

VOLUME 2

DRAFT FINAL REPORT

BENEFITS ANALYSIS OF
CHESAPEAKE BAY

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BENEFITS ANALYSIS OF
CHESAPEAKE BAY

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APPENDIX A

FISH KILLS OF THE CHESAPEAKE BAY AND TRIBUTARIES

1971 - 1981

Prepared by:

Elliot Lomnitz

U.S. Environmental Protection Agency

July 27, 1982

Fish Kills of the Chesapeake Bay and Tributaries

Fish kills vary in cause - from the fish that dies of old age to the catastrophic kill - from partial to complete population diminution, and from natural to the man caused. Fish kills may be caused by natural events such as acute temperature change, storms, ice and snow cover, decomposition of natural materials, salinity change, parasites and bacterial and viral epidemics. Man-caused fish kills may be attributed to municipal or industrial wastes, agricultural activities, and water control activities. This paper examines the number of kills, frequency, and principal causes of fish kills in the Chesapeake Bay and its tributaries for the years 1971 - 1981. The data for this analysis was obtained from the U.S. Environmental Protection Agency, Monitoring and Data Support Division.

Forty-three fish kills were reported for the period from 1971 to 1981. The range of fish deaths per reported kill was from 4 to 47,712,000 fish. Using the criteria established by the American Public Health Association (1976) for defining "minor", "moderate" and "major" kills, Table 1 presents a yearly breakdown of the extent of the kills.

Table 1: YEARLY BREAKDOWN OF FISH KILLS				
YEAR (# of kills reported)	MINOR (<100 fish)*	MODERATE (100-1000)	MAJOR (>1000)	EXTENT UNKNOWN
1971 (11)	2	1	6	2
1972 (4)	0	0	2	2
1973 (3)	0	0	3	0
1974 (12)	1	2	9	0
1975 (2)	0	0	2	0
1976 (1)	1	0	0	0
1977 (2)	0	0	2	0
1978 (4)	1	0	3	0
1979 (1)	0	0	0	1
1980 (2)	0	1	1	0
1981 (1)	0	0	1	0
Total 43	5	4	29	5
* Source: Definition of Criteria: APHA, 1976. "Standard Methods".				

Of the forty three kills reported, twenty nine were major (>1000 fish) during this period. The extent of damage for five of the kills is unknown as the reports submitted were incomplete. The number of kills reported per year has significantly dropped since 1974 with many of the later kills being attributed to accidental spills.

Table 2 presents the year to year summaries of fish kills on the Chesapeake and its tributaries. As can be seen from this data, the most severe kills occurred in 1974 in the Back River near Essex, MD. Four kills occurred in August due to high nutrient loading and high B.O.D. from a sewage system, resulting in algal blooms and fish kills. The range of these kills was 10,733,000 - 47,712,000 fish with the duration of critical effect being 6 hours for each occurrence. The total number of fish killed was 101,361,000 fish.

Two problem areas were revealed via the fish kill data - the James River and the Chesapeake near Sparrows Point. The James River near Menchville had two toxic discharges from a secondary treatment plant resulting in fish kills totalling between 5 and 10 million fish. Other kills on the James River were reported ranging from 30 at Little Blackwater River to 9514 fish near Big Island. Discharges near Sparrows Point have resulted in three fish kills with a total of 614,544 fish killed. The source implicated in these kills was the Bethlehem Steel Company. However, no reports of kills due to this source have been reported since 1974.

Overall, the causes of fish kills in the Chesapeake vary and are attributable to: accidental spills, raw or heavily chlorinated sewage discharges, pesticide application programs, and chemical and thermal discharges. Accidental spills are the predominant cause of kills in recent years (5 kills since 1976).

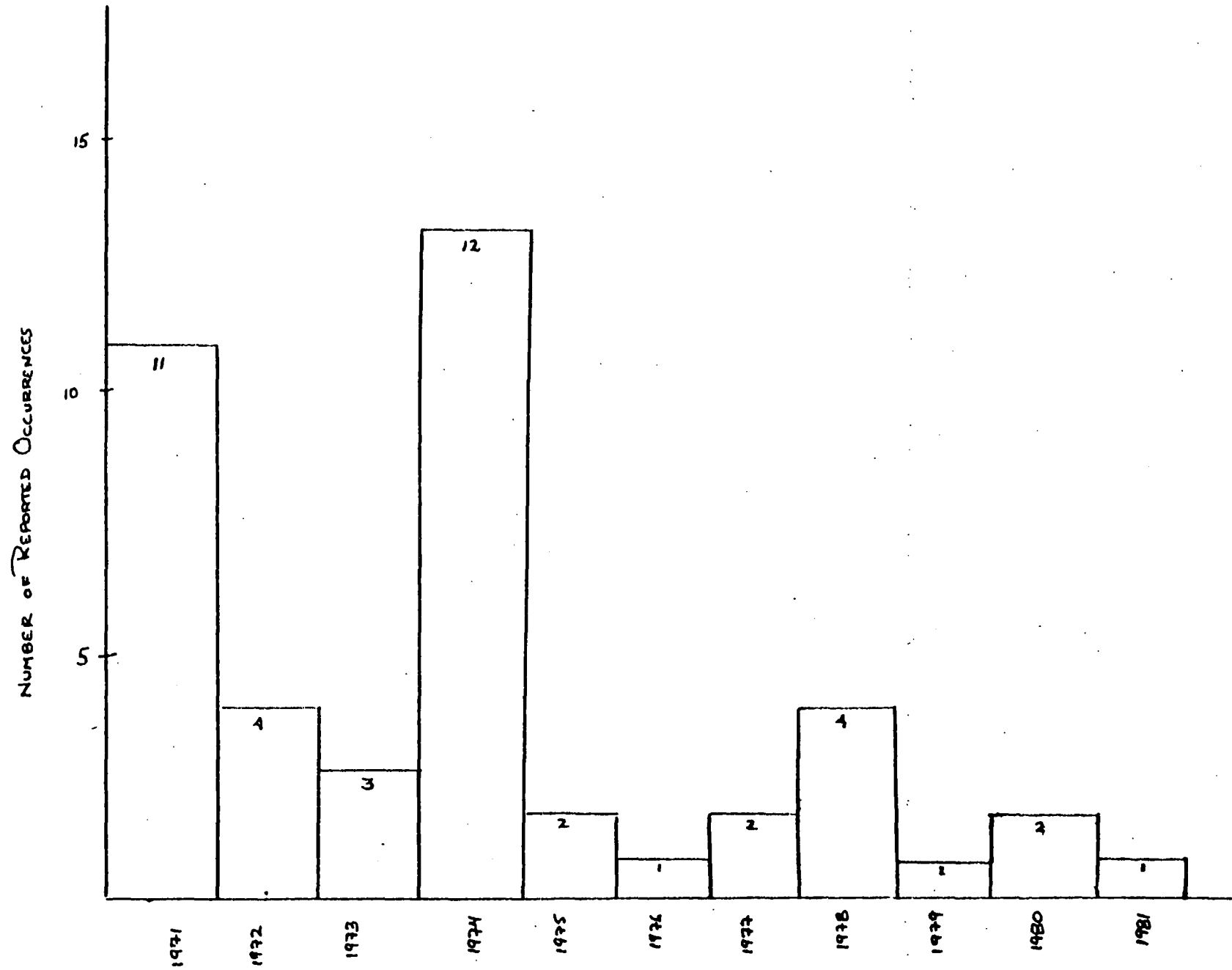
TABLE 2: FISH KILLS - 1971 thru 1981

<u>Date</u>	<u>Location</u>	<u>Estimated # killed</u>	<u>Source of Pollution</u>
<u>FISH KILL-1971</u>			
2-18	Baltimore Harbor-NW Harbor Basin	"thousands"	Kerosene via storm sewer system
5-4	Little Blackwater River	30	Hog farm discharge - low D.O.
5-9	Susquehanna River	1,253,516	Water withholding for hydroelectric power
10 days in May	River Beach Pond	"thousands"	Malathion-municipal pesticide program spraying
6-19	Piney Run	113,000	Sewage system
7-12	Ross Cove-Magothy River	800	Municipal pesticide program
8-14	Basin Run-Trib. Octorano Creek	unknown	Manure lagoon overflow-low D.O.
8-20	Pawn Run-Deep Creek Lake	100	Lorax applied by potato farmers
8-24	Basin Run-Trib. Octorano Creek	unknown	Manure lagoon overflow
9-16	Bear Creek-Baltimore Harbor	177,550	Metals discharge
11-9	Jones Creek-Old Road Bay	"thousands"	Cyanide suspected
<u>FISH KILL-1972</u>			
5-10	Stonehouse Bay-Curtis Bay	unknown	200 gal. release of sodium sulfide
6-14	Patapsco River-Sparrows Point	114,244	Cyanide release by Steel company
9-4/5	Dorsey Branch of Patuxent River	1,041	Concrete bridge construction
9-16	Cabin Branch of Patuxent River	unknown	Concrete bridge construction
<u>FISH KILL-1973</u>			
5-23	James River (near Menchville)	5-10 million	STP discharge combined with chlorine compounds
8-16	Unnamed stream to Gunpowder	4,000	Chloradane-commercial exterminator
9-9	James River (near Big Island)	9,514	High BOD from pulp wastes
<u>FISH KILL-1974</u>			
3-26	Elizabeth River	200	Oil spill
4-16	Chesapeake (near Sparrows Point)	300	Cyanide Steel manufacturer
5-5	James River (near Menchville)	9,000	Chlorine from STP
6-4	Chesapeake (near Dameron)	1,500	Construction explosion
6-30	Chesapeake (near Sparrow Point)	500,000	Cyanide Steel manufacturer
8-3	Back River	10,733,000	BOD, nutrients from sewage system
8-15	Back River	47,712,000	BOD, nutrients from sewage system
8-17	James River (Hopewell)	1,500	Heavy rain stirred up bottom sludge
8-17	Back River	11,016,000	BOD, nutrients from sewage system
8-20	Patapsco	77,425	Raw sewage and thermal discharge
8-27	Back River	31,900,000	BOD nutrients
11-1	Flintstone Creek-Potomac River	<100	#7 Diesel fuel

TABLE 2: FISH KILLS - 1971 thru 1981 (con't.)

<u>Date</u>	<u>Location</u>	<u>Estimated # killed</u>	<u>Source of Pollution</u>
<u>FISH KILL-1975</u>			
5-8	James River (Richmond)	2,936	Toxic chemical discharge
6-5	James River (Newport News)*	8,000	Sewage System
<u>FISH KILL-1976</u>			
8-19	Rappahannock River	4	Hydrogen sulfide release from broken pipe
<u>FISH KILL-1977</u>			
7-14	Little Falls	19,620	Pulp wastes
9-3	Middle Patuxent River	42,550	Chemical industry
<u>FISH KILL-1978</u>			
6-12	South Branch of Gunpowder	4,155	Truck discharge of hydrochloric acid
7-12	Crook Branch of Potomac	1,211	Oil spill
9-6	Gunpowder (near Perry Hall)	93	Chlorinated raw sewage
9-22	Gunpowder (near Perry Hall)	1,489	Chlorinated raw sewage
<u>FISH KILL-1979</u>			
8-15	Unnamed tributary to James River	unknown	Oil, source unknown
<u>FISH KILL-1980</u>			
3-10	Rappahannock River	39,790	#2 Fuel oil pipeline release
9-23	Blackwater Creek and James River	545	Sewage system
<u>FISH KILL-1981</u>			
7-17	James River (Richmond)	3,533	Power generator thermal discharge

*Note: Report indicates that this is a re-occurring problem area with fish kills in the spring of 1973 and 1974 also.



APPENDIX B

ANALYSIS OF SHELLFISH CLOSURES FOR FIVE
VIRGINIA RIVER SYSTEMS ASSOCIATED WITH THE
CHESAPEAKE BAY (1972-1979)

Prepared by:

Elliot Lomnitz

U.S. Environmental Protection Agency

August 3, 1982

I. Introduction

The purpose of this paper is to evaluate the closure and reopenings of shellfish growing areas for five major Virginia river systems associated with the Chesapeake Bay during the period of 1972 to 1979. The analyses presented in the paper attempts to answer the following questions:

- How many closures and reopenings occurred during this period overall and for each system?
- How many acres were affected by each action?
- What were the causes of closures?
- What trends are seen within each system? Are there shifts in the percent of closures?

The following briefly summarizes the evaluations made during this analysis. Table i summarizes all the condemnation areas within this study area and included the acres closed and reopened during this period.

II. Analysis of the Five River Systems Collectively

The data compiled and analyzed for the five systems reveals that the greatest number of closure actions occurred in 1972 with 65

closures (Table 2). Most of these closures occurred prior to Hurricane Agnes. These closures accounted for 89% of the total acres closed between 1972 and 1979 (Table 3). The greatest number of reopening actions occurred in 1977 with 20 actions (Table 2). These actions accounted for 34.9% of the total acres reopened between 1972 and 1979. The total number of acres closed from 1972 to 1979 was 115,948 while the reopenings during this period were only 15,107 acres (net loss of 100,841 acres). The total number of acres closed as of 12/31/71 was 63,961 thus the closures in 1972 were greater than all prior actions combined.

Six major categories of causes for closures have been identified:

- (1) bacterial data showing that standards are not met
- (2) sewage treatment plant effluent discharges
- (3) industrial waste effluent discharges
- (4) actual or potential waste discharges from dwelling units
- (5) presence of sources of boat pollution and
- (6) actual or potential animal waste pollution.

Tables 9 through 13 indicate the causes for condemnation for each water body within the five systems. Generally, the prime reason for closure in the five systems is that the bacterial counts did not meet the established standards. However most of the areas were condemned on two or more of the above categories.

The following sections examine each of the river systems individually so that trends appropriate to a single system could be identified.

III. Potomac River System

Most of the 13 closure actions taken in this river system occurred in 1972 (Table 4). These nine closures accounted for 98.5% of the total acres closed from 1972 to 1979. The total acres closed from 1972 to 1979 was 17,783. Only 1,842 acres were reopened during this period with 82% being reopened in 1972 and 1973. The net acres closed therefore was 15,941. Table 9 shows the reasons for the closures in the river system. Bacterial problems were found in all but two segments. Most of the segments were condemned for multiple reasons.

IV. Rappahannock River System

Twenty-one closures and twelve reopenings occurred in the period of 1972 to 1979 for this system (Table 5). Sixteen closures occurred in 1972 accounting for 90.1% of the total acreage closed during this period. Twelve reopening actions were taken, all in 1977-1979 (3,235 acres). The net acreage lost from 1972-1979 was 23,839. Table 10 shows the causes of the closures for each segment.

V. York River System

Table 6 reveals that 19 of 28 closure actions were taken in 1972 but constituted only 31.1% of the total acreage closed from 1972-1979. This is due to the large area closed in 1977 in the York River in the vicinity of West Point (3,789 acres). Eleven reopenings occurred during this period for a total of 4,768 acres. The net acres lost from 1972-1979 was 3,194. Table 11 shows the causes of closures for each segment.

VI. James River System

Thirteen closures and eleven reopenings occurred from 1972-1979. The net acres closed during this period was 56,105 (Table 7). 93.4% of the total acres closed occurred in 1972. The total acreage reopened was 4,929. Table 12 summarizes the causes for the closures during this period.

VII. Eastern Shore System

Nineteen closures and five reopenings occurred from 1972-1979. The net acres closed during the period was 2,280 (Table 8). 86.6% of the total acres closed (2,350) occurred during 1972. Only 434 acres were reopened from 1972-1979. Table 13 summarizes the causes for the closures during this period.

Hurricane Agnes

The advent of Agnes during June 19-23, 1972, was a highly extraordinary event which produced physical, chemical, and biological changes in the Bay. The following summarizes the effects Agnes had on the shellfish-growing areas in Virginia.

Virginia Waters

The threat of bacteriological loading resulted in immediate closing of all Virginia waters for taking of shellfish for direct consumption on June 23, 1972. Reopening of grounds as a result of Agnes began on July 20 in the lower part of the Bay including portions of the mouths of the James and York Rivers. All grounds closed as a result of Agnes were reopened on October 5, 1972. Table 1 is a summary of the history of closings and openings following the hurricane.

Table 1. History of closings and openings of Virginia Shellfish areas following bacterial contamination from the Hurricane Agnes floods.	
<u>Date</u>	<u>Action</u>
23 June	All Virginia waters closed.
20 July	Lower Bay opened below New Point Comfort - Cape Charles City Range light line, except Mobjack Bay, York above Gloucester Point, and James (including an area south of the Old Point Comfort - Cape Henry Light line).
1 August	Mobjack Bay (except certain tributaries) and York to Bland Creek opened.
3 August	James and tributaries opened below a line north from Days Point except for areas normally closed. Bay opened below line from Cherry Point north east through southern tip of Tangier Island continuing to Md. - Va. state line. Area south of Old Point Comfort - Cape Henry Light remains closed.
9 August	Remainder of Bay open except for south of Old Point Comfort - Cape Henry Light opened. Rappahannock River opened. Upper Piankatank and Upper Great Wicomico remain closed.
5 October	All condemnation areas established due to Agnes opened. Normal condemnation areas remain in effect.
Source:	Chesapeake Bay Research Council, 1972. "The Effects of Hurricane Agnes on the Environment and Organisms of Chesapeake Bay"

Table 1: SUMMARY OF SHELLFISH CONDEMNATION AREAS WITHIN THE CHESAPEAKE BAY AND TRIBUTARIES (1971-1979)

BODY OF WATER	VA CONDEMNATION AREA NO.	RIVER SYSTEM and adjacent Chesapeake Bay	SEGMENT CODE	# ACRES CLOSED AS OF 12/71	ADDITIONAL ACRES CLOSED (YEAR)	ACRES REOPENED (YEAR)	#OVERALL ACRES CLOSED AS OF 12/31/79
Upper Machodoc Creek	36	Potomac	LE2	358	570(72)	-	928
Rosier Creek	88	Potomac	LE2	-	233(72)	17(77)	216
Monroe Creek	1	Potomac	LE2	413	-	-	413
Monroe Bay and Mattox Creek	47	Potomac	LE2	1,095	-	-	1,095
Popes Creek	146	Potomac	LE2	-	262(72)	-	262
Curriomon-Nomini Bay - Ruckner Creek	82	Potomac	LE2	-	885(72) 112(75)	327(72) 113(73)	557
Potomac River upstream of Mathias Point (Footnote #1)	147	Potomac	RET2	-	13,343(72)	-	13,343
Lower Machodoc Creek	83	Potomac	LE2	-	479(72)	151(72) 59(73) 166(77)	103
Yencomico River	28	Potomac	LE2	2	411(72) 76(74) 51(75)	174(73) 38(78)	328
Coan River and the Glebe	145	Potomac	LE2	-	545(73) 25(77)	107(72) 117(73) 101(77)	245

SUMMARY OF SHELLFISH CONDEMNATION AREAS WITHIN THE CHESAPEAKE BAY AND TRIBUTARIES (1971-1979)

BODY OF WATER	VA CONDEMNATION AREA NO.	RIVER SYSTEM and adjacent Chesapeake Bay	SEGMENT CODE	# ACRES CLOSED AS OF 12/71	ADDITIONAL ACRES CLOSED (YEAR)	ACRES REOPENED (YEAR)	#OVERALL ACRES CLOSED AS OF 12/31/79
Great Wicomico River	89	Potomac	LE2	-	791(72)	371(72) 101(73)	319
Cockrell Creek	2	Potomac	LE2	798	-	-	798
Carters Creek	41	Rappahannock	LE3	590	-	150(78)	440
Corrotoman River	58,132	Rappahannock	LE3	350(East Branch) - (West)	81(77)(E) 184(72)(W) 75(77)(W)	81(77)(E) 81(78)(E)	269(E) 259(W) = 528
Dymers Creek	24	Rappahannock	LE3	183	6(72)	36(77)	153
Farnham Creek	70	Rappahannock	RET3	-	263(72)	-	263
Tabbs Creek	133	Rappahannock	LE3	-	22(72)	-	22
Greenvale Creek	94	Rappahannock	LE3	-	92(72)	-	92
Indian Creek	57	Rappahannock	LE3	255	-	82(78)	173
Lancaster Creek	120	Rappahannock	RET3	-	229(72)	62(78)	167
Paynes Creek	114	Rappahannock	LE3	-	28(72)	-	28
Upper Rappahannock River (Essex County)	60	Rappahannock	RET3	-	20,472(72)	-	20,472
Totuskey and Richardson Creeks	71	Rappahannock	RET3	-	740(72) 221(79)	-	961
Rappahannock adj. to Windmill Point	53	Rappahannock	LE3	68	-	-	68

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Milford Haven and Queens Creek	99	Rappahannack	LE3	-	282(72)	82(77) 113(79)	87
Statts Creek	61	Rappahannack	LE3	265	-	196(77)	69
Piankatank River	76	Rappahannack	LE3	-	1,328(72)	-	1,328
Jackson Creek	84	Rappahannack	LE3	-	200(72)	-	200
Broad Creek	38	Rappahannock	LE3	81	-	-	81
Bush Park Creek	109	Rappahannock	LE3	-	60(72)	-	60
Rappahannock R. Middlesex City (below Urbana Creek)	51	Rappahannock	LE3	977	204(72) 2,078(77)	2,234(78)	1,025
Sturgeon Creek	104	Rappahannock	LE3	-	99(72)	41(78)	58
LaGrange Creek	127	Rappahannock	LE3	-	185(72) 224(75)	76(77)	333
Urbanna Creek	42	Rappahannock	LE3	297	-	-	297
Back Creek	157	York	LE4	-	51(77)	17(78)	34
Davis Creek	85	York	LE4	-	43(72)	-	43
Monday Creek	125	York	LE4	-	23(72) 45(75)	-	68

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Perrin River	81	York	LE4	-	88(72)	-	88
Sarah's Creek	52	York	LE4	305	-	-	305
Severn River	54	York	LE4	57	-	-	57
Ware River	96	York	LE4	-	283(72)	-	283
Wilson Creek	106	York	LE4	-	94(72)	-	94
York River at Gloucester Point	27	York	LE4	54	-	-	54
Aberdeen Creek	78	York	RET4	-	73(72)	-	73
Carter's Creek	107	York	RET4	-	185(72)	87(73) 44(75)	54
Cedar Bush Creek	108	York	RET4	-	137(72) 23(77)	110(76)	50
Fox Creek	72	York	RET4	-	15(72)	-	15
Jone Creek	115	York	RET4	-	44(72)	-	44
Poropotank Creek and Adams Creek	128	York	RET4	-	754(72) 138(78)	370(77)	522
Timber neck Creek	3	York	RET4	112	-	47(77)	65

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York River (West Point Vicinity)	4	York	RET4	3,342	3,789(75)	1,958(76) 1,790(77)	3,383
East River	92	York	LE4	-	170(72)	75(77)	95
Horn Harbor and Doctors Creek	26	York	LE4	130	29(72)	117(73)	42
Put-in-Creek	5	York	LE4	132	-	-	132
Back Creek (in VA District 15)	151	York	LE4	-	225(75)	-	225
Carter Creek (in VA District 15)	79	York	RET4	-	22(72)	-	22
Chrisman and Patricks Creeks	137	York	LE4	-	83(72) 840(75)	-	923
King and Felgate Creeks	134	York	RET4	-	239(72) 105(75)	-	344
Skimino Creek	87	York	RET4	-	44(72)	-	44
Ware Creek	73	York	RET4	-	67(72)	-	67
York River (York County near Queen Creek)	6,35,39,40	York	RET4	1279	200(79) 53(72)	53(77)	1479

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Back River includ- ing Harris Creek	21,158	James	LE5	1279	872(72) 106(77) 597(79)	193(73) 428(75) 163(76)	1718
Deep Creek and Warwick River	34,55	James	LE5	1413	-	49(77) 143(79)	1221
James River (op- posite Tribell Shoal & Fort Eustis)	23,67	James	RET5	3392	1318(73)	-	4710
Bennetts Creek	46	James	LE5	170	-	-	170
Chuckatuck River	80	James	LE5	-	466(72) 579(79)	162(77)	883
Hoffler Creek	19	James	LE5	14	-	-	14
Upper James River nr. James City and Surrey Cty.	69	James	RET5	-	54,082(72)	-	54,082
James Creek and Pagan River	77	James	LE5	2270	-	522(72)	1748
Knotts Creek	77	James	LE5	-	90(72)	-	90
Nansemond River	8,30	James	LE5	1980	-	-	1980
Streeter Creek	18	James	LE5	8	-	-	8

SUMMARY OF SHELLFISH CONDEMNATION AREAS WITHIN THE CHESAPEAKE BAY AND TRIBUTARIES (1971-1979)

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Chesapeake Bay ad- joining Little Creek	60	James	CB5	1235	-	-	1235
Hampton Roads	7	James	LE5	35,990	172(77)	1275(76)	34,887
Little Creek	17	James	CB5	792	-	-	792
Lynnhaven River	25	James	CB5	1770	93(72) 441(74) 2119(75)	411(76) 1583(77)	2429
Rudee Inlet	74	James	CB5	-	99	-	99
Kings Creek	139	Eastern Shore	CB7	-	121(72)	74(77)	47
Chesapeake opposite Cape Charles	11	Eastern Shore	CB7	264	-	-	264
Jacobus Creeks and Matlawoman	136	Eastern Shore	CB7	-	252(72)	88(77)	164
Nassawadox Creek	110	Eastern Shore	CB7	-	95(72)	-	95
Warehouse Creek	48	Eastern Shore	CB7	-	78(72)	-	78
Occahannock Creek	43	Eastern Shore	CB7	125	147(75)	-	272
Pungoteague Sound and Creek	119	Eastern Shore	CB7	-	213(72) 96(75)	90(77)	219
Magothy Bay	59	Eastern Shore	CB7	-	22(72)	-	22

SUMMARY OF SHELLFISH CONDEMNATION AREAS WITHIN THE CHESAPEAKE BAY AND TRIBUTARIES (1971-1979)

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Oyster Harbor	12	Eastern Shore	CB7	12	-	-	12
Parting Creek	14	Eastern Shore	CB7	192	-	-	192
Chesconessex Creek	112	Eastern Shore	EE3	-	41(72)	-	41
Hunting and Deep Creeks	138	Eastern Shore	EE3	-	203(72) 102(75)	-	305
Onancock Creek	13	Eastern Shore	EE3	440	-	129(77)	311
Pocomoke Sound	33	Eastern Shore	EE3	1485	-	-	1485
Starling Creek	118	Eastern Shore	EE3	-	48(72)	-	48
Tangier Island	86	Eastern Shore	EE3	-	739(72)	-	739
Chinoteague Chan.	20	Eastern Shore	ET10	237	231(72)	53(72)	415
Greenbackville Harbor	153	Eastern Shore	ET10	-	6(75)	-	6
Mosquito Creek	32	Eastern Shore	ET10	102	-	-	102
Swan Gut Creek	97	Eastern Shore	ET10	-	78(72)	-	78
Assawoman Bay	135	Eastern Shore	ET10	-	152(72) 13(77)	-	155
Parkers Creek	98	Eastern Shore	ET10	-	76(72)	-	76

FOOTNOTES

1. This condemned area includes the Virginia portion of all tributaries to the Potomac River between Mathias Point, located approximately 3 miles upstream of the Potomac River Bridge and Jones Point located at Alexandria. The tributaries thus condemned are Chotank Creek, Passapatanzy Creek; Potamac and Accokeek Creeks; Aquia Creek; Tank Creek; Chopawamsic Creek; Quantico Creek; Powells Creek; Neabsco Creek; Farm Creek; Marcimsco Creek; Belmont and Occoquan Bays and their tributaries.
2. Condemned area 68 and 147 also have low salinity which is not amenable to shellfish propogation.

TABLE 2: CLOSING AND REOPENING ACTIONS FOR FIVE MAJOR RIVER SYSTEMS IN VIRGINIA
(1972-1979)

NUMBER OF CLOSURE ACTIONS

1972-65
1973-0
1974-2
1975-13
1976-0
1977-9
1978-1
1979-4
TOTAL-95

NUMBER OF REOPENING ACTIONS

1972-6
1973-8
1974-0
1975-2
1976-5
1977-20
1978-8
1979-2
TOTAL-51

TABLE 3: NUMBER OF ACRES CLOSED AND REOPENED FOR FIVE MAJOR RIVER SYSTEMS IN
VIRGINIA (1972-1979)

<u>NUMBER OF ACRES CLOSED</u> <u>PER YEAR</u>	<u>PERCENTAGE OF</u> <u>TOTAL</u>	<u>NUMBER OF ACRES OPENED</u> <u>PER YEAR</u>	<u>PERCENTAGE OF</u> <u>TOTAL</u>
1972-103,229	89%	1972-1,531	10.1%
1973-0	0	1973-961	6.4%
1974-517	<1%	1974-0	0%
1975-7,861	6.8%	1975-472	3.1%
1976-0	0	1976-3,917	25.9%
1977-2,624	2.3%	1977-5,265	34.9%
1978-138	0.1%	1978-2,705	17.9%
1979-1,579	1.4%	1979-256	1.7%
Total Closed 115,948		Total Opened 15,107	

TABLE 4: POTOMAC RIVER SYSTEM-CLOSURES AND REOPENINGS 1971-1979

TOTAL ACRES CLOSED AS OF 12/31/71 = 2,666

TOTAL ACRES CLOSED AS OF 12/31/79 = 18,607

NET ACRES CLOSED FROM 12/31/71 THRU 12/31/79 = 15,941

YEAR	NUMBER OF CLOSURE ACTIONS	ACRES CLOSED	PERCENTAGE OF TOTAL CLOSED ACRES '71-'79	NUMBER OF REOPENING ACTIONS	ACRES REOPENED	PERCENTAGE OF TOTAL REOPENED ACRES '71-'79
1972	9	17,519	98.5%	4	956	51.9%
1973	0	0	0	5	564	30.6%
1974	1	76	0.5%	0	0	0
1975	2	163	0.9%	0	0	0
1976	0	0	0	0	0	0
1977	1	25	0.1%	3	284	15.4%
1978	0	0	0	1	38	2.1%
1979	0	0	0	0	0	0
TOTAL	13	17,783	100%	13	1,842	100%

TABLE 5: RAPPAHANNOCK RIVER SYSTEM-CLOSURES AND REOPENINGS 1971-1979

TOTAL ACRES CLOSED AS OF 12/31/71 = 3066
 TOTAL ACRES CLOSED AS OF 12/31/79 = 26,905
 NET ACRES CLOSED FROM 12/31/71 THRU 12/31/79 = 23,839

YEAR	NUMBER OF CLOSURE ACTIONS	ACRES CLOSED	PERCENTAGE OF TOTAL CLOSED ACRES '71-'79	NUMBER OF REOPENING ACTIONS	ACRES REOPENED	PERCENTAGE OF TOTAL REOPENED ACRES '71-'79
1972	16	24,394	90.1%	0	0	0
1973	0	0	0	0	0	0
1974	0	0	0	0	0	0
1975	1	224	0.8%	0	0	0
1976	0	0	0	0	0	0
1977	3	2,234	8.3%	6	472	14.6%
1978	0	0	0	6	2,650	81.9%
1979	1	222	0.8%	1	113	3.5%
TOTAL	21	27,074	100%	12	3,235	100%

TABLE 6: WORK RIVER SYSTEM CLOSURES AND REOPENINGS 1971-1979

TOTAL ACRES CLOSED AS OF 12/31/71 = 5,411
 TOTAL ACRES CLOSED AS OF 12/31/79 = 8,605
 NET ACRES CLOSED FROM 12/31/71 THRU 12/31/79 = 3,194

YEAR	NUMBER OF CLOSURE ACTIONS	ACRES CLOSED	PERCENTAGE OF TOTAL CLOSED ACRES '71-'79	NUMBER OF REOPENING ACTIONS	ACRES REOPENED	PERCENTAGE OF TOTAL REOPENED ACRES '71-'79
1972	19	2,446	31.1%	0	0	0
1973	0	0	0	2	304	6.4%
1974	0	0	0	0	0	0
1975	5	5,004	63.6%	1	44	0.9%
1976	0	0	0	2	2,068	43.3%
1977	2	74	0.9%	5	2,335	49.0%
1978	1	138	1.8%	1	17	0.4%
1979	1	200	2.6%	0	0	0
TOTAL	28	7,862	100%	11	4,768	100%

TABLE 7: JAMES RIVER SYSTEM CLOSURES AND REOPENINGS 1971-1979

TOTAL ACRES CLOSED AS OF 12/31/71 = 49,961
 TOTAL ACRES CLOSED AS OF 12/31/79 = 106,066
 NET ACRES CLOSED FROM 12/31/71 THRU 12/31/79 = 56,105

YEAR	NUMBER OF CLOSURE ACTIONS	ACRES CLOSED	PERCENTAGE OF TOTAL CLOSED ACRES '71-'79	NUMBER OF REOPENING ACTIONS	ACRES REOPENED	PERCENTAGE OF TOTAL REOPENED ACRES '71-'79
1972	7	57,020	93.4%	1	522	10.6%
1973	0	0	0	1	193	3.9%
1974	1	441	0.7%	0	0	0
1975	1	2,119	3.5%	1	428	8.7%
1976	0	0	0	3	1,849	37.5%
1977	2	278	0.5%	3	1,794	36.4%
1978	0	0	0	0	0	0
1979	2	1,176	1.9%	1	143	2.9%
TOTAL	13	61,034	100%	10	4,929	100%

