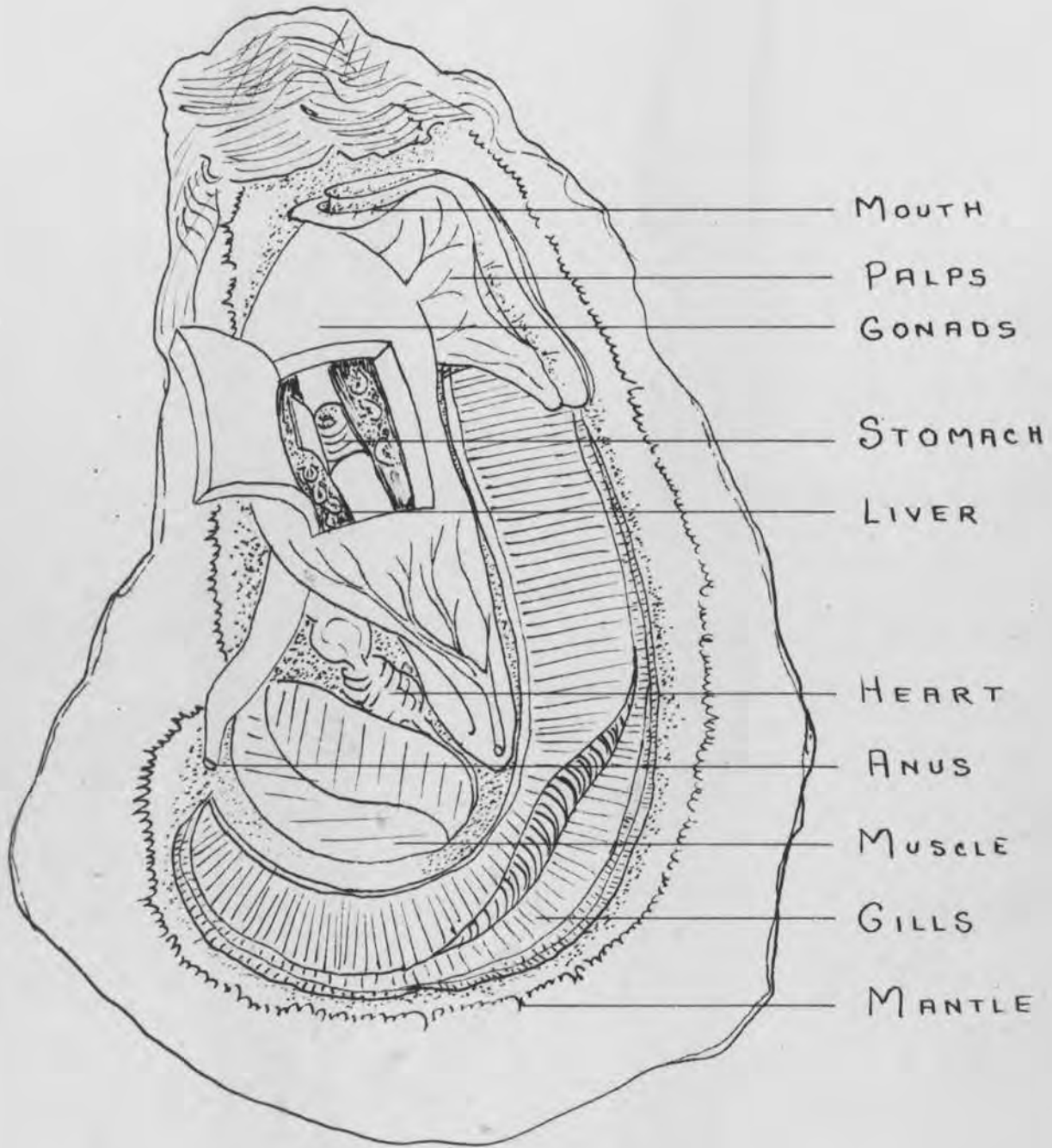
The Life of the Oyster

The oyster, which utilizes micro-organisms for food, has a highly evolved form of digestive system. Four fringe-like appendages called gills gather the food as water passes over them. Small hair-like structures, called cilia, grow along the edges of the gills and are covered with a secretion which forms the food into small balls. During this process, unacceptable bits of food are isolated and discarded. The cilia serve several purposes: gathering of food, breathing and excretion. Because of the performance of these several functions the oyster is a complicated organism.

Let us trace briefly the food as it enters the mouth of the oyster, which is located near the hinge. The food passes from the mouth through the esophagus to the stomach and is partly digested by juices secreted in the folds of the stomach and the liver. Digestion is completed and absorption occurs principally in the intestine.

The digested foods are delivered to all parts of the

Figure 1. Internal anatomy of commercial oyster (Crassostrea Virginica). Source: Robert P. Hofstetter, The Texas Oyster Fishery, Bulletin No. 40, Series No. VI, Marine Laboratory, (Austin, Texas: Texas Game and Fish Commission, August, 1959), Fig. 3, p. 5.



oyster by a well developed circulatory system consisting of a central pumping station, the heart, which is divided into the auricle and ventricle regions. The heart lies in a cavity in front of the adductor muscle. Pulsation of the heart forces aerated blood, a slightly gray, almost clear fluid, through the heart valves into the body, in which it passes over the digestive tract and gills before returning through the veins to the auricle. There are no walls in the blood passages between the arteries and veins; thus tissues are bathed in food and oxygen-laden plasma, which then picks up carbon dioxide for discharge by the gills. In this manner respiration is effected.

The oyster is a sensitive animal and its sensory system is perfectly adapted to the environment in which it grows. The greatest sensitivity lies in the small tubercles or tentacles which project outward from the thick membrane, the mantle, that envelops the whole oyster. For these tentacles, usually extending out over the edges of the shells, receive impulses of the most delicate nature. Since this is the case, the slightest change in water temperature, water pressure, rate of flow, even light intensity, causes the shell to snap shut. Its quick responses provide a high degree of protection for the oyster; as a matter of fact, this sensitivity to the slightest change in the environment

is its only means of protection, since the adult oyster has no eyes or means of locomotion.

The shell of the oyster is concave and provides ample space for the animal. The shell is produced by a heavy glandular membrane which surrounds the oyster and secretes a liquid substance. When this substance hardens, it becomes shell.

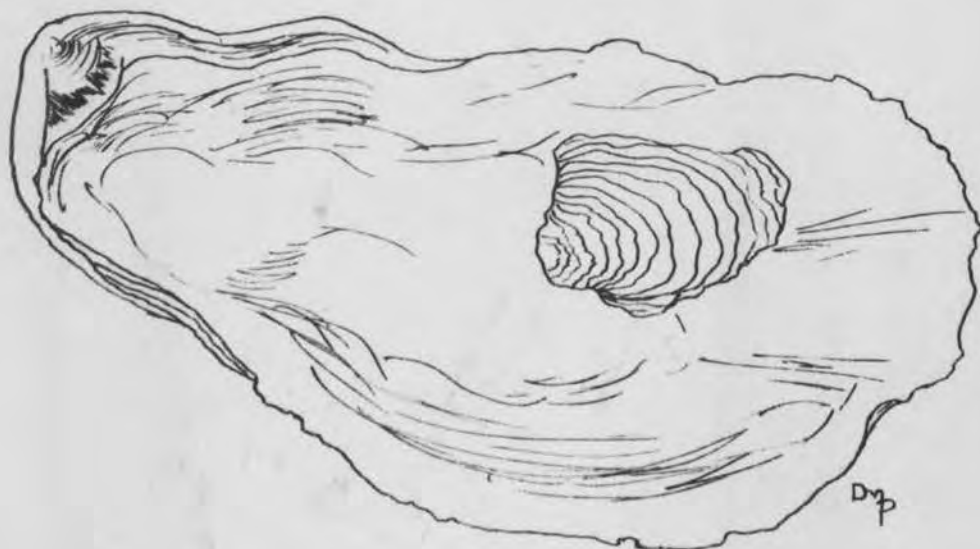
Nearly everyone, at some time or other, has seen how the shells of the oyster are hinged together. The ligament, or hinge, acts as a spring to force open the shells. This is but an opening mechanism, and if it were not for the adductor muscle, a toughened mass of tissue back of the heart, which permits the shells to close tightly, they might remain open indefinitely.

In their native state, oysters keep their shells open for long periods of time, continually going through the circulation cycle of feeding, breathing and excretion. There is rife among watermen the idea that the oyster feeds and is active only at flood tide, but observations have proved otherwise. Activity occurs on both flood and ebb tides, at night as well as by day. However, as noted previously, water temperatures determine activity; and at a temperature of 4 °C., or below, oysters cease to feed.

Figure 2. Exterior and Interior Surface of Commercial Oyster Shell, Right Valve, Delaware Bay Oysters (Drawn by Mrs. Doris Major Payne from specimens in the author's possession.)



EXTERIOR SURFACE - RIGHT VALVE



INTERIOR SURFACE - RIGHT VALVE

Temperature is one factor in determining the length of time an oyster survives out of water--the lower the temperature, the longer the period of survival. Even when removed from its shell, the oyster may remain alive for many hours or few, depending upon conditions.

Crassostrea virginica on the east coast of the United States are of a single sex, while the European species, the Ostrea edulis, possesses two sex systems, making it possible to become either male or female. This phenomenon has actually been observed. Microscopic examination is necessary to determine the sex of an oyster, but when "ripe" a greater part of the reproduction system is plainly visible to the naked eye because of the distention caused by the presence of vast numbers of germ cells.

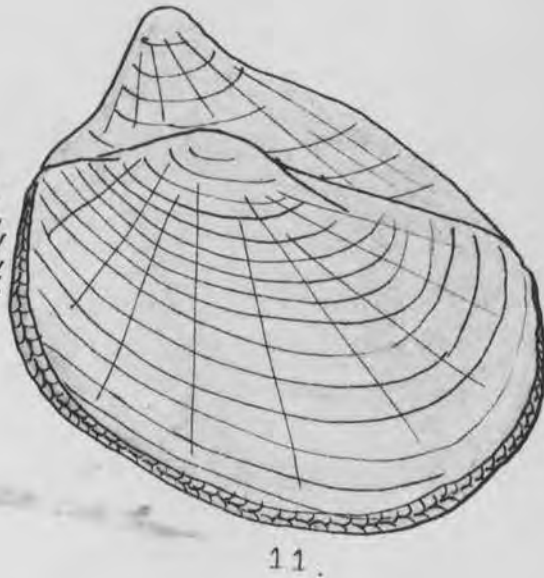
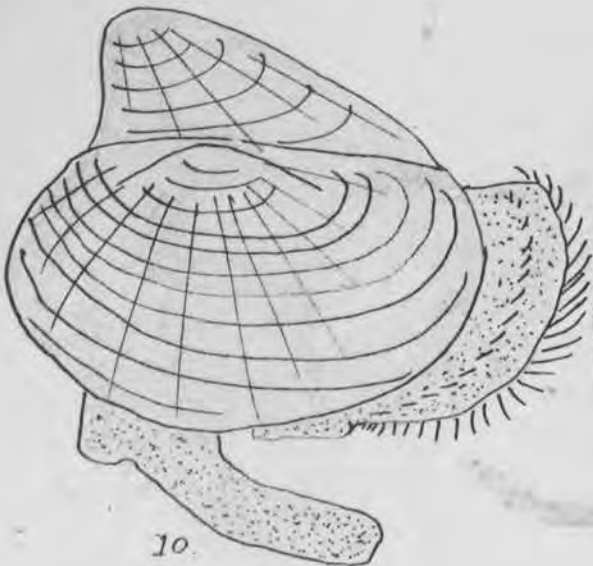
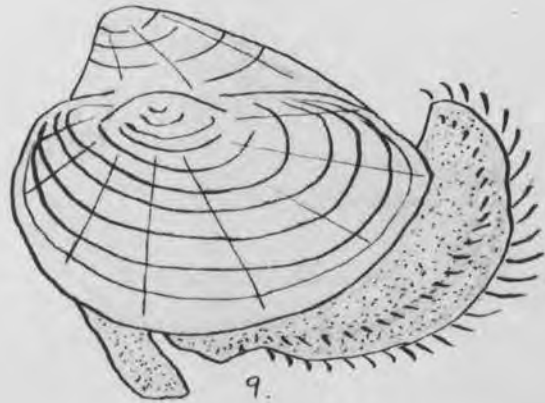
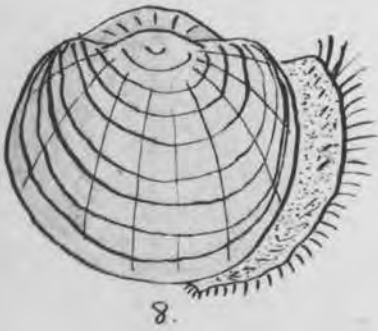
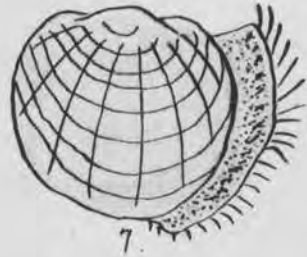
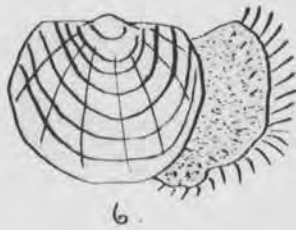
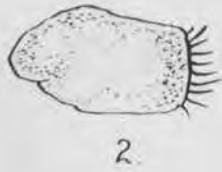
The reproductive cells of the American oysters are ejected into the open water, where fertilization depends upon the chance contact of the sperms and the ova. There may be two or three periods of major spawnings in one season from one oyster. American oysters frequently first develop as males and then become females later in their life. The studies of spawning characteristics of the oyster have contributed to a better understanding of the proper planting time of shells or other cultch (material available for oyster larvae to "set" upon) for maximum production and the need for adult populations among the spawners as well as young oysters.

Figure 3. Development of the Oyster from Egg to Youngest Spat.

Key.

1. Oyster's ovum.
2. Trochophore or first stage of the larva, with its swimming organ--the prototroch. The animal now begins to swim, swallow food and grow.
3. Beginning of the shell.
4. Growing shell.
5. Shell sufficiently large to enclose the body but not the prototroch.
6. Shell 15 x 14:7. The prototroch is now a retractile velum.
7. Shell 20 x 18. Beginning of the umbos.
8. Shell 25 x 23.
9. Shell 45 x 42. Velum and tip of foot protruded.
10. Shell 50 x 46. Foot protruded.
11. Spat of a few hours' fixation, with a narrow rim of spat shell (dissoconch) built on to the lower border of the larval shell (prodissococonch).

Source: Joseph Stafford, The Canadian Oyster, Its Development, Environment and Culture, Commission of Conservation, Canada, Committee on Fisheries, Game and Fur-Bearing Animals, (Ottawa: The Mortimer Co., Ltd., 1913), Plate I following p. 16.



Within four or five hours after fertilization, certain cells develop cilia by which means an embryo rises from the bottom and swims about. In the short space of twenty-four hours, rapid changes occur and a microscopic larva is developed, a free-swimming, feeding, bivalved animal with a prominent foot and mantle. Larval growth is completed in about fifteen days, and the young oyster seeks out a clean, hard surface to which it attaches itself. Here it remains, depending upon the current to supply its food and oxygen and to carry away its waste materials.

The process of the oyster larva attaching itself to an object is known as "setting" and "spat-fall", synonymous terms. A larva, with foot protruding, scuds across objects, seemingly testing their surfaces for their suitability. Once a favorable spot is selected, the larva thrusts its adhesive foot out full length, about .22 mm., and temporarily fastens its tip. The body is then drawn toward the attached foot, which is then released and is attached elsewhere, pulling the body again toward the tip of the foot. This process is repeated several times until the left valve comes to rest against the object. From the base of the foot, secretions are produced at this time which are used to cement the oyster in place. The entire operation requires about one quarter

Figure 4. Delaware Bay Oysters on a Clam Shell.

- A. Oysters after a few hours' set as they appear to the naked eye.
- B. Oysters a few months old, appearing like miniature copies of adult oysters to the naked eye.

(Drawn by Mrs. Doris Major Payne from specimens in the author's possession.)



A.



B.

of an hour.³³

Not all clean, hard surfaces are suitable for "setting." Many different materials have been used experimentally, such as brick-bats, oyster shells, clam shells, broken glass, chips of wood, coal, slag, pebbles and other things suspended in wire baskets, side by side, over heavily producing oyster beds. These have shown that the kind of cultch preferred by oysters is still oyster or clam shells.

The first description of the formation of shell by an oyster was by W. K. Brooks, who placed microscope cover glass between the shell and the mantle.

At the end of twenty-four hours the glass was found to be covered by a transparent faintly brown film of thin gummy deposit, which exhibited no evidence of structure, and contained no visible particles of lime, although it effervesced when treated with acids, thus showing that it contained particles too small to be visible with a microscope. The gummy film is poured out from the wall of the mantle, and in forty-eight hours it forms a rough, leathery membrane fastening the glass over the inside of the shell. At about this time the invisible particles of lime begin to aggregate and to form little flat crystals, hexagonal in outline and about 1/2500 of an inch long. The crystals grow and unite into little bundles

33. Descriptions of the biology of the oyster can be found in most of the works of general nature and specific details in research projects by different investigators. The description of the setting process can be found in Yonge, op. cit., pp. 66-70, including diagrammatic representation of the process from the work of Prytherch in 1934. Description of the oyster in Yonge, op. cit., can be found on pp. 17-78. Other descriptions can be found in works cited previously and to be found in the bibliography. See also R. V. Truitt, "The Oyster," State of Maryland, Board of Natural Resources, February 1945, Educational Series, No. 7, Department of Research and Education, Solomons Island, Maryland. Reprinted from BIOS: vol. XV, no. 3, October 1944.

Figure 5. Cluster of Market Type Delaware Bay Oysters
Still Attached to a Clam Shell, Two-year Olds.

(Drawn by Mrs. Doris Major Payne from specimens in the
author's possession.)



or groups, and new ones appear between the old ones, until at the end of six days the film has completely lost its leathery character and has become stony, from the great amount of lime present in it. In three or four weeks the glass cover is completely built into the shell and can no longer be seen, and its place is only to be traced by its form, which is perfectly preserved upon the inner surface of the shell. When broken out it is found to be coated with a thick plate of white shell, which is beautifully smooth and pearly upon the side nearest the glass. Microscopic examination of this plate shows that it is made up of an immense number of minute crystals, packed and crowded together into a solid mass, without any regular arrangement. These observations show that the new layers are thrown off in the form of a gummy secretion from the mantle, with the lime in solution, and that the particles unite with each other and form crystals while the gum is hardening. 34

The life of the oyster is a precarious one. The large number of eggs which are spawned in any one season is necessary to maintain a supply of adult oysters because numbers of eggs are never fertilized. Some of the larvae fall prey to other marine life, while others do not find proper setting places. Of those that "set," the normal survival in Delaware waters for the first year is only about fifty per

34. William Keith Brooks, The Oyster, A Popular Summary of a Scientific Study, (Baltimore: The Johns Hopkins Press, 1905 Second and Revised Edition), pp. 24-25.

cent.³⁵ Of the one-year old seed planted to harvest three years later only five per cent of the seed can be expected to survive.³⁶

Physical factors which affect the oyster have been mentioned previously: extreme changes in the temperature, amount of fresh water or the degree of the salinity past the tolerance point, bad winters with ice grinding upon the beds in shallow water, increased run-off from the streams carrying extra sediment over the beds and smothering the oysters. In addition there are the man-made factors of pollution from industry and sewage, dredging which changes the water currents, deeper draft vessels which use the Delaware River and Bay and a lack of docking facilities.

There are also enemies which act directly and indirectly upon the oyster. These are predators, competitors and parasites. Various fish, boring snails or drills, starfish, flatworms and crabs are predators. As the oyster grows and survives, the number of his enemies is gradually decreased. Schools of drum fish and skates have been known to strip beds

35. Carl N. Shuster, Jr., "Study of Disease-Causing Organisms and Pathology of the Eastern American Oyster," Progress Report to the United States Fish and Wildlife Service, Bureau of Commercial Fisheries, Period: 1 April-30 June 1960, p. 16, Fig. 7.

36. Ibid.

of oysters of all sizes. One of the most destructive predators is the oyster drill, Urosalpinx cinerea. The drill can not live in water with the salinity much below fifteen ‰ (parts per thousand)--the ocean is considered to be thirty-five ‰--while the oyster can survive in water of about seven ‰.³⁷ The damage by this pest varies from area to area depending largely upon the range of salinity in the area. Thus, the importance of seed oyster areas' being established far enough upstream to be out of range of the drills while the oyster is still young and vulnerable can be appreciated.

Whelks and conches also damage large numbers of oysters, as do some of the small snails which are parasitic in character and cause deformation in the shell and oyster meats. Fortunately, these snails are presently not in large enough numbers to be much of a threat to the industry in Delaware. This is also true of whelks and conches.

One of the worst enemies, one which causes the oystermen much concern, is the starfish. It creates a serious problem in Long Island Sound, which seems to provide an excellent breeding ground. Again the Delaware area is fortunate in not being seriously menaced by these marine animals.

37. Interview with Dr. Harold H. Haskin, Rutgers University, November 6, 1961.

Dragging with mop-like structures to remove them from the bottom and killing them with steam is one method used to get rid of them, but it is expensive and requires much work to clear bed areas. Another method being used is the spread of quicklime which kills the starfish and leaves the oyster unharmed. Unfortunately, this method has not completely solved the problem.³⁸ The work of Imai, a Japanese scientist, showed that the starfish pours into the water a poison secreted by the stomach. The stomach is extruded and the poison ejected in front of the oyster's inhalent syphon. The poison is taken into the oyster with a current of water and causes the animal to close its shell. This hastens the action of the poison and results in the relaxation of the adductor muscle. As the muscle relaxes, the oyster shell is pulled open by the action of the rows of hydro-vascular feet on the five arms of the starfish. Thus the age-old belief that the starfish used its feet to pull the valves of the oyster apart in order to eat it can be understood. Once the valves are open the starfish protrudes its stomach and eats the oyster. The whole process requires about two hours.³⁹

38. Yonge, op. cit., pp. 116-118.

39. Cahn, op. cit., pp. 63-65.

Some flatworms cause a great deal of damage elsewhere, but not too much in the Delaware region. Other major pests are crabs. One which is really a parasite is the small Oyster Crab, Pinnotheres ostreum. This has caused considerable damage to the oyster in the Delaware Bay.⁴⁰

In the class of competitors there are the Slipper Limpets, Crepidula fornicata, mussels and barnacles. At one time there were great mussel beds near the shore of the Delaware Bay, but many of these have been cut away for bait or during dredging operations for new and deeper channels. These competitors take up space which could otherwise be used by oysters. In order to raise oysters commercially the competitors must be kept to a minimum. One way to destroy the young Crepidula, which use the same cultch material that oysters might use, was proposed by Dr. P. Korringa of Holland. That method was to dip the young oysters and shell cultch in mercuric chloride or copper sulphate solution.⁴¹

Another competitor of the oyster is the wild fowl. The birds feed on the same marshland which provides some of the necessary foods for oysters. The birds also pollute the

40. Yonge, op. cit., p. 118.

41. Michael Graham, ed., Sea Fisheries, Their Investigation in the United Kingdom, (London: Edward Arnold, Ltd., 1956), p. 154.

water with their excrement to a degree beyond the safety range set by public health officials. Oysters from these polluted waters, therefore, may not be used for interstate commerce. An oyster, once polluted, may be made marketable, by "relaying" in clean water for a period of time. This cleansing process is effected by the dual excurrent water passages found in the American oyster. This species can cleanse itself in about two days, although generally legal requirements for "relaying" polluted oysters demand a period of several weeks.⁴²

Another major cause of death is a marine fungus, Dermocystidium marium. This parasite is carried by crabs and invades the tissues of the oyster, sometimes killing it. It is not harmful to man. The fungus has been found in the private beds in Delaware Bay and was first identified by Dr. Harold Haskin of Rutgers in 1953.⁴³ It appears to be more

-
42. John H. Ryther, "The ecology of phytoplankton blooms in Moriches Bay and Great South Bay, Long Island, New York," Biol. Bull., vol. 106 (1954), pp. 198-209; Varley Lang, Follow the Water, (Winston-Salem, N. C.: John F. Blair, 1961), pp. 49-50. Also interviews with Dr. Varley Lang and Dr. M. R. Carriker on November 28, 1961. The situation in Delaware was revealed in an interview with Dr. A. Joel Kapovsky, Director of the Water Pollution Commission of Delaware on September 28, 1961, results to appear in a paper to be given in February 1962.
43. Yonge, op. cit., p. 124; L. Eugene Cronin, "Oyster Studies," Biennial Report, 1953 and 1954, Publication No. 2, (Newark and Lewes, Delaware: University of Delaware, Department of Biological Sciences, Marine Laboratories, 1953 and 1954), pp. 75-77.

destructive in high salinities and high temperatures. It was probably introduced with southern seed stock for the private beds. Another source of damage is a species of bristle-worm, Polydora ligni. It bores into the shell, forming blisters within the shell and mud tubes over the surface. Major damage from this worm occurred in Delaware Bay in 1940. ⁴⁴

From 1957 to the present a disease called "MSX" has attacked the oysters in Delaware Bay, first on the New Jersey side, then on the Delaware side. This disease has spread into Maryland and Virginia waters of the Chesapeake and Chincoteague Bays. "MSX" stands for multi-nucleated spherical X quality. Research to identify, isolate and develop preventive measures dealing with this unknown quantity is being carried out by marine biologists in New Jersey, Delaware, Maryland, Virginia and the United States Fish and Wildlife Service. Heaviest losses have occurred in water of high salinity but as yet no sharp division line has been found. Death is higher in spring plants than in late summer plants. Oysters which were imported into Delaware Bay have shown greater susceptibility to "MSX." The best survival rate has been shown by local seed from parents

44. Yonge, op. cit., pp. 126-128; also interview with Dr. Harold H. Haskin, Rutgers University, November 6, 1961.

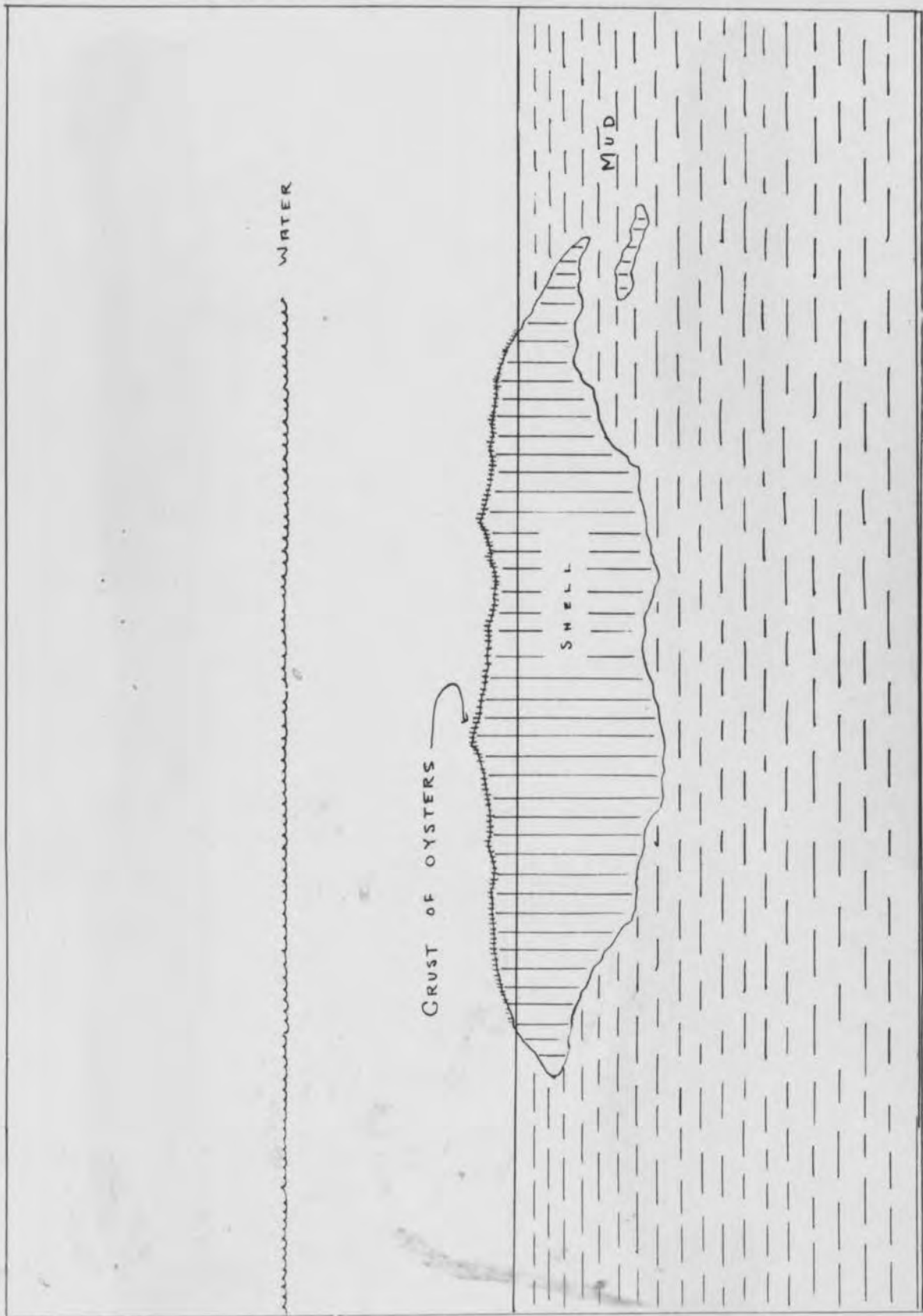
which have survived the disease. This result was suspected from similar occurrences in Canada, and it was the Canadian experience which led to the decision by the various shell fisheries commissions to restrict importation of seed into the Delaware Bay in the hope that the local oysters would not all die, but that some would survive and spawn, producing young oysters resistant to "MSX." This hope is being realized at present, with all indications of a good "set" on the Jersey side from oysters which survived "MSX." 45

Over many years as new growths of oysters "set" upon the old live and dead shells small mounds or islands were formed above the bottom of bodies of water. South of the Chesapeake Bay region these formations are called reefs, while north of this region they are referred to as natural reefs, beds, rocks or banks. The bottom must be firm and of sticky mud, clay, sandy mud or gravel. The development of such beds depends upon the water currents. They can be formed at right angles to the prevailing currents or parallel

45. L. Eugene Cronin, "Oyster Mortalities in Delaware and Chesapeake Bays," Presidential address to National Shellfisheries Association, August 1960. Accounts in local newspapers, Journal Every Evening and Evening Journal and Wilmington Morning News, all printed in Wilmington, Delaware, issues from spring 1957 to the present. Discussions with marine biologists in Delaware, New Jersey and Maryland, oystermen and members of shell fisheries commissions in Delaware, New Jersey and Maryland.

Figure 6. Generalized Cross-Section of an Oyster Bed.

Source: Robert P. Hofstetter, The Texas Oyster Fishery, Bulletin No. 40, Series No. VI, Marine Laboratory, (Austin, Texas: Texas Game and Fish Commission, August, 1959), Fig. 8, p. 24.



to the currents along deeper channels. The currents help both to build up and to destroy the beds. They bring shells and debris from upstream which lodge against the living oysters. These same currents help keep the shells clean to provide good spatting surface for new oyster growth. The age of the bed can be reckoned by the depth of the shells beneath the living layer of oysters. Some of the beds may have been attacked by diseases such as "MSX" in the past, killing off the oysters, after which the beds were buried by the sand and mud. Some of these beds have been used over the years to provide shell for roads and lime. The dredging of these old beds has become important now to provide clean cultch for new beds. Oyster shells are still the best surface for the young oysters to "set" on. The use in the past of these old shells for other purposes reduced the spaces young oysters were able to settle upon.⁴⁶

New beds can be developed by utilizing biological information and laying cultch at the proper time to catch the young oysters, provided there is sufficient spawning stock. The cultch and seed can then be placed on staked grounds in

46. Robert P. Hofstetter, The Texas Oyster Fishery, Bulletin No. 40, Series No. VI, Marine Laboratory, (Austin, Texas: Texas Game and Fish Commission, 1959), pp. 23-24.

estuaries, in pits or "claires" built in tide marshes, or in floats to insure optimum growth and flavor for a commercially acceptable product.⁴⁷

The Environment of Delaware Oysters

Each of the numerous estuaries along the Atlantic Coast where the Crassostrea virginica is found provides an unique environment. The Delaware River estuary covers about 4,000 square miles and includes portions of Delaware, Pennsylvania, New Jersey and Maryland.⁴⁸ The Delaware estuary is composed of both the Delaware Bay and the Delaware River. The separation of these two is roughly halfway between Philadelphia and the Delaware Capes, a distance of approximately fifty miles. South of this midpoint the Delaware oyster industry has been developed. Because the oyster is found in this region and adapts itself to its environment, it is essential to study that particular environment.

-
47. For further information on artificial methods of culture see works cited previously by Brooks, Cahn, Cole, Coste, the Nelsons, Steele, Yonge and many others.
48. Carl N. Shuster, Jr., A Biological Evaluation of the Delaware River Estuary, Information Series, Publication No. 3, (Newark, Delaware: University of Delaware Marine Laboratories, 1959), p. 3.

What is this community of plants, animals, marshes, fresh and salt water, air and sun that constitutes this environment? It changes its aspect with each season and its configuration from year to year. As the seasons change there occurs a regular cycle of production of marine plants and animals. Meanwhile the movement of the water over the basin of the bay carves out new channels and shoals up former ones.

The Delaware Bay for the most part is relatively shallow; more than eighty per cent of it is less than thirty feet deep.⁴⁹ There are fewer inlets or coves than in the Chesapeake. This condition would indicate a low rate of biological productivity.⁵⁰ However, this is offset by the high percentage of shallow water and exposure of mud flats to the sun at low tides. The shallow water allows more sunlight to penetrate its depths, and so there is increased production of microscopic plants which form the foundation of the food cycle in an estuary. Even to an untrained eye, however, the Delaware Bay appears cloudy, often dirty, and this condition limits light penetration and the growth of both plants and animals. Some compensation is achieved with the exposure of mud flats at periods of low tide, but the exact

49. Ibid., p. 12, Fig. 4.

50. Ibid.

value and nature of this phenomenon has not as yet been studied. Tidal streams which empty into the bay increase the shoreline, and their exposed mud flats and the marsh areas around the mouths add greatly to the entire production potential of the bay. The mass of intertidal flats is on the New Jersey side along Cape May.⁵¹

The role of tidemarshes in the production pattern of an estuary has been a newly opened field for investigation.

Fresh water from the numerous streams drains through the tidal area on the shore of the Delaware River and Bay. This tidemarsh area furnishes the necessary ingredients for high production of plants and animals. In 1947 Dr. T. C. Nelson in New Jersey first focused attention on this interaction between fresh water and salt water, plus the tidal effects in the Delaware Bay. He studied the importance of the Cape May intertidal flats and marshes in the shellfish industry of New Jersey.⁵² Similar areas are no less important to the industry on the Delaware side of the

51. Ibid., p. 12.

52. Shuster, op. cit., pp. 16-18.





Figure 7. Delaware Wetlands Preservation, 1959.

**Source: United States Department of the Interior,
Fish and Wildlife Service, Bureau of Sport
Fisheries and Wildlife, Boston, Massachusetts.**

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

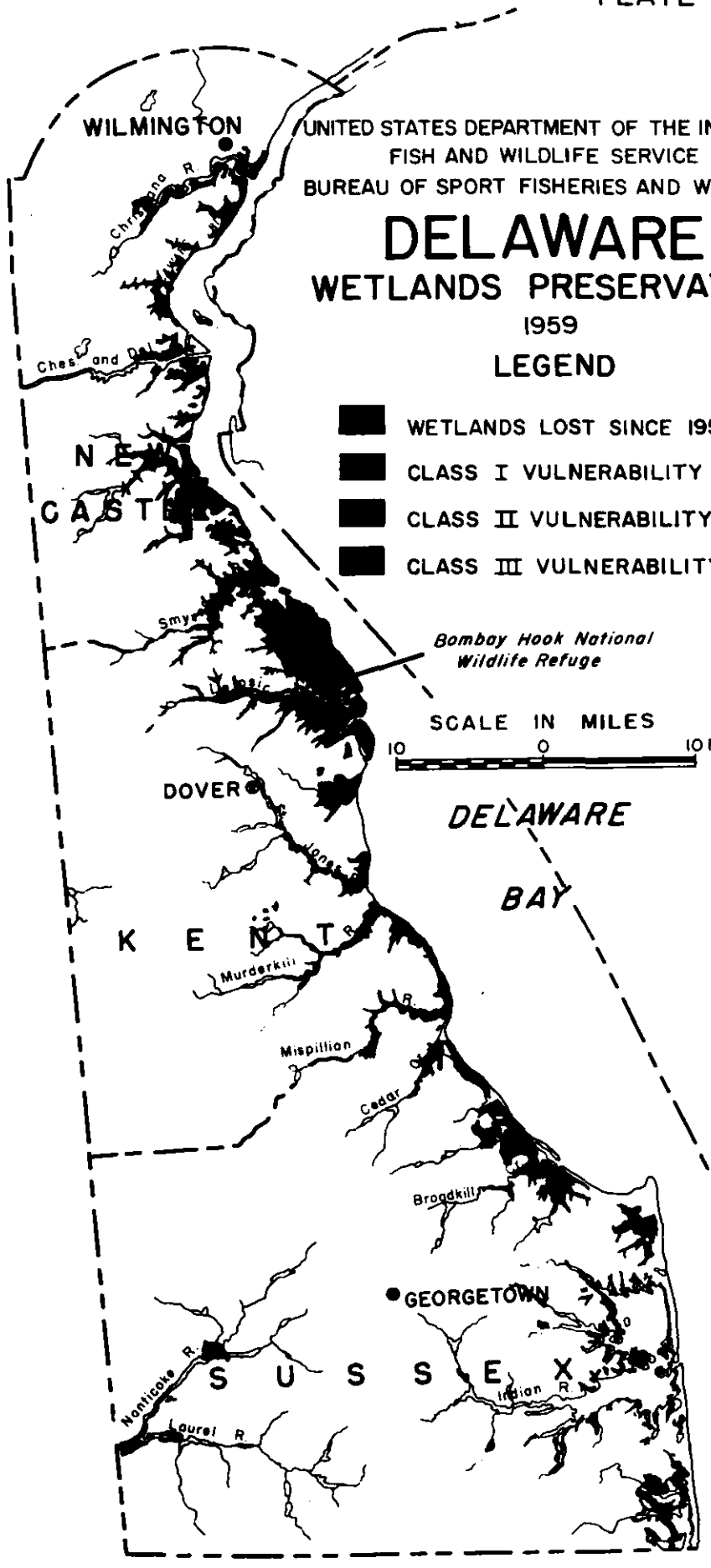
DELAWARE WETLANDS PRESERVATION 1959

LEGEND

-  WETLANDS LOST SINCE 1954
-  CLASS I VULNERABILITY
-  CLASS II VULNERABILITY
-  CLASS III VULNERABILITY

*Bombay Hook National
Wildlife Refuge*

SCALE IN MILES



bay. The Coriolis effect of the turning of the earth upon its axis in space tends to increase the value and extent of the shellfisheries on the eastern side of the bay over those on the western side.⁵³ The same effect can be seen in the Chesapeake with its vast beds on the Eastern Shore far out-producing those on the west.

To the organisms living on the bay bottom, like the oyster, the actual bottom itself and water conditions in motion over its location are very important. In an estuary the salt water is diluted to some extent with fresh water.⁵⁴ Geographers set up different boundaries to describe different sections of water, two of which are (a) the Fall Line, which marks the point beyond which there is no tidal effect and (b) the Offshore Area, which can be greatly affected by the fresh water carried into the ocean currents. The intertidal area houses many species and plays an important role in the food cycle.

53. T. C. Nelson, "Science in Oyster Production, An Outline of Recent Research Projects and Their Results Affecting Production of Shellfish," Reprint from Fishing Gazette, Oct., Nov. and Dec. 1954, 46th Joint Annual Convention, Oyster Growers and Dealers Association of North America and National Shellfisheries Association, Sheraton-Plaza Hotel, Boston, August 1-5, 1954. Nelson referred to G. F. Beaven's work on oyster setting at Solomons Laboratory, Maryland. Beaven listed as one factor in the distribution of oyster spat the Coriolis force or deflection of water current to the right as a result of the rotation of the earth.

54. Shuster, op. cit., p. 14.

The marshes produce bacteria and algae which form part of the food of oysters. They also produce the proteins, vitamins, minerals and other nutrients needed by oysters and all other life in the estuary. In the lower Delaware River the water on its way to the sea contains an increased amount of nitrogen and phosphorus. This is a peculiar condition because normally the materials should be depleted by the time the water reaches the lower sections of the river and bay. This is apparently due to the biological complex and the low degree of light penetration in the water in the lower river. During certain times of the year the amounts of nitrogen and phosphorus are greater than at other times. Some are free in the form of inorganic phosphates and nitrates, and some are combined into organic compounds. Bacteria help break down the organic compounds so that living plants can utilize the minerals. The shallowness and circulation in the bay increases the distribution of these substances in the water. Low light penetration prevents the utilization of all of these substances, and tides wash them over the marshes. Plant life on the marshes uses them and in turn dies and decomposes, releasing the inorganic nutrients back into the water, thus helping to renew the nitrates and phosphates in the water. With these restored, many forms of life can exist in the bay where otherwise

Figure 8. Major Fish and Wildlife Habitat Areas in the Delaware River Estuary, June, 1960

Source: United States Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Branch of River Basin Studies, Boston, Massachusetts.

PENNSYLVANIA

MAJOR FISH AND WILDLIFE HABITAT AREAS in the DELAWARE RIVER ESTUARY

LEGEND

WETLANDS VALUABLE TO WATERFOWL

- HIGH
- MODERATE
- LOW
- EXTREMELY HIGH VALUE PERMANENT WATER AREAS

FIN-FISHERY RESOURCES

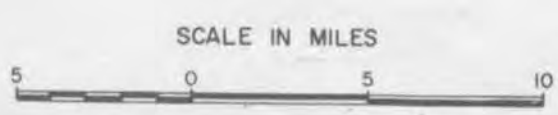
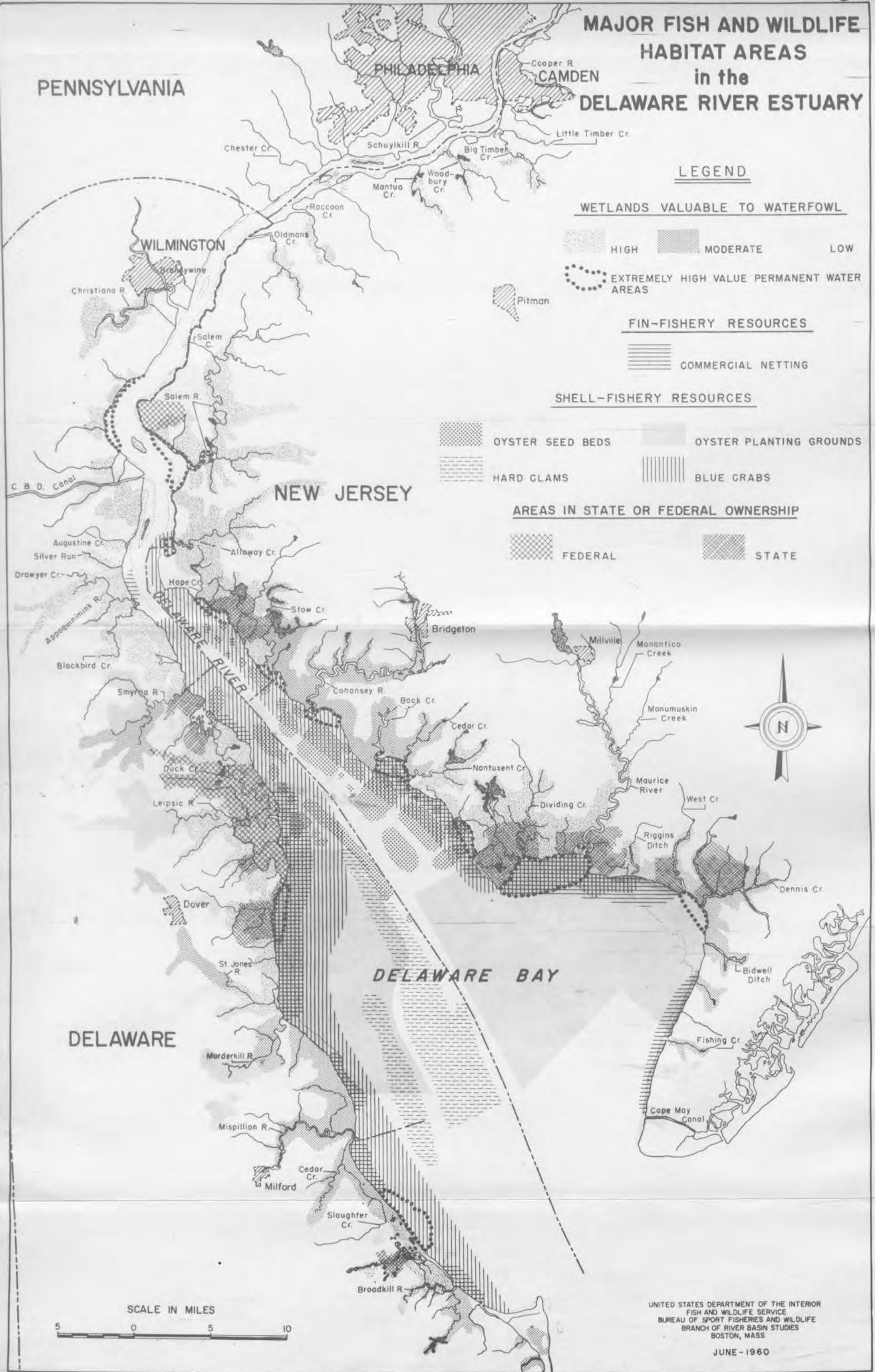
- COMMERCIAL NETTING

SHELL-FISHERY RESOURCES

- OYSTER SEED BEDS
- OYSTER PLANTING GROUNDS
- HARD CLAMS
- BLUE CRABS

AREAS IN STATE OR FEDERAL OWNERSHIP

- FEDERAL
- STATE



UNITED STATES DEPARTMENT OF THE INTERIOR
 FISH AND WILDLIFE SERVICE
 BUREAU OF SPORT FISHERIES AND WILDLIFE
 BRANCH OF RIVER BASIN STUDIES
 BOSTON, MASS

JUNE - 1960

they would be unable to survive.⁵⁵ The balance of nature described above is being destroyed by drainage for mosquito control, pollution from industry and shipping, dumping of dredged material on marshes and the advancement of industrial plants on shore areas. All these factors have helped to decrease the flow of nutrients to the waters from the land, and there has thus been a reduction in the variety and quantity of marine life.

Oysters are considered one of the most perfect of foods, together with milk. Analysis has shown that the oyster contains all the minerals needed by man for healthful metabolism. A pint of oysters furnishes twenty-five per cent of the proteins, more than fifty per cent of the phosphorus, thirty-three per cent of the calcium and all the iodine and iron needed daily. Oysters also contain glycogen, energy-producing material, required for normal human diet, vitamins A, B, C,

55. Frederick A. Kalber, Jr., "A Hypothesis on the Role of Tidemarshes in Estuarine Productivity," Estuarine Bulletin, vol. 4, no. 1, (Newark, Delaware: University of Delaware Marine Laboratories, March 1959), pp. 3, 14, 15. See also Franklin C. Daiber, "Tidal Marsh, Conflicts and Interactions," Estuarine Bulletin, vol. 4, no. 4, (Newark, Delaware: University of Delaware Marine Laboratories, December 1959), pp. 4-16.

D and G.⁵⁶ Vitamins B and G are necessary for growth, good appetite and digestion and counteraction against nervous fatigue. Vitamin C prevents scurvy and is needed for the dentine of the teeth. Iron and copper content help prevent and treat nutritional anemia. Vitamin D is needed for assimilation of calcium and phosphorus for growth of bones and teeth, and Vitamin A for resistance to infections of the eye, ear, sinus and lungs. The iodine is necessary for proper functioning of the thyroid gland.⁵⁷ Oysters are easily digested by both adults and children. Over the years in many countries oysters have been considered as a general remedy and a vivifying influence.

Physicians of old recommended the oyster as a general remedy, and employed it on all occasions with success. It has been proved beyond dispute that it possesses a remarkable vivifying influence, in all cases where the nervous organs are affected, more than any other food. Oysters taken before midday with a glass of wine produce a most salutary effect. The nerves and muscles regain their strength, and

56. Cahn, *op. cit.*, p. 33; W. O. Atwater, "Report of progress of an investigation of the chemical composition and economic value of fish and invertebrates used for food," Report of U. S. Fish. Comm., 1880, vol. VIII, (Washington: Government Printing Office, 1883), pp. 231-286; W. O. Atwater, "Contributions to the knowledge of the chemical composition and nutritive values of American food fishes and invertebrates," Report U. S. Fish. Comm., 1883, vol. XI, (Washington: Government Printing Office, 1885), pp. 433-500.

57. Oyster Institute of North America, Bulletin 2, 1949.

the body its mental and physical powers, bringing cheerfulness and energy to compete with the duties of the day. If not a cure, at all events an oyster diet, under medical supervision, brings unquestionable relief to those who are suffering from pulmonary complaint, indigestion, or nervous affections.

Percy relates having seen a large number of wounded persons, exhausted by the loss of blood and treatment, who were entirely kept up by eating oysters; and Dr. Lenac considered them the most nourishing food in existence....

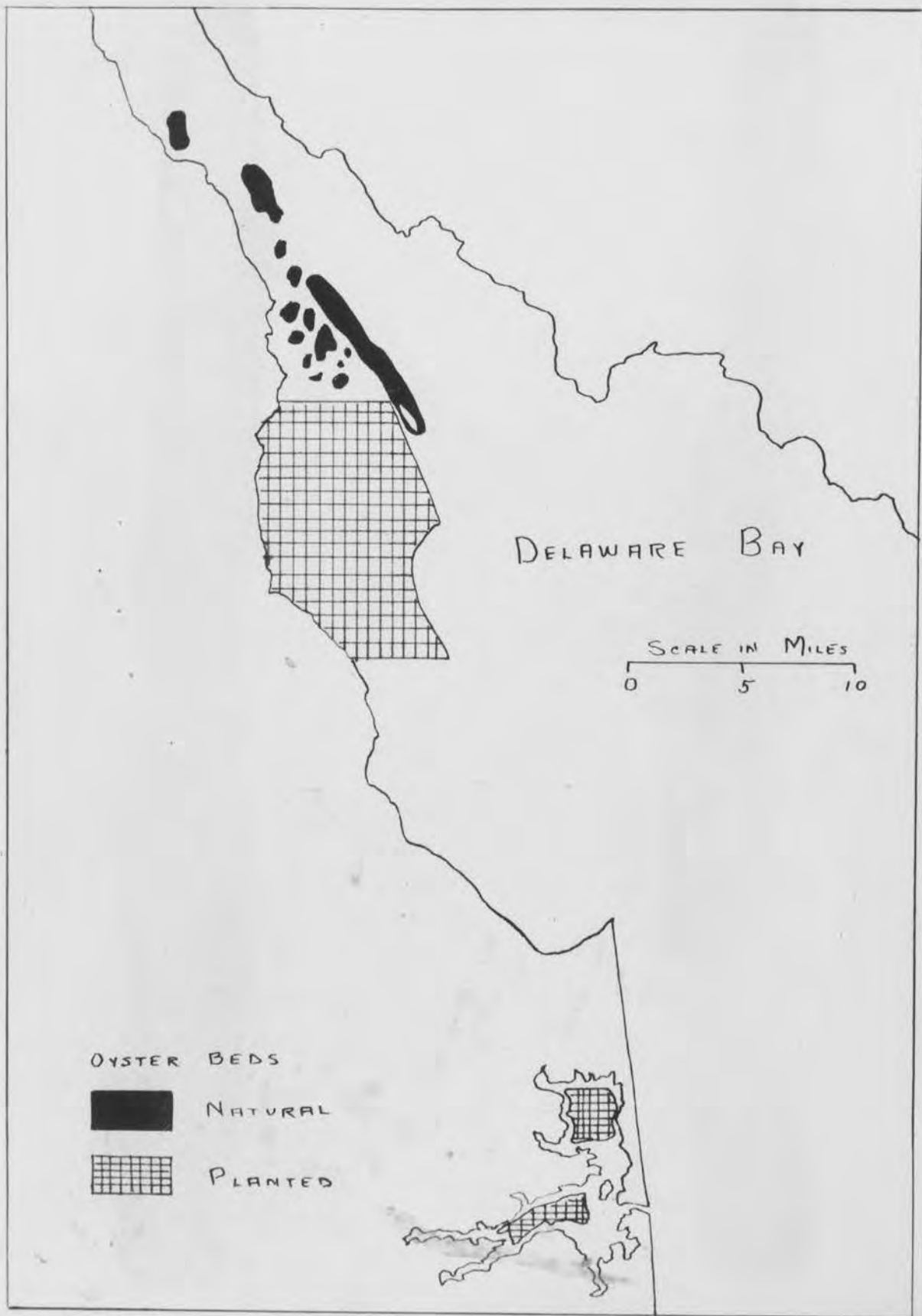
Oysters increase the blood without heating the system, and hence when a wound has caused much loss of blood the eating of oysters not only prevents fever, but replaces the loss which no other remedy can effect. The great Boerhaave affirms to have known a tall, strong man, who had fallen into a decline, and who, after all other remedies had proved useless, by the use of oysters rapidly recovered, became strong, and died 93 years old.

But to ladies particularly do I recommend oysters as the best of all light meals between breakfast and dinner. At the period of a lady's married life, when nausea is prevalent, a few fresh oysters, taken raw in their own liquor, with no addition but a little pepper, and a fair slice of French roll or other light bread, stop the feeling of sickness, and keep up the stamina unimpaired. During the time, too, when a young child most requires maternal care and attention, the mother's diet of oysters will impart strength to the infant, and tend much to alleviate the pains of its first teething. 58

Oysters can live in water with a salinity of five to thirty-five parts per thousand, but thrive in water whose salt content is between fifteen and thirty parts per thousand.

-
58. The Oyster Epicure, A Collection of Authorities on the Gastronomy and Dietetics of the Oyster, (New York: White, Stokes and Allen, 1883), pp. 46-48.

Figure 9. Natural and Planted Oyster Beds in Delaware Bay, Rehoboth Bay and Indian River Bay, Delaware.



Optimum spawning takes place at twenty to twenty-four degrees Centigrade. Data collected by Dr. F. C. Daiber of the University of Delaware Marine Laboratories in 1952-1953 on water temperatures and salinities from Augustine Beach, near Delaware City in the north of the state, down to Lewes Beach near Lewes in the southern part of the state are as follows:

	Temperature (°C.)		Salinity (‰, parts per thousand)		
	<u>Min.</u>	<u>Max.</u>	<u>AVG.</u>	<u>Min.</u>	<u>Max.</u>
Augustine Beach	2	28	4.61	0.80	9.90
Lewes Beach	4.5	28	27.02	23.01	29.05

59

Studies of the salinity of surface water of Indian River Bay from the inlet to the river section made in November 1956 three and one-half hours after the start of the flood current at the inlet showed a range of thirty-two to twenty-two parts per thousand. Temperatures ranged from thirteen degrees Centigrade at the inlet and into Rehoboth Bay to ten degrees Centigrade near the Indian River. ⁶⁰

59. Shuster, op. cit., p. 21.

60. Biennial Report, No. 3, (Newark and Lewes, Delaware: University of Delaware, Department of Biological Sciences, Marine Laboratories, 1955-1956), p. 16.

Chapter III

Ancient Times to the Nineteenth Century

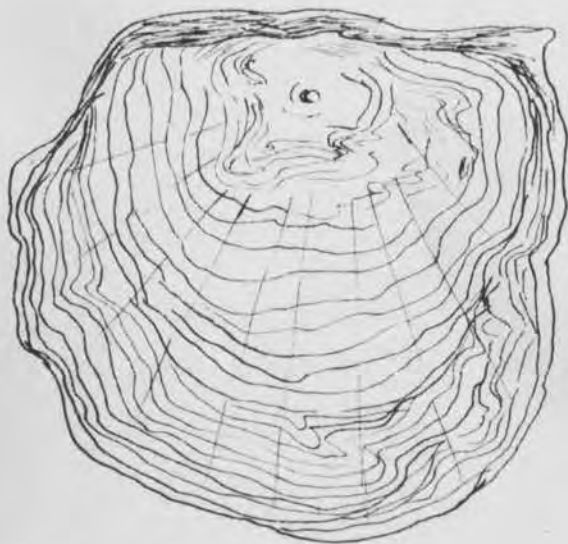
Ancient Remains

Evidence of oysters in the Delaware region goes back many millions of years. Fossil remains show extensive beds in the banks of the Chesapeake and Delaware Canal in the northern part of the state. It is estimated that these beds are about eighty million years old. Some of the layers of the canal banks were laid in the Upper Cretaceous period over sixty million years ago. Two species were found, Exogyra cancellata and Gryphaea mutabilis. Both of these species were associated with shallow water localities and so experienced a variety of different salinities to be found in estuaries, although Exogyra cancellata's known range was more often associated with the deeper waters along the Continental Shelf, of less variable salinity than in the estuary itself.

The fossil remains show that the shells of Exogyra were thick and had layers much like the growth layers of modern oysters. The space left by the adductor muscle shows as a curved, triangular-shaped area. The shell of the

Figure 10. Two Types of Extinct Oysters Found in Delaware.

Source: Estuarine Bulletin, Vol. 5, No. 3, (Newark, Delaware: University of Delaware Marine Laboratories, Autumn 1960). (Drawn by Mrs. Doris Major Payne.)



GRYPHAEA MUTABILIS



EXOZYRA CANCELLATA

Gryphaea appears to have been deeply cupped and of round appearance. The upper or right valve is partly cupped to match the deep cupping of the lower or left valve. The muscle can be found closer to the hinge than to the edge of the shell, a position which is less efficient than that in the modern oyster, the muscle of the Gryphaea therefore being larger. The Gryphaea was like the present European oyster, Ostrea edulis.⁶¹

Both of these species are extinct, probably because of changes in climate to which they were unable to adapt, sudden disease or blight or overadaptation. One example of overadaptation is as follows: the increase of the cupping of the oyster shell also increases the curling of the shells extending from the hinge over the entire shell. This affects the extent to which the right shell can be opened, hindering feeding and growth by reason of overcirculation of water through the oyster. The oyster is also less able to protect himself by tightly closing his shell and keeping all dangers on the outside. This probably happened many times to different flat oysters in the millions of years shown by fossil

61. Carl N. Shuster, Jr., "Along the Chesapeake and Delaware Canal," Estuarine Bulletin, vol. 5, no. 3, (Newark, Delaware: University of Delaware Marine Laboratories, Autumn 1960), pp. 3, 12-14; also interview with Dr. Shuster, November 26, 1961.

remains. The failure of these species to overcome all of the requirements of these new conditions probably caused their extinction.⁶²

During 1957 while digging was in process for a reservoir and some drainage ditches near Laurel, Delaware, an ancient oyster bed was found. This was probably buried during the last Ice Age some 35,000 to 50,000 years ago. The shells, although fragile, show great similarity to the modern Crassostrea virginica. Other reports from nearby areas indicate that there were large beds in existence for long periods of time in Delaware.⁶³

The Delaware Indian Oyster Industry

All evidence suggests that Delaware was not occupied by Indians for long before the arrival of the white man. Remains from diggings indicate the origin of Indians here to be of

62. For an excellent description of evolution processes of Exogyra and Gryphaea see Yonge, op. cit., pp. 132-136.

63. Carl N. Shuster, Jr., "Ice-Age Oyster Beds," Estuarine Bulletin, vol. 5, no. 3, (Newark, Delaware: University of Delaware Marine Laboratories, Autumn 1960), pp. 3, 10-11.

post glacial time.⁶⁴ The Indians were a stone age people. A semi-religious record, Walam Olum, "painted sticks," told some of the stories of the Indians.⁶⁵ The interpretation of the pictures on the sticks was that the Algonkian Indians came from west of the Mississippi River. After their arrival in the area of Pennsylvania some stayed, others went to New Jersey and northern Delaware, becoming known as Lenni Lenape, the "original people." Others went to the Eastern Shore of the Chesapeake, becoming known as the Nanticokes. Besides

-
64. Knowledge of the Indians in Delaware is taken from contemporary accounts by such persons as DeVries and Lindeström, early travel reports, archeological work by H. W. T. Purnell, artifacts at the Delaware State Museum, Dover, Delaware, and the University of Delaware, Newark, Delaware, accepted Delaware history accounts, with more detailed accounts by Wallace and Weslager in the following: Paul A. Wallace, Indians in Pennsylvania, (Harrisburg, Pennsylvania: The Pennsylvania History and Museum Commission, 1961); C. A. Weslager, A Brief Account of the Indians of Delaware, (Newark, Delaware: University of Delaware Press, 1953); C. A. Weslager, Delaware's Buried Past, (Philadelphia: University of Pennsylvania Press, 1944); C. A. Weslager, Delaware's Forgotten Folk, (Philadelphia: University of Pennsylvania Press, 1943); C. A. Weslager, "The Indians of Delaware," vol. I, Ch. 2 of Delaware, A History of the First State, H. Clay Reed, ed., (New York: Lewis Historical Publishing Company, Inc., 1947), pp. 31-62.
65. Walam Olum. The Migration Legend of the Lenni Lenape or Delaware Indians, A new Translation Interpreted by Linguistic, Historical, Archaeological, Ethnological, and Physical Anthropological Studies, (Indianapolis: Indiana Historical Society, 1954). The new translation is based on the Constantine S. Rafinesque manuscript in the Brinton Memorial Library at the Museum of the University of Pennsylvania.

these two main tribes there was another group, probably related to the Nanticookes, known as the Assateagues or Indian River Indians who moved into the Indian River area in 1705 from Maryland. These Indians lived in a flat, coastal area thickly covered with dense forests. Delaware was considered hunting ground also for the Indians of New Jersey, Pennsylvania and the Eastern Shore. Furthermore, it was considered war territory by the Minquas, Iroquois-speaking Indians from the area of the Susquehanna River in Pennsylvania.

The Indians moved with the food supply, and it was along the rivers and shoreline that an abundant supply of seafood could be found to add to the small garden plots and the hunting expedition. One Indian legend concerns the discovery of the fine taste of the Delaware oyster. An Indian was searching for food and happened to pick up a curious-looking stone from shallow water. Since it was not a stone, but an oyster, it closed its shell on his finger. Smashing the shell to release his finger, the Indian then placed his finger in his mouth and discovered the excellent flavor of the Delaware oyster. It is more likely that the Indians observed birds and animals, such as the raccoon, eating oysters and simply followed the example. Regardless of how the first oyster was discovered to be edible, we know that oysters

played an important part in the diet of the Indians in Delaware. The oysters gathered from the bays, inlets and rivers could be eaten raw, since they could easily be opened by any of the stone implements the Indians possessed. Animal meat was cooked in a kind of stew with corn and beans, and flavor was augmented with the addition of oysters.

Oysters were also dried and stored for use in the winter. Some storage pits were found in 1958 near Slaughter Creek where oysters had been stored in the shell.⁶⁶ This area is believed to have been at least a seasonal Indian village, for here were found storage areas, work areas and evidence of periods of group living. Pottery fragments are also much in evidence, as are stone tools, jasper scrapers from Pennsylvania and other artifacts. It is believed that these pits at the Draper Site were used to keep a supply of oysters available. After the supply was used up, then the pit, dug laboriously with crude stone tools and wooden implements, would be used for refuse pits or burial sites. The site seemed to have been used over a relatively long time span, suggesting a semi-permanent village depending a great deal

66. H. W. T. Purnell, "Draper Site Relations," The Archeologist, vol. 10, no. 2, (Delaware: Sussex Society of Archeology and History, 1958), pp. 1-16; also interview with Mr. Purnell, September 16, 1961; Carl N. Shuster, Jr., "Delaware Indians Stored Oysters in Pits," Estuarine Bulletin, vol. 5, no. 3, (Newark, Delaware: University of Delaware Marine Laboratories, Autumn 1960), pp. 4-9.

upon agriculture and fishing. The seafood was used to supplement crops in the event of a crop failure. The distance from the oyster banks to the site indicated that the oysters were brought there by canoe. Shallow ditches from Slaughter Creek to the storage area show how the canoes got to the site itself. Further evidence that this area was not primarily a disposal area is the presence close by of shell mounds near oyster beds, where the Indians left shells rather than carrying them away. The pits were four or five feet deep, and the temperature at the bottom was lower than that at the top. Modern evidence indicates that the oysters could have been kept all winter in this outdoor root cellar. Some of the piles of shells can still be seen between Lewes and Rehoboth Beach.

The canoes used by the Indians were dugouts from twelve to thirty-five feet long. They were made by using fire to burn part of the log and chipping away the burned part with stone tools. Motive power was by paddle, pole or drifting with the current. Having no sails or center-boards, the dugouts capsized easily. Considering the waters these canoes traversed, the Delaware Bay and River, numerous creeks on the peninsula and the Chesapeake Bay, one wonders how the primitive people navigated these waters in safety.

There was a great deal of travel, trade and communication between the Indians of the Delaware region and other areas.

Figure 11. Delaware or Lenni Lenape Indians Diving
for Oysters.

(Drawn by Mrs. Doris Major Payne under the
author's direction.)



Indians living along the shore had valuable food sources which the inland Indians wanted. This is indicated by the appearance of Pennsylvania jasper, useful in making various implements, and flint from as far away as Ohio in Delaware probably in exchange for oysters, clams and conchs. Sometimes these inland natives came to visit the coast and there were great feasts. The great quantities of shellfish consumed were shown as huge shell deposits. These same shells also served as a source for the "bead money" or wampum made by the Indians. It is believed by some that this was not used in exchange before the whites came. A note made by Lindeström in the 1650's stated that,

The Indians are ignorant of European Coyne; yet they have given a name to our, and call it Moneash from the English money.

Their owne is of two sorts; one white, which they make of the stem or stocke of the Periwinkle, which they call, Meteauhock, when all the shell is broken off: and of this sort six of their small Beads (which they make with holes to string the bracelets) are currant with the English for a Peny.

The second is black, inclining to blue, which is made of the shell of a fish, which some English call Hens, Poquauhock, and of this sort three make an English peny.

They that live upon the Sea side generally make of it, and as many make as will.

67

67. P. Lindeström, Geographia Americae with An Account of the Delaware Indians, Based on Surveys and Notes Made in 1654-1656 by Peter Lindeström, Translated by Amandus Johnson, (Philadelphia: The Swedish Colonial Society, 1925), p. 229, note 4, Williams, Key, 128.

The Indians who visited the area undoubtedly ate oysters while there and probably took some with them for gifts or to supplement their winter food supply. Both large and small oysters were consumed. Many of the single oysters found at the Draper Site were attached to small stones which showed evidence of partial chipping.⁶⁸ These could have been pebbles on the beach which had "set" on them, or they could represent an attempt of the Indians to catch "set" by bagging the small stones. After the "set" the stones could have been scattered in the intertidal area. Probably they were later gathered by the women and children. Oysters in deeper water would have been gathered by the men in canoes. It is possible that some diving was done by the young men. Since stone would have been extremely heavy underwater, even at relatively shallow depths, the implements used, such as crude rakes, were probably made of wood but are not now extant. For the Indians living more or less permanently in the area the crude culture, capturing the young oysters on stones and then scattering them in shallow water to be gathered when they had grown to the appropriate size, would have greatly increased their handy food supply and would have been easy to carry out with the large number of natural beds in the water to provide good "sets" each year. The Indian was well acquainted with his natural sur-

68. Interview with Mr. H. W. T. Purnell, September 16, 1961.

roundings and the animals which inhabited it. Probably by accident a good area for "set" was found and the use of otherwise unusable materials as cultch was started.

There were at least three ways the Indians could have transported oysters: dried, smoked or in the shell. Oysters in the winter will keep for long periods of time at low temperatures. It is possible that some of the visiting Indians took back small numbers of oysters in the shell to eat raw. Because of the bulk of this item it is doubtful whether any large quantities were ever transported in this fashion. However, small amounts carried by the constantly traveling Indians could have resulted in the removal of a considerable total.

Oysters which were to be smoked were first shucked. This could be done with any of the stone implements used by the Indians. The oysters may then have been soaked in salt water for a time and then drained on a mat of woven grass, reeds, oak splints or corn husks. The oysters were then placed on another mat over a wooden frame made of saplings beneath which a fire was built. Among the woods used were probably white oak or cherry.⁶⁹ Hickory, ash or loblolly pine could also have been used when available. The oysters

69. These same woods are used today for smoking oysters in Japan. See Cahn, op. cit., p. 55.

Figure 12. Delaware or Leni Lenape Indians Smoking Oysters.

(Drawn by Mrs. Doris Major Payne under the author's direction.)



were smoked a day or two or until they were judged "done." They were then packed in pottery jars with some oil made from corn or other vegetables. The oysters could then be eaten at will. The women were in charge of the process.

The oysters could also be dried. The oysters were shucked and then cooked overnight in salty liquid. The juice was removed and the oysters washed in fresh water, drained on a mat, boiled again and drained again. They were then dried for several days on woven mats. The juice itself was probably kept in jars and added to the various meat and fish stews which were prepared. Undoubtedly some of these dried oysters, specially prepared by the medicine men, were used as one of the many Indian remedies to cure disease and sterility. Sometimes the shells, too, could be used as a medicine, after proper preparation by the medicine men. The exact ingredients and methods of preparation were well-kept secrets passed from one generation of medicine men to another.

Although the Indians undoubtedly ate oysters raw, it is also true that they ate a great many roasted. This saved them from shucking the oysters. The oysters were simply thrown into the fire, and when they gaped open they were removed and eaten, the shells being tossed away. This is probably the way in which most of the oysters were eaten at

the oyster and clam bakes held by the Indians. Not only were these festivals held by the local Indians, they were also part of the celebrations by the friendly visitors and the warlike tribes which came into the area, also.

Oyster shells were used by the Indians to temper their pottery. Examples of this may be found in the Delaware State Museum. Oyster shells are found in pieces of Indian pottery excavated in Delaware and identified as "Townsend Minatures" or "Rappahannock Incised," pottery identification by anthropologists from the Smithsonian Institute. In this manner the natives provided the necessary lime from the burnt shells for their pottery.

White Men in the Seventeenth Century

The first white man to see the Delaware region was Henry Hudson, sailing in 1609 on the Half Moon, which arrived off Cape Henlopen on August 28. ⁷⁰ One of the early Dutch expeditions to what is now Delaware Bay was commanded by Peter

70. For the general information on early settlements see Delaware. A Guide to the First State, American Guide Series, Jeannette Eckman, ed. Revised edition, (New York: Hastings House, 1955). More specific information on different national settlements can be gotten from the works listed in the bibliography.

Figure 13. Delaware or Lenni Lenape Indians at an Oyster Feast.

(Drawn by Mrs. Doris Major Payne under the author's direction.)



Heyes. The expedition he led reached the bay in April 1631. "Sailing up the western shore the two vessels passed the sandy point now known as Cape Henlopen, and entered what was recorded as 'a fine navigable stream filled with islands, abounding in good oysters' and flowing through a fertile region."⁷¹ DeVries led another expedition to the Dutch colony, arriving in December of 1632. It was on this trip that he described the shoals and banks in Delaware Bay between Cape Henlopen and Cape May which were later identified by Lindeström as oyster banks.⁷² Lindeström was an engineer and a member of the Tenth Expedition to New Sweden from Sweden. The group arrived in the South Bay on May 18, 1654. The writings

-
71. Pennock Pusey, "History of Lewes," Historical and Biographical Papers, vol. IV, (Wilmington, Delaware: The Historical Society of Delaware, 1903), p. 12. Read before the Historical Society of Delaware, November 17, 1902. This probably is the earliest written record of oysters in Delaware and was kindly brought to my attention by Captain T. C. Conwell of the American President Lines, Ltd., in San Francisco. The stream referred to was the Hoern Kill reported by Smith (see footnote 75), appeared as Lewes Creek on the 1799 map of Delaware and today has been made into the Lewes and Rehoboth Canal connecting the two towns by the same names.
72. David Peterson DeVries, Voyages from Holland to America, A. D. 1632 to 1644. Translated by Henry C. Murphy. Second Series, vol. III, Part I, Collection of the New York Historical Society, (New York: D. Appleton and Company, 1857), p. 31; see also Lindeström's map of the region of 1654-1655.

and maps of this young man tell much about Delaware at that time:

And about south-west by west, from Cape May about $2/3$ of a mile, from Cape Henlopen, lie, in a row south-west by west, three large oyster banks, not deep under the water. The channels, or where the water runs between said oyster banks, are dangerous to navigate ships through, but about a musketshot out from Cape May ships can pass through at a depth of 5, $4\frac{1}{2}$ and 4 fathoms, (even) when it is the very lowest and dryest. From Cape Henlopen the sailing channel passes some distance out in the ocean, passing the opening between Cape Henlopen and the above (mentioned) oyster banks, in towards the river, having a depth of 10, 9, 8 fathoms, but outside (of the banks) 12 and 13 fathoms....

On the sides of the South River are found some remarkable creeks and large brooks, which we can navigate with sloops a considerable distance up into the country. 73

He described the Indians, the animals, birds and fish found in New Sweden. About oysters he said, "Oysters are found on the great oyster banks in and outside of the river; (also) mussels and eels." 74

The close attention paid to navigation channels resulted in frequent mentioning of these same oyster banks in early colonial accounts, referred to as banks. One example is taken from a manuscript in the British Museum dated 1669 from an interview with a soldier who had been in Delaware and reported in 1662.

73. Lindeström, op. cit., pp. 153-156.

74. Ibid., p. 188.

Figure 14. *Nova Suecia: Eller the Swenkas Revier in India Occidentali (New Sweden or the Swedes' River in the West Indies)* by Peter Lindeström based on surveys and notes made in 1654-1656. Note especially the oyster banks marked "A" and the similarly stippled area along the Delaware coast of Delaware Bay.

Source: Amandus Johnson, trans., *Geographia Americae with An Account of the Delaware Indians, Based on Surveys and Notes Made in 1654-1656* by Peter Lindeström, (Philadelphia: The Swedish Colonial Society, 1925).

NOVA SUECIA: Eller the Swenskas REVIER



A: Öfver Banckar. B: Tamakonck, de Sandhoeck, nu kallas Treescaldigheets Fort. C: Wier Claerlands. D: Strandwijck. E: Trancudden. F: Lillefalsudden. G: Christina Kijl. H: Fiskiekijlen. I: Hatotsanningh eller Timmeröön. J: Hatotsanningh eller Timmeröön. K: Rijtsacht. L: Amimensipatj. M: Fiskiekijlafallet. N: Skillpaddefallet. O: Christina Fort. P: Wijndrusfuccudden. Q: Naamansfallet. R: Imminicheck Hackingh. S: Fricen udden. T: Finlandh.

Lindeström's Map (A) of "Nova Suecia, Eller the Swenskas Revier in India Occidentali" (New Sweden)

Names Indicated by Letters

- | | | | | |
|---|---|---|---|---|
| <p>A Oster Banckar.
"Oyster banks."</p> <p>B Tamakonck, de Sandhoeck, nu kallas Treescaldigheets Fort.
"Tamakonck, the Sandhoeck, now called Trinity Fort." New Castle. The creek to the left of B on Map is Mill Creek.</p> <p>C Nieuw Claerlandh.
"New[ly] cleared land." Plantations just about New Castle, Delaware.</p> <p>D Strandwijck.
"Strand-bay." Neck of high land about a mile and a half above New Castle.</p> <p>E Trancudden.
"The crane point." Point of high land about half a mile below Pigeon Point, Del., opposite Deepwater Point.</p> <p>F Lillefalsudden.
"The little-falls point."</p> <p>G Christinakijl.
Christina (Christiana) Creek.</p> | <p>H Fiskiekijlen, och det prickade äro Rijtsachter.
"Fish creek and the dotted [places] are reed flats."</p> <p>I Hatotsanningh eller Timmeröön ("or Timber island").
The Indian name would seem to mean the "Island of Timber," but I know of no stem resembling the above form, which means wood, or timber.</p> | <p>K Rijtsacht.
"Reedflat." Cherry Island Marsh, near Wilmington, Del.</p> <p>L Amimensipatj.
District between the Delaware and the Brandywine.</p> <p>M Fiskiekijlafallet.
"The fish-creek fall."</p> | <p>N Skillpaddefallet.
"Turtle falls." Shellpot Creek.</p> <p>O Christina Fort.
Wilmington, Del.</p> <p>P Wijndrusfuccudden.
"The grape point." Just below Naaman Creek.</p> | <p>Q Naamansfallet.
"Naaman's fall" (see Naamans Kijl).</p> <p>R Imminicheck Hackingh.
Perhaps Indian village and plantation along Delaware, above Naaman Creek.</p> <p>S Fricen udden.
"The lady's point," now</p> <p>T Finlandh.
Just above Chester Cr in Johnsons, II, 1</p> |
|---|---|---|---|---|

Names Indicated by Numerals

Two leagues from Cape Cornelius on the west side of the river near its mouth, there is a certain creek called the Hoeren Kill, which may well pass for a middling or small river,....There are two small islands in it, the first very small the last about half a league in circumference, both overgrown with fine grass, especially the latter, and are at about half a league distance asunder, and the latter about a league from the channel's mouth: The two islands are surrounded with a muddy ground, in which there grows the best sort of oysters, which said ground begins near the first island, for the mouth of the channel has a sandy bottom, being also very deep, and therefore there are no oysters there: 75

Dutch control of the Delaware was short-lived, however. English seizure of New Netherlands at the beginning of the second Anglo-Dutch War in 1664 was made permanent with the signing of the peace treaty. This ended the rule of the Dutch and both the Dutch and Swedish settlers remained under the English. The establishment of English rule, of course, pleased the English settlers in the area, who wished to retain their rights as free Englishmen. The population along the Delaware River and Bay, consisting of mostly Swedes and Finns, some Dutch, and a few English and French, numbered about a thousand. Charles II granted the Duke of York New England in 1664, but this grant did not include the present area of Delaware. The lucrative Dutch trade attracted the

75. Samuel Smith, The History of the Colony of Nova-Caesaria, or New-Jersey, (Burlington, in New-Jersey: James Parker, 1765), pp. 57-58.

English in New York and the Delaware area was actually included in the jurisdiction of the English in New York. Settlers came into the area from Maryland, Virginia, New Jersey, New York, Connecticut and Europe.

The grant Charles II made to William Penn on March 4, 1680/1, was only for the area of Pennsylvania. It did not include Delaware. A deed of feoffment dated August 24, 1682, was granted Penn by the Duke of York. It was to include the twelve-mile circle around New Castle south to Cape Henlopen. It was not until March 22, 1683, that Charles II granted Delaware to the Duke of York, and the Duke never officially conveyed the grant to Penn at that time. This oversight was partly responsible for the long years of litigation over the Delaware boundaries.⁷⁶

Penn's arrival at New Castle, Delaware, on October 27, 1682, on the Welcome, opened a new era for the Delaware colony.

⁷⁶. For the story of some of the boundary problems between the Penns and the Calverts see Dudley Lunt, The Bounds of Delaware, (Wilmington, Delaware: The Star Penn Company, 1947). The boundary problem has also extended to the New-Jersey boundary in the Delaware Bay and River. For aspects of this dispute, largely over fishery rights, see the Supreme Court of the United States, No. 19 Original, October Term 1929, New Jersey vs. Delaware, and Supreme Court of the United States, No. 13 Original, October Term 1933. The Court decision of 1935 may have settled the problem legally but there is still feeling on both sides, since one factor in the litigation was the valuable natural oyster growth on the Jersey side.

Under Penn the land of Delaware was united with Pennsylvania. Penn was anxious to attract settlers to his colony. A letter from him addressed to the Free Society of Traders in England in 1683 stated some of the attractions of the colony as follows: "Of Shelfish, we have Oysters, Crabs, Cockles, Conchs, and Musshels; some Oysters six Inches long, and one sort of Cockles as big as the Stewing Oysters, they make a rich Broth." ⁷⁷ "A Further Account of the Province of Pennsylvania" by Penn written in England in 1685 told about the colony. Concerning general provisions in the colony he wrote:

1. It has been often said we were starv'd for want of food; some were apt to suggest their fears, others to insinuate their prejudices, and this was contradicted, and they assur'd we had plenty, both of Bread, Fish and Flesh, then 'twas objected that we were forc't to fetch it from other places at great Charges....

5. For Fish, it is brought to the Door, both fresh and salt. Six Alloes or Rocks for twelve pence; and salt fish at three fardings per pound, Oysters at 2s. per bushel. 78

William Penn estimated that 7,000 immigrants came to the new colony between 1682 and 1685, partly drawn by the descriptions of the colony in those years. ⁷⁹ Delaware was largely agricultural with some trade, but the resources of Pennsylvania

77. Albert Cook Myers, ed., Narratives of Early Pennsylvania, West New Jersey and Delaware, 1630-1707. (New York: Charles Scribner's Sons, 1912), p. 228.

78. Ibid., pp. 266-267.

79. Ibid., p. 260.

soon overshadowed the smaller Three Counties to the south.

Another attempt to attract settlers to the Delaware area appeared in "An Historical and Geographical Account of Pensilvania and of West-New-Jersey," by Gabriel Thomas in 1698. One section read:

As also the large sort of Fish, as Whales (of which a great deal of Oyl is made), Salmon, Trout, Sturgeon, Rock, Oysters (some six Inches long), Crabs, Cockles (some as big as Stewing Oysters of which are made a Choice Soupe or Broth), Canok & Mussels, with many other sorts of Fish, which would be too tedious to insert. 80

The Dutch knowledge of the value of oysters, as indicated by their paintings in the seventeenth century, points to the importance that they placed upon oysters found in their colony. Since there appears to be neither documented proof nor disproof of the statements made to attract settlers to the area in the last part of the seventeenth century, therefore one must accept such reports on face value. It is noteworthy that the outstanding documentation of the existence and extent of oysters found in Delaware in the seventeenth century was by the Dutch rather than the English.

The rapid growth of the colony and the added weight that additional population gave Pennsylvania led to separate assemblies in 1704. The two colonies, Delaware and Pennsylvania, had the same governor until the American Revolution.

80. Ibid., p. 321.

In Delaware the two lower counties received settlers from Maryland and Virginia, mostly English in origin. New Castle was the center for a large influx of Scotch-Irish early in the eighteenth century.

The Eighteenth Century

The population of Delaware in 1704 was around 2,500.⁸¹ People in this area supplied foodstuffs--wheat, rye, corn, horses, cows and pigs--for export on the numerous rivers and creeks which afforded access to the Delaware Bay and River and to Philadelphia, the center to which Delawareans looked all through the 1700's. The main occupations were farming, fishing, tanning leather and building ships. Farming and fishing were usually combined occupations, since most of the persons who farmed lived along waterways. Fishing and oystering supplemented the farm products and could be engaged in at times of the year when there was little or no farm work to be done. For fishing small punts or canoes were used, while shallops and bateaux carried produce to Philadelphia and Wilmington, the nearest large population centers.

81. Delaware, A Guide to the First State, op. cit., p. 44.

The oyster played a most important part in the lives of the people during this period. It provided food, necessary ingredients of building materials for houses and roads, fertilizer for the newly developing farms and a product to barter for other supplies for daily living.

The first implement used to gather oysters was probably a simple farm rake of wood or iron, much like what the early settlers had observed the Indians using. Besides the large banks of oysters there were also adequate supplies in shallow water, and the use of rakes and baskets would have quickly yielded an ample supply. Tongs are supposed to have come into use in the mid-seventeenth century.⁸² How tongs came to be used is not known. Probably the idea developed independently in different areas at different times to meet specific conditions. The use of a type of tong in early Canada has been documented.⁸³ In order to be able to utilize the banks of oysters growing in deeper water something beside a simple rake was needed, and tongs

82. H. Irving Buckson, "Financing the Middle Atlantic States' Oyster Industry," Rutgers University, New Brunswick, New Jersey, 1959, unpublished paper for the Graduate School of Banking, p. 6.

83. Ingersoll, *op. cit.*, p. 5. Another description of tongs observed in use in New York on October 30, 1748, can be found in Adolphe B. Benson, ed., Peter Kalm's Travels in North America, from the 1770 English translation, 2 vols., (New York: Wilson-Erickson, Inc., 1937), p. 125.

Figure 15. Tongs Designed for Use in Delaware Waters.

(Drawn by Mrs. Doris Major Payne from material lent by the Chesapeake Welding Company, Crisfield, Maryland.)



were the answer. Tongs are simply two rakes attached together so that the tines form a sort of basket to hold the oysters being brought to the surface. The length of the handles was determined by the depth of the water in which they were to be used. As long as these were of wood each man could make his own. Later they were made of iron by local blacksmiths to each person's specifications, which varied according to the type of bottom on which they were to be used.⁸⁴ With this small outlay for equipment a man was in the oystering business.

The value of this bivalve which existed in such vast quantities in the Delaware region lay in the number of different ways it could be used. Oysters were eaten by everyone. In addition to the use of oysters for food, the discarded oyster shells were used for the early roads, especially the roads near streams and the shore. The shells were also burned for lime, some of which was used by farmers as fertilizer. This seems to have been the fate of the "White Cliffs of Dover," shell mounds near Dover, Delaware, in the early 1700's.⁸⁵

84. Personal communication with Mr. R. J. Purnell of the Chesapeake Welding Company, Crisfield, Maryland, October 24, 1961.

85. Personal communication with Mr. H. W. T. Purnell, Georgetown, Delaware, September 15, 1961.

Another use of shells was in building. A Swedish log cabin now at the Delaware State Museum in Dover, Delaware, formerly stood in the northern part of the state near the junction of Routes 13 and 40. This cabin is known to date from 1704, at which time it was not new. How much earlier it was built has not as yet been determined. In the mortar from the fireplace stone, fragments of oyster shells were discovered.⁸⁶ This use of oyster shells was apparently very common:

The people showed me some houses in this town (Philadelphia) which were built of stone, and in the mason work of which the lime of oyster shells had been employed. The walls of these houses are always so wet two or three days before a rain, that great drops of water can plainly be perceived on them, and thus they serve as hygrometers. Several people who had lived in them complained of these inconveniences.⁸⁷

During excavations of the John Dickinson Mansion near Dover, Delaware, in the 1950's, large quantities of wild oyster shells were found in the root cellar.⁸⁸ This house was first occupied in 1740, a two-story brick building in

86. Delaware State Museum, Dover, Delaware, Exhibit of log cabin and details of its removal to Dover.

87. Adolphe B. Benson, ed., Peter Kalm's Travels in North America, p. 91.

88. Delaware State Museum, Dover, Delaware, conversation with staff, October, 1961.

the eighteenth century with a Flemish-bond front and a hip roof, a rich planter's house where all the aspects of rural eighteenth century American aristocratic life were seen. It is not known for certain just when these shells came to the root cellar, but they undoubtedly were the remains of the numerous barrels of oysters which were used during the winter, stored in cellars or other cool places, by all members of Delaware society.

The influx of settlers to the peninsula had brought changes in the hundred years since the first settlement. Smith spoke of the variety of fish in 1721 as follows:

These in great variety, are plenty along the coast, in the Delaware and the north river; ...besides, oysters, clams, and other shell fish: Most of these supply in great part the New-York and Philadelphia markets: 89

Of the area near Lewes where such good oysters were found in 1631 he reported:

Where the creek is described deep and sandy, is now (1721) a mowing marsh: The channel also by the Hoarkill, then used for vessels to pass, is diminished to about a hundred yards breadth at the mouth: The two islands, one very small, and the other but half a league in circumference are now the first supposed to be ten and the last thirty times as large as then described; and this alteration in about a hundred years. 90

89. Samuel Smith, The History of the Colony of Nova-Caesaria, or New-Jersey, p. 510.

90. Ibid., pp. 58-59.

Thus some of the beds which attracted the attention of the first visitors to the Delaware region had disappeared. As the land was settled and cleared, this changed the character of the various streams and the mouths of these streams which had served as good set areas in early days. The change came about very gradually, as the constant ebb and flow of the tide piled land in new spots and cut it away at others.

The Reverend William Beckett, Anglican missionary in Sussex County, wrote in 1732 from his home on Angola Neck to Governor Patrick Gordon of Pennsylvania and the Three Lower Counties on Delaware the following:

The situation of my new purchase is pleasant. In full view before my door lies Rehoboth Beach and the mouth of the Indian River well stored with excellent fish, cockles and Oysters, of which, whenever you come down to Sussex, I hope you will honor me so far as to take a taste. 91

The New World had caught the fancy of Europe and there was frequent communication between the two sides of the Atlantic. There was an active desire among everyone to know all about the new land. Natural history description played an important role in answering that desire. By the

91. Anthony Higgins, "Oysters From Rehoboth Bay," Journal Every Evening, Wilmington, Delaware, October 3, 1946, p. 8.

summer of 1745, following the advice of Linnaeus, an expedition to North America was authorized by Scandinavian interests.⁹² Peter Kalm, a Finnish natural scientist and the first trained biologist to come to North America on a purely scientific trip, was given the responsibility of the study, and his trip in North America covered the years 1747-1751. A keen observer of life, three impressions stand out from his notes; the abundance of religious sects in America, the general wealth and abundance of the North American continent, and the pervading spirit of liberty.⁹³ He noticed that agriculture was the chief occupation and that the years of English rule had left its impress upon the Delaware region. His interest in economics covered the way people earned a living, the degree of comfort in daily life and the organization of life.⁹⁴ This was the mid-eighteenth century idea of economics.

Few aspects of life in the Delaware region escaped his attention. The canoes which he observed the settlers using were patterned after the dugout canoes of the Indians. They

92. Martti Kerkkonen, Peter Kalm's North American Journey, Its Ideological Background and Results, (Helsinki: The Finnish Historical Society, 1959), pp. 53-62.

93. Ibid., pp. 98-99.

94. Ibid., p. 236.

were put to good use by the settlers when farm work was at a lull and the oystering was in full swing. Kalm wrote a description of the canoes on October 3, 1748:

Canoes are boats made of one piece of wood and are much in use among the farmers and other people upon the Delaware and some little rivers. For that purpose a very thick trunk of a tree is hollowed out; the red juniper or cedar (Juniperus Virginiana), the white cedar, the chestnut, the white oak and the tulip tree are commonly used. Canoes of red and white cedar are reckoned the best because they float very lightly upon the water and last twenty years. But of these the red cedar canoes are most preferred. Those made of chestnut will likewise last for a good while, while those of white oak are hardly serviceable more than six years and also float deep because they are so heavy. The liquidambar tree, or Liquidambar styraciflua L., is large enough, but unfit for making canoes because it imbibes the water. The size of the canoes varies with the purpose for which they are destined. They can carry six persons, who, however, must in no way be unruly, but sit at the bottom of the canoe in the quietest manner possible, lest the boat capsize. The Swedes in Pennsylvania and New Jersey, near the rivers, seldom have any other boats in which to go to Philadelphia, which they commonly do twice a week on market days, though they be several miles distant from the town, and meet sometimes with severe storms. Yet misfortunes from the overturning etc. of these canoes are seldom heard of, though they might well be expected on account of the small size of the boats. Still, a great deal of attention and care is necessary in managing the canoes when the wind is a little violent; for they are narrow, round below, have no keel and therefore may easily be upset. Accordingly when the wind is more brisk than ordinary the people make for the land. 95

95. Benson, ed., Peter Kalm's Travels in North America, p. 85.

Under the date of October 8 the same year Kalm wrote about oysters:

The shore of Pennsylvania has a great quantity of the finest oysters. About this time the people begin to bring them to Philadelphia for sale. They come from that point of the shore which is near the mouth of the Delaware River. They are considered as good as the New York oysters, of which I shall make special mention later. However, I believe that the latter kind is generally larger, fatter and more palatable. It is remarkable that they commonly become edible about the time when the agues have spent their fury (i.e. in October). Some men are seen with whole carts full of oysters crying them about the streets. This is unusual here when anything is to be sold, but in London it is very common. The usual way of preparing oysters here is to fry them on live coals until they begin to open. They are then eaten with a sandwich of soft wheat bread and butter. Since they are sooty outside from the fire it is customary to hold them in the left hand with a rag or napkin while eating. The oyster shells are thrown away, though formerly a lime was burnt from them, which has been found unnecessary, there being better material from which to make lime in this neighborhood. 96

Again on November 20, 1749, Kalm wrote about the popularity of oysters in Philadelphia:

Oysters were carried at this time in quantities to the city. People brought them

-
96. Ibid., pp. 90-91. These two selections also appear in John Reinhold, Peter Kalm's Travels into North America, second edition, 3 vols., (London: T. Lowndes, 1772). The first edition was in three volumes, vol. 1 published in 1770, vols. 2 and 3 in 1771.

from places which lie in the vicinity of the Delaware River. 97

One of the commonest ways of preserving oysters in the eighteenth century was by pickling. Every woman pickled oysters for her own family use and for members of the family away from home and for family friends. A 1748 description of the pickling method is as follows:

As soon as the oysters are caught, their shells are opened and the fish washed clean; some water is then poured into a pot, the oysters are put into it, and they are boiled for a while; the pot is then taken off the fire again and the oysters taken out and put upon a dish till they are almost dry. Then some nutmeg, allspice and black pepper are added, and as much vinegar as is thought sufficient to give a sourish taste. All this is mixed with half the liquor in which the oysters are boiled, and put over the fire again. While boiling great care should be taken to skim off the thick scum. At last the whole pickling liquid is poured into a glass or earthen vessel, the oysters are put into it, and the vessel is well stopped to keep out the air. In this manner, oysters will keep for years, and may be sent to the most distant parts of the world. 98

And ship them they did. Pickled oysters were part of the export to the West Indies from New York and Philadelphia.

97. Fredr. Elving, Pehr Kalm's Resa Till Norra Amerika, Utgiven av Fredr. Elving och Georg Schauman, Tilläggsband Sammanställt av Fredr. Elving, Skrifter Utgivna av Svenska Litteratursällskapet; Finland, CCX, (Helsingfors: Mercators Tryckeri Aktiebolag, 1929), pp. 102-103. This section and more which was not included was graciously translated from the Swedish for me by Mrs. Charles Kirby-Miller, Dean of the Radcliffe Graduate School, Cambridge, Massachusetts.

98. Benson, op. cit., pp. 125-126.

In 1749 Joshua Hempstead from Connecticut visited some of the people who had moved to Delaware and Pennsylvania from Connecticut and who still had relatives in that state. In his diary he told of visiting an iron works near the head of the Chesapeake Bay on June 27, 1749:

Afterward we went to see the Iron Works where they Runn Piggs for To make barr Iron off. A great old building. It goes by a River that Runs into the Bay. A Coave come up here about two or three miles N. E. to the mouth of the River (Susquehanna). there is 30 Piggs now cast that by hot in the Sand as they Runn out of a hole in the bottom or lower end of the furnace in this form;

$$\begin{array}{cccccc} \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} & \underline{1} \\ 1 & 1 & 1 & 1 & 1 & 1 \end{array}$$

The large Bellows 2 pr go by water and the fire goes out after it is once blown up untill the Season of the year comes about. the furnace I Suppose is 20 foot high or more and is fed with oar and Coal etc. at the top as if it were the Top of a Chimney all put in there. there they bring in horse carts the oar the Coal & Oyster Shels & there stayed two men Day and night. The Top of ye furnace is about breast high from the floor where they Stand to Tend as they feed it. Each couple Tend 24 hours, in which Time they Runn or Cast twice. they have small Baskets that hold about a peck and half and they put in a Cart in number of baskets full of oar and a Certain Number of Baskets of Coal and a Certain Number of Baskets of oyster Shels, all in exact proportion and as the materials consume below in the furnace, they filled up at the top and out at the Bottom beside the Iron near a day there is vast quantities of Glass that runs out every now & then and is tough and hangs together like an Ox hide and they drag it away with such a hook as the Tanner pull up hides with and when it is Cool is as Brittle as any other Glass and they cart it away and bestow it in waste places to mend the Cartways and Damms even as small stones. (there is one man beside

the 4 that tend by Course that is Constantly breaking the rock oar with a large hammer or Sledge) which lyes like a little hill near the Coave where it is landed out of the large boats.... 99

Iron making also became important in Sussex County, Delaware, where there was bog iron ore, plenty of water, transportation and a good supply of oyster shells. In 1764 the Deep Creek Furnace and Nanticoke Forge was founded. The iron was shipped down the Nanticoke River to the Chesapeake and then to other destinations. Pine Grove Furnace was founded at Concord, Delaware, by some Philadelphia and New York merchants.¹⁰⁰

The American Revolution cut severely the coastal trade which had been active in the Delaware region. It even broke up the iron making industry in the southern part of the state, and therefore, the use of oyster shells in that industry. The disruption of iron making occurred at the time in American history when iron was a sorely needed commodity. The British blockade, by cutting off coastal trade,

99. Diary of Joshua Hempstead, 1711-1758, vol. I in series published by New London County Historical Society. The excerpt is quoted in an article by George McIntire in The American Scene, (New York: Carlton House, 1937), p. 103.

100. John A. Munroe, "The Eve of the Revolution," in Delaware, A History of the First State, H. Clay Reed, ed., (New York: Lewis Historical Publishing Company, Inc., 1947), vol. I, Ch. 4, p. 86.

forced the furnaces to close because of the inability to transport the finished product.¹⁰¹

During the Revolution news about the war filled the correspondence of Delaware citizens. Occasionally some more mundane items crept into the letters like the mention of a jar of pickled oysters sent to Anthony Wayne in 1777.¹⁰² The capture of Philadelphia by the British this same year meant that the British controlled all the bay and river traffic. Even with the evacuation of the city in 1778 the British maintained effective control over the river trade, destroying vessels docked at wharves in the creeks off the river and bay.

During the last decade of the eighteenth century the wartime rise in costs and the depreciation of currency caused more use of produce and seafood to pay rents and services. By 1796 the sad condition of the formerly active iron works in Sussex County was described:

In the county of Sussex, among the branches of the Nanticoke river, large quantities of bog iron ore are to be found. Before the revolution,

-
101. James M. Tunnell, Jr., "The Manufacture of Iron in Sussex County," Delaware History, vol. VI, no. 2, (Wilmington, Delaware: Historical Society of Delaware, September 1954), pp. 88-89.
102. Samuel W. Pennypacker, "Anthony Wayne," The Pennsylvania Magazine of History and Biography, vol. 82, (Philadelphia: The Historical Society of Pennsylvania, 1908), p. 264.

this ore was worked to a considerable extent: It was thought to be of a good quality, and peculiarly adapted to the purposes of castings. 103 These works have chiefly fallen into decay.

One of the Frenchmen who was touring America about this time was the Duc de la Rochefoucault. He described the active coasting trade between Philadelphia and Wilmington. In addition he told of the communication with Baltimore and the Chesapeake Bay and the Philadelphia region through the northern part of the state of Delaware.¹⁰⁴

All through these years Americans ate oysters as a staple food item. One observation of the supply of oysters and the relish with which they were eaten was given by Moreau de St. Méry, a trained lawyer and excellent observer of American life and habits in the last decade of the eighteenth century. Following an entry for August 22, 1798, in Philadelphia he wrote:

Americans have almost a passion for oysters, which they eat at all hours, even in the street. They are exposed in open containers in their own liquor, and are sold by dozens and hundreds up to ten o'clock at

-
103. W. Winterbotham, "State of Delaware," An Historical, Geographical, Commercial and Philosophical View of the United States of America... First American edition, vol. 2, (New York, 1796), p. 468.
104. Duc de la Rochefoucault Liancourt, Travels Through North America, vol. III, 1797, pp. 22-32. From a typewritten copy in the Historical Society of Delaware, Wilmington, Delaware.

Figure 16. Map of New Jersey, entworfen von D. F. Sotzmann, Hamburg bey Carl Ernst Bohn, 1797, Die unterstrichene Namen zeigen die volkreichsten Ortschaften an. This map shows the Oyster Rocks or beds, marked with x's on the Delaware side of Delaware Bay from Little Creek to Murderkill Creek, also oysters are marked on the Jersey side.

Source: Division of Maps, Library of Congress.



NEW JERSEY

entworfen von D.F. Sotzmann.

Hamburg bey Carl Ernst Bohn

1797.

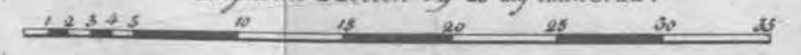
— Die unterstrichene Namen zeigen die volkreichsten Ortschaften an.

Division of Maps
Library of Congress

Geographische Meilen 15. auf einen Grad.



Englische Meilen 69 ²/₃ auf einen Grad.



2° Ostliche Länge vom Capitel in Washington welche 2° westlich von Philadelphia liegt

74° zu Elstines Kräftschreibung von America

night in the streets, where they are peddled on barrows to the accompaniment of mournful cries. 105

The cost of oysters in Frederica, Delaware, in February 1799 was still two shillings per bushel, as it had been in the 1680's when William Penn wrote of the cost of oysters while attracting settlers to the New World.¹⁰⁶

105. Moreau de St. Méry's American Journey (1793-1798), Translated and edited by Kenneth and Anna M. Roberts, (Garden City, New York: Doubleday and Company, Inc., 1947), p. 266.

106. Day Book of Benjamin Coombe, Frederica, Delaware, January 15, 1796-January 20, 1804, entry for Matthew Clark, Frederica, of February 12, 1799. Day Book in possession of the Historical Society of Delaware, Wilmington, Delaware.

Chapter IV

The Nineteenth Century to the Civil War

By 1800 there was quite a change in maps of Delaware showing the existence of oyster banks. The vast banks described by Lindeström had shrunk, according to the maps of 1797 and 1799. Rehoboth Bay, however, was shown as filled with oysters and terrapins. The naming of a small creek just below Cedar Creek "Oister Inlet" indicates the location of oysters in good supply in creek waters. The oyster banks along the shore of Kent County were more distinctly marked. Part of the reason for the decline of the oyster banks at the mouth of the Delaware Bay was attributed to the wide uses the growing population made of the oyster and its shell. The use of oysters for lime was extensive and in 1802 the value of a bushel of shell lime was one shilling and six pence.¹⁰⁷

Correspondence showed that native Delawareans away from home did not suffer from lack of news of home or from lack of home products which they especially prized, par-

107. Ibid., entries under Samuel Baker, Bricklayer, of May 12 and June 16, 1802.

Figure 17. A Map of the State of Delaware and Eastern Shore of Maryland with the Soundings of the Bay of Delaware, 1799, 1800 and 1801. Engraved by Francis Shallus, Philadelphia. It is believed that this map was drawn by Pierre Charles Varlé. Note especially Rehoboth Bay "Abounds with Oysters & Terapins," "Oister Inlet" south of Cedar Creek, x's marking oyster beds on the Delaware shore from Jones River to Little Creek and the oyster beds marked off Mahon Ditch.

Source: Public Archives Commission, Dover, Delaware.



S O M E R S E T C.

K E N T C.

D E L A W A R E

W O R C E S T E R C.

S U S S E X C.

A T L A N T I C

O C E A N

B A Y

D E L A W A R E

Note: The soundings are marked at low water. The feds are marked with an f but the Falls are without.

Northwest Fork H.

Nanticoke H.

Mother Kill H.

Dover H.

Dagsbury H.

Broad Kill H.

Cedar Creek H.

Indian River H.

Baltimore H.

Cape Henlopen

Light House

Over Falls

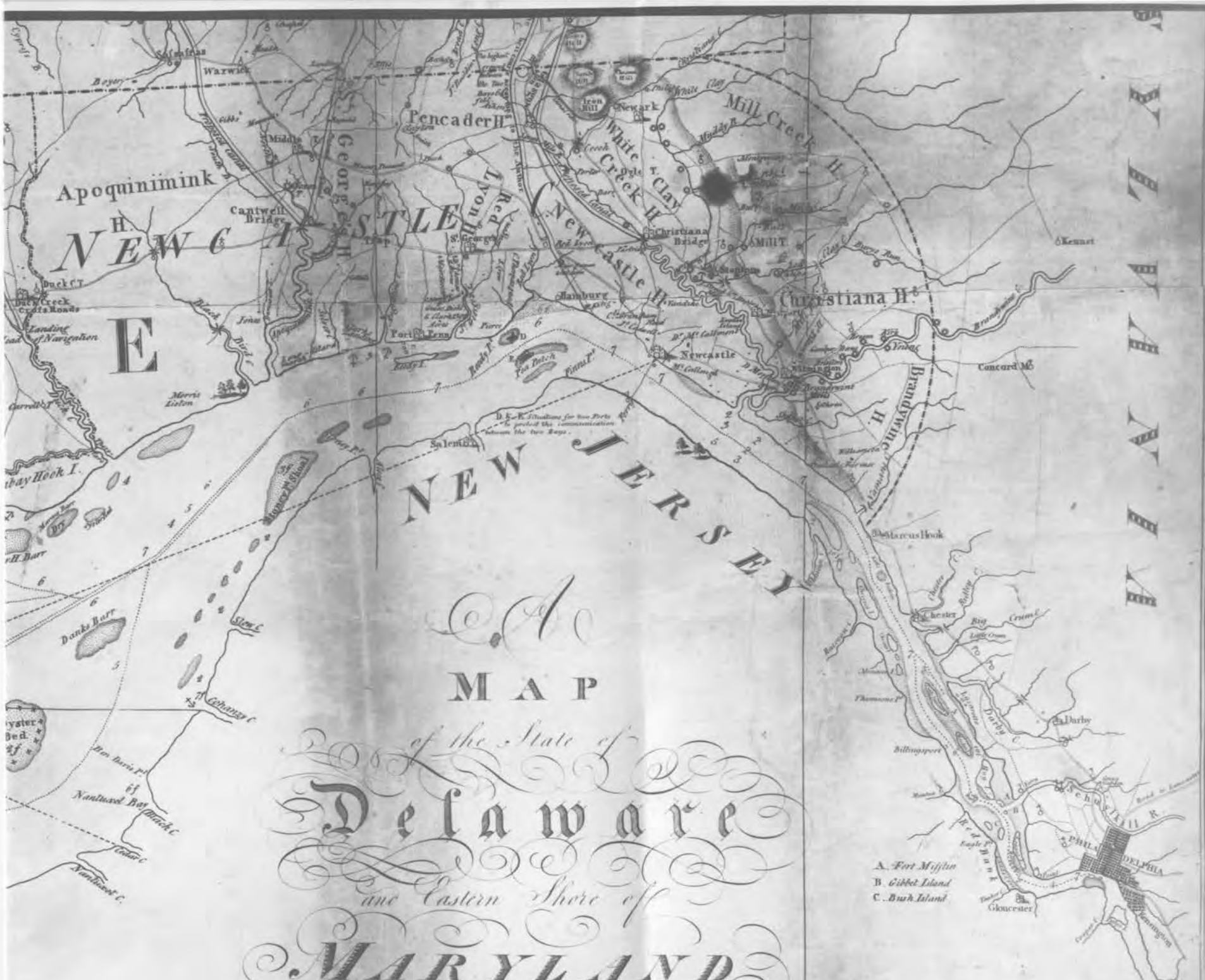
Big Shoal ground

Big Shoal ground larger since Fishers Channel

Cape May

Island Flats

HE. careful Delaware found in rivers. S! The Each!



A. A.
MAP
of the State of
Delaware
and Eastern Shore of
MARYLAND

With the Soundings of the Bay of Delaware

From actual survey & soundings made in
1799, 1800, & 1801 by the Author.



- A. Fort Mifflin
- B. Gibbet Island
- C. Bush Island

EXPLANATION

- Towns in which Courts of Justice are held are marked thus
- Boundaries of States
- Other Towns
- Villages
- Mills
- Plantations
- Foot Roads
- Hills
- Bridges
- Taverns
- Places of Worship
- Common Roads
- County lines

Note. C. is the Abbreviation of County, & H. of Hundred.

Worn Pilots of Delaware Bay having examined the Chart of the Bay of as laid down in this Map have correct, & recommend it to mar-

0th Oct. 1801.

ticularly the local oysters. Around September 1805, Mrs. Elizabeth Travis of Philadelphia wrote to Miss Williamina Ridgely:

The pickled oyster came safely to hand. They were excellent and I am greatly obliged to you for them. I shall take great care of the Jars and return them by the first opportunity. 108

Again a letter to Miss Williamina Ridgely from a Miss Rebecca Bond of Philadelphia, dated February 15, 1806, referred to oysters sent to the city:

Mamme thank my Aunt for the nice Oysters she has sent her -- & will return the Pots as soon as they are empty -- I tell her with a hope to get more she says not but that she gave them to her Sister & she shall have them back.

Mrs. Travis talks of writing her thanks for the oysters. -- Tom told me to tell your mamma how much he was obliged to her -- 109

Another letter dated January 29, 1807, was addressed to Miss Williamina Ridgely and was from Dr. Abraham Ridgely:

By Mr. McClyment I received your letter of yesterday, but can hear nothing of the oysters & Salmon.

Immediately on seeing your letter I sent to the Tavern but they said nothing came up for me. 110

-
108. Leon deValinger, Jr. and Virginia E. Shaw, Ed., A Calendar of Ridgely Family Letters, 1742-1899 in the Delaware State Archives, vol. 1, (Dover, Delaware: Public Archives Commission, 1948), p. 338, and the original letter in the Ridgely Collection, Public Archives, Dover, Delaware.
109. Ibid., p. 341, and original letter.
110. Ibid., p. 344, and original letter.

Figure 18. Bill from Ezekiel Macier and Company to E. I. duPont de Nemours and Company, May 23, 1808. Note that a bushel of oysters sold for fifty cents.

Source: Longwood Manuscripts, Papers of E. I. duPont de Nemours and Company, Eleutherian Mills Historical Library, Wilmington, Delaware.

Wilmington May 23 1808

Mr Dupont & Co. Jr. to Eschsch Mearns & Co

1808 To hire of Boat for 38 Days \$24.00
To Bunches of Oysters 2.50
1.50

\$77.50

23 Days at 2 D. . . . \$ 66. -
2 Bunches of oysters in the Spring 1 - 50.

Recd the above acct in full this 23rd May 1808.

Anthony + Christy
Drs

Wm R.

Delawareans carried their knowledge of the shore with them wherever they went and compared the products they knew at home with those they found elsewhere. Judge Thomas Rodney, of the family active in the Revolution, wrote to his son in Washington, Caesar A. Rodney, Attorney General of the United States, on November 7, 1810:

There are numerous Salt Lakes a long the Arkinsaw, by which means I have no doubt I could raise as fine fish and oysters there as the world affords -- but this Experiment has never yet been tried at any of the Salines in our western Country.... 111

Later on November 20, 1810, he wrote again:

Since I have been sick I have suffered so much for want of fish and Oysters, the only things Could have Eaten That I have Seriously reviewed the Situation and Climate of Orleans where fish and Oysters are always plenty in season -- and indeed almost all other articles plenties & Cheaper than here. 112

Delaware oysters had been well known to the relatives of New Haven people who had come to settle in the Delaware region before the nineteenth century. The wide use of oysters in Connecticut had led to a sharp decline of the oyster production on the natural beds in the eighteenth

111. Simon Gratz, "Thomas Rodney," The Pennsylvania Magazine of History and Biography, vol. 45, (Philadelphia: The Historical Society of Pennsylvania, 1921), p. 191.

112. Ibid., p. 196.

century. In order to maintain their position of importance in the oyster industry the Connecticut people looked to the rich natural beds to the south for seed oysters to replenish the dwindling natural beds in Connecticut. Relatives in Delaware had reported the rich natural beds in Delaware Bay and it was natural that, when the Connecticut supply of oysters was insufficient to fill business orders, the Delaware Bay was investigated as a possible source of oysters for replanting in Connecticut or immediate shipment from Fair Haven. The sharpies and schooners from Fair Haven sailed down the Jersey coast and into the Delaware Bay. Soon vessels from towns neighboring the Fair Haven township sent vessels for loads of oysters also. As early as 1811 some of these vessels also found their way into the Chesapeake for oysters.¹¹³

To buy up a cargo from the several small operators in the bay took too much time for the penny-pinching Yankees. These New Englanders therefore introduced the dredge, an iron bar with short teeth which was dragged across the bottom, into southern waters. This dredge picked up everything from the area over which it was pulled. A bag attached

113. Archibald J. Nichol, The Oyster-Packing Industry of Baltimore, Its History and Current Problems, (College Park, Maryland: University of Maryland, 1937), p. 4.

to the bar, at first of rope, later of metal, held the oysters until they were hoisted to the surface and dumped on board ship. The oyster dredge had been known as long ago as the fourteenth century in England. It was an adaptation of this ancient dredge which was and is used by naturalists to obtain specimens of the bottom animals in any marine setting.¹¹⁴

The hoisting of a loaded dredge from a moving vessel was tedious and back-breaking, especially when it depended entirely upon hand winches for power. Moreover, feeling that the use of this device was exceedingly harmful to the oyster beds, Virginia prohibited dredging in 1811.¹¹⁵ Maryland then became the center of operation for some of the dredgers. They simply moved up the Chesapeake Bay. But in 1820 Maryland too restricted dredging and, concerned about her natural resources, limited transportation of oysters out of the state to vessels owned by Marylanders.¹¹⁶

On February 12, 1812, realizing the effect which the influx of vessels from out-of-state would have upon the local oystermen, Delaware enacted its first law to preserve

114. Michael Graham, ed., Sea Fisheries, Their Investigation in the United Kingdom, p. 139.

115. Archibald J. Nichol, op. cit., p. 4.

116. Ibid.

Figure 19. An Act for the Preservation of Oysters,
Terrapins and Clams, February 12, 1812,
Delaware General Assembly.

Source: Public Archives Commission, Dover, Delaware.

An Act for the
 Preservation of
 Rhytes terrigena
 and Clams

31 Jan'y 1819 read
 1 Feb'y " read
 " " " read

to this time and pass'd
 J. Bennett.

sent for con

for Sent Feb. 10, read

11 was 2^d time
 2 was 3^d time by
 Special order
 and passed

An Act for the preservation of ~~Certain~~
~~Fisheries and oysters~~ -
 certain shell Fisheries within this State.

Art. 1 Be it enacted by the Senate and
 House of Representatives of the State
 of Delaware in General Assembly
 met, That no person not residing
 in this State shall take or gather any
 oysters Turpines or clams within the
 same, and do put them on board of
 any canoe, flat scow, boat or other
 vessel, not wholly belonging to a vessel
 owned by some person or persons who
 live in this State, under the penalty
 of forfeiting such canoe flat scow, or
 other vessel, together with all the Oysters,
 Oyster rakes tongs, tackle furniture and
 apparel in and belonging to the same

Art. 2 And be it enacted that any
 person who shall seize and seize
 any such canoe, flat scow boat or other
 vessel aforesaid shall immediately
 thereupon give information thereof to
 any two justices of the peace of the
 County where such seizure shall have
 been made, who are hereby empowered
 and required to meet at such time

and place as they shall appoint
 for the time thereof and the same
 if condemned shall ~~with~~ all things
 thereunto belonging be sold by the
 order and under the direction of
 the said Justices who after de-
 ducting all legal costs and
 charges shall pay the one moiety
 of the proceeds to the ^{Treasurer} ~~collector~~ of
 the County for the use of the
 County and the other moiety
 to the person who seized and
 prosecuted for the same -

Sec. 3^d And be it enacted that if any
 person or persons on board of any
 such canoe flat, row, boat or other
 vessel aforesaid shall refuse and
 not suffer to enter or visit before
 or after entering, any of the said offi-
 cers, or otherwise visit ~~them~~ ^{any}
 of them in the execution of their office
 then every person so offending shall
 forfeit and pay ~~any~~ ^{twenty} dollars
 to be recovered with costs by actions
 of debt, by such officers, in any Court
 of record in this State having cogni-
 zance of that sum, the one moiety
 to the use of such prosecutors and

and place as they shall appoint
 for the time thereof and the same
 if indented shall ~~be~~ all things
 thereunto belonging be sold by the
 order and under the direction of
 the said Justices who after all
 meeting all legal costs and
 charges shall pay the one moiety
 of the proceeds to the ^{treasurer} ~~collector~~ of
 the County for the use of the
 County and the other moiety
 s. 4. Person who seized and
~~conveyed to the~~

provided always nevertheless that nothing
 in this Section contained shall be deemed
 or construed to extend to any vessel the
 crew of which, or any part thereof may
 in the pursuit of a lawfull voyage be
 within the limits of and for the purpose
 of taking any claims against or territories
 for their ^{immediate} own use only ~~and~~
~~no~~ ~~of~~ ~~carrying~~ ~~to~~
~~part~~

of record in this case
 same of that sum; the one moiety
 to the use of such proprietors and

The other moiety to the ^{treasurer} collector
of the County for the use of this
County when the expense was
committed —

Sec. 4 Provided always, and be it further
enacted, That nothing contained in
this act, shall be taken or construed to
extend to the State of Maryland or any
Citizen thereof, so long as the shell Fisheries
of the waters of that State shall remain
free to the Citizens of this State and no
longer. —

shell-fisheries in the state.¹¹⁷ Oystering was restricted to vessels owned within the state, except for food procurement for immediate consumption on vessels passing through the bay. Shell fishing rights in the Delaware Bay were open to citizens of Maryland on a reciprocal basis. This law showed the inherent solidarity, community and unity of the people of Delaware and Maryland on the peninsula which transcended the legal boundaries of the states.

War with Great Britain in 1812 completely disrupted the intercoastal trade which was just beginning in the oyster business. The effective British blockades of the Delaware and Chesapeake Bays cut off these areas from the rest of the United States. The laws restricting the oyster industry, beginning with the law of 1812, were seldom observed because of lack of enforcement agencies and public support. But the British, through their blockade, solved the problem for the time being.

The War of 1812 left fewer boats in Delaware, boats which had been essential in the marketing of oysters. Fortunately for Lewes, a Delaware seaport, the British attack in the spring of 1813 did not include troops. The English commander of the squadron, Beresford, took much verbal abuse

117. Delaware, Laws of the State of Delaware, vol. 4, pp. 568-569.

because of the destruction of many oyster boats that spring:

The brave Commodore Beresford has captured and destroyed a great many oyster boats, wood-flats, and lumber boats and 'Nelsonized' the Delaware Bay. His depredations have been of the most wanton and malignant character, and would have disgraced a Sardinian privateer! Four of the five United States gunboats left New Castle for Bombay Hook some days ago. They may limit the operations of the barges sent to destroy shipping. 118

Out of a population of 72,000-75,000, Delaware furnished over seven thousand men for this war, and this exodus lessened the number of men at home who could engage in the oystering business.¹¹⁹

Although Wilmington was the site for most of the industrial developments, there was some activity in Sussex County as well. Shortly after 1815 the iron industry which had thrived in Sussex County before the Revolution was revived. Millsboro, being near the timber supply, bog iron, oyster shells to supply the lime, navigable water and the water power needed for the operation of the furnace bellows and the forge hammer, was the logical location for the furnaces.

118. Anna T. Lincoln, Wilmington, Delaware, Three Centuries Under Four Flags, 1609-1847, (Rutland, Vermont: The Tuttle Publishing Company, Inc., 1937), p. 190. This excerpt was quoted from a Delaware paper printed in 1813.

119. United States Census Reports. (See table in appendix.)

This industry was to continue commercially until the late 1850's, and even for thirty years afterward local farmers dug up iron ore to ship across the Delaware Bay to southern Jersey where it could be shipped to the growing industrial centers of America.¹²⁰

The war had undoubtedly pointed up the need for a canal to connect the Chesapeake and Delaware regions without ships having to go around the capes. Such a canal would lessen both the duration and the danger of voyages. Although the peculiar problems of navigating sail vessels in the Delaware River helped to encourage early development of steamboats in the area, the oyster industry did not adapt steam for use on the oyster boats.

A map of Pennsylvania published in 1822 showed oyster beds off Bombay Hook and just north of Dover, Delaware. Other areas, such as the creeks along the bay, also contained good oysters, as has been seen in the accounts of visitors and local inhabitants. One of these creeks, Broad Kill Creek, north of Lewes, Delaware, was noted for its fine-tasting salt oysters, both in Delaware and in Philadelphia. These oysters were sometimes referred to as "Broadkills."

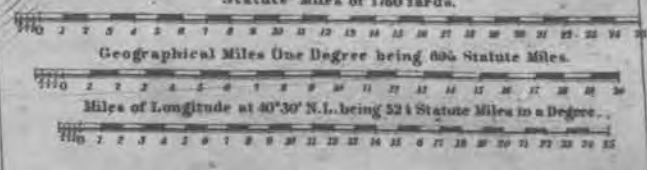
120. John M. Tunnell, Jr., "The Manufacture of Iron in Sussex County," pp. 89-90.

Figure 20. Map of Pennsylvania, 1822, by John Melish, Engraved by B. Tanner. Oyster beds off Bombay Hook are shown, as well as the beds off Dover, Delaware, which are indicated by a series of x's.

Source: Division of Maps, Library of Congress.



SCALES.
Statute Miles of 1760 Yards.



Map Division
Library of Congress



In 1824 the Revolutionary hero General Lafayette and his son George Washington Lafayette visited Delaware, and the newspapers were full of their visit. The General was in Wilmington on October 6th and on that evening visited New Castle to attend the marriage of Miss Dorcas Montgomery VanDyke to Charles Irene duPont.¹²¹ Without a doubt some of the refreshments served were prized Delaware oysters. These would have been bigger than the ones Lafayette would have eaten in France, but the flavor would have compared favorably. Later in July, before he left for France, the General visited the duPont home and was probably served some of the oysters pickled by the women of the household during the winter months. Chancellor Nicholas Ridgely in 1827 wrote about a visit he made to New Castle and told of his declining an invitation "'to sup on Terrapin and Oysters'" with a group of men there.¹²²

121. Anna T. Lincoln, op. cit., p. 201. Accounts of this visit can be found in papers and records in the duPont papers at the Eleutherian Mills Historical Library, Wilmington, Delaware.

122. Leon deValinger and Virginia Shaw, ed., A Calendar of Ridgely Family Letters, 1742-1899 in the Delaware State Archives, vol. 2, (1951), p. 36, also the original letter in the Ridgely Collection at the Public Archives, Dover, Delaware.

Figure 21. Page from ledger of household accounts, "Dépense de ménage," for the month of March 1828, duPont household. Note especially the purchase of oysters on March 4 and 14, purchases noted in French bill d'huîtres, bushel of oysters.

Source: Henry Francis duPont Winterthur Collection of Manuscripts, Papers of E. I. duPont, Eleutherian Mills Historical Library, Wilmington, Delaware.

1828
mars

Depense de menage

				6
1	caspar oil (store)	un gigot de mouton 46 et poulet 31	1	14
		10 L de vis ⁵⁰ 2 L d'olive ²⁵ et 1 de bleu ¹⁸ (John warner)		93 3/4
3	un baril de notre farine	5.25. sans et de sup		
		2 cordes de Bois de charbon (ferme)		
		4 dz d'œufs (store)		32
4	une demi paine 2 g ^{de}	(John warner)	1	12 1/2
		4 L d'olive ⁵⁰ et 8 L de blanc havanaux 2 1/2	1	70
		1 6 th d'huîtres		31 1/2
		incris		6 1/2
7	4 dz of egg's (store)			32
8	un rock fait 50 ^u	1 Liguetton 56 Shiver 25		
10	20 L de sucre Brun a 10 ^u	(John warner)	1	31
		un baril (store)	2	
		1 corde d'incris et 3 de chenes (de la ferme)		7 1/2
11	12 dz d'orge et 3 dz d'œufs 26 (store)			30
12	un poisson			32
14	un 6 th d'huîtres			50
15	une shad			31 1/2
		2 skins		37 1/2
		un de nos veau cidre un 9 a 16 Btin 16		
		un d ^u a Stepm 16 L de la m ^u et 20 1/2 p ^u nous		
		une corde d'incris de la ferme		
		un point		
18	1/2 gal de sel ³³ et une livre de pois ²² (John warner)			22 1/2
		10 L de vis ⁵⁰ 2 on caneth ¹⁰ 11 Harp ¹⁰ et 10 L savon ²⁵		55
19	une shad		1	60
20	un pot a Lian ² et une L de the ³⁰ (store)			31 1/2
22	castor oil et une bo	(store)	1	17 1/2
		une gigot de mouton		6 1/2
		2 skins 40 ^u et une shad 25		62 1/2
26	medicin p ^u mor et p ^u Eleuthera			65
28	5 dz d'œufs (store) de ch ^u l ^u			28
		shad		40
		13 L unutton		37 1/2
		2 cups de fer blanc p ^u la cuisine (store)		81 1/2
		un L de veau		16 1/2
		4 dz d'œufs (store)		81 1/2
31	50 p ^u sugar (John warner)		3	32
		1/2 gallon wine (store)	1	
		blacking (store)		10
			22	89 7/8

In the 1830's there was renewed legislative interest in the oyster industry in Delaware. Apparently oystermen had been in the habit of throwing shells and refuse into the creeks where they were operating, for on January 26, 1830, an act was passed by the State Legislature prohibiting such dumping in Mispillion Creek, on penalty of a fine.¹²³ On February 2, 1833, another law set fines for persons resisting arrest for breaking any of the laws to protect oysters, or exceeding the take limit for the state, set at five bushels in certain places.¹²⁴ Again on February 4, 1835, a legislative act was passed to preserve certain shell fisheries in Delaware, oysters included.¹²⁵ This act set up the first regulation as to the time of year when oysters could be gathered. The closed season in creeks and ponds ran from May 15th to August 15th each year. Once again the passage of a law did not guarantee its acceptance, for there was widespread discontent at all shore areas over this restriction. It was in this same decade that there was an effort made to unite Delaware and the Eastern Shore of Maryland into one legal unit.

123. Delaware, Laws of the State of Delaware, vol. 8, p. 49.

124. Ibid.

125. Ibid., Chap. CCCXLII, pp. 383-384.

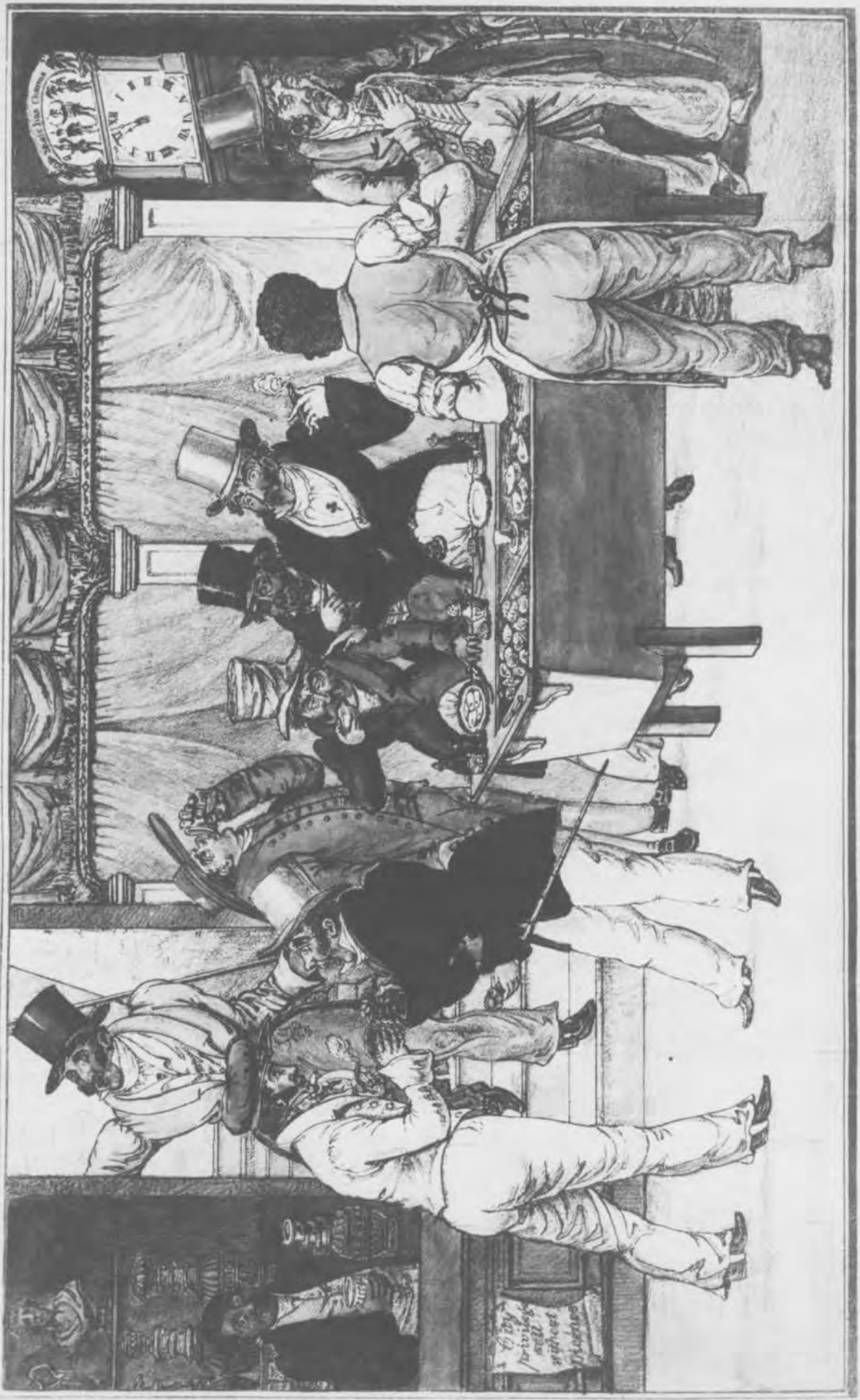
The opening of the Chesapeake and Delaware Canal in 1829 and its completion in 1830 was followed shortly by the establishment of raw oyster packing houses in Baltimore.¹²⁶ This event opened the Philadelphia trade to the Chesapeake as well as the Delaware region. The early canners in Baltimore were from Connecticut and Massachusetts. Oysters were shipped from Baltimore both pickled and fresh. Wagons took them westward over the Cumberland Road. The Baltimore and Ohio Railroad stimulated the canning business. Railroad shipments of canned oysters became a staple, swelling the Baltimore trade with points west. With the development of a canning industry, it was no longer necessary to ship pickled oysters, although advertisements for them still appeared in the 1850's. The canned fresh oysters soon became known as "Cove Oysters." The new impetus which the canning business gave to oystering soon had every available person busily engaged in buying, locating new beds, canning, shipping or in some other aspect of the business.