TABLE 8: EASTERN SHORE (VA) SYSTEM-CLOSURES AND REOPENINGS 1971-1979

TOTAL ACRES CLOSED AS OF 12/31/71 = 2,857
 TOTAL ACRES CLOSED AS OF 12/31/79 = 5,137
 NET ACRES CLOSED FROM 12/31/71 THRU 12/31/79 = 2,280

YEAR	NUMBER OF CLOSURE ACTIONS	ACRES CLOSED	PERCENTAGE OF TOTAL CLOSED ACRES '71-'79	NUMBER OF REOPENING ACTIONS	ACRES REOPENED	PERCENTAGE OF TOTAL REOPENED ACRES '71-'79
1972	14	2,350	86.6%	1	53	12.2%
1973	0	0	0	0	0	0
1974	0	0	0	0	0	0
1975	4	351	12.9%	0	0	0
1976	0	0	0	0	0	0
1977	1	13	0.5%	4	381	87.8%
1978	0	0	0	0	0	0
1979	0	0	0	0	0	0
TOTAL	19	2,714	100%	5	434	100%

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
36	X	X			X	X
88	X		X			X
1,47		X	X	X	X	X
146	X	X				
82	X	X	X	X	X	X
B-22 147 (*see foot- note 2)	X					
83	X		X		X	X
28	X	X	X		X	X
145	X	X	X		X	X
89	X	X	X	X	X	
2	X	X	X	X	X	X

TABLE 10: RAPPAHANNOCK RIVER SYSTEM - CONDEMNATION RATIO TABLE

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
41	X	X	X	X	X	X
58,132	X	X	X	X	X	X
70	X				X	
133	X			X	X	X
94,114	X		X		X	
57	X	X	X		X	X
120	X					X
24	X				X	X
68 (Ft. Note 2)	X				X	X
71	X	X	X		X	X
53		X			X	

TABLE 10: (continued)

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
99	X	X		X	X	X
61	X				X	X
76	X	X				
84	X			X	X	
38	X			X	X	
109	X					
51	X	X	X			X
104	X					
127	X		X	X	X	X
42	X	X		X	X	X

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
157	X			X		X
85	X			X	X	X
125	X		X	X	X	X
81	X		X		X	X
52	X		X		X	X
54	X	X		X	X	X
96	X	X	X	X		X
106	X				X	
27			X		X	
78	X		X	X	X	
107	X	X		X	X	
108	X			X	X	X

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
72	X		X	X		
115	X					X
128	X			X	X	X
3	X		X	X	X	X
4	X	X	X	X	X	X
26	X	X		X		
92	X	X		X		
5	X	X		X		
151	X		X	X	X	
79	X	X				
137	X			X	X	
134	X	X	X			
87	X					
73	X	X				X
6	X	X			X	X
35,39,40	X in Queen's Creek	X			X	

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
21,158	X			X	X	X
23,67		X			X	
34,55	X	X			X	X
8,30,46,77	X	X	X	X	X	X
80	X		X		X	X
19	X					
69 (foot- note 2)						
64	X	X	X	X	X	X
18	X			X		
60	X	X				
7,50		X	X		X	
25	X	X				
17	X				X	
74	X				X	

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VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
139	X	X	X	X	X	X
11	X	X	X		X	
136	X	X				X
110	X	X	X			X
48	X	X			X	X
43	X		X			X
119	X	X			X	X
59		X				
12	X		X	X	X	
14		X	X		X	X
112	X			X		X
138	X	X	X	X		X
13	X	X		X	X	
33	X	X	X	X	X	
118	X		X	X	X	

VA. CONDEMNATION AREA #	BACTERIAL DATA DOES NOT MEET STANDARDS	SEWAGE TREATMENT PLANT EFFLUENT DISCHARGES	INDUSTRIAL WASTE EFFLUENT DISCHARGES	ACTUAL OR POTENTIAL WASTE DISCHARGES FROM DWELLING UNITS	SOURCES OF BOAT POLLUTION	ACTUAL OR POTENTIAL ANIMAL WASTE POLLUTION
86	X		X	X	X	
20	X	X	X	X	X	X
153	X				X	
32	X	X			X	
97	X					
135	X	X	X		X	X

**TABLE 14: INDEX OF CONDEMNED AREA FOR FIVE MAJOR RIVER SYSTEMS.
IN VIRGINIA INCLUDING DATES OF ACTION**

1. Monroe Creek. Westmoreland County immediately south of Colonial Beach. Restricted May 1931.
2. Cockrell Creek. Northumberland County near Reedville. Restricted May 15, 1929.
3. Timberneck Creek. Gloucester County near Wicomico. Restricted August 5, 1948. Revised May 23, 1977.
4. York River. West Point vicinity - Condemnation revised May 2, 1960. Revised February 21, 1975. Revised June 21, 1976. Revised March 16, 1977.
5. Put-In Creek. Mathews County near Mathews Court House. Restriction revised September 23, 1965.
6. York River and Wormley Creek. York County opposite U. S. Naval Mine Warfare School. Restricted October 23, 1950. Revised September 20, 1979.
7. Hampton Roads. Condemned effective July 7, 1961. Revised effective November 8, 1976. Revised March 1, 1977.
8. Nansemond River. Nansemond County below Suffolk. Restriction revised November 15, 1933. Revised March 24, 1975. Revised August 16, 1976.
9. Pagan River. Isle of Wight County below Smithfield. Restricted November 22, 1933 (9 and 16 on same map). Cancelled December 7, 1970 (see #64).
10. Linkhorn Bay. City of Virginia Beach. Restricted October 15, 1930. Cancelled March 24, 1975. (Area now contained in #25).
11. Chesapeake Bay. Northampton County opposite Cape Charles. Restriction revised October 28, 1933.
12. Oyster Harbor. Northampton County near Oyster. Restriction revised December 30, 1935.
13. Onancock Creek. Accomack County below Onancock. Restricted January 9, 1928. Revised March 18, 1977. Revised November 21, 1979.
14. Parting Creek. Northampton County opposite Willis Wharf. Restriction revised June 27, 1934.
15. Chesapeake Bay. Entrance to Hampton Roads. Condemned effective July 7, 1961. See area map #7. Conditionally approved March 1, 1977.

16. Pagan River. Isle of Wight County near Battery Park. Restricted October 11, 1934 (9 and 16 on same map). Cancelled December 7, 1970. See area map #64.
17. Little Creek. Cities of Norfolk and Virginia Beach. Restricted April 16, 1935. Revised August 1, 1940.
18. Streeter Creek. Nansemond County. Restricted June 28, 1935.
19. Hoffler Creek. Nansemond County. Restricted June 28, 1935.
20. Chincoteague Channel. Accomack County. Restriction revised May 5, 1936. Revised February 15, 1972. Revised December 4, 1972.
21. Back River. City of Hampton. Northwest and Southwest Branches. Condemned August 18, 1961. Revised April 5, 1972. Revised May 18, 1973. Revised March 14, 1975. Revised August 4, 1976. Revised July 5, 1979. Revised
22. Dividing Creek. Northumberland County. Restriction revised December 15, 1965. Revised May 1, 1972. Revised February 14, 1973. Rescinded April 15, 1977.
23. James River. Adjacent Fort Eustis. Restricted November 19, 1951.
24. Dymer Creek. Lancaster County. Restriction revised May 12, 1952. Revised May 1, 1972. Revised February 16, 1977.
25. Lynnhaven Bay. City of Virginia Beach. Headwaters of Eastern Branch of Lynnhaven Bay. Restricted September 27, 1937. (25 and 29 on same map). Revised February 24, 1974. Revised March 24, 1975. Conditionally approved November 1976. Revised September 14, 1977.
26. Horn Harbor. Mathews County. Restricted January 6, 1941. Revised June 18, 1969. Revised April 27, 1972. Revised August 10, 1973.
27. York River. Gloucester County opposite Gloucester Point. Restricted January 6, 1941.
28. Yeocomico River. Northumberland and Westmoreland Counties. Restricted December 31, 1951. Revised May 23, 1972. Revised February 14, 1973. Revised March 2, 1973. Revised March 29, 1974. Revised February 21, 1975. Revised February 20, 1978.
29. Lynnhaven Bay. City of Virginia Beach. Headwaters of Western Branch and portion of Eastern Branch of Lynnhaven Bay and Pleasure House Creek. Restricted September 9, 1941. (25 and 29 on same map). Cancelled February 20, 1974. (Area contained in #25).
30. Nansemond River. Opposite Pig Point. Condemned November 6, 1963.
31. Lynnhaven Bay. Long Creek Branch and portion of Broad Bay. Condemned December 30, 1964. Cancelled February 20, 1974. (Area contained in #25).

32. Mosquito Creek. Accomack County near Chincoteague Naval Air Base. Restricted November 2, 1942.
33. Pocomoke Sound & Pocomoke River. Accomack County. Condemned September 1, 1964. Revised December 15, 1964.
34. Warwick River. Newport News near Denbigh. Condemned February 26, 1962. Revised March 5, 1963. Revised April 19, 1977. Revised January 25, 1979.
- 35, 39 and 40. York River. Queen Creek in York County: York County opposite Cheatham Annex and Naval Mine Depot. Restriction revised March 28, 1951. Revised November 17, 1969. Revised January 24, 1972. Revised May 1, 1972. Revised September 10, 1977.
36. Upper Machodoc Creek. King George County. Condemned March 12, 1965. Revised March 9, 1972.
37. Chesapeake Bay. City of Norfolk. East of Entrance to Hampton Roads. Cancelled June 12, 1967.
38. Broad Creek. Middlesex County. Condemned October 11, 1965.
39. See 35.
40. See 35.
41. Carter Creek. Lancaster County near Irvington. Restricted October 15, 1945. Revised July 1, 1970. Revised January 11, 1978.
42. Urbanna Creek. Middlesex County at Urbanna. Restricted August 18, 1961.
43. Occohannock Creek. Accomack and Northampton Counties. Restriction revised December 7, 1953. Revised March 26, 1975.
44. Hampton Flats. Restricted February 19, 1953. See map of area #7.
45. Hampton Flats. Restricted February 19, 1953. See map of area #7.
46. Bennett Creek. Nansemond County. Condemned September 12, 1953.
47. Monroe Bay, Mattox Creek. Westmoreland County. Condemnation revised November 12, 1959.
48. Warehouse Creek. Northampton County. Conditionally opened November 22, 1955. Condemned March 22, 1972.
49. Lynnhaven Bay - Western Branch. City of Virginia Beach. Condemned October 13, 1959. Cancelled February 20, 1974 (area contained in #25).
50. Willoughby Bay. City of Norfolk. Condemned September 12, 1960. See area map #7.
51. Rappahannock River. Middlesex County. Below Urbanna Creek. Condemned March 20, 1963. Revised October 7, 1963. Revised March 21, 1972. Revised October 7, 1977. Revised March 6, 1978. Revised May 30, 1978.

52. Sarah Creek. Gloucester County. Condemned September 27, 1965.
53. Rappahannock River. Lancaster County. Adjoining Windmill Point. Condemned November 10, 1965.
54. Severn River. Gloucester County. Achilles Prong, Southwest Branch. Condemned July 28, 1966.
55. Lower Warwick-James River. City of Newport News. Condemned July 26, 1967. Revised February 28, 1968. Revised April 19, 1977.
56. Chesapeake Bay East of the Entrance to Hampton Roads. Condemned June 12, 1967. Rescinded July 17, 1967.
57. Indian Creek. Lancaster and Northumberland Counties. Condemned May 8, 1968. Revised April 4, 1978.
58. Eastern Branch of Corrotoman River. Lancaster County. Condemned May 8, 1968. Revised December 16, 1977. Revised January 13, 1978.
59. Magothy Bay: Portion of Inland Waterway. Northampton County. Condemned March 10, 1972.
60. Chesapeake Bay - Adjoining Little Creek. Cities of Norfolk and Virginia Beach. Condemned March 28, 1969.
61. Stutts Creek. Mathews County. Condemned May 26, 1969. Revised October 19, 1977.
62. Chesapeake Bay East of Entrance of Hampton Roads. Condemned July 30, 1969. Rescinded September 8, 1969.
63. Nassawadox, Westerhouse, Hungar, Mattawoman, Barlow Creeks and Tributaries. Northampton County. Condemned July 14, 1970. Rescinded October 6, 1970.
64. Jones Creek and Pagan River. Isle of Wight County. Condemned December 7, 1970. Revised September 18, 1972.
65. Lynnhaven Bay-Entire Western Branch. City of Virginia Beach. Condemned June 28, 1971. Rescinded December 15, 1971.
66. Lower James & Nansemond Rivers & Tributaries-Hampton Roads-Chesapeake Bay-Lynnhaven Complex. Condemned October 6, 1971. Rescinded February 8, 1972.
67. James River - Opposite Tribell Shoal Channel. James City County. Condemned January 17, 1972.
68. Upper Rappahannock River. Essex and Richmond Counties. Condemned March 6, 1972.
69. Upper James River. James City and Surry Counties. Condemned March 6, 1972.

70. Farnham Creek. Richmond County. Condemned March 6, 1972.
71. Totuskey and Richardson Creeks. Richmond County. Condemned March 6, 1972.
72. York River: Fox Creek. Gloucester County. Condemned March 7, 1972.
73. York River: Ware Creek. James City and New Kent Counties. Condemned March 7, 1972. Condemned March 16, 1977.
74. Rudee Inlet. City of Virginia Beach. Condemned March 9, 1972.
75. Lynnhaven Bay: Brock Cove. City of Virginia Beach. Condemned March 7, 1972. Cancelled February 20, 1974. (Area contained in #25).
76. Upper Piankatank River. Gloucester and Middlesex Counties. Condemned March 7, 1972.
77. Nansemond River: Knotts Creek. Nansemond County. Condemned March 9, 1972.
78. York River: Aberdeen Creek. Gloucester County. Condemned March 7, 1972.
79. York River: Carter Creek. York County. Condemned March 7, 1972.
80. Chuckatuck Creek. Isle of Wight and Nansemond Counties. Condemned March 9, 1972. Revised April 8, 1977. Revised ~~June 28, 1979.~~
81. Perrin River. Gloucester County. Condemned March 10, 1972.
82. Nomini and Currioman Bays. Westmoreland County. Condemned May 23, 1972. Revised November 14, 1972. Revised March 24, 1975. Revised March 18, 1977.
83. Lower Machodoc Creek. Westmoreland County. Condemned March 9, 1972. Revised May 23, 1972. Revised December 7, 1972. Revised January 26, 1973. Revised February 14, 1973. Revised February 16, 1977.
84. Jackson Creek. Middlesex County. Condemned March 9, 1972.
85. Davis Creek. Mathews County. Condemned March 10, 1972.
86. Tangier Island. Accomack County. Condemned May 1, 1972.
87. York River: Skimino Creek. James City and York Counties. Condemned March 22, 1972.
88. Rosier Creek. Westmoreland and King George Counties. Condemned May 23, 1972. Revised May 6, 1977.
89. Great Wicomico River. Northumberland County. Condemned March 22, 1972. Revised November 14, 1972. Revised March 26, 1973.

90. Rappahannock River: Parrotts Creek. Middlesex County. Condemned March 29, 1972. Rescinded February 14, 1973.
91. Middle Warwick River: City of Newport News. Condemned March 29, 1972 Revised July 5, 1976. Rescinded December 22, 1976.
92. East River. Mathews County. Condemned April 5, 1972. Revised March 16, 1977.
93. Severn River: Northwest Branch. Gloucester County. Condemned April 5, 1972. Rescinded January 19, 1973. Condemned July 12, 1974. Rescinded January 10, 1975.
94. Rappahannock River: Greenvale Creek. Lancaster County. Condemned April 11, 1972.
95. Broad Bay: Dey Cove & Mill Dam Creek. City of Virginia Beach. Condemned April 11, 1972. Cancelled March 24, 1975 (area now contained in #25).
96. Ware River. Gloucester County. Condemned April 11, 1972.
97. Swans Gut Creek. Accomack County. Condemned April 11, 1972.
98. Parker Creek. Accomack County. Condemned April 11, 1972.
99. Queens Creek - Milford Haven. Mathews County. Condemned April 11, 1972. Revised January 14, 1977. Revised May 31, 1979. Revised August 24, 1979.
100. Dyer Creek. Mathews County. Condemned April 13, 1972. Rescinded April 2, 1973.
101. Severn River, Southwest Branch: Heywood Creek. Gloucester County. Condemned April 13, 1972. Rescinded December 31, 1973.
102. Rappahannock River: Locklies Creek. Middlesex County. Condemned April 13, 1972. Rescinded January 9, 1974.
103. Rappahannock River: Mill Creek. Middlesex County. Condemned April 13, 1972. Rescinded January 9, 1974.
104. Rappahannock River: Sturgeon Creek. Middlesex County. Condemned April 21, 1972. Revised March 16, 1978.
105. Little Wicomico River. Northumberland County. Condemned April 21, 1972. Rescinded March 28, 1974.
106. Ware River: Wilson Creek. Gloucester County. Condemned April 21, 1972.
107. York River - North Shore: Carter Creek. Gloucester County. Condemned April 21, 1972. Revised December 31, 1973. Revised September 10, 1975.
108. York River: Cedarbush Creek. Gloucester County. Condemned April 21, 1972. Revised December 10, 1976. Revised November 9, 1978.

109. Rappahannock River: Bush Park Creek. Middlesex County. Condemned April 21, 1972.
110. Nassawadox Creek. Northampton County. Condemned April 21, 1972.
111. Little Wicomico River: Tabbs Creek. Northumberland County. Condemned April 21, 1972. Rescinded March 28, 1974.
112. Chesconessex Creek. Accomack County. Condemned April 21, 1972.
113. Little Wicomico River: Cod Creek. Northumberland County. Condemned April 27, 1972. Rescinded March 5, 1973.
114. Rappahannock River: Paynes Creek. Lancaster County. Condemned April 27, 1972.
115. York River: Jones Creek. Gloucester County. Condemned April 27, 1972.
116. Rappahannock River: Beach Creek. Lancaster County. Condemned April 27, 1972. Rescinded November 28, 1977.
117. Rappahannock River: Wyatt Creek. Lancaster County. Condemned April 27, 1972. Rescinded April 16, 1975.
118. Starling Creek. Accomack County. Condemned April 27, 1972.
119. Pungoteague Creek. Accomack County. Condemned April 27, 1972. Revised March 24, 1975. Revised November 28, 1977.
120. Rappahannock River: Lancaster Creek. Lancaster and Richmond Counties. Condemned April 28, 1972. Revised January 3, 1978.
121. Rappahannock River: Deep Creek. Lancaster County. Condemned April 28, 1972. Rescinded March 5, 1973.
122. Chesapeake Bay: Gaskin & Owens Ponds. Northumberland County. Condemned April 28, 1972. Rescinded January 19, 1973.
123. Mill Creek. Northumberland County. Condemned April 28, 1972. Rescinded May 20, 1974.
124. Chesapeake Bay: Cloverdale & Ball Creeks. Northumberland County. Condemned April 28, 1972. Revised February 14, 1973. Rescinded April 15, 1977.
125. Monday Creek. Gloucester County. Condemned April 28, 1972. Revised March 24, 1975.
126. Piankatank River: Wilton Creek. Middlesex County. Condemned April 28, 1972. Rescinded April 15, 1977.
127. Lagrange Creek. Middlesex County. Condemned April 28, 1972. Revised February 21, 1975. Revised December 9, 1977.

128. Poropotank Bay & Adams Creek. Gloucester and King and Queen Counties. Condemned April 28, 1972. Revised March 1, 1977. Revised November 9, 1978.
129. Piankatank River: Healy Creek. Middlesex County. Condemned April 28, 1972. Rescinded April 15, 1977.
130. York River: Indian Field Creek. York County. Condemned May 1, 1972. Rescinded March 24, 1975.
131. North River: Blackwater Creek. Mathews County. Condemned May 1, 1972. Rescinded April 2, 1973.
132. Western Branch Corrotoman River. Lancaster County. Condemned May 1, 1972. Revised December 16, 1977.
133. Tabbs Creek. Lancaster County. Condemned May 1, 1972.
134. York River: King & Felgates Creeks. York County. Condemned May 1, 1972. Revised March 24, 1975.
135. Assawoman, Hog, & Little Cat Creeks. Accomack County. Condemned May 1, 1972. Revised December 9, 1977.
136. Jacobus and Mattawoman Creeks. Northampton County. Condemned May 1, 1972. Revised May 6, 1977.
137. Poquoson River: Chisman & Patricks Creeks. York County. Condemned May 1, 1972. Revised February 21, 1975.
138. Hunting & Deep Creeks. Accomack County. Condemned May 1, 1972. Revised March 26, 1975.
139. Cherrystone Inlet: Eyreville & Kings Creeks. Northampton County. Condemned May 1, 1972. Revised April 8, 1977.
140. Potomac River: Presley Creek. Northumberland County. Condemned May 1, 1972. Rescinded March 26, 1973.
141. Potomac River: Cod Creek. Northumberland County. Condemned May 1, 1972. Rescinded November 14, 1972.
142. Potomac River: Hull Creek. Northumberland County. Condemned May 1, 1972. Rescinded March 2, 1973.
143. Potomac River: Gardner Creek. Westmoreland County. Condemned May 1, 1972. Rescinded January 15, 1973.
144. Potomac River: Jackson Creek. Westmoreland County. Condemned May 1, 1972. Rescinded January 15, 1973.
145. Coan River & The Glebe. Northumberland County. Condemned May 23, 1972. Revised November 16, 1972. Revised March 9, 1973. Revised March 26, 1973. Revised March 25, 1977. Revised December 16, 1977.

146. Potomac River: Popes Creek. Westmoreland County. Condemned May 23, 1972.
147. Virginia Potomac River Tributaries Upstream of Mathias Point. King George, Stafford, Prince William, and Fairfax Counties. Condemned July 28, 1972.
148. James River: Mulberry Point to James River Bridge. Condemned June 7, 1973. Revised August 6, 1973, name changed to James River: Adjacent Mulberry Island. Rescinded in entirety September 14, 1973.
149. James River: Adjacent Lake Maury. City of Newport News. Condemned March 20, 1974. Revised November 13, 1974. Revised November 8, 1976.
150. Chesapeake Bay, Hampton Roads, James & Nansemond Rivers & Tributaries. Condemned November 22, 1974. Rescinded December 3, 1974.
151. Back Creek-York County. York County. Condemned February 21, 1975.
152. Old Plantation Creek. Northampton County. Condemned March 26, 1975. Rescinded November 28, 1977.
153. Greenbackville Harbor. Accomack County. Condemned March 26, 1975.
154. James River, Hampton Roads & Tributaries. Condemned December 17, 1975. Rescinded May 21, 1976.
155. Kings Creek. Northampton County. Condemned June 9, 1976. Rescinded September 10, 1976.
156. James River: Brown Shoal Area. Conditionally approved November 8, 1976.
157. North River: Back Creek. Gloucester County. Condemned May 27, 1977. Revised March 28, 1978.
158. Back River: Long & Grunland Creeks. York County and Hampton City. Condemned December 9, 1977.

APPENDIX C
ANALYSIS OF COMMERCIAL LANDINGS
1970-1980

1.0 ANALYSIS OF COMMERCIAL LANDINGS

Several approaches have been taken to analyze the commercial fishery data for the period 1970 to 1980. The first approach examines the trend in landings by bay region. The second examines each bay system and the contribution of that system to the total bay landings for each species. The third examines the specie profile for each bay system.

Transformations were performed on the annual landing data to enable one to examine the time dependent variation in landings that were the result of (1) fishing effort, (2) year class strength, or (3) water quality.

The principal transformation was to convert each years catch for a segment to a percent of the total Chesapeake Bay Catch for that species. This approach eliminates the year class variability and the annual effort variability by indexing each segments' catch to the percent contribution to the total Bay Catch. The variability (or delta) from year to year could then be used as a measure of the shift in landings due to change in level of effort in the segment, change in water quality in the segment, or a combination of the two factors interacting.

Because of the number of figures and tables in this appendix, all figures and tables have been placed at the end of the section.

2.0 TRENDS IN LANDINGS FOR THE MOST VALUABLE COMMERCIAL SPECIES* (1970 - 1980)

In this section, we examine the trends in landing for three of Chesapeake Bay's important fisheries. For convenience, we have divided our discussion of each specie into three major regions of the bay. The upper bay is the area from the Chesapeake Bay Bridge north, the mid-bay region extends from the Potomac River to the Bay Bridge, and the lower bay is that area south of the Potomac River.

Oysters

As noted earlier, the oyster landing during the period 1970-1976 have been relatively constant. With the exception of 1977, landings have ranged from 2.1 million pounds per year to 2.5 million pounds per year. In the upper bay, the trend has been generally downward with time (Figure 1). The decline has been most pronounced for the main stem of the upper bay and the upper eastern shore. The western tributaries which exhibit serious eutrophication and metal contamination have shown a lower rate of decline.

Figure 2 shows the landings trend for the mid-bay region, the main stem, and the Potomac and Patuxent declines, although not at the rate of the upper bay region. The mid eastern shore, however shows an increase from 1970 to 1976, then declines until 1979 when the landings begin to increase again. The improved water quality observed in the Potomac during the 1970's does not appear to be matched by increased landings of oysters.

The lower bay (Figures 3 and 4) generally shows an increase in oyster landings with time. The most dramatic increases in landings are shown by the York River (Figure 4) and the lower eastern shore. These areas appear to be compensating for lower landings in the mid and upper bay regions.

Crabs

The landings of crabs during the period has fluctuated with time. Bay-wide landings have been a slight decline in landing over time. Within the bay regions, the patterns for individual systems have been dramatically different.

*Account for the largest fraction of the income

In the upper bay (Figure 5) the main stem has shown an increase in landings with time while the western tributaries showed a decline from 1970 to 1971 similar to the main stem. From 1971 to 1972 the landings rose and then began a decline which continued until 1979 when the landings rose dramatically from 1300 pounds to 91,000 pounds. The upper eastern shore showed a slight decline with time. The decline in the 1972 to 1974 period was most likely the result of hurricane Agnes. Other changes do not show any immediate relationship to the decline in water quality which has been noted by other investigators.

Most systems of the mid-bay region showed declines during the period (Figure 6). The Potomac River system is the lone area to show an increase in landings. This increase for the Potomac may be the result of improving water quality trends during the period. The mid-bay main stem and Patuxent show similar trends

Crab landings in the lower bay tributaries (Figure 1) showed a general increase with the exception of the York and James Rivers. The large drop in the York during the 1972 to 1974 period may be the result of hurricane Agnes. The decline in the James is most likely due to the effect of Agnes and the discovery of kepone which closed much of the river to harvest. The main stem of the lower bay and the lower eastern shore (Figure 8) showed a slight decline in landings with time, with the lower eastern shore showing an unexplained dip in 1978.

Striped Bass

~~Following an increase in landings from 1970 to 1973, bay-wide landings of striped bass drastically declined until 1979.~~

In the upper bay, poor harvests occurred in most areas in 1973. The landings then declined until 1979 when a reversal in the trend is observed (Figure 9). From 1979 to 1980 the increase in the main stem and upper eastern shore begin to approach landings observed in the early 1970's. Whether the trend observed is due to water quality or other factors is hard to say at this time.

The mid-bay shows a similar trend for the period (Figure 10) with peak harvest in 1973 and lows in 1978 and 1979, followed by an apparent recovery. The pattern may be related to availability of alewife and menhaden.

The western tributaries show a pattern of peak harvest occurring earlier in the 70's as one moves south (Figure 11). The James has declined since 1970 (possibly the result of kepone), the York peaked in 1972, the Wicomico in 1973 and the Rappahanock in 1974.

The decline to zero observed in the James is due to kepone contamination. The decline in the York maybe the result of closure due to transport of the kepone into the York, or due to the perception that striped bass might not be safe to consume.

The lower Bay main stem, and the eastern shore reflect patterns observed for the tributaries with the main stem behaving like the York (Figure 12). The pattern may reflect the influence of kepone contamination more than anything else.

It is interesting to note that the Bay wide decline seems to have begun after hurricane Agnes. The decline continues until 1974 (Figure 13), and then the landings increase in the upper and mid-bay regions. While it is hard to relate the changes in landings to hurricane Agnes, it appears likely that the events of the hurricane such as increased river flows, scouring, and shifting of toxic substances into the rivers may have contributed to the striped bass decline.

Bluefish

The landings for bluefish have increased rapidly during the early 1970s reaching a peak level in 1976. A slight decline followed until 1978 and then the landings increased again.

In the upper bay there has been an increase in landings over the decade in all but the western tributaries (Figure 13). In the western tributaries, the landings jumped in 1972 when the landing reached 270,000 pounds, and then declined until 1979 when only 550 pounds were reported. Landings of bluefish from the upper eastern shore have generally followed the same pattern as the upper bay main stem. From 1975 to 1980, the tributaries appear to respond inversely to the trends observed in the upper-bay main stem.

Bluefish landings in the mid-bay region show a varied pattern over time which differs greatly between systems (Figure 14). Sharp declines in landings occurred in the mid-bay main stem and Patuxent in 1972 (possibly the result of

hurricane Agnes) and in the mid-bay main stem and middle eastern shore in 1975. In general, a slight increase in landings occurred over the eleven year period.

In the western tributaries of the lower bay (Figure 15), an increase in landings over the period occurred in all but the James River. The decline to zero which occurred between 1975 and 1976 in the James River is the result of closure of the river to fishery when kepone was discovered in the river in 1975. Whether the earlier declines in landings were related to kepone levels is difficult to determine from the data evaluated.

Over the eleven year period, the landings in the lower bay main stem and the lower eastern shore increased (Figure 16).

Alewife Herring

~~Landings for Alewife Herring in the lower bay main stem and the lower eastern shore show a general increase over the period. The pattern for certain tributaries shows wild fluctuations from year to year.~~

In the upper bay main stem and upper eastern shore, declines in landings were noted for 1972. A decline in the western tributaries occurred a year later in 1973 (Figure 17). It is interesting to note that if the western tributary landing data is lagged by one year, the pattern of landings is similar to that for the upper eastern shore.

Landings for the mid-bay region show a general decline for all but the Potomac system (Figure 18). The Potomac landings exhibit a general increase for successive years with the exception of 1973, 1977, and 1979. The net increase in the Potomac system may be a result of pollution control activities on the Potomac River during the 1970s. The erratic patterns for mid-bay main stem in 1974 - 1975 and in 1977 are difficult to explain.

The western tributaries of the lower bay (Figure 19) show a downward trend over the period. The James River landings are erratic, but can be explained by the closures of fisheries in areas of the river. The steep decline between 1979 and 1980 for both the York and the James River raises questions about the causes of this rapid decline.

The lower bay main stem and the lower eastern shore follow trends observed in the upper and mid-bay regions (Figure 20): The abrupt decline observed in

the data for the lower bay main stem is matched by an abrupt increase in the mid-bay main stem for the same year.

Menhaden

The landings over the eleven year period have fluctuated between 290 million pounds per year until 1979 when an increase in landings occurred. and 1980.

In the upper bay the landings have been nearly constant since 1973 (Figure 21) with increases in the eastern shore landings occurring during the same period. The western tributaries experienced an increase in 1971; fluctuations from 1971 to 1974 and then a decline until 1979 when an increase in landings occurred.

In the Mid-bay region (Figure 22), landings in the Mid-bay main stem and Potomac River averaged about a million pounds per year. A slight growth is seen in the Potomac with a slight decline in the main stem. The middle eastern shore shows considerable variation over the same period.

In the western tributaries of the lower bay, the Rappahannock and the Wicomico show a general increase in landings over the period (Figure 23). At the same time the James and York Rivers show a decline with the James having no reported landings after 1973.

The lower eastern shore has also shown an increase in landings over the period with the lower bay main stem yielding around 400 million pounds per year until 1979 (Figure 24). During this period, the landings ranged from 290 million in 1972 to 499 million in 1973 (Table 10).

3.0 Relative Commercial Importance of Individual Species

3.1 BAY WIDE SUMMARY OF COMMERCIALY IMPORTANT SPECIES

Tables 1 through 28 contain data generated from files of the Chesapeake Bay Program.

Table 1 provides a summary of the bay wide landings. Price and Value for 15 of the most important commercially harvested species. As may be

determined from Table 1, the most important species in terms of pounds landed are: (1) Menhaden, (2) Blue Crabs, (3) Oyster, and (4) Alewife. In terms of commercial value, the most important species are: (1) Oysters, (2) Menhaden, (3) Blue Crabs, and (4) Soft Shell Clams.

3.2 SUMMARY OF IMPORTANCE OF EACH BAY SYSTEM TO EACH COMMERCIALY IMPORTANT SPECIES

Tables 2 through 16 provide an analysis of each species, identifying the importance of each bay system to that fishery. The significant findings for each species is summarized below:

- Oysters harvest has remained nearly constant for much of the Bay. A decline in harvest has been noted for the upper bay, while the middle and lower eastern shore areas have shown increases in landing (See Table 2).
- Soft Shell Clam Large fluctuations are observed in data for specific segments which indicates the instability in the yield of soft shelled clams. A shift in landings from the mid bay region to the middle eastern shore can be noted in Table 3. However this may be the result of a shift in water codes which occurred in 1976 resulting in landings from the same area being reported in different systems after 1976 as compared to the pre 1976 period.
- Hard Shell Clams The hard shell clam industry, like that of other shellfish shows shifts in importance of individual systems over time (Table 4). No trends are observable in the data.
- Blue Crab Although the actual landings have varied considerably from year to year (Table 5), no trend is apparent which would suggest that certain systems are becoming more important to commercial fishing over time. The most important systems in terms of crab landing are: lower bay (39% - 56%); mid bay (16.4% - 26.8%) and Wicomico (2.2% - 15%).