The period was not without its troubles, however. In the diary of a Wilmington inhabitant, who described a visit from friends on August 10, 1832, mention was made of nine men having cholera from eating oysters. Of the nine, seven

126. Archibald J. Nichol, op. cit., pp. 4-10.

Figure 22. Philadelphia Taste Displayed or, Bon-ton Below Stairs, Lithograph Oyster Cellar Caricature by James Akin, 1830, published by Kennedy and Lucas. This depicts a typical oyster cellar late in the evening in Philadelphia. The original was hand colored, 9-1/2 x 14-3/8 in size.

Source: The Historical Society of Pennsylvania, Philadelphia, Pennsylvania.



OR, BON-TON BELOW STAIRS.

PHILADELPHIA TASTE DISPLAYED.

Illustration by J. C. ...

died.¹²⁷

Despite such occurrences oysters still continued to be eaten in great quantities. At Bordentown, New Jersey, in the 1830's oyster suppers were very common among the local society.¹²⁸ The waterfront of Philadelphia was busy, with the center of activity at the foot of Market Street. Many vessels docked at the fish market and among their cargoes were oysters. There are two pictures of this market in the 1830's.¹²⁹ Many of these oysters found their way into the numerous oyster cellars which existed in Philadelphia. A caricature of an oyster cellar was drawn by James Akin in 1830. It was titled, "Philadelphia Taste Displayed, Or, Bon-Ton Below Stairs." On the left a Negro operates a bar over a sign, 'City privilege sell without License.' The oyster bar itself is presided over by another Negro.

-
127. Manuscript, "Diary of Phoebe George Bradford," 1832-1839, 23 vols., in the Historical Society of Delaware, Wilmington, Delaware. Phoebe Bradford was the wife of Moses Bradford, publisher of the Delaware State Journal.
128. "Reminiscences of Admiral Edward Shippen, Bordentown in the 1830's," The Pennsylvania Magazine of History and Biography, vol. 78, (Philadelphia: The Historical Society of Pennsylvania, 1954), p. 210.
129. David Budlong Tyler, The Bay & River Delaware. A Pictorial History, (Cambridge, Maryland: Cornell Maritime Press, 1955), pp. 71, 72.

The patrons, eight white men, are busily eating oysters or drinking, with several of them barely able to hold a glass.¹³⁰

Local farmers and fishermen helped supply the growing towns with food. One description of the market at Dover, Delaware, appeared in 1838:

The market of Dover is plentifully supplied with poultry, pork, bread stuffs, vegetables, fruits, fish, oysters & terrapins of good quality, at fair prices, but is deficient in the article of good beef; for which we are principally indebted to our neighbors of New Castle county. Shad are caught in the creek near the town, and the terrapins taken on the bay shore within a few miles of the place, are considered superior to any to be procured elsewhere.¹³¹

A record of the prices of oysters in Wilmington from 1828-1833 and 1838-1842 can be found in the household account books in the duPont records. During this period the price of oysters remained, with some slight fluctuation, at about fifty cents per bushel for oysters in the shell

-
130. This lithograph was printed by Kennedy & Lucas, Philadelphia. It was hand colored, 9-1/2 x 14-3/8 in size. It is in the possession of the Historical Society of Pennsylvania and has been published in Nicholas B. Wainwright, Philadelphia in the Romantic Age of Lithography, (Philadelphia: The Historical Society of Pennsylvania, 1958), pp. 11, 187.
131. William Huffington, The Delaware Register and Farmers' Magazine, vol. I, (Dover, Delaware, 1838), p. 193.

Figure 23. Page from ledger of duPont household accounts, "Household expenses," for the month of March 1839. Note especially the purchase of a bushel of oysters on March 19 at fifty cents.

Source: Henry Francis duPont Winterthur Collection of Manuscripts, Papers of E. I. duPont, Eleutherian Mills Historical Library, Wilmington, Delaware.

		Household expenses	\$	cts
1839				
March	2	10 th of Veal 80. 9 th Lard 1.26 Limes 25. Fat 87 ¹ / ₂		
"		Tin Sausage 35	3	43 ¹ / ₂
"	5	To the Sausages	"	35
"		a Barrel of Flour		
"	6 th	a leg of mutton	"	80
"	7	Forks for the Garden (Duncans)	3	88
"	8	11 th Lard from Mrs Mary at 11 ^{cts}	1	54
"	9	13 ¹ / ₂ # Veal at 9 ^{cts}	1	22
"	6 th	2 dozens of Eggs (cash Chandler)	"	28
"	11	a paper of carpet tacks	"	9
"	13	mutton chops 55 ^{cts} , Fish 12 ^{cts}	"	67
"	16	leg of mutton 75 - Fish 25, Howmany 30	1	30
"	19	a Barrel of Oysters	"	50
"	20 th	leg of Veal 95, Fish 12 ¹ / ₂	1	07 ¹ / ₂
"	23	leg of mutton 85, Fish 12 ¹ / ₂ , unbaked Flour 1.00	4	97
"	27	leg of Veal 11 # 99, Fish 12 ¹ / ₂ - meal 90	1	91 ¹ / ₂
"		a tin Sausage	"	25
"	30	a leg of mutton 5 ¹ / ₂ # at 11 ^{cts} = 60 Fish 10 ^{cts}	"	70
"		hicks bought in Pt by Michael	1	18
"		7 dozens of Eggs from Stydams Store	"	98
"		To Saml Bailey for cows feed	19	72 ¹ / ₂
			31	86

Figure 24. Page from ledger of duPont household accounts, "Household expenses," for the month of December 1840. Note especially the purchase of oysters by the quart on December 4, 15, 24 and 31.

Source: Henry Francis duPont Winterthur Collection of Manuscripts, Papers of E. I. duPont, Eleutherian Mills Historical Library, Wilmington, Delaware.

1840

House hold Expenses

Date	Description	\$	Cts
2	3# Sausage		33
"	a Barrel of Flour Brandysine		6
4	a quart of Oysters		25
"	two Rabbits		25
5	a coal scuttle		75
9	Leg of Veal 75, chickens 30 1 Dozen Eggs 19	1	44
"	Two dozens Eggs from Gugg	"	28
"	Rhubarb	"	19
15	a quart of Oysters	"	25
16	beef steak 28, Liver 20, partridges 42 1/2 Rabbit 10	1	00
"	Rope yarn for Matts for the hot bed	"	85
19	a leg of Veal 87 1/2 Rose water 12 1/2	1	00
20	a Butcher's knife 25, Sugar supper 80 (Dunson)	"	75
"	a pudding stuffer	"	19
"	a plate warmer } Haddon	1	50
22	To the Sumps, Louisa's room Steel Chk, Wash wood kitchen	"	82
24	a quart of Oysters	"	25
"	three brass folts for parlour shutters	"	19
26	4 partridges Bunsing	"	32
"	Veal 20 - 4 partridges, 25	"	45
"	a barrel of flour Brandysine		
"	147 # white Sugar at 13 1/2 bought on P.	19	30
30	a Turkey 106 suit 8	1	14
31	two Quarts of Oysters	"	75
"	6 dozen small cakes	"	75
"	Soap and Candles from Bancroft during the Year	43	74
"	Groceries & other articles from Brutton's Store	85	31
"	ditto, from Mr Wainis	91	79
"	ditto from Mr Jamies since July	17	89
"	To Robert Reid for Eggs bought in his store for	2	67
"	a tongue for New Year Day	"	00
"	Repairing sawpans, tea Kettle & at Haddons	"	32
"	Repairing the Entry Stone		
"	one dozen Eggs (Cash Elor)	2	50
"	a Plate warmer (Haddon)	"	14
"	To Miss Conby for 4 barrels of flour	1	50
"	To S Conby part of a milk pig	34	45
"	To Mrs Dunnan Corn for the pigs	1	25
"	To Dutton Nov 12 - Dec 31 6. 16	8	50
		18	16
		\$341	63 1/2

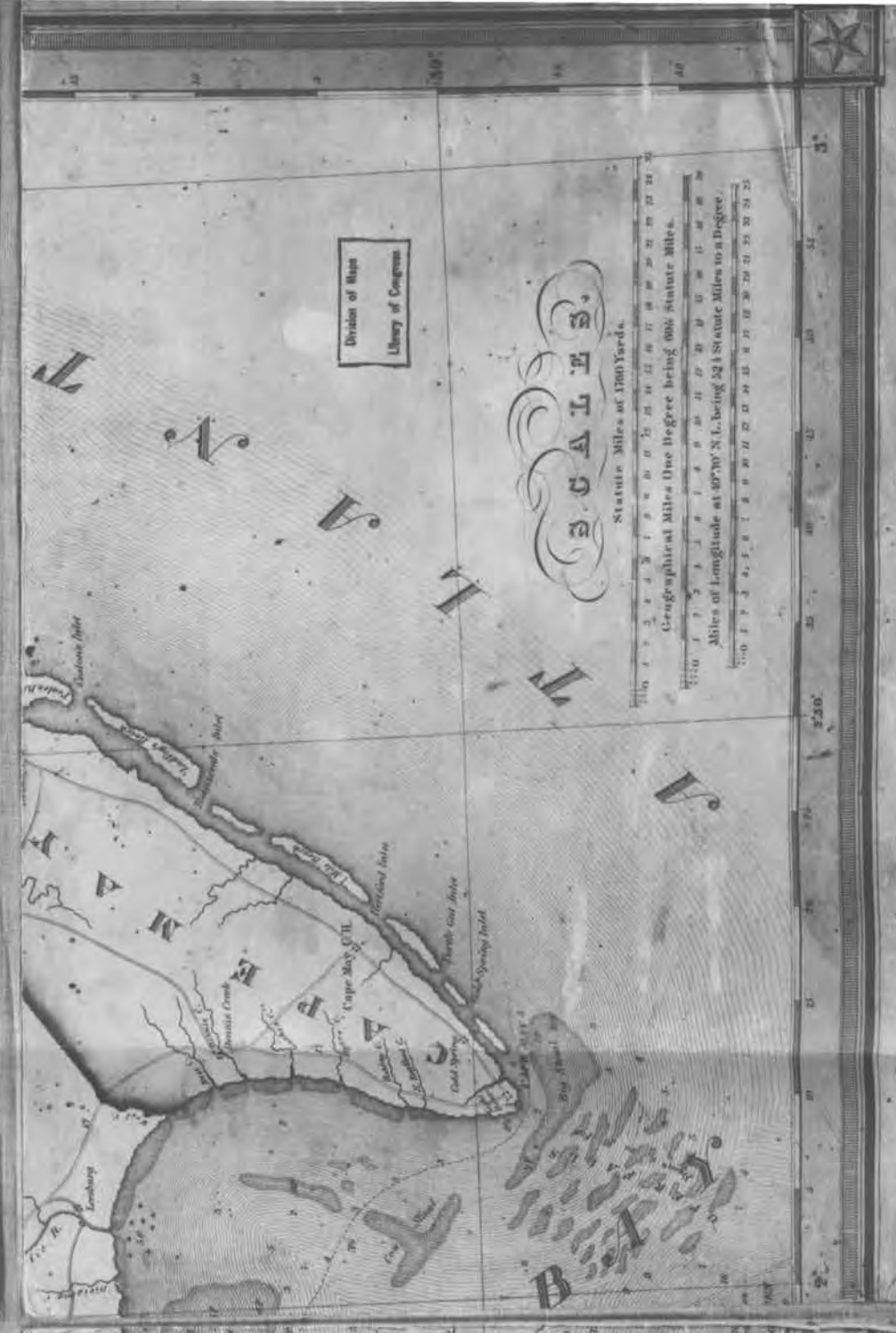
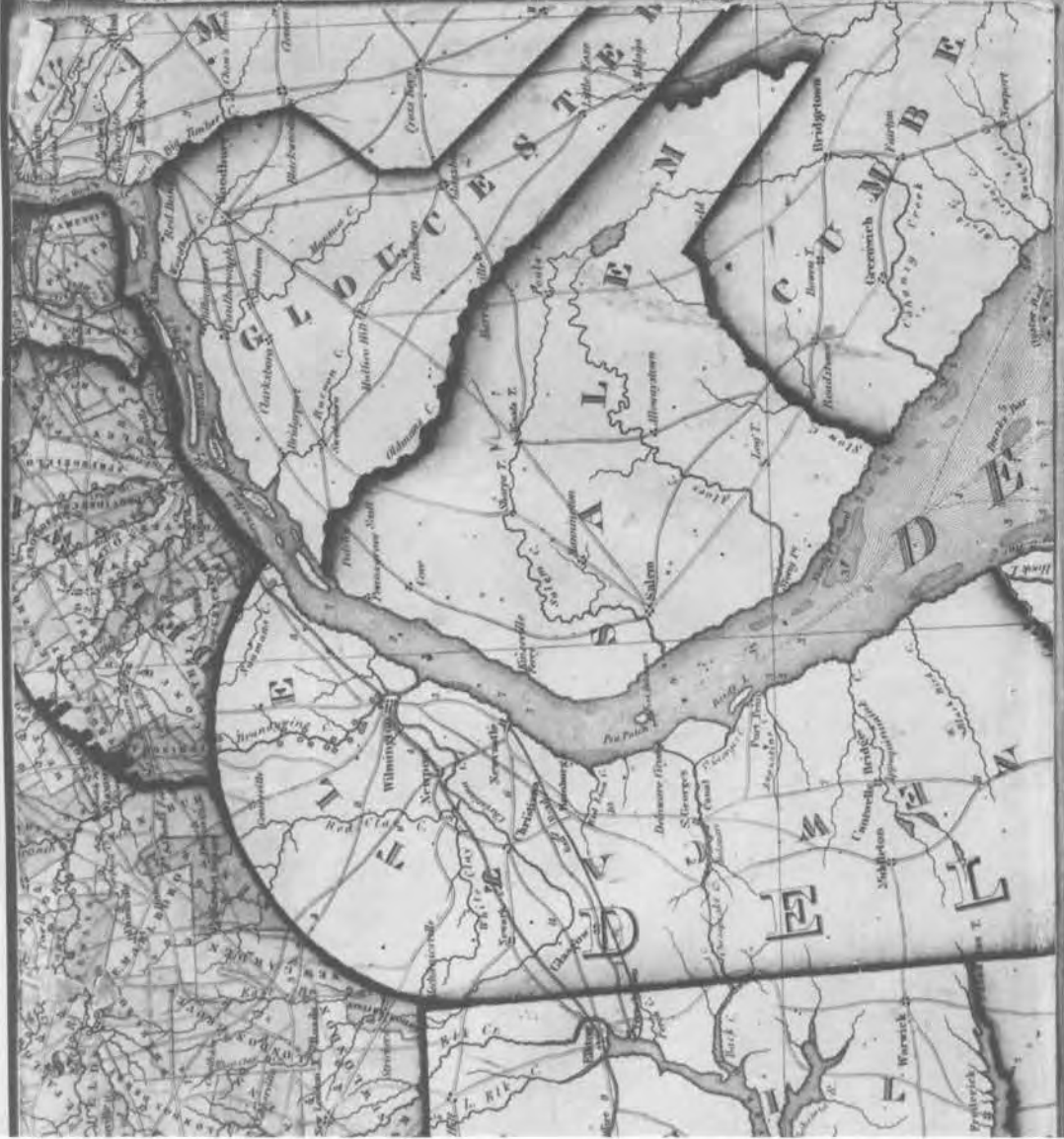
and twenty-five cents a quart for shucked oysters.¹³² It was the custom in Europe to eat oysters primarily from September to May. Although the oyster in America was a different species than the European oyster, this fact was not known in the early nineteenth century and therefore the oyster-eating habits of the Continent were imitated in America. In the duPont household, as in many others in Delaware, extra stocks of oysters were bought and pickled in the winter for use later in the year. Some of the oysters were bought from the wharves in Wilmington, but apparently many of them were bought from peddlers selling oysters from door to door. The most expensive oysters were sold around the end of December for the New Year's celebration. This was not just an old French custom, but an old English one as well. Even today there are many homes on the Eastern Shore that would not be without their oyster dinner on New Year's Day.

Oysters still came from much the same region in Delaware as previously, according to a map made in 1849. In addition to the areas marked on the map, provision had been made in 1841 by the Legislature for private planters to

132. The Henry Francis duPont Winterthur Collection of Manuscripts, Papers of E. I. duPont, Group 4, Series C, Box 9, Legal Papers 1771-1842. Eleutherian Mills Historical Library, Wilmington, Delaware.

Figure 25. Map of Pennsylvania, 1849, under the supervision of William E. Morris, published by R. L. Barnes, Philadelphia. Note the marked oyster beds off Bombay Hook and Dover, Delaware, on the Delaware side of the bay, as indicated by x's.

Source: Division of Maps, Library of Congress.



Division of Maps
Library of Congress

STATES.
Statute Miles of 1760 Yards.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Longitude 75° 00' 00" W. to 76° 00' 00" W. Latitude 37° 00' 00" N. to 38° 00' 00" N.

plant oysters in Indian River Bay and Rehoboth Bay.¹³³

This planting had followed closely upon the opening of an oyster packing plant, W. W. Stevens and Company, in Seaford, Delaware, in 1840.¹³⁴ Early in February 1843 the unpopular closed-season law of 1835 was repealed.¹³⁵ In 1845 a John C. Price advertised Fresh and Salt Oysters at the Delaware Oyster House on West Fourth Street, Wilmington, Delaware.¹³⁶ In the 1840's the quantity of oysters shipped by railroads from Baltimore increased greatly. The rise of industrialized centers meant that not everyone could supply his own food, and the source of supply was frequently far distant from its point of consumption.

One of the signs of growing national power was the effort to modernize the United States Navy. There was no need to modernize the oyster suppers of the Eastern Shore. The Navy suffered a setback in 1844 when Robert F. Stockton's 12-inch shell gun on board the "U. S. S. Princeton," a new screw-propelled vessel designed by John Ericsson, blew up. Although the explosion during the trial run killed the Secre-

133. Delaware, Laws of the State of Delaware, vol. 9, p. 481.

134. J. Thomas Scharf, History of Delaware, 2 vols., (Philadelphia: L. J. Richards and Company, 1888), vol. II, p. 1311.

135. Delaware, Laws of the State of Delaware, vol. 9, p. 481.

136. Wilmington Directory, Wilmington, Delaware, 1845, p. 131. The Delaware Oyster House is listed under Oyster Saloons.

tary of State, the Secretary of the Navy and several Congressmen, if it had not been for oyster suppers the affair might have been much more disastrous. At the time of the explosion, the President, most of the women and many of the men on board ship were below decks drinking champagne and eating oysters and chicken salad.¹³⁷

Bowers Beach, at the mouth of the Murderkill River, was named for a family which had owned land there from 1734 to about 1847. In the eighteenth century small communities like this had been active in the coastal trade with Philadelphia. With the advent of the steamship, many of these same communities continued trade relations with the city. In the 1840's people from the towns and farms in Kent County went to Bowers Beach in wagons and carts. The whole family went for the trip which lasted about three days. During this outing a store of oysters for the fall was gathered. On the way home the oysters were stored in the wagons and covered with salt hay.¹³⁸ Well before the middle of the nineteenth century the habit of spending an occasional few days at the beach was ingrained in many Delawareans.

137. "The Diary of Sidney George Fisher 1844," The Pennsylvania Magazine of History and Biography, vol. 79, (Philadelphia: The Historical Society of Pennsylvania, 1955), p. 486, entry dated March 3, 1844.

138. J. Thomas Scharf, op. cit., vol. II, p. 1149.

In a letter to his wife in Dover, Charles I. duPont wrote on August 5, 1847:

Give my affectionate regards to Willie and tell her I intend to pay her a long visit at Marshyhope as soon as frost comes, I intend to go it strong on Terrapins & oysters. -- 139

In the following year, steam packing of oysters was begun in Baltimore, and in that same year a packer from New York City moved to Baltimore to be nearer the oyster supply.¹⁴⁰ At this time oysters constituted the principal product canned by plants. In the off season, or summer season, the plants canned fruits and vegetables to maintain full operation. The Gold Rush in California gave an added impetus to the canning business as oysters were shipped around the Horn and sent by railroads and wagons to the Pacific Coast. This business was to continue until the Civil War. The introduction of hermetically sealed cans about 1850 made it unnecessary to continue to pickle oysters.¹⁴¹ The eastern oyster became known on the West Coast and also in the mid-West from the shipments out of St. Louis. Brand names became important.

In local regions oysters were peddled by wagons. This was a common sight, and a lithograph depicting it was drawn

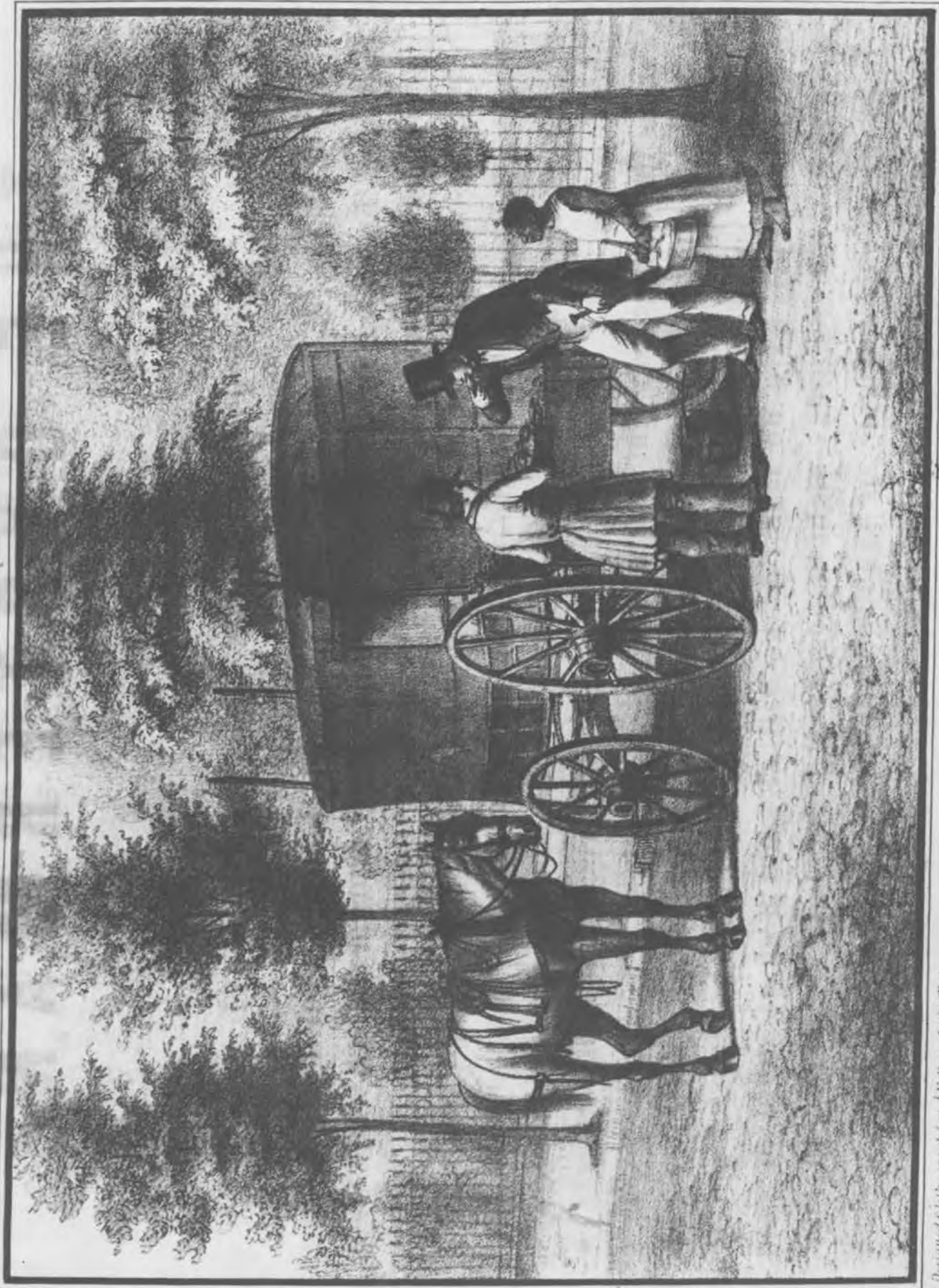
139. Leon deValinger and Virginia Shaw, ed., op. cit., vol. 3, (1961), p. 187, and the original letter in the Ridgely Collection, Public Archives, Dover, Delaware.

140. Archibald J. Nichol, op. cit., p. 12.

141. Ibid., p. 11.

Figure 26. The Oysterman, lithograph by Augustus Kollner, 1850, shows the oyster peddler plying his trade on the streets of Philadelphia. Printed by J. H. Camp, size 7-1/8 x 9-7/8.

Source: The Historical Society of Pennsylvania, Philadelphia, Pennsylvania.



Designed & Lithographed at J. Kiltnew Litho Phila

Published by the American Sunday School Union, 3-146 Chestnut St Phila

It is completely free.

by Augustus Kollner in 1850 for the American Sunday School Union in Philadelphia. The accompanying moral lesson was given:

The Oysterman. 'Every creature of God is good,'
1 Tim. iv. 4.

Joe M'Fadden is a sober and civil man, and though his calling is not the best nor the safest in the world, he honors it by a proper discharge of his duty, and he is prospered.

His wagon is always at the corner in season for the earliest call. His horse is taken out and tied to the front of his cart, and supplied with food and drink at proper times, and when it is cold, Joe never fails to throw a blanket over him. It is only a thoughtless or cruel man that neglects or abuses the dumb beast that serves him.

Joe is expert at his business, and can open his wares quite as fast as his most greedy customers can dispose of them. Families who depend on Joe for their supply, have no fear that he will give them short count or poor oysters. When Saturday night comes, Joe's horse is in the stable in good time; the week's accounts are soon settled, and we hope the Lord's day finds him in 142
some place of divine worship.

-
142. Augustus Kollner, Common Sights in Town and Country, Delineated and Described for Young Children, (Philadelphia: American Sunday School Union, 1850). These booklets cost fifty cents and copies of the few which have survived can be found in the Pennsylvania Historical Society, Philadelphia. Kollner traveled in the Middle Atlantic area and was familiar with American life, especially that in Philadelphia and Delaware. His lithographs show what he saw on his numerous trips from his home in Philadelphia. See Nicholas B. Wainwright, Philadelphia in the Romantic Age of Lithography, (Philadelphia: The Historical Society of Pennsylvania, 1958), pp. 213, 216, 219. In this work the date of this print is given as c. 1853. See also Nicholas B. Wainwright, "Augustus Kollner, Artist," The Pennsylvania Magazine of History and Biography, vol. 84, (Philadelphia: The Historical Society of Pennsylvania, 1960), pp. 335-336, where the date of the booklet in which this print appears is given as 1850, the first of four booklets Kollner produced for the American Sunday School Union.

In the late 1840's and early 1850's numerous distinguished visitors from abroad came to Philadelphia and the near by vicinity. It was inevitable that among the places visited would be the famous oyster cellars or homes which served oysters. One of the famous men who ate late oyster suppers was William Makepeace Thackeray.¹⁴³ Natives of the Delaware region often sent gifts of oysters to friends and family overseas, as well as in the United States. Not all gifts arrived in good condition, as shown in an entry in the 1856 diary of George Mifflin Dallas, Minister to the Court of St. James.¹⁴⁴ It was also during this same period that the business of oystering appeared to have fallen into disrepute.

Prime Oysters!

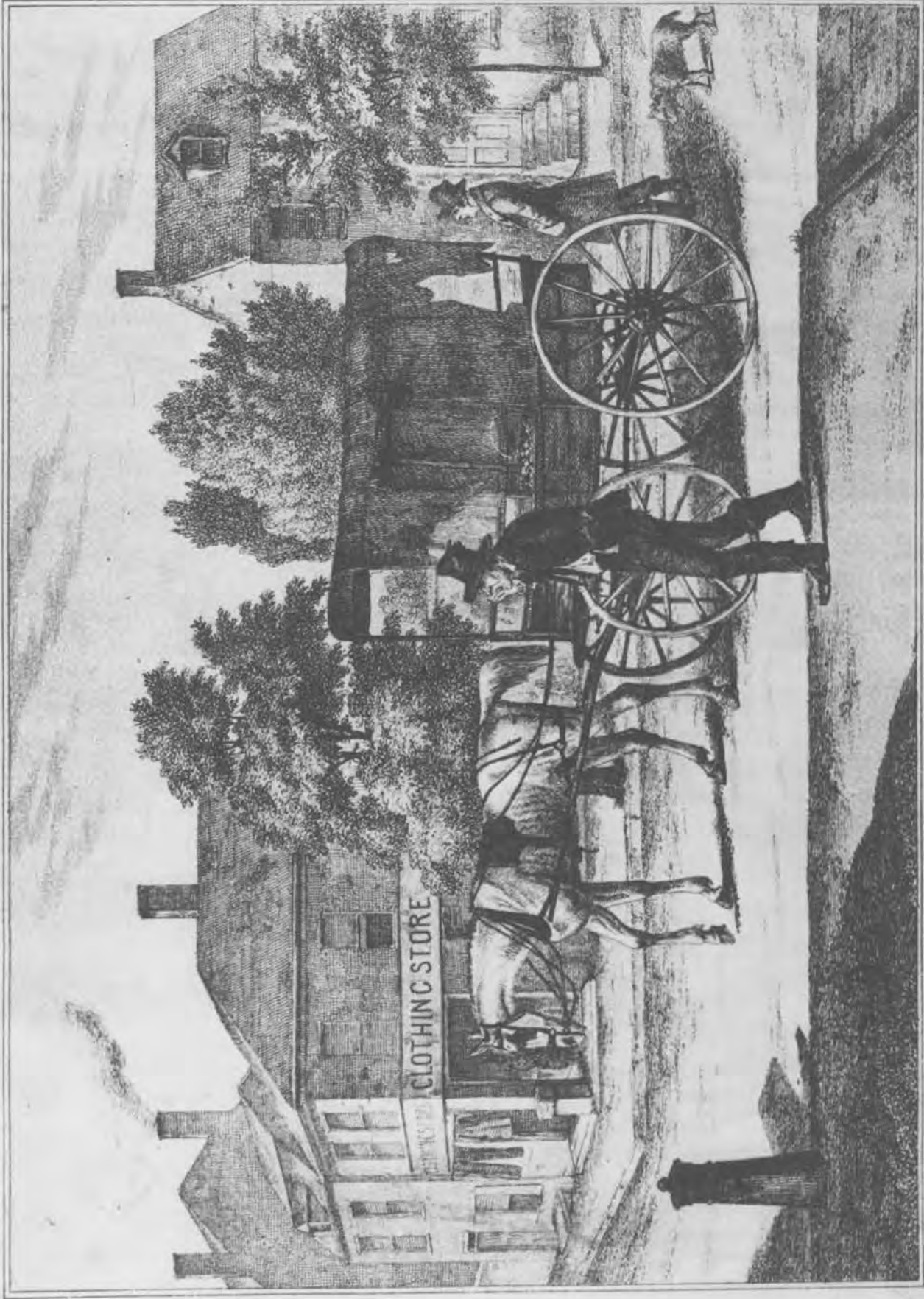
Not a very high calling to be sure; but honest and industrious men are often found in very humble occupations. The wagon is shabby and rickety, and the horse looks as if he had but little more life in him than one of the shelled passengers that he is dragging about after him.

-
143. Robert L. Bloom, "Morton McMichael's North American," vol. 77, The Pennsylvania Magazine of History and Biography, (Philadelphia: The Historical Society of Pennsylvania, 1953), p. 168. McMichael was a leader in the social life of Philadelphia at this time and he entertained many prominent visitors.
144. Roy F. Nichols, "The Missing Diaries of George Mifflin Dallas," vol. 75, The Pennsylvania Magazine of History and Biography, (Philadelphia: The Historical Society of Pennsylvania, 1951), p. 313, entry dated April 27, 1856.

Figure 27. *Fine Oysters*, lithograph by Augustus Kollner, c. 1856, shows a disreputable peddler plying his trade on the streets of Philadelphia. Size 6-7/8 x 9-5/8.

Source: The Historical Society of Pennsylvania, Philadelphia, Pennsylvania.

FINE OYSTERS



Litho. of Holstee

Chestnut St. Philadelphia

Published by the American Sunday School Union

From the Philadelphia

'Here they go! Oys-te-ers! Prime fat Oys-te-ers!' and the cry is heard all along the streets. But what rough and sorry looking men they are. Yes, -- rough and sorry enough. Old Mike who has been known in our city for many a long year took the wrong road when he was a boy. His mother wanted him to go to school, but he chose to be idling about at the taverns and stables. There he found bad company, in which he soon learned to drink and smoke and swear and fight. He learned no trade. He could neither read nor write, and so for want of something better to do, he hired an old wagon, an older horse and a small stock of oysters. Now he drags himself along through the street all day, crying, 'Oys-te-ers! Prime fat oys-te-ers!' and at night, perhaps, finds his lodging in the same 145 place with his old horse!

Two events of the 1850's were of importance to the oyster industry. First, the Delaware Railroad Company, which had been first chartered in 1836 and revived in 1848, started construction about 1852 to connect the southern part of the state with Wilmington, Baltimore and Philadelphia. The line reached Dover in January 1856 and, toward

-
145. Augustus Kollner, City Sights for Country Eyes, (Philadelphia: American Sunday School Union, 1856). See footnote 142, also Nicholas B. Wainwright, Philadelphia in the Romantic Age of Lithography, (Philadelphia: The Historical Society of Pennsylvania, 1958), p. 132. Here the lithograph is listed as "Fine Oysters by A. Kollner, c. 1850." However, the date on the booklet itself is 1856. It is a possibility that this was not the first edition, but this information did not appear, so it may be assumed that the copy was one of the first edition. Two other booklets were published by the American Sunday School Union in the 1850's for which Kollner was the lithographer, Common Sights on Land and Water, 1852, and Country Sights for City Eyes, 1858.

the end of that same year, Seaford, Delaware. The line eventually was built to Delmar, Delaware, where it met a rail line built north from Crisfield, Maryland. At Seaford the railroad was linked to the entire Chesapeake area by steamers down the Nanticoke River.¹⁴⁶ In 1853 the Baltimore and Ohio Railroad was completed to Wheeling, on the Ohio River. The downstate Delaware counties now were able to communicate with areas not close to navigable waters. The development of fruit and vegetable growing in the two lower counties was aided, as was the canning industry, by the ease of rail transportation. The use of hermetically sealed cans made fruit and vegetable canning a booming business. The town of Seaford became one of the canning centers of Sussex County and the peninsula.

The second factor of importance to the Delaware oyster industry in the 1850's was legislative action. Early in March 1851 the General Assembly passed legislation dealing with shell fishing in Delaware Bay.¹⁴⁷ Several features of this law are of interest. First, the previous laws,

-
146. The development of the railroads in Delaware can be found in various works on Delaware history by such writers as Conrad, deValinger, Lincoln, Scharf and many others.
147. Delaware, Laws of the State of Delaware, vol. 10, Chap. 55, p. 562.

amendments and appeals were reviewed. Licenses were now required, at a cost of fifty dollars, for out-of-staters. Oysters were to be culled at the place where they were caught, with the catch limited to twenty bushels for some of the creek oyster banks. Dredging was prohibited. A closed season from May 1 to August 10 was set. And a limit of one acre was placed on planting grounds for citizens' use. The laws of the state were codified for the first time in the Revised Statutes of 1852, which became known as the Code of 1852. Some slight revision was made in March 1857.¹⁴⁸ One feature of the session in that year was the extension of the closed season on the Mispillion and Murderkill Creeks from May 1 to September 1 each year.

By 1857 there were thirteen oyster saloons operated in Wilmington, Delaware.¹⁴⁹ This was quite an increase over the single oyster saloon which existed in 1845. The effect of renewed interest in the oyster business was paralleled by a growth in the per capita consumption of oysters.

Another practical result of this legislation in the 1850's was the development of a local custom which was to

148. Ibid., vol. 11, pp. 513-514.

149. Wilmington Directory, Wilmington, Delaware, 1857, pp. 155-156.

become a tradition, "Big Thursday." The people of Kent County had been in the habit of going to Bowers Beach in the summer for their supply of oysters. The closed season act passed in 1835 had proved so unpopular that it had been repealed in 1843, thus permitting the county residents to continue their summer treks to the beach to gather oysters for winter use. With the passage of the Act of 1851 the closed season on oysters was reestablished. Thereupon, Kent Countians converged on Bowers Beach on the second Thursday in August, 1851, a day thereafter to be known as "Big Thursday." This enabled them to gather their supply of oysters and return home by Saturday. For many families who had to work hard all summer and did not often see other people, this trip to the beach was a big treat and a wonderful holiday. Oysters were gathered in large quantities, either by tonging or simply by picking them up along the shore. They were eaten raw or were roasted over camp fires alongside the family wagons and carts.

Other activities naturally were engaged in. There was the inevitable fiddle and plenty of dancing, drinking, gossiping and politicking, while the children slept. When Saturday arrived, the oysters had been carefully stored away, the children bundled into the wagons and the long trek home began. The men had talked over the political news of the day, and candidates or aspiring candidates had had an excellent

opportunity to talk to the voters shortly before election. So, the great festival ended as it had begun with wagon wheels creaking as they slowly turned in the sandy roads.

There is a difference, however. The voices of men, women and children are subdued, quiet as if a pall had descended upon them. Activity had taken its toll. Everyone seemed tired physically, and yet each had been revived spiritually by seeing and visiting old friends and forming new acquaintances. The year ahead to the next "Big Thursday" seemed a long way off, indeed.

An additional holiday was set aside at about the same time for the free Negroes and slaves in the area. Known as "Black Saturday," this day was set aside after "Big Thursday" for the Negroes to gather their supply of oysters. Families came and much the same activities occurred as those on "Big Thursday." There was no politicking, however, since the Negroes did not have a vote at that time, but otherwise the two days served the same purposes and were indeed gala holidays. Each year the crowds at these holidays seemed to increase.¹⁵⁰

150. See J. Thomas Scharf, op. cit., p. 1149; Delaware, A Guide to the First State, op. cit., p. 402; also Conrad and other Delaware histories. In addition see Mary Emily Miller, "Port Town on the Starboard," p. 24, unpublished bachelor's thesis at the University of Delaware, Newark, Delaware, 1955.

The state approached the beginning of the Civil War with the Democratic party in power and with definite Southern sympathies, although many of the economic ties of the state were with Philadelphia and the North. In a total population of 112,216 in 1860 there were 19,829 free Negroes and 1,798 slaves.¹⁵¹ Delaware remained in the Union, but Southern customs and many family ties, especially in the southern part of the state, indicated that the war years would be difficult ones indeed.

151. United States Census Reports (see table in appendix for totals); also various histories of Delaware.

Chapter V

Civil War to the Twentieth Century

Shortly before the outbreak of the Civil War, Mallory, one of the founders of the Baltimore canning firm, established a branch in Seaford, Delaware, known as Platt and Mallory.¹⁵² Seaford was ideally situated for this kind of enterprise, being located on the Nanticoke River, connected with Baltimore and Norfolk by steamers and by rail with Philadelphia. This port provided a good supply of fresh water and was near oyster beds.

With the outbreak of the Civil War, other Baltimore and northern firms began opening branches in Seaford. By 1862 several such firms had set up oyster packing houses in this town. The number increased in 1863 and 1864.¹⁵³ There in Delaware they were on safer ground than in Maryland, where the danger of secession was greater. Despite some southern sympathy in the neighborhood, oysters were supplied to northern markets.

152. Ingersoll, op. cit., p. 171.

153. Ibid.

Oysters were shipped both in cans and in bulk from Seaford. A report by C. S. Maltby of Baltimore in 1865 revealed that the oysters taken in Maryland waters that year went to eight places, Baltimore taking the greatest portion. The next largest consumer of these oysters was Fair Haven, Connecticut, followed by Philadelphia and Boston. Next in rank was Seaford, Delaware, followed by New York, Washington, Alexandria and Salisbury, Maryland. Seaford used 275,000 bushels, almost all of them tonged rather than dredged from Chesapeake Maryland waters.¹⁵⁴

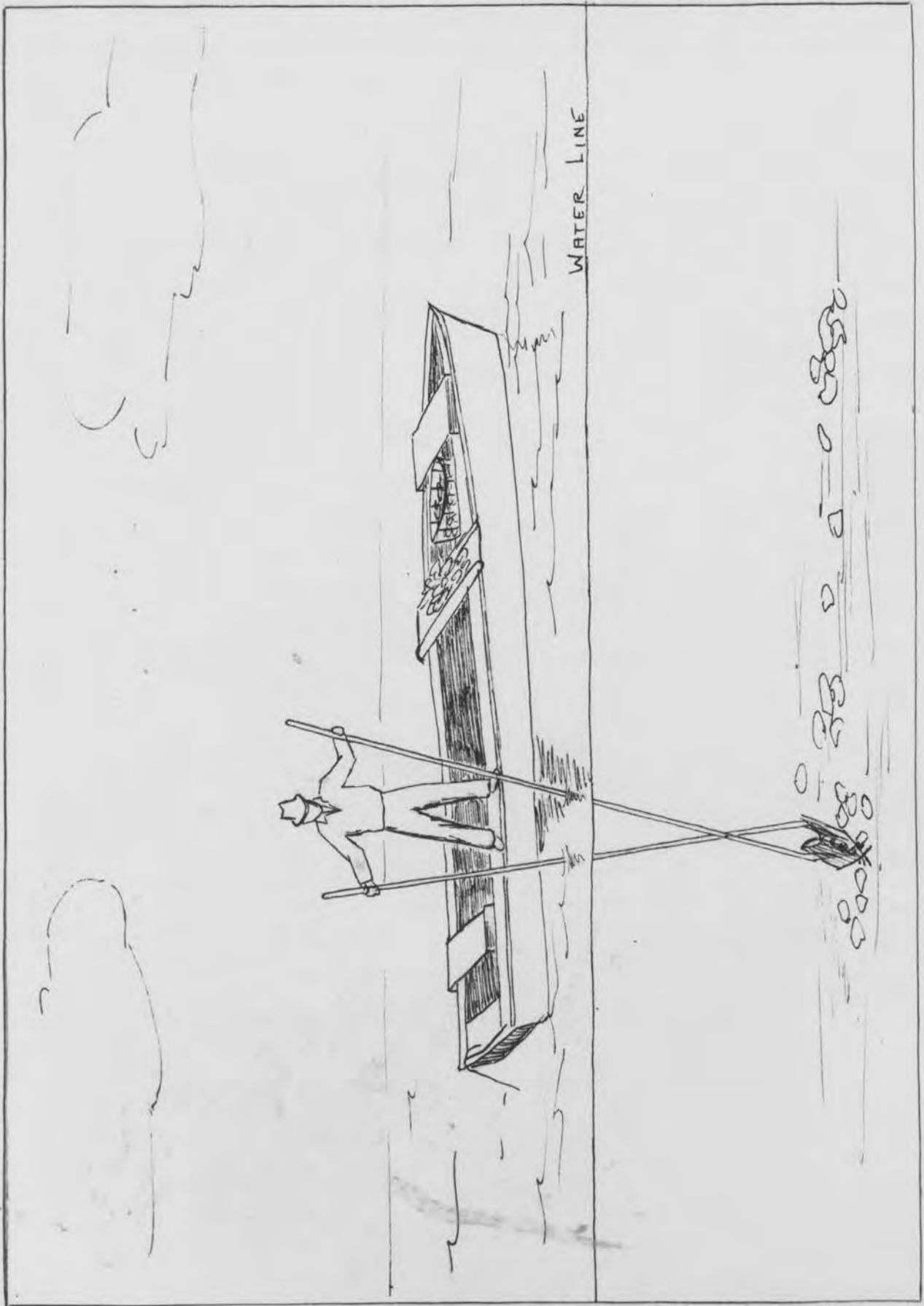
The extent of the oyster harvest in 1866 is indicated in a letter to Miss Annie Johnson at Farmington, Delaware, from "Jenney" (Mrs. Henry Ridgely) of Dover sometime in February 1866 in which the writer said, "I wish thee was here now I have chicken sallad, calves foot jelly, and ice-cream to a right fresh loaf of pound cake, to fruit cake, we have abounded in oysters & Maninones, fresh sausage."¹⁵⁵ On October 21, 1866, the same Miss Annie Johnson wrote to "Nicky" (Nicholas Johnson) at school in Chestertown, Maryland,

154. Ibid., p. 165.

155. DeValinger and Shaw, ed., op. cit., vol. 3, pp. 341-342, and original letter in the Ridgely Collection, Public Archives, Dover, Delaware.

Figure 28. Oysterman tonging in shallow water.

(Drawn by Mrs. Doris Major Payne under
the direction of the author.)



saying, "Mr. Hamilton has been oystering and we got two bushels from him he got 25 bushels....have you been down to old Perkins to get oysters yet I guess you have."¹⁵⁶ Families all over Delaware were enjoying oysters, and by the end of the war there was increased consumption, as shown by the rising popularity of such holidays as "Big Thursday." The industry was thus stimulated in proportion.

During the Civil War and thereafter, the Delaware Legislature was active in passing legislation to protect and to promote the industry. Toward the end of March 1863 the General Assembly imposed a tax of one cent per bushel on opened oysters for export and about a year later decreased the tax to half a cent per bushel.¹⁵⁷ On March 16, 1865, the Legislature passed another act which required licenses of thirty dollars to be taken out by anyone exporting oysters if the business exceeded \$500.¹⁵⁸ This license fee, coming as it did near the end of the Civil War, led many of the Baltimore firms to sell their interests in Delaware and return to the west shore of the Chesapeake.

156. Ibid., p. 343, and the original letter in the Ridgely Collection.

157. Delaware, Laws of the State of Delaware, vol. 12, pp. 353, 419.

158. Ibid., p. 627.

The southern part of Delaware was still closely connected with the Chesapeake oyster industry and that in Indian River Bay in Delaware. The industry in Delaware Bay had always been oriented toward Philadelphia. One of the reasons Philadelphia imported so few Chesapeake oysters was the availability of "Delaware Salts" from both sides of the Delaware Bay. In Wilmington two firms were listed as oyster dealers in 1866.¹⁵⁹ However, the prosperity of the times was not to remain undisturbed.

On February 1, 1871, a comprehensive oyster law was passed by the Delaware General Assembly. This law covered various aspects of oystering: tonging, dredging, planting, licensing, taxation, inspection and protection. The first provision of this law was that the areas where oysters were planted would be called oyster plantations and would be the property of the planters for an annual payment of a total ground rent of twenty-five dollars and three dollars per ton for the vessel which was to be used working the plantation. The area set up for planting was in the Delaware Bay south of Reedy Island and west of Blake's Channel. A limit of fifteen acres per license was to be enforced, while it was specially pointed out that non-residents would

159. The Wilmington Directory, Wilmington, Delaware, 1866-1867, p. 222.

not be allowed to dredge without a license. Provisions were made for a watch boat to patrol night and day from March 1 to September 1 or longer if necessary, to protect the rights of the planters. No dredging was to be permitted in July and August, after sunset or before sunrise or on Sunday. The office of Collector of Oyster Revenue was established to issue licenses, provide protection for the planters and collect and account for the taxes and license fees. His term of office was to be two years, and he was to be appointed by the governor.¹⁶⁰ The first collector, Stephen M. Collins, was appointed by Governor James Ponder in 1871.¹⁶¹

The enforcement of this new act was not an easy task. On March 28, 1871, a "Report...in Reference to the Oyster Fisheries in Delaware Bay" was issued by the State of Pennsylvania. It contended that for more than forty years the fisheries of the Delaware River and Bay had been used in common by the citizens of Pennsylvania, Delaware and New Jersey. The fact which changed this arrangement was an act passed by the New Jersey Legislature in 1871 to enforce an

160. Delaware, Laws of the State of Delaware, vol. 14, pp. 11-16.

161. Delaware, Executive Appointments for the State of Delaware, 1871; see appendix for list of Oyster Revenue Collectors.

act passed in 1846 which had made provision for assessing every vessel working on the New Jersey oyster beds and for requiring a New Jersey license for each vessel. The 1846 act also required the person holding a license to have been a resident of the state of New Jersey for at least six months. The resolution passed by the Pennsylvania Legislature asked New Jersey to repeal the section of their 1846 act which had established the licenses and limitations. The Legislature contended, in short, that the New Jersey statute discriminated against Pennsylvania people who had put money and effort into improving and increasing oyster beds for supplying Philadelphia markets. One of the signers of the resolution was named Buckalew, a name which appears in both New Jersey and Delaware in the oyster business, sometimes with a different spelling.¹⁶² It must also be noted that the same type of provision to which Pennsylvania objected was included in the Delaware law of 1871.

A supplement to the Oyster Act was passed on March 7, 1871, drawing a line from Mahon River Light House to Blake's Channel which would divide the oyster grounds. The area

162. Pennsylvania, "Report of the Committee on Federal Relations, and the Resolutions Passed by the Senate and House of Representatives of the State of Pennsylvania, in Reference to the Oyster Fisheries in Delaware Bay, March 28, 1871," pp. 1-8.

north of this line, which became known as the East Line, was considered public ground, while the area south of this line was open for private planting.¹⁶³ This same line, even today, divides public from private grounds on the Delaware side of the bay. The booming oyster business found its center in the Delaware Bay around Mahon's Landing and Little Creek, near Dover, with such small ports as Leipsic and Bowers Beach acquiring some importance.

A few additions were made to the oyster law in the 1870's, most of them to clarify points which had not been clear in the law of 1871. The frequent references to strict observance of the restriction on night oystering showed that oystermen were not obeying the law. The demand for oysters tempted many oystermen to evade the laws. Despite evasions, state income from oysters slightly exceeded \$4,900 in 1872.¹⁶⁴

By 1871 there were nine oyster dealers listed in Wilmington alone.¹⁶⁵ On October 16 of that year Miss Annie Johnson of Farmington wrote to Nicholas Johnson in Chestertown, Maryland, that "one day last week Miss Lizzie Straughn

163. Delaware, Laws of the State of Delaware, vol. 14, p. 25.

164. Delaware, Auditor's Report, 1874, "Oyster Fund."

165. The Wilmington Directory, Wilmington, Delaware, 1871-1872, p. 272.

sent papa a barrel of splendid oysters we only eat the last yesterday, they were as large oysters as I ever saw, I know you would like to have some."¹⁶⁶ Oysters were part of the college menus during those years. On February 4, 1873, Miss Annie Johnson, then at Wesleyan College in Wilmington, wrote Nicholas Johnson about the food which was served:

We still have extraordinary fare here, such as stewed oysters, mince pie, chicken pie and the like, I wish you poor little mortals could get some, but I suppose you can't, so I won't wish any more....As stewed oysters always make people sleepy, I will have to stop writing, for they have had that effect on me.

167

Because of the keen competition involved in the industry, a controversy over jurisdiction of the Delaware River arose between Delaware and New Jersey. Beginning in 1871, it involved much correspondence, several committees and finally the Supreme Court of the United States. A report by the Delaware Commissioners on fishing rights within the twelve mile circle around New Castle, Delaware, was given in September 1874.¹⁶⁸ The Delaware Commission was dis-

166. DeValinger and Shaw, ed., op. cit., vol. 3, p. 344, and original letter in the Ridgely Collection, Public Archives.

167. Ibid., pp. 347-348 and original letter in Ridgely Collection.

168. The Fishery Question. Argument of the Delaware Commissioners upon the Question, Whether the Citizens of New Jersey have the right to Fish in the Waters of the Delaware Within the Circle of Twelve Miles Around New Castle. (Wilmington, Delaware: James and Webb, Printers, 1874).

banded in 1875 without having received an answer from the New Jersey Commission.

Some of the difficulty the oystermen encountered in these years is set forth in a petition to the governor of Delaware which was written sometime between the inauguration of the governor early in January and February 20, 1875:

To His Excellency Jno. P. Cochran
Governor of the State of Delaware,

Dear Sir:

We the subscribers, Oyster planters in the Delaware Bay, do most respectfully represent, that we have so far as in our power, complied with the law, that we have regularly paid out License, but we regret to say that our oyster plantations have not had the protection, which the law contemplated; that some of our beds have been robbed and plundered by a set of depredators, who take out planting licenses, under a pretext to be called Planters, but for the sole purpose to rob and plunder, when an opportunity offers, day or night, and notwithstanding all the complaints made to parties having charge of the Enforcement of the Law, these depredations have continued, and grown worse and worse, and should it continue to be managed as it has been, before the end of two years the planting of Oysters, on this Shore, will be virtually broken up: -- And why? Simply from bad management!

The law of itself is good enough, with some exceptions (which would would [sic] be as difficult, to comply with, as taking hot coals out of a fire, and eating them) and such are no material difference to the State whatever, whether complied with or not.

The Expense paid for Watch Boat and Crew is ample to watch the different plantations day and night. The Law says that 'the Watch Boat shall cruise at all times, day and night, over the plantations, and see that no depredations are

committed, and she shall not go in harbor except in stress of weather.' It has been hard work to get her out in daytime, let alone at night.

These Boats that follow thieving know exactly when the Watch boat will be out of harbor: -- She will not watch in windy weather, or at night, and hence, our grounds are left to the mercy of these plunderers.

Some of us have put out thousands of bushels of Chesapeake Oysters, and have not been able to get off their grounds more than their natural increase was at the time of planting; And now, Sir, this is all from the fact of appointing incompetent persons, to take charge of the administering of the Law.

The licenses collected from the Oyster boats are enormous; and Sir, we must have protection!

The time will soon arrive, when it will devolve on you to appoint a Collector, and we ask you to appoint some one that is competent to take charge of the affair. We have no particular choice of our own: only some honest and competent person who shall reside at Little Creek Landing; but we do ask you, not to re-appoint the present incumbent.

We understand that several persons, living from six to nine miles from Little Creek Landing are asking for the appointment of Collectorship; now to appoint such a one is heaping insult upon injury.

The Collector should remain on the Landing, being the most convenient place for us to come and the place where a number of us reside. The amount paid to the Collector, would not justify any one living so far off to attend to the duties of his office, and hence, the impropriety of such a thing.

We have no objection to the man being Collector, from the fact that he has not heretofore lived on the Landing, but we do object to him, unless he shall reside there, and is a competent person. It is the most convenient place for the oystermen to come, and there you are provided with a Justice of the peace, and Constable, to help carry out the design of the Law.

While there are persons residing on the Landing, who are competent to take charge of the

affairs, and who have an interest in the welfare of the oystermen, as well as interest for the State, why not make the Appointment from some one among them? And, permit us farther to suggest to you that whoever you may appoint, it should be expressly understood that as soon as he fails to do his duty, in keeping watch over the plantations, he shall be removed from office, in which case the law provides.

We also say further, in regard to the appointment of said office that there are numerous petitions to come to you, if not already before you, to make certain one or ones Collector, and signed by persons all over the County and by persons who have no interest in the oyster business, and know no more of its working than a five year old boy does, and we ask you not to be guided by such influence.

And, now in conclusion, what is the use for us to pay heavy, ay, enormous License and get no protection? And on the other hand the State get no revenue? Why, the Sooner the Law is annulled the better, and as we said before, if we don't have better management for the next two years than we have had in the former ones, the present law will amount to nothing.

Now, Sir, we ask you in the name of all that is good, and in the name of our families, who are dependent on our labor for support, to not encumber us for another two years, with a Collector who will not do his duty as the law prescribes. It should be no hard matter to keep a boat out on watch, night and day. The pay for such work is large, and it would be to the interest of the State as well as the oysterman to do so.

The way the affair is conducted at the present time is driving honest men away from the Western Shore. We know of at least thirty to forty boats on the Eastern Shore, which would come on our Shore to plant oysters but who say 'You have no protection, your Watch boat is more than half the time in harbor; we cannot afford to buy oysters, plant them and then have them Sent to Market by a Set of thieves.' Now, Sir, you may think we are

speculating, but these are facts, and we have exaggerated on nothing which this Statement contains, but on the contrary the half has scarcely been told you, and leaving this to your careful consideration we remain

Yours truly

169

This petition contained the signatures of fifty-seven oystermen. It is interesting to note that the salary of the Captain of the Watch Boat was to be eighty dollars per month and each of the crew was to receive forty dollars per month.¹⁷⁰ However, the most important feature of this petition is the statement of the difficulties the oystermen were having at that time. It is also noteworthy that on February 20, 1875, the governor appointed James Barber as Collector of Oyster Revenue and did not reappoint the incumbent Collector.¹⁷¹

The January messages of Governor Cochran to the Legislature in 1877 and 1879 reviewed the boundary question. As a result of the injunction of the Supreme Court of the United States on March 31, 1877, New Jersey residents were not required to buy Delaware licenses until the court gave

169. Delaware, "Executive Petition, 1875 Oysters," file in Public Archives, Dover, Delaware, unpublished.

170. Delaware, Laws of the State of Delaware, vol. 14, p. 16.

171. Delaware, Executive Appointments, 1875.

Figure 29. Petition from Oystermen to Governor Cochran of Delaware, January or February, 1875. The oystermen were concerned about the appointment of a new Oyster Revenue Collector in Delaware.

Source: Executive Petition, 1875 Oysters, Public Archives Commission, Dover, Delaware.

To His Excellency J. C. Calhoun
Governor of the State of Georgia
Dear Sir

We the undersigned Oyster planters in the Oyster Bay, do most respectfully represent, that we have so far as in our power complied with the law, that we have regularly paid our license, but we do not say that our oyster plantations have not had the protection which the law contemplated; that some of our beds have been robbed and plundered by a set of depredators, who take out planting licenses, under a pretense to be called planters, but for the sole purpose, to rob

may think we are speculating, but these are facts, and we have exaggerated on nothing which this statement contains, but on the contrary the half has scarcely been told you, and leaving this to your careful consideration we remain

Yours truly
David C. Montgomery
Thos W. Wallace
Cornelio Rogers
Thomas Seaneig
Alexander Hall
Silas Wall & Co
David M. White & Co
J. J. Matthew Sr.
J. S. Taylor
John M. Ward
J. P. Wood
W. L. Luman

Daniel Miller
Gomel Hall
James Bull
Whitem, Kelley
Ozzy Henderson
Thomas Lambert
W. Davis
James McNear
Edward Southers
Mr. McConison
Thomas Stenhouse
John G. Finney
William G. Chambers
S. Nathanman
Solomon Wells
Wm. Wells
Henry Hagerty
John Carey
George Wells
Arthur W. Montgomery
James McClellan
Enoch Silvester

Samuel Walker
Richard Bull
James C. Conquest
William J. J. J. J.
Henry Mason
Samuel Dudley & Sons
Charles Collier " "
Joseph Smith " "
Wm. McClellan " "
Wm. H. Wells
Henry E. Keith
Lewis Smith
Andrew Parsons
James R. Carey
John Cannon
George Mason
George Master
Michael Haynes
William Brindick
Henry J. J.
Charles Hester
Thos. Sterling
Thomas Middleton

other instructions. No solution had been reached by the time the Governor gave his January message in 1879.¹⁷²

In these years after the Civil War the Delaware oyster industry was largely in the hands of Philadelphians, either as silent partners or as co-owners. A petition to Governor John Hall, dated Philadelphia, December 14, 1878, contained a plea to reappoint the incumbent captain of the watch boat Sloop Blue Wing.¹⁷³ The signers were licensed planters in Delaware Bay. Some of the signatures on this petition were the same as those appearing on the 1875 petition to Governor Cochran. It was apparent that all these men thought highly of Captain William Chambers, who performed a difficult task in guarding the oyster grounds.

The names of over eighty vessels were listed as working on the planted grounds of Delaware at that time. Most of these were listed as schooners or sloops. Sloops, schooners, skipjacks and bugeyes all were used in oystering on the Delaware. Punts were used by tongers in the shallow water of the creeks.¹⁷⁴ The skipjacks were single-masted

172. Delaware, House Journal 1877, pp. 27-29; Delaware, House Journal 1879, pp. 18-20.

173. Manuscript petition in the possession of Valentine Massey, Dover, Delaware.

174. Information collected from oystermen such as Captain Earl Fisher, October 26, 1961, and Captain John Tarburton, December 15, 1961.

Figure 30. Petition from Oystermen to Governor Hall of Delaware, December 14, 1878. The oystermen were concerned with the appointment of the captain of the Watch Boat for the State of Delaware.

Source: Manuscript in the possession of Mr. Valentine Massey, Dover, Delaware.

Philadelphia. Dec. 14/78
 To the Hon. Jno. W. Hall
 Governor of the State of Delaware
 Sir

Your petitioners, owners of oyster Boats licensing in the State of Delaware, engaged in the business of planting and dredging oysters in Delaware Bay, within the limits of the State of Delaware; respectfully beg the appointment as captain of the Patch Boat (Gook Blue King) Capt. William Chambers - the present incumbent.

Capt. Chambers has held the position for several years giving by his Courtesy and close attention universal satisfaction. although the duties have been arduous and responsible, we have ever found him fully competent

We feel that his appointment would reflect credit upon yourself and honor to the State

owners names	Names of vessels
James D. Hittingburg	Capt. C. B. Buckaloo
	" E. U. Richardson
	" Clifton
	" Village Belle
	" H. Krimer
A. Garrett	Capt. Alfred Bunting
W. S. Smith	Capt. Gen Taylor
	Sch Lavinia
	Sch Wood Duck

H. Waney
Tylan & Lunder

Harry M. Heiser
Ohio
Protector
Maria Green
Mary L. Byrd
John Berley
E. A. Ballard

Thomas Rogers

E. C. Love
Jane Crowell
A. S. Bird

7
Tigle Bull

Wm. Pollock
Mail

John A. English

A. A. Nelson
M. J. Bostley
Katy Burton

John Cooney

John W. Willing
R. G. Hastings
Loretta

John Tules

Sec. Champion

John Cochran

Stark Kingston
Sch. Blossom

William Robbins

Sch. O. Queen

J. M. Mearns & Son

Baltimore
J. D. Lehman
Pearrell
Fisher
W. Mearns

John W. Heisinger
Joseph Carrey

Ellen Heisinger
Sch. Allabamma

C. McComer
A. M. Taylor

Sch. Mary (Cottida)
Sch. Daniel

St. Julia H. Amherst

Michael Harrison
A. Black
John Dunkin

Mary Elizabeth
Henry Fisher
Patina

Peter P. Payton

Deanna Price S. P. Delam.
Lafayette Mary Yaulame

Geo. P. Stephany
James Carrey

Seaman Benjamin Harper
Sch. Mary Ann

Patrick McLaughlin Lady of the Lake

Conklin Roydon S. C. Roydon

Capt. Lewis Taylor & F. Chambers

A. O. Drame
M. and E. Hall

Quinn Hall

Wm. R. Hertz

Patrick Flynn

Wm. J. Duelle

James J. Matthews

Capt. Lepp
John Shelders

John Kelly

Wm. J. Moore

Wm. Kelly

- John J. Moore
 Frederick Hicks
 Capt Lewis H. Pickering
 Capt E. S. Guyant
 Capt M. E. Buntingham
 Capt W. Bromell
 Capt Chas Pease
 Capt Saml Williams
 Capt J. Walker
 Capt John Martin
 Capt James P. Byler
 William Murphy
 Neal Johnson
 John McPhann
 James Miller
 John Baker Jun
 Christian Foxson
 Daniel McBride
 Daniel an South
 James Lodge
 John Blossom
 Capt James W. Winslow
 Captam Arthur Penny
 James Bull
 Wm E. Sterling

W. Kelley
 Wm Wible
 Capt E. S. Hann
 Theodore H. Kover
 Capt. W. S. Arnold
 Capt Wm Davis
 Capt Theodore Cumbright
 Capt B. Balten
 Capt J. W. Fensler
 Capt J. W. Word
 Capt W. H. Joslin
 J. P. Matthe
 Jim Cochean
 Al Kern
 Jno Dunn
 James Winslow
 David Haley
 Nathan Harker
 John Lodge
 Thos W. Wallace
 James Cincaran
 Wm. Earl
 John H. Taylor
 Samuel. V. B. Hall

Geo W. Murphy

Joseph Thomas
Editha D. Smith
Starlight

John Dusenbury

N. L. Whitman

James P. Tolon

Gar. H. Woodward

John McCabe

Clyde
W. C. S. J. Gordon
Wm. Adam Francis
Northampton

Thomas A. Joslin

Schrs Lucy & Can
Schrs Camille
Schrs Joslin

H. West

Slope Loge Cober
Sch. W. Edwards
Annu. Mares
Anno Warle

E. Swamy

L. Hess
Farming
de A. Seavis

John Guyant

E. S. C. Guyant
John Guyant
J. Fairness
Mr. G. Washington
E. S. Conner

Tom McCully
Hudson Flavelle

John Commodore
Set. W. ...

square-sterned vessels of varying lengths. The bugeyes and schooners were favored because of their seaworthiness on the unpredictable Delaware Bay, subject to sudden and severe storms. These vessels were able to drag the dredges over the oyster grounds and had a cargo capacity which enabled them to stay out a week or more at a time, the common practice among oyster boats. The dredging of oysters was hard work, and the vessel used for this operation had to sail steadily in order not to bump the dredge over the beds and thus injure the oysters. Each dredge load had to be culled and the trash thrown back before the oysters could be stored for market. Frequently, two or four dredges were operated from one vessel as she sailed over planted grounds. The vessels ran into port only with full loads. Most of these cargoes were taken directly to Philadelphia, since the investors were in that city and the rail lines were able to connect with points north and west of the city.

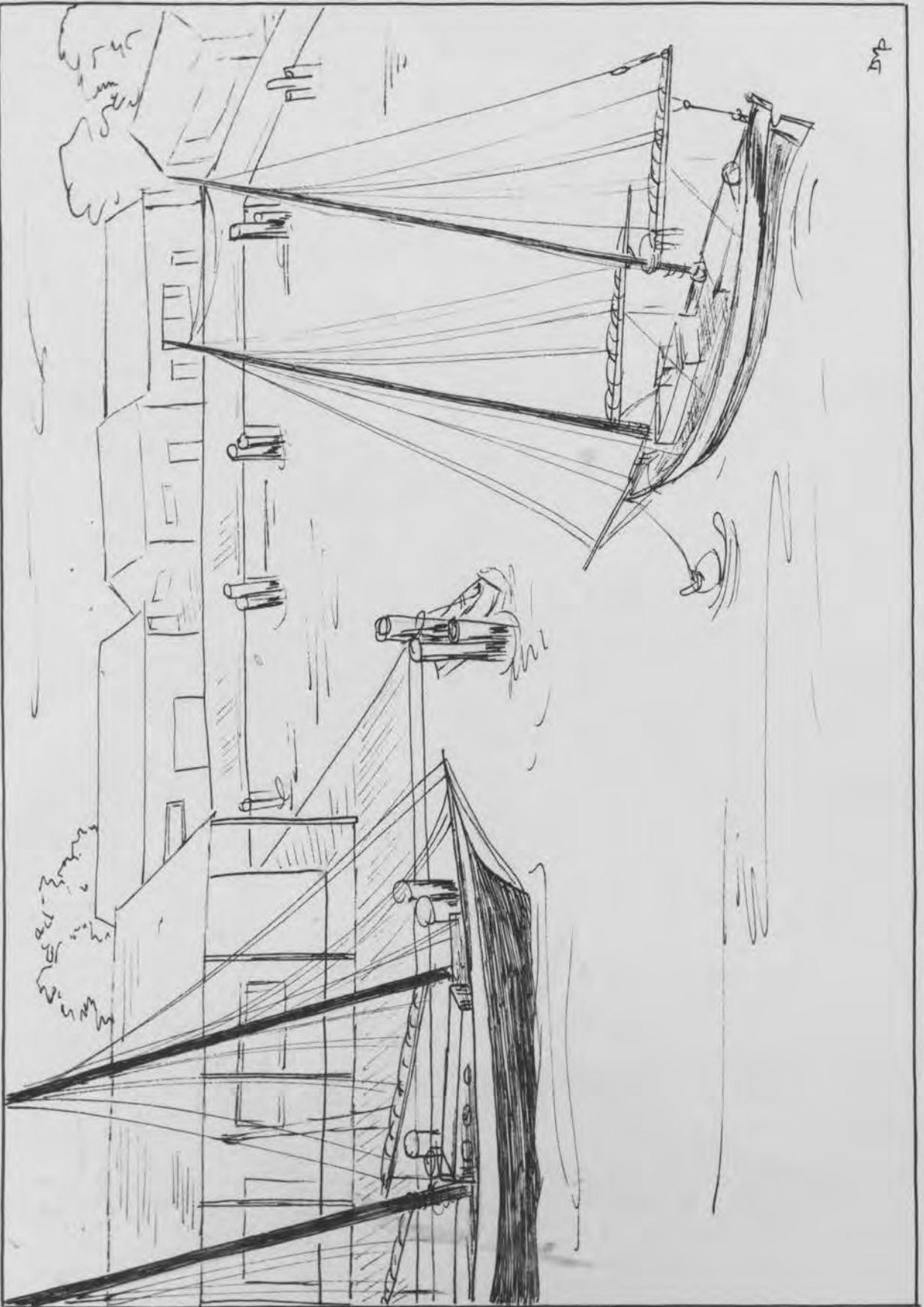
The bugeye was especially designed for oystering. She was developed in the Chesapeake Bay, but was also used extensively in the Delaware Bay. The origin of the name of this vessel is as obscure as her building origins. She had begun to appear in the late 1860's, but it was not until the 1870's and 1880's that the name "bugeye" became standard usage. She was to be a working sail vessel. She was

designed to use a minimum number of hands for the sails to free the men for use on the dredges. A low freeboard also aided in hauling the dredges. The hull was patterned after the dugout log canoes of the Chesapeake, utilizing a centerboard to enable the vessel to work in shallow water. Two outstanding features were her two masts set at a raking angle and her sharp bow-like stern. At least one of these vessels was built in Delaware. She was the "Lizzie J. White" built at Woodland, Delaware, in 1884. She was fifty feet long, a little over twelve feet wide and had a draft of three feet.¹⁷⁵ Because the Marylanders were skilled in building these vessels, most of the bugeyes used in Delaware were purchased in Maryland. However, the Delaware shipyards turned out schooners and sloops of all sizes for use in the oyster business and the intercoastal trade. The Delaware yards had the resources and the extra skills needed to build planked vessels which the growing economy of the Delaware River and Bay needed to carry on commerce.

175. Marion Bernon Brewington, Chesapeake Bay Bugeyes, (Newport News, Virginia: The Mariners' Museum, Museum Publication No. 8, 1941), p. 99. This work contains an excellent description of the evolution of the bugeye and also relates the various tales about the naming of the vessel. A list of known bugeyes is included, although it is believed that many vessels are missing from the list.

Figure 31. Bugeyes at rest in harbor.

(Drawn by Mrs. Doris Major Payne under the
author's direction.)



AP

By the end of the 1870's an expanding business in transplanting southern oysters to Delaware Bay was developing. Although the Delaware oyster industry was owned and operated principally by Philadelphians,¹⁷⁶ the Delaware Bay oysters were well known by brand in the mid-West, especially around the St. Louis area.¹⁷⁷ Wood-droggers (light draft schooners) carried Maryland and Virginia seed oysters from the Chesapeake through the Chesapeake and Delaware Canal into Delaware Bay. Some of these oysters--all of them in fall and winter--were shipped immediately to Philadelphia, for consumption, but most of them went to the "plantations" on the Delaware. The schooners held from 500 to 1,500 bushels, averaging about 1,300 bushels for planting. Upon arrival over the staked grounds, the vessel would sail back and forth while the men on board shoveled the oysters onto the grounds. Most of these oysters were left until the fall when they were taken up to market. In those few months they had grown larger and fuller and had acquired the distinctive Delaware flavor which was so popular, the "Delaware Salt." During the 1879-1880 season some

-
176. See the accompanying plantation license for 1879, manuscript in the possession of Valentine Massey, Dover, Delaware.
177. Accounts of the Lewis family in Missouri, unpublished, in the possession of Mrs. George R. Miller, Jr., Frederica, Delaware.

Figure 32. Plantation Grant for Planting Oysters from Governor Hall, Delaware, to Captain Christain Johnson and David Smith of Philadelphia, September 15, 1879.

Source: Manuscript in the possession of Mr. Valentine Massey, Dover, Delaware.

Licenses
Granted

Le
Capt. Christian Johnson &

David Smith

John

Sells Ford Truck

~~Permit~~ = 18000 = 55.00

Permitation = 28.00
8780.02

100

9

In the Name and by the Authority of the State of Delaware.



State of Delaware, ss.

John A. Hall Governor of the said State,

To all Persons Whom These Presents May Concern, Greeting:

This License is granted to *Capt Christian Johnson & David Smith* of the City of *Philadelphia* in the County of *Philadelphia* and State of *Pennsylvania* to appropriate to their own use, a part not exceeding in the whole, fifteen acres, of the bottom of Delaware Bay south of Reedy Island, and west of Blake's Channel,

FOR PLANTING OYSTERS,

the said *Capt Christian Johnson & David Smith* having applied to *Chas. Drury* Collector, in writing, for a license for that purpose, and having paid to the said Collector the sum of twenty-five dollars as the fee or price therefor, and the sum of $55 \frac{02}{100}$ dollars, being at the rate of three dollars per ton, (custom-house measurement,) for the vessel *Sch^{rs} Wood Duck* employed in the business of planting; the said vessel being of $18 \frac{34}{100}$ tons burthen, according to said measurement. But the privilege granted by this license shall not embrace any portion of the bottom which is a natural oyster bed, and has been hitherto used or worked as such, nor shall be extended beyond the mere right to plant oysters and hold them as property.

THIS LICENSE shall continue in force until the first day of May next, and is granted conformably to the provisions of an Act of the General Assembly of said State, entitled, "An Act in Relation to Oysters," passed at Dover, February 1, 1871, as amended by the Act entitled, "An Act to Extend the Time for Taking out Certain Licenses, and for Other Purposes," passed at Dover, February 24, 1871.

Given Under my Hand, and countersigned by the Secretary of State, and sealed with the seal of his office, at Dover, the *fifteenth* day of *September* in the year of our Lord one thousand eight hundred and

Seventy three

John A. Hall

James S. Covert

Secretary of State.

700,000 bushels of Chesapeake seed were planted on the Delaware side of Delaware Bay.¹⁷⁸

The list of vessels registered to work on the plantations in 1880 included some sixty-eight sloops and schooners.¹⁷⁹ These vessels took their cargo to the market at the foot of Spruce Street in Philadelphia. Many of the Philadelphia merchants had holdings in both Delaware and New Jersey.¹⁸⁰ Despite the fact that a great deal of profit from oystering was taken out of the state, the Oyster Fund was large enough to be a separate fund in the Auditor's Report. The state revenue in 1880 from oysters was \$5,500.¹⁸¹ By law the money in that fund was to be used exclusively to redeem state bonds.¹⁸² During this same period shell lime was selling in Seaford for nine cents a bushel,¹⁸³ and there were thirteen oyster dealers in Wilmington.¹⁸⁴

-
178. Ingersoll, op. cit., pp. 152-153.
179. "Oyster Revenue Collector's List of Registered Vessels for 1880," unpublished manuscript in the possession of Valentine Massey, Dover, Delaware.
180. Ingersoll, op. cit., pp. 154-156.
181. Journal Every Evening, Wilmington, Delaware, February 23, 1945, "State Revenue From Oysters Changes Little in 64 Years," p. 11.
182. Delaware, Auditor's Report 1879-1880, p. 16.
183. Milford Chronicle, Milford, Delaware, vol. VI, March 30, 1883, advertisement for shell lime by M. Colburn and Company, Seaford, Delaware.
184. Wilmington Directory, 1880-1881, Wilmington, Delaware, p. 433.

**Figure 33. A List of Boats and Names of Captains
Licensed on the Western Shore (of Delaware
Bay) To Dredge and Plant Oysters for the
Year 1880**

**Source: Manuscript in the possession of Mr. Valentine
Massey, Dover, Delaware.**

A List of Boats and names of Capt. Licensed on the Western Shore to Drudge & Row for the year 1850

Sch#	Boat	Capt	Char	Value	Rate	Year
1	Wood Duck	Capt	Chas. Simpson	18 ⁰⁰	50.02	9
2	Mary Ann	"	Samuel Stevenson	18 ⁰⁰	50.23	7
3	Abingdon	"	Blamen Halls	16 ⁰⁰	73.87	19
4	Blaysburg	"	Lecky Orain	23 ⁰⁰	74.63	1
5	John O. Miller	"	Wm. Montgomery	25 ⁰⁰	101.74	1
6	Communodator	"	A. Montgomery	14 ⁰⁰	67.99	2
7	W. Miller	"	A. Montgomery	14 ⁰⁰	68.71	10
8	W. Grant	"	A. Montgomery	22 ⁰⁰	73.46	13
9	W. Grant	"	John W. Tucker	5 ⁰⁰	40.30	6
10	W. Grant	"	John W. Tucker	19 ⁰⁰	83.50	5
11	W. Grant	"	John W. Tucker	16 ⁰⁰	75.70	53
12	W. Grant	"	John W. Tucker	24 ⁰⁰	97.54	29
13	W. Grant	"	John W. Tucker	12 ⁰⁰	62.59	49
14	W. Grant	"	John W. Tucker	21 ⁰⁰	96.25	15
15	W. Grant	"	John W. Tucker	29 ⁰⁰	112.48	75
16	W. Grant	"	John W. Tucker	12 ⁰⁰	61.38	53
17	W. Grant	"	John W. Tucker	15 ⁰⁰	65.11	8
18	W. Grant	"	John W. Tucker	17 ⁰⁰	77.02	37
19	W. Grant	"	John W. Tucker	6 ⁰⁰	18.39	0
20	W. Grant	"	John W. Tucker	17 ⁰⁰	76.00	46
21	W. Grant	"	John W. Tucker	27 ⁰⁰	107.68	50
22	W. Grant	"	John W. Tucker	23 ⁰⁰	95.80	81
23	W. Grant	"	John W. Tucker	7 ⁰⁰	47.98	25
24	W. Grant	"	John W. Tucker	5 ⁰⁰	15.00	5
25	W. Grant	"	John W. Tucker	30 ⁰⁰	117.82	22
26	W. Grant	"	John W. Tucker	24 ⁰⁰	113.87	72
27	W. Grant	"	John W. Tucker	19 ⁰⁰	83.59	24
28	W. Grant	"	John W. Tucker	33 ⁰⁰	124.60	18
29	W. Grant	"	John W. Tucker	25 ⁰⁰	102.25	52
30	W. Grant	"	John W. Tucker	31 ⁰⁰	115.80	45
31	W. Grant	"	John W. Tucker	26 ⁰⁰	104.71	35
32	W. Grant	"	John W. Tucker	28 ⁰⁰	110.00	36
33	W. Grant	"	John W. Tucker	32 ⁰⁰	126.42	38
34	W. Grant	"	John W. Tucker	27 ⁰⁰	92.17	41

Continued
List of Boats and Names of Capt.

Continued
Licensed on the Western Shore To Dodge Point for the year 1850

Boat No.	Boat Name	Capt.	Spec.	Name	Age	Value	Days
35	John Birley	Capt	John	James	27	107.26	107.26
"	Oliza A. Ballard	"	John	W. H. C.	23	95.50	95.50
"	Ellen A. Richardson	"	Michael	W. C. C.	21	114.13	114.13
"	Lady of Lake	"	George	W. C. C.	21	90.07	90.07
"	F. Fox	"	Thomas	Guinand	5	15.75	15.75
"	R. H. Miles	"	James	Herriman	18	80.11	80.11
"	Trio	"	John	Blackman	18	72.15	72.15
"	Chickie	"	Samuel	Williams	24	97.75	97.75
"	Chathamion	"	James	Gails	27	106.48	106.48
"	Essex C. Rogers	"	Samuel	Raynor	28	113.65	113.65
"	Ann Gutzander	"	James	Carey	25	101.41	101.41
"	Ann Edwards	"	John	Wald	24	98.20	98.20
"	Protector	"	James	Bishop	31	119.62	119.62
"	Mary L. Byrd	"	John	Roberts	22	93.67	93.67
"	A. J. Bird	"	John	West	14	62.53	62.53
"	Mariah Green	"	John	West	10	100.24	100.24
"	Edith Gould	"	William	West	25	94.01	94.01
"	Adiel	"	Adam	West	23	95.44	95.44
"	Samuel J. Landon	"	Samuel	West	17	76.66	76.66
"	Lewis J. Hess	"	Lewis	West	30	116.38	116.38
"	Clayde	"	James	West	24	98.46	98.46
"	Michael Mastine	"	Ann	West	32	122.74	122.74
"	Lafayette	"	John S.	West	26	104.35	104.35
"	Mary W. Ormona	"	Ann	West	19	55.62	55.62
"	Rahce Oswald	"	Ann	West	16	76.99	76.99
"	Ormona C. Lore	"	Ann	West	15	90.57	90.57
"	Lillie	"	John	West	17	51.63	51.63
"	Harriet D. Liphigood	"	John	West	27	103.88	103.88
"	Mary I. Dobbins	"	John	West	27	103.09	103.09
"	Mark A. Melton	"	George	West	25	102.55	102.55
"	Margery Mandurey	"	George	West	26	105.82	105.82
"	Mary A. Parker	"	John	West	23	96.49	96.49
"	Katie	"	Richard	West	27	106.84	106.84
"	Ormona Collins	"	Lewis	West	20	57.79	57.79

The legislative acts of the 1880's were mainly additions and clarifications of the 1871 law. By 1881 it was unlawful to dredge in July or August or for non-residents to dredge.¹⁸⁵ Non-residents were not allowed to plant oysters in the Indian River Bay or Delaware Bay.¹⁸⁶ Some of the area of Indian River Bay was restricted for planting to the Frankfort Oyster Planting Company, incorporated in 1881, and the Indian River and Rehoboth Bay Oyster Planting Company, incorporated in 1875.¹⁸⁷ In 1885 some restrictions were established on both dredging and tonging on the natural beds above Mahon's Landing and below Bombay Hook.¹⁸⁸

Planting was prohibited in 1887 in the rectangle south of Mispillion Creek, north of Cape Henlopen, west of West Flats and east of the shore line.¹⁸⁹ The West Flats were part of the deeper water in Delaware Bay about ten or twelve miles off-shore. Oystering was profitable, and the possibility of creating new grounds, enticing. Areas close to shore were not entirely satisfactory and efforts were

185. Delaware, Laws of the State of Delaware, vol. 16, pp. 294-295.

186. Ibid., vol. 17, p. 23.

187. Ibid., vol. 17, p. 26.

188. Ibid., vol. 17, pp. 615-616.

189. Ibid., vol. 18, p. 12.

made in the West Flats to plant oysters. These grounds also became well known as excellent fishing spots.

Oysters were included in menus throughout the peninsula. On October 5, 1882, Mrs. Charles I. duPont of Wilmington, Delaware, wrote to Miss Annie Johnson in Farmington: "Annie writes glowing descriptions of her school, four meals of a day--oysters, almost every evening for tea--." ¹⁹⁰ Again in 1886 Mrs. duPont wrote to Annie of her birthday dinner in Wilmington on February 21:

Now I will just tell you about my dinner. As I had not had a visit from the Stetsons this fall, I feared I would become rusty in giving stylish dinners, so I determined to practice on this. Now for the bill of fare--First raw oysters, seasoned with pepper and salt, and put in those little, fish shaped china forms. Every-¹⁹¹ one enjoyed them,....

On August 14, 1885, the following appeared in a local paper:

Oyster Lost--An oyster 86 years old, estimating its age by the ridges or water lines of the shell, was some time ago in the possession of a New York fish dealer, who says of it: 'It was caught in Delaware Bay three years ago. That oyster had intelligence. I put it in a tank of salt water and it opened and shut itself up as if

-
190. DeValinger and Shaw, ed., op. cit., vol. 3, p. 284, and the original letter in the Ridgely Collection, Public Archives, Dover, Delaware.
191. Ibid., p. 294, and original letter in the Ridgely Collection.

enjoying a bath. One day I put the oyster on a plank in order to study its shell with a microscope. It lay there dumb and dead-like. I stepped aside to wait upon a customer. The tomcat walked up to the oyster and began to turn it over with its paws. Suddenly the bivalve opened its shell and caught the cat's tail. The cat bounded off like a rocket, bumping the oyster against the pavement. The octogenarian clung to the cat's tail. I never saw the cat or the oyster again.' 192

The passage of oyster laws caused much confusion among the oystermen themselves. New acts were passed which added creeks to restricted lists and took the same creeks off the list almost as soon as the residents learned about the law.

Our oystermen are anxiously conning over the oyster laws to ascertain the exact time when that luscious bivalve can be taken from our creeks. It's hard to tell much about the law on this subject, as so many acts are passed that conflict one with the other, or are made to fit one locality and not another. For just this reason, the laws of the State should be published in two or more papers in each county, as soon as they are signed by the Governor. 193

Despite the confusion the state had collected a little over \$4,800 from oysters in 1884. 194

192. Milford Chronicle, Milford, Delaware, August 14, 1885.

193. Ibid., August 21, 1885.

194. Ibid., January 10, 1885.

The industry in Delaware was growing, as indicated by the Auditor's Report of 1890, which listed income of \$340 from tonging licenses, \$2,285 from rent of oyster grounds, and \$4,812 from taxes on oyster boats.¹⁹⁵ Testimony to the value and importance of the Delaware oyster industry also appeared in a work by William K. Brooks in 1891. He reported:

The oyster industry of Delaware furnishes an instructive illustration of the value of oyster-planting. The natural beds of this State are not equal to a two-hundredth part of those of our State (Maryland), but under a law which allows any citizen to appropriate fifteen acres of ground where there are no natural oysters, upon payment of a fee of \$25 and an annual license fee of \$3 per ton for the boat used, a system of planting has grown up which is encouraged by public sentiment and is a great source of wealth.

Until recent times nearly half of the million bushels of seed oysters which were planted annually upon these beds were taken from our waters (Maryland), and they cost the planter less than twenty-five cents per bushel, put down upon his beds. These oysters were taken up within three or four months, and then sold for more than eighty cents per bushel. 196

The preamble to Chapter 135 of Legislative Acts passed in 1891 read:

-
195. Delaware, Auditor's Report 1890, Oyster or Sinking Fund; see table in Appendix for income to the state from the oyster industry.
196. William K. Brooks, The Oyster, A Popular Summary of a Scientific Study, (Baltimore: Johns Hopkins Press, 1891), pp. 129-130.

Whereas the culture and protection of the oyster in the waters of the Delaware Bay, furnishing as they do food to the people and revenue to the state, is entitled to the most serious consideration by the General Assembly and whereas it is represented that the supply of oysters is being exhausted by the great demand for the same, and as it is known by those who have made the matter a study that shells of the oyster deposited in proper places in the waters will, in a few years, on account of the spawn attaching themselves to the shells, produce an abundant supply of oysters: and whereas there is now over \$40,000 in the Treasury of the State arising from the oyster fund; therefore, in order to foster the oyster interest and to protect the same in this state;.... 197

The law provided for the purchase of oyster shells, the proper planting of those same shells and closing the area so planted to all oystering until 1893.¹⁹⁸ In 1893 all oysters taken from Delaware waters had to be at least two and one-half inches in size.¹⁹⁹ Oysters sold in the shell were to be measured by a bushel measure which was described as

a circular bushel tub with straight sides and a straight solid bottom and said tub shall have the following dimensions, viz.: fifteen inches in diameter across the top from inside to inside, and thirteen and three-quarters inches across the bottom from inside to inside

-
197. Delaware, Laws of the State of Delaware, vol. 19, p. 265.
198. Ibid., pp. 265-266.
199. Ibid., p. 795.

and twenty inches diagonal from inside
chime to top. 200

In 1891 most of the creeks were reserved for the use of the tongs.²⁰¹ This legislation culminated more than a decade of hot war between the dredgers and the tongs over the oyster. Enforcement of the law was as difficult at this time as it had been earlier. Oyster pirates heavily armed their vessels and were quite able to fight off watch boats or private planters who were forced to arm their vessels in self defense. The tonger who went to work in a small open boat often took a rifle with him. However, this was poor defense against the cannons which were capable of blowing him out of the water entirely.

Captain Flynn, an oysterman who had witnessed and participated in the oyster wars in the 1880's, spoke of the lawlessness, battles, bloodshed and loss of life in the struggle over oysters.²⁰² Tough captains and crews, sometimes shanghaied, took oysters illegally from the grounds reserved for the tongs and also from the planters' grounds. Captain Flynn told of the ~~ermity~~

200. Ibid., vol. 21, p. 416.

201. Ibid., vol.18, pp. 683-686.

202. Sunday Star, Wilmington, Delaware, September 3, 1933, Magazine Section, "The Oyste(r) Season Arrives," p. 2.

between the tongers and the dredgers.

In the early 80's there were two kinds of oystermen--the tongers and the dredgers. The tongers worked in the tributary streams, known as the county waters. They were respectable citizens, who made their homes on the banks of the rivers where they worked. The dredgers of those days, many of them, as I told you, were the scum of the earth. A running feud between the two factions had been going on for years. This feud came to a head in..., '88, a year which saw more fighting on the bay than any before or since. There were scores of battles, all year long. 203

Flynn's favorite story concerned the exploits of Pungy Joe, a unique character, whom Flynn believed to hail from somewhere in Blackbird Hundred, although no one ever knew Joe's real name or home.

In 1880, or thereabouts, Joe was about 30--a tall, broad-shouldered heavy set young fellow who knew his way about. He could handle boats and he could handle men. Like all good oystermen, however, Joe figured that God had given him the right to take oysters wherever he found them, like the feller in the poem. He did not believe that it was wrong to go into illegal waters at night and take oysters, for he never looked upon it as illegal, and he was so strong in his convictions that he led many a foray into tributary waters to tangle with the rifle and cannon.... Joe did not believe in shanghai methods, however, but had his own crew, loyal fellows who would follow him anywhere, without question.

Police boats patrolled the bays, equipped to prevent illegal dredging in county waters. The dredging ships were also armed with cannon, and in addition carried crescent-shaped sections

203. Ibid.

of iron in front to protect the helmsmen from rifle balls.

The year 1888 was outstanding in the history of the industry. More dredging boats engaged in harvesting the bivalves than ever before, and bay skippers were bolder in their disregard for the law. Countless clashes between forces took place,.... 204

Sporadic raids continued long after the year 1888 had passed. These raids, the constant drain upon the oyster beds, and the Blizzard of 1888, led to a decline in the industry in the mid-1890's, as indicated by the sharp drop in state revenue for the middle years of that decade.²⁰⁵

204. Ibid.

205. For the income to the state from the oyster industry see the tables in the appendix.

Chapter VI

The Twentieth Century: To the Depression

Throughout the nation at the turn of the century one of the most popular items of food was the oyster. In Wilmington, Delaware, forty-three oyster retail outlets were listed in the Directory for 1900. ²⁰⁶

An account of the oyster industry in the Delaware Bay in 1902 indicated that the oysters in the Bay were on the increase. Oysters were especially good in the beds off Benjamin Davis' Point and Maurice River, New Jersey, and off Mahants (Mahon's) Point, Delaware.

Since the formation of the breakwater, lobsters and black fish have come there in quantity. It is discovered to be a fact, in all the ponds found in the sedge marshes lining the two shores of the Delaware, that in them are found the best oysters, and that in one of them called 'the ditch' (in Delaware, near Mahon's Landing) which is an artificial canal out into the marsh, fine oysters are always to be fished out. ²⁰⁷

The industry centered around the Delaware Bay and Maurice River Cove areas in the last twenty years of the nineteenth

206. Wilmington Directory, Wilmington, Delaware, p. 46.

207. William Stainsby, The Oyster Industry, A Historical Sketch, (Trenton, New Jersey: Bureau of Statistics, 1902), p. 35.

century. The principal ports of shipment by water were Maurice River, Bivalve and Greenwich Piers, all in New Jersey. Oysters were also sent over the West Jersey and Seashore Railroad and the Central Railroad of New Jersey in special trains to the markets in Philadelphia and New York.²⁰⁸ The tongers usually made their shipments by rail from Port Norris, Dividing Creek, Newport, Cedarville and other small towns within reach of the railroad.²⁰⁹ Some seasons were good, others bad. Besides the natural enemies and the weather, up to fifteen per cent loss was attributed to oyster thieves, while the carelessness of steam and sail freighters traveling in the Delaware accounted for losses of quantities of oysters through crushing and pollution.²¹⁰

During these years the rail facilities in Jersey were used by the Delaware men, who frequently formed partnerships with Jersey men. These shipments were all shell stock. In this manner the rich oyster beds in both states could be utilized. In the southern part of Delaware some of the men in Seaford became interested in the potentials

208. Ibid., p. 45.

209. Ibid.

210. Ibid., p. 57.

of Chincoteague Bay, Virginia, and set up planting areas there as well as in Delaware.²¹¹ In 1908 oyster packing, a large industry in Seaford, opened operations in September with a plentiful stock and a brisk demand anticipated for the year.²¹²

By 1904 the per capita production of oysters in the East of the United States was almost three-tenths of a bushel.²¹³ This was a drop from the high in 1880, but it shows the extent of the use of oysters as food in that region. The industry had become so fully developed that in the early fall of 1902 a trade journal had begun publication. This was called The Oysterman and the Fisherman and was devoted to shellfish and concurrent fisheries.²¹⁴ Most of its contents concerned the oyster industry. Oyster and fish dealers in various states were listed and advertisements were run by many oyster packers and suppliers.

The Fishery Question of the 1870's had not been solved, and in February of 1905 the states of Delaware and New

211. The Oysterman and the Fisherman, (Hampton, Virginia: The Oysterman Publishing Company, 1908), vol. 6, no. 1, October, p. 4.

212. Ibid., p. 20.

213. Taylor, op. cit., p. 415.

214. The Oysterman and the Fisherman, (Hampton, Virginia: The Oysterman Publishing Company, 1902-1916).

Jersey appointed Commissions to continue the study of the problem.²¹⁵ This compact specifically stated that nothing in the compact should affect the planting, catching or taking of oysters or interfere with the oyster industry of either state. In April of this same year the Delaware General Assembly passed an act to provide for the surveying of all Delaware Bay bottom within the state boundaries, the survey to be completed by May 1, 1906.²¹⁶ In April 1905 an act was passed, permitting only sailing vessels to take oysters from the natural beds.²¹⁷ Provision was also made for rough culling of the oysters taken from the natural beds before the vessels left the beds, and power-driven winders for the dredges were prohibited on the natural beds.²¹⁸ Finally in 1907 the General Assembly modernized the watch boat by authorizing it to have both sail and motor power.²¹⁹ On April 5, 1909, a Commission was created to look after oyster interests. The members

215. Supreme Court of the United States, No. 19 Original, October Term 1929, New Jersey vs. Delaware, p. 12.

216. Delaware, Laws of the State of Delaware, vol. 23, p. 222.

217. Ibid., vol. 23, p. 224.

218. Ibid., vol. 23, pp. 225-226.

219. Ibid., vol. 24, p. 287.

of this Commission were Governor Simeon S. Pennewell, Senators Alvin B. Conner and John W. Sheldrake and Representatives Walter Donoho and Alfred L. Ainscow. Their duties were to survey the oyster grounds, mark the boundaries, subdivide some of the grounds and obtain the services of a surveyor. 220

A report of the Delaware Bay Oyster Beds appeared in September 1907:

Inspections made recently of the oyster bars along the Delaware side of Delaware Bay reveal the fact that there will be better oysters and more of them taken from Delaware waters next month than at any time since the early eighties. The smooth seas during July, together with an immense catch of spat, all go to load and interweave the sea grass on the oyster bars and flats with spat shells, while stones are full. Could the oyster fisheries be abandoned for a year and have the advantage of a complete rest, there is a belief that the prolific and widespread growths of fine oysters would result.

Already, however, the oyster industry at Mahon's is brisking up and boats are being put into commission for next month's attack by the oyster fleet. Notwithstanding the rigors of the new oyster law (and the oystermen say let no more laws be passed for a generation until they get to understand the present ones), there will be thirty-six vessels engaged in oystering this season's at Mahon's, while smaller fleets will be engaged along the bay at various other points. Of the large fleet Philadelphia will be represented by almost thirty of the thirty-six. The principal Delaware oystermen are Captain John Buckson and Thomas Murray. The Philadelphia representation own boats in the

220. Ibid., vol. 25, p. 240.

oyster fleets and lease and own oyster boats as follows:

Michael P. Howett, 6 boats; John J. Cooney, 6 boats; Captain Wm. Shillingsburg, 6 boats; George Shoch, 4 boats; Captain Elkinhead, 2 boats. Delaware and New Jersey's scattering boats will number 10.

On the opening week of the oyster season, next month, it is expected that each large boat which weighs anchor for Philadelphia with a cargo will carry to that city 50,000 prime Delaware Bay salts. The cullens will probably number 35,000 a load.

No thoroughly reliable estimate of the Delaware Oyster Field this year can be obtained, but the local oystermen estimate that it will reach all the way from 500,000 to 1,000,000 bushels outside of that consumed at home by Delawareans who are at liberty to take oysters at certain periods.

221

By this time serving oysters had become an art in itself. The increase in consumption in the last part of the nineteenth century had taxed the ingenuity of the Americans in devising new ways of serving a seafood which they enjoyed. Most people preferred oysters raw, served ice cold with or without garnishes. If oysters were to be cooked they were to be served immediately or they would become tough. In the shell they could be boiled, roasted or steamed before serving. After shucking there were dozens of ways the oysters could be cooked: broiled, deviled, grilled, fried, fricasseed, baked, scalloped, stewed or stuffed. They appeared in stews, chowders,

221. Milford Chronicle, Milford, Delaware, September 1, 1907.

muffins, omelets, loaves, pies, shortcakes, salads, sandwiches, or mixed with any food item at all.²²² Some of the recipes have received special distinction, as Oyster Bellevue Stratford, Oysters Florentine or Oysters à la Rockefeller, this last a specialty of Antoine's in New Orleans.²²³

It was during the last part of the first decade of the twentieth century that members of the oyster industry began to organize on a national level. In 1908, shortly after oyster production had declined from the peak years, especially in the New England area, the Oyster Growers and Dealers Association of North America was founded.²²⁴ The New England packers and growers led the organization, since they were first to be faced with some of the problems inherent in a declining natural resource. Men in the Middle Atlantic and Chesapeake areas soon joined with the New England people. On January 15, 1909, a preliminary meeting on the organization of the National Association of Commissions of Shell Fisheries was held in New York City. The interested states included Maine, Massachusetts, Connecticut,

222. May E. Southworth, One Hundred and One Ways of Serving Oysters, (San Francisco and New York: Paul Elder and Company, 1907).

223. Hector Bolitho, ed., op. cit., pp. 157, 170-171.

224. Founders, (Annapolis, Maryland: The Oyster Institute of North America, 1958), p. 1.

Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, Georgia, Florida, Texas, Louisiana, Mississippi, Oregon, California and Washington. The object of this organization was to bring the various state representatives together to promote the care of natural resources of the country with special attention to the advancement and betterment of the oyster industry. Government experts were also interested and attended this January meeting.²²⁵

The first annual convention of the National Shellfisheries Association was held in New York City on May 5, 1909.²²⁶ The first annual meeting of the Oyster Growers and Dealers Association of North America was held in Baltimore on May 18 and 19, 1909.²²⁷ The treasurer's report showed that 218 members had paid three dollars each in dues. One of the Board of Directors was George Y. Schoch, a Philadelphian who leased grounds on the Delaware side of the Delaware Bay and on the Jersey side as well.²²⁸

225. The Oysterman and the Fisherman, vol. 6, no. 4, January 1909, p. 13; also vol. 6, no. 5, February 1909, p. 16.

226. Ibid., vol. 6, no. 8, May 1909, inside back cover.

227. Ibid., vol. 6, no. 9, June 1909, p. 1.

228. Ibid., p. 2.

There were several reports of the fine condition of the Delaware oyster industry in 1909. "The stock is fair, and the seed beds very promising," ²²⁹ said one. A letter to T. C. Davis in Hampton, Virginia, from George Schoch of Philadelphia dated July 29, 1909, stated:

My oysters on the Western Shore never were finer, at this time of the year than they are this year, neither have I ever had a better growth in the Delaware Bay than I have had this year and I think I planted in the neighborhood of 50,000 to 60,000 bushels on the Western Shore this season, and between 30,000 and 40,000 bushels on my Maurice River cove grounds. I was down and inspected my cove grounds last Thursday and Friday and went over all my grounds, and have never seen anything look better, and they are growing fine and am in hopes of having some very good oysters this fall. ²³⁰

In the same year it was reported that "Delaware is slowly but surely making good its oyster asset." ²³¹ "The value of the oyster output of Delaware during the last year was \$168,610. This stock is yearly increasing its popularity." ²³² For that same year, 1908, the income to the state from the oyster industry totaled \$6,359 and for 1909 the total was \$6,197. ²³³

229. Ibid., vol. 6, no. 11, August 1909, p. 6.

230. Ibid., p. 19.

231. Ibid., p. 23.

232. Ibid., vol. 7, no. 2, November 1909, p. 2.

233. Delaware, Auditor's Reports 1909, 1910, see table in appendix.

Under the auspices of the Commission of 1909 there were two surveys conducted early in the second decade of the twentieth century. The first of these surveys was made in the summer of 1910 by H. F. Moore of the Bureau of Fisheries. He charted the exact location and gave the condition of the natural oyster beds in Delaware north of Mahon's Point.²³⁴ This was the first survey of the Delaware beds. The natural beds were important for the production of seed, not market oysters. The survey included over 16,000 acres, of which 2,144 acres contained oyster beds of varying productivity.²³⁵ For the tonger the oysters on beds in shoal water are more valuable because of the greater ease in procuring them. During the fall and sometimes in winter and early spring, tongers work in the Delaware Bay in areas which are not too deep. More productive work is accomplished by the dredges which are allowed on the natural beds for short periods of time, in 1910 from April 15 to June 30. When the survey was made, most of the dredging for seed oysters was on the natural

234. H. F. Moore, Condition and Extent of the Natural Oyster Beds of Delaware, Doc. No. 745, Department of Commerce and Labor, Bureau of Fisheries, (Washington: Government Printing Office, 1911).

235. Ibid., p. 6.

Figure 34. Map of Natural Oyster Beds of Delaware, Surveyed by United States Bureau of Fisheries and the Delaware Oyster Survey Commission under the direction of H. F. Moore, June and July 1910.

Source: Library of Congress.



Note

Natural Oyster Beds shown in red.
 Area of dense growth of oysters
 " scattered " " "
 " very scattered " " "
 " depleted " " "

Soundings:
 Depth at mean low water expressed in feet.

Bottom symbols:
 h, for hard - s, for soft.

Dona River
(Simons Creek)

Mahon River Light

Mahon River

Deep Water Point

Stone Bed

Small scattered patches

Southern Bed

East-line Bed

B L A K E
C H A N N E L

S H I P
C H A N N E L

P I O N E E R
B e d

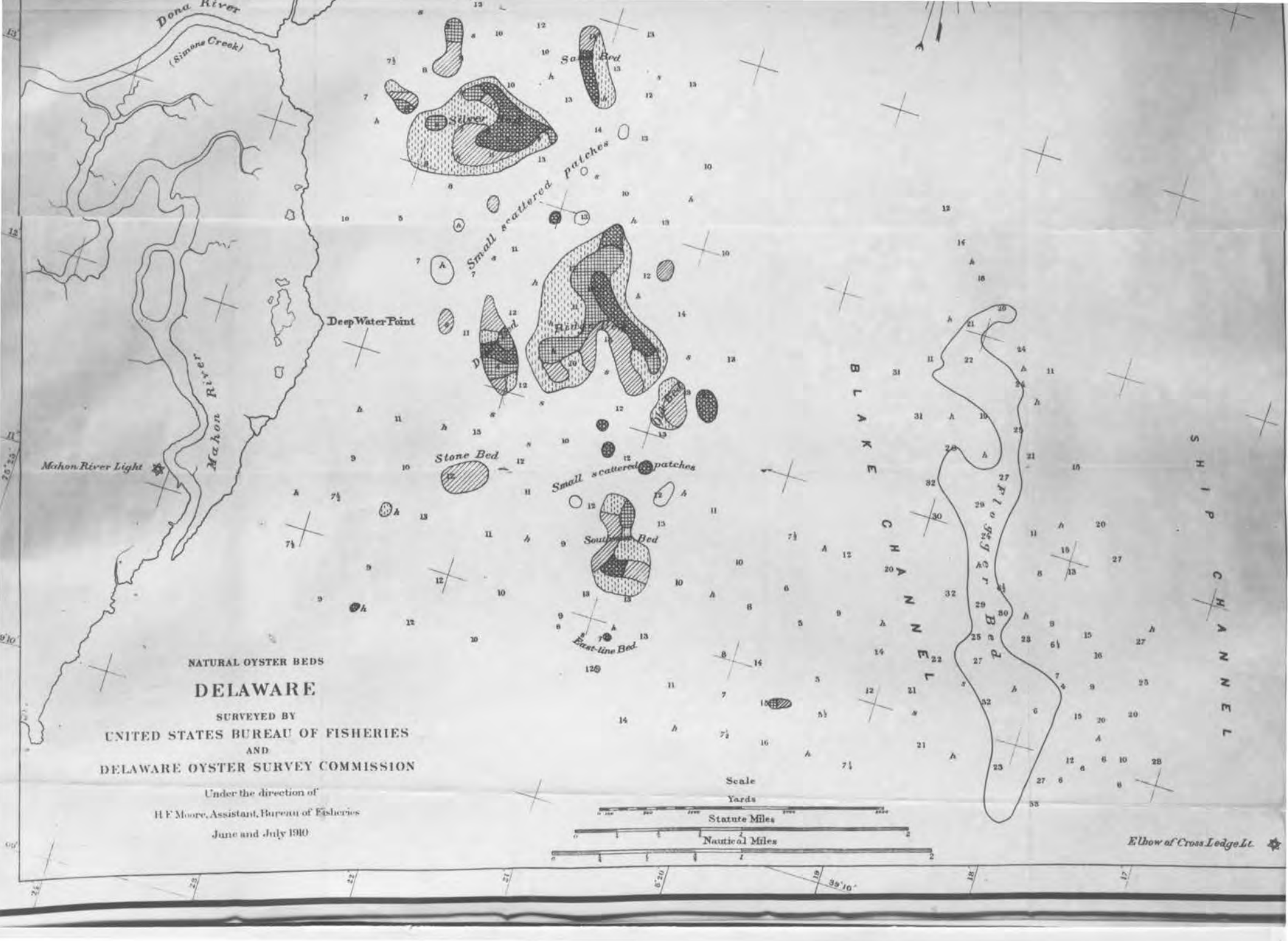
Elbow of Cross Ledge Lt.

NATURAL OYSTER BEDS

DELAWARE

SURVEYED BY
UNITED STATES BUREAU OF FISHERIES
AND
DELAWARE OYSTER SURVEY COMMISSION

Under the direction of
H F Moore, Assistant, Bureau of Fisheries
June and July 1910



beds south of Over-the-Bar. The 1,088 acres of beds had an estimated 111,061 bushels of oysters. This excluded Flogger Bed, which had previously been a rich source of seed oysters, but in 1910 revealed poor yields in the samples taken.²³⁶ The map of the natural oyster beds in 1910 shows the extent of the beds at that time.

The private beds below the East Line were planted with oysters from the Chesapeake as well as the Delaware natural beds. The grounds were leased or controlled by residents of Philadelphia and New Jersey, and the product or market oysters were consumed largely in Philadelphia, with the market depot at Maurice River Cove in New Jersey.²³⁷

Moore found the salinity at the upper natural beds to be low, while at the southern end of the planting grounds the salinity was comparatively high and the danger from oyster drills was higher than on the natural beds. He felt that the chief problem of the oyster industry in 1910 was the lack of culling after dredging. There were few shells replaced to which the infant oysters could attach themselves. This despite the state law setting up at least one shelling experiment early in the 1890's. The oysters would not set on mud; and the future of the industry in Delaware, if

236. Ibid., p. 25.

237. Ibid., p. 24.

shelling were not systematically carried out, would be bleak, as the most productive beds became depleted by heavy removals.²³⁸ As long as there were shells on the bottom and enough adult oysters to furnish spat, regular sets and a mature oyster population would result under favorable water and temperature conditions. The stripping of seed oysters from the natural beds to be planted and then marketed reduced the adult population which produced the spawn each year. The additional reduction of good setting area by the loss of the oyster shells which were removed from the bay for roads, lime and replanting meant a cumulative reduction in the yearly production of oysters in the Delaware Bay on the Delaware side.

The Delaware Oyster Survey Commission published its report in 1912. The Commission recommended some amendments to the oyster laws of the state. These were adopted by the General Assembly in 1911. The laws of Delaware relating to oysters were compiled by Daniel O. Hastings.²³⁹ Captain Charles C. Yates reported that,

238. Ibid., pp. 26-27.

239. Delaware Oyster Survey Commission, 1909-1912, Report of Commission by Members of Commission and Report of Survey by Charles C. Yates, (Baltimore: King Brothers, 1912), pp. 12-17.

figuring on a five per cent basis, the State of Delaware by means of the 'oyster survey' has increased the 'going valuation' of her oyster properties about \$80,000 which is a very good return for the less than \$5,000 invested in the work.

240

The survey showed a total of 6,593 acres of bottom leased to planters, and the map drawn up to indicate various plots is still in use.²⁴¹

A partial working agreement was reached in the Fishery Question on March 16, 1915. Both New Jersey and Delaware were to have common rights of fishing in the Delaware River between the low water marks on each side except where either state had granted private fishing rights. The agreement further stated that:

Nothing herein contained shall affect the territorial limits, rights or jurisdiction of either of said States of, in or over the Delaware River, or the ownership of the subaqueous soil thereof, except as is expressly set forth in the compact between the said States; nor shall anything herein contained affect in any way the

-
240. Ibid., p. 10. The cost of the survey to Delaware of the planted grounds was a little under \$5,000. The survey showed that many planters were using more ground than they registered and paid rentals for. The oyster income for the next few years was contested by planters and state rental income was held up for court action. For the results see the tables in the appendix.
241. Ibid., pp. 75-108, also the map in the envelope on the back cover. A photostat of this 1910 map of planted grounds is included in this study. Changes in this map have been added in pencil on the copy kept on the watch boat.

Figure 35. Chart of Leased Oyster Bottoms, Delaware Bay, State of Delaware, Surveyed by Delaware Oyster Survey Commission under the direction of C. C. Yates, 1910.

Source: Delaware State Highway Department.

CHART OF
LEASED OYSTER BOTTOMS
 DELAWARE BAY
 STATE OF DELAWARE

SURVEYED BY
DELAWARE OYSTER SURVEY COMMISSION
 1880

Members of Commission
 Governor **SIMEON S. PENNELL**, Chairman
 Senator **ALVAN B. COOPER**, Secretary
 Senator **JOHN WHELDRAKE**
 Representative **WALTER DONOHUE**
 Representative **ALFRED L. AINSBOW**

Assistant Oyster Surveyor
 J. Thurston Wainwright

Mah Maul Light
 Consulting Engineer
C. C. YATES, U.S. Coast and Geodetic Survey

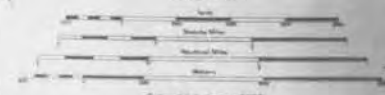
Trigonometrical Engineer
E. A. HURST
 Hydrographic Engineer
T. Van De Bogert
E. A. HURST

Trigonometrical Computers
Frank W. Smith, U.S. Coast and Geodetic Survey
A. Louise McCrea, U.S. Coast and Geodetic Survey

Draftsmen
David M. Hildreth, U.S. Coast and Geodetic Survey
A. Louise McCrea, U.S. Coast and Geodetic Survey
T. Van De Bogert
David M. Hildreth, U.S. Coast and Geodetic Survey
John B. Trowey, U.S. Coast and Geodetic Survey
G. C. Moore, U.S. Coast and Geodetic Survey

Note: The survey performed by the officers of the U.S. Coast and Geodetic Survey engaged on the work of the Delaware Oyster Survey was authorized by Hon. **CHARLES KAGEL**, Secretary of Commerce and Fishery and by **MR. GLETTIMAN**, Superintendent of Coast and Geodetic Survey.

Scale 1:2500



Color of depth of water in feet



Note: Latitudes and Longitudes based on the United States Standard Meridian of the U.S. Coast and Geodetic Survey.

This chart is hereby certified as showing the correct location of the leased oyster bottoms of Delaware Bay on the State of Delaware as July 31, 1880, as marked out with buoys which by the Lessee and as surveyed by the members of the DELAWARE OYSTER SURVEY COMMISSION
C. C. Yates
 U.S. Coast and Geodetic Survey
 Consulting Engineer

Reviewed and approved by us as members of the DELAWARE OYSTER SURVEY COMMISSION
Simon Pennell
 Governor and Chairman
John Wheelwright
 Secretary
Walter Donohue
Alfred L. Ainsbrow

planting, catching or taking of oysters, clams, or other shell fish, or interfere with the oyster industry, as now or hereafter carried on under the laws of either of said States. And nothing herein contained shall be construed to give to the inhabitants of the State of New Jersey a common right of fishery with the inhabitants of the State of Delaware in the waters of the Delaware Bay. ²⁴²

During this year the laws of the State of Delaware were codified, while the work of the Delaware Oyster Survey Commission had simplified the task in regard to the oyster laws.

During the 1920's the oyster industry in Delaware operated at full capacity. Despite this fact the per capita production in the east of the United States had dropped to almost half that of 1904. ²⁴³ One of the prominent oyster packers in Seaford was J. B. Robinson and Company. Oysters were prepared for market in three ways: in the shell, shucked and iced or canned. Although there were four oyster dealers listed in Wilmington in 1921, most of the Delaware oysters were marketed through Maurice River Cove, New Jersey. ²⁴⁴

242. Delaware, Laws of the State of Delaware, vol. 28, pp. 598-599.

243. Taylor, op. cit., p. 415.

244. Wilmington Directory, Wilmington, Delaware, 1921-1922, p. 937; Edward P. Churchill, Jr., The Oyster and the Oyster Industry of the Atlantic and Gulf Coasts, Doc. No. 890, Department of Commerce, U.S. Bureau of Fisheries, (Washington: Government Printing Office, 1920), p. 6.

For oysters not marketed in the shell, shucking was required. This has been done in the same way for generations.

[The shucker] worked with the precision of a machine, and made six motions for each oyster. One hand took the oyster from the pile at his side, the other cut the muscle from the upper shell; a third movement threw the shell away; a fourth forced the oyster from the other shell; a fifth threw it into a tin bucket, and the second shell was thrown 245
aside by the last movement.

The knives used in this operation were made by Charles D. Briddell, Inc., of Crisfield, Maryland, operating since about 1900. The Champion blade oyster knife was patented by George Briddell. The knives were shipped to all parts of the United States. Different sections of the country had different specifications or types of knives which were popular. The present knives are made from stainless steel, the blanks being stamped out of a sheet about six inches wide and ten feet long. The blanks are then partially ground and the end tapered. After heating the blade is polished and ready to be driven into the wooden handle.²⁴⁶

245. William K. Brooks, The Oyster, A Popular Summary of a Scientific Study, Second Edition, Revised, (Baltimore: The Johns Hopkins Press, 1905), p. 18.

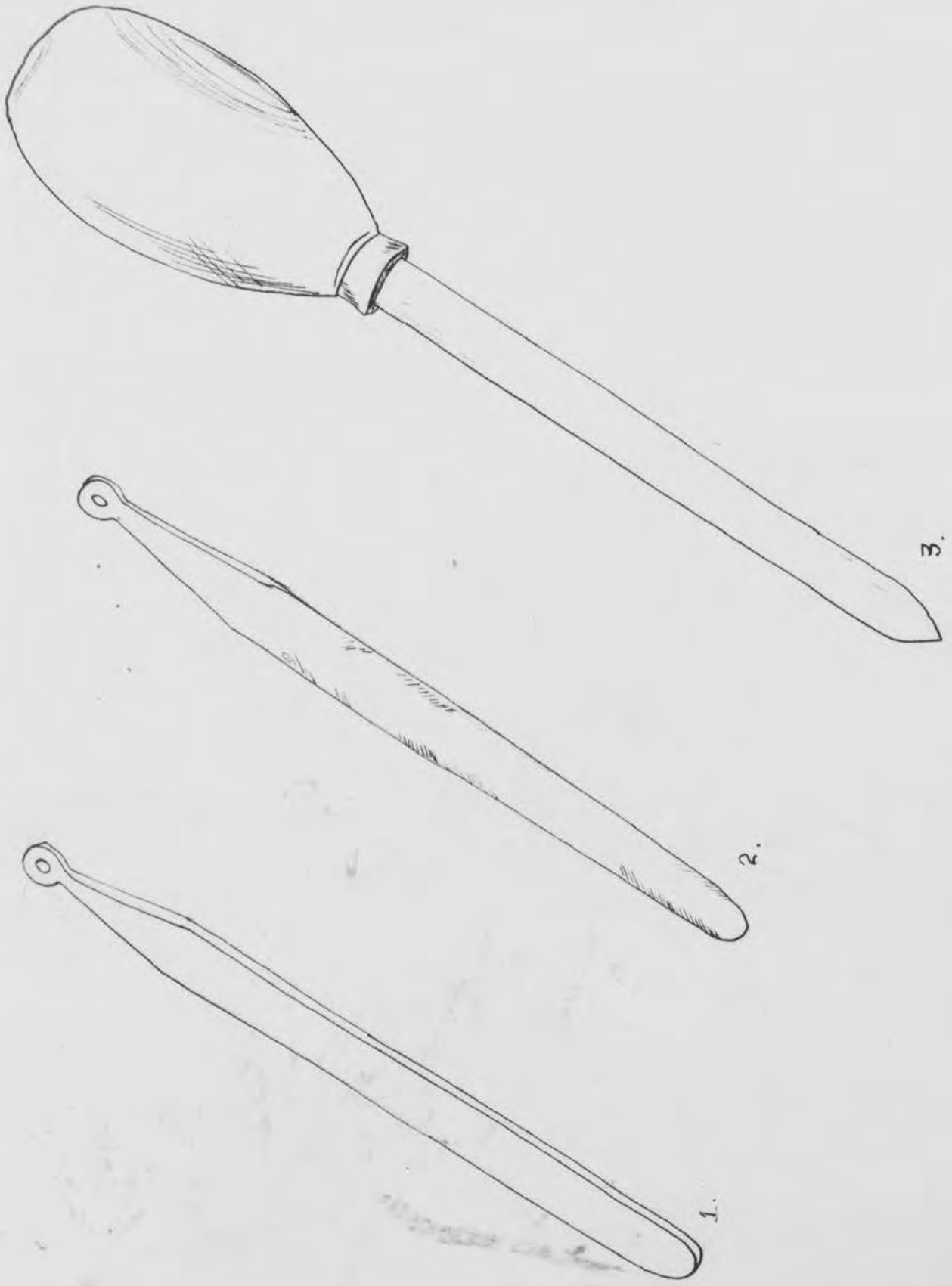
246. Interview, Mrs. Margaret Lawson, Charles D. Briddell, Inc., Crisfield, Maryland, October 25, 1961.

Figure 36. Oyster Knife.

Key

1. Blank stamped from sheet of stainless steel.
2. Partly worked blank, showing tapering of tip.
3. Finished blade after polishing and inserting into wooden handle.

Source: Drawn by Mrs. Doris Major Payne from material lent by the Charles D. Bridwell, Inc., Crisfield, Maryland.



Shucking was begun in the southern part of New Jersey in 1922. The center of the New Jersey oyster industry had shifted to the Maurice River Cove area after World War I. By 1923 there were three opening or shucking houses in Maurice River and five by 1924. There were two real advantages to shipping a shucked product: because each oyster varied in quality and size, opening enabled the oysters to be graded and insured the purchaser a fairly standard product; and because the shucking houses were near the beds, the shells could be used to "shell" both natural and private grounds to increase the oyster growth.²⁴⁷

A standard product was especially desirable for the Philadelphia market which, unlike those at New York and Baltimore, purchased by count rather than volume.²⁴⁸ The one big disadvantage in marketing shucked oysters was the possibility of adding water to the product or contaminating it during or after the shucking operation. Great quantities of oysters were still marketed in the shell. The shipments to Philadelphia were often two trains per day, each containing some ninety cars filled with oysters. From the city

247. William H. Dumont, Shucking Oysters: One of New Jersey's Growing Industries, Bulletin 418, (New Brunswick, New Jersey: New Jersey Agricultural Experiment Station, July 1925), p. 4.

248. Interview with Fred Goldstein of the Liberty Fish Company, Philadelphia, Pennsylvania, January 3, 1962.

these oysters were transhipped to other parts of Pennsylvania, Ohio, Indiana and Illinois. The cost of shipments beyond those points made the opened products in iced cans more profitable.²⁴⁹ During these years some shipments of oysters were still made directly by boat to the Philadelphia markets on Dock Street. With the change-over to shucking, a large portion of the New Jersey oyster catch was shipped to Baltimore. Baltimore companies had built the shucking houses to save on freight costs, and it was therefore logical that the product would find its way to the canning plants in that city.²⁵⁰ The opening of the duPont Highway to Dover in 1924 initiated the possibility of shipping oysters in bags or barrels by truck to Wilmington and thence to other parts of the country. Some truck shipping was done, but the old ties were hard to break. Photographs of the oyster fleet in port and at work in 1924 showed the activity on the bay in this decade. The work on those vessels was hard and the life of an oysterman was frequently lonely and quite dangerous, although having attractions for at least one poetically inclined office-worker:

249. William H. Dumont, op. cit., pp. 3-4; also interview with Dr. Leslie A. Stauber, Rutgers University, November 10, 1961.

250. Dumont, op. cit., p. 5; also interview with Sheriff William Riggan of Cumberland County, New Jersey, December 18, 1961.

Figure 37. Oyster Fleet at Little Creek, Delaware,
April 27, 1924.

Source: Photographs by Hammond, Department of Agriculture,
Delaware in the 1920's, glass negatives in Public
Archives Commission, Dover, Delaware, negative
no. I 134 G.



The Oysterman

The oysterman's life is a lonely one,
 Under his single sail.
 His boat is his house and home;
 His prayer, that the wind not fail.

Little he knows of corn and wheat
 And stock may go up and down;
 He has ready cash, his wants to meet,
 There's always a market for fish in town.

His lungs drink deep of the salty air,
 And his skin is browned by the sun
 But his mind is free from worry and care
 And he sleeps sound when work is done.

I see his white sail glide o'er the lake,
 And feel the sweet breeze that drives him on;
 Then I think of the "office" and what a mistake
 That a lonely oysterman I was not born. ²⁵¹

Although attempts have been made to develop chemical or mechanical methods of opening oysters commercially, these have not proved feasible as yet. The hand method of shucking oysters is still needed before any kind of processing can be accomplished. Whether this is done with just a knife, or whether the edge of the oyster is first broken to facilitate the opening of the shell, skilled shuckers handle large quantities of oysters. Today the wooden shucking house has been replaced by the concrete one, the wheelbarrow by the conveyor belt and the aluminum or galvanized equipment by stainless steel. The oysters are brought to the benches where the shuckers work. Besides actually

251. Louis A. Dodge, New Orleans, published in The Oysterman and the Fisherman, vol. 7, no. 12, October 1910, p. 4.

Figure 38. Oyster Schooners, Gracie and Ishmael, working in Delaware Bay, April 28, 1924.

Source: Photographs by Hammond, Department of Agriculture, Delaware in the 1920's, glass negatives in Public Archives Commission, Dover, Delaware, negative no. I 136 G.



shucking the oysters, these workers also separate the oysters by size into different containers: "standards," regular size; "selects," larger oysters used for frying; "extra selects," larger than the selects but not the finest ones; and "counts," the finest and largest oysters. The workers, although paid by piece work, receive more than the legal minimum hourly wage. When the worker has filled one or all of his containers, small buckets or pots holding about six quarts, he takes them to the skimmer. The skimmer is like a big sieve. The water is drained from the oysters, and they are measured in gallon containers. The worker's score or tally is kept so that he can be paid correctly. The oysters are then put into big tubs with false bottoms into which air is blown to tumble the oysters in water, allowing the dirt and fine shell particles to drop through the false bottom. This process continues for eight minutes. The oysters are then ladled out with stainless steel strainers, placed in containers of one or five gallon sizes and kept refrigerated until used or shipped out.²⁵² With the inauguration of the sanitation regulations in the last part of the 1920's, shucking

252. William H. Dumont, op. cit., pp. 8-20; visits to Hickman and Sterling, Crisfield, Maryland, October 6, 1961, and Allen Kirkpatrick Company, Rehoboth Beach, Delaware, October 26, 1961; Robbins Brothers, Maurice River, New Jersey, December 18, 1961.

Figure 39. Oyster Vessels at Work, Delaware Bay,
April 29, 1924.

Source: Photographs by Hammond, Department of Agriculture,
Delaware in the 1920's, glass negatives in Public
Archives Commission, Dover, Delaware, negative
no. I 147 G.



houses had to conform to proper standards for the protection of the public. The main locations for shucking houses still remained the ports which the oyster fleets used: Mahon's Landing, Little Creek Landing, Bowers Beach.

The marketing of an increasing quantity of shucked oysters heightened the danger of contamination; in 1925 an epidemic of typhoid in Chicago was attributed to polluted oysters from the Chesapeake area.²⁵³ Although the oysters had not come from the Delaware Bay, the public considered all oysters to be polluted. The Oyster Growers and Dealers Association of North America, Inc., incorporated in Delaware in the same year, fortunately was ready to handle this kind of emergency. With the help of this group, the U. S. Public Health Service and the Health Departments of states which had oyster industries, sanitation requirements and inspection plans were set up. The U. S. Public Health Service set up the minimum sanitation requirements, and the local health agencies in the various states policed the industry with the cooperation and help of the industry itself. The plan was adopted in 1927; and the manual written at that time, but since revised in 1937, 1946 and 1957, has

253. Founders, (Annapolis, Maryland: The Oyster Institute of North America, 1958), p. 1.

Figure 40. Oyster Vessel Deck, Dredge Full Coming Aboard,
April 29, 1924.

Source: Photographs by Hammond, Department of Agriculture,
Delaware in the 1920's, glass negatives in Public
Archives Commission, Dover, Delaware, negative
no. I 149 G.



been in constant use.²⁵⁴

As a result of the work of these cooperating agencies, creek oysters in Delaware were found to be polluted. Many of these oysters were being shipped out of the state to other markets each year. As early as 1924 the Delaware State Board of Health had stated that the waters in the St. Jones, Murderkill, Mispillion and Upper Broadkill Creeks were polluted. Many bushels of oysters were being harvested, nonetheless. It was not until the Federal and State governments, with the cooperation of the industry itself, organized and put into effect the plan in 1927 that the danger of buying polluted oysters was eliminated. The threat of a ban on the sale of all Delaware oysters, with the power of both the State and Federal governments to enforce it, compelled the unscrupulous dealer to be more circumspect in his business. The news of polluted oysters caused great consternation in Delaware in 1927, especially among the oystermen whose livelihood was threatened. Meetings were held to try to find a way to allow the creek tongers to continue working, while still protecting the public from polluted oysters. On November 25, 1927, Dr.