- Alewife Herring During the period 1970 - 1980 the landings of alewife herring have declined in the lower and mid-bay main stems as well as the York (Table 6). Increases are noted for the Potomac and Rappahanock. The most important areas in terms of commercial landings are the Wicomico (24.6% - 57%), the lower bay (2% - 49.8%).
- Bluefish A slight decline in bluefish landings has occurred in the mid-bay system while a slight increase is noted in the upper bay (Table 7). The systems contributing the largest portion of the catch are the: lower bay main stem (38.8% to 70.6%), Wicomico (10.6% to 27%) and York (3.2% to 20%).
- Catfish For different years, considerable variability is evident for contribution of each systems to total landings (Table 8). The majority of the commercial catfish landings come from the: James (28.8% to 76%); Rappahannock (3.8% to 23%) and upper eastern shore (2.8% to 15%).
- Croaker The principal commercial landings for croaker occur in the: lower bay (41.8% to 85.4%) and York systems (14.8% to 45.4%).
- Menhaden The majority of the menhaden harvest occurs in the lower bay (approximately 92%) with sizeable contribution from the Great Wicomico, Rappahannock and Potomac (See Table 10).
- Sea Trout Commercial harvest of sea trout occurs mainly in the lower bay main stem (44% to 80.4% of landings) with the York system and Great Wicomico system following closely (See Table 11).
- Shad Although substantial declines in the shad harvest are observed (Table 12), the contribution of individual segments is relatively stable. The major harvest of shad has occurred in the: York (5.2% to 62.2%); the James (29.4% to 44.4%) and the lower bay (6.6% to 31.6%).
- Spot Commercial harvest of spot come primarily from the lower bay (43.8% to 83.6%) and the York System (5.4% to 34.6%). See Table 13.
- Striped Bass Striped Bass landing occur mainly in the upper bay water (Table 14). The main contribution to the commercial landings are the: upper bay main stem (19.2% to 50.2%), the Great Wicomico (14.2% to 31.4%) and the Potomac River (5% to 21.8%).
- White Perch White Perch commercial landing occur primarily in the upper bay main stem (9.6% to 27.2%); upper eastern shore (14.6% to 21.4%) and middle eastern shore (9.4% to 22.8%). See Table 15 for the contribution from other systems.

- Yellow Perch Commercial harvest of Yellow perch comes primarily from the Potomac River (see Table 16).

3.3 PROFILE OF MAJOR BAY SYSTEM COMMERCIAL FISHERIES

Tables 17 to 28 provide a profile of the contribution of each specie to the total landing in a given Bay System..

Upper Bay landings are dominated by oyster, crabs, striped bass, and white perch, and menhaden (Tables 17 - 19). The mid bay is dominated by crabs and oysters with menhaden important in the Potomac (Table 20 - 22). The lower bay is dominated by menhaden, crabs and oysters (Tables 23 - 28).

1970-1980 UPPER BAY OYSTER LANDINGS (IN THOUSANDS OF POUNDS)

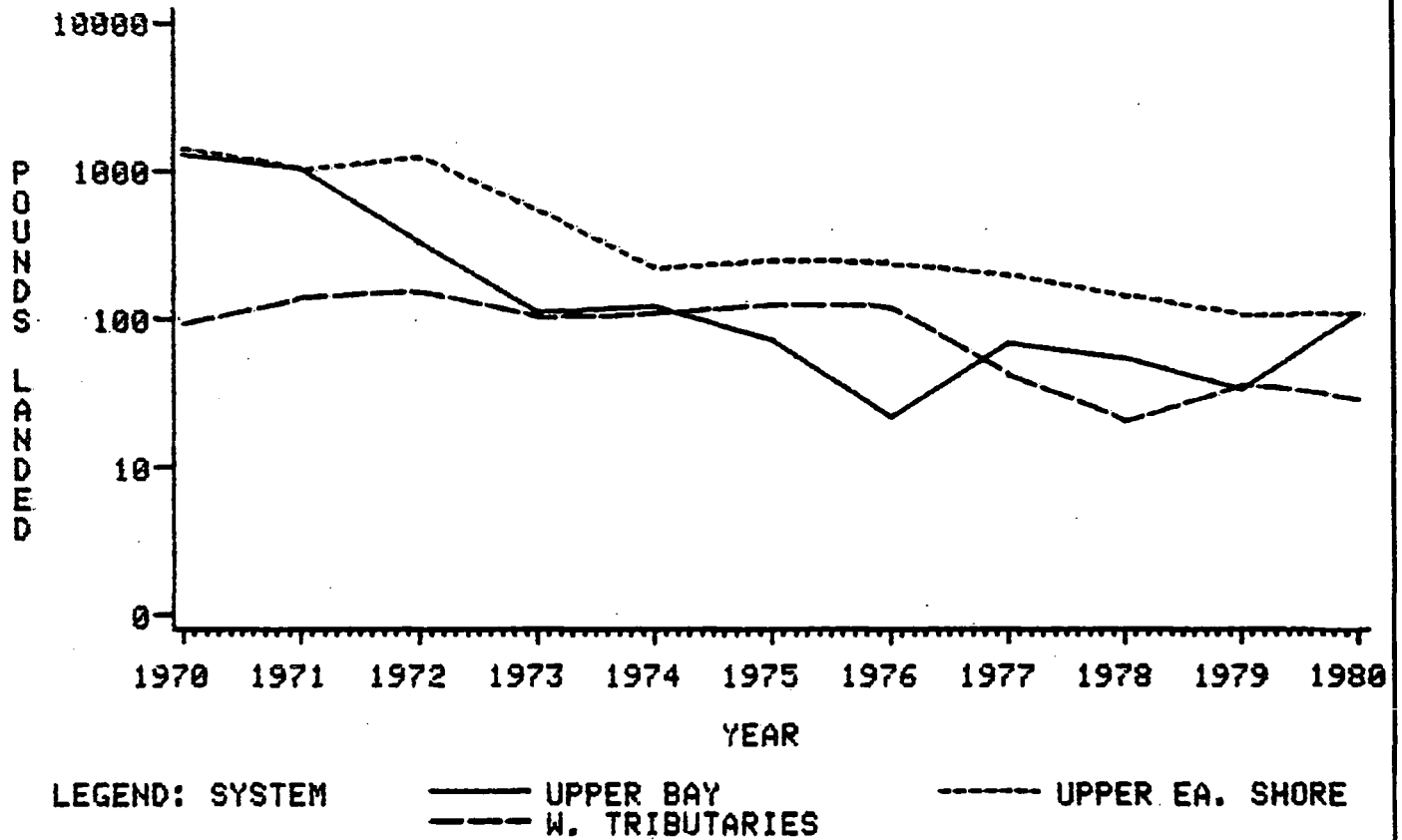


Figure 1: Upper Bay Oyster Landings

1970-1980 MID BAY OYSTER LANDINGS (IN THOUSANDS OF POUNDS)

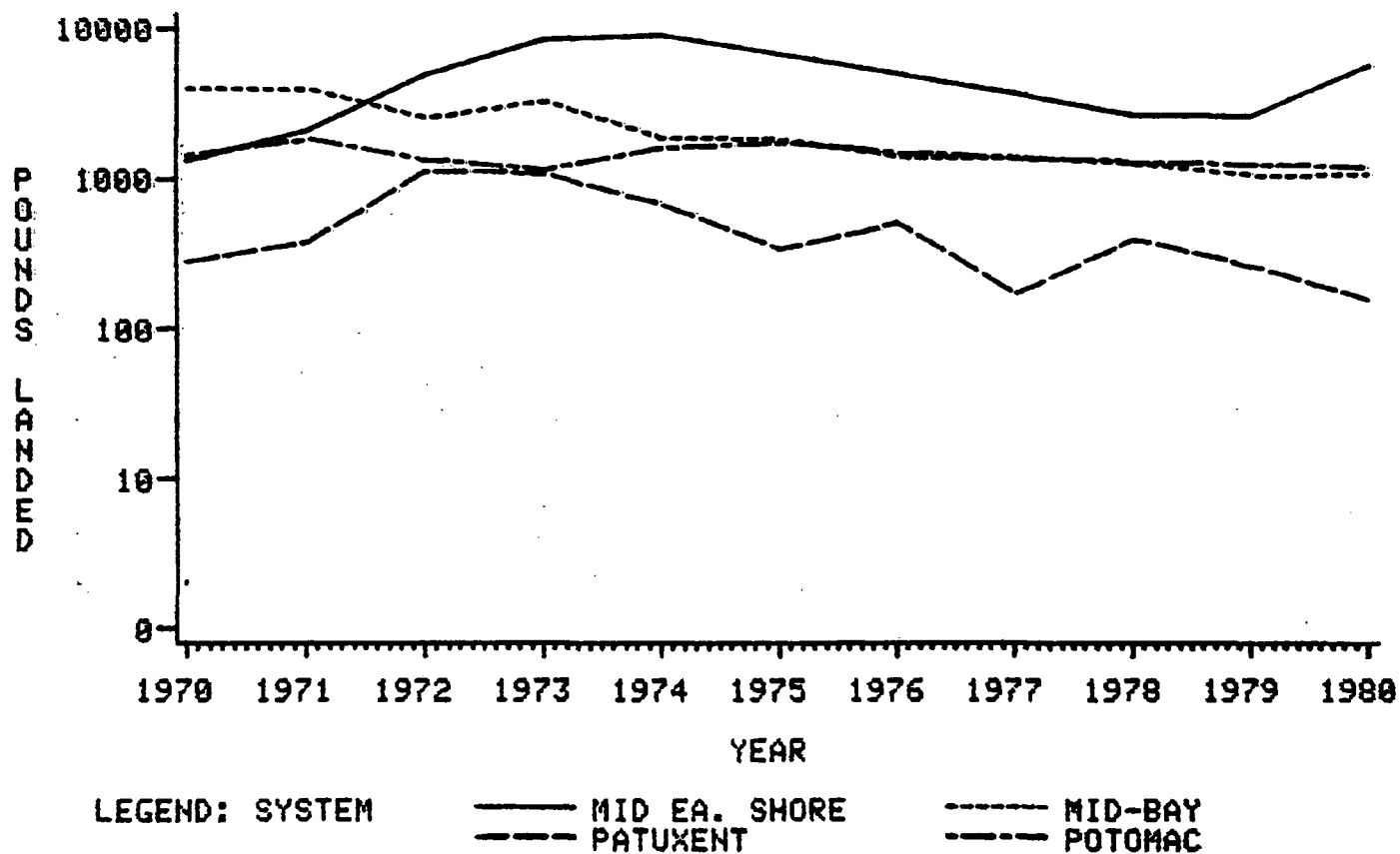


Figure 2: Mid Bay Oyster Landings

1970-1980 LOWER BAY (WESTERN TRIBUTARIES) OYSTER LANDINGS
(IN THOUSANDS OF POUNDS)

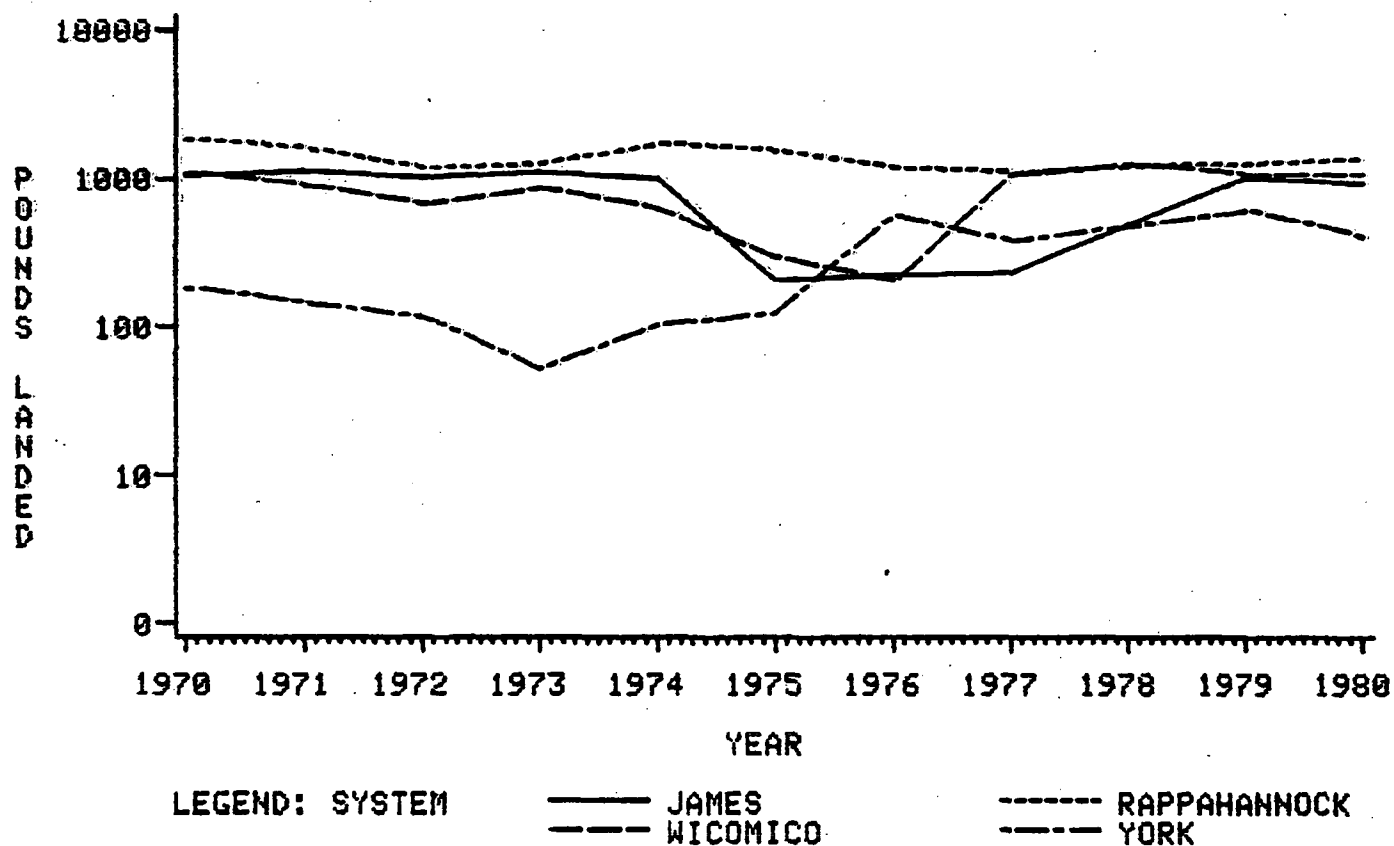


Figure 3: Lower Bay (Western Tributaries) Oyster Landings

1970-1980 LOWER BAY OYSTER LANDINGS (IN THOUSANDS OF POUNDS)

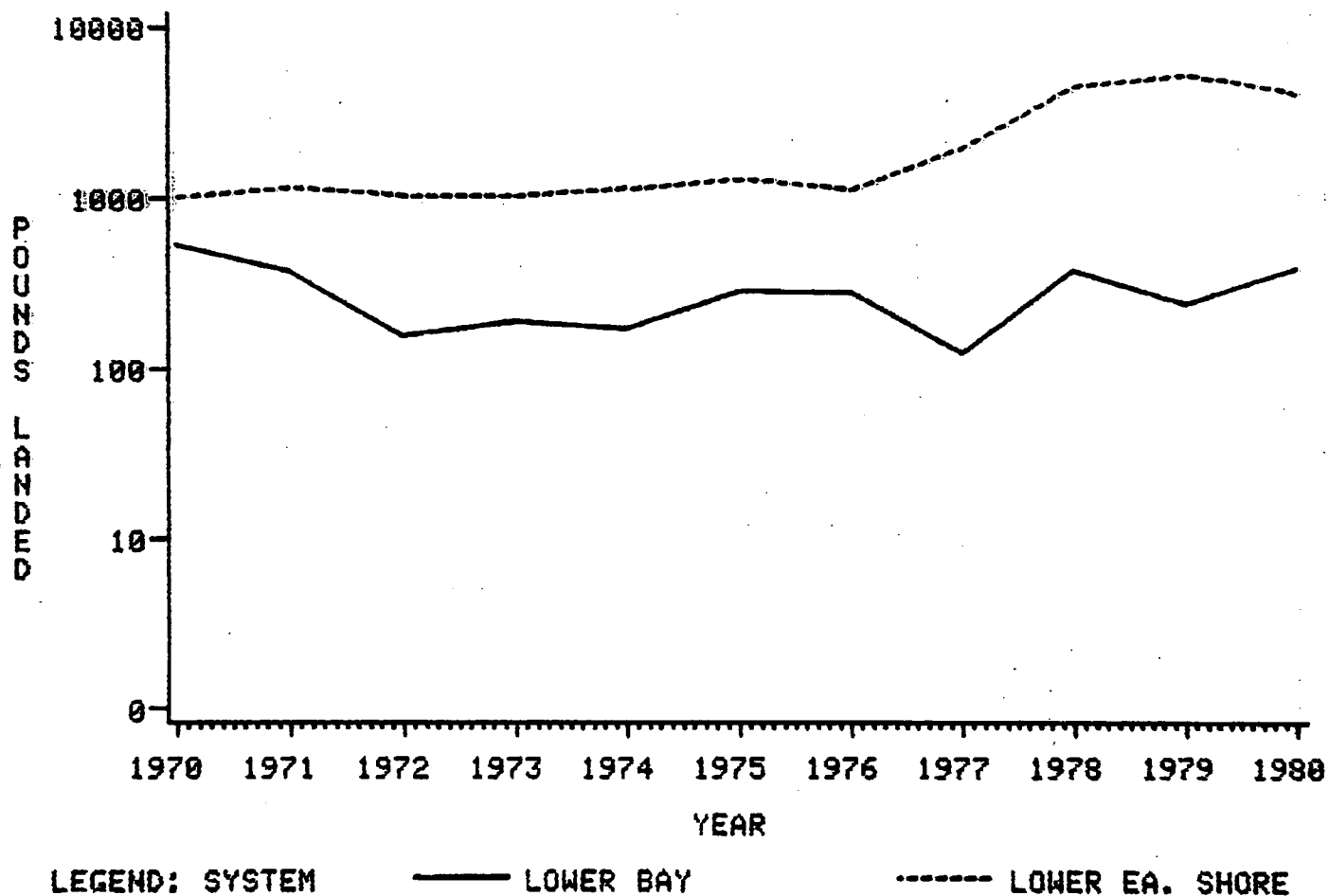


Figure 4: Lower Bay Oyster Landings

1970-1980 UPPER BAY CRAB LANDINGS (IN THOUSANDS OF POUNDS)

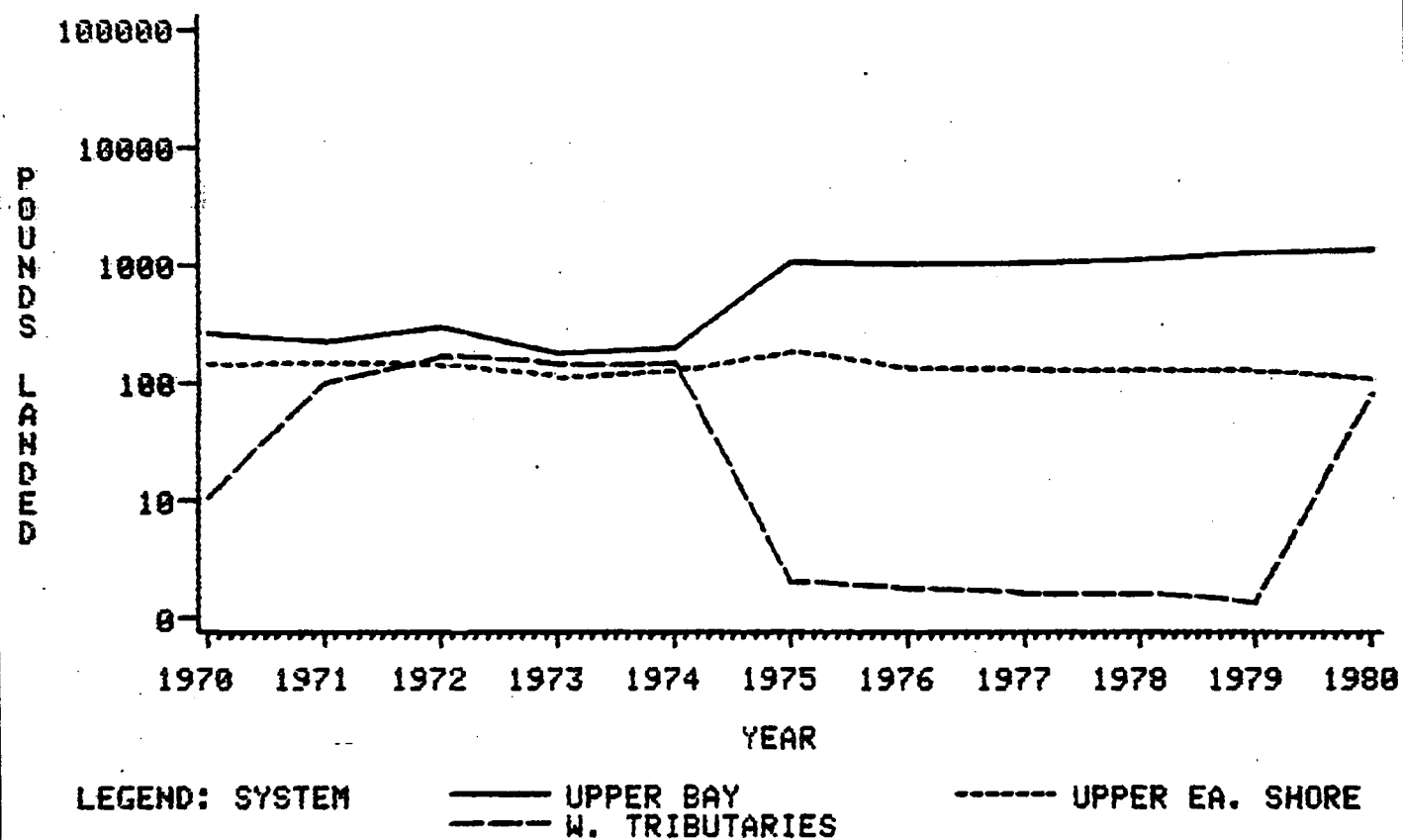


Figure 5: Upper Bay Crab Landings

1970-1980 MID BAY CRAB LANDINGS (IN THOUSANDS OF POUNDS)

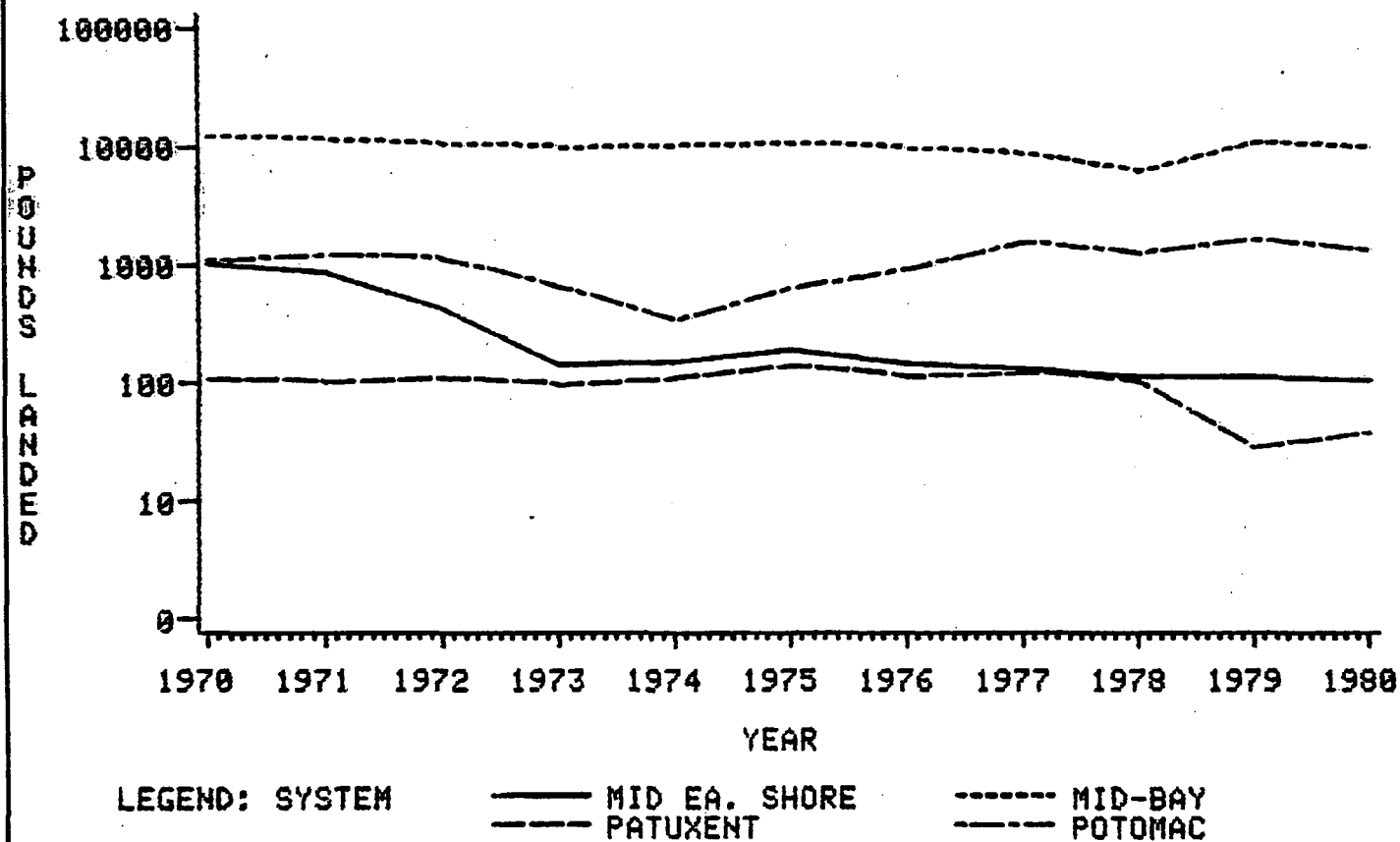


Figure 6: Mid Bay Crab Landings

1970-1980 LOWER BAY (W. TRIBUTARIES) CRAB LANDINGS (IN THOUSANDS OF POUNDS)

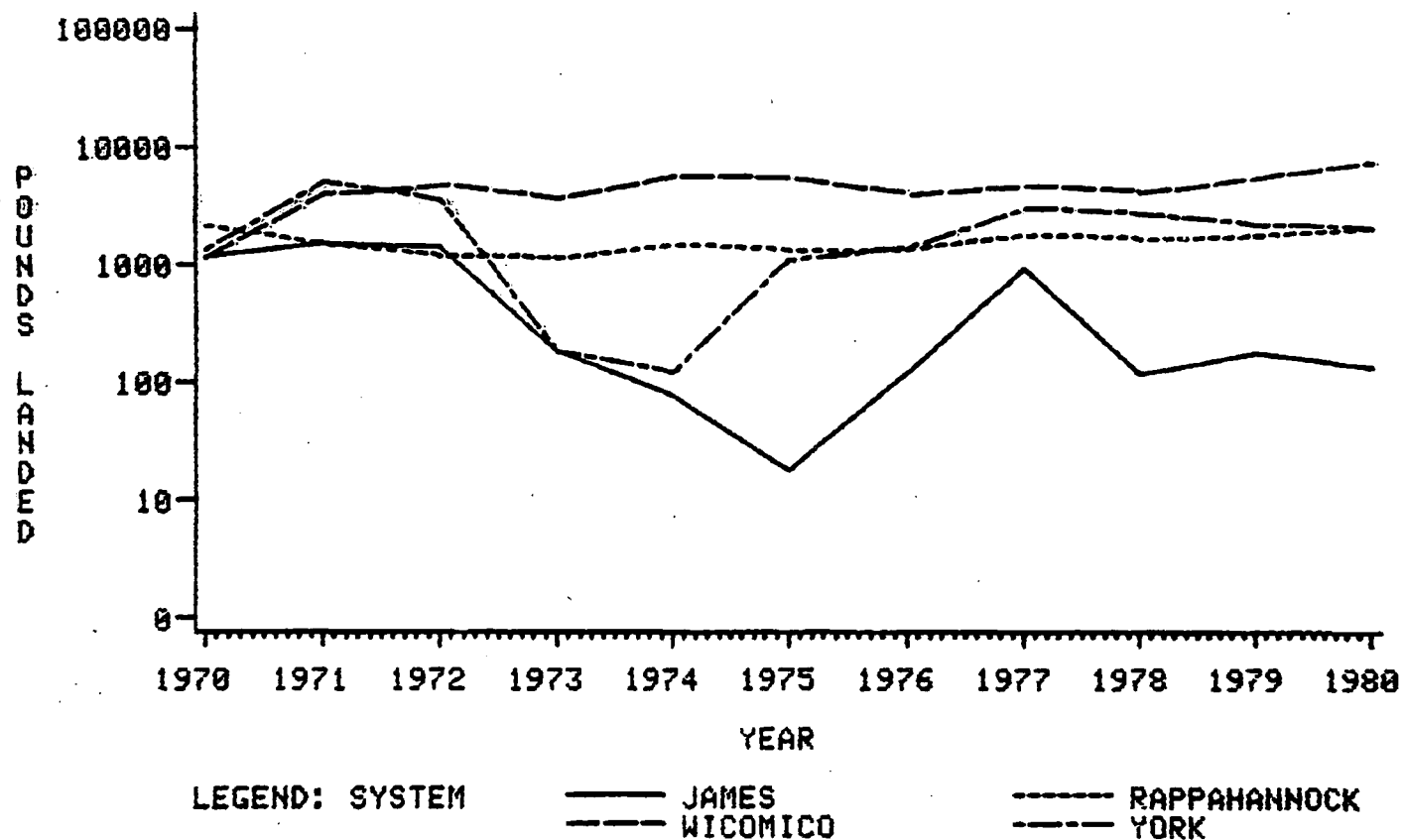


Figure 7: Lower Bay (Western Tributaries) Crab Landings

1970-1980 LOWER BAY CRAB LANDINGS (IN THOUSANDS OF POUNDS)

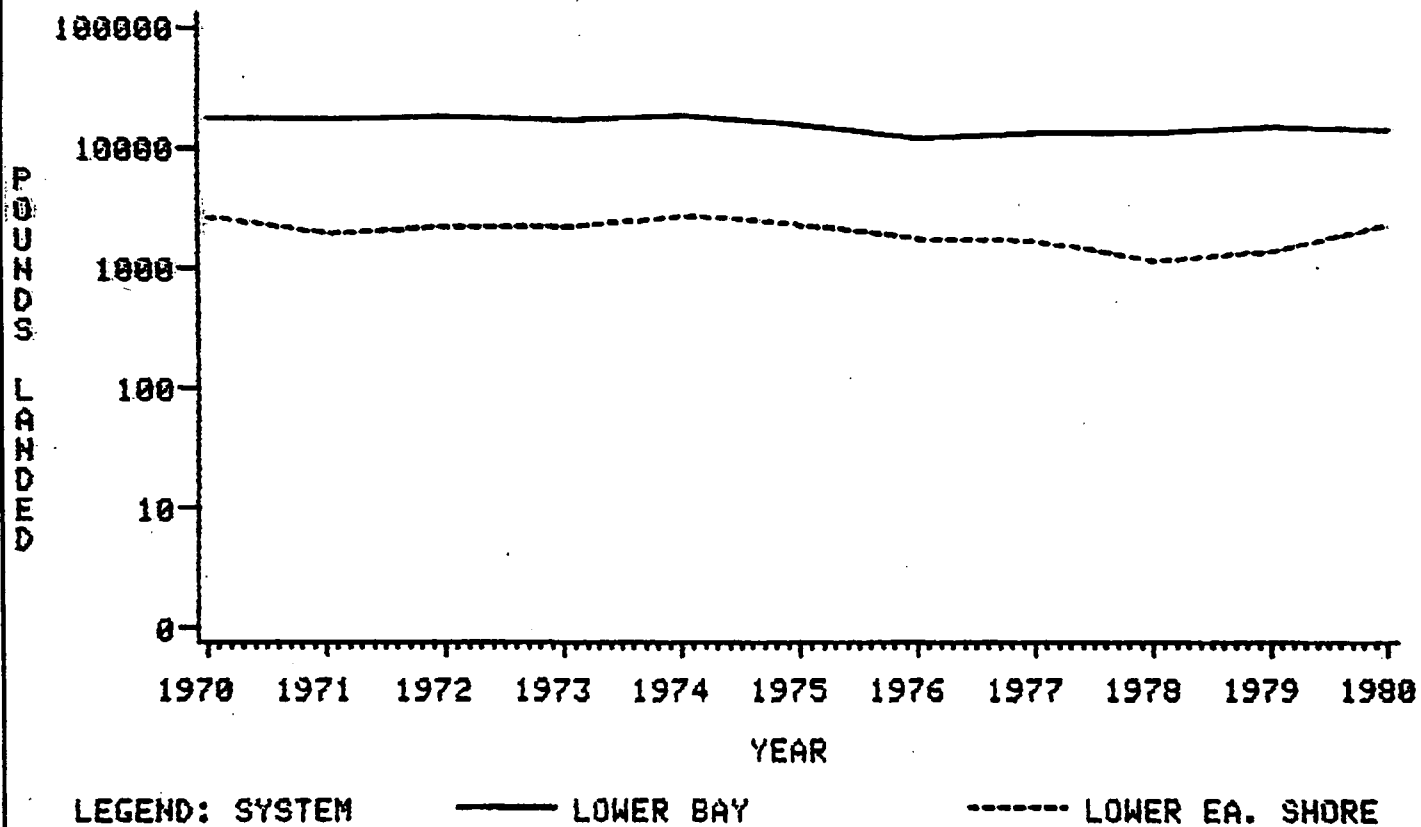


Figure 8: Lower Bay Crab Landings

1970-1980 UPPER BAY STRIPED BASS LANDINGS (IN THOUSANDS OF POUNDS)