254. Ibid., pp. 1-2; also Sanitary Control of the Shellfish Industry, Manual of Recommended Practice, Part II: Harvesting and Processing, U. S. Department of Health, Education and Welfare, Public Health Service, (Washington: Government Printing Office, 1957), p. 1.

Arthur T. Davis, Executive Secretary of the Delaware Board of Health, suggested that the creek oysters be replanted in Delaware Bay, thus giving work to the tongers and increasing the total oyster production of the state. On November 30 the formal closing of St. Jones, Murderkill, Mispillion and the Upper Broadkill Creeks was announced because of eighty-five to one hundred per cent pollution of those creek waters.²⁵⁵ Thus began the era of watchfulness over the pollution of streams in Delaware. The following thirty years have seen several formal openings and then closings of creeks as the pollution level was judged to warrant.

The 1920's also were years in which the legal battle between New Jersey and Delaware over the boundary line continued. It had been agreed on August 12, 1885, that the division between Delaware Bay and the Delaware River would be a line drawn from Bombay Hook on the Delaware side to Cohansey Creek on the Jersey side. Later the line was moved further upstream, running from Liston's Point in Delaware

255. Wilmington Morning News, Wilmington, Delaware, November 21, 1927, "Government Ban on Creek Oysters Alarms Dredgers;" Evening Journal, Wilmington, Delaware, November 25, 1927, "Suggest That Creek Plants Be Sold," p. 16; Evening Journal, Wilmington, Delaware, November 30, 1927, "Ban Oysters From Some Delaware Waters."

Figure 41. Oyster Vessel Deck, Shovelling Away Oysters,
April 29, 1924.

Source: Photographs by Hammond, Department of Agriculture,
Delaware in the 1920's, glass negatives in Public
Archives Commission, Dover, Delaware, negative
no. I 152 G.



to the mouth of Hope Creek in New Jersey.²⁵⁶ The dispute between Delaware and New Jersey concerned the area between the main ship channel and the geographic center of the Delaware River and Bay below the twelve mile circle around New Castle. This area contained 830 acres of natural oyster beds and some 18,010 acres of planted oyster grounds in the neighborhood of the Ship John Lighthouse.²⁵⁷ One estimate of the value of the disputed area was that there were 1,500 bushels of oysters per acre present.²⁵⁸ This rich bed had grown up gradually as the dredgers year after year had shoveled overboard the shells and culls from their loads. Thus the bed became enlarged from its original size. With 400 acres in the disputed area containing about 600,000 bushels of oysters which could be sold at forty or fifty cents per bushel the value of the disputed area was considerable. New Jersey claimed that her grounds were invaded by Delawareans whenever there was a shortage of seed oysters in Delaware waters. In May of 1925, Delaware oystermen took seed oysters to the extent of many thousands of bushels from

256. Supreme Court of the United States, No. 19 Original, October Term 1929, New Jersey vs. Delaware, Third Book, p. 11.

257. Ibid., "Reply Brief of Plaintiff before Master, No. 14 Original," p. 18.

258. Ibid., First Book, p. 162.

Figure 42. Oyster Vessel Deck, Dredge Used in Getting Oysters, April 29, 1924.

Source: Photographs by Hammond, Department of Agriculture, Delaware in the 1920's, glass negatives in Public Archives Commission, Dover, Delaware, negative no. I 153 G.



beds which were also claimed by New Jersey oystermen.²⁵⁹ Dredging in the disputed area occurred in 1926 by oystermen from both states.

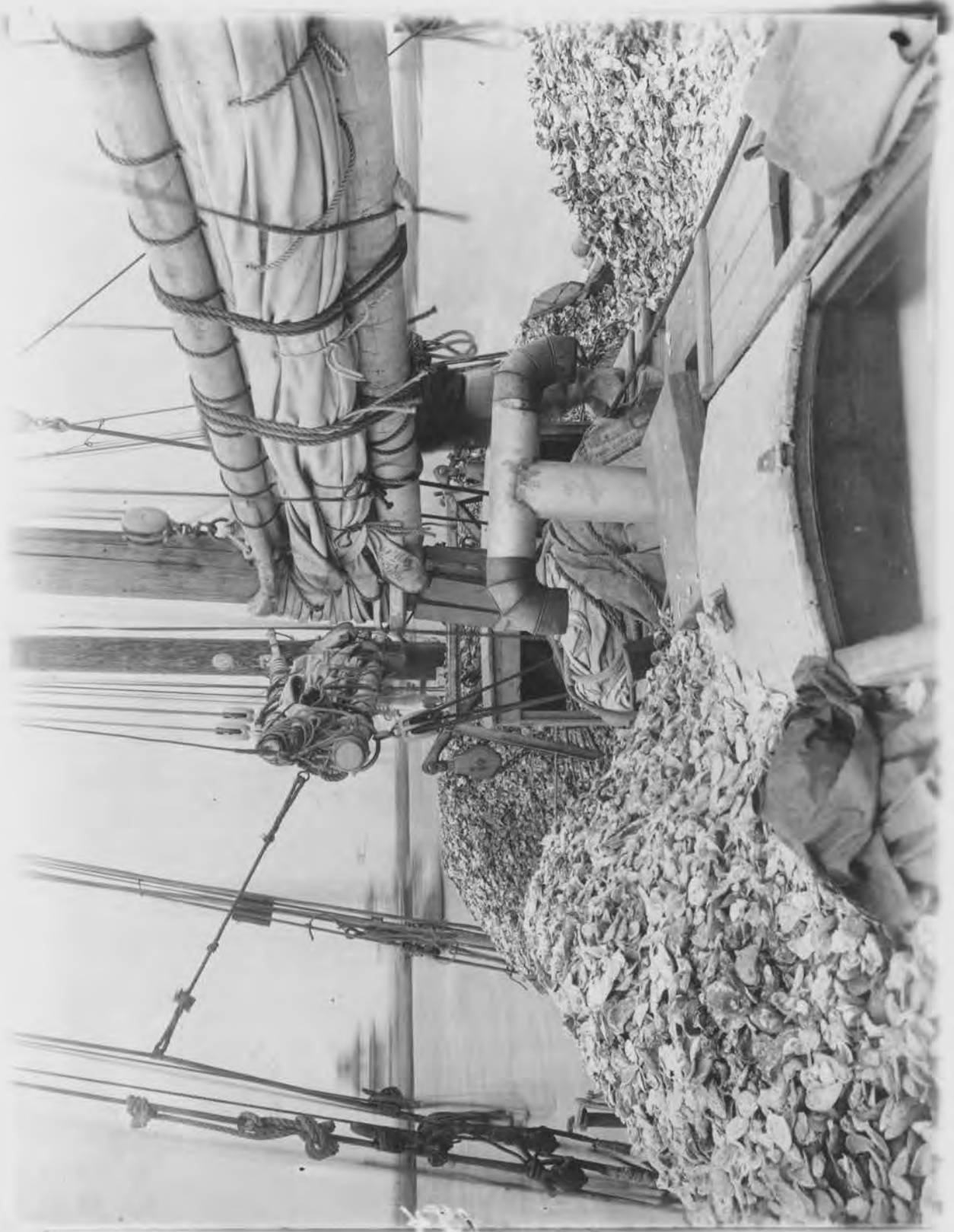
Dividing the area in half would not have solved the problem, since it was impossible to dredge in the area with the prevailing tides and winds without crossing any imaginary line from either side. Delaware and New Jersey restricted dredging to sailing vessels, which did not have the maneuverability of powered vessels. There was at that time a difference of fifteen days between the New Jersey and the Delaware legal dredging seasons. In 1925 the Delaware boats were all off the Ship John beds by May 1, when the Jersey season opened. Delaware boats were reported in the disputed area in 1926 and in 1927.²⁶⁰ The case reached the Supreme Court of the United States in the October Term of 1929, New Jersey being the plaintiff and Delaware the defendant. Both states presented evidence of ownership of the disputed Ship John area. Some interesting testimony on the oyster industry is found in this case presented by members of the Nelson family, a family which had been active in oyster research in New Jersey since 1888.

259. Ibid., First Book, p. 14.

260. Ibid., p. 476.

Figure 43. Oyster Vessel, Deck Load of Oysters,
April 29, 1924.

Source: Photographs by Hammond, Department of Agriculture,
Delaware in the 1920's, glass negatives in Public
Archives Commission, Dover, Delaware, negative
no. I 154 G.



A Special Master's Report was filed in January 1930. In the October Term of 1933 the Supreme Court again considered the boundary question, and a decision was rendered by Mr. Justice Cardozo on February 5, 1934.²⁶¹ The decision was divided into two parts. One part concerned the title to the bed of the Delaware River within the twelve mile circle around New Castle. Within this circle Delaware claimed up to low water mark on the Jersey side and New Jersey claimed to the middle of the channel. The Jersey suit begun in 1877 was discontinued in 1907, the Compact of 1905 having provided for concurrent rights of fishing. The decision in 1934 upheld Delaware's claim within the twelve mile circle.²⁶² The second part of the decision concerned the boundary line between the two states below the circle. New Jersey based her claim upon the Thalweg, or downway, the track which boats take in their course down stream and which is the path of the strongest current.²⁶³ The court decision was based on international law, using the doctrine of the Thalweg and fixing the boundary in the

261. Supreme Court of the United States, No. 13 Original, October Term 1933, New Jersey vs. Delaware, p. 43.

262. Ibid., pp. 12-13.

263. Ibid., p. 13.

Figure 44. Oysters from Delaware Bay, Clusters of Market Types, April 30, 1924.

Source: Photographs by Hammond, Department of Agriculture, Delaware in the 1920's, glass negatives in Public Archives Commission, Dover, Delaware, negative no. I 161 G.

194a



middle of the main ship channel. The line ran in the main ship channel south of the twelve mile circle for about fifty miles, only five of which were in the Delaware River. The costs of the suit were to be divided equally between the two states.²⁶⁴

On December 26, 1930, Governor C. D. Buck appointed an Oyster Commission to study "The Statutes of this State in relation to the taking and catching of oysters, and the general condition of the Shell Fish Industry" of Delaware.²⁶⁵ Early in January the Commission sent its report to the legislature.

After....making such inquiries and studies that were possible, we have found that the oyster industry in this State is in the most chaotic condition, and that if something is not done immediately to foster the growth and cultivation of oysters in the Delaware Bay, its tributaries, Indian River and Rehoboth Bay, such shell fish food will have to be imported from the waters of other States, and those of our people who now are engaged in oyster catching and oyster packing, will have to seek other sources of income.

From our investigations, we find that the natural rocks in the Delaware Bay have practically become depleted, and that there is no system, or any organized effort or control exercised in the restoration of what few oyster rocks that now exist.

We find further that all of the best oyster bottoms in the Delaware Bay are owned and operated

264. Ibid., pp. 13-15.

265. Governor C. Douglass Buck, "Report of Oyster Commission, Special Commission to the Members of the 103rd General Assembly," (Dover, Delaware: January 6, 1931), p. 1.

in fact by non-residents, and the oysters taken from these beds are taken up, carried outside of the State and sold, thus depriving the citizens of the State of Delaware of the greater part of the oyster income which should belong to our citizens.

We further find that it is absolutely necessary in the collection of proper revenue and the identification of the acreage taken up by various oystermen, that a re-survey should be made of our oyster bottoms, the method now in use being mere guess work.

Since opening of the Indian River Inlet, your Commission has caused to be planted some oysters in various places in Indian River, and that upon examination of the plants put out last Spring, they have made a very marked growth, and that there should be available for planting some fifteen or twenty thousand acres, the revenue from which should be ample to cover all just charges and expenses in the policing of said oysters, and the maintenance of our Inlet, thus bringing an opportunity for employment and a livelihood to a great number of our citizens.

You may go into a profitable business, a new business which does not now exist. The Committee has examined the various Acts of the legislature which are now in our Statute books, in relation to the shell fish industries in this State, and find some of them can not be enforced and some of them wholly inadequate to meet the purposes for which they were intended.

266

The Committee made several recommendations concerning the oyster industry in the state: the laws relative to the industry should be codified; new laws should be passed where necessary; a Shell Fish Commission of five men should

266. Ibid., pp. 1-2.

be appointed to supervise the industry; a survey of Delaware Bay, Rehoboth Bay and Indian River Bay should be carried out; and legislation should be passed to control the pollution of the rivers and creeks in Delaware, especially those areas which had been closed to oystering because of pollution.²⁶⁷ The Committee believed that the industry could become exceedingly profitable if these recommendations were carried out.

267. Ibid., pp. 3-4.

Chapter VII

The Twentieth Century: From the Depression to the Present

During the 1930's the oyster industry, just recovering from the pollution scare of the 1920's, succumbed to the depression. The depleted natural beds could not support planting requirements within the state and importing seed was too expensive. The State Board of Health maintained a watch on river oysters, the creeks themselves and the areas to which some of the river oysters were transplanted to cleanse themselves.²⁶⁸

Oysters were harvested and sold during these years. Beginning in September the oyster schooners would dock in the Christiana River at the municipal basin near Third Street, Wilmington, Delaware, early on Sunday morning with the week's oyster catch waiting to be sold. The skippers hoped to retail their catch and return home.

Standing on the deck, the skipper will deftly remove a shell, pass the meat up to the prospective buyer on shore. Fresh from the water, the taste is delicious, tinged with the salty tang of the sea. In basket,

268. Delaware, Laws of the State of Delaware, vol. 37, pp. 769-770; vol. 40, p. 738; vol. 41, p. 603; vol. 42, pp. 259-260.

bag and thrown loosely in motor car they are carried away to grace the gastronomic palates of Wilmington. 269

By the early 1930's there were few of the men in the industry who remembered the oyster wars or the, to them, glorious, romantic days of the business. As the industry gradually declined from the high production peak of the 1880's and 1890's, men seemingly lost the urge to battle the elements and to evade the oyster law.

In 1938 Captain Harry Hagarty, an oysterman for over fifty years, had one of the largest businesses in the state. He was of at least the third generation of oystermen in his family. In the middle years of this decade his vessel led in the amount of oysters marketed in Delaware waters. In 1937 he sold 60,000 bushels of Delaware Bay salts. Before 1929 he had run three boats, but by 1938 there was only one, the "Florence Errickson." This schooner had a crew of ten men, four of whom worked each dredge. Her home port was Port Mahon, from where the Delaware Bay beds were within easy access. Her cargo of oysters was transferred at sea to another schooner which shipped them to market where the oysters were shucked and sold. Captain Hagarty reported

269. Sunday Star, Wilmington, Delaware, September 3, 1933, Magazine Section, "The Oyste(r) Season Arrives," p. 2.

that the bulk of the 1937 crop was shipped through the Chesapeake and Delaware Canal to Baltimore, whence it was carried west by railroad refrigerator cars to California.²⁷⁰

Galtsoff reported that in 1939 forty-four oystermen operated about ten or eleven schooners in Delaware in the oyster industry. The schooners were equipped with sails and auxiliary engines. Most were old but in good condition. Smaller boats were used for tonging.²⁷¹

One of the recommendations of the governor's committee in 1931 was accomplished when a new Code of Delaware Laws was issued in 1935. This recodification clarified the previous oyster laws which had contained contradictions, and it highlighted the role the state was playing in managing the industry.

Both the federal and the local governments were concerned about the industry. The organization of the industry, called the Oyster Growers and Dealers Association of North America, decided to shorten its name and in 1935 became

270. Sunday Star, Wilmington, Delaware, August 14, 1938, "One of State's Chief Industries Is That of 'Harvesting' the Delectable Oyster?" by Louise Chapman, p. 30.

271. Paul S. Galtsoff, "Mortality of Oysters in Delaware Bay," unpublished manuscript, 1942, p. 2.

the Oyster Institute of North America.²⁷² This group helped promote the oyster business and advertise the shell food to the public. The federal government also helped with such fishery circulars as The Story of Oysters published in 1936.²⁷³

A study of Delaware Bay and its water control problems in relation to the oyster fishery was made in October 1939 by Dr. Paul S. Galtsoff, serving the Bureau of Commercial Fisheries, Shellfish Division. He felt it important to maintain the existing water regime and to protect the bay against increased pollution.²⁷⁴

The work done by the Oyster Institute of North America in informing the public about the oyster industry and helping members of the industry keep up-to-date was greatly aided in 1938 when the Interior Department's Fish and Wildlife

272. Founders, (Annapolis, Maryland: The Oyster Institute of North America, 1958), p. 2.

273. R. H. Fiedler, The Story of Oysters, U.S. Department of Commerce, Bureau of Fisheries, Fishery Circular No. 21, (Washington: Government Printing Office, 1936). The pamphlet included oyster biology, culture and enemies. A brief history of the industry with sanitary regulations and food value of oysters was also given. As an added attraction thirty-five recipes for oysters were included.

274. Paul S. Galtsoff, "Oyster Fishery in the Delaware Bay and Water Control Problems in the Delaware River," October 16, 1939, unpublished.

Service began publishing the Commercial Fisheries Review. Although this was not devoted to the oyster industry, as The Oysterman and the Fisherman had been, the new review filled a much needed gap left after the former publication had ceased. With the new publication, information about new scientific developments, industry statistics, market opportunities and many other aspects of oyster fisheries could be disseminated.

Another of the recommendations made by the governor's committee in 1931 had concerned the pollution problem in the Delaware. The establishment of INCODEL, the Interstate Commission on Delaware, in 1936, was a big step in the right direction, since one of its functions was to control the pollution in the Delaware River Estuary.

In April 1939 the Delaware Legislature passed an act making it possible for persons to make loans on oyster beds or grounds in the Delaware Bay and to hold a mortgage against the beds as security for the loans.²⁷⁵ In this way much needed financing to procure seed oysters could be obtained. During the 1930's the depleted condition of the natural beds in Delaware Bay made the problem of obtaining seed oysters an acute one.

275. Delaware, Laws of the State of Delaware, vol. 42, p. 261.

The decade of the 1940's proved to be a busy one for the oyster industry. The General Assembly authorized Delaware's entry into the Atlantic States Marine Fisheries Compact on May 6, 1941.²⁷⁶ This compact was established to supply a central agency for the collection of data, cooperation among various state and federal agencies, and development of research in marine fisheries, all with the intention of increasing the efficiency and utilization of the Atlantic coastal marine resources. On April 26, 1943, the Legislature established the Delaware Commission of Shell Fisheries.²⁷⁷ This commission was to have full control and direction of the shellfish industry and the protection of the shellfish within this state. One of the five members was to be the Collector of Oyster Revenue and two of the members had to be engaged in the shellfish industry.

The first annual report of the Commission was issued at the end of June 1944. This report evaluated the activities of the Commission over the preceding fourteen months. Items of note were the 20,000 bushels of seed oysters

-
276. Delaware, ibid., vol. 43, Chapter 287, pp. 1197-1205; Journal Every Evening, Wilmington, Delaware, September 15, 1941, "Bacon to Sign Fishery Pact," p. 2.
277. Delaware, Laws of the State of Delaware, vol. 44, Chapter 151, pp. 480-484.

dredged from Leipsic Creek and transplanted to the Delaware Bay on the natural beds. In addition 6,000 bushels of seed oysters had been planted in Broadkilyn Creek for the fall harvest. This creek was the only creek open for market oysters for shipping out of the state. During the tonging season about 100 persons worked on the creek, marketing some 13,000 bushels selling for \$1.00 to \$1.50 per bushel. Most of these oysters were sold to shucking houses within the state of Delaware. About 2,500 acres of oyster grounds had been leased by the Commission in Rehoboth Bay and Indian River Bay during the first year of its operation. It was felt that these beds would prove to be among the finest in the East, with the oysters tested comparing favorably with those from Chincoteague Bay.²⁷⁸

The Commission's report for 1945 indicated that about 100,000 bushels of oysters had been planted in Rehoboth Bay.²⁷⁹ It was also in this year that a survey of the waters of Indian River, Indian River Bay and Rehoboth Bay was authorized.²⁸⁰ Again in 1946 some 275,000 bushels of

278. Delaware, "First Report of the Delaware Commission of Shell Fisheries," May 1, 1943-June 30, 1944.

279. Delaware, "Second Annual Report of the Delaware Commission of Shell Fisheries," Fiscal Year Ending June 30, 1945.

280. Ibid.

oysters were planted in Rehoboth Bay and a large harvest was expected. These oysters were being received very well in Eastern markets, comparing favorably with the Long Island oysters.²⁸¹ The industry in the Rehoboth Bay had grown up largely from 1939 when the new Indian River Inlet was completed. Between 1939 and 1946 large investments had been made by private individuals in seed oysters, vessels and crews, wharves, shucking and packing facilities, fees to the state and other expenses amounting to about \$1,000,000.²⁸² Predictions in 1934 by W. S. Corkran concerning the benefits of a permanent inlet had borne fruit by 1946. It was his mosquito-control campaign which helped create a public demand for the present inlet. The oyster industry was developed after the inlet opened the area to ocean currents needed to maintain some salinity in the bay.

Production in the industry had been sporadic in the nineteenth century. Storms closed or opened inlets along the coast near Rehoboth Bay. The digging of the Assawoman Canal in the 1880's provided drainage for wet lands in Baltimore Hundred. However, it also diverted water from

281. Delaware, "Third Annual Report of the Delaware Commission of Shell Fisheries," Fiscal Year Ending June 30, 1946.

282. Anthony Higgins, "Oysters From Rehoboth Bay," Journal Every Evening, Wilmington, Delaware, October 3, 1946, p. 8.

Indian River Inlet which would have helped scour the channel and maintain sufficient depth for vessels. The completion of the Lewes-Rehoboth Canal in 1913 connected the Delaware Bay with Rehoboth Bay and prevented the long and dangerous trip around Cape Henlopen. These two canals, despite their value as drainage ditches or transportation canals, proved to be responsible for the half century of difficulty with the Indian River Inlet. In the 1920's, when there was a shortage of water, the inlet was closed completely and the waters of the two bays became entirely fresh. This fresh water killed off the shellfish and seafood industry in the bays. The re-opened inlet in 1939 allowed salt water to ebb and flow into these bays again. Engineers have blamed the inlet's behavior on the two canals, one to the north, the Lewes-Rehoboth Canal, and the other to the south, the Assawoman Canal.²⁸³

With the reappearance of salt water all the mobile types of shellfish and seafood returned to the bays. However, it was necessary to plant oysters before that industry could stage a comeback. Great were the hopes in this project for taking advantage of the high prices which oysters commanded after the Second World War. Because of the high

283. Anthony Higgins, "Oysters from Rehoboth Bay," Journal Every Evening, Wilmington, Delaware, October 5, 1946, p. 6.

degree of competition which developed, adjustments had to be made between the planters already in the business and newcomers in the field.

The past experience with canals and a wandering inlet meant that some workable relationship between man and nature had to be reached before an oyster industry could hope to survive and increase its potential. This circumstance frequently meant coordinating the varied interests of commercial and sport fishermen, building growth and the conservation of natural resources. When the shellfish had died, one of their greatest enemies, the drill, had also died. Here was an excellent opportunity to try to develop an industry with the application of developed scientific information.

You people in Delaware have an opportunity to do something big in those little bays. The closing of the inlet for so long a time killed all the natural enemies of the oyster. Its reopening made the bays a virgin field for a fresh, clean start. But the screwborer can affect your natural advantage if not controlled. Don't spare any effort to keep it out. 284

This warning was issued by G. F. Beaven, of the Chesapeake Biological Laboratory on Solomon's Island in Maryland in 1946. Some experiments in the use of copper sulphate solutions to treat seed oysters to kill the boring snails

or their eggs had been tried and found workable to some degree. Where this pest was not controlled it destroyed as much as half of any anticipated crop in a given year. Despite efforts to keep the drill out of the bays it has caused a great deal of destruction over several years. Two surveys in the 1940's, one, of the oyster beds themselves to determine leaseholds and bases for state licenses, and the other, for a proposed channel between Rehoboth Bay and Indian River Bay, affected the industry in those two bays. The cutting of this channel, while opening new oyster areas, would have to be dug through already existing ones. The survey of leaseholds was intended to help new planters to determine what oyster grounds were available. A state limit of 300 acres had been imposed. The leasehold survey was finally completed in 1948 and the two accompanying maps show where the oyster grounds were located in the two bays.

Delaware had no plan for a scientific approach to oyster culture and was forced to rely upon the work of neighboring states and the federal government, which had had laboratories in operation for many years. Therefore, when the oyster growers became alarmed at the excessive mortality on the natural beds in Delaware early in the 1940's, it was natural that they turned to the U. S. Fish and Wildlife

Figure 45. Chart of Areas Leased for Planting of Shellfish
in Rehoboth Bay, Delaware, April 12, 1948
revised.

Source: Delaware State Highway Department.



CONTROL POINTS		
POINT NAME	NORTH COORDINATE	EAST COORDINATE
1	4321 52 27	7 585 170 28
2	4321 52 27	7 585 170 28
3	4321 52 27	7 585 170 28
4	4321 52 27	7 585 170 28
5	4321 52 27	7 585 170 28
6	4321 52 27	7 585 170 28
7	4321 52 27	7 585 170 28
8	4321 52 27	7 585 170 28
9	4321 52 27	7 585 170 28
10	4321 52 27	7 585 170 28
11	4321 52 27	7 585 170 28
12	4321 52 27	7 585 170 28
13	4321 52 27	7 585 170 28
14	4321 52 27	7 585 170 28
15	4321 52 27	7 585 170 28
16	4321 52 27	7 585 170 28
17	4321 52 27	7 585 170 28
18	4321 52 27	7 585 170 28
19	4321 52 27	7 585 170 28
20	4321 52 27	7 585 170 28
21	4321 52 27	7 585 170 28
22	4321 52 27	7 585 170 28
23	4321 52 27	7 585 170 28
24	4321 52 27	7 585 170 28
25	4321 52 27	7 585 170 28
26	4321 52 27	7 585 170 28
27	4321 52 27	7 585 170 28
28	4321 52 27	7 585 170 28
29	4321 52 27	7 585 170 28
30	4321 52 27	7 585 170 28
31	4321 52 27	7 585 170 28
32	4321 52 27	7 585 170 28
33	4321 52 27	7 585 170 28
34	4321 52 27	7 585 170 28
35	4321 52 27	7 585 170 28
36	4321 52 27	7 585 170 28
37	4321 52 27	7 585 170 28
38	4321 52 27	7 585 170 28
39	4321 52 27	7 585 170 28
40	4321 52 27	7 585 170 28
41	4321 52 27	7 585 170 28
42	4321 52 27	7 585 170 28
43	4321 52 27	7 585 170 28
44	4321 52 27	7 585 170 28
45	4321 52 27	7 585 170 28
46	4321 52 27	7 585 170 28
47	4321 52 27	7 585 170 28
48	4321 52 27	7 585 170 28
49	4321 52 27	7 585 170 28
50	4321 52 27	7 585 170 28
51	4321 52 27	7 585 170 28
52	4321 52 27	7 585 170 28
53	4321 52 27	7 585 170 28
54	4321 52 27	7 585 170 28
55	4321 52 27	7 585 170 28
56	4321 52 27	7 585 170 28
57	4321 52 27	7 585 170 28
58	4321 52 27	7 585 170 28
59	4321 52 27	7 585 170 28
60	4321 52 27	7 585 170 28
61	4321 52 27	7 585 170 28
62	4321 52 27	7 585 170 28
63	4321 52 27	7 585 170 28
64	4321 52 27	7 585 170 28
65	4321 52 27	7 585 170 28
66	4321 52 27	7 585 170 28
67	4321 52 27	7 585 170 28
68	4321 52 27	7 585 170 28
69	4321 52 27	7 585 170 28
70	4321 52 27	7 585 170 28
71	4321 52 27	7 585 170 28
72	4321 52 27	7 585 170 28
73	4321 52 27	7 585 170 28
74	4321 52 27	7 585 170 28
75	4321 52 27	7 585 170 28
76	4321 52 27	7 585 170 28
77	4321 52 27	7 585 170 28
78	4321 52 27	7 585 170 28
79	4321 52 27	7 585 170 28
80	4321 52 27	7 585 170 28
81	4321 52 27	7 585 170 28
82	4321 52 27	7 585 170 28
83	4321 52 27	7 585 170 28
84	4321 52 27	7 585 170 28
85	4321 52 27	7 585 170 28
86	4321 52 27	7 585 170 28
87	4321 52 27	7 585 170 28
88	4321 52 27	7 585 170 28
89	4321 52 27	7 585 170 28
90	4321 52 27	7 585 170 28
91	4321 52 27	7 585 170 28
92	4321 52 27	7 585 170 28
93	4321 52 27	7 585 170 28
94	4321 52 27	7 585 170 28
95	4321 52 27	7 585 170 28
96	4321 52 27	7 585 170 28
97	4321 52 27	7 585 170 28
98	4321 52 27	7 585 170 28
99	4321 52 27	7 585 170 28
100	4321 52 27	7 585 170 28

NO OF PARCELS	LESSEE	AREA IN ACRES	CORNER POINT NO	NORTH COORDINATE	EAST COORDINATE
1	E. M. CLENDANIEL	32.81	1	4321 52 27	7 585 170 28
2	MARCEL	28.71	2	4321 52 27	7 585 170 28
3	CHAS FAGAN	22.21	3	4321 52 27	7 585 170 28
4	WM H BOCKHAMMER	28.21	4	4321 52 27	7 585 170 28
5	R. J. MARSHALL	22.21	5	4321 52 27	7 585 170 28
6	DUKES	28.21	6	4321 52 27	7 585 170 28
7	MARLIN WICKERSON	22.21	7	4321 52 27	7 585 170 28
8	E. E. BUNTING	28.21	8	4321 52 27	7 585 170 28
9	HARRY BLADES	22.21	9	4321 52 27	7 585 170 28
10	J. LANTON & TAYLOR	28.21	10	4321 52 27	7 585 170 28
11	DELAWARE OYSTER FARMS	22.21	11	4321 52 27	7 585 170 28
12	E. M. CLENDANIEL	28.21	12	4321 52 27	7 585 170 28
13	H. BLADES	22.21	13	4321 52 27	7 585 170 28
14	CHAS FAGAN	28.21	14	4321 52 27	7 585 170 28
15	SOPHIEA LERMAN	22.21	15	4321 52 27	7 585 170 28
16	G. E. SHOCKLEY	28.21	16	4321 52 27	7 585 170 28
17	JOHNSON & BUCKALDO	22.21	17	4321 52 27	7 585 170 28
18	JOHN LEED	28.21	18	4321 52 27	7 585 170 28
19	V. MARSHALL & H. BUCKALDO	22.21	19	4321 52 27	7 585 170 28
20	KATHLEEN LAWTON	28.21	20	4321 52 27	7 585 170 28
21	HENRY BUCKALDO & VANCE MARSHALL	22.21	21	4321 52 27	7 585 170 28
22	HAZEL D. MARSHALL & SAMUEL J. COOPER	28.21	22	4321 52 27	7 585 170 28
23	ADAM RIVER OYSTER CO	22.21	23	4321 52 27	7 585 170 28
24	J. LANTON & TAYLOR	28.21	24	4321 52 27	7 585 170 28
25	JOHNSON & BUCKALDO	22.21	25	4321 52 27	7 585 170 28
26	H. A. SHOCKLEY	28.21	26	4321 52 27	7 585 170 28
27	WM HAMILTON	22.21	27	4321 52 27	7 585 170 28
28	RALPH BLADES	28.21	28	4321 52 27	7 585 170 28
29	W. CANTY	22.21	29	4321 52 27	7 585 170 28
30	JAMES TURNELL	28.21	30	4321 52 27	7 585 170 28
31	CHAS HENRIK	22.21	31	4321 52 27	7 585 170 28
32	ADAM RIVER OYSTER CO	28.21	32	4321 52 27	7 585 170 28
33	ELDON BUCKALDO	22.21	33	4321 52 27	7 585 170 28
34	GORDON COUNSELMAN & LERMAN	28.21	34	4321 52 27	7 585 170 28
35	H. BLADES	22.21	35	4321 52 27	7 585 170 28

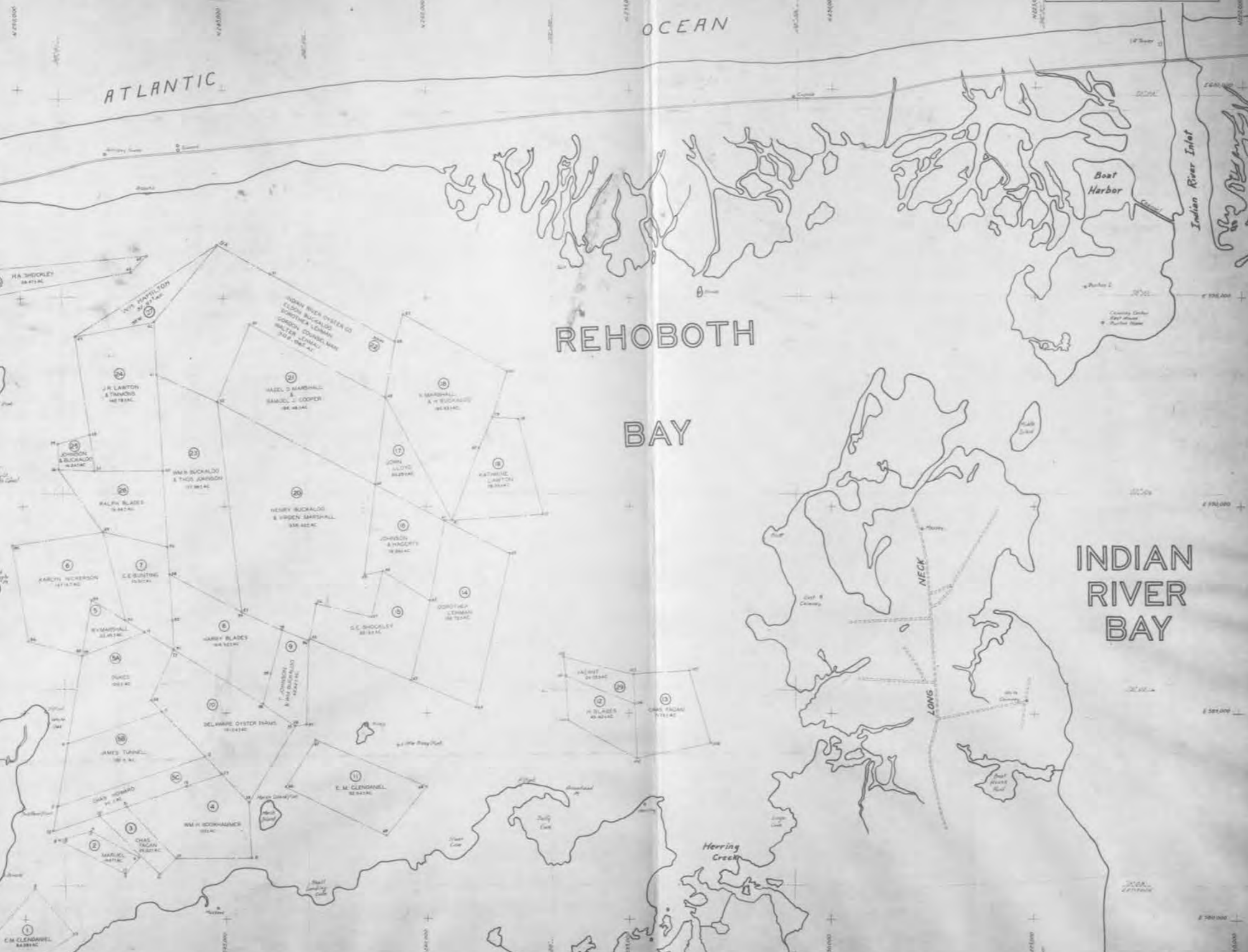
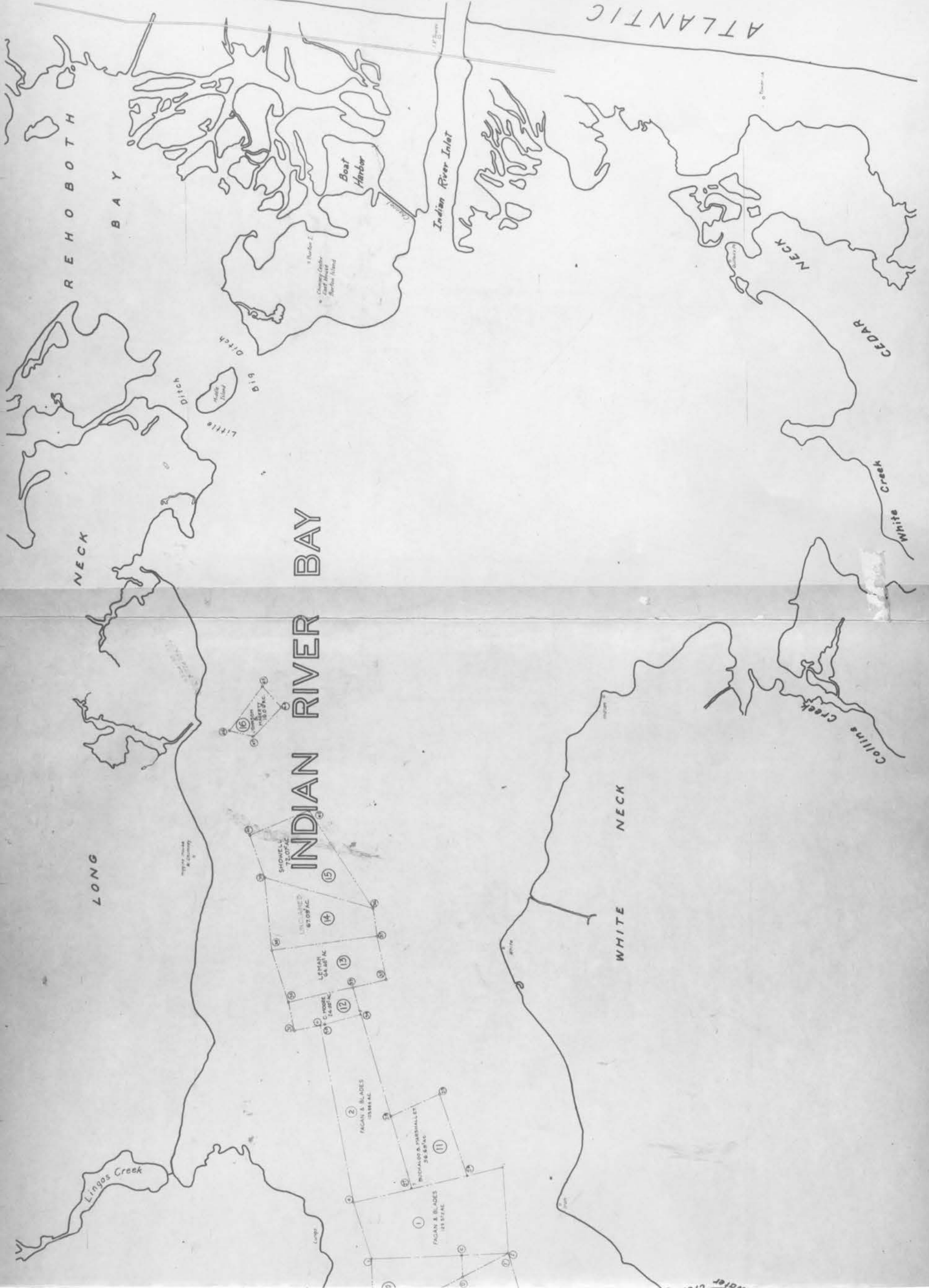


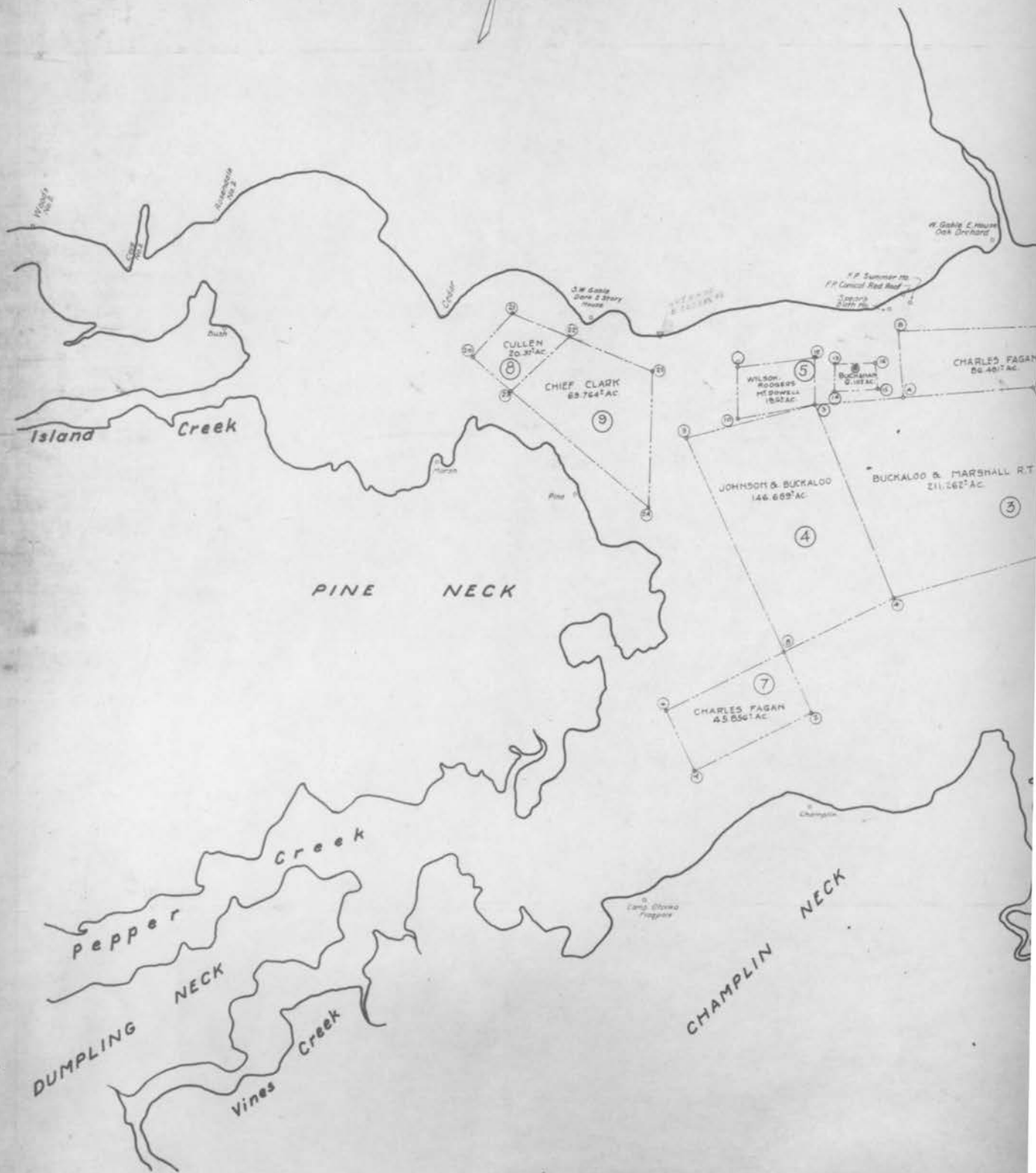
CHART OF
AREAS LEASED FOR PLANTING OF SHELLFISH
REHOBOTH BAY
STATE OF DELAWARE
PREPARED BY THE STATE HIGHWAY DEPARTMENT FOR
THE COMMISSION OF SHELL FISHERIES IN ACCORDANCE WITH
CHAPTER 16, VOLUME 44, LAWS OF DELAWARE AS AMENDED
BY SECTION 13A.

SCALE: 1 INCH = 1 MILE

Figure 46. Chart of Areas Leased for Planting of Shellfish
in Indian River Bay, Delaware, April 10, 1948
revised.

Source: Delaware State Highway Department.





Service for help. In April of 1942 this service was asked to investigate the mortality of oysters and to find a solution to the problem. The oystermen believed that dredging operations around Philadelphia and Wilmington might be responsible. Dredging presented the combined problems of disposal of the dredged material near oyster grounds and the stirring up of deposits of industrial wastes which might release toxic substances into the water injuring the oysters. A study was made in September 1942 by Paul S. Galtsoff of the Division of Shellfishery Investigations. The oyster grounds in Delaware Bay had not been surveyed since 1910, when Moore had studied the natural beds and Yates had studied the private grounds. Galtsoff found a mortality of forty to ninety-five per cent in adult seed oysters in the natural beds. It appeared that this mortality had ceased some time before the setting season of 1942 in late June. In the planted oysters, high mortality had been observed and the scarcity of seed oysters on the natural beds had led the planters to suspend operations. The evidence neither supported nor refuted the claim that dredging had been the cause of the death of the oysters. Adult oysters on the natural grounds were badly infested with several parasites and predators, thus weakening the oysters and making them more susceptible to a chance disease

which might have temporarily invaded the region.²⁸⁵

Investigation of the seed beds was made in June of 1943 by David G. Frey under the direction of Galtsoff. The lack of seed oysters still posed a threat to the industry. The Delaware Commission of Shell Fisheries had closed Ridge and Silver Beds, two of the best seed areas, after a twenty day season. Because of the war there was a manpower shortage and the vessels were permitted to use power when dredging on the natural beds which remained open, a method suspected of depleting the oyster beds. In addition, the rough cull law was not enforced, resulting in large portions of shells being removed from the natural beds along with the seed oysters, and too, most of the seed oysters were sold to New Jersey planters because of the tightness of money among the Delaware planters. To counteract this trend the inland waters were developed for seed purposes, since most of them had been closed by the State Health authorities because of pollution in the waters making the oysters unfit for market, although they were available for transplanting.²⁸⁶

-
285. Paul S. Galtsoff, "Mortality of Oysters in Delaware Bay," unpublished manuscript, 1942, pp. 5-10.
286. David G. Frey, "Investigation of Seed Oyster Beds on Delaware Side of Delaware Bay, June 10, 1943," unpublished manuscript, p. 4.

In February 1947 the oyster growers and dealers of Rehoboth Bay had requested the Fish and Wildlife Service to make a study of that area to determine the cause of excessive mortality of oysters and lack of quality of the oysters. The survey was made by Walter A. Chipman, Jr., and James B. Engle, with the cooperation of the Delaware Commission of Shell Fisheries, the State Sanitary Inspector and the local oyster industry members. The grounds in Rehoboth Bay were all private and the seed used came from several sources, sixty-five per cent coming from the Delaware Bay, while the rest came from nearby creeks in Delaware and Maryland and a few from James River, Virginia. At the time the study was made, there was no apparent reason for the failure of the oysters to fatten properly. This failure may have been related to the food supply in the bay before hibernation. Although seed oysters from different areas produced different quantities and qualities of market oysters from year to year, this fact has never been satisfactorily explained. It was suggested that further study of conditions be made in which the biologists from the State University would be of help.²⁸⁷

287. Walter A. Chipman, Jr. and James B. Engle, "The Condition of the Oysters and Oyster Grounds of Rehoboth Bay, Delaware, in February 1947," unpublished manuscript, pp. 7-8.

At the end of the Second World War there was a development in the oyster industry which proved revolutionary. The rise in truck transportation of oysters in the 1930's had enabled oyster dealers to reach more areas with oysters in the shell or in the can. In 1945 Walter Lehman moved to Rehoboth Beach, Delaware, from Pittsburgh. In Pittsburgh he had bought the Allen Kirkpatrick Company, which had started out as a wholesale grocery in 1953 and later was operated as a chain of super markets in western Pennsylvania.²⁸⁸ The rise of the oyster industry in Rehoboth Bay at that time attracted the interest of Lehman, and soon what had been a pleasant hobby was turned into a big business. The foundation of his oyster business was the Kirkpatrick Company, the name he retained for his oyster company. The first product the company marketed was frozen oysters. This product reached the consumers in time to take advantage of the rising prices of the post-war years. Packed in cans they proved to be a valuable seafood market item. Whenever possible the oysters from Rehoboth Bay, Indian River Bay and Delaware Bay were used. As consumer interest in the product grew, research interest also grew

288. Morning News, Wilmington, Delaware, November 13, 1954, "Rehoboth Couple Build Big Big Industry with Oysters," by Virginia Cullen, p. 1.

in improving the consumer product.²⁸⁹

From 1943 to 1949 there had been an increase in the number of shucking houses in Delaware, from one to six.²⁹⁰ The largest of these houses was Newcomb and Hand of Port Mahon. Hand was a Delawarean and Newcomb was a New Jerseyite. This partnership proved very profitable over the years. By 1953 oyster industry activities in all three bays had increased as the conditions had improved. Prospects looked good and the natural beds in the Delaware were being studied by biologists from the University of Delaware.²⁹¹ The codification of all Delaware laws in 1953 again clarified the oyster laws. In 1956 the shell fish laws and regulations were published by the Commission for the use of oystermen and dealers in the industry. This publication made the laws available to all interested parties. The codification had eliminated much of the confusion over oystering by simplifying and collating the laws. Laws

-
289. For example see "Study of fresh and frozen oysters," Commercial Fisheries Review, vol. 12, no. 11 A, Fish and Wildlife Service, U. S. Dept. of the Interior, (Washington: Government Printing Office, 1950), p. 5; S. R. Pottinger, "Results of Some Tests with Frozen Oysters," Commercial Fisheries Review, vol. 13, no. 10, (1951), pp. 1-5.
290. Delaware, "Sixth Annual Report of the Delaware Commission of Shell Fisheries," Fiscal Year Ending June 30, 1949.
291. Delaware, "Tenth Annual Report of the Delaware Commission of Shell Fisheries," Fiscal Year Ending June 30, 1953.

which were in conflict were repealed and the total result was a much better legal basis for the industry.

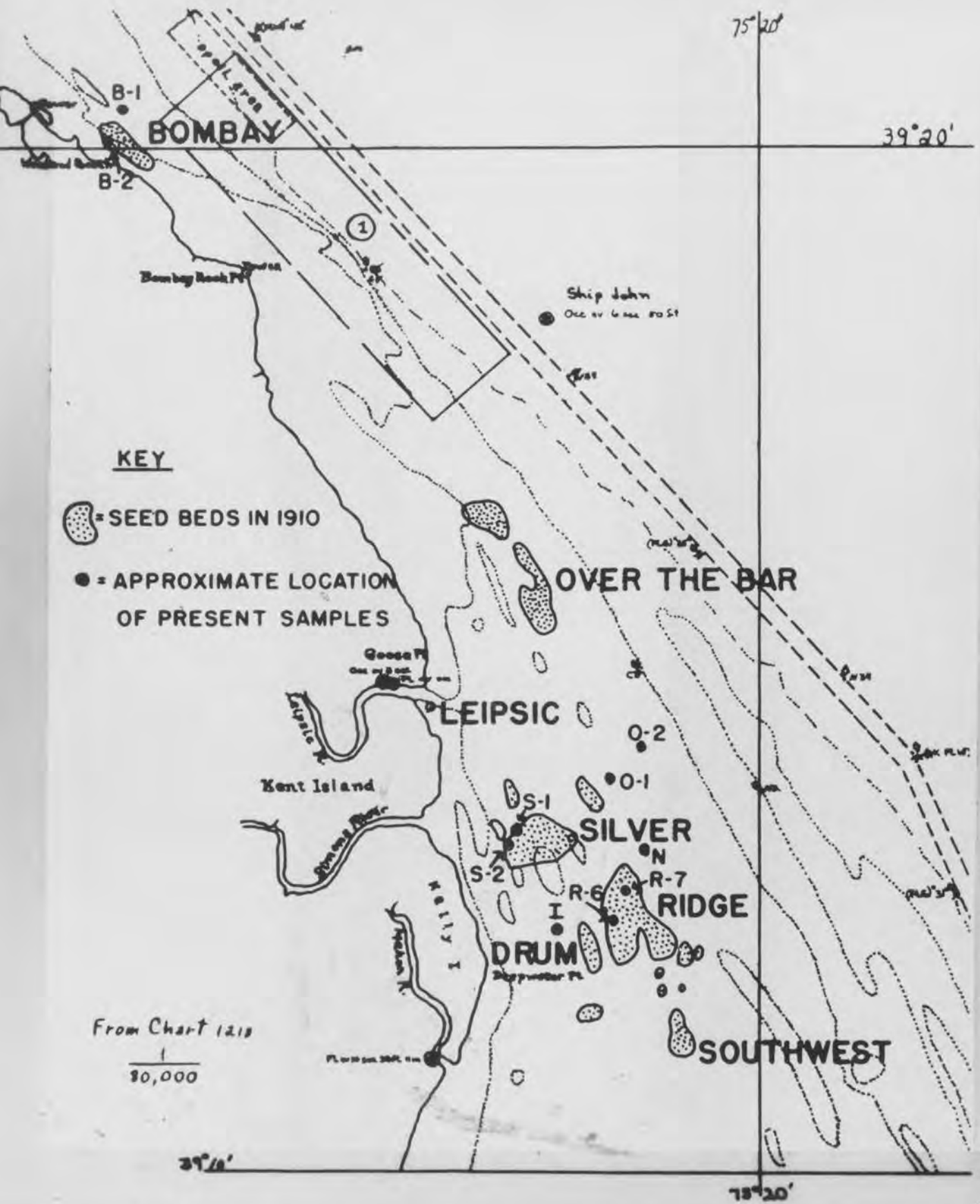
During the summer of 1950 there was another heavy mortality among the oysters on the natural beds in the Delaware Bay.²⁹² Even without this death rate the drain upon the natural beds during the 1940's could not have been continued without serious damage to the beds themselves. The Commission of Shell Fisheries made attempts in the late 1940's and again in the 1950's to restock some of these beds. Without a sufficient adult oyster population, adequate cultch during the spawning season and favorable growing conditions each year, the set had not replaced itself as rapidly as it had been depleted. Factors which changed the environment, even slightly, had long range effects upon the whole industry.

The mortality of seed oysters on the natural beds in the summer of 1950 had resulted in a preliminary study made in the early fall of 1951 by Dr. L. Eugene Cronin of the University of Delaware. His tentative findings showed that the Ridge Bed off Mahon's was about the only seed bed area

292. Carl N. Shuster, Jr., A Biological Evaluation of the Delaware River Estuary, Publication No. 3, (Newark, Delaware: University of Delaware Marine Laboratories, 1959), p. 48.

Figure 47. The Delaware Seed Beds, showing the location of beds as surveyed in 1910 and the source of samples in the spring survey of 1952.

Source: Manuscript in University of Delaware Marine Laboratories, by L. Eugene Cronin, "First Annual Biological Survey of Delaware Seed Oyster Bars," May 15, 1952.



which had seed oysters in fair quantity and of fair quality.²⁹³ The following year Dr. Cronin made another check of the seed beds. Although no extensive survey of the bars had been made since 1910 it was known that the production in 1952 was much less than that in 1910. It was hoped that annual surveys could be made to determine the quality of the seed oysters and the annual set and survival of the various natural beds. The one good source of seed oysters proved to be the Ridge, and parts of this bed were in bad condition from recent mortalities.²⁹⁴

The work on oyster research begun by Dr. L. Eugene Cronin was carried on by his successor, Dr. Carl N. Shuster, Jr., after 1955. Cooperating with the federal government and neighboring states, the Marine Biological Laboratories at Newark and Lewes, Delaware, have been able to contribute to the increasing knowledge of the oyster and especially with respect to the localities in Delaware where the bivalve is grown. This local information regarding salinity ranges, temperature ranges, studies on the setting time and many

293. L. Eugene Cronin, "Preliminary Survey of the Delaware Seed Oyster Areas," unpublished manuscript, September 4, 1951, Marine Laboratory, University of Delaware.

294. L. Eugene Cronin, "First Annual Biological Survey of Delaware Seed Oyster Bars," unpublished manuscript, May 15, 1952, University of Delaware.

Figure 48. Old Schooners Converted to Modern Oyster Boats
Docked Next to Newer Vessels in the Oyster
Fleet, September 1952.

Source: Photograph by C. S. Horn, Rehoboth Beach, Delaware.

219a



other aspects of oystering are providing the necessary scientific background for the advancement of the Delaware industry, however small, into the competitive market.

Despite an increase in Delaware production in the 1950's, the increased sale of packed oysters from Delaware required oysters to be shipped in from other areas to fill packing needs.²⁹⁵ In 1956 the state's oyster industry was valued at \$5,000,000, despite the losses incurred during the hurricane season of 1954 and 1955.²⁹⁶ The oyster industry was considered one of the largest natural resources of the state and the need for its protection and preservation was indicated in the Commission's report.

Part of the increase in the Delaware industry was directly traceable to the increased use of frozen oysters. In November of 1954 a new frozen product was placed on the market, frozen oyster stew. Production was begun in September of 1954 and the product was first distributed in chain stores in the Lewes and Rehoboth area. Oysters from

295. Journal Every Evening, Wilmington, Delaware, February 25, 1955, "State Oyster Industry Busy As Market Calls for More," p. 3.

296. Journal Every Evening, Wilmington, Delaware, January 31, 1956, "Delaware Oyster Industry's Value Put at \$5,000,000," p. 15; Delaware, "Twelfth Annual Report of the Delaware Commission of Shell Fisheries," Fiscal Year Ending June 30, 1955.

Figure 49. Old Oyster Schooner Converted to Power Vessel.

Source: Photograph by C. S. Horn, Rehoboth Beach, Delaware, September 1952.

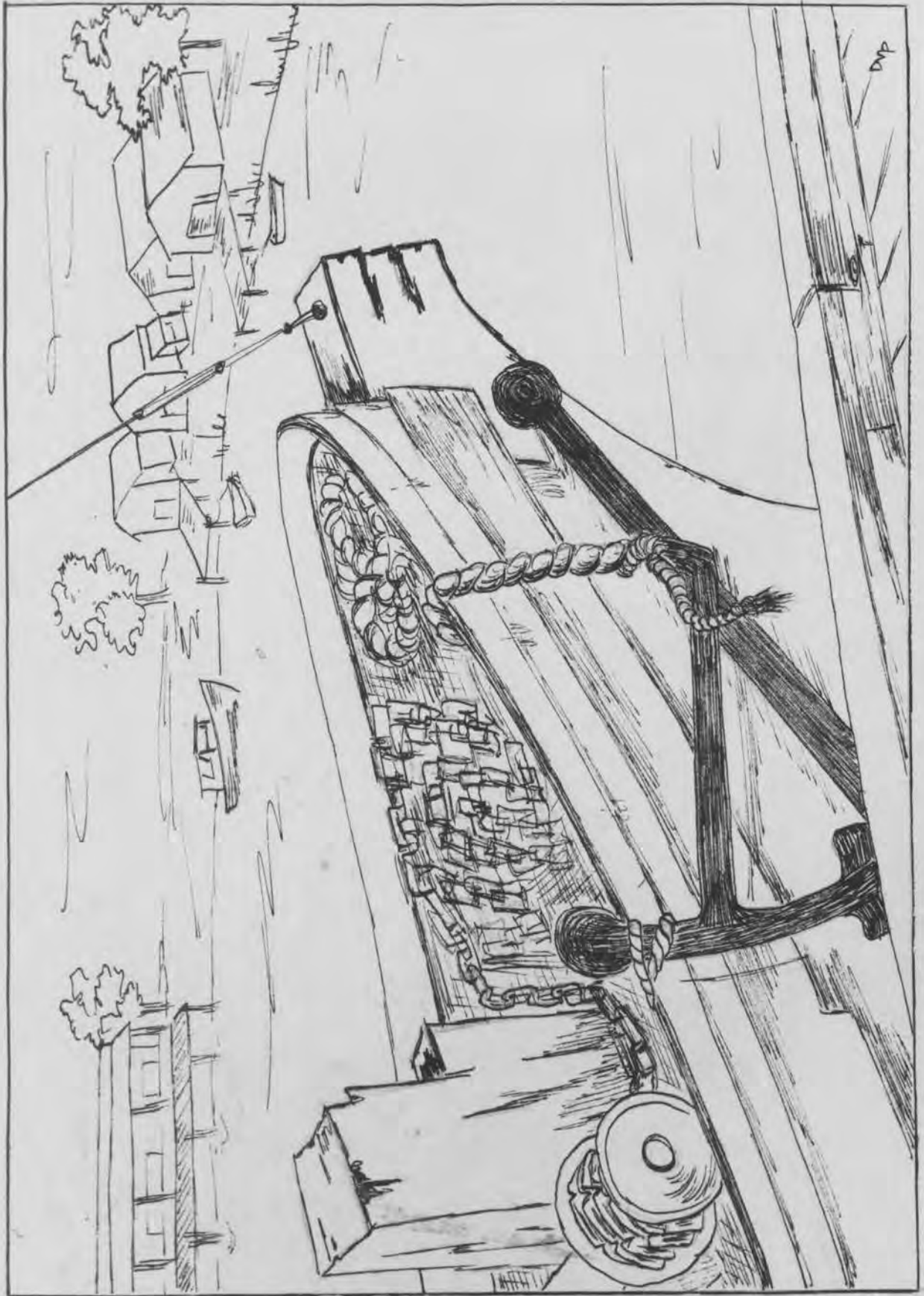


Rehoboth Bay and Delaware Bay were used in the frozen product. The Allen Kirkpatrick Company developed and marketed this product. In 1954 it distributed to forty of the then forty-eight states and this distribution has been increased since then. Frozen breaded oysters ready for frying for hotel use or for home use were soon added to the frozen oyster line of the company. The lack of oysters in the immediate vicinity forced this company to look elsewhere for a supply of oysters to fill its growing commitments. The most logical place to look was to the south. Today oysters from many parts of the country may be packed in Delaware or other sections of the country and be found in any one of the fifty states in cans or frozen packages.²⁹⁷ The use of a frozen product means that one need no longer wait for the months with an "r" in them before obtaining oysters. Packaging gives the consumer a more uniform product, but it means that the packer no longer can depend solely upon one area for a source of supply in an industry which carries such high risk. This indicates that

297. Morning News, Wilmington, Delaware, November 13, 1954, Virginia Cullen, "Rehoboth Couple Build Big Big Industry With Oysters," p. 1. See also Delaware, "Annual Reports of the Delaware Commission of Shell Fisheries," in the 1950's; interviews with Henry Buckaloo, December 16, 1961; Joseph Farner, October 26, 1961; Samuel Fox, September 26, 1961; Walter Lehman, October 26, 1961; Otis H. Smith, December 16, 1961; N. W. Taylor, Jr., November 18, 1961.

Figure 50. Bowsprit Removed When Sailing Schooner
Converted into Power Vessel.

(Drawn by Mrs. Doris Major Payne under the
direction of the author.)



the packer of necessity becomes a sea farmer in order to supply a product which he can guarantee to the public.

The danger of "MSX" to the industry threatened other areas as well as Delaware Bay. First appearing on the Jersey side in 1957 it had spread to the Delaware side by 1958. It appeared in seed oysters and in adult oysters, usually in waters of relatively high salinity. The threat to the rich beds of nearby Chesapeake Bay was real, as was the immediate threat to the operation of local packing houses.²⁹⁸ Edward Vahl, office manager of Newcomb and Hand, Port Mahon, one of the largest packers, reported, "Harvest worst in 10 years...will take two years to recover...normally ship to 40 of the 48 states...Now using only two of six boats...."²⁹⁹ Walter Lehman, head of Allen Kirkpatrick and Company in Rehoboth, said, "We don't depend on the state for supply...get Virginia and Maryland oysters and shuck in 17 outlets in those states...not affect much...feel sorry for those depending on Delaware Bay oysters...two-

298. Morning News, Wilmington, Delaware, January 4, 1957, "Natural Oyster Beds in Danger, State Advised;" Journal Every Evening, Wilmington, Delaware, August 11, 1958, "Mystery Blight That Hit State Oysters to Cut Harvest 50 Pct;" Journal Every Evening, Wilmington, Delaware, October 29, 1958, "Delaware's Oyster Crop Cut 60-90 Pct."

299. Journal Every Evening, Wilmington, Delaware, January 5, 1959, "Unidentified Blight Threatens Delaware Oyster Industry," p. 17.

Figure 51. Chart of Delaware Bay Showing East Line
Dividing Natural Oyster Beds from Planting
Grounds on the Delaware Side of the Bay,
1961.

Source: United States Department of Commerce, Coast and
Geodetic Survey, Map of Delaware Bay.

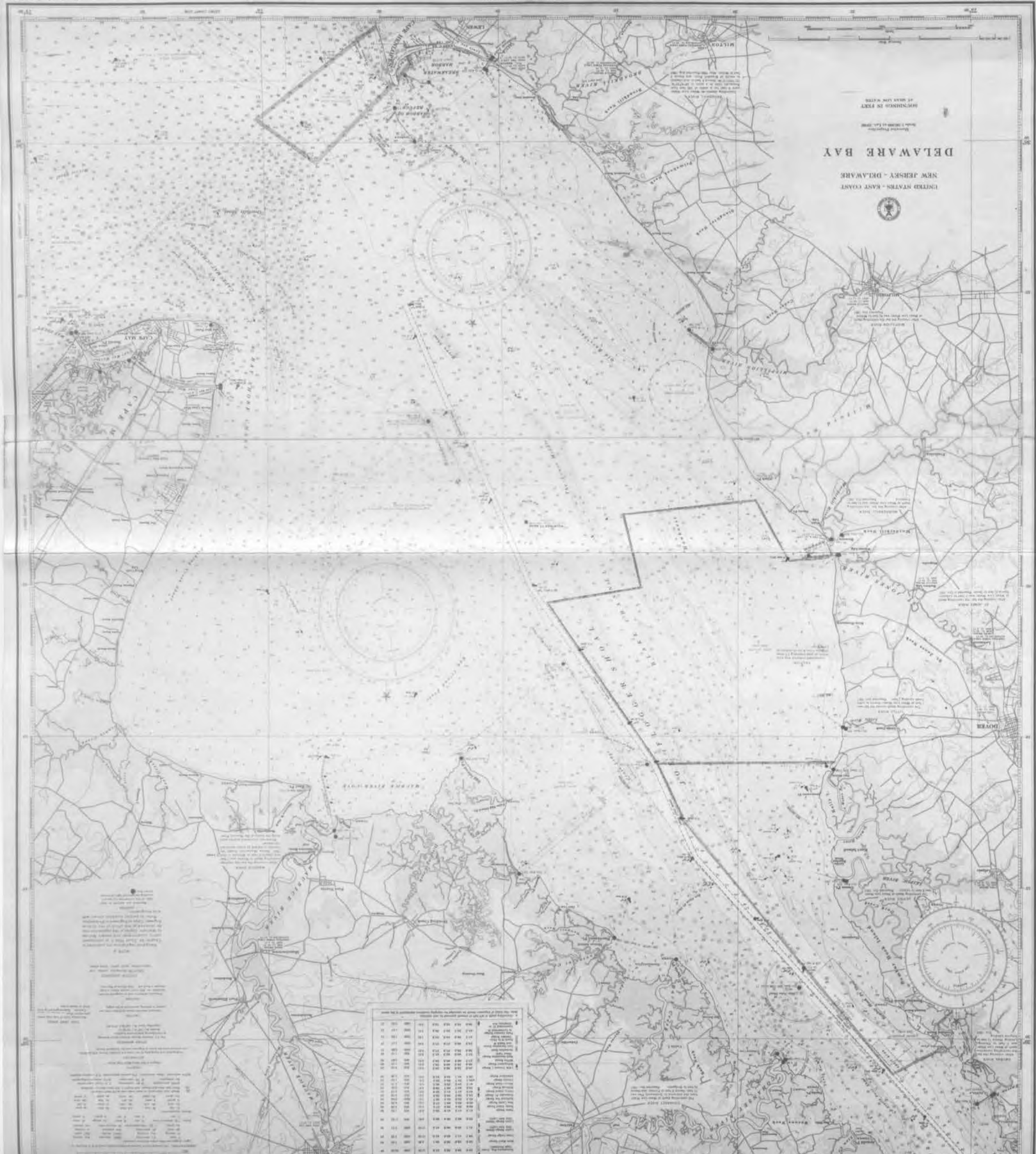


TABLE OF SOUNDINGS

Depth (Fathoms)	Depth (Meters)	Symbol
1	1.8	1
2	3.7	2
3	5.5	3
4	7.3	4
5	9.1	5
6	11.0	6
7	12.8	7
8	14.6	8
9	16.4	9
10	18.3	10
11	20.1	11
12	22.0	12
13	23.8	13
14	25.6	14
15	27.4	15
16	29.3	16
17	31.1	17
18	32.9	18
19	34.7	19
20	36.6	20
21	38.4	21
22	40.2	22
23	42.0	23
24	43.8	24
25	45.7	25
26	47.5	26
27	49.3	27
28	51.1	28
29	52.9	29
30	54.7	30
31	56.5	31
32	58.3	32
33	60.1	33
34	61.9	34
35	63.7	35
36	65.5	36
37	67.3	37
38	69.1	38
39	70.9	39
40	72.7	40
41	74.5	41
42	76.3	42
43	78.1	43
44	79.9	44
45	81.7	45
46	83.5	46
47	85.3	47
48	87.1	48
49	88.9	49
50	90.7	50
51	92.5	51
52	94.3	52
53	96.1	53
54	97.9	54
55	99.7	55
56	101.5	56
57	103.3	57
58	105.1	58
59	106.9	59
60	108.7	60
61	110.5	61
62	112.3	62
63	114.1	63
64	115.9	64
65	117.7	65
66	119.5	66
67	121.3	67
68	123.1	68
69	124.9	69
70	126.7	70
71	128.5	71
72	130.3	72
73	132.1	73
74	133.9	74
75	135.7	75
76	137.5	76
77	139.3	77
78	141.1	78
79	142.9	79
80	144.7	80
81	146.5	81
82	148.3	82
83	150.1	83
84	151.9	84
85	153.7	85
86	155.5	86
87	157.3	87
88	159.1	88
89	160.9	89
90	162.7	90
91	164.5	91
92	166.3	92
93	168.1	93
94	169.9	94
95	171.7	95
96	173.5	96
97	175.3	97
98	177.1	98
99	178.9	99
100	180.7	100

NOTES

1. The soundings in this chart are in fathoms, except where otherwise indicated.

2. The depths are given in fathoms, meters, and feet.

3. The depths are given in fathoms, meters, and feet.

4. The depths are given in fathoms, meters, and feet.

5. The depths are given in fathoms, meters, and feet.

6. The depths are given in fathoms, meters, and feet.

7. The depths are given in fathoms, meters, and feet.

8. The depths are given in fathoms, meters, and feet.

9. The depths are given in fathoms, meters, and feet.

10. The depths are given in fathoms, meters, and feet.

thirds dead." ³⁰⁰ Charles Fagan of the Delaware Oyster Farms in Oak Orchard near Millsboro, Delaware, said, "Freezing hurt too...we specialize in oysters on the half shell or singles...harvest off 75 per cent...so's business." ³⁰¹

In January of 1959 the Bay oystermen were asked to halt operations to let the blight run its course with the hope that the oysters would develop a resistant strain. On January 28 a ban was placed on oyster transplants to or from areas outside Delaware. ³⁰²

The oysters appeared to be replenishing themselves with a disease resistant strain in the summer and fall of 1961. Any gains at that time, however, were probably wiped out by a storm on March 6, 1962. Heavy pounding and the ocean breakthrough into Rehoboth Bay and Indian River Bay spread havoc in those shallow bays. The amount of sand displaced and the disrupted sewage systems in the area would have called a halt to the industry if it had not already been at a standstill. In the Delaware Bay the planted grounds were in the part hardest hit by the storm.

300. Ibid.

301. Ibid.

302. Journal Every Evening, Wilmington, Delaware, January 28, 1959, "Ban Placed On Oyster Transplants," p. 1.

It will be some time before the total amount of destruction can be evaluated. The extremely high tides and great amounts of debris created problems for the beds in shallow water when the high tides receded.

Capital has played an important part in the oyster industry, from the initial outlays for boats, equipment and seed to the bank loans needed to carry the oysterman over rough times. The present blight has created a five year hiatus in the growing industry with not too rosy prospects for another three to five years. One method of financing the oyster industry is the Production Credit Association. Loans are made to oyster growers, with the date of payment being the time when the oysters are finally sold. The security for the loan can be a lien on the oysters themselves and other real estate belonging to the grower. This Production Credit Association was part of the Farm Credit Administration.³⁰³ Both the initial outlay and the working capital needed to operate in the oyster business can be stumbling blocks to successful operations. Insufficient working capital may force an oysterman into bankruptcy,

303. H. Irving Buckson, "Financing the Middle Atlantic States' Oyster Industry," Paper for the Graduate School of Banking conducted by the American Bankers Association, Rutgers University, New Brunswick, New Jersey, June, 1959, pp. 43-46. This presents an account of how such a loan would be negotiated.

thus costing him his initial outlay of money as well.³⁰⁴
The big problem in financing the oyster industry is that
the usual types of secured loans may not cover the
lengths of time the oyster industry needs to recover from
diseases or weather destruction without undue risk to
depositors' funds.³⁰⁵ The day is long past when a man
could use a small row boat and a pair of tongs and earn
a good bit of hard cash.

304. Ibid., pp. 46-48.

305. Ibid., pp. 49-61.

Chapter VIII

Jurisdiction, Industrialization and Conservation in the Delaware Valley

Industrialization and Jurisdiction

The Delaware Bay and River area is one of the most highly developed in the United States. Since colonial days it has been the scene of extensive trade and traffic, a natural artery for rich farmland and growing cities. Mills and manufacturing plants received raw materials by cheap water transportation and tapped nearby food-growing areas to feed the increasing population of workers. Ship building arose to carry the products, secondary industries to support shipbuilding.

Downstate Delaware remained primarily agricultural until after the Second World War, while the industry of the state was concentrated in the northernmost county. Following the war, industry began expanding into the two southernmost counties. As a result, the population of the state has grown in the 1950's faster than that of the nation as a whole. In 1790 Delaware's population was 1.5 per cent of the national total, in 1890 it was only .25 per cent, and in 1950 it was down to .21 per cent. However, by 1958 the

ratio had risen to .26 per cent.³⁰⁶ Much of this growth comprises young workers with families, some of it the influx around Dover Air Force Base in the middle of the state. Despite the lack of varied natural resources, the state's location in the Washington to Boston strip of the eastern seaboard--the future "megalopolis"--has been an important factor in its dramatic growth.

There has been a great change in the nature of work in the state and also in the people who do that work. The expansion of market areas and the regional specialization in production have made the state more and more dependent upon decisions made in other parts of the country. With this has come the organization of state and federal agencies to assemble and coordinate information on interstate industries. Delaware's economy is based on agriculture, geographical location and water supply. The state attracts industry which can use the water of the Delaware River and Bay for transportation and temperature control, such as the chemical and petroleum refining industries with their suppliers; and also these industries which desire cheap and plentiful land within easy access of the Washington, New York and Boston areas.³⁰⁷

306. Albert H. Dunn, III, and staff, The Delaware Economy, 1939-1958, (Newark, Delaware: Bureau of Economic and Business Research, University of Delaware, 1961), pp. 1, 11-15.

307. Ibid., p. 86.

The rise of industries in the Delaware River Valley has contributed to the pollution problem in the area. With increased building development, flood control has become correspondingly important in safeguarding property. These problems are interstate in nature. The mutual interests of several states in the Delaware River and Bay thus led to the organization of INCODEL in 1936. This Interstate Commission on Delaware was a means for the states of Delaware, New Jersey, Pennsylvania and New York to get together and work out the best arrangements for use of the waters in each state while respecting the water needs of the other states. Interest in developing recreational areas and preventing destruction of property by water and storms and conserving natural resources along valuable waterways demanded the forming of many mutual agreements. Boundary difficulties, such as those which plagued Delaware and New Jersey for years, were settled.

Population and industrial growth in the Delaware Valley area brought the water needs of the area into sharp focus. New York City's need for water led to court cases in which the effect of the diversion of water from the Delaware River and subsequent releases of water by New York and New Jersey further downstream was clearly pointed out. This alternate holding and releasing of water affects the salinity of the Delaware Bay. Scientists in both New Jersey

and Delaware warned of the effects in terms of increase in predators on the valuable seed oyster beds, due to an increase in salinity, as well as other forms of marine life.³⁰⁸ New York's contention that this effect would be of minor significance has not been borne out by later developments.³⁰⁹

The hurricanes in August 1955 accentuated Delaware's needs for water. Some general studies of water needs had been made, but none of a comprehensive nature involving the Delaware River Basin. However, toward the end of 1956 a complete study was undertaken by the U. S. Corps of Engineers.³¹⁰ The Intrastate Water Resources Survey was an appendix to this.³¹¹ The study in Delaware was made

308. L. Eugene Cronin, "Testimony on the effects of the New York plan of water diversion and release upon the estuarine resources of Delaware," Biennial Report, 1953 and 1954, (Newark and Lewes, Delaware: Marine Laboratory, Dept. of Biological Sciences, University of Delaware, 1954), pp. 81-83.

309. Later studies have shown that the salinity of the seed oyster areas has risen to a point more favorable to oyster drills; drills have been observed in quantity in areas where previously they were noted only infrequently; see Carl N. Shuster, Jr., "Oyster Survey, Summer 1956," University of Delaware Marine Laboratories, Reference 57-2; Carl N. Shuster, Jr., various progress reports to U.S. Fish and Wildlife Service, 1959, 1960, 1961; interviews with Dr. Carl N. Shuster, Jr., November 21, 1961; Dr. Harold H. Haskin and Dr. Leslie A. Stauber, November 6 and 10, 1961.

310. State of Delaware, Intrastate Water Resources Survey, (Wilmington, Delaware: William N. Cann, Inc., 1959), pp. 1-4.

311. Ibid., pp. 1-5.

by numerous agencies, commissions and interests within the state, and Dr. Carl N. Shuster, Jr., of the University of Delaware, evaluated the shellfisheries.³¹²

The water resources survey emphasized the need for further interstate cooperation. The dreams of a Delaware River Basin Compact became reality on September 27, 1961, when President John F. Kennedy signed legislation creating it. The Basin Pact was to plan, operate, utilize, develop, manage and control the water and natural resources of the Delaware River Basin. The partners in this undertaking are the United States Government, Delaware, New Jersey, New York and Pennsylvania.³¹³ The survey by the Corps of Engineers had already developed a plan for future needs of the area. As Delaware's working member of the Pact, Governor Elbert Carvel appointed Brigadier-General Norman N. Lack, the state's representative on the Delaware River Basin Advisory Commission which had prepared the legislation.³¹⁴ As the first effort toward regional control of

312. Ibid., pp. 21-46 to 21-54.

313. Evening Journal, Wilmington, Delaware, September 28, 1961, "U. S. Partner With 4 States, Law Signed for Compact on Delaware River Basin."

314. Evening Journal, Wilmington, Delaware, September 30, 1961, "Carvel Names General Lack His Alternate on Delaware River Basin Group."

water resources, the Pact's activities should be followed with great interest by other river systems.³¹⁵

One of the problems the Basin Pact will be investigating is the pollution in the Delaware River and Bay. Of the ten major factors of the oysters' environment, five may be considered positive and five negative factors. The positive factors include character of the bottom, temperature, salinity, water movements and food. Of these, pollution directly affects only the character of the bottom and the food. Of the negative characteristics--natural sedimentation, changes associated with human activities, competition, predation and disease--only the first two affect the environment of the oyster adversely.³¹⁶

Pollution may be slight or remain undetected for long periods of time during which gradual damage to marine life may occur.

Galtsoff has concluded that factors leading to the decline of the oyster industry have been man-made and

-
315. Kenneth G. Gehret, "Delaware River Compact Draws Praise," Christian Science Monitor, Boston, Massachusetts, October 2, 1961.
316. Paul S. Galtsoff, "Environmental Requirements of Oysters in Relation to Pollution," Reprinted from the Transactions of the Second Seminar on Biological Problems in Water Pollution, April 20-24, 1959, U. S. Public Health Service, Robert A. Taft Sanitary Engineering Center, Cincinnati 26, Ohio, Technical Report W60-3.

therefore can be corrected. Inadequate management of natural resources, not the pollution of those resources, has been reputed to be a major factor in the decline of the industry. Intensive oystering led to depletion of natural beds beyond the ability of the oyster to recover. Planting shells by state agencies to counteract this loss is both expensive and ineffective.³¹⁷

Conservation

Galtsoff has stated that the oyster industry has a chance of surviving if more attention is paid to oyster farming. This idea is not a new one, since a crude sort of farming was carried out in ancient Rome. The work of Coste, Möbius and Brooks in the second half of the nineteenth century was directed toward artificial cultivation of the oyster. Without the necessary scientific information and public approval, however, these efforts were doomed to failure. In the United States, as natural beds have been exhausted, efforts were redoubled to create

317. Paul S. Galtsoff, U.S. Fish and Wildlife Service, Woods Hole, Massachusetts, "Ecological Changes Affecting the Productivity of Oyster Grounds," unpublished manuscript, pp. 10-11.

private planting areas, as exemplified by the Delaware experience described earlier in this study. The increased cost of labor led the planters to become more and more mechanized. This mechanization has also created a sharp dividing line between the small investor and the big operator. Thus, oyster farming, to produce a product of high quality in appearance and flavor, has become necessary to insure the public adequate and safe food supplies.

Oyster farming requires a protected area with a relatively hard bottom of moderate depth, with water changes of a tidal nature. The area must be free from pollution and have an abundant food supply available. Utilization of marsh land along the tide waters of Delaware on the order of the French claire system, large artificial ponds with flood gates for water control (see Glossary), or a float industry, floating ponds which can be moved from place to place, would fit these requirements.³¹⁸ Pond oyster farming is being experimented with at the Osprey Fishery near Crisfield, Maryland. This type of farming, using the natural ponds and suitable marshes, would afford protection against predators, thieves and storms.

318. Interview with Dr. Paul S. Galtsoff, Bureau of Fisheries, Woods Hole, Massachusetts, December 8, 1961.

Natural oyster beds still require protection, since at present these areas produce the seed oysters needed in oyster farming. No way has yet been found to breed oysters artificially in sufficient quantities for commercial use. Obviously, without seed there can be no industry at all.

With the diminishing of the extensive natural beds the public has had to rely upon private planters for a supply of oysters. On the whole these planters have been able, in the face of great odds, to meet the demand. The price of oysters has been very elastic in recent years, supporting the assumption that the commodity has become a luxury rather than a staple.³¹⁹ The diminished natural beds with the resulting rise in cost explains this. Part of the gradual diminution in popular demand for oysters can be attributed to the loss of flavor as a result of the sanitation requirements enforced upon the packers of oysters. The public may have been protected from contamination by these health regulations, but in the process oysters became a luxury food item.

319. Harold Louis Barrick, "The Economic Factors Affecting the Demand for and the Price of Oysters and Blue Crabs in the United States," unpublished Ph.D. dissertation, Rutgers University, 1959, p. 74.

Chapter IX

Summary, Conclusions and Recommendations

Summary and Conclusions

The need to expand the world's food supply has become of paramount importance as the world's population has mushroomed. One source of food which has not been sufficiently investigated is the marine environment. The oyster industry is world-wide, its earliest culture having begun in China, while western culture techniques stemmed from those of ancient Rome. There appears to be a consistent pattern in the decline of the industry throughout the world because of ruthless exploitation and lack of scientific knowledge.

Oysters are considered one of the most nearly perfect of foods. Analysis has shown that the oyster contains all the minerals needed by man for healthful metabolism, plus glycogen, an energy-producing material. From time immemorial the oyster has served as an item of food for coastal people. But because of destructive exploitation throughout the years it is no longer to be considered a food of the common man, but rather as a luxury item.

The oyster industry, although subject to periods of marked growth and sharp decline, has had a continuing importance to the State of Delaware, as evidenced by recurrent efforts to maintain and improve it by legislation. These efforts were not entirely successful, partly because the laws were patterned after those in other states without enough regard for special circumstances in Delaware. Furthermore, the oyster grounds covered too much territory for the state to enforce the law adequately. This fact alone encouraged disregard of the law.

The great boom in the oyster industry began immediately after the Civil War and extended into the twentieth century. The removal of oyster shells from the beds in these heydays gradually reduced the amount of cultch material available for each year's new crop of oysters. Furthermore, besides man, the oyster has many enemies; predators, competitors and parasites. These must be controlled in order that oysters may be produced commercially. There is evidence to indicate that complete reliance upon public grounds has led to a decline in the oyster industry. It has also been shown that without public seed bar areas, protected by the state from irresponsible depletion, the industry will lack the necessary seed to produce marketable oysters.

A further problem exists in that the balance of nature is being destroyed by drainage for mosquito control, pollution from industry and shipping, dumping of dredged material on marshes and the encroachment of industrial plants on shore areas. All of these factors have helped to decrease the flow of nutrients from the land to the waters, and have thus reduced the variety and quantity of marine life. The Coriolis effect of the rotation of the earth tends to increase the value and extent of the shellfisheries on the eastern side of Delaware Bay over those on the western (Delaware) side. Regulations restricting the removal of oysters from the natural beds for seed purposes to those between two and one-half and three inches in size may actually be removing a larger percentage of male oysters from the beds, since young oysters frequently develop as males first and later become females. This practice prevents adequate reproduction on the natural beds and causes a cumulative decline in the production of seed oysters.

Since the Second World War the Chesapeake, South Atlantic and Pacific areas have become more important in the production of oysters, while the Middle Atlantic States have declined in importance because of the increasing industrialization of that area. Men have turned from oystering because of the more assured income offered by

other industries developing in the area, and because of the fewer jobs available, since labor costs have stimulated the adaptation of mechanization to the oyster industry.

Numerous efforts to revitalize the industry have been made in latter years through development of more efficient and practical ways of oyster culture. No method has been devised as yet to breed oysters artificially on a scale that is commercially profitable. On the other side of the coin is the proper management of natural resources, depletion of which has, after all, been man-made. In recent years the conservation movement has resulted in cooperation among certain of the Atlantic Seaboard States to remove and to prevent pollution of waters so as to restore them as sources of food supply. Only in the last decade has there been a consistent program in Delaware to gather the scientific data necessary for oyster culture within the state. A further stimulus for scientific research has been provided by the appearance of the blight known as "MSX" in New Jersey, Delaware, Maryland and Virginia waters. Much of this effort is directed toward developing strains of oysters resistant to the disease.

The Delaware River Basin Compact holds great promise for the restoration of the Delaware Bay and River as suitable breeding and growing areas for oysters. Hope for the reju-

vention of the industry lies in the development of modernized oyster farming methods with the emphasis on private planting. This planting requires a capital outlay in the neighborhood of \$300,000 and sufficient working capital to cover the frequent periods of inactivity in the oyster industry. This working capital might be provided by credit services through banks in coastal areas, banks which should be familiar with the problems of the oyster industry.

Recommendations

If the oyster industry is to be revived, further research must be undertaken to conquer the "MSX" blight which has seriously crippled the industry. This research must be continued until the cause of the blight has been discovered and eradicated.

Greater sums of money must be provided by the federal and state government and private operators in the industry for continuing research on the oyster in Delaware.

Cooperative efforts of the federal government, the state shellfish agency, marine biologists and the Delaware Agricultural Experimental Station should be developed on the pattern of the New Jersey Agricultural Experimental Station program in the field of applied oyster research.

Private oyster culture should be developed in suitable natural ponds and tidemarshes in Delaware, so as to produce a better and guaranteed product to the consumer.

Because of the irregularity of employment and the trend toward automation, adult education resources in the state must be utilized to assist oystermen to acquire other saleable skills through retraining programs.

For those who remain in the industry, training programs should be developed through the State Department of Education to provide oystermen with improved skills which will enable them to meet the modern demands of the industry. Help in providing such programs is presently being provided by the federal government to State Departments of Education.

A long range program of conservation and development for the oyster industry in Delaware must be planned in conjunction with the Delaware River Basin Compact representatives.

Since a survey of the Delaware Bay beds has not been made since 1910, a survey should be undertaken as soon as practicable.

A leasing procedure comparable to that existing in Maryland should be set up to encourage wider public interest in leasing and greater responsibility in operating the private grounds.

Significance of the Study

The history of the Delaware oyster industry exemplifies the struggle of man to exploit natural resources amid both the opportunities and complications arising from modern science and its offspring, an urban, industrialized society. The discovery of a resource, such as oyster banks, has led to an enriched life for the men who harvested and marketed the oysters and for those who consumed the oysters. But as the population has grown and industry has crowded the shores of the oyster-growing estuaries, the environment of the oyster has been changed. In some cases the change has been so drastic as to result in the extinction of the oyster beds; in others the changes have merely depleted the beds so that fewer men could depend upon them for their livelihood. In the second quarter of the twentieth century the steady income of industry has therefore attracted more and more to work at specialized jobs.

At the same time, growth of an industrial population increases the need for food. As the amount of land available for raising crops decreases with the use of land for housing and industry, the sea will become more and more important as a "farming" area to help feed the peoples of the world.

Industry, born of science, has encroached upon the growing areas of such foods as oysters; but science also gives hope for developments in increased productivity and better products. The scope of such undertakings, however, has become too great for individual effort. The Delaware oyster industry has clearly shown that individual initiative is not enough and that the support and guidance of state and federal governments and cooperative agencies transcending the legal boundaries of the states is absolutely necessary. With this support vast new productive sea areas may yet be "farmed" and the peoples of the world fed.

APPENDIX A

GLOSSARY

Phrases and Words Descriptive of Oysters in 1880 *

- Ambulance.** A box with bottom and top of wire netting, in which the "collectors," covered with young oysters, are placed to protect them from their enemies, while the water is freely admitted. (France)
- Ark.** A house on a scow or other floating hulk, used as a work- and store-house in winter. (Connecticut) See Scow. (1880)
- Bank.** The oyster colony or locality where they grow. (South) See Bed, Rock, Bar, etc.
- Barnacle.** The slipper-limpet, Crepidula sp.; also, true barnacles. (Cape May, New Jersey) At Cape May limpets are called "barnacles," and confounded by many with the true barnacles.
- Basket-Fish.** Astrophyton Agassizii, a kind of many-armed starfish.
- Bateau.** A small, flat-bottomed boat, like a sharpie, used for moving about the oyster-beds, for clamming, and other light work. (Staten Island)
- Beard.** I. The finely-fringed margin of the oyster's mouth, which shows near the edges of the shells.
II. The protruding byssus of mussels.
- Bed.** The bank, reef, or deposit of oysters in the water, either growing naturally or artificially, original or transplanted.
- Bedding.** Transplanting oysters of any size to beds prepared for them, from which they are to be removed before the frosts of the ensuing winter. See Fatten.
- Bedding-Down.** See Bedding.
- Bench.** The broad, sloping platform which runs around the walls of an opening-house, where the oysters are piled for opening. Sometimes a movable table, etc., for opening oysters.

* This Glossary is adapted from Ingersoll, The Oyster-Industry, pp. 241-250. Some of the phrases and definitions are no longer used in the industry.

- Bench-Oysters.** Those sold at a restaurant or lunch-counter, to be opened for "plate" or "half-shell" custom. See Fancy, Extra.
- Blister.** A young oyster, not larger than a quarter dollar.
- Block.** See Spawn, Spat. (Barnegat to Cape May) The lignum vitae conical block, having an iron chisel fixed in its top, upon which oysters are broken before being opened. (New York)
- Blue Points.** Oysters originally found off Blue Point, eastern end of Great South Bay, Long Island, but now applied to all oysters from any part of the south shore of Long Island, whether native or transplanted, eastward of Babylon.
- Board-Bank.** A platform set in the bank, or otherwise arranged so as to be alternately covered by tide and flooded with fresh water, for freshening oysters before selling. (Cape May) See Platform.
- Boat.** The little mollusk, Crepidula fornicata. (New Haven) See Deckhead.
- Borer.** I. The Urosalpinx cinerea. (New England) See Drill, Snail-bore, etc.
II. A sponge, Cliona sulphurea, which eats into oyster-shells.
- Box.** A measure for oysters, equal to one-fourth of a barrel; an oblong, shallow box, with cleats as handles nailed on the ends. (Mobile to Texas)
- Box-Oyster.** An oyster from seven to ten years old, of round, handsome shape, not less than 3 inches wide and 5 inches long. (Connecticut and New York) See Extra. The name is due to the fact that many years ago it was customary to ship oysters of this grade to New York in boxes instead of the ordinary barrel.
- Box-Stew.** A stew made of box-oysters. (New York)
- Breaking.** In Baltimore, the chipping of the shell preparatory to opening an oyster. See Cracking.
- Brogan.** A kind of large boat used by the oystermen of the Chesapeake.
- Bucket.** A wooden, firkin-shaped, covered receptacle for shifting oysters; of variable capacity.

- Bugeye.** A flat-bottomed, center-board schooner of three to fifteen tons, built of heavy timbers, without a frame. A bugeye is always decked over and has a cabin aft. (Chesapeake) (This is an 1880 description.)
- Bunch Oysters.** Those growing in clusters. (South) See Raccoon Oysters.
- Bushel-Barrel.** A barrel cut in two, holding about $1\frac{1}{2}$ bushels of oysters, and used as a measure.
- Bushel-Oysters.** See Cullenteens.
- Capes.** Oysters from Cape Cod and Buzzard's Bay. Also, (particularly in the case of the latter) known as "Natives." (Boston)
- Carrier.** I. A man who makes his living by unloading the boats and carrying oysters into the warehouse scows. (New York and New Orleans)
II. An oyster which will endure transportation well. (Trade term)
- Chaplet.** A string of shells or other oyster-spat collectors suspended on wire. (France)
- Claire.** An excavation, "more or less deep, having a muddy or marly bottom, close to the edges of the sea-board, through which the sea-water passes into them.... In these claires they assume that green color (formerly) so much prized by the French." Asplet.
- Clucker.** An oyster injured by chill, or otherwise, so as to sound hollow when its shell is struck. In England this word is spelled Clock; a dealer in London wrote, "The last oysters lost their sea-water, and became clocks and worthless."
- Collectors.** An arrangement of arched tiles, piles of stone, hurdles, or anything similar, to collect and give lodgment to the spat. (Europe)
- Colander.** A large perforated tin basin, similar to the cooking utensil of the same name, only three or four times as large, in which the oysters are washed.
- Coon-Heel.** A long, slim oyster. (Connecticut) See Razor-blade, Shanghai, Rabbit's-ears.

- Coon Oyster. Small, shapeless, worthless stock, growing in heavy clusters along the salt marshes, or forming great bars. (Southern coast) At Cape May the word is restricted to young oysters caught on the sedges.
- Cot. See Finger stall. (Baltimore)
- Count. I. Method of selling oysters in Philadelphia and New York, by enumeration instead of measurement.
- Cove-Oyster. "The term cove-oyster has a trade-signification differing from that in which it is understood by the oysterman. The packer, by cove-oysters, simply means steamed oysters packed in hermetically sealed cans. They may be, in fact they are, of any and every size and quality. By 'cove-oysters' the oysterman means the single oysters scattered through the bays and creeks and old planting-grounds, occurring too sparsely to be taken by the ordinary methods of tonging. When the water is clear and smooth the oysterman moves slowly over these grounds, and when he 'sights' an oyster, which he can readily do in from 4 to 7 feet water, or even more, he picks them up singly with a pair of nippers. These oysters, as might be expected, are large, fat, and of good shape. They class as 'selects' and bring 'top' prices in the market, from 60 cents to \$1 per bushel." Colonel M. McDonald. (Chesapeake Bay)
- Coving. The business of picking up "cove-oysters" (q.v.) with nippers. (Chesapeake)
- Cracker. One who opens oysters by first breaking the shell with a hammer.
- Cracking. The breaking of the oyster-shell before extracting the oyster. See Breaking.
- Cracking-Iron. A piece of hard iron, 1/8 inch thick, 2 inches long, and 1 inch wide, set upright in the bench upon which the opener rests the oyster, while he breaks the edge of the shell off with his hammer. (Fair Haven)
- Cull-Boy. A boy who goes in the small boat with tongs to pick over the oysters. (Virginia)

- Cull-Board. A heavy board laid athwart the gunwales, or elsewhere, upon which the oysters are broken apart and sorted.
- Cullens. See Cullins.
- Culler. One who picks over oysters, or culls out the worthless and smaller ones; usually a boy.
- Cullins. See Cullings.
- Cullings. The poorer oysters remaining after the culls have been picked out.
- Culling-Tool. A straight, stout, blunt, but thin-edged instrument of steel, about 10 inches long, having the heavy butt wound with cord to form a handle, used for knocking and prying apart a cluster of oysters. It is like an exaggerated and very heavy oyster-knife. But various rougher tools, of no particular form, are used for the same purpose.
- Cullinteens. The smaller grade left after "extra," "box," and "cull" oysters have been picked out. (Norwalk) Formerly called "bushel oysters."
- Culls. Culled-out oysters; the next to the poorest grade; 4 to 5 years old. (New York and East River)
- Cultch. The shells, gravel, fragments of brick, or any other material placed in the water to catch the spawn of the oyster. See Cutch.
- Cultivate. To raise oysters artificially from spawn, or from transplanted young. See Plant.
- Cunner. A canoe. (Chesapeake)
- Cutch. An American spelling of cultch.
- Cut-Out. I. To open oysters. (Providence River)
- Deck-Head. The Crepidula. (East River) See Slipper-limpet, boat.
- Designation. The right to plant oysters on a certain piece of ground designated by oyster-commissioners or other authority (Connecticut); also, the plat of ground itself.
- Drag. I. See Dredge. (Norwalk)
II. To dredge.
- Dredge. "A scoop-net, with a heavy, rectangular iron frame for scraping the sea-bottom. The frame is about three times as long as high, the two longer sides having sharp edges and serving as scrapers. The net is of heavy twine, or of iron chain-work. The rope by which

- Dredge.(cont.) the dredge is manipulated is fastened to the ends of two handles, reaching forward from the ends of the frame." Rathbun.
- Dreg. Corruption of Dredge.
- Dingy. A small, sharp-prowed, flat-bottomed boat, with a miniature center-board, and half-decked; used for running about the grounds in, and back and forth from vessels at anchor. (Southern)
- Drift. The distance gone over while making a single haul of the dredge or dredges.
- Drill. A small mollusk, the Urosalpinx cinerea. See Borer.
- Drink. To give oysters a "drink" is to place them in fresh water, over one or more tides, in order that they may expel the salt-water from their systems and imbibe the fresh water. This results in an increase of size and plumpness. This, however, lasts only for a few days. At the end of this time the oysters become lean again, for the increase in size is due to no material growth of flesh, but due entirely to the absorption of moisture. The tissues of oysters, when first taken, are saturated with the ocean brine, and when removed to fresh water, or that which is less salt, the external liquid passes inward more rapidly than the more saline and denser elements within can escape; the effect being simply to cause the oyster to swell, with no increase of its virtues. When the water in which the oyster is immersed is too fresh, it loses its flavor. It has been suggested, that by immersing the oysters for some days in concentrated brine, and then removing them to ocean water, the plumpness would be gained without the sacrifice of the saltness which is so agreeable to the epicure. A simple method of ascertaining whether the oysters increase in flesh or not, would be to take 100 or more from a given locality on the sea-coast, and drying them at 220° Fahrenheit and ascertaining their average weight, and then repeating the process for the same number of like oysters after transplanting.

- Drudge. See Dredge.
- Drugged. Past tense of drag (q.v.). A Connecticut man told me: "I heaved my drudge over and drugged the whole lot."
- East Rivers. Oysters grown between New Haven, Connecticut and New York.
- Etalage. A place on shore where oysters are stored for sale. (France)
- Eye. II. The colored circular mark or cicatrix in the interior of an oyster-shell, near the hinge, where the adductor muscle was attached.
- Fall. A deposit or set of spawn, or infant oysters. Used also as a verb. (South of England)
- Fancy Oysters. Superior grades kept at retail, to be opened on the counter and eaten raw. In New York these are "Saddle-Rocks," "Blue Points," etc. See Bench.
- Fatten. To place oysters on floats or in fresh water, just before marketing. See Drink.
- Fatten. To bed down for growth; also to plant. Not good usage, because confusing.
- Feather-Edge. The new thin growth added to an oyster-shell each season.
- Firsts. Box-oysters. (New Jersey and New York City)
- Finger-Stall. In Fair Haven, the protection (of rubber or of twilled cotton) worn on the left hand in opening. See Cot.
- Five-Finger. A starfish.
- Flat. A flat-bottomed, square-sterned boat used by the oystermen in Prince Edward Island.
- Float. A platform of planks, upon which oysters are piled and subjected to fresh water, before being taken to market. See Fatten.
- Garvey. A small scow, used to plant oysters, and take them up in for market. (Barnegat, New Jersey)
- Grant. Stipulated area "granted" by the state for oyster-culture. (Massachusetts)
- Gravette. The oyster of the Bay of Arcachon, France; so called "from the impressions they make on the sandy bottom."
- Gray-Beard. The common hydroid of northern oyster-beds, Sertularia argentea.
- Green-Gill. In Richmond and Petersburg, and on the York River in Virginia, are to be found in the

- Green-Gill
(cont.) markets what are called "green-gill oysters." Some say they are diseased, and refuse to eat them; but the oyster-men claim that they are perfectly wholesome, but admit that they do not sell very well, because of a prejudice against them. The Negroes claim that they are the best in Richmond, and that they are made green by their being found with the green sea-weed.
- Gully Oysters. Those caught on shoals, etc. (Mobile)
- Hair. Hydroids. The "hair" that oystermen assert grows on their oysters under certain circumstances, is an animal growth, which attaches itself to the shell, and is nothing put out by the oyster itself.
- Half-Deck. The slipper limpet, Crepidula fornicata.
- Half-Measure. A tin receptacle for the meats of opened oysters, holding 2½ quarts. (New Haven)
See Measure.
- Hamper. An oyster-basket holding two bushels. (New York)
- Hard-Oyster. The northern "native" oyster. (Staten Island Sound)
- Hooker. II. A tool of any size, consisting of a rod of tough iron, bent into more or less of a hook at the end, used to pull out the raccoon oysters, and knock the bunches to pieces. (Georgia)
- Husk. To remove the shells from an oyster; or "open" it. (Georgia)
- Husks. Oyster-shells.
- Jag. A lot, parcel, or quantity of oysters of indefinite size; e.g., "I sold a jag of 75 bushels to A, B & Co."
- Kitchen-Oyster. Small oyster for cooking. (New Orleans)
- Layer. An artificial oyster-bed. (England)
- Loaded. An oyster is said to be loaded when it is coated with annelid tubes. See Sand Up. (Rhode Island)
- London Stock. Oysters culled out for the foreign market; about three years old, small, round, and cup-shaped. See Cullins, etc.
- Measure. A round tin receptacle for meats, holding five quarts, used in the opening-houses. (New Haven)
- Meat. The fleshy, edible part of an oyster, or other mollusk.

- Milk. The spat before it is discharged from an oyster, and is said just before and during spawning to be "in the milk."
- Milky, or Milchy. To be "in the milk," i. e. ready to spawn.
- Mussel. Mollusks of the family Mytilidae and genera Mytilus and Modiola.
- Naturals. Oysters of natural growth; wild, not planted. (New Jersey)
- Nippers. Tongs having at the end not a rake-head with many teeth, but only one tooth, or a very few teeth, so as to act as pincers; used in picking up solitary oysters, which can be seen and aimed at. (Chesapeake)
- Open. To remove the meat from the shell of a mollusk. See Cut out.
- Opener. One who opens oysters for trade. See Sticker; Side-opener.
- Opening House. A place where oysters are opened.
- Oyster. A mollusk of the family Ostreidae and genus Ostrea; also, some allied forms distinguished as "pearl" oysters, etc. They are scattered over the whole world, and through the geological record since Jurassic time. In the United States only one species, Ostrea virginiana, is now recognized as edible; but this appears in market under a long and diverse set of names, derived from the district or bed where the particular variety grew. See particularly the sections on the Chesapeake.
- Oyster-Can. The tin receptacle, holding from one pint to four quarts, in which oysters are packed for shipment. These may be square or round, and of various shapes. The industry of can-making is perhaps the greatest auxiliary of the oyster-trade. There is an enormous industry in Maryland centered at Baltimore. In New England all the retail trade is carried on by means of cans, in which the opened oysters are delivered raw to the consumers, either in the city or outside, by railway express.
- Oyster Crab. The female of the Pinnotheres ostreum, found parasitic in the gills of oysters from Massachusetts southward.
- Oyster-Grass. The kelp and other sea-weeds which attach themselves to oysters and mussels, or grow on the beds. (Cape May)

- Oyster-Glove. A leather palm or mit worn as a protection for the hand in opening oysters. See Cot. (Georgia)
- Oystering. Fishing for oysters.
- Oyster-Hammer. A square, blunt-headed hammer of medium hard iron, used to break the shell of the oyster before opening. (Fair Haven)
- Oyster-Keg. A small wooden keg for transporting raw oysters; now gone out of use. (Connecticut)
- Oyster-Knockers. Double-headed hammers used for culling oysters and prying apart the bunches. See Culling-tools. (Cape May)
- Oyster-Pail. A wooden receptacle with a locked cover, used in transporting raw oysters. They hold from four to six gallons each, and cost from 75 cents to \$1 each. They are made chiefly at Fair Haven, Connecticut; Jamestown, New York, and Brooklyn, New York, and are of various patterns, with several patented devices for securing the cover. These pails are returned to the wholesale dealer by his customer. (1880)
- Oyster-Palm. See Oyster-glove.
- Oyster-Rake. See Rake.
- Oyster-Sacks. Sacks or bags of coarse gunny-cloth, holding about $1\frac{1}{2}$ bushels. Used chiefly near Philadelphia, in place of barrels.
- Oyster-Sign. A large letter "O" plainly painted on a board affixed to a stake, to mark the boundaries of marshland claimed for oyster-culture. (Georgia)
- Oyster-Tongs. See Tongs.
- Oyster-Tub. A large wooden receptacle for transporting raw oysters. It has a cover which may be locked down, and is simply an oyster-pail of large size.
- Packer. One who buys oysters from the planters and packs them in barrels for shipment to Europe. (Long Island)
- Parc. A sunken bed, wherein oysters are placed for reproduction and growth, which is filled with water by each high tide. (Europe) There are French and Italian parcs. In England the word is spelled park.
- Park. See Parc.

- Periwinkle. I. Littorina littorea. (England and in America, from New Haven, Connecticut, northward to the Gulf of St. Lawrence.)
II. The Sycotypus canaliculatus, a large pear-shaped mollusk, destructive to the oyster. Also known as Winkle and Wrinkle.
- Pick. To gather wild oysters for seed from the muddy shores at low tide. (Georgia)
- Pinched. Long, slender growth.
- Plant. I. To place oysters on artificial beds, intending them to survive the winter, attain full size, and spawn. See Cultivate. In Connecticut the term is applied only to southern oysters laid down for the summer. See Bed.
II. An oyster which has been "bedded," in distinction from one of natural growth. The name of the original locality is usually prefixed, as "Virginia plant." In Boston the term is generally applied to oysters that have been transplanted to Providence River. In some localities, also, by "plant" is meant a young oyster suitable for transplanting. See Seed.
- Plantation. Cultivated areas of oyster-bottom; a common and legal term in the state of Delaware.
- Platform. The planked floor on the bank, where oysters are laid out to freshen before selling. (Atlantic County, New Jersey)
- Prog. To search for clams, etc., along the shore in a desultory way. (Connecticut) (This term is used elsewhere.)
- Progger. One who digs clams and searches for other sea-life alongshore, in a desultory and unbusiness-like way. A man who persistently gets his living this way is generally a good-for-nothing fellow, and is said to "follow the creek." (Connecticut)
- Rabbit-Ear. A long, slender oyster. See Coon-heel.
- Raccoon Oysters. Wild oysters, growing naturally on muddy banks, exposed at low tide; and owing to their luxuriance and crowded conditions, long, slender, and shapeless; or very diminutive. (Southern coast)

- Rake.** An instrument for lifting the oyster from the bed; shaped much like the agricultural implement of the same name, but all iron except the handle, and having tines straight, and from 6 to 12 inches long, or curved into a half circle. The rake is an ancient device. In 1748 Baron Kalm crossed New York Bay, and notes the following sentence: "We saw many boats, in which the fishermen were busy catching oysters; to this purpose they make use of a kind of rake with long iron teeth bent inward. These they used either single or two tied together in such a manner that the teeth were turned toward each other." The rake is used in deeper water than the tongs, and is more serviceable in catching quahaugs than oysters; indeed, it is now rarely used for the latter, except in Buzzard's Bay, Massachusetts. With it the oysterman can alternately push his boat along and then pull the rake toward him, and thus take all the mollusks that lie in his path.
- Razor-Blade.** A long, slim oyster. (Connecticut) See Coon-heel.
- Reefer.** A natural reef-growing or untransplanted oyster. (Mobile to Texas)
- Riddle.** To sift the young oysters and cultch on a bed by means of coarse-netted dredges. (Norwalk)
- Rock.** A growth of native oysters massed into a rock-like bottom or ridge. (Chesapeake and southward)
- Rock-Oyster.** An oyster found growing upon a rock, as distinguished from those found in beds; wild growth.
- Rough Culling.** Hasty separation, throwing out only dead shells and largest trash. (Virginia)
- Ruche.** A pile of arched tiles, loosely placed, to catch and lodge oyster-spawn; one form of collector, q.v. (France)
- Runner.** Vessels engaged in transporting oysters from the grounds to the market; they also buy the stock they carry. (Chesapeake)
- Saddle-Rock Oysters.** A trade name in New York for the largest and finest oysters.

- Sand. To bury oysters beneath drifting sand or mud.
- Sanding. I. The burying of oysters under storm-drifted sand or mud.
II. In some parts of Rhode Island they say an oyster is sanded or sanded up, when it is thickly coated with annelids' tubes, and the mud which has gathered among them.
- Sand-Oysters. Single scattered oysters found on leeward sandy shores. (Chesapeake)
- Schaeffer. Cart-boys or Arabs, who peddle a mean quality of oysters (Maryland stock) about the streets of Baltimore.
- Schooner-Basket. A basket holding three-fourths to seven-eighths of a bushel, used in measuring oysters to be sold out of vessels. (New York)
- Scow. See Ark. Also called Scow-house.
- Seconds. Oysters of second market grade; cullens. (Northern cities)
- Seed. Infant or young oysters suitable or intended for transplanted growth in artificial beds. See Set and Plant.
- Seekonks. Oysters (mainly seed) growing in Seekonk River, Rhode Island.
- Selects. Oysters of the first quality, i.e., selected; applied wholly to opened stock.
- Set. I. A young oyster. Occasionally "Set" is used improperly for spawn. See Spat.
II. The appearance of young oysters in a district, as a whole, thus: "The Set is good in Somerset this year;" i.e., there is an abundance of infant oysters. See Seed.
- Shanghai. A long, slender oyster. See Coon-heel.
- Sharppers. Elongated, protruding, sharp-ended oysters, dangerous to the feet in moving about the reefs. (Gulf coast)
- Shelling. The spreading of shells upon the bottom to catch spawn.
- Shift To. To move half-grown oysters to a new bed for their improvement.
- Shock. To open or "shuck" clams or oysters. (New England)
- Shoots. The spaces between the concentric ridges on an oyster-shell, marking each season's growth. (New Jersey)

- Shuck. I. To open oysters. (Baltimore and southward)
II. An oyster-shell. (South)
- Shucker. One who opens oysters. (South)
- Shucking-Stand. A rude table, with boxed sides, etc., at which oysters are opened. (South)
- Side-Opener. An oyster-opener, who rests the oyster in the palm of his left hand alone, while he parts the shell. (Quicker and more laborious than the sticker's method; it is followed at Providence, Rhode Island)
- Sight (verb). To be able to see oysters on the bottom and direct the tongs to them. (Virginia)
- Skiff. The peculiar, special oyster-boat used at Keyport, New Jersey. It is shaped like a small, shallow yawl.
- Skift. Vernacular for skiff.
- Skimmer. Flat, shallow pans of tin or zinc, with perforated bottom, in which the openers empty their measures of oysters, and where the liquor is allowed to drain away.
- Single Oysters. In the south "single oyster" means an edible oyster in contradistinction from the raccoon oyster.
- Slipper Limpet. Mollusks of the genus Crepidula (three species). Also known as Deckhead, Boat, and q.v.
- Snail-Bore. Mollusks of the genus Urosalpinx, etc. (New Jersey) See Drill, Borer, etc.
- Snaps. The most inferior oysters sent to market. (Maryland)
- Soft Oyster. The "Virginia plant," or southern oyster (Staten Island Sound), as distinguished from the "hard" native oyster.
- Somersets. Oysters from Taunton River, Massachusetts, after the name of the chief village, 7 miles north of Fall River.
- Somerset Tongs. Oyster-tongs, working on a patented swivel-joint of brass, used at Somerset, Massachusetts.
- Sounds. Oysters grown in Staten Island Sound, New York; especially an European brand.
- Spat. Spawn. This word, however, is generally used to signify the "set" or minute infant oysters, after they have become attached to some support. See Spawn.
To emit eggs or spawn.

- Spawn.** The eggs of the oyster (or any other sea-animal) in their floating condition; but sometimes the "set" or infant oysters are erroneously called spawn. See Spat, Milk, Set.
- Spawned.** Improper pronunciation of spawn, frequent in some districts.
- Stabber.** One who opens oysters by sticking the knife in at the side, without previously breaking the shell. (Massachusetts and Rhode Island) See Sticker.
- Stales.** The handles of the oyster-tongs or oyster-rake.
- Stew.** An artificial bed of oysters. Applied to the old Roman, and also to the modern methods of fattening. (English) See Layer.
- Sticker.** An oyster-opener who rests the oyster against the bench while he thrusts the knife between the valves. This is the method in Boston, and obviates the strain across the loins, but takes longer than side-opening, q.v. (See Stabber)
- Stickup.** A long, thin oyster, growing in mud, etc. (Dennis Creek, New Jersey) See Strap oyster, etc.
- Stone-Caddys.** Schooner carrying stone. (Chesapeake and Delaware)
- Stools.** Material spread on the bottom for oyster spawn to cling to. See Cultch, etc.
- Strap-Oyster.** The long, slender form which grows in mud. See Coon-heel, etc. (New Jersey)
- Strike.** To become tenanted by living oysters; or when infant oysters attach themselves to any object, they are said to "strike." (Staten Island) See Set, etc.
- Ten-finger.** A thief.
- Tile-Coating.** At Vannes, France, the coating of spat-collectors is composed as follows: The tiles are first dipped into a solution of hydraulic lime and water; when dry they are again dipped into a very thin mixture of common lime and water; when dry they are ready for use.
- Toleration.** License to gather oysters or operate beds; paid by every individual annually. (Brookhaven, Long Island) The money paid is called a Toleration fee.

Tonger.

One who procures oysters by the use of tongs.

Tong-Man.

See Tonger.

Tongs.

An instrument used in gathering oysters from the bottom. Something of an idea of it may be got by supposing two garden-rakes with very long handles, with the tooth-side of each rake facing each other; let the handles be secured by a loose rivet about two or three feet from the teeth, so that by operating the extreme ends of the handles the whole contrivance shall act as a pair of tongs. The instrument is so constructed, that when the tong handles or "stales," as they are called, are held perpendicular to the bottom, the teeth are at an angle of 45° , and by working the upper end of the stales together above water, at the same time pressing the teeth against the bottom, the oysters are thus raked together, and may be hoisted to the surface and emptied into the boat. Various patented forms have been made, but in general those in actual use are made by the local blacksmith and are one of two patterns--iron-headed or wooden-headed--according to intended service. The latter form is the most common. Ordinarily the heads must be of the best oak, and the whole tongs are worth \$3.50 to \$5. The teeth are about $1\frac{1}{2}$ inches apart and not over 1 to $1\frac{1}{2}$ inches long. The stales are sawed out of a white-pine board $\frac{3}{4}$ inch thick. Though seeming so thin, they last as long as the heads. A pair of tongs lasts only about a year. The wooden heads are better, because they do not dig into the sand as do the iron heads, and because they are lighter to work. Tongs are used of from 7 to 24 feet in length, and the latter, worked as they are, in 21 and 22 feet of water, require not only considerable skill, but a good allowance of strength, to handle with success. This tong is a very ancient contrivance in America, for Charlevoix, in the middle of the seventeenth century, found them "on the coasts of Acadia."

- Trash. All cullings, small oysters, refuse, etc., thrown over from the oyster-gathering on to idle ground, and which will be overhauled one or two years later. (Delaware)
- Tub. I. Long Island measure for selling oysters, holding somewhat less than a bushel. It consists of part of a barrel, and should be 10 inches deep, 17 inches wide at the bottom, and 19 inches at the top, inside. II. Chesapeake measure; is similar to the above, but twice as capacious.
- Wagon-Load. Of oysters; a "wagon-load" is 26 bushels; of mussels, 30 bushels. (New Jersey)
- Wash-Basket. A rude splint basket, circular, shallow, holding about a peck, and with a high bale-handle. (Rhode Island)
- Watch-House. A shanty built on the shore, or near the planted oyster-beds, from which they may be guarded. (Massachusetts)
- Wild Oyster. One of natural growth; uncultivated or transplanted. (Massachusetts)
- Winter-Killed. Oysters that have become so weak by long-continued cold weather or contact with ice, that, though they are living when caught, they will not survive handling or transportation, and are of no value for food.
- Whips. Slender branches used to mark the bounds of oyster-beds. (Connecticut) "Stakes" are larger and break rather than bend before gales and ice.
- Wood-Drogger. A wood schooner. (Chesapeake and Delaware)

APPENDIX B

List of Oyster Revenue Collectors in Delaware, 1871-1958 *

1871-1873	Stephen M. Collins
1873-1875	Joshua McGonigal
1875-1879	James Barber
1879-1883	Charles Denny
1883-1887	William S. Heverin
1887-1891	Joseph H. Hopkins
1891-1895	Alexander Minner
1895-1897	W. S. Hendrixson
1897-1899	Jacob G. Lewis
1899-1903	Frank E. Maloney
1903-1905	John T. Buckson
1905-1909	Charles G. Wright
1909-1913	Joshua B. Wharton
1913-1917	Howard Hudson
1917-1921	James C. Richardson
1921-1937	John W. Wilcutts
1937-1939	William F. Cummins
1939-1941	William D. Ennis
1941-1945	John W. Wilcutts
1945-1949	Thomas E. Moore
1949-1953	Samuel J. Fox
1953-1958	Nathaniel W. Taylor, Jr.

* Position established by Legislative Act passed at Dover, February 9, 1871, Collector appointed by the Governor every two years.

In 1958 the office of Oyster Revenue Collector was abolished and its incumbent made the Executive Secretary of the Shell Fisheries Commission

APPENDIX C

The Members of the Delaware Commission of Shell Fisheries

On April 26, 1943 the Legislature passed an act establishing the Delaware Commission of Shell Fisheries, with the Oyster Revenue Collector being one member until that office was abolished in 1958.

<u>Year</u>	<u>Name</u>	<u>Term</u>	<u>Term Expires</u>
1944	Harry Blades, Bowers Beach	2 yrs.	May 1, 1945
	Charles Fagan, Bowers Beach	3 yrs.	May 1, 1946
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1946
	John W. Willcutts, Bowers Beach		
1945	G. Clifton Maull, Lewes	2 yrs.	May 1, 1945
	Harry Blades, Bowers Beach	2 yrs.	May 1, 1945
	Charles Fagan, Bowers Beach	3 yrs.	May 1, 1946
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1946
	John W. Willcutts, Bowers Beach		
1946	Charles Fagan, Sec., Bowers	3 yrs.	May 1, 1946
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1946
	G. Clifton Maull, Lewes	3 yrs.	May 1, 1948
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1948
	Thomas E. Moore, Magnolia		
1947	G. Clifton Maull, Lewes	3 yrs.	May 1, 1948
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1948
	Charles Fagan, Sec., Bowers	3 yrs.	May 1, 1949
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1949
	Thomas E. Moore, Magnolia		
1948	G. Clifton Maull, Lewes	3 yrs.	May 1, 1948
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1948
	Charles Fagan, Sec., Bowers	3 yrs.	May 1, 1949
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1949
	Thomas E. Moore, Magnolia		
1949	Charles Fagan, Sec., Bowers	3 yrs.	May 1, 1949
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1949
	G. Clifton Maull, Lewes	3 yrs.	May 1, 1951
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1951
	Thomas E. Moore, Magnolia		

The Members of the Delaware Commission of Shell Fisheries

<u>Year</u>	<u>Name</u>	<u>Term</u>	<u>Term Expires</u>
1950	G. Clifton Maull, Lewes	3 yrs.	May 1, 1951
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1951
	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1952
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1952
	Samuel J. Fox, Leipsic		
1951	G. Clifton Maull, Lewes	3 yrs.	May 1, 1951
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1951
	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1952
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1952
	Samuel J. Fox, Leipsic		
1952	Otis H. Smith, Lewes	3 yrs.	May 1, 1954
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1954
	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1955
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1955
	Samuel J. Fox, Pres., Leipsic		
1953	Harry Blades, Bowers Beach	3 yrs.	May 1, 1954
	Otis H. Smith, Lewes	3 yrs.	May 1, 1954
	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1955
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1955
	Nathaniel W. Taylor, Jr., Dover		
1954	Harry Blades, Bowers Beach	3 yrs.	May 1, 1954
	Otis H. Smith, Lewes	3 yrs.	May 1, 1954
	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1955
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1955
	Nathaniel W. Taylor, Jr., Dover		
1955	Wilbert Rawley, Leipsic	3 yrs.	May 2, 1955
	Roscoe N. Bennett, Dagsboro	3 yrs.	May 2, 1955
	Harry Blades, Bowers Beach	3 yrs.	May 1, 1957
	Otis H. Smith, Lewes	3 yrs.	May 1, 1957
	Nathaniel W. Taylor, Jr., Dover		
1956	Harry F. Blades, Bowers	3 yrs.	May 1, 1957
	Otis H. Smith, Lewes	3 yrs.	May 1, 1957
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1958
	Eugene D. Bookhammer, Lewes	3 yrs.	May 1, 1958
	Nathaniel W. Taylor, Jr., Dover		

The Members of the Delaware Commission of Shell Fisheries

<u>Year</u>	<u>Name</u>	<u>Term</u>	<u>Term Expires</u>
1957	Harry F. Blades, Bowers	3 yrs.	May 1, 1957
	Otis H. Smith, Lewes	3 yrs.	May 1, 1957
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1958
	Eugene D. Bookhammer, Lewes	3 yrs.	May 1, 1958
	Nathaniel W. Taylor, Jr., Dover		
1958	Harry F. Blades, Bowers	3 yrs.	May 1, 1960
	Otis H. Smith, Lewes	3 yrs.	May 1, 1960
	Eugene D. Bookhammer, Lewes	3 yrs.	May 1, 1958
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1958
	Nathaniel W. Taylor, Jr., Executive Secretary, Dover		
1959	Harry F. Blades, Bowers	3 yrs.	May 1, 1960
	Otis H. Smith, Lewes	3 yrs.	May 1, 1960
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1961
	Eugene D. Bookhammer, Lewes	3 yrs.	May 1, 1961
	Nathaniel W. Taylor, Jr., Executive Secretary, Dover		
1960	Harry F. Blades, Bowers	3 yrs.	May 1, 1960
	Otis H. Smith, Lewes	3 yrs.	May 1, 1960
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1961
	Eugene D. Bookhammer, Lewes	3 yrs.	May 1, 1961
	Nathaniel W. Taylor, Jr., Executive Secretary, Dover		
1961	Walter J. Lehman, Rehoboth		May 1, 1963
	Otis H. Smith, Lewes	3 yrs.	May 1, 1963
	Russell G. Moore, Little Heaven	3 yrs.	May 1, 1964
	Wilbert Rawley, Leipsic	3 yrs.	May 1, 1964
	Samuel J. Fox, Executive Secretary		During pleasure of Governor

APPENDIX D

Delaware Members of the Atlantic States Marine Fisheries
Commission

Year	Name	Term	Term Expires
1942	Burton S. Heal, Holly Oak	_____	Feb. 1, 1943
	Harley G. Hastings, Bethel	_____	Sept. 19, 1945
	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1944
1943	Burton S. Heal, Holly Oak	_____	Feb. 1, 1943
	Harley G. Hastings, Bethel	_____	Sept. 19, 1945
	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1944
1944	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1944
	Harry S. Mulholland, Milford		Feb. 1, 1945
	Harley G. Hastings, Bethel		Sept. 19, 1945
1945	Harry S. Mulholland, Milford		Feb. 1, 1945
	Harley G. Hastings, Bethel		Sept. 19, 1945
	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1947
1946	W. M. Davis, Odessa		Sept. 19, 1947
	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1947
	Fred Bailey, Harrington		Feb. 1, 1949
1947	W. M. Davis, Odessa		Sept. 19, 1947
	Arnold J. Stewart, Wilmington	3 yrs.	Oct. 20, 1947
	Fred Bailey, Harrington		Feb. 1, 1949
1948	Howard H. Dickerson, Laurel		Feb. 1, 1949
	M. Haswell Pierce, Milford	3 yrs.	Oct. 20, 1950
	W. M. Davis, Odessa		Sept. 19, 1953
1949	Howard H. Dickerson, Laurel		Feb. 1, 1949
	M. Haswell Pierce, Milford	3 yrs.	Oct. 20, 1950
	W. M. Davis, Odessa		Sept. 19, 1953
1950	M. Haswell Pierce, Milford	3 yrs.	Oct. 20, 1950
	Howard H. Dickerson, Laurel		Feb. 1, 1951
	W. M. Davis, Odessa		Sept. 19, 1953
1951	Howard H. Dickerson, Laurel		Feb. 1, 1951
	W. M. Davis, Odessa		Sept. 19, 1953
	I. W. Tarburton, Lewes	3 yrs.	Oct. 20, 1953

**Delaware Members of the Atlantic States Marine Fisheries
Commission**

<u>Year</u>	<u>Name</u>	<u>Term</u>	<u>Term Expires</u>
1952	I. W. Tarburton, Lewes Senator Curtis Steen, Dagsboro Austin D. Smith, Dover	3 yrs. (Re: INCODEL)	Oct. 20, 1953 Feb. 1, 1953 Sept. 19, 1955
1953	I. W. Tarburton, Lewes Senator Curtis Steen, Dagsboro (Re: INCODEL) Austin D. Smith, Dover	3 yrs. 3 yrs. 3 yrs.	Oct. 20, 1953 Feb. 1, 1955 Sept. 19, 1955
1954	M. Haswell Pierce, Milford Senator Curtis Steen, Dagsboro (Re: INCODEL) Austin D. Smith, Dover	3 yrs. 3 yrs. 3 yrs.	Oct. 20, 1956 Feb. 1, 1955 Sept. 19, 1955
1955	Senator Curtis Steen, Dagsboro (Re: INCODEL) Austin D. Smith, Dover M. Haswell Pierce, Milford, Ch.	3 yrs. 3 yrs. 3 yrs.	Feb. 1, 1955 Sept. 19, 1955 Oct. 20, 1956
1956	M. Haswell Pierce, Milford, Ch. Sen. Walter J. Hoey, Milford (Re: INCODEL) Rodney M. Layton, Wilmington	3 yrs. 3 yrs. 3 yrs.	Oct. 20, 1956 Feb. 1, 1958 Sept. 19, 1959
1957	Sen. Walter J. Hoey, Milford (Re: INCODEL) Rodney M. Layton, Wilmington M. Haswell Pierce, Milford	3 yrs. 3 yrs. 3 yrs.	Feb. 1, 1958 Sept. 19, 1958 Feb. 8, 1960
1958	Sen. Walter J. Hoey, Milford (Re: INCODEL) Rodney M. Layton, Wilmington M. Haswell Pierce, Milford, Ch.	3 yrs. 3 yrs. 3 yrs.	Feb. 1, 1958 Sept. 19, 1958 Feb. 8, 1960
1959	Sen. Walter J. Hoey, Milford (Re: INCODEL) Rodney M. Layton, Wilmington M. Haswell Pierce, Milford	Ex officio Ex officio 3 yrs.	 Feb. 8, 1960

**Delaware Members of the Atlantic States Marine Fisheries
Commission**

<u>Year</u>	<u>Name</u>	<u>Term</u>	<u>Term Expires</u>
1960	Sen. Walter J. Hoey, Milford (Re: INCODEL)	Ex officio	Feb. 1, 1961
	Rodney M. Layton, Wilmington	Ex officio	During term as member of Game & Fish Comm. Sept. 19, 1965
	M. Haswell Pierce, Milford	3 yrs.	Feb. 8, 1960
1961	Sen. Curtis W. Steen, Milford (Re: INCODEL)	Ex officio	Feb. 1, 1965
	C. Parker Wheatley, Laurel	Ex officio	During term as member of Game & Fish Comm.
	M. Haswell Pierce, Milford	3 yrs.	Aug. 12, 1963

APPENDIX E

Table 1.

Population of the State of Delaware 1790-1960 *

Year	New Castle County	Kent County	Sussex County	Total
1790	19,688	18,920	20,488	59,096
1800	25,361	19,554	19,358	64,273
1810	24,429	20,495	27,950	72,674
1820	28,481	21,103	24,884	74,468
1830	29,720	19,913	27,115	76,748
1840	33,120	19,869	25,093	78,082
1850	42,780	22,816	25,936	91,532
1860	54,797	27,804	29,615	112,216
1870	63,515	29,804	31,696	125,015
1880	77,716	32,874	36,008	146,608
1890	97,182	32,664	38,647	168,493
1900	109,697	32,762	42,276	184,735
1910	123,188	32,721	46,413	202,322
1920	148,239	31,023	43,741	223,003
1930	161,032	31,841	45,507	238,380
1940	179,562	34,441	52,502	266,505
1950	218,879	37,870	61,336	318,085
1960	307,446	65,651	73,195	446,292

* United States Census Reports.