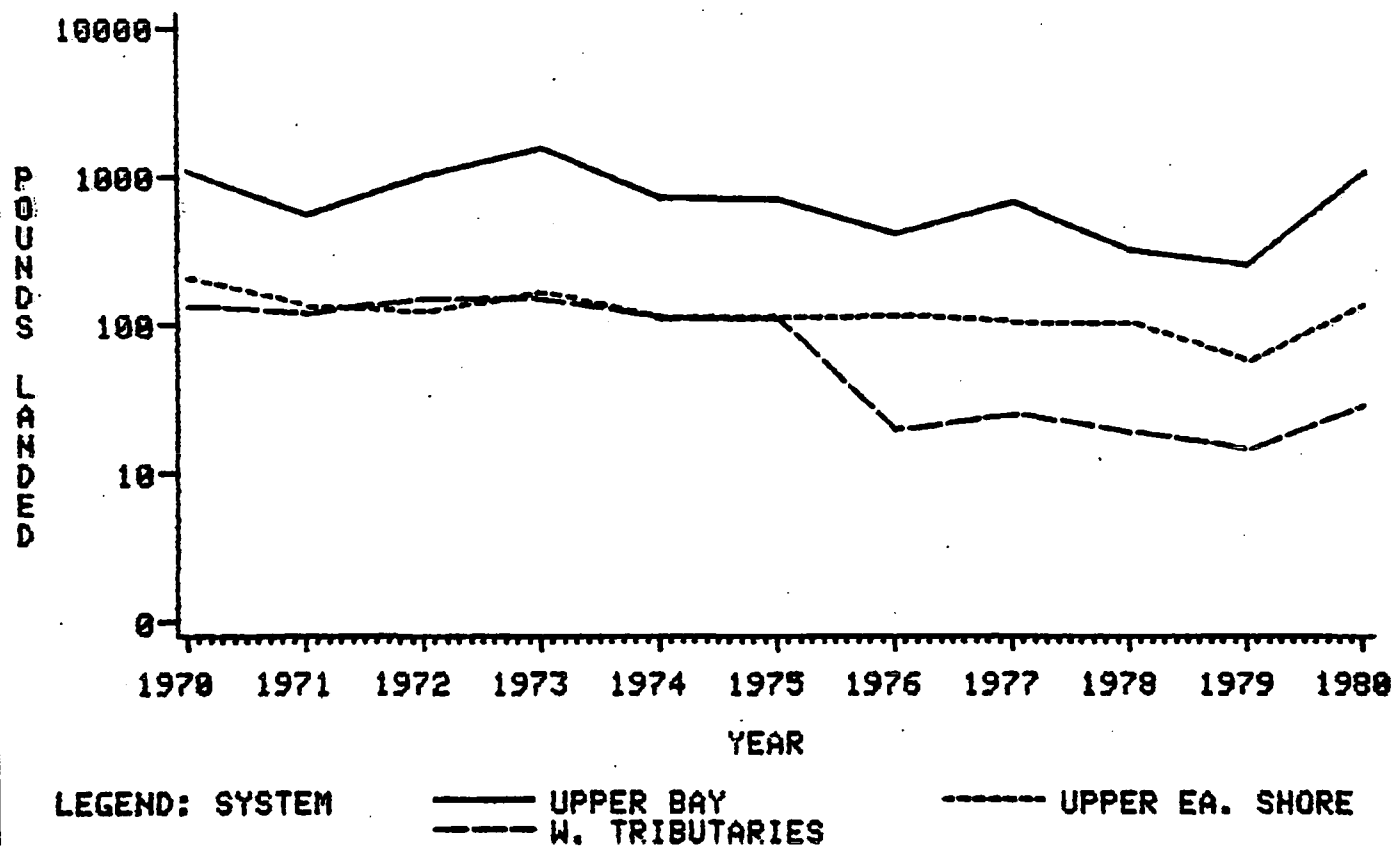


Figure 9: Upper Bay Striped Bass Landings

1970-1980 MID BAY STRIPED BASS LANDINGS (IN THOUSANDS OF POUNDS)

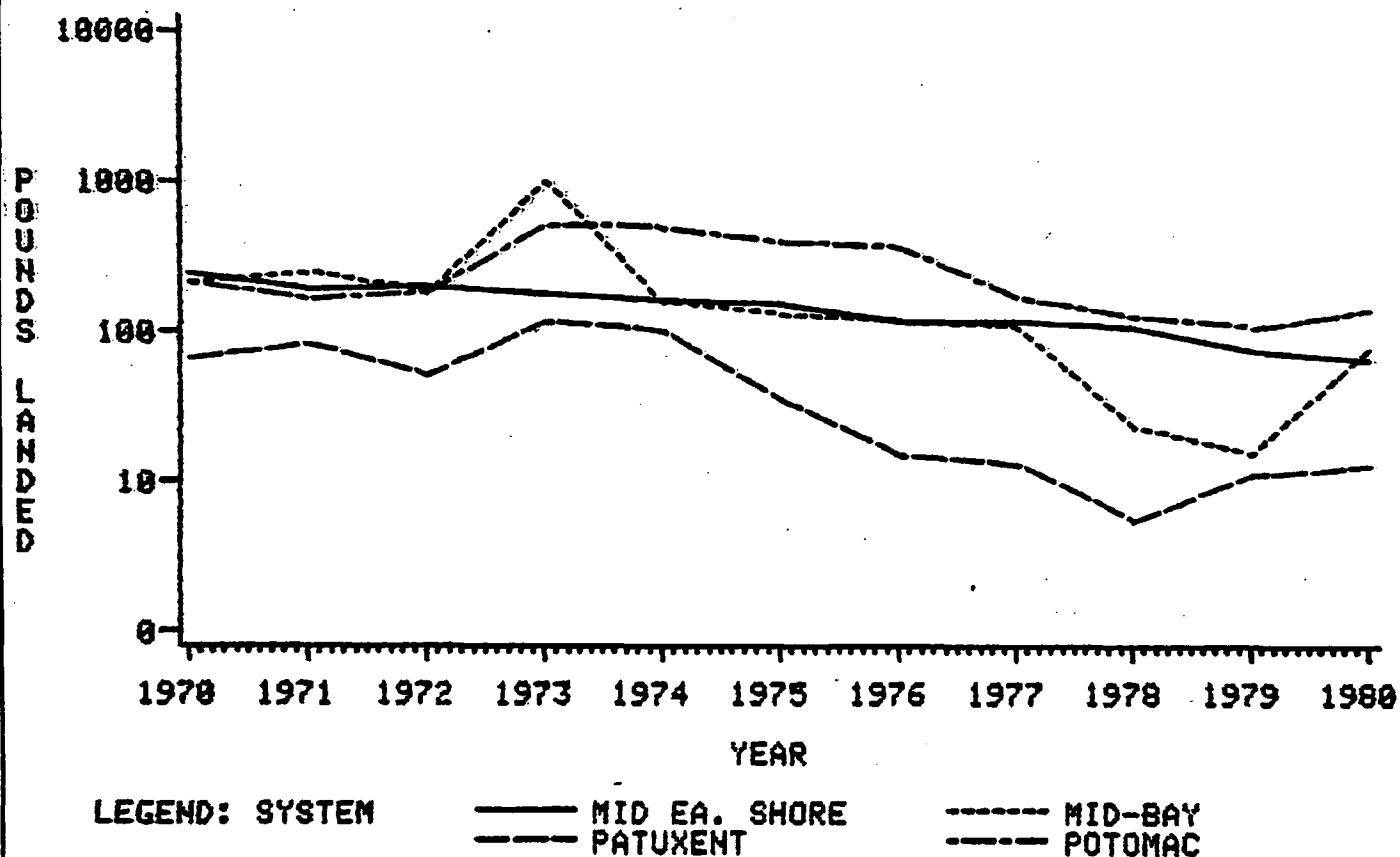


Figure 10: Mid Bay Striped Bass Landings

1970-1980 LOWER BAY (W. TRIBUTARIES) STRIPED BASS LANDINGS (IN THOUSANDS OF POUNDS)

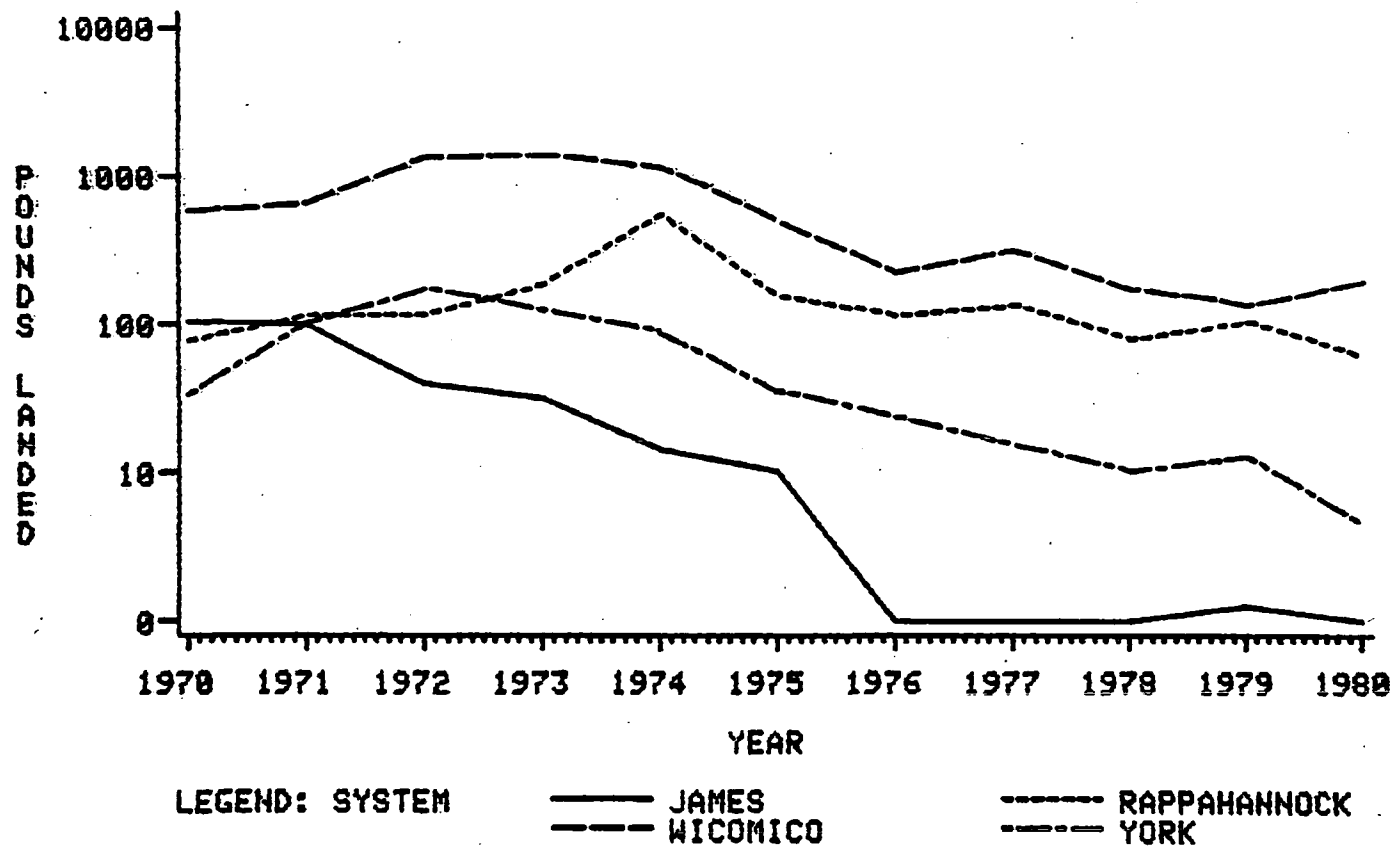


Figure 11: Lower Bay (Western Tributaries) Striped Bass Landings

1970-1980 LOWER BAY STRIPED BASS LANDINGS (IN THOUSANDS OF POUNDS)

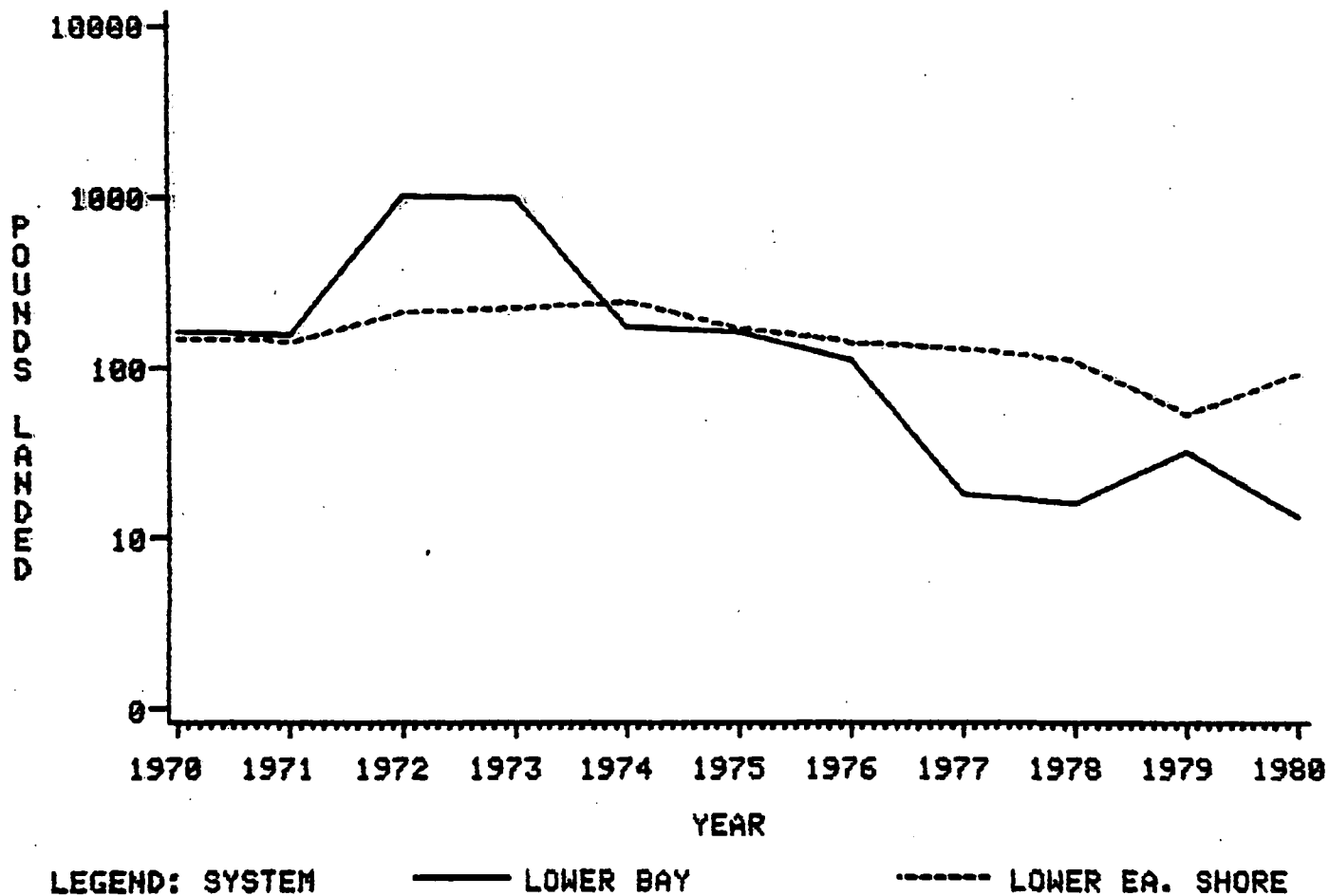


Figure 12: Lower Bay Striped Bass Landings

1970-1980 UPPER BAY BLUEFISH LANDINGS (IN THOUSANDS OF POUNDS)

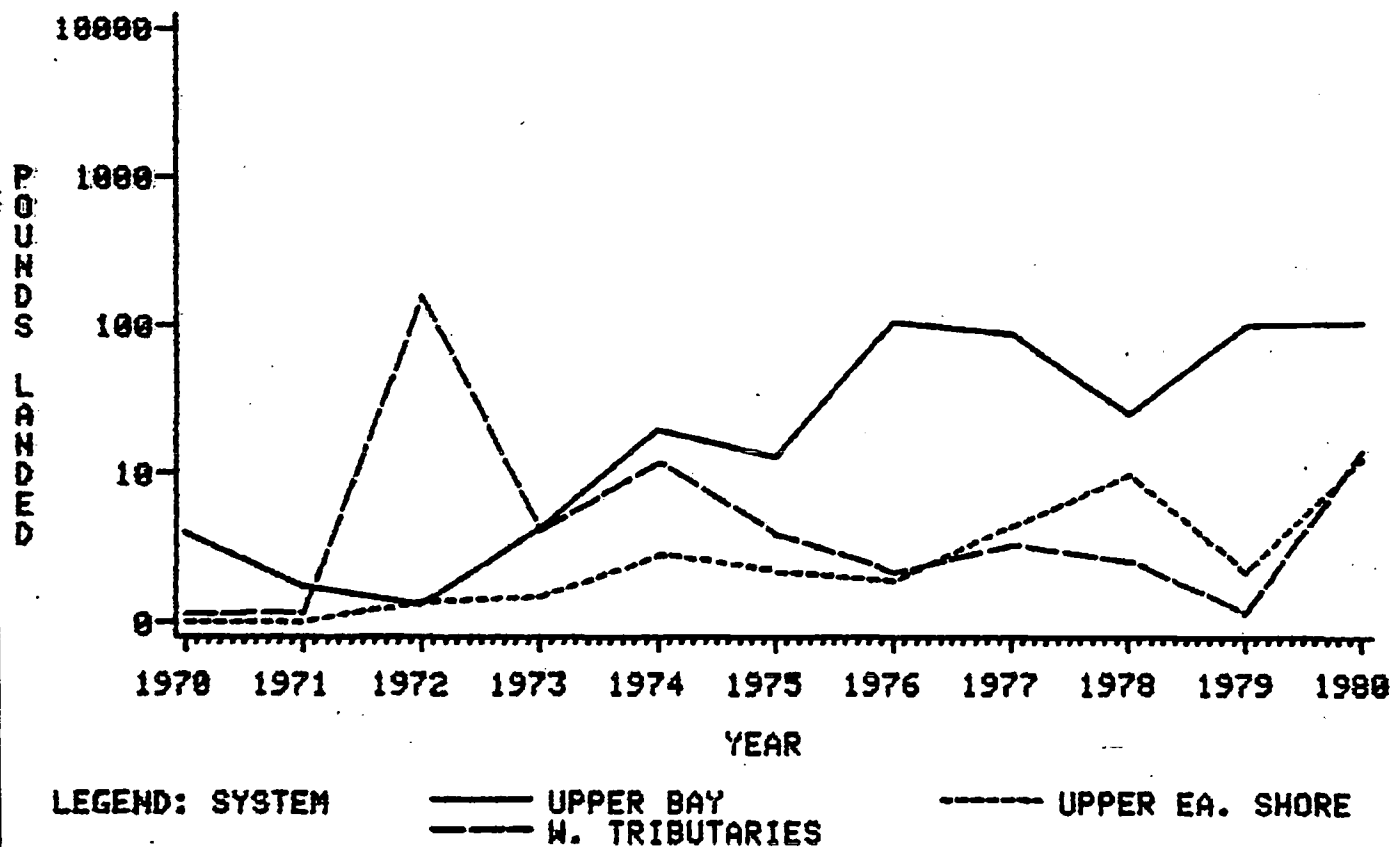


Figure 13: Upper Bay Bluefish Landings

1970-1980 MID BAY BLUEFISH LANDINGS (IN THOUSANDS OF POUNDS)

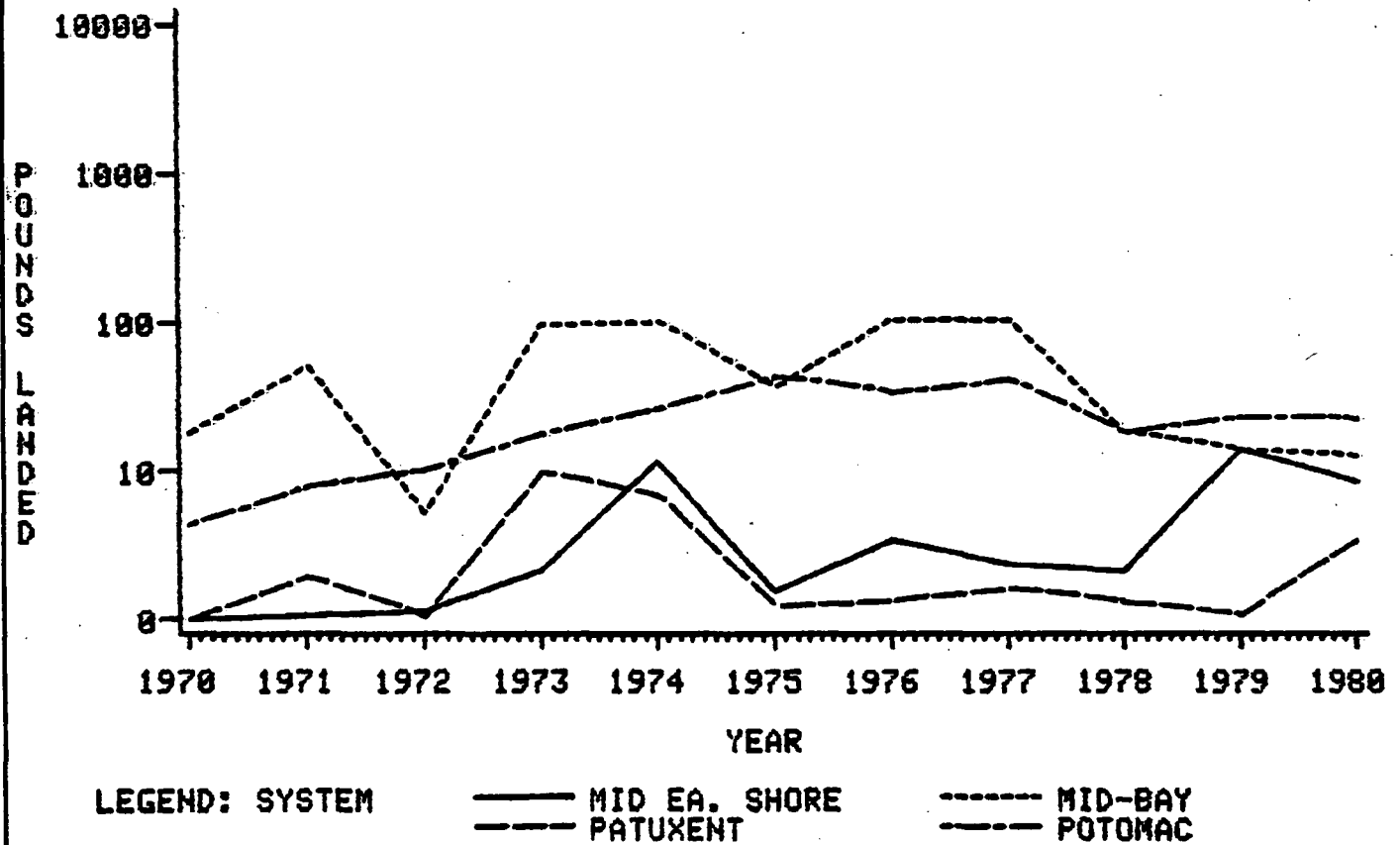


Figure 14: Mid Bay Bluefish Landings

1970-1980 LOWER BAY (W. TRIBUTARIES) BLUEFISH LANDINGS
(IN THOUSANDS OF POUNDS)

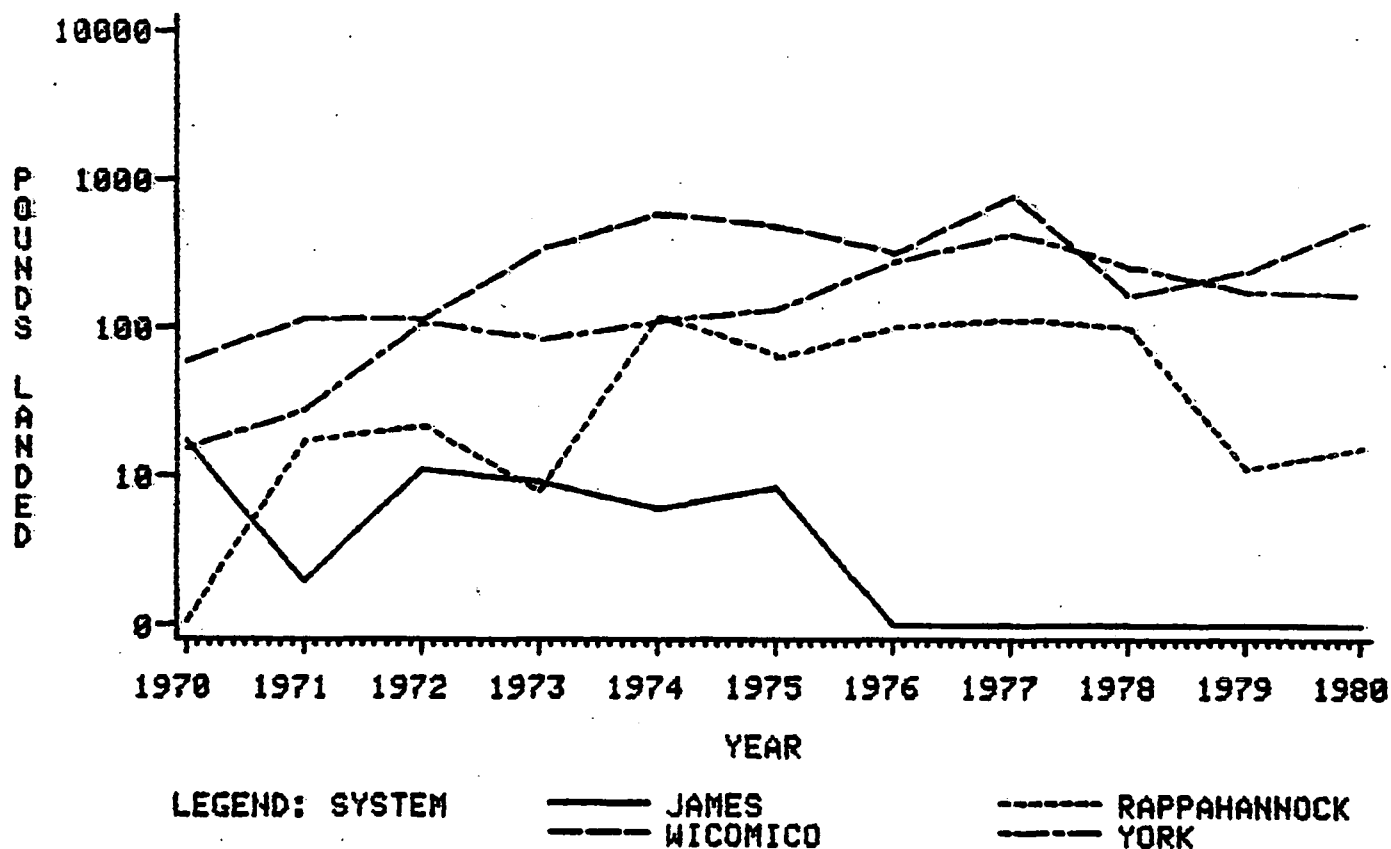
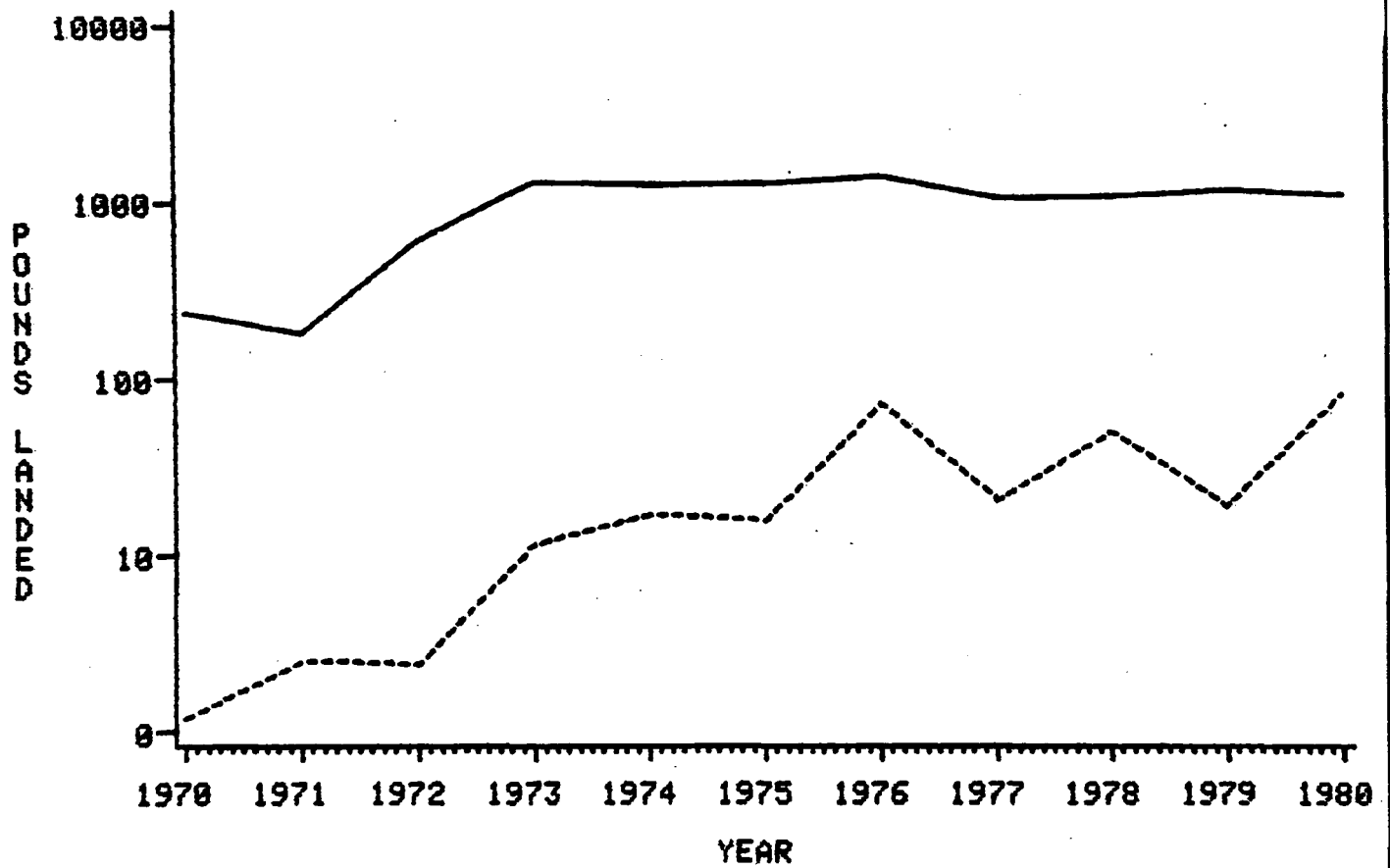


Figure 15: Lower Bay (Western Tributaries) Bluefish Landings

1970-1980 LOWER BAY BLUEFISH LANDINGS (IN THOUSANDS OF POUNDS)



LEGEND: SYSTEM ——— LOWER BAY - - - - - LOWER EA. SHORE

Figure 16: Lower Bay Bluefish Landings

1970-1980 UPPER BAY ALEWIFE HERRING LANDINGS (IN THOUSANDS OF POUNDS)

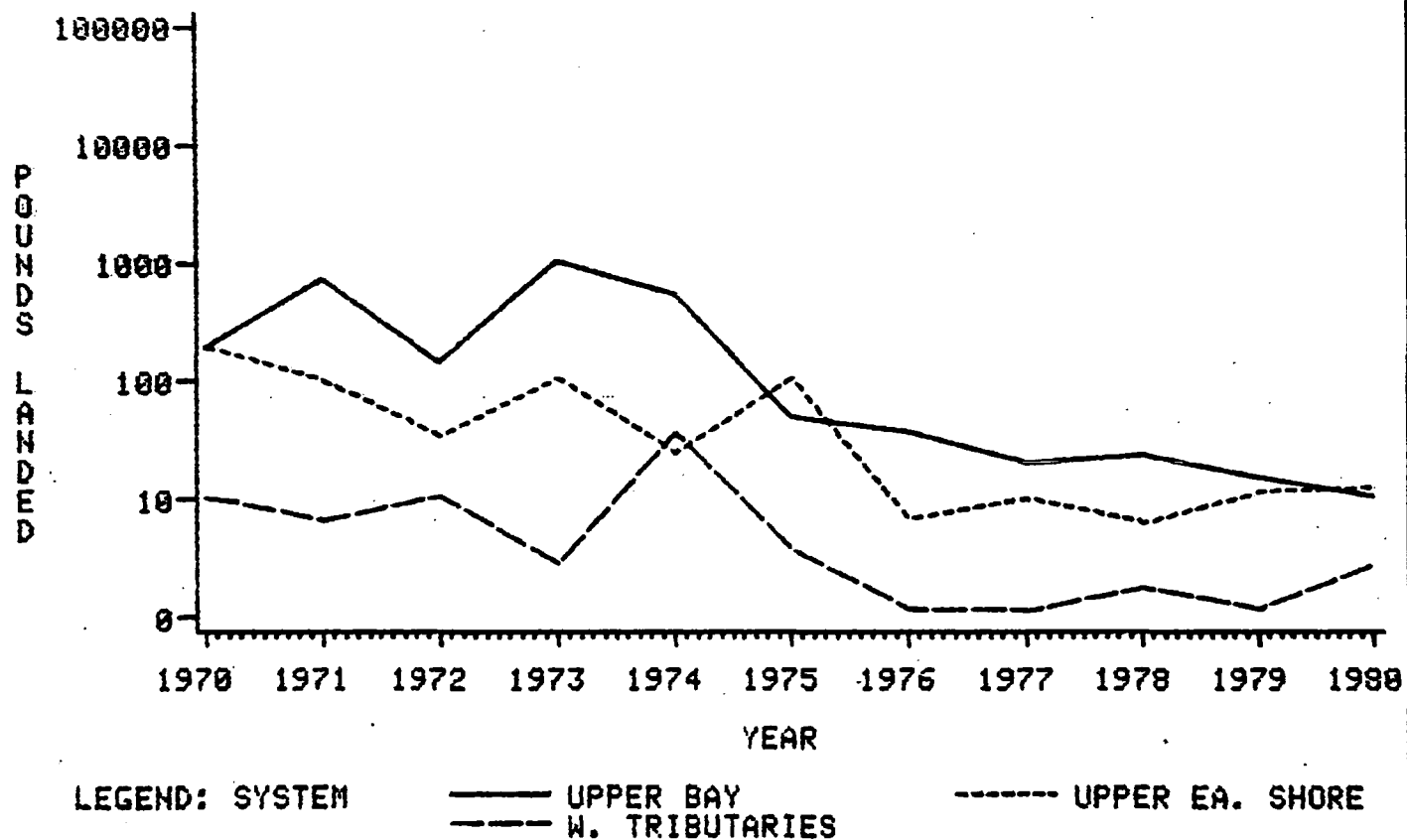


Figure 17: Upper Bay Alewife Herring Landings

1970-1980 MID BAY ALEWIFE HERRING LANDINGS (IN THOUSANDS OF POUNDS)

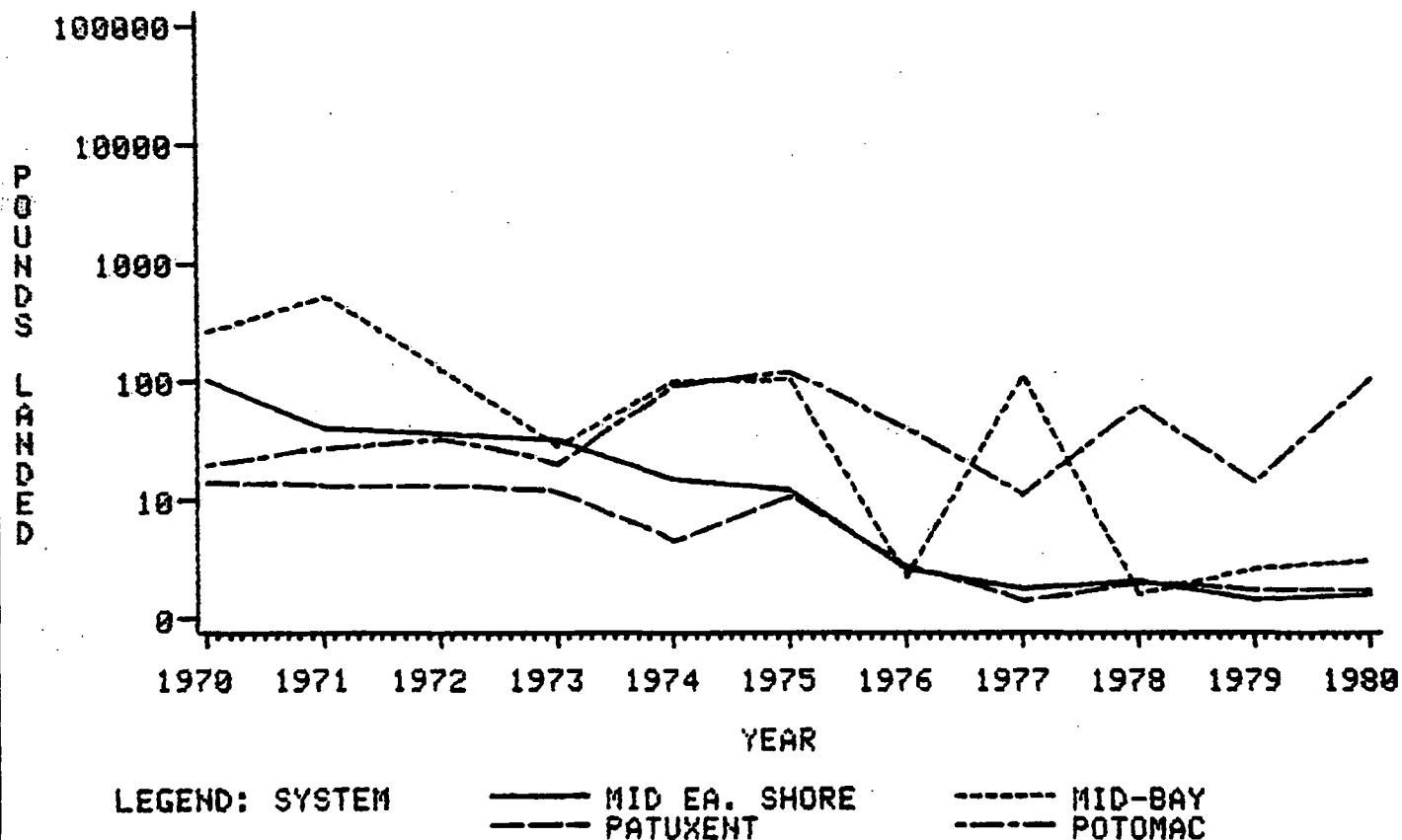


Figure 18: Mid Bay Alewife Herring Landings

1970-1980 LOWER BAY (W. TRIBUTARIES) ALEWIFE HERRING LANDINGS (IN THOUSANDS OF POUNDS)

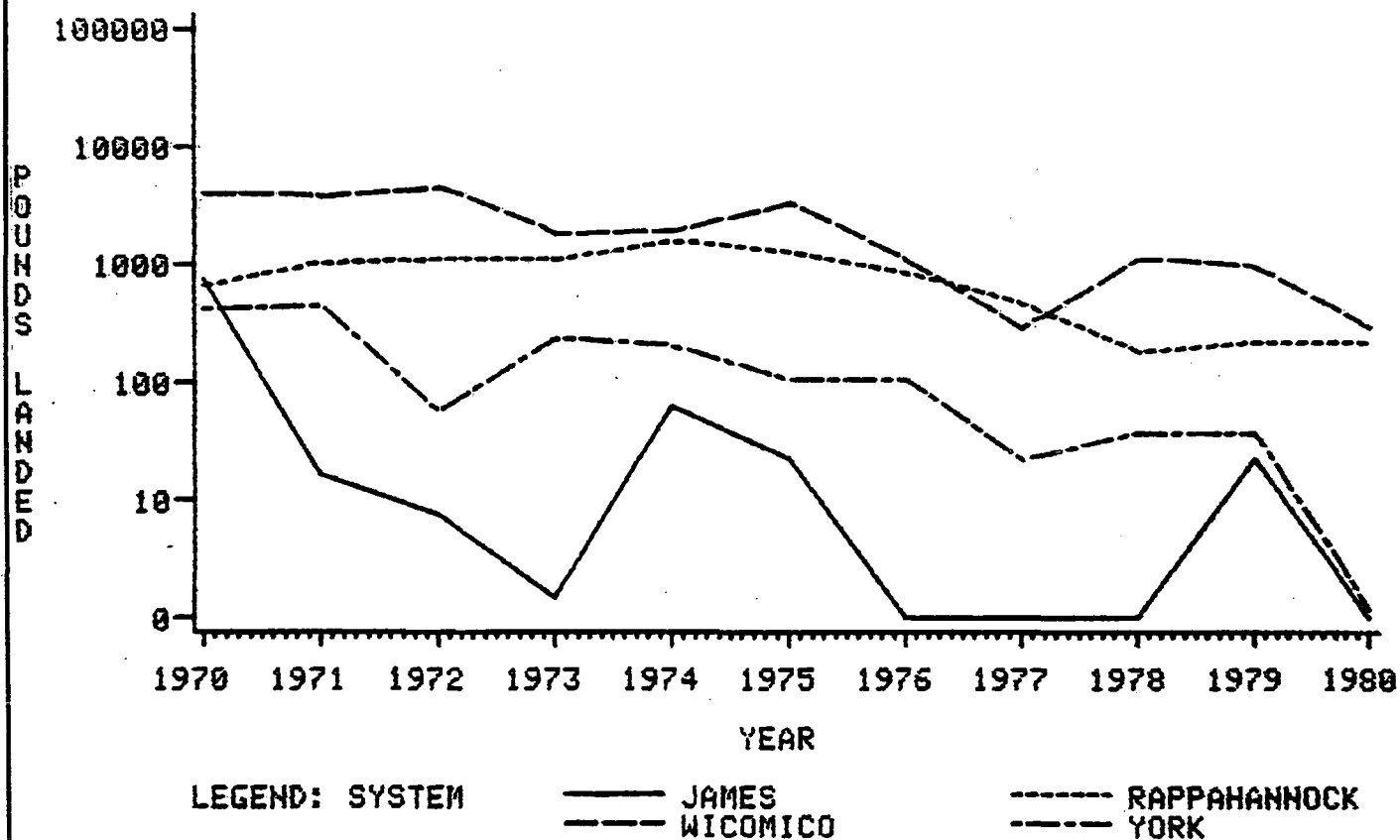


Figure 19: Lower Bay (Western Tributaries) Alewife Herring Landings

1970-1980 LOWER BAY ALEWIFE HERRING LANDINGS (IN THOUSANDS OF POUNDS)

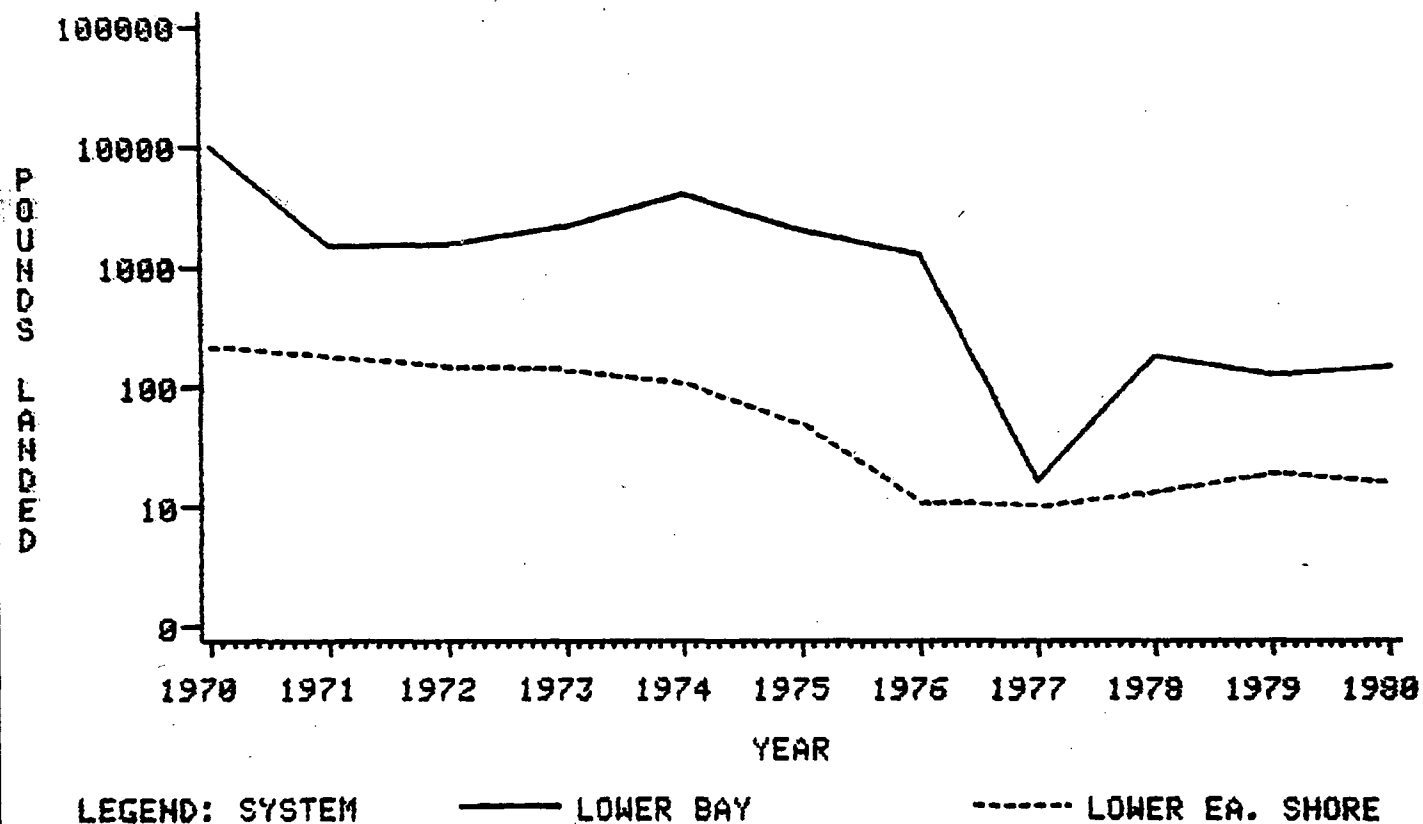


Figure 20: Lower Bay Alewife Herring Landings

1970-1980 UPPER BAY MENHADEN LANDINGS (IN THOUSANDS OF POUNDS)

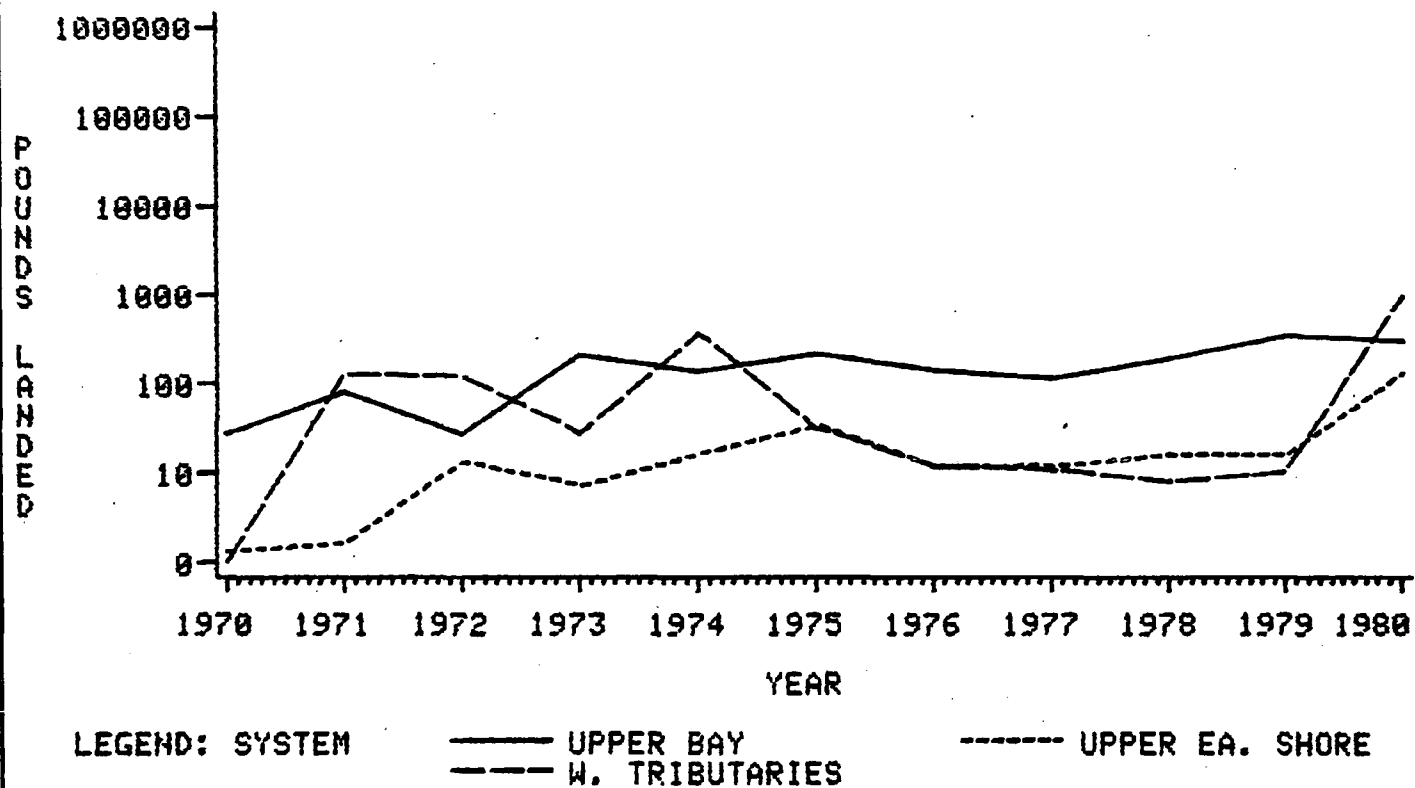


Figure 21: Upper Bay Menhaden Landings

1970-1980 MID BAY MENHADEN LANDINGS (IN THOUSANDS OF POUNDS)

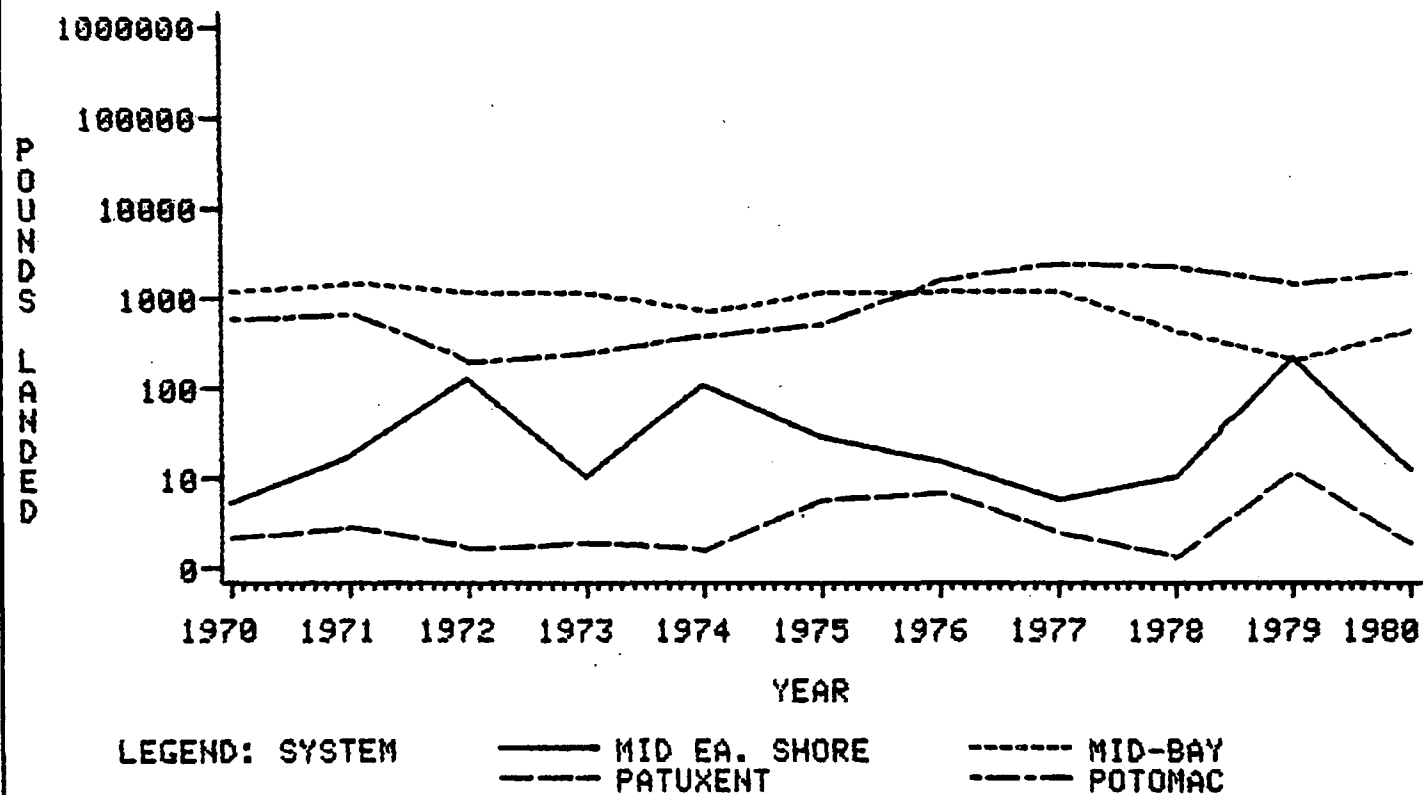


Figure 22: Mid Bay Menhaden Landings

1970-1980 LOWER BAY (W. TRIBUTARIES) MENHADEN LANDINGS (IN THOUSANDS OF POUNDS)

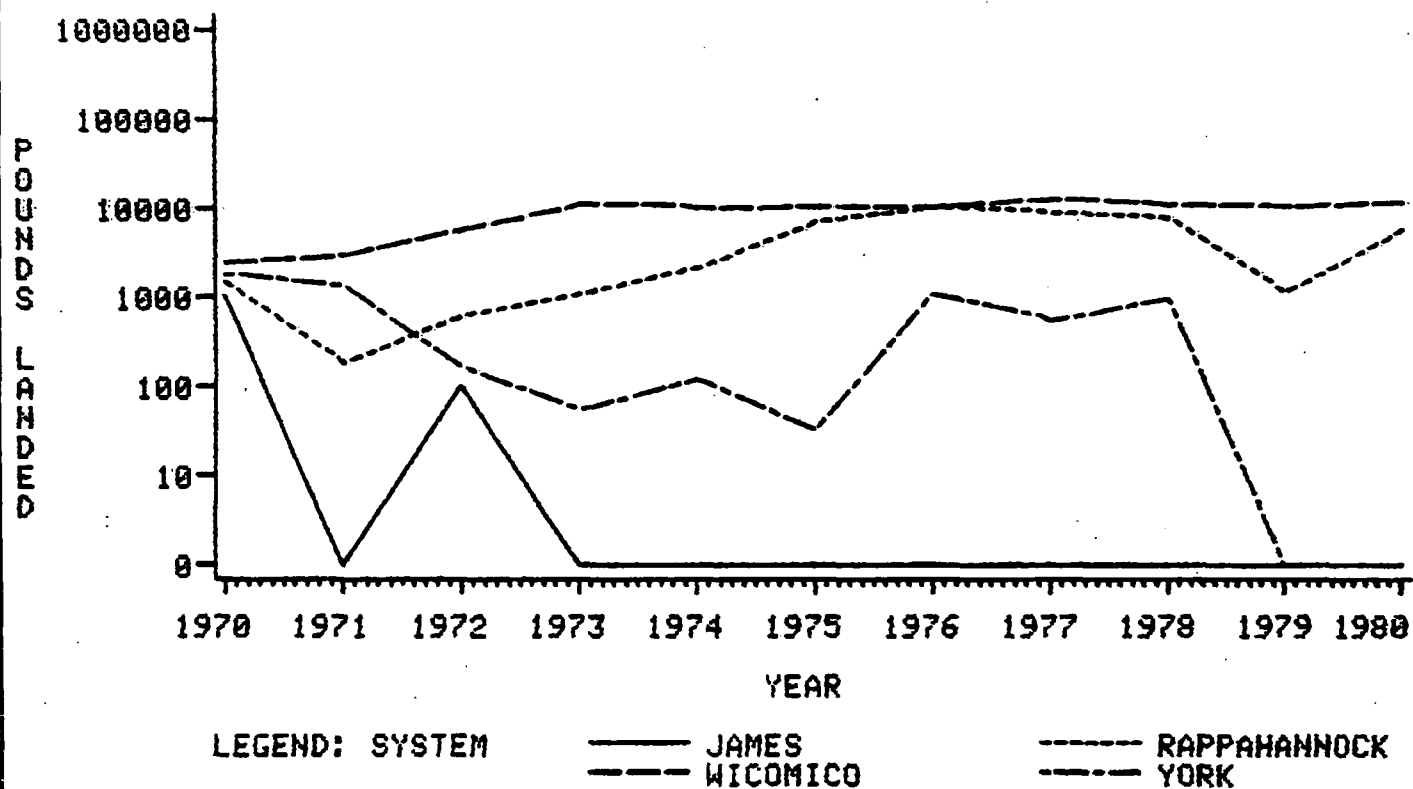


Figure 23: Lower Bay (Western Tributaries) Menhaden Landings

1970-1980 LOWER BAY MENHADEN LANDINGS (IN THOUSANDS OF POUNDS)

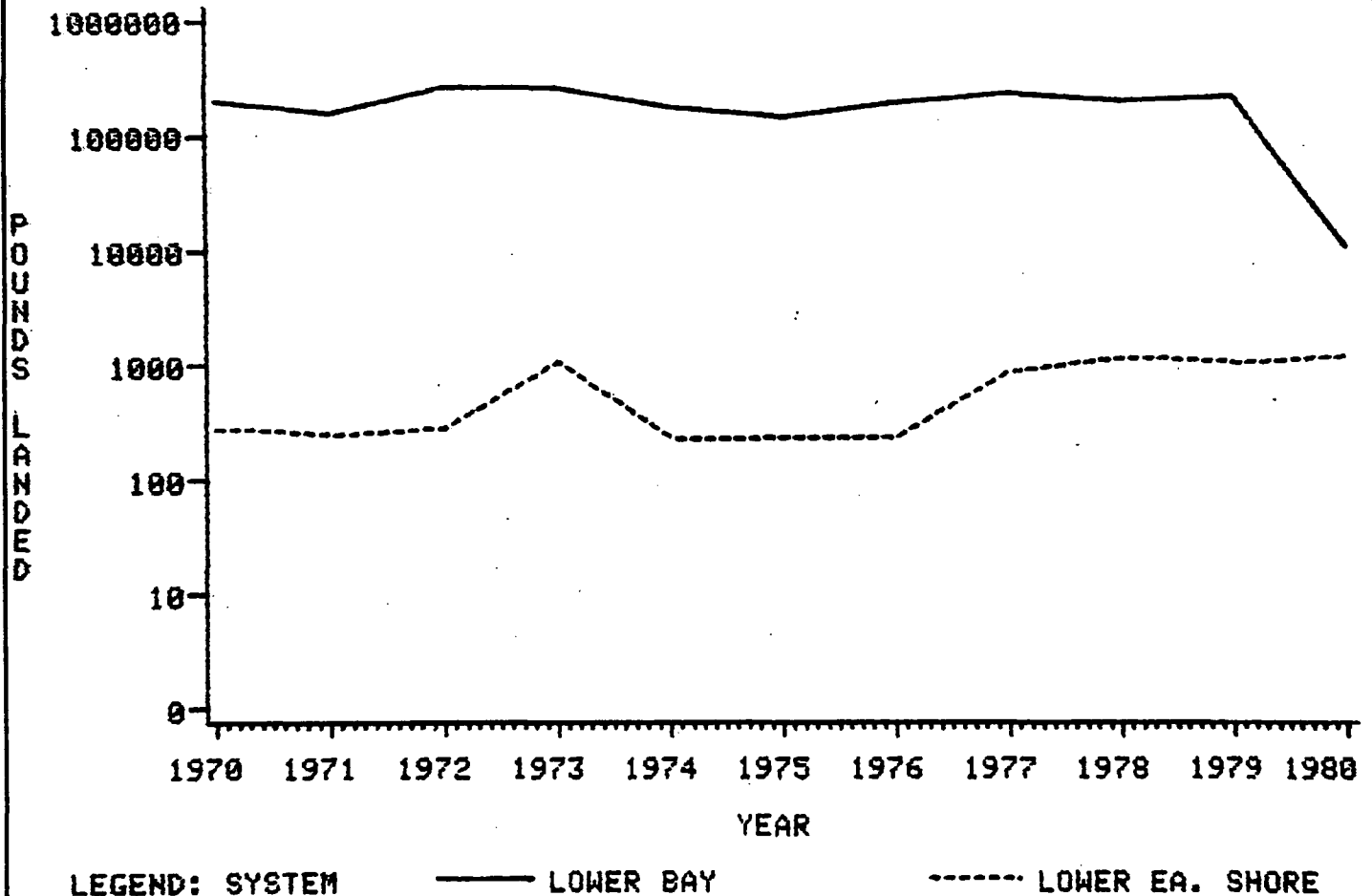


Figure 24: Lower Bay Menhaden Landings

TABLE 1. Summary of Chesapeake Bay Landings, Price, and Value for 15
Commerically Important Species, 1970-1980.