Table 2.

United States Oyster Catch By Regions for Selected Years,
1880-1959 ¹
(Thousands of Pounds)

Year	New England ²	Middle Atlantic ³	Chesa- peake ⁴	South Atlantic ⁵	Gulf ⁶	Pacific Coast ⁷
1880	3,860	28,397	117,405	1,570	2,173	N.A.
1888	12,655	37,871	82,250	1,999	7,525	N.A.
1889	12,521	26,577	N.A.	6,654	9,819	N.A.
1890	N.A.	29,102	111,305	6,018	10,650	N.A.
1897	N.A.	29,127	95,967	8,498	8,751	N.A.
1901	N.A.	32,135	78,959	N.A.	N.A.	N.A.
1902	10,371	N.A.	N.A.	15,808	16,624	N.A.
1908	19,701	23,192	63,893	19,670	22,327	2,057
1910	26,629	N.A.	N.A.	8,030	N.A.	N.A.
1911	N.A.	35,317	N.A.	N.A.	18,108	N.A.
1912	N.A.	N.A.	66,617	N.A.	N.A.	N.A.
1918	N.A.	N.A.	N.A.	3,982	11,891	N.A.
1919	12,289	N.A.	N.A.	N.A.	N.A.	N.A.
1920	N.A.	N.A.	52,316	N.A.	N.A.	N.A.
1921	N.A.	26,420	N.A.	N.A.	N.A.	N.A.
1923	N.A.	N.A.	N.A.	7,892	11,868	820
1924	7,478	N.A.	N.A.	N.A.	N.A.	766
1925	N.A.	N.A.	48,383	N.A.	N.A.	768
1926	N.A.	24,926	N.A.	N.A.	N.A.	842
1929	5,957	29,214	33,138	6,404	14,605	746
1930	9,432	21,516	36,724	5,896	12,688	619
1931	4,066	21,546	32,311	4,691	10,185	1,411
1932	7,386	15,026	27,890	4,601	11,149	3,415
1933	5,157	13,933	25,153	N.A.	N.A.	3,128
1934	N.A.	N.A.	35,786	5,270	13,556	5,376
1935	10,004	14,811	29,901	N.A.	N.A.	5,930
1936	N.A.	N.A.	30,314	6,384	14,246	6,754
1937	11,415	14,617	31,716	5,454	24,184	8,240
1938	8,637	16,144	33,412	3,645	16,036	9,057
1939	7,806	11,654	36,847	3,333	24,380	8,988
1940	5,990	13,983	37,457	3,367	17,584	11,001
1945	2,478	13,553	32,570	2,822	13,970	10,235

N.A. Not available.

1. From the Annual Statistical Digest of the United States Fish and Wildlife Service: John J. Wheatley, The Economic Implications of the York River Oyster Industry, (Charlottesville: University of Virginia, 1959), pp. 62-63, to the nearest thousand pounds.

United States Oyster Catch by Regions for Selected Years,
1880-1959
(Thousands of Pounds)

Year	New England ²	Middle Atlantic ³	Chesapeake ⁴	South Atlantic ⁵	Gulf ⁶	Pacific Coast ⁷
1949	4,004	17,411	31,777	N.A.	13,121	8,373
1950	4,728	18,170	29,954	3,034	12,292	8,239
1951	1,970	17,410	29,598	3,783	11,519	8,710
1952	2,209	16,767	34,418	4,112	14,637	10,100
1953	1,038	14,462	36,946	4,019	12,836	10,418
1954	735	13,377	41,587	3,811	11,443	10,969
1955	619	9,848	39,227	2,260	13,881	11,680
1956	506	8,466	37,064	3,656	13,513	11,928
1957	405	7,981	33,875	931	14,274	11,662
1958	276	4,296	37,434	905	10,381	11,235
1959	379	1,392	33,221	2,853	13,700	12,372

2. Maine to Connecticut, inclusive.
3. New York, Pennsylvania (exclusive of Great Lakes), New Jersey and Delaware.
4. Maryland and Virginia.
5. North Carolina to Florida east coast, inclusive.
6. West coast of Florida to Texas, inclusive.
7. Washington, Oregon and California.

Table 3.

Oyster Catch in Delaware, Pennsylvania and New Jersey,
1880-1960 *
(Thousands of Pounds)

Year	Delaware	Pennsylvania	New Jersey
1880	2,109	1,250	17,735
1887	276	1,573	23,523
1888	294	1,599	22,670
1889	1,039	1,343	9,560
1890	1,184	1,255	10,207
1891	1,102	1,189	9,860
1897	389	1,870	11,351
1901	681	284	18,789
1904	811	633	11,756
1908	1,082	907	8,253
1921	2,825		14,172
1926	3,426	no more reported in Pennsylvania	14,375
1929	105		19,917
1930	428		11,825
1931	470		14,402
1932	426		8,564
1933	229		7,612
1935	582		8,462
1937	270		4,563
1938	140		5,798
1939	285		5,096
1940	974		5,942
1942	184		5,522
1943	47		6,024
1944	348		5,640
1945	732		7,748
1947	4,106		5,853
1948	2,850		5,988
1949	2,190		7,085
1950	2,141		7,242
1951	2,266		5,761
1952	2,252		7,994
1953	3,142		8,484
1954	4,340		7,329
1955	3,290		5,204
1956	1,893		5,503
1957	4,194		heavy mortalities due to MSX
1958	2,410	MSX reported	
1959	295		
1960	176		

* From the Annual Statistical Digest of the United States Fish and Wildlife Service.

Table 4.

Delaware State Revenue from Oyster Industry, 1890-1944
(in Dollars)

Delaware State Auditor's Re- ports Oyster or Sinking Fund	Income from Oyster Boats	Rent from Oyster Grounds	Licenses and Fees
1890	4,812	2,285	340
1891	3,895	2,305	400
1892	3,818	2,020	240
1893	3,712	2,065	305
1895	3,468	1,740	185
1897	1,455	1,300	77
1899	811	45	346
1900	1,883	1,629	522
1901	1,639	1,165	13
1902	2,393	1,120	522
1903	1,375	1,510	625
1904	1,342	1,334	1,474
1905	2,865	1,390	689
1906	3,339	1,645	759
1907	4,187	1,710	546
1908	3,842	1,975	542
1909	3,554	2,055	588
1910	3,482	2,075	547
1911 ¹	4,641	3,255	7
1912	(2)	(2)	343
1913	6,361	1,014	382
1914	4,584	2,662	469
1915	2,481	4,209	413
1916	2,002	4,239	588
1917	2,198	3,972	535
1918	2,289	3,715	315
1919	2,828	3,764	469

1. Does not include licenses and leaseholds due to the State for the whole year because of pending court claims on the 1910 Survey of private planting grounds.
2. Total for boats and grounds \$9,019. \$1,097 was balance due from 1911 the amount involved and decided due to the State by Superior Court of Delaware.

Delaware State Revenue from Oyster Industry, 1890-1944
(in Dollars)

Delaware State Auditor's Re- ports Oyster or Sinking Fund	Income from Oyster Boats	Rent from Oyster Grounds	Licenses and Fees
1920	2,054	4,181	479
1921	2,233	4,320	777
1922	2,250	4,626	553
1924	2,086	4,558	584
1925	2,418	4,705	374
1926	3,811	7,955	255
1927	2,393	4,231	318
1928	1,774	4,122	420
1929	2,079	3,925	311
1930	2,021	4,026	241
1931	1,951	3,635	521
1932	2,634 ³	2,379 ⁴	---
1933 *	4,014		681
1934 *	3,482		742
1935 *	5,282		345
1936 *	3,141		272
1937 *	5,514		10
1938 *	2,422		153
1939 *	4,245		205
1940 *	4,424		438
1941 *	3,806		382
1942 *	3,919		700
1943		4,777 ⁵	1,740 ⁶
1944		4,818 ⁵	6,896 ⁶

* Income from tax on boats and ground rent reported together, 1933-1942.

3. Resident acreage and tonnage reported together in 1932.
4. Non-resident acreage and tonnage reported together in 1932.
5. Tax on boat tonnage and ground rent reported together for 1943 and 1944.
6. Tongers' licenses and Plantation licenses reported together for 1943 and 1944.

Table 5.

Delaware State Revenue from Oyster Industry, 1945-1960
(in Dollars)

Delaware Commission of Shell Fisheries, est.,
May 1, 1943

Year	Licenses - Oyster Grounds				
	Tongers' Licenses	Acreage Tax	Dredging Licenses for Nat- ural Beds	Non-Resi- dents' Planting Licenses	Fees for Inspection and Corners
1945	542	4,785	1,302	382	4,780
1946	350	4,615	620	154	8,520
1947	760	5,922	1,712	274	7,690
1948	1,045	6,001	2,103	676	15,022
1949	770	7,424	2,041	850	9,693
1950	570	3,782	1,528	664	9,458
1951	480	10,308	3,365	973	9,543
1952	555	9,457	3,193	114	5,502
1953	935	10,277	2,230	399	6,833
1954	955	10,650	3,507	549	7,836
1955	955	10,613	1,629	246	6,340
1956	305	11,873	2,595	165	5,000
1957	485	14,846	2,271	165	246
1958	1,250	20,660	2,808	909	16,008
1959 *	635	7,255	924	15	379
1960	900	7,212	684	15	768

* This was the first year in which state income was drastically affected, the cause was "MSX."

Bibliography

The Literature of the Delaware Oyster Industry

The first and most comprehensive report of the oyster industry appeared in the Industries Studies of the Tenth Census of the United States.¹ This is the classic study of the oyster industry. It contains a description of the industry in each of the states of the United States in 1880, notes on the natural history of Ostrea virginica and a glossary of terms used in the shell fish industries. The section on Delaware, called "The Western Shore of the Delaware Bay," is a small one indeed, but is the first authoritative one on the oyster industry in the state. The report in G. Brown Goode, 1884-87, on oystering, is essentially a modified reprint of Ingersoll.² From 1871

1. Ernest Ingersoll, The History and Present Condition of the Fishery Industries. The Oyster-Industry, Prepared under the direction of Professor S. F. Baird, U. S. Commissioner of Fish and Fisheries, by G. Brown Goode, Assistant Director U.S. National Museum, and a Staff of Associates, (Washington: Government Printing Office, 1881).
2. G. Brown Goode (and a Staff of Associates), The Fisheries and Fishery Industries of the United States, V sections, 7 volumes. U. S. Commissioner of Fish and Fisheries, Sec. I, Text and plates, 1884; Secs. II, III, IV and V (Vols. I and II and Plates), 1887. (Washington: Government Printing Office).

to the present there are various state official reports relating to the income from oysters and the outlay of moneys for state supervision. It is from the reports by state officials that the major portion of year-to-year reconstruction of the industry's history must be developed. In the years 1909-1912 a special commission was appointed to study the condition of the oyster rocks. The State and the U. S. Coast and Geodetic Survey cooperated, and in 1911 a report on the area and condition of the natural beds was released; in the following year the committee issued a report which contained a survey of the extent and location of the leased grounds.³ In 1931 there appeared a special report of another commission which had been set up to evaluate the current depressed condition of the oyster industry in the state.⁴ This short report urged a codification and clarification of the existing laws.

-
3. H. F. Moore, Condition and Extent of the Natural Oyster Beds of Delaware, Document No. 745, U. S. Comm. Fish., (Washington: Government Printing Office, 1911). Delaware Oyster Survey Commission, 1909-1912, Report of Commission by Members of Commission, Report of Survey by Charles C. Yates, (Baltimore: King Brothers, 1912).
 4. Report of Oyster Commission, Special Commission by Governor C. Douglass Buck, January 6th, 1931. Report to the members of the 103rd General Assembly, Dover, Delaware.

One of the procedures of this study was to examine the statutes of the state in relation to the taking and catching of oysters and the general condition of the shell fish industry. Again there is a blank span of years in literature on this subject in the State of Delaware and it was not until 1942 that the U. S. Fish and Wildlife Service conducted another study under the supervision of Dr. Paul S. Galtsoff in an effort to determine the cause of the mortality in the oysters in the Delaware Bay and to seek a remedy for the situation.⁵ Dr. Galtsoff is one of the most eminent biologists in the United States and a specialist on the oyster and pollution. In 1943 another examination of some of the seed bars was made by David G. Frey.⁶ This dovetailed with Dr. Galtsoff's study and again showed the beds' condition at that time. In the latter part of the 1940's the Delaware State Highway Department conducted a survey in the Indian River Bay and the Rehoboth Bay; however, this was primarily for the purpose of marking grounds to be leased for oyster planting there.

-
5. Paul S. Galtsoff, "Mortality of Oysters in Delaware Bay," 1942, unpublished manuscript.
 6. David G. Frey, "Investigation of Seed Oyster Beds on the Delaware Side of Delaware Bay, June 10, 1943," unpublished manuscript.

In 1951 Dr. L. Eugene Cronin as Marine Biologist at the University of Delaware conducted a preliminary survey of the seed beds and again in 1952 a biological survey of the seed beds to determine their sets and condition, information necessary for more efficient operations.⁷ In the following years Dr. Cronin continued his survey.⁸ From 1955 these surveys have been under the direction of Dr. Carl N. Shuster, Jr., Director of the Marine Biological Laboratory at the University of Delaware. During the last seven years oyster research has been one of the main areas of investigation by the Marine Laboratory in its efforts to assist the industry of the state, a blight called "MSX" having brought the industry to a standstill. Reports of this research can be found in publications from the Laboratory.

-
7. L. Eugene Cronin, "Preliminary Survey of the Delaware Seed Oyster Areas," September 4, 1951, unpublished manuscript, Marine Laboratory, University of Delaware.
 _____, "First Annual Biological Survey of Delaware Seed Oyster Beds," May 15, 1952, unpublished manuscript, University of Delaware.
8. L. Eugene Cronin, "Oyster Studies," Biennial Report, 1953 and 1954, (Newark and Lewes, Delaware: Marine Laboratory, Department of Biological Sciences, University of Delaware, December 1954), pp. 71-77.
 _____, "Testimony on the effects of the New York plan of water diversion and release upon the estuarine resources of Delaware," Biennial Report, 1953 and 1954, (Newark and Lewes, Delaware: Marine Laboratory, Department of Biological Sciences, University of Delaware, December 1954), pp. 81-83.

Pertinent articles may be found in the Estuarine Bulletin, published by the University of Delaware since 1955.

From 1943 to the present a continual record of the efforts of the state to assist the oyster industry is to be found in the annual reports of the Delaware Commission of Shell Fisheries. Although difficult to separate Delaware's share, there are references to the oyster industry of the Middle Atlantic States in reports of the Atlantic States Marine Fisheries Commission, of which Delaware has been a member since 1941. This commission tries to coordinate efforts in those industries which can not be limited by state boundaries. Also there are the Biologist Reports of the Agricultural Experimental Station of New Jersey which contain the invaluable research work and observations of the Nelson family on the oyster, running from Dr. Julius Nelson's appointment in 1888. This is the first and only continuous attempt to coordinate research and practical application to the fisheries, oyster industry in particular, as part of the regular function of the Experimental Station in those states with maritime industries.

In the July 1958 issue of The Archeolog, published by the Sussex Society of Archeology and History, there were reported the findings of excavations on the Draper Site of Indian shell pits. In the area of financing there has been

a great dearth of research. One excellent report by a member of the Delaware Trust Company, Dover, Delaware, has helped fill the gap.⁹

In September 1959 the University of Delaware Marine Laboratories published A Biological Evaluation of the Delaware River Estuary by Dr. Carl N. Shuster, Jr., Director. This filled a need for information for use by various fisheries, for commercial shipping and recreational purposes. This report also appears in the Intrastate Water Resources Survey, published by the State of Delaware in 1959 under the Delaware Basin Survey Coordinating Committee for the State of Delaware. The whole study was made to assess the present and future water needs of the Delaware Valley. Compiled over a period of three years by various governmental agencies of Delaware, it evaluates changing water needs for a rapidly growing area. In August of 1960, Dr. L. Eugene Cronin, President of the National Shellfisheries Association, addressed the Association on "Oyster Mortalities in Delaware and Chesapeake Bays," a topic about which he is well qualified to speak. His lecture included

9. H. Irving Buckson, "Financing the Middle Atlantic States' Oyster Industry," Submitted in partial fulfillment of the requirements of the Graduate School of Banking conducted by the American Bankers Association at Rutgers University, New Brunswick, New Jersey, June 1959, unpublished manuscript.

reports from marine biologists from New Jersey, Delaware, Maryland, Virginia, and the United States Fish and Wildlife Service on "MSX" mortalities since 1957.¹⁰ A short study with recommendations was made in 1961 by E. Hall Downes, "A Study of the Training Needs of Delaware Fishing Industries." This study sets up an inservice training program for workers in the industry under the supervision of the State Department of Public Instruction. The purpose is to provide these workers with the latest techniques and methods.

There are two annotated bibliographies available on oysters. One is by Charles Hugh Stevenson and appeared in the Report of the U. S. Fisheries Commissioner of 1892, published in 1894.¹¹ This listed works in English up to that time and included English translations of articles in other languages from 1665 to 1894. Of the 546 separate articles only twenty-eight are dated prior to 1850. The other bibliography is by J. L. Baughman in 1948.¹² By then there

-
10. L. Eugene Cronin, "Oyster Mortalities in Delaware and Chesapeake Bays," August 1960, National Shellfisheries Association, unpublished manuscript, U. S. Fish and Wildlife Service Library, Washington, D. C.
 11. Charles Hugh Stevenson, A Bibliography of Publications in the English Language Relative to Oysters and the Oyster Industries, Report of U.S. Fisheries Commissioner, 1892 (1894), pp. 305-359.
 12. J. L. Baughman, An Annotated Bibliography of Oysters with Pertinent Material on Mussels and other Shellfish and an Appendix on Pollution, (College Station, Texas: The Texas Agricultural and Mechanical Research Foundation, The Agricultural and Mechanical College of Texas, 1948).

were literally thousands of titles, most dealing with biological aspects of the oyster. Baughman has collected this bibliography for persons working in the field of oyster research for use as a handy reference. It is presently out-of-print. Since 1948 there has been a great deal of research; to attempt to collate it would be an ambitious task for anyone.

Dr. Thurlow C. Nelson has reviewed some of this work in an article on scientific aids to the industry in the American Scientist.¹³ This is an excellent overview of the highlights of work in the twentieth century on the oyster. For the years 1938 to 1952 Korringa has reviewed the major scientific contributions to knowledge of oysters.¹⁴ This is a review of 277 articles which should be read by all persons interested in oyster biology. An unpublished manuscript by Dr. Charles L. Quittmeyer entitled, "The History of the U. S. Oyster Industry," reviews the industry before and after 1880 and deals with the marketing of a perishable food item. A few pages covering the high spots of the

13. Thurlow C. Nelson, "Some Scientific Aids to the Oyster Industry," American Scientist, (vol. 45, no. 4, September 1957), pp. 301-332.

14. P. Korringa, "Recent Advances in Oyster Biology," Quarterly Review of Biology, vol. 27, pp. 266-308; 339-365.

Delaware oyster industry appear in a senior thesis written in 1957 by James G. Horn at the University of Delaware entitled, "The History of the Commercial Fishing Industry in Delaware."

Bibliography

Sources

Primary

Interviews and Correspondence

- Ball, Eric T., Commissioner of the Shell Fish Commission of the State of Connecticut, August 1960.
- Beaven, G. Francis, Senior Shellfisheries Biologist, Department of Research and Education, Solomons, Maryland, July 1960.
- Brewington, Marion V., Assistant Director, Curator of Maritime History, Peabody Museum, Salem, Massachusetts, July 1960.
- Brey, William, Statistician, U. S. Fish and Wildlife Service, Oxford, Maryland, November 1961.
- Buckaloo, Henry, Delaware oysterman, December 1961.
- Buckson, H. Irving, Delaware banker, October 1961.
- Carriker, Melbourne R., Coordinator of Oyster Research at U. S. Fish and Wildlife Service, Oxford, Maryland, November 1961.
- Casson, Lionel, Professor of Classics, New York University, December 1961.
- Conard, W. H., Delaware oysterman, November 1961.
- Conwell, Captain T. C., Vice President, Operations, American President Lines, Ltd., San Francisco, January 1961.
- Cronin, L. Eugene, Chairman of Department of Research and Education, Solomons, Maryland, July 1960.
- Darby, John C., retired banker and member of 1931 Delaware Oyster Survey Commission, October 1961.
- Delaware State Museum, Staff, Dover, Delaware, October 1961.
- Fagin, Charles, deceased, Delaware Oyster Farms, Oak Orchard, Delaware, September 1961.
- Farner, Joseph, Manager, Allen Kirkpatrick and Company, Rehoboth Beach, Delaware, October 1961.
- Fisher, Earl, Delaware and Florida oysterman, for the Allen Kirkpatrick and Company, October 1961.
- Fox, Samuel J., Executive Secretary of the Delaware Commission of Shell Fisheries, September 1961.
- Galtsoff, Paul S., dean of oyster research, U.S. Fish and Wildlife Service, Woods Hole, Massachusetts, December 1961.

- Goldstein, Fred, Liberty Fish Company, Philadelphia, Pennsylvania, January 1962.
- Goldstein, Sam, Liberty Fish Company, Philadelphia, Pennsylvania, January 1962.
- Haggerty, Harry, Captain Delaware, State watch boat, October 1961.
- Haskin, Harold H., Marine biologist, Rutgers University, New Brunswick, New Jersey, November 1961.
- Hickman and Sterling, Oyster packers, Crisfield, Maryland, October 1961.
- Kapovsky, A. Joel, Director of the Water Pollution Commission, Delaware, September 1961.
- Lang, Varley, Maryland oysterman, Tunis Mills, Maryland, November 1961.
- Lawson, Margaret, Charles D. Briddell, Inc., oyster knife manufacturers, Crisfield, Maryland, October 1961.
- Lefevre, John P., retired, former Commissioner of Delaware Fish and Game Commission, Dover, Delaware, November 1961.
- Loosanoff, Victor, U. S. Fish and Wildlife Service, Milford, Connecticut, July 1960.
- Malloy, Captain L. H., oysterman, New London, Connecticut, July and August 1960.
- Marshall, W. V., Jr., Allen Kirkpatrick and Company, Rehoboth Beach, Delaware, October 1961.
- Moffatt, L. Gaston, Chairman, Department of Romance Languages, University of Virginia, Charlottesville, Virginia, September 1961.
- Mothershead, William, ship rigger and oysterman, St. Michaels, Maryland, November 1961.
- Mowlds, W. Lyle, Director Agricultural Education, Dover, Delaware, 1961 and 1962.
- Munroe, John A., Chairman, Department of History, University of Delaware, Newark, Delaware, November 1961.
- Nelson, J. Richards, Manager, F. Mansfield and Sons Company, Oyster Farms, New Haven, Connecticut, July 1960.
- Nelson, Thurlow Christian, deceased, Marine Biologist, Rutgers University and the State of New Jersey, July 1960.
- Purnell, R. J., Chesapeake Welding Company, Crisfield, Maryland, September 1961.
- Purnell, W. H. T., Delaware archeologist, Georgetown, Delaware, October 1961.
- Quittmeyer, Charles L., Hampton, Virginia, October 1961.
- Rankin, John S., Marine biologist, University of Connecticut, Storrs, Connecticut, July and August 1960.
- Reck, Samuel H., Director, Department of Agricultural Communications, College of Agriculture, New Brunswick, New Jersey, November 1961.

- Riggin, Sheriff William, Cumberland County, New Jersey, December 1961.
- Robbins, Lee, Sr., Robbins Brothers, oyster packers, Maurice River Cove, New Jersey, December 1961.
- Robbins, Mary, Maurice River Cove, New Jersey, December 1961.
- Robbins, Robert, Oyster captain, Maurice River Cove, New Jersey, December 1961.
- Seeger, L. J., Manager, F. Mansfield Company of New Haven, Connecticut, August 1960.
- Shell, W. D., oyster packer, Allen Kirkpatrick and Company, Rehoboth Beach, Delaware, October 1961.
- Shuster, Carl N., Jr., Marine Biologist, University of Delaware, Newark and Lewes, Delaware, August and November 1961.
- Simpson, Chauncey O., Alternate Coordinator Delaware River Basin Survey, September 1961.
- Smith, Otis H., member Delaware Commission of Shell Fisheries, December 1961.
- Stauber, L. A., Marine Biologist, Rutgers University, New Brunswick, New Jersey, November 1961.
- Tarburton, John, retired oysterman, Dover, Delaware, December 1961.
- Taylor, Nathaniel W., Jr., ex-Oyster Revenue Collector and Executive Secretary of the Delaware Commission of Shell Fisheries, November 1961.
- Wallace, David H., Director, Oyster Institute of North America, Annapolis, Maryland, July 1960.
- Wilder, Norman, Director of Conservation, Board of Game and Fish Commissioners, Dover, Delaware, January 1962.
- Williams, John J., U. S. Senator from Delaware, December 1961.
- Wilson, Houston, attorney, Georgetown, Delaware, October 1961.

Manuscripts

- Day Book of Benjamin Coombe, Frederica, Delaware, January 15, 1796-January 20, 1804. In possession of the Historical Society of Delaware, Wilmington, Delaware.
- Diary of Phoebe George Bradford, 1832-1839, 23 vols. In possession of the Historical Society of Delaware, Wilmington, Delaware.

- Executive Petition, 1875 Oysters, Public Archives Commission, Dover, Delaware.
- Files of Delaware Commission of Shell Fisheries, Dover, Delaware.
- Henry Francis duPont of Winterthur Collection of Manuscripts, Papers of E. I. duPont, Eleutherian Mills Historical Library, Wilmington, Delaware.
- Legislative Act of February 12, 1812, "An Act for the Preservation of Oysters, Terrapins and Clams," Public Archives Commission, Dover, Delaware.
- List of Boats and Names of Captains Licensed on the Western Shore (of Delaware Bay) To Dredge and Plant Oysters for the Year 1880. In the possession of Mr. Valentine Massey, Dover, Delaware.
- List of Materials Sent to the World's Fisheries Exhibit in London, 1883, from the United States. In the possession of the Fish and Wildlife Service Library, Department of Interior, Washington, D. C.
- Longwood Manuscripts, Papers of E. I. duPont de Nemours and Company, Eleutherian Mills Historical Library, Wilmington, Delaware.
- Petition from Oystermen to Governor Hall of Delaware, December 14, 1878. In the possession of Mr. Valentine Massey, Dover, Delaware.
- Plantation Grant for Planting Oysters from Governor Hall, Delaware, to Captain Christain Johnson and David Smith of Philadelphia, September 15, 1879. In the possession of Mr. Valentine Massey, Dover, Delaware.
- Ridgely Collection, Public Archives Commission, Dover, Delaware.

Maps

- 1654-1656, "Nova Suecia: Eller the Swenkas Revier in India Occidentali (New Sweden or the Swedes' River in the West Indies)" by Peter Lindeström. Published in Geographia Americae with An Account of the Delaware Indians, Based on Surveys and Notes Made in 1654-1656 by Peter Lindeström, Amandus Johnson, trans., (Philadelphia: The Swedish Colonial Society, 1925).
- 1797, Map of New Jersey, entworfen von D. F. Sotzmann, Hamburg bey Carl Ernst Bohn. Division of Maps, Library of Congress.

- 1799, 1800 and 1801, A Map of the State of Delaware and Eastern Shore of Maryland with the Soundings of the Bay of Delaware, engraved by Francis Shallus, Philadelphia, probably drawn by Pierre Charles Varlé. Public Archives Commission, Dover, Delaware.
- 1822, Map of Pennsylvania, by John Melish, engraved by B. Tanner. Division of Maps, Library of Congress.
- 1849, Map of Pennsylvania, under the supervision of William E. Morris, published by R. L. Barnes, Philadelphia. Division of Maps, Library of Congress.
- 1910, Map of Natural Oyster Beds of Delaware, surveyed by United States Bureau of Fisheries and the Delaware Oyster Survey Commission under the direction of H. F. Moore, June and July 1910. Library of Congress.
- 1910, Chart of Leased Oyster Bottoms, Delaware Bay, State of Delaware, surveyed by Delaware Oyster Survey Commission under the direction of C. C. Yates. Delaware State Highway Department, Dover, Delaware.
- 1948, Chart of Areas Leased for Planting of Shellfish in Rehoboth Bay, Delaware, April 12, 1948, revised. Delaware State Highway Department, Dover, Delaware.
- 1948, Chart of Areas Leased for Planting of Shellfish in Indian River Bay, Delaware, April 10, 1948, revised. Delaware State Highway Department, Dover, Delaware.
- 1952, The Delaware Seed Beds, showing the location of beds as surveyed in 1910 and the source of samples in the spring survey of 1952. L. Eugene Cronin, "First Annual Biological Survey of Delaware Seed Oyster Bars," May 15, 1952, University of Delaware Marine Laboratories, Newark and Lewes, Delaware.
- 1959, Delaware Wetlands Preservation. United States Department of Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Boston, Massachusetts.
- 1960, Major Fish and Wildlife Habitat Areas in the Delaware River Estuary, June, 1960. United States Department of Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Branch of River Basin Studies, Boston, Massachusetts.
- 1961, Chart of Delaware Bay Showing East Line Dividing Natural Oyster Beds from Planting Grounds on the Delaware Side of the Bay. United States Department of Commerce, Coast and Geodetic Survey, Map of Delaware Bay, 1961.

Photographs

Series of photographs taken by Hammond, Department of Agriculture, Delaware, in 1924, of the oyster industry in Delaware Bay. The glass negatives of this series are in the Public Archives Commission, Dover, Delaware.

Several photographs taken by the Horn family of Rehoboth Beach, Delaware, in 1952 and 1957, of the oyster vessels in Delaware. Some of these appear in a Senior Thesis by James G. Horn, entitled, "The History of the Commercial Fishing Industry in Delaware," Department of History, University of Delaware, 1957.

Secondary

Public Documents

Atlantic States Marine Fisheries Commission, Annual Meeting Reports 1942-1960 and Supplements, Mount Vernon, New York. This group meets to look over the state of fisheries in the Atlantic area. There are scientific and commercial reports. Within the last few years the Atomic Energy Committee decisions on ocean dumping of atomic wastes have been among the problems facing the Commission.

Atwater, W. O., "Report of Progress of an Investigation of the Chemical Composition and Economic Value of Fish and Invertebrates Used for Food," Report United States Fish Commissioner, 1880, vol. VIII, 1883, pp. 231-286. This report gave an early comparative evaluation of the food value of fish and invertebrates.

_____, "Contributions to the Knowledge of the Chemical Composition and Nutritive Values of American Food-Fishes and Invertebrates," Report United States Fish Commissioner, 1883, vol. XI, 1885, pp. 433-500. This study corroborates the 1883 statistics.

Cahn, Alvin Robert, Oyster Culture in Japan, General Headquarters, Supreme Commander for the Allied Powers, Natural Resources Section, Report No. 134, (Tokyo: General Headquarters, 1950). This is a well researched account of the Japanese oyster culture with some excellent illustrations. Great detail on all phases of the industry is presented.

- Carson, Rachel L., Fish and Shellfish of the South Atlantic and Gulf Coasts, Department of Interior, Bureau of Fisheries, Conservation Bulletin 37, 1944. This bulletin gives a quick view of the various fish and shellfish in the South Atlantic and Gulf regions with some information on the apparatus, marketing and value of the fish and shellfish as food.
- Canned Fish and Shellfish Preferences of Household Consumers, 1956, Special Scientific Report-Fisheries No. 200, Department of Interior, Fish and Wildlife Service, 1957. This report is the result of a national survey on the use of fish and shell fish products to determine the actual likes and dislikes of the consumers affecting actual and potential markets for these items.
- Churchill, E. P., Jr., The Oyster and the Oyster Industry of the Atlantic and Gulf Coasts, Department of Commerce, Bureau of Fisheries, Document No. 890, 1920. This is a very helpful work which deals with the geographic distribution, description and anatomy, life history, factors of environment, cultivation and something on preparation for market. It has a short but valuable bibliography with some annotation.
- Coker, R. E., Progress in Biological Inquiries, Department of Commerce, Bureau of Fisheries, Document No. 896, 1920. This gave a view of the depletion of the natural beds and some of the conclusions drawn by various studies on water temperature, pollution and similar factors.
- Cole, H. A., Oyster Cultivation in Britain. A Manual of Current Practice, (London: Her Majesty's Stationery Office, 1956, reprinted 1960). This manual gives an excellent picture of the oyster industry in Britain today and does exactly what its title suggests, tells of current practices in the industry.
- Collins, J. W., Notes on the Oyster Fishery of Connecticut Extracted from Bulletin of U. S. Fish Commission, vol. IX, 1889, pp. 461-497, published in 1891. This work gave some of the development of legal action in the State of Connecticut distinguishing between "state" and "town" grounds. The work was published soon after the introduction of steamers with screw propellers for use in dredging. It also tells of the "brush" or "Poquonock" method of culture, using branches, which was discovered accidentally in that area of Connecticut, but which had been in use for decades in France and a modification in Japan where bamboo was used for hand culture techniques.

Commercial Fisheries Review, Department of Interior, Fish and Wildlife Service, vols. 1-24, (1938-1962). This monthly magazine published by the Service provides the fishing and related industries with research material and market information necessary to the industries. It aids in the practical application of the latest scientific discoveries to the fisheries themselves and collects needed statistics.

Connecticut, Annual Report of the Shell Fish Commission of the State of Connecticut, 1881-1895. These reports contain valuable information on the regulation of the oyster industry, statistics on grounds, vessels, owners, shipments and valuable maps of owners' plots of oyster grounds with the names of the owners.

Coste, M., "Report on the Oyster and Mussel Industries of France and Italy," U. S. Fish. Comm. Report 1880, Extracted from Voyage d'Exploration sur le littoral de la France et de l'Italie, par M. Coste, membre de l'Institut, professeur au Collège de France. Deuxième édition, suivie de nouveaux documents sur les pêches fluviales et marines. Publiée par ordre de S. M. l'Empereur sous les auspices de S. Exc. le Ministre de l'Agriculture, du Commerce et des travaux publics. (Paris: Imprimerie Imperiale, MDCCCLXI), pp. 825-885. This eminent French embryologist demonstrated, after his study of the Italian coast in 1853, the use of private oyster beds. Early success was soon blunted by failure on the beds and over production in other areas. The work by Coste was adopted by many others in the West and his importance to the American industry can be seen in this translation of his work in a federal publication.

Delaware, "Annual Reports of the Delaware Commission of Shell Fisheries," 1944-1958. These reports give valuable information on the role the state has played in the oyster industry in Delaware since the Second World War. Statistics for the industry maintained by this Commission for future study.

_____, Auditor's Reports, 1874, 1890-1960. These reports show the state income and expenditures from the oyster industry. At various times the vessels engaged in the trade were also listed by name and captains.

_____, Executive Appointments, 1871-1961. These reports give the governor's appointments to various offices in the State. See Appendixes for those pertaining to the oyster industry.

_____, The Fishery Question, Argument of the Delaware Commissioners Upon the Question, Whether the Citizens of New Jersey have the Right to Fish in the Waters of the Delaware Within the Circle of Twelve Miles Around New Castle, (Wilmington, Delaware: James and Webb, Printers, September 1874). This states the Delaware side of the boundary question arising over the rights to fish in the twelve mile circle around New Castle, Delaware.

_____, House Journal, 1877 and 1879. The messages from the governors to the House in January 1877 and 1879 reviewed the boundary problem between Delaware and New Jersey and related the action which had been taken. No solution had been reached by 1879.

_____, Intrastate Water Resources Survey, 1959. This was prepared as an appendix to the U. S. Corps of Engineers Delaware Valley water needs study. The water needs for Delaware are pointed out and the future needs, based on population growth and industrial development, have been predicted.

_____, Laws of the State of Delaware, vols. 1-49, (1797-1953), Delaware Code Annotated, 1953, with 1959 Cumulative Pocket Part. These volumes contain the story of Delaware's role in the oyster industry. The growth of legislation on the various aspects of the industry can be clearly followed.

_____, Oyster Survey Commission, 1909-1912, Report of Commission by Members of Commission and Report of Survey by Charles C. Yates, 1912. Combined with the report by H. F. Moore in 1910 on the natural oyster beds of Delaware, this report completed the survey of the oyster grounds in Delaware at the end of the first decade of the Twentieth Century. Valuable information on statistics, owners and extent of planted grounds is presented.

_____, Report of Oyster Commission, Special Commission by Governor C. Douglass Buck, 1931. This short report gives information on the Delaware oyster industry just before the depression hit the industry. Several recommendations were made for improving the industry, most of which were not put into effect for more than a decade later.

_____, State Board of Health. Permits for growers and packers of oysters, especially after the 1927 pollution scare in Delaware.

- Dumont, William H., Shucking Oysters: One of New Jersey's Growing Industries, Bulletin 418, New Jersey Agricultural Experiment Stations, July 1925. This work compares salt and floated oysters, deals with shucking house location, plans, equipment and relates the development of this industry in South Jersey.
- Dymond, John, Jr., The Oyster in Louisiana, issued under auspices and authority of the Oyster Commission of Louisiana, March 1904. This is a summary of various states' efforts to promote public or private oyster grounds and the relative merits of these efforts for the state of Louisiana. It is very handy for the summary information.
- Fiedler, R. H., The Story of Oysters, Department of Commerce, Bureau of Fisheries, Fishery Circular No. 21, 1936. This is the usual type of government document which brings up to the mid-1930's the data on the oyster industry. There are included thirty-five recipes for the use of oysters.
- Fraiche, Félix, "A Practised Guide to Oyster Culture and the Methods of Rearing and Multiplying Edible Marine Animals," pp. 753-824, U. S. Fish. Comm. Report, 1880, translated by H. J. Rice from "Guide Pratique de l'Ostréiculteur et Procédés d'Élevage et de Multiplication des Races Marines Comestibles," par M. Félix Fraiche, Professeur de Sciences Mathématiques et Naturelles. (Paris: Eugène Lacroix, Éditeur, 1865). This work discussed the natural history of the European oyster and other mollusks, told of the history of oyster culture in France and described that oyster culture in great detail. This translation was done so as to familiarize Americans with the French techniques of oyster culture.
- Galtsoff, Paul S., Chipman, Walter A., Jr., Engle, James B. and Calderwood, Howard N., Ecological and Physiological Studies of the Effect of Sulfate Pulp Mill Wastes on Oysters in the York River, Virginia, Department of Commerce, Fishery Bulletin 43, 1947. It was felt that conservation of seafood resources in coastal waters could best be saved by preventive measures which involved cooperative efforts, pulp mill industry and the shellfish industries.
- Galtsoff, Paul S., Oyster Industry of the Pacific Coast of the United States, Department of Commerce, Bureau of Fisheries, Document No. 1066, 1929. This work gives an excellent view of the industry of the Pacific Coast. The difference in the number of estuaries suitable for oyster cultivation on the Pacific as compared to the Atlantic coast is quite noticeable.

- Galtsoff, Paul S., and Luce, R. H., Oyster Investigations in Georgia, Department of Commerce, Bureau of Fisheries, Document No. 1077, 1930. This work reported the condition of the natural beds in Georgia and the potential development of an oyster industry using modern culture methods in that state.
- Gannett, Henry, A Gazetteer of Delaware, Department of Interior, U.S. Geological Survey, Bulletin No. 230, 1904. This is a short work which gives the general description of the state with some statistics and population figures.
- Goode, George Brown, The Fisheries and Fishery Industries of the United States, 7 vols., 1887. This collects information about all the fishing industries in the United States. The section on the oyster industry is essentially a revised edition of Ingersoll's 1880 report.
- Grave, Caswell, Notes on the History of the Oyster in Maryland and the Physical Valuation of the Oyster Properties, Johns Hopkins University and the Maryland Shell Fish Commission, 1912. This work gives an excellent picture of the Maryland oyster industry, its development and period decline. A great deal of emphasis was placed on the value of the oyster grounds and the loss of revenue to the state from mismanagement of those grounds.
- Great Britain, Parliamentary Papers, 1870's and 1880's are especially valuable on the oyster industry in Great Britain following the passage of the Sea Fisheries Act, 1868.
- Hofstetter, Robert P., The Texas Oyster Fishery, Bulletin No. 40, Series No. VI, Marine Laboratory, Texas Game and Fish Commission, Austin, Texas, August 1959. This excellent bulletin gives valuable information on the Texas oyster industry. The illustrations are useful for the oyster industry in other parts of the country.
- Hunter, Albert C. and Harrison, Channing W., Bacteriology and Chemistry of Oysters, with Special Reference to Regulatory Control of Production, Handling, and Shipment, Department of Agriculture, Technical Bulletin No. 64, 1928. This bulletin deals with the interstate controls and shipment of oysters. Studies were made on Delaware Bay oysters and the results appear in this work.

- Ingersoll, Ernest, The History and Present Condition of the Fishery Industries, The Oyster-Industry, Prepared under the direction of Professor S. F. Baird, U. S. Commissioner of Fish and Fisheries, by G. Brown Goode, Assistant Director U.S. National Museum, and a Staff of Associates, 1881. This is the classic work on the oyster industry, and it originally appeared as part of the industries studies of the Tenth Census of the United States. All writers since have quoted liberally from this work. It is the first work to present statistics for the industry.
- Kerr, Rose G. and Burtis, Jean, How To Cook Oysters, Department of Interior, Fish and Wildlife Service, Test Kitchen Series No. 3, 1960. This bulletin gives recipes and hints on serving oysters today.
- Lemon, J. M., Market for Fresh Oysters in Fourteen Cities of the United States, Department of Commerce, Bureau of Fisheries, Fishery Circular No. 3, 1931. This work deals with the marketing and public demand for oysters.
- Lockwood, Samuel, The American Oyster: Its Natural History, and The Oyster Industry in New Jersey, Being a part of the Vth Annual Report of the Bureau of Statistics of Labor and Industries of the State of New Jersey, 1883. This work dealt with the oyster industry in New Jersey in the early 1880's. Most of the information could be found in Ingersoll which was quoted extensively without benefit of citation. The natural history information is now out-of-date.
- Louisiana, Annual and Biennial Reports of the Oyster Commission of Louisiana, 1902-1910. These reports contain some pictures and good information on vessels, owners and the oyster industry in Louisiana in the first decade of the twentieth century.
- Möbius, Karl, "The Oyster and Oyster-Culture," U. S. Comm. of Fish and Fisheries Report, 1880, published 1883, pp. 683-751, translated by H. J. Rice from Die Auster und die Austernwirtschaft, von Karl Möbius, Professor der Zoologie in Kiel. Mit einer Karte und neun Holzschnitten. Berlin, Verlag von Wiegandt, Hempel and Parey, 1877. This work is one of the classics in the field of oyster culture. He dealt with the development of oyster culture on the German coast, reviewed the work of Coste.
- Moore, H. F., Condition and Extent of the Natural Oyster Beds of Delaware, Department of Commerce and Labor, Bureau of Fisheries, Document No. 745, 1911. This report deals with the natural oyster beds in Delaware in 1910. Combined with the 1912 report of the planted areas this gives a picture of the industry in Delaware at that time. Depletion on the natural beds was thought to be caused from lack of culling.

Nelson, Julius, Report of the Biologist, 1890-1916, New Jersey Agricultural Experimental Station. These reports contain valuable information on the oyster industry in New Jersey and the work of this man, who was a student of W. K. Brooks at Johns Hopkins, did much to advance the industry in the Delaware Bay.

Nelson, Thurlow Christian, Report of the Biologist, 1916-1955, New Jersey Agricultural Experimental Station. The son of Julius Nelson carried on the work begun by his father in New Jersey, searching for scientific information and applying it to the oyster industry in the state. He was assisted by his brother J. Richards Nelson in his work.

_____, Aids to Successful Oyster Culture, I. Procuring the Seed, Bulletin 351, New Jersey Agricultural Experimental Station, 1921. This bulletin put forth some of the scientific information needed to produce good oyster seed and keep it in condition to produce market oysters.

Pennsylvania, Report of the Committee on Federal Relations and the Resolutions Passed by the Senate and House of Representatives of the State of Pennsylvania, in Reference to the Oyster Fisheries in Delaware Bay, 1871. This report deals with the problem of jurisdiction in the bay over the areas where the oyster beds were located. The problem was pointed up by New Jersey's requiring licenses and also requiring residence to secure the licenses. Pennsylvania wished to have the need for a license repealed.

Refrigeration of Fish-Part 4, Preparation, Freezing, and Cold Storage of Fish, Shellfish, and Precooked Fishery Products, Department of Interior, Fish and Wildlife Service, Fishery Leaflet 430, 1956. This work deals with freezing. It has some fine illustrations of various processes in plants throughout the United States.

Research and Activities Under the Saltonstall-Kennedy Act, Fiscal Year 1957, Department of Interior, Annual Report of the Secretary of Interior, 1957. This work deals with the work done in the fiscal year ending June 30, 1957, to promote domestic fisheries under the act passed July 1, 1954. Both biological and commercial studies were undertaken. In the oyster industry studies were made on salt-pond culture, spat collectors and control of predators, among them, of course, the drill. This act has promoted studies which have been very helpful to numerous fisheries.

Sanitary Control of the Shellfish Industry. Manual of Recommended Practice, Part I: Sanitation of Shellfish Growing Areas, 1959 revised, Part II: Sanitation of the Harvesting and Processing of Shellfish, 1957, Department of Health, Education and Welfare, Public Health Service, Bureau of State Services, Division of Sanitary Engineering Services. The two parts of this manual form a complete guide to the operation of growing areas, the harvesting of shellfish and the process of this food for interstate marketing. The revised editions show the increased role that state and federal governments are playing in these fields.

Stainsby, William, The Oyster Industry. A Historical Sketch, with Statistics of the Product of New Jersey Fisheries for 1901. Monograph on New Jersey's Industries from the Twenty-fifth Annual Report of the Bureau of Statistics of New Jersey, 1902. This work gives a fine picture of the New Jersey oyster industry up to the twentieth century. Again Ingersoll is heavily quoted for the period to 1880. Early New Jersey legislation on oysters is discussed and some value statistics for the year 1901 are given. Oyster statistics are very hard to come by before the detailed reports of the U.S. Bureau of Commercial Fisheries.

Stevenson, Charles Hugh, A Bibliography of Publications in the English Language Relative to Oysters and the Oyster Industries, Report of U.S. Fisheries Commissioner, 1892 (1894), pp. 305-359. This valuable bibliography included the works on the oyster in English from 1665 to 1894. There are 546 articles listed, only twenty-eight prior to 1850. This work was annotated and the notations appear in Baughman for the works listed by Stevenson.

Stolting, W. H., Garfield, M. J., and Alexander, D. R., Fish and Shellfish Preferences of Household Consumers, Department of Interior, Fish and Wildlife Service, Research Report 41, 1955. This study was carried out to determine the use of fish and shellfish in the home and the preferences which might prevail. With this information the fisheries could then capitalize upon the information or try to correct any factors which might be forcing a product to lose out to other products.

Sundstrom, Gustaf T., Commercial Fishing Vessels and Gear, Department of Interior, Fish and Wildlife Service, Circular 48, 1957. This bulletin is an attempt by the Fish and Wildlife Service to help standardize the equipment and vessels used in various fisheries in the United States. This would help greatly in the repair and maintenance of these articles, especially if vessels were far from their home ports.

Training Programs for Fishery Occupations, Department of Health, Education, and Welfare, Office of Education, 1961. This report is part of the effort the federal government is putting forth to assist the state departments of education to provide proper training for the fishing industries. With this training newer methods and the latest scientific discoveries can be put to use in fisheries to provide the fishermen with a safer living and the public with an improved product.

U. S. Army Engineer Division, North Atlantic, Water Resources Development, Delaware, 1961. This report tells of the projects and surveys under way in Delaware. These are under the control of the Philadelphia District Engineer Corps.

U. S. Bureau of the Census, Census of the United States, 1790-1960, Population. These reports give a picture of the progressive growth of Delaware, see appendix.

U. S. Commission of Fish and Fisheries, Commissioner's Reports, 1871-1960. The reports in the 1870's, 1880's and 1890's contain much valuable information on the oyster industry which was in its heydays during that period. Foreign observers came to this country to study our industry and many foreign articles were translated in these reports, see Coste, Fraiche and Möbius.

U. S. Supreme Court, Supreme Court of the United States, No. 19 Original, October Term 1929, New Jersey vs. Delaware. This is a voluminous report of the twentieth century efforts to settle the ancient boundary dispute between New Jersey and Delaware.

Supreme Court of the United States, No. 13 Original, October Term 1933, New Jersey vs. Delaware. It was this report which finally presented a solution to the long boundary dispute between those two states in 1934. This solution is still in operation.

Wilmington Directory, Wilmington, Delaware, 1845-1960. Shows the rise in number of oyster outlets in Wilmington in the years following the Civil War and the decline in the twentieth century.

Books

- Baughman, J. L., Annotated Bibliography of Oysters, with Pertinent Materials on Mussels and other Shellfish and an Appendix on Pollution, Texas A & M Research Foundation, Agriculture and Mechanical College of Texas, College Station, Texas, 1948. This is a valuable work which lists the vast literature on the oyster all in one volume. Some of the annotations are inaccurate, but on the whole it is quite valuable. Besides the vast biological papers referred to, the works of outstanding value covering other phases of the industry are listed, such as Ingersoll. Since its publication there has been a vast amount of work done in oyster research.
- Benson, Adolph B., ed., Peter Kalm's Travels in North America, the English Version of 1770 with a translation of new material from Kalm's Diary Notes, 2 vols., New York: Wilson-Erickson, Inc., 1937. This is a fine account of an early naturalist in the Middle Atlantic area. His observations were keen and gave a clear picture of life in the middle of the eighteenth century.
- Beers, D. G., Atlas of the State of Delaware, from actual Surveys by and under Beers' direction, Philadelphia: Pomeroy and Beers, 1868. This atlas gives a picture of Delaware in the period shortly following the Civil War. The population figures for the state are given from the Census of 1790 to that of 1860.
- Berrill, N. J. and Berrill, Jacquelyn, 1001 Questions Answered About the Seashore, New York: Dodd, Mead and Co., 1959. This is a handy little volume which has some valuable information listed in a condensed fashion. The index is quite good with some cross-references.
- Bolitho, Hector, ed., The Glorious Oyster. Its History. in Rome and Britain; what various writers and poets have said in its praise; together with chapters by Maurice Burton D.Sc. on the 'Reproduction and Growth' of oysters. 'Their Enemies', their 'Anatomy and Physiology.' and their 'Culture.' and a chapter on 'Oysters. Raw and Cooked' by W. A. Bentley. Illustrated with still life paintings from collections in England, Europe, and America, London: Sidgwick and Jackson, 1960. This is an interesting volume which has some excellent photographs of still life paintings containing oysters. There are many interesting quotations from well known literature.

- Brewington, Marion Vernon, Chesapeake Bay Bugeyes, Newport News, Virginia: The Mariners' Museum, Museum Publication No. 8, 1941. This is an excellent work which traces the history and development of the bug-eye. The legends of its name are given. Also included is a list of known bugeyes.
- Brooks, William Keith, The Development and Protection of the Oyster in Maryland, Being the report written by him as chairman of the Oyster Commission of the State of Maryland, and Presented to the General Assembly, February 1884, Baltimore: Johns Hopkins University Press, 1884. This is one of the classic works on the oyster. It is frequently quoted. The author was a professor at Johns Hopkins University. This work gives an account of the oyster beds in Maryland in the early 1880's. There are some excellent maps of the Chesapeake Bay showing the division between Maryland and Virginia.
-
- , The Oyster, A Popular Summary of a Scientific Study, Baltimore: Johns Hopkins Press, 1891. This work was an effort to produce a popular account of the oyster industry. It succeeded quite well. There are several quotes from Ingersoll's study and many details of the Maryland industry.
-
- , The Oyster, A Popular Summary of a Scientific Study, Baltimore: Johns Hopkins Press, 1905, second and revised edition. In this revision of the 1891 volume Brooks added information about the oyster industry. Much of the book remains the same. Probably one of the most interesting sections is the first description of the process of the making of shell by the oyster to be found in this work.
- Conrad, Henry C., History of the State of Delaware, 3 vols., published by the author, 1908. This is one of the standard works on Delaware history. It is quite well done and for the most part quite accurate.
- Dalido, Pierre, L'huître du Morbihan, Etude Economique et Sociale, Paris: Librairie Marcel Rivière et Cie, 1948. This work tells of the oyster industry in Morbihan, France. There are some excellent plates on oyster culture. The usual aspects and problems of the industry are covered. Commercial relations with England, Holland and the interior of France are discussed. He argued for more private initiative in the industry and less state control.

- DeValinger, Leon and Shaw, Virginia, ed., A Calendar of Ridgely Family Letters 1742-1899 in the Delaware State Archives, vol. 1, 1948, vol. 2, 1951, vol. 3, 1961. Published privately by some descendants of the Ridgely Family for the Public Archives Commission, Dover, Delaware. This is a valuable collection of correspondence covering a great deal of the Delaware period as colony and state. The family was active in state government and federal affairs. The letters also reflect the close ties among this family with Delaware.
- DeVries, David Peterson, Voyages from Holland to America, A. D. 1632 to 1644, translated from the Dutch for the New York Historical Society by Henry C. Murphy, in the Second Series, vol. III, Part I of Collections of the New York Historical Society, New York: D. Appleton and Company, 1857. This work tells of some of the earliest European descriptions of the Delaware Bay and shore. The variety of animals and marine life was noted. Oysters were prominent in some of these early reports.
- Dolan, Paul, The Government and Administration of Delaware, American Commonwealth Series, New York: Thomas Y. Crowell Co., 1956. This work relates the political and administrative affairs of Delaware to the political and social pattern of the state. There is an excellent chapter on Conservation.
- Eckman, Jeannette, Delaware. A Guide to the First State, Compiled and Written by the Federal Writers' Project of the Works Progress Administration for the State of Delaware, American Guide Series. This is the revised edition New York: Hastings House, 1955. This is a handy volume which gives some of the historical development of Delaware and interesting information on some of the social history as well.
- Elfving, Fredr., Pehr Kalms Resa Till Norra Amerika, Utgiven av Fredr. Elving och Georg Schauman, Tilläggsband Sammanställt av Fredr. Elving, Helsingfors: Mercators Tryckeri Aktiebolag, 1929, Skrifter Utgivna av Svenska Litteratursällskapet i Finland, CCX. Most of this work has been translated. There is one entry for November 20, 1749, concerning oysters in Philadelphia and the Delaware region which was not translated. Some of this information also appears in previous sections which were translated in the 1770's.

- Eyton, T. C., A History of the Oyster and the Oyster Fisheries, London: John van Voorst, 1858. This is an interesting work on observations along the coasts of England, Ireland, Scotland and the Isle of Man of Wales on the oyster industry. The author did some early anatomy work with the oyster and although much of his biological information is outdated the work is very informative. He traces the early Parliamentary Acts concerning fisheries, particularly as they related to oysters. He also gives information about the Roman use of oysters and the early cultivation which Pliny reported.
- Faulkner, Harold Underwood, American Economic History, Fifth Ed., New York: Harpers, 1943. This is one of the standard economic history texts. It has little along the maritime line and even less about oysters, except as they relate to the fishing industry as a whole in its role in American economic history.
- Forester, John Reinhold, Peter Kalm's Travels into North America; containing Its Natural History and A circumstantial Account of its Plantations and Agriculture in general, with the Civil Ecclesiastical and Commercial State of the Country, The manners of the Inhabitants, and several curious and important remarks on various subjects, 2 vols. second ed. 1772, London: T. Lowndes, 1772. This is essentially the same as the first edition published in 1770 which was the first English translation of Kalm's work. It is excellent for its views of the mid-eighteenth century in the New World.
- Graham, Michael, ed., Sea Fisheries. Their Investigation in the United Kingdom, London: Edward Arnold, Ltd., 1956. This work is a good one for the fisheries of England and other parts of the British Isles. The emphasis is mainly upon the biological aspects of the industries.
- Hasse, Adelaide R., Index of Economic Material in Documents of the States of the United States, Delaware 1789-1904. Prepared for the Department of Economics and Sociology of the Carnegie Institution of Washington, Washington: Carnegie Institution, April 1910. This reports on the documents of the state of Delaware which contain valuable economic materials. There are specific references to oysters and the Delaware River.
- _____, Index of Economic Material in Documents of the States of the United States, New Jersey 1789-1904. Washington: Carnegie Institution, 1910. This volume gives the same information as the volume on Delaware, with the emphasis being on New Jersey documents.

- _____, Index of Economic Material in Documents of the States of the United States, Pennsylvania 1790-1904, Washington: Carnegie Institution, 1910. This section of the study is in two parts and deals with the Pennsylvania documents, especially the economic material concerning the oysters and the Delaware River is to be noted.
- Johnson, Amandus, trans., The Instruction for Johan Printz, Governor of New Sweden, including letters from Governor John Winthrop, of Massachusetts, and Minutes of Courts, Sitting in New Sweden, Philadelphia: The Swedish Colonial Society, 1930. This is an excellent translation of the early governing power on the Delaware. The amount of toleration was notable for the period.
- _____, The Swedish Settlements on the Delaware, 1638-1664, 2 vols., Philadelphia: The Swedish Colonial Society, 1911. This is a fine work on this period of Delaware's colonial history. The heritage of the Swedes lingers in several places in Delaware today.
- Kellogg, James L., Shell-Fish Industries, New York: Henry Holt and Company, 1910. This was one of the standard works on the shellfisheries. However, there has been much work done since its publication and it is very much out-of-date.
- Kerkkonen, Martti, Peter Kalm's North American Journey, Its Ideological Background and Results, Helsinki: The Finnish Historical Society, 1959. This is a fine work dealing with the background of Kalm's voyage to North America in the middle of the eighteenth century.
- Kincaid, Trevor, The Oyster Industry of Willapa Bay, Washington, Seattle, Washington: The Tribune, Ilwaco, Washington, 1951. This work is an account of the industry given in brief non-technical language for the use of visitors to the area.
- Lang, Varley, Follow the Water, Winston-Salem, North Carolina: John F. Blair, 1961. This is a well written book by a man who makes his living from the water on the Eastern Shore of Maryland. He knows his subject well and has a feel for the rigors of the waterman's life. Dr. Lang received the Ph.D. in English from Johns Hopkins University and after some time spent teaching college English he returned to his first love, the water.
- Lincoln, Anna T., Wilmington, Delaware, Three Centuries Under Four Flags, 1609-1937, Rutland, Vermont: The Tuttle Publishing Co., Inc., 1937. This is a well written and accurate work on the history of Wilmington, Delaware.

- Lindeström, Peter, Geographia Americae with An Account of the Delaware Indians, Based on Surveys and Notes Made in 1654-1656, translated by Amandus Johnson, Philadelphia: The Swedish Colonial Society, 1925. This is another work translated by Johnson which has added valuable information on the colonial period of Delaware. Lindeström was methodical and his maps show the presence of vast oyster banks in the Delaware Bay and River. These were carefully noted, since they were also navigational hazards.
- Lewis, Jack, The Delaware Scene, Published by the author, 1961. This is a fine work by a Delaware artist which shows many scenes on the waterways of Delaware. There are several sketches of oyster boats and the vessels at work and in harbor.
- Liberman, Cy and Rosbrow, James M., The Delaware Citizen, Published by the authors, 1952. This is an excellent volume on Delaware in the twentieth century. There is a chapter on natural resources, part of which deals with oysters.
- Lunt, Dudley, The Bounds of Delaware, Wilmington, Delaware: The Star Publishing Co., 1947. This small volume deals very well with the boundary dispute between the Baltimores and the Penns and the effect this has had on the State of Delaware.
- Miner, Roy Waldo, Field Book of Seashore Life, New York: G. P. Putnam's Sons, 1950. This follows the field book pattern of giving concise information about various topics to enable their use on field trips.
- Morgan, Robert, World Sea Fisheries, New York and London: Pitman Publishing Corp., 1956. This work gives a general survey of sea fisheries. There are some excellent black and white photographs.
- Munroe, John A., Federalist Delaware, 1775-1815, New Brunswick, New Jersey: Rutgers University Press, 1954. This is a fine work dealing with Delaware from the Revolution through the War of 1812. The State remained Federalist longer than most of the other states in the Union.
- Myers, Albert Cook, ed., Narratives of Early Pennsylvania, West New Jersey and Delaware, 1630-1707, New York: Charles Scribner's Sons, 1912. This work collects the early documents on this area. It is very handy and the comments concerning the documents are valuable additions to the documents themselves.

The Oyster: Where, How, and When to Find, Breed, Cook, and Eat It. Second edition, with a new chapter "The Oyster-Seeker in London," London: Trübner and Company, 1863. Although the author's name does not appear in this edition, this work was probably written by George Cruikshank. This is typical of the type of volumes about oysters published in the middle of the nineteenth century. There is a great deal on the history of the oyster in ancient times, the use of oysters by doctors and the places in London where one could find the best oysters. This is an interesting book and large sections of it appear in later works, such as that by Philpots.

The Oyster Epicure. A Collection of Authorities on the Gastronomy and Dietetics of the Oyster, New York: White, Stokes and Allen, 1883. This short volume is full of little bits of information on the oyster, what to eat with it, what to drink with it, how to open it and many others. One chapter is entitled, "The Happiness of the Oyster." There were several citations of sections which were quoted, a rather unusual practice for the period. This work is enjoyable to read and points out the widespread use of oysters in England in the 1880's.

Philpots, John R., Oysters and All About Them being A complete history of the titular subject, exhaustive on all points of necessary and curious information from the Earliest writers to those of the Present Time, with numerous additions, facts, and notes, 2 vols., London: John Richardson and Company, vol. 1, 1890, vol. 2 1891. The title of this work indicates a valuable addition to oyster literature. However, this is not the case with these two volumes. There is neither a table of contents nor an index, thus making it impossible to find any specific fact or passage. There are many repetitions, contradictions, quotations and undigested information presented. Unfortunately material is not clearly documented. Only by the repetition of certain passages is it clear how much was taken from other authors without giving them credit. On the whole the work is entirely unuseable.

Rafinesque, C. S., A Life of Travels, being a verbatim and literatim reprint of the only edition, Philadelphia, 1836. (Foreword by Elmer D. Merrill, Adm. Botanical Collections, Harvard University Chronica Botanica, Waltham, Massachusetts, vol. 8, no. 2) Spring 1944. In this account of the life of a renowned botanist

there appears a section on his trip to Lewes, Delaware. On these trips he collected specimens of plants and animals native to the region. His journey to Delaware was made in 1804.

- Reed, H. Clay, ed., Delaware. A History of the First State, 3 vols., New York: Lewis Historical Publishing Company, Inc., 1947. This is a very fine history of the state, with the third volume containing genealogical records. The first two contain the history of the state in chronological order. Each chapter is written by a person specializing in that particular phase of Delaware history.
- Roberts, Kenneth and Anna M., ed., Moreau de St. Méry's American Journey [1793-1798], Garden City, New York: Doubleday and Company, Inc., 1947. This translation of the travels of the Frenchman St. Méry is a very astute account of life in the new nation. His observations on the habits of Americans are clear and descriptive; while also utilizing his training as a lawyer St. Méry was able to report with humor and insight. One of his many observations dealt with the role oysters played in the eating habits of Americans.
- Duc de la Rochefoucault Liancourt, Travels Through North America, vol. III, 1797, "Tour from Philadelphia to Chester and Wilmington Brandywine-River and Wilmington." These sections were taken from a typewritten manuscript in the Historical Society of Delaware. In the passages on Delaware the Duc gave an interesting description of life in the state near the turn of the century.
- Rounsefell, George A. and Everhart, W. Harry, Fishery Science Its Method and Applications, New York: John Wiley and Sons, 1953. This work does for the American fisheries what the Graham volume does for the British fisheries. The modern techniques used in America are described.
- Ryden, George Herbert, ed., Letters to and From Caesar Rodney 1756-1784, Philadelphia: University of Pennsylvania Press, 1933, published for the Historical Society of Delaware. This work covers the correspondence of a man who was active in the American Revolution and the forming of the young country. As one of the signers of the Declaration of Independence his opinion was frequently sought by many Delawareans and residents of other states. Most of the correspondence deals with national and international affairs, although there are a few references to fishing in Delaware.