FISHERY	YEAR	LANDINGS (lbs)	% OF TOTAL BAY LANDINGS (lbs)	PRICE AT YEAR OF CATCH (\$)	VALUE AT YEAR OF CATCH (\$)	% OF TOTAL \$ AT YEAR OF CATCH
OYSTER	1970	23741800	4.46	.602	14292563	44.49
	1971	24690100	5.67	.617	15233791	45.68
	1972	23502200	3.67	.621	14594866	40.94
	1973	24820200	3.99	.645	16009029	31.43
	1974	24505300	5.14	.691	16933162	39.70
	1975	24377232	6.23	.791	19282390	46.07
	1976	21777545	4.45	1.044	22735756	43.83
	1977	18964750	3.29	1.098	20823295	34.62
	1978	22369571	4.40	1.103	24673636	45.81
	1979	21375153	4.04	1.243	26569315	37.16
	1980	23164225	3.58	1.275	29534386	39.59
SOFT SHELL CLAM	1970	6221300	1.17	.391	2432528	7.57
	1971	5986300	1.38	.5	2993150	8.98
	1972	1949500	.30	.521	1015689	2.85
	1973	668400	.11	.834	557445	1.09
	1974	2098800	.44	.848	1779782	4.17
	1975	1246200	.32	.942	1173920	2.80
	1976	1750800	.36	1.57	2748756	5.30
	1977	1654200	.29	1.579	2611981	4.34
	1978	3450500	.68	1.355	4675427	8.68
	1979	2882900	.54	1.836	5293004	7.40
	1980	1925800	.30	2.214	4263721	5.72
HARD SHELL CLAM	1970	467800	.09	.647	302666	.94
	1971	938300	.22	.773	725305	2.17
	1972	1029800	.16	.842	867091	2.43
	1973	989100	.16	.929	918873	1.80
	1974	1074200	.23	.926	994709	2.33
	1975	805600	.21	.938	755652	1.81
	1976	611400	.12	.946	578384	1.12
	1977	440300	.08	1.461	643278	1.07
	1978	279200	.05	2.074	579060	1.08
	1979	350700	.07	2.18	764526	1.07
	1980	580700	.09	2.206	1281024	1.72

TABLE 1. Summary of Chesapeake Bay Landings, Price, and Value for 15 Commercially Important Species, 1970-1980. - Continued

FISHERY	YEAR	LANDINGS (Tbs)	% OF TOTAL BAY LANDINGS (lbs)	PRICE AT YEAR OF CATCH (\$)	VALUE AT YEAR OF CATCH (\$)	% OF TOTAL \$ AT YEAR OF CATCH
CRABS	1970	67483900	12.69	.079	5331228	16.59
	1971	74610600	17.15	.095	7088007	21.25
	1972	71542600	11.17	.1	7154260	20.07
	1973	56165400	9.03	.137	7694659	15.11
	1974	63202300	13.26	.14	8848322	20.74
	1975	57662600	14.73	.169	9744979	23.28
	1976	43939900	8.98	.236	10369816	19.99
	1977	54700600	9.50	.231	12635838	21.01
	1978	49728300	9.77	.234	11636422	21.61
	1979	61082400	11.55	.213	13010551	18.20
	1980	57791300	8.92	.231	13349790	17.90
ALEWIFE HERRING	1970	21109685	3.97	.021	443303	1.38
	1971	12850268	2.95	.023	295556	.89
	1972	12066944	1.88	.027	325807	.91
	1973	10921045	1.75	.033	360394	.71
	1974	14598425	3.06	.032	467149	1.10
	1975	12027910	3.07	.036	433004	1.03
	1976	4362958	.89	.037	161429	.31
	1977	1491778	.26	.039	58179	.10
	1978	2290942	.45	.042	96219	.18
	1979	1791401	.34	.051	91361	.13
	1980	1372694	.21	.069	94715	.13
BLUEFISH	1970	623986	.12	.094	58654	.18
	1971	674024	.15	.101	68076	.20
	1972	1447111	.23	.08	115768	.32
	1973	2963030	.48	.08	237042	.47
	1974	3336323	.70	.082	273578	.64
	1975	3205559	.82	.073	234005	.56
	1976	3938882	.80	.075	295416	.57
	1977	3367108	.58	.068	228963	.38
	1978	2438056	.48	.092	224301	.42
	1979	2592193	.49	.105	272180	.38
	1980	2752787	.43	.096	264267	.35

TABLE 1. Summary of Chesapeake Bay Landings, Price, and Value for 15 Commercially Important Species, 1970-1980. - Continued

FISHERY	YEAR	LANDINGS (lbs)	% OF TOTAL BAY LANDINGS (lbs)	PRICE AT YEAR OF CATCH (\$)	VALUE AT YEAR OF CATCH (\$)	% OF TOTAL \$ AT YEAR- OF CATCH
CATFISH	1970	1292279	.24	.15	193841	.60
	1971	1728942	.40	.145	250696	.75
	1972	1875356	.29	.148	277552	.78
	1973	1506366	.24	.182	274158	.54
	1974	1751966	.37	.204	357401	.84
	1975	1786296	.46	.214	382267	.91
	1976	1453970	.30	.207	300971	.58
	1977	1950585	.34	.207	403771	.67
	1978	1500836	.29	.209	313674	.58
	1979	1536504	.29	.236	362614	.51
	1980	2228880	.34	.229	510413	.68
CROAKER	1970	121372	.02	.122	14807	.05
	1971	211133	.05	.134	28291	.08
	1972	389735	.06	.143	55732	.16
	1973	1031465	.17	.118	121712	.24
	1974	986622	.21	.151	148979	.35
	1975	3058519	.78	.111	339495	.81
	1976	3922323	.80	.138	541280	1.04
	1977	7098699	1.23	.099	702771	1.17
	1978	6261374	1.23	.168	1051910	1.95
	1979	1752640	.33	.22	385580	.54
	1980	606706	.09	.294	178371	.24
MENHADEN	1970	391871467	73.66	.017	6661814	20.74
	1971	302392553	69.49	.016	4838280	14.51
	1972	510509464	79.67	.017	8678660	24.34
	1973	502360857	80.73	.041	20596795	40.43
	1974	352356990	73.94	.03	10570709	24.78
	1975	276756928	70.69	.024	6642166	15.87
	1976	399076135	81.55	.029	11573207	22.31
	1977	475901601	82.65	.04	19036064	31.65
	1978	410504551	80.69	.018	7389081	13.72
	1979	426193540	80.55	.05	21309677	29.81
	1980	545937000	84.31	.037	20199669	27.08

TABLE 1. Summary of Chesapeake Bay Landings, Price, and Value for 15 Commercially Important Species, 1970-1980. - Continued

FISHERY	YEAR	LANDINGS (lbs)	% OF TOTAL BAY LANDINGS (lbs)	PRICE AT YEAR OF CATCH (\$)	VALUE AT YEAR OF CATCH (\$)	% OF TOTAL \$ AT YEAR OF CATCH
SEA TROUT	1970	2011337	.38	.12	241360	.75
	1971	2181669	.50	.119	259618	.78
	1972	2395088	.37	.107	256274	.72
	1973	4641016	.75	.13	603332	1.18
	1974	2475954	.52	.157	388724	.91
	1975	3118006	.80	.132	411576	.98
	1976	3309352	.68	.161	532805	1.03
	1977	3693861	.64	.163	602099	1.00
	1978	3062525	.60	.214	655380	1.22
	1979	4259595	.81	.249	1060639	1.48
	1980	4918232	.76	.247	1214803	1.63
SHAD	1970	5014622	.94	.079	396155	1.23
	1971	2473801	.57	.096	237484	.71
	1972	3035234	.47	.11	333875	.94
	1973	3092966	.50	.151	467037	.92
	1974	1774721	.37	.149	264433	.62
	1975	1312668	.34	.274	359671	.86
	1976	811931	.17	.362	293919	.57
	1977	1488986	.26	.348	518167	.86
	1978	1289762	.25	.175	225708	.42
	1979	953786	.18	.246	234631	.33
	1980	903055	.14	.366	330518	.44
SPOT	1970	5471500	1.03	.092	503378	1.57
	1971	500800	.12	.116	58092	.17
	1972	2856300	.45	.108	308480	.87
	1973	2367100	.38	.139	329026	.65
	1974	2065900	.43	.154	318148	.75
	1975	1532200	.39	.136	208379	.50
	1976	1025900	.21	.186	190817	.37
	1977	1591600	.28	.209	332644	.55
	1978	2748700	.54	.184	505760	.94
	1979	2167700	.41	.201	435707	.61
	1980	1745900	.27	.329	574401	.77

TABLE 1. Summary of Chesapeake Bay Landings, Price, and Value for 15 Commercially Important Species, 1970-1980. - Continued

FISHERY	YEAR	LANDINGS (lbs)	% OF TOTAL BAY LANDINGS (lbs)	PRICE AT YEAR OF CATCH (\$)	VALUE AT YEAR OF CATCH (\$)	% OF TOTAL \$ AT YEAR OF CATCH
STRIPED BASS	1970	4830057	.91	.213	1028802	3.20
	1971	4053300	.93	.251	1017378	3.05
	1972	6809504	1.06	.216	1470852	4.13
	1973	9781331	1.57	.263	2572490	5.05
	1974	5627867	1.18	.21	1181852	2.77
	1975	3929399	1.00	.442	1736794	4.15
	1976	2746229	.56	.509	1397830	2.69
	1977	2620531	.46	.528	1383640	2.30
	1978	1624174	.32	.956	1552710	2.88
	1979	1299856	.25	1.134	1474036	2.06
	1980	2510895	.39	.963	2417991	3.24
WHITE PERCH	1970	1700397	.32	.132	224452	.70
	1971	1838415	.42	.139	255539	.77
	1972	1353462	.21	.145	196251	.55
	1973	981886	.16	.202	198340	.39
	1974	652799	.14	.196	127948	.30
	1975	700161	.18	.212	148434	.35
	1976	604939	.12	.248	150024	.29
	1977	833063	.14	.191	159115	.26
	1978	1221071	.24	.227	277183	.51
	1979	842137	.16	.276	232429	.33
	1980	1120945	.17	.34	381121	.51
YELLOW PERCH	1970	3300	.00	.122	402	.00
	1971	600	.00	.135	81	.00
	1972	10900	.00	.222	2419	.01
	1973	3300	.00	.186	613	.00
	1974	7300	.00	.238	1737	.00
	1975	3900	.00	.161	627	.00
	1976	2800	.00	.207	579	.00
	1977	2300	.00	.171	393	.00
	1978	1000	.00	.19	190	.00
	1979	400	.00	.24	96	.00
	1980	300	.00	.31	93	.00

TABLES 2 - 16
SPECIE PROFILE BY
BAY SYSTEM

TABLE 2
TOTAL LANDINGS BY SYSTEM FOR OYSTER FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	1972800 8.40	1172800 4.80	564900 2.40	144900 0.60	170400 0.60	87034 0.40	40380 0.20	85369 0.40	76567 0.40	57734 0.20	131105 0.60
WESTERN TRIBUTARIES	96900 0.40	227100 1.00	266100 1.20	109900 0.40	130300 0.60	179662 0.80	165568 0.80	65822 0.40	38207 0.20	59963 0.20	50953 0.20
UPPER EASTERN SHORE	2269800 9.60	1075400 4.40	1842900 7.80	752200 3.00	399300 1.60	448815 1.80	427818 2.00	361057 2.00	237270 1.00	123116 0.60	132834 0.60
MID-BAY	6391700 27.00	6401800 26.00	4662600 19.80	5696200 23.00	3467100 14.20	3255895 13.40	2286212 10.40	2331574 12.20	1907159 8.60	1161753 5.40	1233372 5.40
POTOMAC	2417800 10.20	3453400 14.00	2162500 9.20	1538300 6.20	2896500 11.80	3129506 12.80	2521569 11.60	2201829 11.60	1966914 8.80	1783605 8.40	1561558 6.80
PATUXENT	499200 2.20	627400 2.60	1513300 6.40	1338700 5.40	843100 3.40	575902 2.40	737438 3.40	306995 1.60	640908 2.80	468519 2.20	269903 1.20
MID EASTERN SHORE	2068900 8.80	3945600 16.00	7294800 31.00	9408300 38.00	9706000 39.60	10437869 42.80	10456912 48.00	6167203 32.60	4868699 21.80	4739645 22.20	7670304 33.20
WICOMICO	1358600 5.80	961900 3.80	847300 3.60	941700 3.80	810800 3.40	514532 2.20	363110 1.60	1223582 6.40	1874086 8.40	1257084 5.80	1204611 5.20
RAPPAHANNOCK	3339700 14.00	2800200 11.40	1644600 7.00	1890100 7.60	3087300 12.60	2626800 10.80	1625800 7.40	1336800 7.00	1803900 8.00	1922000 9.00	2194200 9.40
YORK	327000 1.40	240600 1.00	154700 0.60	73700 0.20	111100 0.40	180200 0.80	772300 3.60	619900 3.20	711600 3.20	802400 3.80	643500 2.80
JAMES	1171800 5.00	1522100 6.20	1062800 4.60	1393200 5.60	1013900 4.20	379100 1.60	409200 1.80	424000 2.20	723200 3.20	1103700 5.20	970000 4.20
LOWER BAY	757800 3.20	615100 2.40	277300 1.20	354900 1.40	308800 1.20	506600 2.00	505000 2.40	184000 1.00	620400 2.80	439100 2.00	621600 2.60
LOWER EASTERN SHORE	1069800 4.60	1646700 6.60	1208400 5.20	1178100 4.80	1560700 6.40	2055316 8.40	1466237 6.80	3656619 19.20	6900662 30.80	7456535 34.80	6480285 28.00
OYSTER TOTAL	23741800	24690100	23502200	24820200	24505300	24377232	21777545	18964750	22369571	21375153	23164225

TABLE 3
TOTAL LANDINGS BY SYSTEM FOR SOFT SHELL CLAM FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	240300 3.80	370300 6.20	97900 5.00	1200 0.20	11600 0.60	35700 2.80	11500 0.60	6800 0.40	31800 1.00	184500 6.40	280400 14.60
WESTERN TRIBUTARIES	323100 5.20	120000 2.00	63700 3.20	2700 0.40	6900 0.40	1100 0.00	3900 0.20	600 0.00	2500 0.00	4300 0.20	0 0.00
UPPER EASTERN SHORE	1849600 29.80	2443500 40.80	453100 23.20	17500 2.60	75700 3.60	85000 6.80	20100 1.20	103200 6.20	496400 14.40	599600 20.80	574700 29.80
MID-BAY	2836000 45.60	2667700 44.60	1255700 64.40	373000 55.80	1080800 51.40	825400 66.20	119300 6.80	647600 39.20	1015700 29.40	864100 30.00	237800 12.40
POTOMAC	650800 10.40	151600 2.60	13400 0.60	800 0.20	3100 0.20	600 0.00	0 0.00	0 0.00	300 0.00	600 0.00	0 0.00
PATUXENT	2300 0.00	0 0.00	0 0.00	300 0.00	182000 8.60	57200 4.60	14000 0.80	13800 0.80	72900 2.20	126600 4.40	99500 5.20
MID EASTERN SHORE	319200 5.20	233200 3.80	65700 3.40	272900 40.80	738700 35.20	241200 19.40	535200 30.60	560900 34.00	1716800 49.80	867400 30.00	448300 23.20
WICOMICO	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	45100 2.60	95400 5.80	54800 1.60	38300 1.40	92100 4.80
LOWER EASTERN SHORE	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1001700 57.20	225900 13.60	59300 1.80	197500 6.80	193000 10.00
SOFT SHELL CLAM TOTAL	6221300	5986300	1949500	668400	2098800	1246200	1750800	1654200	3450500	2882900	1925800

TABLE 4
TOTAL LANDINGS BY SYSTEM FOR HARD SHELL CLAM FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
WICOMICO	0 0.00	0 0.00	161700 15.80	242000 24.40	125900 11.80	81700 10.20	40900 6.60	41600 9.40	12200 4.40	24000 6.80	10000 1.80
YORK	96700 20.60	161700 17.20	290600 28.20	250500 25.40	617300 57.40	283100 35.20	119800 19.60	73400 16.60	21500 7.80	26800 7.60	75000 13.00
JAMES	58100 12.40	377400 40.20	0 0.00	0 0.00	0 0.00	348500 43.20	248900 40.80	177600 40.40	200200 71.80	241700 69.00	285100 49.00
LOWER BAY	267100 57.00	387900 41.40	562200 54.60	489100 49.40	329900 30.80	78400 9.80	201800 33.00	147700 33.60	45300 16.20	58200 16.60	210600 36.20
LOWER EASTERN SHORE	45900 9.80	11300 1.20	15300 1.40	7500 0.80	1100 0.20	13900 1.80	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
HARD SHELL CLAM TOTAL	467800	938300	1029800	989100	1074200	805600	611400	440300	279200	350700	580700

TABLE 5
TOTAL LANDINGS BY SYSTEM FOR CRABS FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	479100 0.80	417600 0.60	533300 0.80	325700 0.60	367600 0.60	1216100 2.20	1137100 2.60	1195300 2.20	1468900 3.00	2021700 3.40	2209400 3.80
WESTERN TRIBUTARIES	11700 0.00	104900 0.20	305400 0.40	247600 0.40	249700 0.40	3100 0.00	2500 0.00	2100 0.00	2100 0.00	1300 0.00	91700 0.20
UPPER EASTERN SHORE	242200 0.40	254000 0.40	231300 0.40	143500 0.20	196500 0.40	336000 0.60	209000 0.40	199000 0.40	200400 0.40	187000 0.40	118900 0.20
MID-BAY	18042500 26.80	15662300 21.00	12672600 17.80	10293600 18.40	11814700 18.60	12559800 21.80	9942100 22.60	9522300 17.40	8150500 16.40	13140400 21.60	9871300 17.00
POTOMAC	1420000 2.20	1786200 2.40	1496100 2.00	838000 1.40	579000 1.00	823100 1.40	970600 2.20	2750600 5.00	1895800 3.80	2970100 4.80	2030800 3.60
PATUXENT	129200 0.20	109400 0.20	142800 0.20	99400 0.20	140200 0.20	234700 0.40	156200 0.40	182200 0.40	112800 0.20	50700 0.00	62200 0.20
MID EASTERN SHORE	1074800 1.60	945200 1.20	668200 1.00	240300 0.40	261900 0.40	353200 0.60	252300 0.60	209700 0.40	146900 0.20	153700 0.20	123500 0.20
WICOMICO	1535400 2.20	6430600 8.60	7042500 9.80	6037500 10.80	7727600 12.20	7517500 13.00	6305900 14.40	7002400 12.80	6511000 13.00	7622700 12.40	8809700 15.20
RAPPAHANNOCK	3961300 5.80	2508400 3.40	1619300 2.20	1421900 2.60	2426400 3.80	2014700 3.40	2089200 4.80	3236600 6.00	2978900 6.00	3266300 5.40	3786500 6.60
YORK	2158400 3.20	7345800 9.80	5940600 8.40	329200 0.60	167400 0.20	1291200 2.20	2239700 5.00	5293800 9.60	4892800 9.80	4037700 6.60	3754600 6.40
JAMES	1571000 2.40	2669300 3.60	2328700 3.20	330200 0.60	89600 0.20	32400 0.00	168100 0.40	967100 1.80	165000 0.40	323900 0.60	209200 0.40
LOWER BAY	32044300 47.40	32714000 43.80	34361600 48.00	31702200 56.40	34332900 54.40	27119600 47.00	17330700 39.40	21184200 38.80	21728200 43.60	25124300 41.20	22612700 39.20
LOWER EASTERN SHORE	4814000 7.20	3654900 4.80	4200200 5.80	4156300 7.40	4848800 7.60	4161200 7.20	3136500 7.20	2955300 5.40	1475000 3.00	2182600 3.60	4110800 7.20
CRABS TOTAL	67483900	74610600	71542600	56165400	63202300	57662600	43939900	54700600	49728300	61082400	57791300

TABLE 6
TOTAL LANDINGS BY SYSTEM FOR ALEWIFE HERRING FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	350729 1.60	877522 6.80	241133 2.00	1087689 10.00	757740 5.20	71955 0.60	60664 1.40	37125 2.40	43459 1.80	26540 1.40	11835 0.80
WESTERN TRIBUTARIES	11075 0.00	8133 0.00	12234 0.20	4524 0.00	60620 0.40	5837 0.00	687 0.00	588 0.00	2529 0.20	638 0.00	4406 0.40
UPPER EASTERN SHORE	358367 1.60	104873 0.80	58003 0.40	121278 1.20	44717 0.40	115358 1.00	8246 0.20	10203 0.60	8003 0.40	15742 0.80	18632 1.40
MID-BAY	479380 2.20	752212 5.80	194429 1.60	50794 0.40	102315 0.80	120364 1.00	3515 0.00	141254 9.40	2102 0.00	4240 0.20	4908 0.40
POTOMAC	36200 0.20	50200 0.40	56700 0.40	37800 0.40	96500 0.60	175100 1.40	64600 1.40	14100 1.00	81800 3.60	23500 1.40	120100 8.80
PATUXENT	23498 0.20	21406 0.20	21058 0.20	16371 0.20	6647 0.00	13228 0.20	4406 0.20	1471 0.00	3010 0.20	2378 0.20	2408 0.20
MID EASTERN SHORE	106775 0.60	65019 0.60	61189 0.60	55631 0.60	26285 0.20	18196 0.20	4176 0.00	2467 0.20	3130 0.20	1623 0.00	2084 0.20
WICOMICO	6456362 30.60	6235135 48.60	6886885 57.00	3360350 30.80	3587659 24.60	5676289 47.20	1280706 29.40	509683 34.20	1388750 60.60	982071 54.80	516023 37.60
RAPPAHANNOCK	833600 4.00	1111000 8.60	1398900 11.60	1313600 12.00	2784400 19.00	1863000 15.40	925400 21.20	694800 46.60	336400 14.60	409300 22.80	414500 30.20
YORK	660300 3.20	686000 5.40	77400 0.60	427500 4.00	370900 2.60	116400 1.00	119000 2.80	40300 2.80	61400 2.60	60700 3.40	700 0.00
JAMES	885800 4.20	29700 0.20	8800 0.00	1700 0.00	82100 0.60	41900 0.40	0 0.00	0 0.00	0 0.00	41700 2.40	0 0.00
LOWER BAY	10514200 49.80	2587500 20.20	2798600 23.20	4219300 38.60	6555700 45.00	3739200 31.00	1878600 43.00	29800 2.00	339600 14.80	188900 10.60	250400 18.20
LOWER EASTERN SHORE	393399 1.80	321568 2.60	251613 2.00	224508 2.00	122842 0.80	71083 0.60	12978 0.20	9989 0.60	20759 1.00	34071 2.00	26700 2.00
ALEWIFE HERRING TOTAL	21109685	12850268	12066944	10921045	14598425	12027910	4362958	1491778	2290942	1791401	1372694

TABLE 7
TOTAL LANDINGS BY SYSTEM FOR BLUEFISH FISHERY
ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	5981 1.00	2428 0.40	1179 0.00	6318 0.20	35948 1.00	20190 0.60	116174 3.00	94012 2.80	45881 1.80	100549 3.80	117419 4.20
WESTERN TRIBUTARIES	524 0.00	643 0.00	270343 18.60	6155 0.20	16311 0.40	5920 0.20	3351 0.00	5205 0.20	4066 0.20	554 0.00	23777 0.80
UPPER EASTERN SHORE	0 0.00	0 0.00	1378 0.00	1745 0.00	4504 0.20	3407 0.20	2781 0.00	6470 0.20	9901 0.40	3381 0.20	19043 0.60
MID-BAY	32871 5.20	73847 11.00	7162 0.40	99343 3.40	105288 3.20	60486 1.80	119444 3.00	119789 3.60	33320 1.40	22468 0.80	19067 0.60
POTOMAC	6400 1.00	9000 1.40	11000 0.80	32600 1.20	47600 1.40	66900 2.00	57800 1.40	65500 2.00	33500 1.40	42600 1.60	41400 1.60
PATUXENT	8 0.00	2893 0.40	210 0.00	9936 0.40	8383 0.20	954 0.00	1278 0.00	2076 0.00	1119 0.00	271 0.00	5307 0.20
MID EASTERN SHORE	20 0.00	304 0.00	554 0.00	3327 0.20	16050 0.40	1896 0.00	5395 0.20	3724 0.20	3264 0.20	23482 1.00	9275 0.40
WICOMICO	79594 12.80	155803 23.20	152511 10.60	570854 19.20	788266 23.60	711903 22.20	546943 13.80	902761 26.80	293489 12.00	446172 17.20	742251 27.00
RAPPAHANNOCK	200 0.00	31300 4.60	40500 2.80	8900 0.40	161500 4.80	82400 2.60	106000 2.60	151500 4.40	103500 4.20	14800 0.60	27600 1.00
YORK	26000 4.20	49700 7.40	126600 8.80	93000 3.20	139900 4.20	210600 6.60	497600 12.60	671400 20.00	468100 19.20	317700 12.20	290800 10.60
JAMES	31300 5.00	2900 0.40	14100 1.00	9600 0.40	7800 0.20	9300 0.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
LOWER BAY	440300 70.60	341200 50.60	817800 56.60	2104900 71.00	1973300 59.20	2003600 62.60	2394700 60.80	1306600 38.80	1368700 56.20	1585700 61.20	1365200 49.60
LOWER EASTERN SHORE	788 0.20	4006 0.60	3774 0.20	16352 0.60	31473 1.00	28003 0.80	87416 2.20	38071 1.20	73216 3.00	34518 1.40	91648 3.40
BLUEFISH TOTAL	623986	674024	1447111	2963030	3336323	3205559	3938882	3367108	2438056	2592193	2752787

TABLE 8
TOTAL LANDINGS BY SYSTEM FOR CATFISH FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	20928 1.60	109928 6.40	80838 4.40	60664 4.00	43855 2.60	47105 2.60	72895 5.00	82846 4.20	54961 3.60	113883 7.40	136968 6.20
WESTERN TRIBUTARIES	8032 0.60	15156 0.80	10110 0.60	9409 0.60	4141 0.20	4053 0.20	5701 0.40	6913 0.40	16948 1.20	16571 1.00	14595 0.60
UPPER EASTERN SHORE	43357 3.40	122410 7.00	115305 6.20	46550 3.00	49967 2.80	61105 3.40	64323 4.40	94113 4.80	135953 9.00	221602 14.40	336353 15.00
MID-BAY	51 0.00	354 0.00	530 0.00	1426 0.00	175 0.00	222 0.00	462 0.00	227 0.00	429 0.00	726 0.00	1713 0.00
POTOMAC	63600 5.00	28100 1.60	78700 4.20	79400 5.20	66300 3.80	73400 4.20	74800 5.20	74700 3.80	131800 8.80	131700 8.60	164800 7.40
PATUXENT	4085 0.40	13050 0.80	30997 1.60	41254 2.80	52379 3.00	36185 2.00	19138 1.40	11312 0.60	7073 0.40	14828 1.00	17798 0.80
MID EASTERN SHORE	30269 2.40	35515 2.00	52114 2.80	34213 2.20	34358 2.00	35252 2.00	26480 1.80	15745 0.80	14075 1.00	23801 1.60	9136 0.40
WICOMICO	3852 0.20	1310 0.00	3968 0.20	1273 0.00	4122 0.20	8190 0.40	224432 15.40	92913 4.80	25719 1.80	79531 5.20	204584 9.20
RAPPAHANNOCK	191700 14.80	85000 5.00	70100 3.80	99200 6.60	115000 6.60	187600 10.60	166800 11.40	448400 23.00	407900 27.20	213200 13.80	469200 21.00
YORK	239500 18.60	4800 0.20	13200 0.80	5300 0.40	11900 0.60	39900 2.20	333100 23.00	97500 5.00	40300 2.60	137300 9.00	143000 6.40
JAMES	645000 50.00	1264800 73.20	1373000 73.20	1083200 72.00	1330900 76.00	1247100 69.80	438600 30.20	987300 50.60	621500 41.40	491700 32.00	642300 28.80
LOWER BAY	15100 1.20	17300 1.00	19100 1.00	2200 0.20	2000 0.20	1600 0.00	1100 0.00	10300 0.60	1700 0.20	1900 0.20	2400 0.20
LOWER EASTERN SHORE	26805 2.00	31219 1.80	27394 1.40	42277 2.80	36869 2.20	44584 2.40	26139 1.80	28316 1.40	42478 2.80	89782 5.80	86033 3.80
CATFISH TOTAL	1292279	1728942	1875356	1506366	1751966	1786296	1453970	1950585	1500836	1536504	2228880

TABLE 9
TOTAL LANDINGS BY SYSTEM FOR CROAKER FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS											
SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	0 0.00	0 0.00	197 0.00	0 0.00	8750 0.80	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
WESTERN TRIBUTARIES	0 0.00	0 0.00	2212 0.60	45 0.00	0 0.00	73 0.00	0 0.00	9 0.00	0 0.00	0 0.00	0 0.00
UPPER EASTERN SHORE	5 0.00	0 0.00	0 0.00	1666 0.20	0 0.00	0 0.00	0 0.00	180 0.00	0 0.00	0 0.00	0 0.00
MID-BAY	147 0.20	28 0.00	0 0.00	70 0.00	106 0.00	307 0.00	112 0.00	86671 1.20	2 0.00	0 0.00	0 0.00
POTOMAC	0 0.00	1000 0.40	600 0.20	1600 0.20	400 0.00	39100 1.20	56000 1.40	43600 0.60	2400 0.00	600 0.00	100 0.00
PATUXENT	0 0.00	5 0.00	0 0.00	79 0.00	143 0.00	34 0.00	78 0.00	17 0.00	7 0.00	4 0.00	8 0.00
MID EASTERN SHORE	18 0.00	0 0.00	0 0.00	1 0.00	2 0.00	0 0.00	0 0.00	0 0.00	61 0.00	0 0.00	0 0.00
WICOMICO	1000 0.80	500 0.20	4626 1.20	26704 2.60	11702 1.20	83900 2.80	240400 6.20	916203 13.00	350000 5.60	59233 3.40	700 0.20
RAPPAHANNOCK	0 0.00	17400 8.20	300 0.00	21400 2.00	21200 2.20	175500 5.80	136500 3.40	663300 9.40	184200 3.00	1800 0.20	0 0.00
YORK	55000 45.40	37700 17.80	110800 28.40	267400 26.00	101300 10.20	452300 14.80	712700 18.20	2420100 34.00	2687000 43.00	552600 31.60	102900 17.00
JAMES	11000 9.00	3600 1.80	20300 5.20	2600 0.20	1400 0.20	4600 0.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
LOWER BAY	54200 44.60	150900 71.40	250700 64.40	709900 68.80	841600 85.40	2301900 75.20	2768400 70.60	2967500 41.80	3036000 48.40	1138300 65.00	503000 83.00
LOWER EASTERN SHORE	2 0.00	0 0.00	0 0.00	0 0.00	19 0.00	805 0.00	8133 0.20	1119 0.00	1704 0.00	103 0.00	0 0.00
CROAKER TOTAL	121372	211133	389735	1031465	986622	3058519	3922323	7098699	6261374	1752640	606706

TABLE 10
TOTAL LANDINGS BY SYSTEM FOR MENHADEN FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	49444 0.00	92295 0.00	49526 0.00	381653 0.00	222292 0.00	395336 0.20	242687 0.00	157527 0.00	358719 0.00	594941 0.20	537119 1.20
W. TRIBUTARIES	16 0.00	197921 0.00	162499 0.00	50087 0.00	607504 0.20	54617 0.00	16438 0.00	13364 0.00	9022 0.00	10881 0.00	992872 2.40
UPPER EA SHORE	1231 0.00	2160 0.00	20724 0.00	8551 0.00	29657 0.00	57960 0.00	16585 0.00	17491 0.00	29438 0.00	28231 0.00	209781 0.40
MID-BAY	1697868 0.40	2495598 0.80	1497634 0.20	1365868 0.20	855339 0.20	1612213 0.60	1669828 0.40	1505672 0.40	661364 0.20	371363 0.00	669467 1.60
POTOMAC	801500 0.20	844600 0.20	363400 0.00	451900 0.00	619000 0.20	738800 0.20	2705300 0.60	4455200 1.00	4066300 1.00	2370800 0.60	3553700 8.20
PATUXENT	3392 0.00	4474 0.00	2068 0.00	2686 0.00	1925 0.00	7551 0.00	8316 0.00	3739 0.00	1043 0.00	16053 0.00	2659 0.00
MID EA SHORE	7210 0.00	31148 0.00	190963 0.00	11850 0.00	126873 0.00	51005 0.00	26167 0.00	7591 0.00	11730 0.00	396887 0.00	18147 0.00
LOWER BAY	377184100 96.20	290675700 96.20	498661300 97.60	483906000 96.40	335058100 95.00	253328800 91.60	370610900 92.80	439190000 92.20	379269500 92.40	407466600 95.60	11616400 27.00
LOWER EA SHORE	497774 0.20	455442 0.20	511101 0.20	1297686 0.20	429676 0.20	436191 0.20	437533 0.20	944303 0.20	1504768 0.40	1139469 0.20	1643062 3.80
WICOMICO	4582932 1.20	5217915 1.80	7858249 1.60	13562678 2.60	10325324 3.00	11407255 4.20	10947483 2.80	19257314 4.00	14616467 3.60	12363815 3.00	16111227 37.40
RAPPAHANNOCK	2508000 0.60	337200 0.20	815500 0.20	1246600 0.20	3913100 1.20	8612800 3.20	11133800 2.80	9575100 2.00	8984200 2.20	1434500 0.40	7812200 18.00
YORK	3357400 0.80	2038100 0.60	271200 0.00	75300 0.00	168200 0.00	54400 0.00	1261100 0.40	774300 0.20	992000 0.20	0 0.00	0 0.00
JAMES	1180600 0.40	0 0.00	105300 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
MENHADEN TOTAL	391874467	302392553	510509464	502360857	352356990	276756928	399076135	475901601	410504551	426193540	43166634

TABLE 11
TOTAL LANDINGS BY SYSTEM FOR SEA TROUT FISHERY
ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	633 0.00	1262 0.00	7532 0.40	23 0.00	66 0.00	268 0.00	634 0.00	586 0.00	2172 0.00	3357 0.00	3280 0.00
WESTERN TRIBUTARIES	115 0.00	3859 0.20	8554 0.40	0 0.00	736 0.00	84 0.00	560 0.00	0 0.00	294 0.00	517 0.00	1697 0.00
UPPER EASTERN SHORE	0 0.00	165 0.00	4105 0.20	0 0.00	153 0.00	56 0.00	5 0.00	4 0.00	164 0.00	91 0.00	489 0.00
MID-BAY	22593 1.20	32961 1.60	1452 0.00	4131 0.00	1386 0.00	1621 0.00	2086 0.00	204962 5.60	881 0.00	2480 0.00	2110 0.00
POTOMAC	2300 0.20	6700 0.40	12600 0.60	13200 0.20	9600 0.40	18200 0.60	22400 0.60	24400 0.60	78300 2.60	33800 0.80	59000 1.20
PATUXENT	221 0.00	8434 0.40	7986 0.40	3606 0.00	1211 0.00	106 0.00	435 0.00	31 0.00	115 0.00	515 0.00	1414 0.00
MID EASTERN SHORE	99 0.00	203 0.00	272 0.00	431 0.00	65 0.00	102 0.00	219 0.00	121 0.00	724 0.00	9978 0.20	1132 0.00
WICOMICO	59721 3.00	187265 8.60	258446 10.80	364410 7.80	234250 9.40	268438 8.60	435783 13.20	481027 13.00	415148 13.60	381696 9.00	690167 14.00
RAPPAHANNOCK	224100 11.20	119700 5.40	47100 2.00	10800 0.20	69400 2.80	116900 3.80	147800 4.40	208600 5.60	126500 4.20	99200 2.40	55700 1.20
YORK	47000 2.40	198800 9.20	351100 14.60	650600 14.00	235400 9.60	424700 13.60	511100 15.40	1128100 30.60	684100 22.40	1205700 28.40	1110800 22.60
JAMES	34300 1.80	10700 0.40	22400 1.00	12700 0.20	8300 0.40	1300 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
LOWER BAY	1616500 80.40	1608700 73.80	1634400 68.20	3569800 77.00	1911900 77.20	2276000 73.00	2164500 65.40	1628100 44.00	1690800 55.20	2472200 58.00	2897600 59.00
LOWER EASTERN SHORE	3755 0.20	2920 0.20	39141 1.60	11315 0.20	3487 0.20	10231 0.40	23830 0.80	17930 0.40	63327 2.00	50061 1.20	94843 2.00
SEA TROUT TOTAL	2011337	2181669	2395088	4641016	2475954	3118006	3309352	3693861	3062525	4259595	4918232

TABLE 12
TOTAL LANDINGS BY SYSTEM FOR SHAD UNCLASSED FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	450257 9.00	534522 21.60	530153 17.40	354565 11.40	98018 5.60	51623 4.00	22856 2.80	8982 0.60	23134 1.80	5603 0.60	1456 0.20
WESTERN TRIBUTARIES	11195 0.20	3138 0.20	5689 0.20	6180 0.20	4960 0.20	1309 0.00	1732 0.20	280 0.00	162 0.00	39 0.00	408 0.00
UPPER EASTERN SHORE	78522 1.60	78759 3.20	78717 2.60	65088 2.20	7966 0.40	9805 0.80	3363 0.40	2462 0.20	1469 0.20	416 0.00	80 0.00
MID-BAY	7305 0.20	30142 1.20	18988 0.60	2365 0.00	2342 0.20	3752 0.20	438 0.00	1273 0.00	98 0.00	266 0.00	179 0.00
POTOMAC	325300 6.40	188100 7.60	252300 8.40	113700 3.60	44400 2.60	111000 8.40	84900 10.40	58700 4.00	33100 2.60	16300 1.80	5400 0.60
PATUXENT	511 0.00	1262 0.00	2156 0.00	1281 0.00	887 0.00	3558 0.20	426 0.00	702 0.00	340 0.00	1819 0.20	1552 0.20
MID EASTERN SHORE	3253 0.00	4592 0.20	5484 0.20	1869 0.00	3720 0.20	549 0.00	1109 0.20	175 0.00	83 0.00	93 0.00	973 0.20
WICOMICO	143189 2.80	190667 7.80	213106 7.00	139588 4.60	42240 2.40	59756 4.60	55592 6.80	30867 2.00	34647 2.60	11601 1.20	12655 1.40
RAPPAHANNOCK	874400 17.40	291500 11.80	49500 1.60	97000 3.20	139700 7.80	99100 7.60	31000 3.80	51000 3.40	38500 3.00	18200 2.00	13900 1.60
YORK	762800 15.20	128700 5.20	485900 16.00	312100 10.00	197500 11.20	205900 15.60	153200 18.80	926900 62.20	466100 36.20	420800 44.20	412400 45.60
JAMES	1500500 30.00	548900 22.20	923100 30.40	1375500 44.40	619000 34.80	519000 39.60	244700 30.20	303700 20.40	513300 39.80	355600 37.20	266000 29.40
LOWER BAY	756700 15.00	372300 15.00	398300 13.20	547700 17.80	562300 31.60	225300 17.20	201900 24.80	97300 6.60	157900 12.20	111900 11.80	176900 19.60
LOWER EASTERN SHORE	100690 2.00	101219 4.00	71841 2.40	76030 2.40	51688 3.00	22016 1.60	10715 1.40	6645 0.40	20929 1.60	11149 1.20	11152 1.20
SHAD UNCLASSED TOTAL	5014622	2473801	3035234	3092966	1774721	1312668	811931	1488986	1289762	953788	903055

TABLE 13
TOTAL LANDINGS BY SYSTEM FOR SPOT FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS											
SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
MID-BAY	0.00 ⁰	0.00 ⁰	0.00 ⁰	0.00 ⁰	0.00 ⁰	0.00 ⁰	0.00 ⁰	8200	0.00 ⁰	0.00 ⁰	0.00 ⁰
	0.60	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00
POTOMAC	98800	4800	48300	62200	34100	93900	15300	21300	78900	12700	5100
	1.80	1.00	1.60	2.60	1.60	6.20	1.40	1.40	2.80	0.60	0.20
WICOMICO	691100	78900	221200	262900	182400	199100	23600	96200	138600	87200	9000
	12.60	15.80	7.80	11.20	8.80	13.00	2.40	6.00	5.00	4.00	0.60
RAPPAHANNOCK	545100	81100	135600	18000	104700	118900	34300	112400	99100	29900	2400
	10.00	16.20	4.80	0.80	5.00	7.80	3.40	7.00	3.60	1.40	0.20
YORK	690000	105800	598300	147100	112400	97600	114700	466000	765600	748900	268500
	12.60	21.20	21.00	6.20	5.40	6.40	11.20	29.20	27.80	34.60	15.40
JAMES	720100	10400	100500	19400	2300	400	0.00	0.00	0.00	0.00	0.00
	13.20	2.00	3.60	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00
LOWER BAY	2726400	219800	1752400	1857500	1630000	1022300	838000	887500	1666500	1289000	1460900
	49.80	43.80	61.40	78.40	79.00	66.80	81.60	55.80	60.60	59.40	83.60
SPOT TOTAL	5471500	500800	2856300	2367100	2065900	1532200	1025900	1591600	2748700	2167700	1745900

TABLE 14
TOTAL LANDINGS BY SYSTEM FOR STRIPED BASS FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	1339264 27.80	774704 19.20	1061829 15.60	2739849 28.00	871078 15.40	857913 21.80	649681 23.60	845735 32.20	549714 33.80	458967 35.40	1259883 50.20
WESTERN TRIBUTARIES	206286 4.20	161856 4.00	256316 3.80	247111 2.60	134748 2.40	129589 3.20	36012 1.40	45007 1.80	34458 2.20	23820 1.80	50646 2.00
UPPER EASTERN SHORE	375897 7.80	210151 5.20	173365 2.60	292219 3.00	139774 2.40	144159 3.60	149757 5.40	111446 4.20	106193 6.60	77363 6.00	215576 8.60
MID-BAY	395365 8.20	457672 11.20	332860 4.80	1039359 10.60	269472 4.80	195522 5.00	157277 5.80	128297 4.80	43126 2.60	26684 2.00	90797 3.60
POTOMAC	390300 8.00	292300 7.20	336300 5.00	734800 7.60	716000 12.80	629900 16.00	600100 21.80	296400 11.40	188100 11.60	127000 9.80	232800 9.20
PATUXENT	83713 1.80	92548 2.20	73572 1.00	158489 1.60	101542 1.80	58823 1.40	25352 1.00	19607 0.80	7378 0.40	14265 1.00	19621 0.80
MID EASTERN SHORE	447125 9.20	350125 8.60	371547 5.40	318808 3.20	277066 5.00	258164 6.60	154282 5.60	159766 6.00	125340 7.80	88806 6.80	82676 3.20
WICOMICO	785356 16.20	832789 20.60	2134095 31.40	2264899 23.20	1472020 26.20	724877 18.40	410272 15.00	545250 20.80	309730 19.00	217276 16.80	354855 14.20
RAPPAHANNOCK	90500 1.80	154400 3.80	158500 2.40	335800 3.40	762000 13.60	264100 6.80	150100 5.40	215200 8.20	91000 5.60	114600 8.80	80300 3.20
YORK	57600 1.20	111200 2.80	311000 4.60	178200 1.80	94500 1.60	59000 1.60	43700 1.60	26300 1.00	10700 0.60	19800 1.60	6500 0.20
JAMES	115600 2.40	104000 2.60	63800 1.00	55200 0.60	24300 0.40	11100 0.20	0 0.00	0 0.00	0 0.00	1000 0.00	0 0.00
LOWER BAY	293900 6.00	275000 6.80	1136100 16.60	997400 10.20	317800 5.60	294100 7.40	138800 5.00	32900 1.20	28200 1.80	55400 4.20	21100 0.80
LOWER EASTERN SHORE	249151 5.20	236555 5.80	400220 5.80	419197 4.20	447567 8.00	302152 7.60	230896 8.40	194623 7.40	130235 8.00	74875 5.80	96141 3.80
STRIPED BASS TOTAL	4830057	4053300	6809504	9781331	5627867	3929399	2746229	2620531	1624174	1299856	2510895

TABLE 15
TOTAL LANDINGS BY SYSTEM FOR WHITE PERCH FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	385072 22.60	331030 18.00	198512 14.60	94784 9.60	98514 15.00	48587 7.00	100885 16.60	111808 13.40	319763 26.20	189347 22.40	305946 27.20
WESTERN TRIBUTARIES	98021 5.80	115872 6.40	54770 4.00	29918 3.00	22399 3.40	31332 4.40	25571 4.20	55607 6.60	87187 7.20	45590 5.40	63039 5.60
UPPER EASTERN SHORE	332347 19.60	267926 14.60	217114 16.00	209513 21.40	95989 14.80	106295 15.20	85855 14.20	135390 16.20	254856 20.80	130482 15.40	162635 14.60
MID-BAY	44839 2.60	56438 3.00	72755 5.40	25699 2.60	18726 2.80	12858 1.80	17842 3.00	28515 3.40	34112 2.80	20532 2.40	29502 2.60
POTOMAC	101200 6.00	65500 3.60	128500 9.40	33500 3.40	17700 2.80	59300 8.40	70400 11.60	112300 13.40	129900 10.60	72200 8.60	102600 9.20
PATUXENT	87259 5.20	78671 4.20	62947 4.60	26497 2.60	25982 4.00	43039 6.20	28901 4.80	45553 5.40	50466 4.20	44772 5.40	76840 6.80
MID EASTERN SHORE	313536 18.40	385098 21.00	292432 21.60	223728 22.80	114412 17.60	157546 22.60	63672 10.60	84911 10.20	115609 9.40	155026 18.40	154134 13.80
WICOMICO	131097 7.80	91198 5.00	82390 6.00	84743 8.60	63933 9.80	51575 7.40	56037 9.20	86678 10.40	137813 11.20	63867 7.60	129057 11.60
RAPPAHANNOCK	26000 1.60	80200 4.40	110100 8.20	88900 9.00	93200 14.20	72900 10.40	51400 8.40	83800 10.00	28800 2.40	44500 5.20	28600 2.60
YORK	21900 1.20	85300 4.60	26200 2.00	20300 2.00	2300 0.40	8400 1.20	32600 5.40	3600 0.40	900 0.00	7400 0.80	600 0.00
JAMES	30900 1.80	41900 2.20	9600 0.80	6000 0.60	10900 1.60	2800 0.40	0 0.00	0 0.00	0 0.00	200 0.00	100 0.00
LOWER BAY	52800 3.20	151300 8.20	28000 2.00	46700 4.80	25000 3.80	22500 3.20	4500 0.80	2100 0.20	1300 0.20	9000 1.00	1200 0.20
LOWER EASTERN SHORE	75426 4.40	87982 4.80	70142 5.20	91604 9.40	63744 9.80	83029 11.80	67276 11.20	82803 10.00	60365 5.00	59221 7.00	66692 6.00
WHITE PERCH TOTAL	1700397	1838415	1353462	981886	652799	700161	604939	833063	1221071	842137	1120945

TABLE 16
TOTAL LANDINGS BY SYSTEM FOR YELLOW PERCH FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
POTOMAC	200 6.00	100 16.60	5800 53.20	1200 36.40	1200 16.40	3400 87.20	1700 60.80	1600 69.60	1000 100	300 75.00	0 0.00
WICOMICO	0 0.00	400 66.60	0 0.00	1200 36.40	5200 71.20	0 0.00	1100 39.20	700 30.40	0 0.00	100 25.00	300 100
RAPPAHANNOCK	800 24.20	0 0.00	4900 45.00	0 0.00	300 4.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
YORK	800 24.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
JAMES	0 0.00	100 16.60	100 1.00	900 27.20	600 8.20	500 12.80	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
LOWER BAY	1500 45.40	0 0.00	100 1.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
YELLOW PERCH TOTAL	3300	600	10900	3300	7300	3900	2800	2300	1000	400	300

TABLES 17 - 28
SYSTEM PROFILES OF
COMMERCIAL SPECIES

TABLE 17
WESTERN TRIBUTARIES SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	96900 12.60	227100 23.60	266100 18.80	109900 15.40	130300 10.60	179662 43.20	165568 63.20	65822 33.60	38207 19.40	59963 36.60	50953 4.00
SOFT SHELL CLAM	323100 42.20	120000 12.60	63700 4.40	2700 0.40	6900 0.60	1100 0.20	3900 1.40	600 0.40	2500 1.20	4300 2.60	0 0.00
CRABS	11700 1.60	104900 11.00	305400 21.60	247600 34.60	249700 20.20	3100 0.80	2500 1.00	2100 1.00	2100 1.00	1300 0.80	91700 7.00
ALEWIFE HERRING	11075 1.40	8133 0.80	12234 0.80	4524 0.60	60620 4.80	5837 1.40	667 0.20	586 0.20	2529 1.20	636 0.40	4406 0.40
BLUEFISH	524 0.00	643 0.00	270343 19.00	6155 0.80	16311 1.40	5920 1.40	3351 1.20	5205 2.60	4066 2.00	554 0.40	23777 1.80
CATFISH	8032 1.00	15156 1.60	10110 0.80	9409 1.40	4141 0.40	4053 1.00	5701 2.20	6913 3.60	16948 8.60	16571 10.00	14595 1.20
CROAKER	0 0.00	0 0.00	2212 0.20	45 0.00	0 0.00	73 0.00	0 0.00	9 0.00	0 0.00	0 0.00	0 0.00
MENHADEN	16 0.00	197921 20.60	162499 11.40	50087 7.00	607504 49.00	54617 13.20	16436 6.20	13364 6.80	9022 4.60	10881 6.60	992872 76.80
SEA TROUT	115 0.00	3859 0.40	8554 0.60	0 0.00	736 0.00	84 0.00	560 0.20	0 0.00	294 0.20	517 0.40	1697 0.20
SHAD UNCLASSIFIED	11195 1.40	3138 0.40	5689 0.40	6180 0.80	4960 0.40	1309 0.40	1732 0.60	280 0.20	162 0.00	39 0.00	408 0.00
STRIPED BASS	206286 26.80	161856 16.80	256316 18.00	247111 34.60	134748 10.80	129589 31.20	36012 13.80	45007 23.00	34458 17.40	23820 14.60	50646 4.00
WHITE PERCH	98021 12.80	115872 12.00	54770 3.80	29918 4.20	22399 1.80	31332 7.60	25571 9.80	55607 28.40	87187 44.20	45590 27.80	63039 4.80
WESTERN TRIBUTARIES TOTAL	766964	958578	1417927	713629	1238319	416676	261998	195493	197473	164171	1294093

TABLE 18
UPPER EASTERN SHORE SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	2269800 40.80	1075400 23.60	1842900 57.60	752200 45.40	399300 38.20	448815 32.80	427818 43.40	361057 34.60	237270 16.00	123116 8.80	132834 7.40
SOFT SHELL CLAM	1849600 33.40	2443500 53.60	453100 14.20	17500 1.00	75700 7.20	85000 6.20	20100 2.00	103200 10.00	496400 33.60	599600 43.20	574700 32.20
CRABS	242200 4.40	254000 5.60	231300 7.20	143500 8.60	196500 18.80	336000 24.60	209000 21.20	199000 19.20	200400 13.60	187000 13.40	118900 6.60
ALEWIFE HERRING	358367 6.40	104873 2.40	58003 1.80	121278 7.40	44717 4.20	115358 8.40	8246 0.80	10203 1.00	8003 0.60	15742 1.20	18632 1.00
BLUEFISH	0 0.00	0 0.00	1378 0.00	1745 0.20	4504 0.40	3407 0.20	2781 0.20	6470 0.60	9901 0.60	3381 0.20	19043 1.00
CATFISH	43357 0.80	122410 2.60	115305 3.60	46550 2.80	49967 4.80	61105 4.40	64323 6.60	94113 9.00	135953 9.20	221602 16.00	336353 18.80
CROAKER	5 0.00	0 0.00	0 0.00	1666 0.20	0 0.00	0 0.00	0 0.00	180 0.00	0 0.00	0 0.00	0 0.00
MENHADEN	1231 0.00	2160 0.00	20724 0.60	8551 0.60	29657 2.80	57960 4.20	16585 1.60	17491 1.60	29438 2.00	28231 2.00	209781 11.80
SEA TROUT	0 0.00	165 0.00	4105 0.20	0 0.00	153 0.00	56 0.00	5 0.00	4 0.00	164 0.00	91 0.00	489 0.00
SHAD UNCLASSED	78522 1.40	78759 1.80	78717 2.40	65088 4.00	7966 0.80	9805 0.80	3363 0.40	2462 0.20	1469 0.00	416 0.00	80 0.00
STRIPED BASS	375897 6.80	210151 4.60	173365 5.40	292219 17.60	139774 13.40	144159 10.60	149757 15.20	111446 10.80	106193 7.20	77363 5.60	215576 12.00
WHITE PERCH	332347 6.00	267926 5.80	217114 6.80	209513 12.60	95989 9.20	106295 7.80	85855 8.60	135390 13.00	254856 17.20	130482 9.40	162635 9.00
UPPER EASTERN SHORE TOTAL	5551326	4559344	3196011	1659810	1044227	1367960	987833	1041016	1480047	1387024	1789023

TABLE 19
UPPER BAY SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	1972800 37.20	1172800 25.00	564900 16.80	144900 2.80	170400 6.40	87034 3.00	40380 1.60	85369 3.20	76587 2.60	57734 1.60	131105 2.60
SOFT SHELL CLAM	240300 4.60	370300 8.00	97900 3.00	1200 0.00	11600 0.40	35700 1.20	11500 0.40	6800 0.20	31800 1.00	184500 5.00	280400 5.60
CRABS	479100 9.00	417600 9.00	533300 15.80	325700 6.20	367600 13.60	1216100 43.00	1137100 46.40	1195300 45.60	1468900 49.40	2021700 53.80	2209400 44.20
ALEWIFE HERRING	350729 6.60	877522 18.80	241133 7.20	1087689 21.00	757740 28.20	71955 2.60	60664 2.40	37125 1.40	43459 1.40	26540 0.80	11835 0.20
BLUEFISH	5981 0.20	2428 0.00	1179 0.00	6318 0.20	35948 1.40	20190 0.80	116174 4.80	94012 3.60	45881 1.60	100549 2.60	117419 2.40
CATFISH	20928 0.40	109928 2.40	80838 2.40	60664 1.20	43855 1.60	47105 1.60	72895 3.00	82846 3.20	54961 1.80	113883 3.00	136968 2.80
CROAKER	0 0.00	0 0.00	197 0.00	0 0.00	8750 0.40	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
MENHADEN	49444 1.00	92295 2.00	49526 1.40	381653 7.40	222292 8.20	395336 14.00	242687 9.80	157527 6.00	358719 12.00	594941 15.80	537119 10.80
SEA TROUT	633 0.00	1262 0.00	7532 0.20	23 0.00	66 0.00	268 0.00	634 0.00	586 0.00	2172 0.00	3357 0.00	3280 0.00
SHAD UNCLASSSED	450257 8.60	534522 11.40	530153 15.80	354565 6.80	98018 3.60	51623 1.80	22856 1.00	8982 0.40	23134 0.80	5603 0.20	1456 0.00
STRIPED BASS	1339264 25.20	774704 16.60	1061829 31.60	2739849 52.80	871078 32.40	857913 30.20	649681 26.40	845735 32.20	549714 18.40	458967 12.20	1259883 25.20
WHITE PERCH	385072 7.20	331030 7.00	198512 5.80	94784 1.80	98514 3.60	48587 1.80	100885 4.20	111808 4.20	319763 10.80	189347 5.00	305946 6.20
UPPER BAY TOTAL	5294508	4684391	3366999	5197345	2685861	2831811	2455456	2626090	2975070	3757121	4994811

TOTAL LANDINGS BY SYSTEM FOR OYSTER FISHERY

ANNUAL TOTAL POUNDS AND SYSTEM AS % OF TOTAL BAY LANDINGS

SYSTEM	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
UPPER BAY	1972800 8.40	1172800 4.80	564900 2.40	144900 0.60	170400 0.60	87034 0.40	40380 0.20	85369 0.40	76567 0.40	57734 0.20	131105 0.60
WESTERN TRIBUTARIES	96900 0.40	227100 1.00	266100 1.20	109900 0.40	130300 0.60	179662 0.80	165568 0.80	65822 0.40	38207 0.20	59963 0.20	50953 0.20
UPPER EASTERN SHORE	2269800 9.60	1075400 4.40	1842900 7.80	752200 3.00	399300 1.60	448815 1.80	427818 2.00	361057 2.00	237270 1.00	123116 0.60	132834 0.60
MID-BAY	6391700 27.00	6401800 26.00	4662600 19.80	5696200 23.00	3467100 14.20	3255895 13.40	2286212 10.40	2331574 12.20	1907159 8.60	1161753 5.40	1233372 5.40
POTOMAC	2417800 10.20	3453400 14.00	2162500 9.20	1538300 6.20	2896500 11.80	3129506 12.80	2521569 11.60	2201829 11.60	1966914 8.80	1783605 8.40	1561558 6.80
PATUXENT	499200 2.20	627400 2.60	1513300 6.40	1338700 5.40	843100 3.40	575902 2.40	737438 3.40	306995 1.60	640908 2.80	468519 2.20	269903 1.20
MID EASTERN SHORE	2068900 8.80	3945600 16.00	7294800 31.00	9408300 38.00	9706000 39.60	10437869 42.80	10456912 48.00	6167203 32.60	4868699 21.80	4739645 22.20	7670304 33.20
WICOMICO	1358600 5.80	961900 3.80	847300 3.60	941700 3.80	810800 3.40	514532 2.20	363110 1.60	1223582 6.40	1874086 8.40	1257084 5.80	1204611 5.20
RAPPAHANNOCK	3339700 14.00	2800200 11.40	1644600 7.00	1890100 7.60	3087300 12.60	2626800 10.80	1625800 7.40	1336800 7.00	1803900 8.00	1922000 9.00	2194200 9.40
YORK	327000 1.40	240600 1.00	154700 0.60	73700 0.20	111100 0.40	180200 0.80	772300 3.60	619900 3.20	711600 3.20	802400 3.80	643500 2.80
JAMES	1171800 5.00	1522100 6.20	1062800 4.60	1393200 5.60	1013900 4.20	379100 1.60	409200 1.80	424000 2.20	723200 3.20	1103700 5.20	970000 4.20
LOWER BAY	757800 3.20	615100 2.40	277300 1.20	354900 1.40	308800 1.20	506600 2.00	505000 2.40	184000 1.00	620400 2.80	439100 2.00	621600 2.60
LOWER EASTERN SHORE	1069800 4.60	1646700 6.60	1208400 5.20	1178100 4.80	1560700 6.40	2055316 8.40	1466237 6.80	3656619 19.20	6900662 30.80	7456535 34.80	6480285 28.00
OYSTER TOTAL	23741800	24690100	23502200	24820200	24505300	24377232	21777545	18964750	22369571	21375153	23164225

TABLE 20
MID-BAY SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	6391700 21.40	6401800 22.40	4662600 22.60	5696200 30.00	3467100 19.60	3255895 17.40	2286212 16.00	2331574 15.80	1907159 16.00	1161753 7.40	1233372 10.20
SOFT SHELL CLAM	2836000 9.40	2667700 9.40	1255700 6.00	373000 2.00	1080800 6.20	825400 4.40	119300 0.80	647600 4.40	1015700 8.60	864100 5.60	237800 2.00
CRABS	18042500 60.20	15662300 54.80	12672600 61.20	10293600 54.40	11814700 66.60	12559800 67.40	9942100 69.40	9522300 64.60	8150500 68.80	13140400 84.20	9871300 81.20
ALEWIFE HERRING	479380 1.60	752212 2.60	194429 1.00	50794 0.20	102315 0.60	120364 0.60	3515 0.00	141254 1.00	2102 0.00	4240 0.00	4906 0.00
BLUEFISH	32871 0.20	73847 0.20	7162 0.00	99343 0.60	105288 0.60	60486 0.40	119444 0.80	119789 0.80	33320 0.20	22466 0.20	19067 0.20
CATFISH	51 0.00	354 0.00	530 0.00	1426 0.00	175 0.00	222 0.00	462 0.00	227 0.00	429 0.00	726 0.00	1713 0.00
CROAKER	147 0.00	28 0.00	0 0.00	70 0.00	106 0.00	307 0.00	112 0.00	86671 0.60	2 0.00	0 0.00	0 0.00
MENHADEN	1697868 5.60	2495598 8.80	1497634 7.20	1365868 7.20	855339 4.80	1612213 8.60	1669828 11.60	1505672 10.20	661364 5.60	371363 2.40	669467 5.60
SEA TROUT	22593 0.00	32961 0.20	1452 0.00	4131 0.00	1386 0.00	1621 0.00	2086 0.00	204962 1.40	881 0.00	2480 0.00	2110 0.00
SHAD UNCLASSSED	7305 0.00	30142 0.20	18988 0.00	2365 0.00	2342 0.00	3752 0.00	438 0.00	1273 0.00	98 0.00	266 0.00	179 0.00
SPOT	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	8200 0.00	0 0.00	0 0.00	0 0.00
STRIPED BASS	395365 1.40	457672 1.60	332860 1.60	1039359 5.40	269472 1.60	195522 1.00	157277 1.00	128297 0.80	43126 0.40	26684 0.20	90797 0.80
WHITE PERCH	44839 0.20	56438 0.20	72755 0.40	25699 0.20	18726 0.20	12858 0.00	17842 0.20	28515 0.20	34112 0.20	20532 0.20	29502 0.20
MID-BAY TOTAL	29950619	28631052	20716710	18951855	17717749	18648440	14318616	14726334	11848793	15615010	12160213

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TABLE 21
PATUXENT SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	499200 60.00	627400 65.40	1513300 81.40	1338700 78.80	843100 61.80	575902 55.80	737438 74.00	306995 52.20	640908 71.40	468519 63.20	269903 48.20
SOFT SHELL CLAM	2300 0.20	0 0.00	0 0.00	300 0.00	182000 13.40	57200 5.60	14000 1.40	13800 2.40	72900 8.20	126600 17.00	99500 17.80
CRABS	129200 15.60	109400 11.40	142800 7.60	99400 5.80	140200 10.20	234700 22.80	156200 15.60	182200 31.00	112800 12.60	50700 6.80	62200 11.20
ALEWIFE HERRING	23498 2.80	21406 2.20	21058 1.20	16371 1.00	6647 0.40	13228 1.20	4406 0.40	1471 0.20	3010 0.40	2378 0.40	2408 0.40
BLUEFISH	8 0.00	2893 0.40	210 0.00	9936 0.60	8383 0.60	954 0.00	1278 0.20	2076 0.40	1119 0.20	271 0.00	5307 1.00
CATFISH	4085 0.40	13050 1.40	30997 1.60	41254 2.40	52379 3.80	36185 3.60	19138 2.00	11312 2.00	7073 0.80	14828 2.00	17798 3.20
CROAKER	0 0.00	5 0.00	0 0.00	79 0.00	143 0.00	34 0.00	78 0.00	17 0.00	7 0.00	4 0.00	6 0.00
MENHADEN	3392 0.40	4474 0.40	2068 0.20	2686 0.20	1925 0.20	7551 0.80	8316 0.80	3739 0.60	1043 0.20	16053 2.20	2659 0.40
SEA TROUT	221 0.00	8434 0.80	7986 0.40	3606 0.20	1211 0.00	106 0.00	435 0.00	31 0.00	115 0.00	515 0.00	1414 0.20
SHAD UNCLASSED	511 0.00	1262 0.20	2156 0.20	1281 0.00	887 0.00	3558 0.40	426 0.00	702 0.20	340 0.00	1819 0.20	1552 0.20
STRIPED BASS	83713 10.00	92548 9.60	73572 4.00	158489 9.40	101542 7.40	58823 5.80	25352 2.60	19607 3.40	7378 0.80	14265 2.00	19621 3.60
WHITE PERCH	87259 10.40	78671 8.20	62947 3.40	26497 1.60	25982 2.00	43039 4.20	28901 3.00	45553 7.80	50466 5.60	44772 6.00	76840 13.80
PATUXENT TOTAL	833387	959543	1857094	1698599	1364399	1031280	995968	587503	897159	740724	559208

TABLE 22
POTOMAC SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	2417800 38.20	3453400 50.20	2162500 43.60	1538300 39.00	2896500 56.40	3129506 52.40	2521569 34.80	2201829 21.80	1966914 22.60	1783605 23.60	1561558 19.80
SOFT SHELL CLAM	650800 10.40	151600 2.20	13400 0.20	800 0.00	3100 0.00	600 0.00	0 0.00	0 0.00	300 0.00	600 0.00	0 0.00
CRABS	1420000 22.40	1786200 26.00	1496100 30.20	838000 21.20	579000 11.20	823100 13.80	970600 13.40	2750600 27.20	1895800 21.80	2970100 39.20	2030800 25.80
ALEWIFE HERRING	36200 0.60	50200 0.80	56700 1.20	37800 1.00	96500 1.80	175100 3.00	84600 0.80	14100 0.20	81800 1.00	23500 0.40	120100 1.60
BLUEFISH	6400 0.20	9000 0.20	11000 0.20	32600 0.80	47600 1.00	66900 1.20	57800 0.80	65500 0.60	33500 0.40	42600 0.60	41400 0.60
CATFISH	63600 1.00	28100 0.40	78700 1.60	79400 2.00	66300 1.20	73400 1.20	74800 1.00	74700 0.80	131800 1.60	131700 1.80	164800 2.00
CROAKER	0 0.00	1000 0.00	600 0.00	1600 0.00	400 0.00	39100 0.60	56000 0.80	43600 0.40	2400 0.00	600 0.00	100 0.00
MENHADEN	801500 12.60	844600 12.20	363400 7.40	451900 11.40	619000 12.00	738800 12.40	2705300 37.40	4455200 44.00	4066300 46.80	2370800 31.20	3553700 45.20
SEA TROUT	2300 0.00	6700 0.00	12600 0.20	13200 0.40	9600 0.20	18200 0.40	22400 0.40	24400 0.20	78300 1.00	33800 0.40	59000 0.80
SHAD UNCLASSED	325300 5.20	188100 2.80	252300 5.00	113700 2.80	44400 0.80	111000 1.80	84900 1.20	58700 0.60	33100 0.40	16300 0.20	5400 0.00
SPOT	98800 1.60	4800 0.00	48300 1.00	62200 1.60	34100 0.60	93900 1.60	15300 0.20	21300 0.20	78900 1.00	12700 0.20	5100 0.00
STRIPED BASS	390300 6.20	292300 4.20	336300 6.80	734800 18.60	716000 14.00	629900 10.60	600100 8.20	296400 3.00	188100 2.20	127000 1.60	232800 3.00
WHITE PERCH	101200 1.60	65500 1.00	128500 2.60	33500 0.80	17700 0.40	59300 1.00	70400 1.00	112300 1.20	129900 1.40	72200 1.00	102600 1.40

TABLE 22
POTOMAC SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS											
SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
YELLOW PERCH	200 0.00	100 0.00	5800 0.20	1200 0.00	1200 0.00	3400 0.00	1700 0.00	1600 0.00	1000 0.00	300 0.00	0 0.00
POTOMAC TOTAL	6314400	6881600	4966200	3939000	5131400	5962206	7245469	10120229	8688114	7585805	7877358

TABLE 23
WICOMICO SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS											
SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	1358600 8.60	961900 4.80	847300 3.20	941700 3.40	810800 3.20	514532 1.80	363110 1.80	1223582 4.00	1874086 7.20	1257084 5.40	1204611 4.20
SOFT SHELL CLAM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	45100 0.20	95400 0.40	54800 0.20	38300 0.20	92100 0.40
HARD SHELL CLAM	0 0.00	0 0.00	161700 0.60	242000 0.80	125900 0.40	81700 0.20	40900 0.20	41600 0.20	12200 0.00	24000 0.20	10000 0.00
CRABS	1535400 9.80	6438600 31.60	7042500 27.20	6037500 21.60	7727600 30.40	7517500 27.60	6305900 30.00	7002400 22.40	6511000 24.80	7622700 32.20	8809700 30.40
ALEWIFE HERRING	6456362 40.80	6235135 30.60	6886885 26.60	3360350 12.00	3587659 14.20	5676289 20.80	1280706 6.20	509683 1.60	1388750 5.40	982071 4.20	516023 1.80
BLUEFISH	79594 0.60	155803 0.80	152511 0.60	570854 2.00	788266 3.20	711903 2.60	546943 2.60	902761 2.80	293489 1.20	446172 1.80	742251 2.60
CATFISH	3852 0.00	1310 0.00	3968 0.00	1273 0.00	4122 0.00	8190 0.00	224432 1.00	92913 0.20	25719 0.00	79531 0.40	204584 0.80
CROAKER	1000 0.00	500 0.00	4626 0.00	26704 0.00	11702 0.00	83900 0.40	240400 1.20	916203 3.00	350000 1.40	59233 0.20	700 0.00
MENHADEN	4582932 29.00	5217915 25.60	7858249 30.40	13562676 48.60	10325324 40.60	11407255 41.80	10947483 52.20	19257314 61.60	14616467 55.80	12363815 52.40	16111227 55.80
SEA TROUT	59721 0.40	187265 1.00	258446 1.00	364410 1.40	234250 1.00	268438 1.00	435783 2.00	481027 1.60	415148 1.60	381696 1.60	690167 2.40
SHAD UNCLASSIFIED	143189 1.00	190667 1.00	213106 0.80	139588 0.60	42240 0.20	59756 0.20	55592 0.20	30867 0.00	34647 0.20	11601 0.00	12655 0.00
SPOT	691100 4.40	78900 0.40	221200 0.80	262900 1.00	182400 0.80	199100 0.80	23600 0.20	96200 0.40	138600 0.60	87200 0.40	9000 0.00
STRIPED BASS	785356 5.00	832789 4.00	2134095 8.20	2264899 8.20	1472020 5.80	724877 2.60	410272 2.00	545250 1.80	309730 1.20	217276 1.00	354855 1.20