- Scharf, J. Thomas, History of Delaware, 2 vols., Philadelphia: L. J. Richards and Company, 1888. This is one of the classic works on Delaware history. Scharf wrote histories of several other areas as well as Delaware. There is a certain amount of genealogical material to wade through. There are also many small inaccuracies, but on the whole the work is an exceedingly valuable one, indeed. As with most of the works of this period it is rather difficult to find specific items because of the method of indexing. With some background in the state's history the problem becomes less complicated.
- Shelly, A. Fishe, Ostrea; or, the Loves of the Oysters, New York: T. J. Crowen, 1857. This work is typical of the works published on the oyster in the middle of the nineteenth century. There is a great deal on the ancients' use of oysters, some philosophical thoughts about them and a certain amount on the biology of the oyster which has become greatly outdated.
- Smith, Frederick George Walton and Chapin, Henry, The Sun, The Sea and Tomorrow, London: Hurst and Blackett, 1955, with a foreword by C. M. Yonge, C.B.E., D.Sc., F.R.S., Regius Professor of Zoology, University of Glasgow. This is a well written work dealing with presenting to the public the potentials of the sea, the extent of its natural wealth and the possibility of commercial food production for population increases from salt water.
- Smith, Samuel, The History of the Colony of Nova-Caesaria, or New-Jersey: Containing An Account of Its First Settlement, Progressive Improvements, The Original and Present Constitution, And Other Events, To the Year 1721, with Some Particulars Since; and A Short View of Its Present State, Burlington, in New Jersey: James Parker, 1765. This account was written by the son of one of the early settlers of New Jersey. Included in this work is a description of the Swedish settlement at Lewes, Delaware, in 1662 and observations on conditions at the same spot in 1765.
- Southworth, May E., One Hundred and One Ways of Serving Oysters, San Francisco and New York: Paul Elder and Company, 1907. This is one of the many volumes published around the turn of the century describing different ways of serving oysters. The extent to which this food was served can be seen in the elaborate preparations which had developed.

- Stafford, Joseph, The Canadian Oyster, Its Development, Environment and Culture, Commission of Conservation, Committee on Fisheries, Game and Fur-bearing Animals, Ottawa, Canada: The Mortimer Company, Ltd., 1913. This work gave the most complete and detailed life history of the American oyster up to 1913. Here was described for the first time, the use of the townet for collecting oyster larvae for study. Not only is the biological information valuable, but also the sections on environment, conservation, culture methods used in various countries and a valuable bibliography.
- Steele, Earl N., The Rise and Decline of the Olympia Oyster, Elma, Washington: Fulco Publications, 1957, published for the Olympia Oyster Growers Association. This account of the oyster in Washington state was written by one of the pioneers of twentieth century oystering in Washington. The early history of the industry with the development of the native oysters is presented. Here is depicted the Olympia Oyster industry.
- Taber, William S., Delaware Trees, Publication 6, Dover, Delaware: Delaware State Forestry Department, 1937. This work identifies the species of trees found in the state of Delaware.
- Tatnall, Robert R., Flora of Delaware and the Eastern Shore, Lancaster, Pennsylvania: The Society of Natural History of Delaware, 1946. This work identifies the vegetation which can be found on the Delmarva Peninsula and includes trees as well as other plants.
- Taylor, Harden F. and a Staff of Associates, Survey of Marine Fisheries of North Carolina, With a Comprehensive View of The Economics of National and World Fisheries, Chapel Hill: The University of North Carolina Press, 1951. This outstanding work on marine fisheries was carried out to assemble, to digest, and to summarize all records and reports about physical, chemical, and hydrobiological conditions of coastal waters, fishery resources of North Carolina, status of commercial and sport fisheries and potentials for development. There is a chapter on oysters and other mollusks in Part II of this survey. While Part III deals with the economics of North Carolina's fisheries, it also describes fishery economics in general. It is in this section that valuable information on production, marketing, distribution and consumption can be found. Many later studies of state industries in other parts of the United States have been patterned upon this survey.

- Tyler, David Budlong, The Bay & River Delaware, A Pictorial History, Cambridge, Maryland: Cornell Maritime Press, 1955. This is a history of the Delaware estuary presented in pictures. The use of this artery from the Indians to modern times and the development of technology in the area is shown.
- Vallandingham, E. N., Delaware and the Eastern Shore, Philadelphia: J. B. Lippincott Company, 1922. This is one of the recognized works on the Delmarva Peninsula history. Because it is in one volume it is not as detailed as some of the other works listed.
- Vincent, Francis, A History of the State of Delaware From Its First Settlement until the Present Time. Containing A Full Account of the First Dutch and Swedish Settlements, with A Description of its Geography and Geology, Philadelphia: John Campbell, 1870. One of the strongest features of this history of Delaware is its description of the land and the use of the land in the nineteenth century. A prominent role was played by the waterways in the state to provide communication with Philadelphia and the rest of the United States.
- Wainwright, Nicholas B., Philadelphia in the Romantic Age of Lithography, An illustrated history of early lithography in Philadelphia with a descriptive list of Philadelphia scenes made by Philadelphia lithographers before 1866, Philadelphia: The Historical Society of Pennsylvania, 1958. This is a very interesting work which depicts life in Philadelphia in the first half of the nineteenth century. Numerous signs depicting oysters for sale appear in the background of many of the lithographs, while several are devoted to the selling or eating of oysters in Philadelphia.
- Walam Olum, The Migration Legend of the Lenni Lenape or Delaware Indians, A new translation interpreted by Linguistic, Historical, Archaeological, Ethnological, and Physical Anthropological Studies, Indianapolis: Indiana Historical Society, 1954. This translation is taken from the Constantine S. Rafinesque manuscript in the Brinton Memorial Library of the Museum of the University of Pennsylvania. The story was originally depicted on sticks; the translation by Rafinesque was only one of his many contributions to American history and natural history. This new translation interprets the ancient legends of the Indians in light of modern findings about Indian life in the eastern part of the United States, specifically the Middle Atlantic States.

- Wallace, Paul A., Indians in Pennsylvania, Harrisburg, Pennsylvania: The Pennsylvania History and Museum Commission, 1961. This is a fine volume about the Lenni Lenape Indians. Although the bulk of the work deals with this tribe in Pennsylvania, some reference to the Indians who settled in Delaware appears.
- Ward, Christopher, The Dutch and Swedes on the Delaware 1609-64, Philadelphia: University of Pennsylvania Press, 1930. This work by Ward is an excellent volume on the early colonial period along the Delaware. There also appears some information on the Lenni Lenape Indians in the Delaware region.
- Weslager, C. A., A Brief Account of the Indians of Delaware, Newark, Delaware: University of Delaware Press, 1953. This short volume tells the story of the Lenni Lenape Indians in Delaware primarily for school children. There are a few sketches of typical houses, clothes, hair styles and hunting equipment.
- _____, Delaware's Buried Past, Philadelphia: University of Pennsylvania Press, 1944. This work deals with the Indian background on the Delmarva Peninsula and is very well done. Weslager is considered the authority on Delaware Indians. More archeological work is being done to reconstruct the life led by this tribe in Delaware.
- _____, Delaware's Forgotten Folk, Philadelphia: University of Pennsylvania, 1943. This volume by Weslager deals with the Moors and the Nanticokes in Delaware. The Nanticokes are Indians of the Algonquin tribe who settled along the Nanticoke River in what is now Delaware and the Eastern Shore, Maryland. The Moors are considered an individual strain, showing Indian and Negro characteristics.
- Wheatley, John J., The Economic Implications of the York River Oyster Industry, Charlottesville, Virginia: Bureau of Population and Economic Research, University of Virginia, 1959. This study was made to establish the economic nature and significance of the York River oyster industry. This York River, Virginia, industry was studied within the context of the entire industry. This work is the first one dealing extensively with the economic aspects of the industry in that area. There is a review of physical and biological factors in the oyster industry, as well as the varied economic aspects of that industry.
- White, Donald J., The New England Fishing Industry. A Study in Price and Wage Setting, Wertheim Fellowship Publications, Harvard Economic Studies, vol. XCIV, Cambridge,

Massachusetts: Harvard University Press, 1954. This is a fine study on prices and wages in the fishing industry. However, there is little on the oyster industry, since it did not play an important role in the total fishing picture of New England at the time this study was made.

Williams, Rev. Charles, Silvershell; or, The Adventures of an Oyster, second edition, London: Judd and Glass, 1857. This is an interesting account and one of the earlier ones written on the oyster in the nineteenth century. It relates the life cycle of the oyster. Since that writing there has been a great deal discovered about the life cycle of the oyster. Other items covered concern such things as pearl oysters, commercial value and the perils of the oyster. The writing itself is typical of that found in the mid-nineteenth century. Because most of the facts in this work are out-dated, its value is more that of the feel of the times and the position the oyster played in English life.

Winterbotham, W., An Historical, Geographical, Commercial and Philosophical View of the United States of America..., first American edition with additions and corrections, vol. 2, New York, 1796, State of Delaware. The main feature of this work is its description of the countryside and the agricultural and manufacturing pursuits found in Delaware.

Woodward, Carl Raymond and Waller, Ingrid Nelson, New Jersey's Agricultural Experimental Station, 1880-1930, New Brunswick, New Jersey: New Jersey Agricultural Experimental Station, 1932. This is an excellent review of the work performed by the New Jersey Station. Of especial interest is Chapter VII which is on biology and includes a review of the work of the Nelson family, starting with Dr. Julius Nelson in 1888. His training in biological research at the University of Wisconsin and Johns Hopkins University benefited the state of New Jersey. He held the position of Biologist for the New Jersey Station from 1888 to 1916. His work was carried on by his sons Thurlow C. and J. Richards Nelson. One of the most consistent lines of research followed investigations on oysters. The results of the investigations were applied to the industry in the state. From 1888 a major aim of the biologist was to improve the culture of oysters. The outstanding work done by these men can be found in the numerous reports and bulletins published by them.

Yonge, C. M., Oysters, The New Naturalist Series, London: Collins, 1960. This is an outstanding work on oysters by a Fellow of the Royal Society. In one volume the entire industry is reviewed and although the emphasis is upon the European oyster there is some information on the American oyster. The work is dedicated to Thurlow Nelson and there is some specific reference to the Delaware Bay oyster industry. The work contains valuable photographs and drawings. For anyone who wishes a concise and informed picture of the world oyster industry, this is the volume to read.

Articles and Periodicals

- Bailey, Robert S., Let's Be Oyster Farmers, Educational Series, No. 8, Richmond, Virginia: Virginia Fisheries Laboratory, 1958. The Fisheries Laboratory is in Gloucester, Virginia. This volume gives a few pages on the history of the industry in Virginia, with the majority of the work dealing with operation of private grounds and the biology of the oyster. It is a handy volume for beginners or school children. There are some interesting illustrations in the work.
- Beaven, G. F., Maryland's Oyster Problem, Educational Series No. 8, Solomons Island, Maryland: State of Maryland, Board of Natural Resources, Department of Research and Education, May 1945. This work is a summary of the facts of the industry in Maryland and also indicates the kinds of information needed to solve the problem of regaining Maryland's position in oyster production. The problem of sound culture techniques was raised, as well as the long standing feud between the tongers and the dredgers.
- Brooks, Stanley T., Oysters, Popular Series No. 1, Pittsburgh, Pennsylvania: Carnegie Museum, Laboratory of Recent Invertebrates, December 5, 1930. This work includes the same information on ancient oyster culture that many other works include. The life history of the oyster is described as well as the enemies, and the proper growing conditions the oyster needs. There is also a review of the world oyster industry. Some of the better known American oyster trade names are listed with the area identified which supplies the brand name.

- Chen, T. P., "The Oyster Industry of Chung-Shan," Lingnan Science Journal, vol. 14, no. 1, Canton, China: Chen at Fisheries Experiment Station, Canton, January 1935. This is an article dealing with the oyster industry and culture in Chung-Shan. As in other parts of the world the industry in this area has declined, partly due to changing river flows. A great deal of hand labor is used in the Chinese industry which is not practical in the United States, because of the cost of labor and the differences in natural conditions.
- Cowen, John K., Maryland Oyster and his Political Enemies, Baltimore, Maryland: Steam Press of Wm. K. Boyle and Son, 1889. This is a private printing of a letter to the editors of the Sun, a Baltimore paper dated February 4, 1889. It refers to the "Oyster Navy" and the "Oyster question" with the political and economic aspects emphasized. References are made to Wm. K. Brooks' works cited earlier. This is very interesting for a contemporary view of the "Oyster War" in the Chesapeake in the late 1880's.
- Deane, Silas, "Correspondence of Silas Deane, Delegate to the Congress at Philadelphia, 1774-5," pp. 256-258 in Collections of the Connecticut Historical Society, vol. 2, Hartford, 1870. This account of Wilmington, Delaware, in 1775 was copied from the Connecticut collection by John Cunningham on October 6, 1941, and presented to the Historical Society of Delaware. Wilmington was described and also the landing of the New Haven people at Wilmington in 1640.
- Delaware History, Wilmington, Delaware: Historical Society of Delaware, 1946-1961. This journal is published semi-annually by the Historical Society of Delaware and contains many interesting articles on Delaware history.
- Estuarine Bulletin, Newark, Delaware: Department of Biological Sciences, University of Delaware Marine Laboratories, 1955-1962. This bulletin is published quarterly and contains many interesting articles about the marine life of Delaware; there have been several concerning the oyster industry in the state.
- Galtsoff, Paul S., "Environmental Requirements of Oysters In Relation to Pollution," reprinted from the Transactions of the Second Seminar on Biological Problems in Water Pollution, April 20-24, 1959, U. S. Public Health Service, Robert A. Taft Sanitary Engineering Center, Cincinnati 26, Ohio, Technical Report W60-3. This is a concise report of the necessary requirements for growth of market oysters.
- Hempstead, Joshua, "Diary, 1711-1758," New London, Connecticut: New London County Historical Society, vol. 1. This diary is quoted in an article by George McIntire in The American Scene, popular edition, New York: Carlton House, 1937, p. 103. The section of particular interest concerned Hempstead's visit in 1749 to the Delaware area to see the Connecticut people who had moved to that region.

- Hopkins, S. H., "Oysters, Annotated Bibliographies," Treatise on Marine Ecology and Paleocology, ed. Joel W. Hedgpeth, vol. 1, Ecology, The Geological Society of America Memoir 67. Prepared under the direction of a Committee of the Division of Earth Sciences National Research Council, National Academy of Sciences, Washington, D.C., December 30, 1957, and published in Baltimore, Maryland. There are several articles which are interesting, but the one on oysters is especially valuable as it lists works on the oyster since Baughman's volume of 1948.
- Huffington, William, The Delaware Register and Farmers' Magazine, Dover, Delaware: S. Kimney, 1838 and 1839. This is an interesting two volume magazine full of articles on all sorts of items. There are many articles on Delaware history and the Indians of Delaware. Such things appear as a letter to the Free Society of Traders concerning oysters in the Delaware region. A full account of this letter by William Penn can be found in Myers' book listed in this bibliography.
- Kollner, Augustus, Common Sights in Town and Country, Philadelphia: American Sunday School Union, 1850. This booklet of twelve lithographs of sights in the town and country was published for children and sold for fifty cents. The merit of these works appears as their documentation of nineteenth century American life. One of the lithographs in this work is entitled, "The Oysterman." For further information on these booklets, see Nicholas B. Wainwright, "Augustus Kollner, Artist," vol. 84, p. 335, The Pennsylvania Magazine of History and Biography, Philadelphia: The Historical Society of Pennsylvania, 1960.
- _____, Common Sights on Land and Water, Philadelphia: American Sunday School Union, 1852.
- _____, City Sights for Country Eyes, Philadelphia: American Sunday School Union, 1856. Among the lithographs in this booklet is one entitled, "Fine Oysters."
- _____, Country Sights for City Eyes, Philadelphia: American Sunday School Union, 1858. These booklets can be found in the Historical Society of Pennsylvania, Philadelphia, Pennsylvania.
- Korringa, P., "Recent Advances in Oyster Biology," Quarterly Review of Biology, vol. 27, pp. 266-308; 339-365. This is a review of the 277 articles on oyster biology and should be read by any student or person interested in the subject. The articles reviewed cover the period from 1938 to 1952.

Long, E. John, "Gold in Them Thar Waves!," Sea Frontiers, Bulletin of the International Oceanographic Foundation, The Marine Laboratory, University of Miami, Coral Gables, Florida, vol. 5, no. 1 (February 1959), pp. 41-54. This article deals with reclaiming minerals from ocean water. Among the minerals discussed was magnesium. The reclaiming of this mineral with the aid of oyster shells was proposed.

McLean, Richard A., "The Oysters of the Western Atlantic," Notulae Naturae, no. 67, January 14, 1941, The Academy of Natural Sciences of Philadelphia. This article gives some indication of the geographic ranges of some of the species of oysters.

Nelson, Thurlow C., Science in Oyster Production. An Outline of Recent Research Projects and Their Results Affecting Production of Shellfish, reprinted from October, November and December 1954 issues of Fishing Gazette. This article reported on the projects outlined at the 1954 meetings of the Oyster Growers and Dealers Association of North America and the National Shellfisheries Association which held their 46th Joint Annual Convention in Boston, August 1-5, 1954. The paper is a valuable one for its review of recent developments in the oyster research field.

_____, "Some Scientific Aids to the Oyster Industry," reprinted from American Scientist, vol. 45, no. 4, September 1957, pp. 301-332. This is an extremely valuable review of the scientific developments and their application to a commercial oyster industry during the twentieth century. Two very important factors are brought out by Dr. Nelson; except for oysters and a few privately stocked fish ponds there is no private ownership of aquatic food animals and a very large part of market and seed oysters come from public grounds owned by the states within whose boundaries those grounds are located.

Newspapers, Delaware.

American Watchman and Delaware Republican, Wilmington, Delaware, 1810's-1820's.

Delaware Advertiser and Farmer's Journal, Wilmington, Delaware, 1830's.

Delawarean, Dover, Delaware, 1870's-1900's.

Delaware Free Press, Wilmington, Delaware, 1830's.

Delaware Gazette, Wilmington, Delaware, January 1789-December 1790.

Delaware State Journal, Wilmington, Delaware, 1850's.

Delaware State News, Dover, Delaware, 1900's.

The Delaware Weekly Advertiser, and Farmer's Journal, Wilmington, Delaware, 1820's.

Evening Journal, Wilmington, Delaware, 1950's-1960's.
Journal Every Evening, Wilmington, Delaware, 1880's-1950's.

Milford Chronicle, Milford, Delaware, 1880's-1960's.
Mirror of the Times, and General Advertiser, Wilmington, Delaware, 1800's.

Sunday Morning Star, Wilmington, Delaware, 1880's-1930's.

The Wilmingtonian and Delaware Advertiser, Wilmington, Delaware, 1820's.

Wilmington Morning News, Wilmington, Delaware, 1900's-1960's.

See also Delaware State Archives, Newspaper Clippings, folders entitled, "Agriculture and Conservation" and "Fisheries, Commercial." Wilmington Institute, Free Library, Wilmington, Delaware, Vertical File, section entitled, "Delaware Fish and Game."

Newspapers, others.

Christian Science Monitor, 1950's-1960's.

New York Times, 1950's-1960's.

Nichol, A. J., The Oyster-Packing Industry of Baltimore, Its History and Current Problems, Solomons Island, Maryland: Chesapeake Biological Laboratory, August 1937. This is a valuable bulletin on the oyster packing industry of Baltimore. The history of the industry is developed and there are some fine illustrations. The documentation is good.

Oyster Growers and Dealers Association of North America, Founders, Bulletin published by the Association in 1958. This work was a brochure published for the 50th Anniversary of the organization. The early history of the group is told.

Oyster Institute of North America, Annapolis, Maryland. This organization of commercial oystering interests combines the Oyster Growers and Dealers Association of North America and the National Shellfisheries Association and has been in operation for most of the twentieth century. It publishes many bulletins and informative leaflets on the oyster industry.

The Oysterman and Fisherman, Hampton, Virginia: The Oysterman Publishing Company, 1902-1916. This was a monthly magazine dealing almost exclusively with oystering and the industry. Advertisements from dealers, manufacturers, canners and suppliers appeared. There were many articles about phases of the oyster industry and letters to and from individuals in the industry throughout the United States. These volumes are very interesting and informative. There is not a complete set

available, but some copies can be found in the New York Public Library, the Library of Congress and in Hampton, Virginia.

The Pennsylvania Magazine of History and Biography, Philadelphia: The Historical Society of Pennsylvania, 1876-1961. Because of the close ties Delaware has had with Pennsylvania, many articles on Delaware or Delaware people appear in this magazine. The index is quite good and most subjects can be found without much difficulty.

Papers Presented at the International Technical Conference on the Conservation of the Living Resources of the Sea, Rome, April 18-May 10, 1955, United Nations, New York, 1956. There were two papers especially pertinent; one, Erik M. Poulser, "Conservation problems in the north-western Atlantic," pp. 183-194, and two, Gerard Belloc, "The Conservation of biological resources in coastal waters," pp. 122-127.

Pease, H. D., "The Oyster-Modern Science Comes to the Support of an Ancient Food," reprinted from Journal of Chemical Education, vol. 9, no. 10, October 1932, pp. 1675-1712. This article deals with the use that scientific research can have for a commercial industry.

Prytherch, Herbert F., "The Role of Copper in the Setting, Metamorphosis, and Distribution of the American Oyster, Ostrea Virginica," reprinted from Ecological Monographs 4:47-107, January 1934. This project was originally submitted for the Ph.D. degree at the University of Pennsylvania. This study pointed out that the stimulus for oyster setting occurred when there was a minute amount of copper present in the waters.

_____, "Scientific Methods of Oyster Farming," reprinted from The Scientific Monthly, February 1934, vol. 38, pp. 118-128. This article develops the role of scientific research in oyster farming.

Punch, London: Punch Office, 1870's-1890's. In these volumes there are numerous references to oysters and the London society.

Purnell, Harold W. T., "Draper Site Relations," The Archeolog, publication of the Sussex Society of Archeology and History, Delaware, vol. 10, no. 2, July 1958. This report tells of the findings at the Draper Site of Indian pits and artifacts. The theory is proposed that these pits were not refuse pits, but storage pits. When empty the pits were then used as refuse pits, but that was not their original purpose.

- Pusey, Pennock, "History of Lewes," Historical and Biographical Papers, Wilmington, Delaware: The Historical Society of Delaware, vol. 4. This paper was read before the Historical Society of Delaware on November 17, 1902 and published in 1903. Of particular interest is the account given of Peter Heyes' account of Delaware Bay in 1631 and the fine oysters in the Lewes Creek.
- Ryther, John H., "The ecology of phytoplankton blooms in Moriches Bay and Great South Bay, Long Island, New York," Biol. Bull. 106:198-209. This article reports that the pollution from the duck farms bordering Moriches Bay enriches the bay waters with plant nutrients. The nature of this nutrition is such that certain types of phytoplankton grow rapidly, excluding other species and resulting in starvation of many marine animals because of lack of food.
- Sears, Mary, ed., Oceanography, Invited Lectures Presented at the International Oceanographic Congress held in New York, August 31-September 12, 1959, Publication No. 67, Washington, D.C.: American Association for the Advancement of Science, 1961. Of special interest is the article by G. E. Hutchinson, "The Biologist Poses Some Problems," pp. 85-94, in which an hypothesis of predation as the stimulus to the production of hard fossilizable skeletons is presented.
- Sieling, Fred W., Maryland's Commercial Fishing Gears. II. The Oyster Gears, Educational Series, No. 25, Solomons Island, Maryland: State of Maryland, Board of Natural Resources, Department of Research and Education, May 1950. This work gives a short description of the different types of gear used in taking oysters in Chesapeake Bay. Some background on the history of the industry is related as it has been concerned with the development or use of gear.
- Simons, Howard, "What Science Knows About Your Biorhythms," Think, New York: International Business Machines, September 1961, pp. 25-27. This article relates the work being done in biological research to solve the problem of the balance of physical and biological rhythms found in animal and plant life.
- Smith, Hugh M., "Our Fish Immigrants," National Geographic Magazine, Washington, vol. 18, no. 6, June 1907, pp. 384-400. The section on the Atlantic oysters on the Pacific Coast is found on pp. 394-395. The problem in this type of transplanting was that the west coast was entirely dependent upon the east coast for seed stock.
- _____, "Oysters: The World's Most Valuable Water Crop," National Geographic Magazine, Washington, vol. 24, no. 3, March 1913, pp. 257-281. This article on

- oysters was written by the then U. S. Deputy Commissioner of Fisheries. Information on oyster cultivation and the enemies of the oyster was given. The range of the oyster over the world was shown. There are some excellent photographs in this article.
- Sweet, Gordon, "The Northern Oyster Industry, 1600 to 1950, A Study in Conservation," The New England Social Studies Bulletin, vol. 8, 1951. This is a short view of the oyster industry in the northern part of the United States, showing the changes and the adaptations over the three hundred and fifty years of the New England industry.
- Truitt, R. V., "The Oyster," Educational Series, No. 7, Solomons Island, Maryland: State of Maryland, Board of Natural Resources, Department of Research and Education, February 1945, reprinted from BIOS, vol. 15, no. 3, October 1944. This is a small volume written to present the many facts about the oyster in a concise form and one which the layman could easily understand. There is a section on the history of the use of oysters as food and one on the biology of the oyster.

Reports and Unpublished Material

- Barrick, Harold Louis, "The Economic Factors Affecting the Demand for and the Price of Oysters and Blue Crabs in the United States." Unpublished Ph.D. dissertation, Rutgers University, 1959. This work discusses the economic factors involved in the pricing of oysters and blue crabs.
- Buckson, H. Irving, "Financing the Middle Atlantic States' Oyster Industry." Unpublished thesis, Graduate School of Banking, Rutgers University, 1959. This work deals with the costs of oystering and the means of financing this industry.
- Carpenter, O. G., "Oyster Cultivation in the World Famous Long Island, New York Oyster Beds." Pamphlet prepared for the Long Island Oyster Growers of New York, 1949. This work is a reference outline of the history, practice, development and results of oyster cultivation in New York territorial waters.
- Chipman, Walter A. and Engle, James B., "The Condition of the Oysters and Oyster Grounds of Rehoboth Bay, Delaware, in February 1947." Unpublished manuscript.

This survey was made by the U. S. Bureau of Fisheries upon the request of the oyster growers and dealers of Rehoboth Bay and the Delaware Commission of Shellfisheries to determine the cause or causes of excessive mortality of oysters in the bay and the failure of the oysters to be of good quality.

Cronin, L. Eugene, "First Annual Biological Survey of Delaware Seed Oyster Bars," May 15, 1952. Unpublished manuscript, University of Delaware, Newark, Delaware. This work marks the beginning of the Marine Laboratories of the University of Delaware work with the oyster industry in the state.

_____, "Oyster Mortalities in Delaware and Chesapeake Bays," August 1960, National Shellfisheries Association. Unpublished manuscript, U. S. Fish and Wildlife Library, Washington, D. C. This report deals with the "MSX" deaths in the two bays and the efforts of several state agencies, the federal government and the oyster industry to control this blight and protect the public.

_____, "Preliminary Survey of the Delaware Seed Oyster Areas," September 4, 1951. Unpublished manuscript, Marine Laboratories, University of Delaware, Newark, Delaware. This was the initial study made to set procedures for the annual surveys to be made of the seed bed areas. These surveys hoped to establish the necessary scientific data to improve oyster production in the state.

Dean, Davis, "The Experimental Feeding of Oysters." Unpublished Ph.D. dissertation, Rutgers University, 1957. This work considered detritus and plankton as the principal sources of food for oysters and efforts were made to develop feeding artificially.

Department of Tidewater Fisheries, State of Maryland, Board of Natural Resources, Commission, "Report on the Oyster Problem in the Chesapeake Bay," February 1947. This report was made to evaluate the low production of Maryland waters at that time.

Downes, E. Hall, "A Study of the Training Needs of the Delaware Fishing Industry," June 1961. This study sets forth a program of training oystermen in new techniques and methods of operation for greater efficiency. The program is to be directed by the State Department of Public Instruction with the cooperation of the State Game and Fish Commission.

Dunn, Albert H., III, and staff, The Delaware Economy, 1939-1958. Newark, Delaware: Bureau of Economic and Business Research, University of Delaware, 1961. This report is a comprehensive study of the developing and

changing economy of Delaware. Projections of the labor force, employment and unemployment for the 1960's are made.

Frey, David G., "Investigation of Seed Oyster Beds on Delaware Side of Delaware Bay," June 10, 1943. Unpublished manuscript. This examination of Delaware seed beds was made under the direction of Dr. Paul S. Galtsoff and was carried out from March to June 1943.

Galtsoff, Paul S., "Ecological Changes Affecting the Productivity of Oyster Grounds," 1952. Unpublished manuscript. This work is a study of environmental changes which affect oysters.

_____, "Mortality of Oysters in Delaware Bay," April 1942. Unpublished manuscript. This study was made to determine the cause of the mortality in the oysters in the Delaware Bay and to seek a remedy for the situation.

_____, "Oyster Fishery in the Delaware Bay and Water Control Problems in the Delaware River," October 16, 1939. Unpublished manuscript. Because there was no agency equipped to do research in the state of Delaware, the U. S. Bureau of Fisheries was called upon to conduct periodic surveys in the 1940's within the state. This was conducted by the director of Shellfisheries Investigations.

Horn, James G., "The History of the Commercial Fishing Industry in Delaware." Unpublished senior thesis, University of Delaware, 1957. This work includes a few pages covering the high spots of the Delaware oyster industry and some photographs which were taken in the 1950's of oyster vessels.

Loosanoff, Victor L., "Starfish and Oysters." Unpublished manuscript, 1959. This report deals with the starfish problem in Long Island Sound.

Miller, Mary Emily, "Port Town on the Starboard, A History of Frederica, Delaware." Unpublished bachelor's thesis, University of Delaware, 1955. This history contains references to Bowers Beach, Delaware, one of the centers for oystering among the Kent County populace.

National Shellfisheries Association, "Titles of Papers Presented at Annual Meetings, 1930-1957." These meetings have served as sounding boards for scientific knowledge on oysters. Many different phases of the industry are discussed; biology, control of enemies, harvesting crops, marketing products and many others. Since 1950 convention addresses have been issued as "Proceedings of the National Shellfisheries Association."

Oysters and Other Shell Fish, Report of the Fishmongers' Company, London, December 1902 to June 1909, London: Waterlow Bros. and Layton, Ltd., 1909. This report deals with the authority over the London markets granted to the Fishmongers' Company in 1877 to prevent the sale of fish unfit for human consumption. In the first decade of the twentieth century attention was given to the oyster industry, especially contamination by sewage in its relation to disease.

Quittmeyer, Charles L., "The History of the U. S. Oyster Industry." Unpublished manuscript. This work reviews the industry before and after 1880 and deals with marketing of a perishable food item. Whenever possible statistics are given. These are presented to 1950.

Report from Rutgers, The State University of New Jersey, February 1950. This report contains an article, "Oysters, 'The Fish Like a Nut'. . . with Rutgers Research . . . Became a Stable Jersey Industry." Here is represented the work of the Nelson family in the search for scientific aids to the oyster industry of New Jersey.

Reports from the University of Delaware Marine Laboratories. Note especially the Biennial Report, 1953 and 1954, Publication 2, December 1954, which contains two articles by L. Eugene Cronin, "Oyster Studies," pp. 71-77, and "Testimony on the effects of the New York plan of water diversion and release upon the estuarine resources of Delaware," pp. 81-83; Fishery Statistics of Delaware, 1955, Information Leaflet No. 1; "Study of Disease-Causing Organisms and Pathology of the Eastern American Oyster," Progress Reports to the U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries (Contract 14-17-008-116), by Carl N. Shuster, Jr., covering work done from October 1, 1959, to the present and presented in quarterly reports; various reports on conditions of the oyster industry in Delaware issued by Dr. Carl N. Shuster, Jr., Director, University of Delaware Marine Laboratories, 1955-1962.

Shuster, Carl N., Jr., A Biological Evaluation of the Delaware River Estuary, Information Series, Publication No. 3, University of Delaware Marine Laboratories, September 1959. The sections on the morphometry of the Delaware Bay, role of tidemarshes, the ecology of estuarine invertebrates and especially the evaluation of the Delaware River estuary fisheries give valuable information on this section of the eastern coast and its role in the national fishing picture, along with the potential of the area.

Tripp, Marrenes R., "Studies on the Defense Mechanism of the Oyster, Crassostrea Virginica." Unpublished Ph.D. dissertation, Rutgers University, 1958. This study was made to determine the means by which the oyster protects itself by producing natural immunities.

THE DELAWARE OYSTER INDUSTRY, PAST AND PRESENT

Mary Emily Miller, Ph.D.
Boston University Graduate School, 1962

Major Professor: Robert V. Bruce, Associate Professor
of History

This investigation is an effort to present an accurate historical record of the Delaware oyster industry, to discover how changes in the industry over the years have affected those who were a part of it and to forecast what may lie ahead for it.

The major emphasis is on the State of Delaware; however, developments elsewhere along the Atlantic Seaboard, and especially within the Delaware River estuary have affected the Delaware oyster industry, and are therefore considered.

The oyster industry, although it has been subject to periods of sharp decline, has been important to Delaware, as evidenced by recurrent efforts, not all of them successful, to improve conditions in the industry. The failure of some remedial laws arose from difficulties in enforcement.

Disregard of the oyster laws was one factor in the depletion of the natural oyster beds; another was the oyster's natural enemies: oyster drills, various types of worms, crabs and other marine life. These enemies, unless controlled, cause untold damage to the oyster. Besides,

the Coriolis effect of the earth's turning tends to increase shellfisheries on the east rather than the west (or Delaware) side of Delaware Bay.

The removal of smaller oysters from the natural beds for seed purposes may actually be reducing the percentage of male oysters in the beds, since young oysters frequently develop first as males and later as females. This practice prevents adequate reproduction on the beds and causes a cumulative decline in the production of seed oysters which are needed for private planting. Evidence shows that both public grounds and private planting areas are required for commercial production.

A great boom in the industry followed the Civil War and extended into the twentieth century. However, since World War II the oyster industry in the Middle Atlantic States has declined in importance, primarily because of various effects of industrial development in the area. The immediate result of this decline has been to turn some men from the oyster industry to other pursuits. Furthermore, there have been still fewer jobs available in the industry since the wartime manpower shortage and rising labor costs stimulated mechanization.

Within the past decade a program of gathering scientific data needed for successful local oyster culture has been

begun in Delaware. This search for facts was given added impetus by the appearance in 1958 of the blight, "MSX," which has all but destroyed the local oyster industry. Since the blight has also attacked the waters of neighboring states, these states and the federal government have joined forces in cooperative research projects to discover the cause of the blight and to seek methods for its eradication.

The Delaware River Basin Compact holds great promise for developing the water resources of the Delaware River Drainage Basin. Among its concerns are water supply, hydroelectric power, recreation, forest conservation and pollution control. It is through pollution control that the waters may be restored as productive breeding and growing areas for the oyster.

The best hope for the future of the oyster industry in Delaware lies in modern oyster farming methods that will utilize the tidemarshes in the state.

The history of the Delaware oyster industry exemplifies the struggle of man to exploit natural resources amid both the opportunities and complications arising from modern science and its offspring, an urban, industrialized society.

Autobiography

Mary Emily Miller was born on March 7, 1934 in Wilmington, Delaware. Her parents were Dr. George Roland Miller, Jr., and Lillian Lewis Postles. She graduated from Dover High School, Dover, Delaware, in June 1951. In June 1955 she received her B.A. with distinction in history from the University of Delaware, Newark, Delaware. She attended the University of Maine, Orono, Maine, in the summer of 1953, and Goldey Beacom School of Business, Wilmington, Delaware, in the summer of 1955. In June 1956 she received a Certificate in Business Administration from the Harvard-Radcliffe Program in Business Administration, Cambridge, Massachusetts. She received an M.A. in history in June 1959 from Boston University, Boston, Massachusetts. During the summer of 1959 she attended Harvard University and in 1960 the Munson Institute at Mystic Seaport, Mystic, Connecticut, which is under the auspices of the University of Connecticut, Storrs, Connecticut.



Looking Around Delaware

Little Creek

Delaware's picturesque oyster fleet mustering more than two hundred schooner-rigged vessels during the height of the season, makes its base of operations the harbors of Little Creek, ancient fishing village of eastern Kent, and not many miles from Dover. For it is out in Delaware Bay near this hamlet that the extensive oyster beds, involving hundreds of thousands of dollars, provide one of the most important industries of the Commonwealth.

Oysters "R" in season all the year around in Little Creek, and not simply during those months when the luscious bivalves are most palatable to the rest of us—months which by coincidence contain the letter "R" in their names. For the end of the "R" months means that the oyster "seamen" must toil to prepare the beds for next season's markets.

Base for Hugh Oyster Fleet

If you should journey to this little coastal village early in the morning, you would wonder how many vessels could be packed into its snug harbors. You would note scenes of feverish activity along the wharves—the screams of winches paying out cable and chain, the clanking and rumble of putting overboard the dredges as the fleet hastens to dash out to its work in the oyster beds. Every year, during May and June, the largest fleet of sailing craft in the country, gathers in these waters, to begin its "planting."

Little Creek Landing, as this quaint place is sometimes called, is one of the oldest communities in Kent county. Its annals begin with May 14, 1764, when May Bell conveyed to her children, Henry, John and Lucy Bell, the ground on which it stands. John Bell, several years later, constructed the first wharf, warehouses and general store. He was followed by Captain Robert Collins, then Edward W. Wilson. The "Landing" grew

rapidly into an important shipping point for Little Creek Hundred. Thousands of tons of grain, and marsh hay used in making rope and excelsior for packing cases, were shipped annually on vessels which plied the coast-wise routes.

Captain David Montgomery was the pioneer in Little Creek's oyster industry, which now furnishes daily bread for hundreds of workers.

Bloody Oyster Wars

Peace now reigns along the oyster beds, but the locality has been the scene of long drawn-out "oyster wars" arising out of the bitter disputes over the Delaware-New Jersey boundary. In the middle eighties of the past century, these "wars" developed into actual battles, with lawlessness rampant, and much bloodshed caused loss of lives when rough sea-faring men fought for supremacy of the waters. Boats of Delaware's "Oyster Navy" now patrol the bay, but their vigilance is now unnecessary.

An oddity in Delaware education existed in the school established by old Gun Swamp Methodist Episcopal Church which established in 1832 a day school for the use of both whites and Negroes. This building, about a mile out of town, was moved into Little Creek in 1875. It gave way to a new structure in 1884. The Friends of Little Creek Hundred founded their society in 1714. The present building dates from 1802.

Many fine old Colonial manor houses are still extant in the Little Creek locality. The "Wheel of Fortune," for many years in the Nicholson family, of pre-Revolutionary origin; Pleasanton Abbey, seat of the Stevens clan; Cherbourg, the Martin home built in 1715, home of the late Governor Cornelius P. Comegys, lieutenant-colonel in the War of 1812, and numerous other Eighteenth Century estates.

At the Dickinson Colonial manor of "Kingston-upon-Hull" is a feudal burial ground where lie more than 400 Negro slaves. Here the first courts of Kent County were held before Dover became the seat.

Near the Dickinson place is Bye-field, inherited by Caesar Rodney, Signer of the Declaration of Independence, from his father, William. This was the home to which he returned after making his famous ride for liberty.

Sept 11, 1968

Little Creek dates to 1764

Little Creek, one of the oldest communities in Kent County, began May 14, 1764, when May Bell conveyed to her children, Henry, John and Lucy Bell, the ground on which it stands.

John Bell, several years later, constructed the first wharf, warehouses and general store.

Its early existence depended on its access to the bay and ocean in the days when freight and passengers traveled chiefly by water. Little Creek started as a landing for early settlers, handling their supplies, tobacco and pelts. Later salt-marsh hay used in making rope and excelsior for packing cases, and grain, produce, and seafood moved from its docks. Capt. David Montgomery was the pioneer in Little Creek's oyster industry.

+ Little Creek: Mayor Remembers Kindness of Neighbors

Wild Geese and Dover Planes Dot Sky Above This Quiet Town

1960 By JIM FLOOD
News-Journal Dover Bureau JE

LITTLE CREEK, Oct. 29.—Ten years ago a fire wiped out Charlie Hegman's home. He and his wife had four small children. Their position was grim.

"People of the town took up a collection," he recalls, "and put me back on my feet."

Today Hegman is mayor of Little Creek, a small (pop. 306) Kent County community five miles east of Dover. He is also president of the fire company and the Little Creek school board.

HE REMEMBERS WELL and with appreciation the generosity of his neighbors. It is one reason why he says he will never move from the town. He came here from Camden, N. J., 25 years ago.

The town government Charlie heads doesn't have to meet too often or very long to take care of the community's business—simply because there isn't much. Paying a few bills, arranging for street work, and other routine items pretty well encompass the town council's work.

Serving with Hegman on the council are Robert Knight, secretary; Ferris Wright, Jr., treasurer, and Harry Haggerty and E. B. Gafford, members.

THEY GET ALONG with a tax rate of 20 cents per \$100 valuation plus a \$1 capitation tax.

They are discussing a move which would take a bond issue, however.

Each home has its own well and Charlie says a check of home-owners indicates that "at least 95 per cent are in favor of having a town water system."

A sewer system might come later, he says, but there is no need for it now and likely won't be unless the town grows a great deal.

QUIET AND UNHURRIED though it is, Little Creek is growing. During the past 10 years it has added some 50 persons, many of them personnel from Dover Air Force Base two miles away.

The nearness of the huge air base is something not forgotten for another reason. Planes roar into the sky at all times of the day and night. Huge cargo carriers and swift fighters often follow a pattern which takes them parallel to Little Creek as they head northward before veering to the east over the Delaware Bay and the ocean.

At this time of year the sky is also a place for honking Canadian geese arriving for a winter at Little Creek Wildlife Area (South), a refuge which extends through the marshy section east of the town to the bay. It is managed by the State Game and Fish Commission.

LIKE LEIPSIK to the north and Leb-



people hope the big Newcomb & Hand Oyster Company plant at nearby Port Mahon will soon be busy again.

Other than the water and what it produces Little Creek has no industries. An oyster shucking house used to be located here, as well as tomato canneries. They're gone and the residents now work somewhere else, chiefly in Dover.

OLDEST BUILDING in Little Creek is an 18th-Century house of stone brought in by vessel. It used to be a tavern. Now it is the home of Mr. and Mrs. Herbert A. Winslow.

The white-washed structure is on Little Creek's Main Street, one of the two streets which make up this narrow little town.

This street is part of a road mentioned in deeds as early as 1714. It led to Fast Landing on Little Duck Creek, the present Leipsic, and the spot near the Little Creek landing was a natural location for a tavern. Stones for its construction may have come to this country as ballast for ships. A stepped brick course at the eaves relieves the plainness of the two-story building. Some of the original owners...



All Photos by Jim Flood

Boats at Rest

Boats sit quietly in Little River at Little Creek just east of Dover. The waters of the 'creek' flow placidly, timelessly on—while above (in the center of the picture) a plane from nearby Dover Air Force Base cuts through the sky.

been forgotten. In recent years an old oil truck was converted into a 1,500-gallon tank truck, largely through the labor of Robert Taylor, a fire company member, who added the parts necessary to make it serviceable as fire equipment. "We don't have over \$1,400 in the

tain that children would get a better education in Dover schools because they would be in individual grades.

LITTLE CREEK'S acting postmistress is Mrs. Pearl Hurley, who succeeded Mrs. Rose Haggerty last Aug. 1. Mrs.

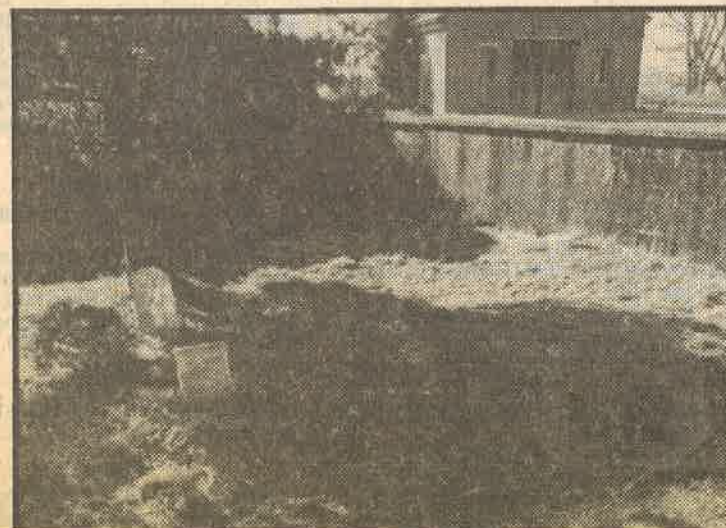
DELMARVA CROSSROADS

A SUPPLEMENT TO
THE NEWS-JOURNAL PAPERS
SERVING THE DELMARVA REGION
MARCH 6, 1985

at Little Creek



A farm house and its outbuildings stand beside one of the fertile fields of Little Creek. Below, the tower of the simple, white Methodist church on Delaware 9 reflects the bright winter sun.



Past is present

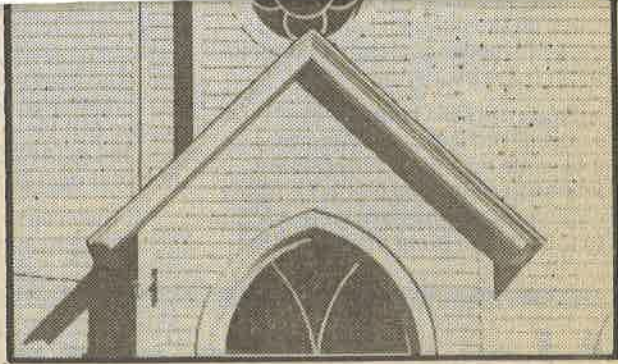
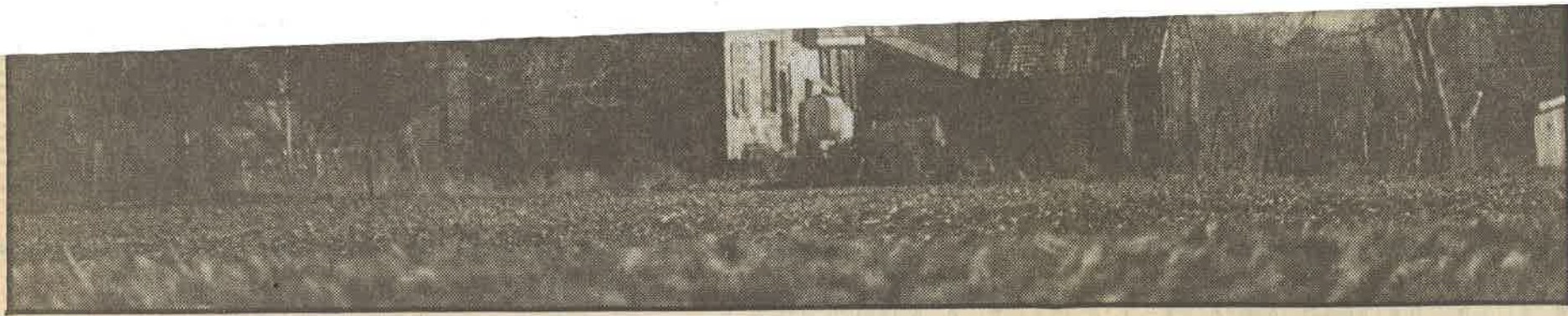
Little-changed Little Creek joins historic list

By **CALLI BARKER**
Special to Delmarva Crossroads

IN PARTS OF Little Creek Hundred, life is much the same as it was 200 years ago.

Back then, the eastern part of Kent County was farming territory, worked by large landowners who grew wheat for export to





Past is present

Little-changed Little Creek joins historic list

By CALLI BARKER
Special to Delmarva Crossroads

IN PARTS OF Little Creek Hundred, life is much the same as it was 200 years ago.

Back then, the eastern part of Kent County was farming territory, worked by large landowners who grew wheat for export to Europe and the Caribbean.

It was the fertile soil of Little Creek Hundred that drew Long Island potato farmers to Kent County after World War II, and now these modern-day growers of potatoes and soybeans have taken over the old manor houses and land holdings.

The fact that the land has stayed pretty much the same for all these years is historically significant, said Stephen G. DelSordo, historian for the state Bureau of Archeology and Historic Preservation.

Its significance led DelSordo to nominate a 2,500-acre section of the hundred to the National Register of Historic Places. That nomination has been accepted, and now Little Creek Hundred has officially been recognized as worthy of pres-



Jim Graham photos

The main house on the Tarburton farm on Delaware 8 is perfect example of area's historic past.

is going to go out and build a museum in the middle of somebody's potato field. Or take a farmer to court if he wants to put

"We don't have any plans for the district. We aren't the kind of agency that can go out and restore old buildings," DelSordo said.

reason to be apprehensive about the government telling them what they can and cannot do with their property. "We explained to them



Historic locale is cited

Continued from Page 1

that they are free to do whatever they want," DelSordo said.

So why get the area designated as historic?

"This is a rural district," DelSordo explained. "What we are trying to do out there is preserve a historic rural area that's been basically the same since the 18th century."

"One of the criteria in doing the district," he continued, "is that this area contains a grouping of nice buildings that look pretty much the same now as they did then," including an old Quaker meeting house, the Octagonal School House, now owned by the state, and various old manor houses and outbuildings.

Many of those buildings date from a mid-1700s construction boom of sorts, which occurred when farmers began to discover the agricultural potential of Little Creek Hundred.

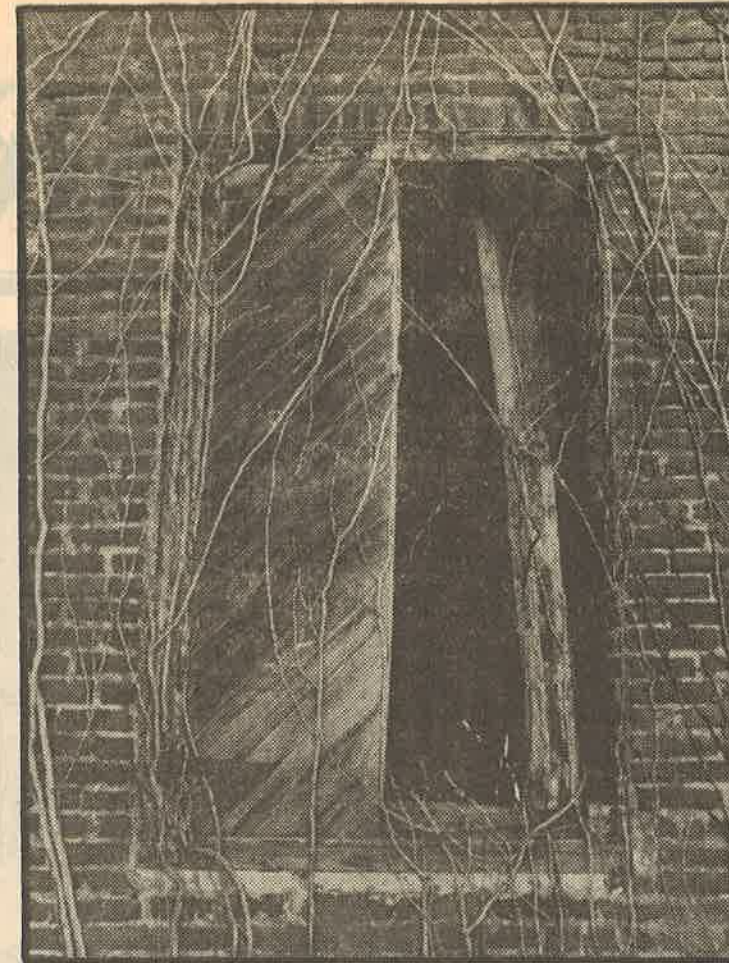
Wealthy landowners built fine homes featuring intricate brick work on the outside, beautifully carved wooden paneling and moldings on the inside.

Some of these homes were "modernized" during Victorian times, and some now have vinyl siding and imitation wood shutters. Many of the outbuildings are gone, victim to modern farming practices that



Jim Graham photos

The stone building above is in Little Creek on Delaware 9, next to the Methodist church. At right, an old building that probably served as the caretaker's shack at the Friends Meeting House cemetery.



call for few outbuildings and more straight-line plowing to conserve time and fuel costs.

But many of these homes still retain the vestiges of their former splendor. DelSordo and his fellow historians are hoping that people with the time and money to restore the homes will do so, lest the places fall victim to the wreckers' ball in the farmers' quests for economical operation.

"If they rehab the buildings according to standards" set by fed-

eral historic preservation officials, "they get a 25-percent tax credit" for materials used, he said. "It's a very popular program in urban areas," particularly in the historic districts of Wilmington and even tiny Milton in Sussex County.

While most of the original farmhouses remain, the outbuildings are almost all gone, leaving architects with few examples to follow when they want to reproduce an old cider mill or chicken house of the period.

Historians at the nearby John

Dickinson mansion have that problem now, DelSordo said. They want to restore the home and grounds so it looks like a working plantation of the 18th century. In some cases, they have found what appears to be the foundations of outbuildings, but their placement and construction is hard to reproduce if there are no existing examples of these buildings on other farms.

For the most part, farmers have been very cooperative, notifying the state if they plan to make changes or if they run across old

Indian relics — Delaware Indians knew of the fertile soils in the area before Europeans got there — when they disc and plow.

Not that there's a lot the state can do about it. DelSordo's bureau does not have the money for extensive archeological work. It doesn't even mark them for the public. "We like to be as non-specific as possible about Indian sites before people go out and loot them," he said.

But the state can work to prevent intervention from other gov-

ernmental authorities that might affect the district. Plans to reroute U.S. 13 include one proposed roadway that would skirt the corner of the district, another that would slice it in half.

Official recognition means that the state will work with the highway builders to avoid especially historic areas if doing so does not cost a whole lot more. "There will be a lot of compromise" before the route is finally worked out if a path through Little Creek Hundred is decided upon, he said.

New freedom at the end of a leash

Continued from Page 1

"All these things come to you when your eyesight leaves you," he says. "They've always been there, but when you see with your eyes you pay no attention to them."

Besides noticing improvement in smell and hearing, he says he's more aware of the way things feel. "I can feel my foot on the streets," he says. "And during a drive to Georgetown, I can feel the bumps

about 40 miles from Detroit. Herbert Predoux had never been on an airplane.

Lions Club members drove the nervous Predoux to Salisbury, Md., airport and escorted him onto the plane. "When we were on the ground and we started moving, I began to wish I hadn't done it," Predoux says. "And when it left the

of dog — German shepherd, golden retriever or Labrador. He chose Schatze, a German shepherd.

Predoux's trainer showed him how to walk the dog with the harness, how to talk to the dog, what commands to give.

Toward the end of the three weeks, Predoux and his classmates were turned loose in downtown Detroit with their dogs and instructed to find the bus station.

That experience was exhilarat-

of praise. The main thing is never to beat her, hit her or scold her, but always speak to her gently and she'll go on working for you."

Predoux and his wife live in a small house on two acres of land also settled by other members of his family. A brother, a sister and his mother live close by. He says having his family near has helped him through the hard times. "They come, they laugh, they talk and they see what they can do. There's

'When you can't

BOOKS

Kent County

Today

Bookmobile: Sandtown, 10:30 a.m.; Willow Grove, 11:15; Canterbury, 1:45 p.m.; Lakewood I, 2:30; Orchard Acres, 3:15; Holly Oak Market, 4:15.

Thursday

Bookmobile: Greenbriar, 9:45 a.m.; Marydel Fire House, 10:30; Kenton, 11:30; Peach Circle, 1:30 p.m.; Clayton, 2:15; Sunnyside Road, 3:45; Garrison Lake clubhouse, 4:30.

Sleepytime story time, Dover Public Library, 7 p.m. Also, Dial-a-story, 24 hours a day, 7 days a week, 734-1006.

Library, 10:30-11 a.m.; stories and activities for children in grades K-6, 4 p.m.

Bookmobile: Hickman's Village, 11 a.m.; Bethel, 12:15 p.m.; Layton's Riveria Mobile Park, 1; Sussex Manor Mobile Park, 1:30; Methodist Manor, 3; Seaford Health Center, 3:45; Collin's Pond, 4:30.

Thursday

Story time, all ages, 3 p.m. Milton Library.

Bookmobile: Angola, 10:30 a.m.; Angola Bay, 11:30; West Bay Mobile Park, 12:15 p.m.; Camelot Mobile Park, 1:30; Sea Air Mobile Park, 2; Midway Shopping Center, 2:45; Tru-Vaie Mobile Park, 3:30.

History

sits on pilings. It is no longer manned.

Off the light in the bay under water there springs an artesian well, once part of a warehouse that was standing on dry land. Up to recently it could be drunk from at low tide.

Marsh hay, a bread-and butter crop of older days, was shipped out of Mahon in the '80's at a rate estimated at about 1,000 tons yearly. Also shipped were an annual 50,000 bushels of grain.

Today Mahon is an oyster center as it has been for years.

Fishing Captain Felled By Polio

W. F. (Gummy) Faulkner, veteran fishing boat captain at Bowers Beach, is a patient in the Doris Memorial Hospital in Wilmington with non-paralytic polio.

He was stricken last Tuesday and will be in the hospital about a month.

Mrs. Faulkner said physicians told her husband he would have probably been able to prevent the polio had he had the Salk vaccine shots. Faulkner has always considered himself too old, she said. He is 48.

Meanwhile, she said, another captain has been hired for the boat Faulkner usually pilots and that he is taking out parties.



LITTLE CREEK METHODIST CHURCH BUILT IN 1883



OLD STONE HOUSE, LITTLE CREEK LANDING'S OLDEST STRUCTURE, BUILT BEFORE 1768 FROM BALLAST STONES

ding (Leipsic).
ears the house
Bell family.
died in 1840
sold by his es-

l atlas of 1868
p here is taken
r homes with
ven as the pre-
t map shows
B, against the
ated today by
ry.

r of trailers in
testifies to the
t town has, for
he area.

homes in 1838
as: West side
ding north to
otter, L. Spen-
E. Stabbs, W.
Gonigal, Post-
son, Hobson's
ksmith's Shop,
Wilson. East
School No. 85,
in, C. P. Catts.

Mrs. Collins,
atledge, and J.
was a vacant
Woodley, W. S.
Hollingsworth,
the south side
e J. McGonire
ore and J. L.

p. 85 was es-
with classes in
op. A school
(this map) was
new one was
ear after the
as built. Now
modern two-room

the most pros-
Little Creek
history of 1888
most prosper-
ate."

h may be call-
le Creek, was
the best shipp-
ay, as well as
out 75 oyster
y its "ditch" is
for use once

that originally
s built in 1830,
ts for a long
house keepers.
g is frame and

Little Creek works to preserve past

Little-changed area earns spot on national historical list

By CALLI BARKER
Special to Compass

IN PARTS OF Little Creek Hundred, life is much the same as it was 200 years ago.

Back then, the eastern part of Kent County was farming territory, worked by large landowners who grew wheat for export to Europe and the Caribbean.

It was the fertile soil of Little Creek Hundred that drew Long Island potato farmers to Kent County after World War II, and now these modern-day growers of potatoes and soybeans have taken over the old manor houses and land holdings.

The fact that the land has stayed pretty much the same for all these years is historically significant, said Stephen G. DelSordo, historian for the state Bureau of Archaeology and Historic Preservation.

Its significance led DelSordo to nominate a 2,500-acre section of the hundred to the National Register of Historic Places. That nomination has been accepted, and now Little Creek Hundred has officially been recognized as worthy of preservation.

This does not mean that the state is going to go out and build a museum in the middle of somebody's potato field, or take a farmer to court if he wants to put aluminum siding on his 200-year-old Georgian farmhouse.

"We don't have any plans for the district. We aren't the kind of agency that can go out and restore old buildings," DelSordo said.

And despite the historical designation, farmers know they have no reason to be apprehensive about the government's telling them what they can and cannot do with their property. "We explained to them that they are free to do whatever they want," DelSordo said.

So why get the area designated as historic?

"This is a rural district," DelSordo explained. "What we are trying to do out there is preserve a historic rural area that's been basically the same since the 18th century."

"One of the criteria in doing the district is that this area contains a grouping of nice buildings that look pretty much the same now as they did then," including an old Quaker meeting house, the Octagonal School House, now owned by the state, and various old manor houses and outbuildings.

Many of those buildings date from a mid-1700s construction boom of sorts, which occurred when farmers began to discover the agricultural potential of Little Creek Hundred.

Wealthy landowners built fine homes featuring intricate brickwork on the outside, beautifully carved wooden paneling and moldings on the inside.

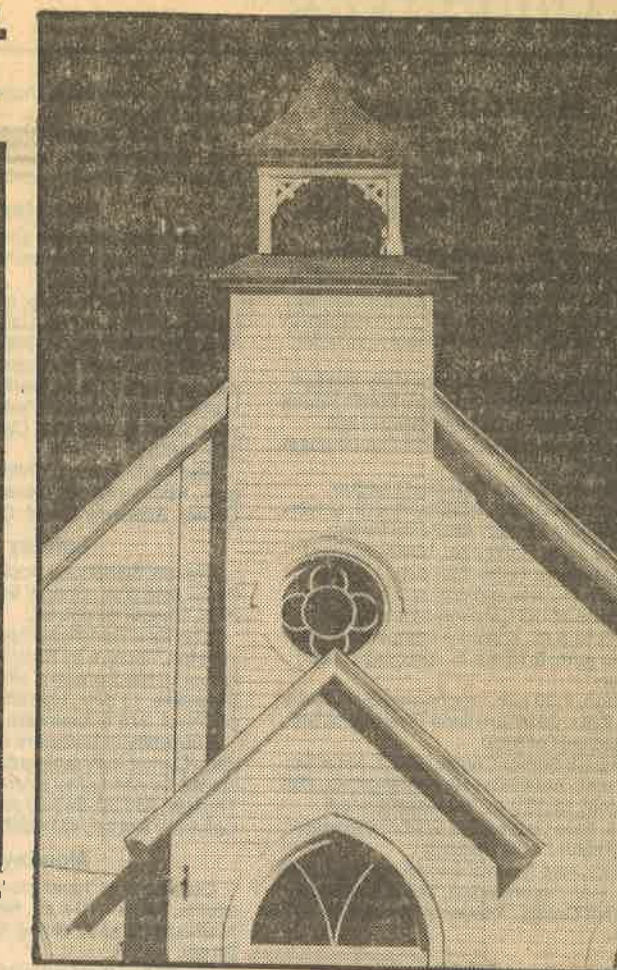
Some of these homes were "modernized" during Victorian times, and some now have vinyl siding and imitation-wood shutters. Many of the outbuildings are gone, victims of modern farming practices that call for few outbuildings and more straight-line plowing to conserve time and fuel costs.

But many of these homes retain the vestiges of their former splendor. DelSordo and his fellow historians are hoping that people with the time and money to restore the homes will do so, lest the places fall victim to the wrecker's ball in the farmers' quests for economical operation.

"If they rehab the buildings according to standards" set by federal historic preservation officials, "they get a 25-percent tax credit" for materials used, DelSordo said.



Little Creek's historical atmosphere can be seen in this house that stands along Delaware 9, next door to the Methodist church.



Jim Graham photos

"It's a very popular program in urban areas," particularly in the historic districts of Wilmington and even tiny Milton in Sussex County.

While most of the original farmhouses remain, the outbuildings are almost all gone, leaving architects with few examples to follow when they want to reproduce an old cider mill or chicken house of the period.

Historians at the nearby John Dickinson mansion have that problem now, DelSordo said. They want

to restore the home and grounds so it looks like a working plantation of the 18th century. In some cases, they have found what appear to be the foundations of outbuildings, but their placement and construction is hard to reproduce if there are no existing examples of these buildings on other farms.

For the most part, farmers have been very cooperative, notifying the state if they plan to make changes or if they run across old Indian relics — Delaware Indians knew of

the fertile soils in the area before Europeans got there — when they disc and plow.

Not that there's a lot the state can do about it. DelSordo's bureau does not have the money for extensive archaeological work. It doesn't even mark them for the public. "We like to be as non-specific as possible about Indian sites before people go out and loot them," he said.

But the state can work to prevent intervention from other governmental authorities that might

affect the district. Plans to reroute U.S. 13 include one proposed roadway that would skirt the corner of the district and another that would slice it in half.

Official recognition means that the state will work with the highway builders to avoid especially historic areas, if doing so does not cost a lot more. "There will be a lot of compromise" before the route is finally worked out if a path through Little Creek Hundred is decided upon, he said.