TABLE 23
WICOMICO SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS											
SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
WHITE PERCH	131097 0.80	91198 0.40	82390 0.40	84743 0.40	63933 0.20	51575 0.20	56037 0.20	86676 0.20	137813 0.60	63867 0.20	129057 0.40
YELLOW PERCH	0 0.00	400 0.00	0 0.00	1200 0.00	5200 0.00	0 0.00	1100 0.00	700 0.00	0 0.00	100 0.00	300 0.00
WICOMICO TOTAL	15828203	20392382	25866976	27860797	25381416	27305015	20977358	31282576	26162449	23634646	28887230

TABLE 24
RAPPAHANNOCK SYSTEM LANDINGS BY SELECTED SPECIE
ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	3339700 26.60	2800200 36.80	1644600 27.00	1890100 28.80	3087300 22.60	2626800 16.20	1625800 9.80	1336800 8.00	1803900 11.80	1922000 25.40	2194200 14.80
CRABS	3961300 31.40	2508400 33.00	1619300 26.60	1421900 21.80	2426400 17.80	2014700 12.40	2089200 12.60	3236600 19.20	2978900 19.60	3266300 43.20	3786500 25.40
ALEWIFE HERRING	833600 6.60	1111000 14.60	1398900 23.00	1313600 20.00	2784400 20.40	1863000 11.40	925400 5.60	694800 4.20	336400 2.20	409300 5.40	414500 2.80
BLUEFISH	200 0.00	31300 0.40	40500 0.60	8900 0.20	161500 1.20	82400 0.60	106000 0.60	151500 1.00	103500 0.60	14800 0.20	27600 0.20
CATFISH	191700 1.60	85000 1.20	70100 1.20	99200 1.60	115000 0.80	187600 1.20	166800 1.00	448400 2.60	407900 2.60	213200 2.80	469200 3.20
CROAKER	0 0.00	17400 0.20	300 0.00	21400 0.40	21200 0.20	175500 1.00	136500 0.80	663300 4.00	184200 1.20	1800 0.00	0 0.00
MENHADEN	2508000 20.00	337200 4.40	815500 13.40	1246600 19.00	3913100 28.60	8612800 53.00	11133800 67.00	9575100 57.00	8984200 59.20	1434500 19.00	7812200 52.40
SEA TROUT	224100 1.80	119700 1.60	47100 0.80	10800 0.20	69400 0.60	116900 0.80	147800 0.80	208600 1.20	126500 0.80	99200 1.40	55700 0.40
SHAD UNCLASSED	874400 7.00	291500 3.80	49500 0.80	97000 1.40	139700 1.00	99100 0.60	31000 0.20	51000 0.40	38500 0.20	18200 0.20	13900 0.00
SPOT	545100 4.40	81100 1.00	135600 2.20	18000 0.20	104700 0.80	118900 0.80	34300 0.20	112400 0.60	99100 0.60	29900 0.40	2400 0.00
STRIPED BASS	90500 0.80	154400 2.00	158500 2.60	335800 5.20	762000 5.60	264100 1.60	150100 1.00	215200 1.20	91000 0.60	114600 1.60	80300 0.60
WHITE PERCH	26000 0.20	80200 1.00	110100 1.80	88900 1.40	93200 0.60	72900 0.40	51400 0.40	83800 0.40	28800 0.20	44500 0.60	28600 0.20
YELLOW PERCH	800 0.00	0 0.00	4900 0.00	0 0.00	300 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
RAPPAHANNOCK TOTAL	12595400	7617400	6094900	6552200	13678200	16234700	16598100	16777500	15182900	7568300	14885100

TABLE 25
YORK SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	327000 3.80	240600 2.20	154700 1.80	73700 2.60	111100 4.80	180200 5.20	772300 11.20	619900 5.00	711600 6.00	802400 9.60	643500 9.40
HARD SHELL CLAM	96700 1.20	161700 1.40	290600 3.40	250500 8.80	617300 26.40	283100 8.20	119800 1.80	73400 0.60	21500 0.20	26800 0.40	75000 1.20
CRABS	2158400 25.40	7345800 65.60	5940600 67.80	329200 11.60	167400 7.20	1291200 37.80	2239700 32.40	5293800 42.20	4892800 41.40	4037700 48.40	3754600 55.20
ALEWIFE HERRING	660300 7.80	686000 6.20	77400 0.80	427500 15.20	370900 16.00	116400 3.40	119000 1.80	40300 0.40	61400 0.60	60700 0.80	700 0.00
BLUEFISH	26000 0.40	49700 0.40	126600 1.40	93000 3.20	139900 6.00	210600 6.20	497600 7.20	671400 5.40	468100 4.00	317700 3.80	290800 4.20
CATFISH	239500 2.80	4800 0.00	13200 0.20	5300 0.20	11900 0.60	39900 1.20	333100 4.80	97500 0.80	40300 0.40	137300 1.60	143000 2.20
CROAKER	55000 0.60	37700 0.40	110800 1.20	267400 9.40	101300 4.40	452300 13.20	712700 10.40	2420100 19.20	2687000 22.80	552600 6.60	102900 1.60
MENHADEN	3357400 39.40	2038100 18.20	271200 3.00	75300 2.60	168200 7.20	54400 1.60	1261100 18.20	774300 6.20	992000 8.40	0 0.00	0 0.00
SEA TROUT	47000 0.60	198800 1.80	351100 4.00	650600 23.00	235400 10.20	424700 12.40	511100 7.40	1128100 9.00	684100 5.80	1205700 14.40	1110800 16.40
SHAD UNCLASSSED	762800 9.00	128700 1.20	485900 5.60	312100 11.00	197500 8.40	205900 6.00	153200 2.20	926900 7.40	466100 4.00	420800 5.00	412400 6.00
SPOT	690000 8.20	105800 1.00	598300 6.80	147100 5.20	112400 4.80	97600 2.80	114700 1.60	466000 3.80	765600 6.40	748900 9.00	268500 4.00
STRIPED BASS	57600 0.60	111200 1.00	311000 3.60	178200 6.20	94500 4.00	59000 1.80	49700 0.60	26300 0.20	10700 0.00	19800 0.20	6500 0.00
WHITE PERCH	21900 0.20	85300 0.80	26200 0.20	20300 0.80	2300 0.00	8400 0.20	32600 0.40	3600 0.00	900 0.00	7400 0.00	600 0.00

TABLE 25
YORK SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
YELLOW PERCH	800 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
YORK TOTAL	8500400	11194200	8757600	2830200	2330100	3423700	6910600	12541600	11802100	8937800	6809300

TABLE 26
JAMES SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	1171800 14.80	1522100 23.20	1062800 17.60	1393200 32.40	1013900 31.80	379100 14.60	409200 27.20	424000 14.80	723200 32.60	1103700 43.20	970000 40.80
HARD SHELL CLAM	58100 0.80	377400 5.80	0 0.00	0 0.00	0 0.00	348500 13.40	248900 16.40	177600 6.20	200200 9.00	241700 9.40	285100 12.00
CRABS	1571000 19.80	2669300 40.60	2328700 38.60	330200 7.60	89600 2.80	32400 1.20	168100 11.20	967100 33.80	165000 7.40	323900 12.60	209200 8.80
ALEWIFE HERRING	885800 11.20	29700 0.40	8800 0.20	1700 0.00	82100 2.60	41900 1.60	0 0.00	0 0.00	0 0.00	41700 1.60	0 0.00
BLUEFISH	31300 0.40	2900 0.00	14100 0.20	9600 0.20	7800 0.20	9300 0.40	0 0.00	0 0.00	0 0.00	0 1.60	0 0.00
CATFISH	645000 8.20	1264800 19.20	1373000 22.80	1083200 25.20	1330900 41.80	1247100 48.00	438600 29.00	987300 34.60	621500 28.00	491700 19.20	642300 27.00
CROAKER	11000 0.20	3600 0.00	20300 0.40	2600 0.00	1400 0.00	4600 0.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
MENHADEN	1180600 14.80	0 0.00	105300 1.80	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
SEA TROUT	34300 0.40	10700 0.20	22400 0.40	12700 0.20	8300 0.20	1300 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
SHAD UNCLASSSED	1500500 18.80	548900 8.40	923100 15.40	1375500 32.00	619000 19.40	519000 20.00	244700 16.20	303700 10.60	513300 23.00	355600 13.80	266000 11.20
SPOT	720100 9.00	10400 0.20	100500 1.60	19400 0.40	2300 0.00	400 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
STRIPED BASS	115600 1.40	104000 1.60	63800 1.00	55200 1.20	24300 0.80	11100 0.40	0 0.00	0 0.00	0 0.00	1000 0.00	0 0.00
WHITE PERCH	30900 0.40	41900 0.60	9600 0.20	6000 0.20	10900 0.40	2800 0.20	0 0.00	0 0.00	0 0.00	200 0.00	100 0.00

TABLE 26
JAMES SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS											
SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
YELLOW PERCH	0 ⁰ 0.00	100 ⁰ 0.00	100 ⁰ 0.00	900 ⁰ 0.00	600 ⁰ 0.00	500 ⁰ 0.00	0 ⁰ 0.00	0 ⁰ 0.00	0 ⁰ 0.00	0 ⁰ 0.00	0 ⁰ 0.00
JAMES TOTAL	7956000	6585800	6032500	4290200	3191100	2598000	1509500	2859700	2223200	2559500	2372700

TABLE 27
LOWER BAY SYSTEM LANDINGS BY SELECTED SPECIE
ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	757800 0.20	615100 0.20	277300 0.00	354900 0.00	308800 0.00	506600 0.20	505000 0.20	184000 0.00	620400 0.20	439100 0.00	621600 1.40
HARD SHELL CLAM	267100 0.00	387900 0.20	562200 0.20	489100 0.00	329900 0.00	78400 0.00	201800 0.00	147700 0.00	45300 0.00	58200 0.00	210600 0.60
CRABS	32044300 7.60	32714000 10.00	34361600 6.40	31702200 6.00	34332900 9.00	27119600 9.20	17330700 4.40	21184200 4.60	21728200 5.40	25124300 5.80	22612700 54.20
ALEWIFE HERRING	10514200 2.40	2587500 0.80	2798600 0.60	4219300 0.80	6555700 1.80	3739200 1.20	1878600 0.40	29800 0.00	339600 0.00	188900 0.00	250400 0.60
BLUEFISH	440300 0.20	341200 0.20	817800 0.20	2104900 0.40	1973300 0.60	2003600 0.60	2394700 0.60	1306600 0.20	1368700 0.40	1585700 0.40	1365200 3.20
CATFISH	15100 0.00	17300 0.00	19100 0.00	2200 0.00	2000 0.00	1800 0.00	1100 0.00	10300 0.00	1700 0.00	1900 0.00	2400 0.00
CROAKER	54200 0.00	150900 0.00	250700 0.00	709900 0.20	841600 0.20	2301900 0.80	2768400 0.60	2967500 0.60	3036000 0.80	1138300 0.20	503000 1.20
MENHADEN	377184100 88.40	290675700 88.00	498661300 91.80	483906000 91.20	335058100 87.20	253328800 86.40	370610900 92.80	439190000 94.00	379269500 92.60	407466600 92.60	11616400 27.80
SEA TROUT	1616500 0.40	1608700 0.40	1634400 0.40	3569800 0.60	1911900 0.40	2276000 0.80	2164500 0.60	1628100 0.40	1690800 0.40	2472200 0.60	2897600 7.00
SHAD UNCLASSED	756700 0.20	372300 0.20	398300 0.00	547700 0.20	562300 0.20	225300 0.00	201900 0.00	97300 0.00	157900 0.00	111900 0.00	176900 0.40
SPOT	2726400 0.60	219800 0.00	1752400 0.40	1857500 0.40	1630000 0.40	1022300 0.40	838000 0.20	887500 0.20	1666500 0.40	1289000 0.20	1460900 3.60
STRIPED BASS	293900 0.00	275000 0.00	1136100 0.20	997400 0.20	317800 0.00	294100 0.20	138800 0.00	32900 0.00	28200 0.00	55400 0.00	21100 0.00
WHITE PERCH	52800 0.00	151300 0.00	28000 0.00	46700 0.00	25000 0.00	22500 0.00	4500 0.00	2100 0.00	1300 0.00	9000 0.00	1200 0.00

TABLE 27
LOWER BAY SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS											
SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
YELLOW PERCH	1500 0.00	0 0.00	100 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
LOWER BAY TOTAL	426724900	330116700	542697900	530507600	383849300	292919900	399038900	467668000	409954100	439940500	41740000

TABLE 28
LOWER EASTERN SHORE SYSTEM LANDINGS BY SELECTED SPECIE

ANNUAL TOTAL POUNDS AND SPECIE AS % OF SYSTEM LANDINGS

SPECIE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
OYSTER	1069800 14.80	1646700 25.20	1208400 17.80	1178100 15.60	1560700 20.60	2055316 28.40	1466237 22.60	3656619 44.80	6900662 66.60	7456535 65.80	6480285 50.20
SOFT SHELL CLAM	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1001700 15.40	225900 2.80	59300 0.60	197500 1.80	193000 1.40
HARD SHELL CLAM	45900 0.60	11300 0.20	15300 0.20	7500 0.00	1100 0.00	13900 0.20	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
CRABS	4814000 66.20	3654900 55.80	4200200 61.80	4156300 55.20	4848800 63.80	4161200 57.60	3136500 48.20	2955300 36.20	1475000 14.20	2182600 19.20	4110800 31.80
ALEWIFE HERRING	393399 5.40	321568 5.00	251613 3.80	224508 3.00	122842 1.60	71083 1.00	12978 0.20	9989 0.20	20759 0.20	34071 0.40	26700 0.20
BLUEFISH	788 0.00	4006 0.00	3774 0.00	16352 0.20	31473 0.40	28003 0.40	87416 1.40	38071 0.40	73216 0.80	34518 0.40	91648 0.80
CATFISH	26805 0.40	31219 0.40	27394 0.40	42277 0.60	36869 0.40	44584 0.60	26139 0.40	28316 0.40	42478 0.40	89762 0.80	86033 0.60
CROAKER	2 0.00	0 0.00	0 0.00	0 0.00	19 0.00	805 0.00	8133 0.20	1119 0.00	1704 0.00	103 0.00	0 0.00
MENHADEN	497774 6.80	455442 7.00	511101 7.60	1297686 17.20	429676 5.60	436191 6.00	437533 6.80	944303 11.60	1504768 14.60	1139469 10.00	1643062 12.80
SEA TROUT	3755 0.00	2920 0.00	39141 0.60	11315 0.20	3487 0.00	10231 0.20	23830 0.40	17930 0.20	63327 0.60	50061 0.40	94843 0.80
SHAD UNCLASSED	100690 1.40	101219 1.60	71841 1.00	76030 1.00	51688 0.60	22016 0.40	10715 0.20	6645 0.00	20929 0.20	11149 0.00	11152 0.00
STRIPED BASS	249151 3.40	236555 3.60	400220 5.80	419197 5.60	447567 5.80	302152 4.20	230896 3.60	194623 2.40	130235 1.20	74875 0.60	96141 0.80
WHITE PERCH	75426 1.00	87982 1.40	70142 1.00	91604 1.20	63744 0.80	83029 1.20	67276 1.00	82803 1.00	60365 0.60	59221 0.60	66692 0.60
LOWER EASTERN SHORE TOTAL	7277490	6553811	6799126	7520869	7597965	7228510	6509353	8161618	10352743	11329864	12900356

APPENDIX D

PERCEPTIONS OF ENVIRONMENTAL
QUALITY IN CHESAPEAKE BAY

PERCEPTIONS OF ENVIRONMENTAL QUALITY IN CHESAPEAKE BAY

D.1 REVIEW OF RECENT STUDIES CONDUCTED IN OTHER AREAS

Four studies by David (1971),^{1/} Dornbush (1975),^{2/} Binkley and Hannemann, (1975)^{3/} and Bouwes and Schneider (1979)^{4/} have attempted to examine how individuals' perceptions of water quality correspond to actual water quality indicators. Each study used survey data. The most frequently cited in the David study visual characteristics of water pollution were algae and green scum, murky-dark and odor and floating debris. However, Dornbush found these characteristics to be unimportant. In terms of the association between perceived and actual water quality David found that respondents correctly classified water bodies in Wisconsin as polluted or not as compared to scientific criteria. Dornbush found substantial differences in the respondents' perceptions of pollution and actual measured water quality indicators, a similar conclusion reached by Binkley and Hannemann.

Because of the disparity between perceptions of pollution and actual measures of water quality, there is a difficult problem of establishing a link between recreational behavior and changes in water pollution, i.e., no systematic relationship has been established between the subjective indicators of water quality and physically measurable parameters. Ultimately, the level of benefits derived from water quality improvement is determined by perceptions of the user rather than by scientific criteria (Bouwes and Schneider, 1979).

D.2 SURVEYS OF INDIVIDUALS' PERCEPTIONS OF WATER QUALITY IN CHESAPEAKE BAY

In a recent survey, the Baltimore Environmental Center found that, in Maryland, support for the environment was strongest in the mid range of education and income.^{5/} Those in the lowest income and education levels are least

supportive. A majority of respondents were unwilling to sacrifice environmental quality for energy or employment. There was no difference in the support for environmental protection between whites and blacks. In general the Baltimore Environmental Center found that support for the environment decreased with age. In another survey of attitudes toward the environment, the Maryland Opinion Center (University of Maryland) found that 47 percent of citizens considered industrial pollution to be the major cause of water pollution.6/

The Maryland Opinion Center asked a series of questions about the condition and use of the Chesapeake Bay. About half the respondents thought the Bay was in a bad environmental condition, 30 percent thought it was in a good condition and 20 percent had no opinion. In terms of individual's perceptions of past and future conditions of the Bay Tables 1 and 2 are in structure. Table 1 shows that an almost equal proportion of people believe the Bay has improved as believe the environmental condition of the Bay has become worse. Nineteen percent of respondents have not noticed any change. As Table 2 shows, 46 percent of respondents expect the condition of the Bay to improve in the next two years but 32 percent expect environmental quality to become worse. Sixteen percent do not expect any change.

TABLE 1. CHANGE IN ENVIRONMENTAL CONDITION IN THE PAST TEN YEARS

<u>CHANGE</u>	<u>% AGREE</u>
Improved	33
Stay the Same	19
Become Worse	36
Don't Know	11

SOURCE: Maryland Opinion Survey, Attitudes Toward the Environment: A Survey of Maryland Citizens, June 1980, P.S.

TABLE 2. EXPECTED CHANGE IN ENVIRONMENTAL
CONDITIONS OVER THE NEXT TEN YEARS

<u>CONDITION</u>	<u>% AGREE</u>
Improve	46
Stay the Same	16
Get Worse	32
Don't Know	6

SOURCE: Maryland Opinion Survey, Attitudes Toward the Environment: A Survey of Maryland Citizens, June 1980. P.S.

People of higher income and education, males and younger individuals tended to favor opinions regarding the deteriorating quality of the Bay. Residents of rural areas and small towns supported this view to a greater extent than residents of suburban or urban areas.

The Citizens Program for the Chesapeake Bay organized a survey to determine what people felt were the principal sources and types of problems found in the Bay. Unfortunately, no information on a respondent's place of residence or familiarity with different parts of the Bay was recorded. However, individuals' perceptions of the problems found in the Bay are indicative of its multiple uses. The major environmental problems identified by respondents include agricultural runoff, industrial waste, oil spills, erosion of the shoreline, untreated sewage, and shoreline discharges. Over fishing and congestion were by far the major types of nonenvironmental problems identified.

In its survey of the Maryland boating population the State Department of Natural Resources found that boaters were evenly divided on whether the waters they use are polluted. There was greater variation in perceptions of water quality problems between different regions of the State than between owners of different types of boats. The areas perceived by boaters to be most polluted are in the Upper Bay, including Baltimore. Areas believed by boaters to be

the least polluted are the Tangier Sound, Lower Potomac and Choptank regions. Boaters who changed the point at which they started their trip were asked what was the motivation force behind their switch. The major reasons for relocation included change of residence, expense, convenience, accessibility and facilities of the starting point. Less than 10 percent of respondents attributed relocation to actual boating or water conditions. Only 1 percent of boaters changed their starting point for reasons of water quality.

A survey conducted by the Maryland Department of Natural Resources (Speir et al., 1977)^{8/} determined complaints of sport fishermen about Chesapeake Bay fishing. The majority of interviewees had no comment. Table 3 shows the distribution of complaints by those who did respond. Nearly 8 percent of respondents cited water pollution as a problem. Kepone was cited by 3.5 percent of fishermen, debris by 1.5 percent and other problems, boats emptying septic tanks, lack of aquatic plants, dead fish and oil spills by 1 percent of fishermen collectively. Hence, nearly 17 percent of fishermen cited water quality problems in their complaints. However, due to the high nonresponse rate, this result may not be reflective of all sport fishermen.

In summary, the analysis of perceptions of environmental quality in the Bay reveal three interesting conclusions:

- Perceptions of water quality are broadly consistent with scientific criteria but the data available is too aggregative to yield any useful correlations
- There is mixed reaction regarding the perceived improvement or deterioration in the water quality of the Bay
- Perceptions of water quality may vary with the type of user, i.e., fishermen and more conscious of water quality than boaters. Possibly, swimmers are more conscious of water quality than both boaters and fishermen.

TABLE 3. FISHERMEN COMMENTS AND COMPLAINTS (Continued)

<u>COMMENTS</u>	<u>PERCENT</u>
J. Litter around launching ramp	0.3
K. Need more marina facilities for small boats	0.3
L. Boat slip rental too high	0.2
M. Need moorings on Bay Bridge	0.1
N. Poor park management at Sandy Point	0.1
V. Commercial-Sport Fishing Conflicts	
A. Crab pots (general)	2.3
1. Bad locations	0.5
2. Too many	0.4
3. Floats should be more visible	0.2
B. Commercial gill nets (general)	0.8
1. Taking of sport fish	0.5
2. Bad locations	0.3
3. Killing of oversize striped bass	0.2
4. Take fish during spawning	0.1
C. Too much commercial seining	0.3
D. Too many ell pots	0.2
VI. Law Enforcement	
A. Snaggers should be more vigorously pursued	0.8
B. Need mandatory boating course or license	0.7
C. Need more Marine Police	0.2
D. Marine Police rudeness	0.2
E. Marine Police harassment	0.2
F. Crabbing abused by sport crabbers	0.2
VII. Regulation and Management	
A. Limit numbers of catch of small rock	0.2
B. Prohibit tying to Bay Bridge	0.2
C. Too many regulations	0.2
D. Bay is overfished	0.2
E. Need better fishing forecast	0.1
F. Need out of state license	0.1

SOURCE: Speir J.H., Weinrich D.R. and Early, R.S., 1976 Maryland Chesapeake Bay Sport Fishing Survey, 1977, op. cit., pp. 34-35.

FOOTNOTES

1. David, E.L., "Public Perceptions of Water Quality", Water Resources Research, Vol. 7, No. 3 (June 1971) pp. 453-57.
2. Dornbush, D.M., The Impact of Water Quality Improvements on Residential Property Prices, Prepared for the National Commission on Water Quality 1975, (NTIS, PB248-805).
3. Binkley, C. and Hannemann, W.M., The Recreation Benefits of Water Quality Improvement: Analysis of Day Trips in an Urban Setting. Prepared for the Environmental Protection Agency by Urban Systems Research and Engineering, Inc., 1975.
4. Bouwes, N. and Schneider, R., "Procedures in Estimating Benefits of Water Quality Change", American Journal of Agricultural Economics, August 1979, pp. 535-539.
5. Baltimore Environmental Center, Environmentation Enters the 80's: Public Opinion in an Era of Policy Tradeoffs, p. 6, Published 1980.
6. Maryland Opinion Survey, Attitudes Toward the Environment: A Survey of Maryland's Citizens, Prepared for a State Conference on Environmental Decisions for the 1980's, June 1980.
7. Unpublished data.
8. Speir, H.J., Weinrich, D.R., and Early, R.S., 1976 Maryland Chesapeake Bay Sport Fishing Survey, Maryland Department of Natural Resources, June 1977.

APPENDIX E
FINFISH INTERCEPT FORM (MARYLAND)

1. Interviewer code (1-2)

2. Year/month/day . . . (7-12)

3. Interview number (13-15)

4. Hour (16-19)

5. State (20-21)

6. County (22-24)

7. Site code (25-27)

This study is being conducted in accordance with the Privacy Act of 1974. You are not required to answer any question that you consider to be an invasion of your privacy. I have a copy of the Privacy Act Statement which you may look at if you like.

8. Language of respondent (28-29)

English = 01 Filipino = 07
Spanish = 02 Korean = 08
French = 03 American Indian = 09
Italian = 04 Native Alaskan (Eskimo, Aleut) = 10
Japanese = 05 Other (specify: _____) = 11
Chinese = 06 Unknown = 12

9. Sex of respondent (30)

Male = 1 Unknown = 3
Female = 2

10. Estimate of mode of fishing (31)

Pier, dock = 1
Jetty, breakwater, breachway = 2
Bridge, causeway = 3
Other man-made structure = 4
Beach or bank = 5
Partyboat = 6
Charter boat = 7
Private or rental boat = 8

11. Interview status (32)

Agrees to interview = 1
Refuses interview initially = 2
Nonresponse due to language barrier, age, or other = 3
Refuses interview after start—questionnaire not usable = 4

35. If the available catch for this fisherman has already been recorded on someone else's form, complete the Type 4 record below—enter the interviewer code number, year/month/day, and interview number (Items 1, 2, and 3) of that person's form.

4													(1-14)
---	--	--	--	--	--	--	--	--	--	--	--	--	--------

If the available catch for this fisherman has *not* been recorded on someone else's form, ask to see the catch and complete the Type 3 records below:

E-8

	Species Name		Species Code	Total No.	Length (mm)	Weight (Kg)	
1.		3					(1-23)
2.		3					(1-23)
3.		3					(1-23)
4.		3					(1-23)
5.		3					(1-23)
6.		3					(1-23)
7.		3					(1-23)
8.		3					(1-23)
9.		3					(1-23)
10.		3					(1-23)

Enter number of Type 3 Records in Item 32, and complete Item 33, Page 5.

APPENDIX F
OUTDOOR RECREATION SURVEY (VIRGINIA)

- END X -

OUTDOOR RECREATION SURVEY

54073
102480

TELEPHONE #: _____
 Area Code Number

TIME ENDED: _____

LOCATION #: _____

TIME STARTED: _____

PAGE #: _____

LENGTH: _____

CIRCLE SEX OF RESPONDENT:

DATE: _____

1 MALE 2 FEMALE

INTERVIEWER: _____

REGION #: _____

I.D. #: _____

Hello, my name is _____ from Opinion Research Corporation, Princeton, New Jersey. The Virginia Commission of Outdoor Recreation is conducting a statewide survey to plan for future outdoor recreation. Your household was selected at random from among all telephone numbers in your exchange. The answers will be confidential, and anyone may refuse to answer any question that he or she prefers not to answer during the interview. The interview will only take about 15 minutes.

INTERVIEWER: THE PROPOSED METHOD FOR SELECTING RESPONDENTS WITHIN A HOUSEHOLD IS DESCRIBED IN DETAIL ON "RESPONDENT SELECTION TABLE (RST)." COMPLETE RST AND STAPLE TO QUESTIONNAIRE.

IF SELECTED RESPONDENT IS A PERSON OTHER THAN ONE WHO FIRST ANSWERED THE PHONE, REPEAT ABOVE INTRODUCTION FOR OTHER PERSON.

1. In general, compared to your other interests, how important is outdoor recreation to you? Is it...

- 1 Very important _____
- 2 Somewhat important _____
- 3 Not very important _____
- 9 Don't know/NR _____

INTERVIEWER: CHECK TO MAKE CERTAIN THAT QUESTION 3 THRU 7 HAVE BEEN COMPLETED FOR EACH ACTIVITY CIRCLED ON Q. 2. NOW CONTINUE WITH Q. 8.

8. Please tell me the names of any other recreation areas in Virginia that you have visited during the six-month period -- April thru September? (WRITE IN ANSWERS BELOW.)

9. Were you dissatisfied with any of your experiences at any of the recreation areas in Virginia you've been to?

- 1 Yes
- 2 No

10. IF "YES": Please tell me which area that was and what the problem was.

a) AREA _____

b) PROBLEM _____
any other problem? _____

c) AREA 2 _____

d) PROBLEM 2 _____

11. In your opinion, what do you think most needs to be done to improve recreation in Virginia?

INTERVIEWER: TURN MATRIX TO SIDE 2 AND RECORD ANSWERS TO Q. 12 THRU Q. 15.

7. I am going to read a list of choices. For each choice, tell me which of the two alternatives is the most important. Should the government spend more of its available outdoor recreation funds...? (READ EACH SET OF CHOICES AND CIRCLE RESPONDENT'S ANSWER IN THE GRID BELOW. IF RESPONDENT INDICATES BOTH, SAY, "Please choose one.")

<u>STATEMENT A</u>		<u>STATEMENT B</u>		<u>BOTH DK/NR</u>	
a. for many small, nearby parks	1	OR for a limited number of <u>large</u> parks	2	3	9
b. in <u>urban</u> areas	1	in <u>rural</u> areas	2	3	9
c. for better maintenance of <u>existing</u> parks	1	for developing <u>new</u> parks	2	3	9
d. for more <u>facilities</u>	1	for more <u>lands</u>	2	3	9
e. for <u>waterfront</u> property	1	for <u>inland</u> property	2	3	9
f. for <u>indoor</u> recreational facilities	1	for <u>outdoor</u> recreational facilities	2	3	9

18. The following are some reasons people have given for not making greater use of outdoor recreation opportunities. For each reason I mention, say "yes" if it is one that prevented you from participating more often in outdoor recreation activities. CIRCLE NUMBER IF "YES" ANSWER.

1. Areas are poorly maintained
2. Areas are too crowded
3. Areas have problems of pollution
4. Areas have personal safety problems
5. Lack of facilities
6. Lack of money
7. Lack of time
8. Lack of interests
9. Lack of transportation
10. Lack of information on outdoor recreation opportunities
11. Personal health reasons
12. Interesting areas not convenient get to

4. Do you belong to a private recreation association, like a tennis or golf club, or swimming pool club?

- 1 Yes
- 2 No

5. Should there be more golf, tennis, swimming or similar facilities provided by public agencies in your community, or not?

- 1 Yes, more public
- 2 No
- 3 Other (Specify): _____
- 9 Don't know/NR

The following questions are for background purposes.

26. What is your age? _____ (YEARS)

27. Are you:

- 1 Married
- 2 Single (including divorced, widowed)

28. In school, what is the highest grade (or year) you have completed?
(CIRCLE RESPONSE)

ELEMENTARY SCHOOL	01	02	03	04	05
MIDDLE SCHOOL	06	07	08		
HIGH SCHOOL	09	10	11	12	
COLLEGE	13	14	15	16	
GRADUATE SCHOOL	17	18	19	20	21

29. What is your race?

- 1 Caucasian or white
- 2 Black or Negro
- 3 Other (Specify): _____
- 9 Don't know/NR

30. Counting yourself, how many members of your family live here?

(IF "1" ON Q. 30, GO TO
Q. 32)

31. How many family members are...

- 1 Over 65 years _____
- 2 40 to 65 years _____
- 3 21 to 39 years _____
- 4 12 to 20 years _____
- 5 5 to 11 years _____
- 6 Under 5 years _____

PARTICIPATED
APRIL-SEPT. 1980

NO. OF DAYS

1 VIRGINIA
2 OUTSIDE STATE
3 BOTH

CITY/TOWN/REC AREA
1 COUNTY
2 TOWN
3 REC AREA

2 5 M TO 10 M
3 1/2 HR TO 1 HR
4 OVER 1 HR

3 PUSC
DK

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
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[illegible][illegible]

APPENDIX G

FISHING SITES INCLUDED IN THE
MARYLAND SPORT FISHING SURVEY, 1979

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
810	B/D	Mouth of Deer Creek, River Susquehanna/Use=3, Seasonal	Harford	State-supplied	
811	D/D	Lapidum/Use=3, Seasonal	Harford	State-supplied	
128	B/D	Elk Neck State Park Beach/Use=J, Seasonal	Cecil	State-supplied	
812	B/D	Turkey Point/Use=3-5, Seasonal	Cecil	State-supplied	
816	B/D	Rt. 40 Bridge/Use=3, Seasonal	Baltimore	State-supplied	
817	D/D	Mattapeake Public Fishing Pier/Use=3	Queen Anne's	State-supplied	
791	B/D	Salisbury Public Kamp/Use=2	Wicomico	State-supplied	
815	B/D	Claiborne Ferry/Use=2	Talbot	State-supplied	
807	B/D	St. George Island, 249 Hwy. Bridge	St. Mary's		
808	D/D	Rock Point (Near Cobb Island)/Use=1	Charles	State-supplied	
809	B/D	Rt. 4 Bridge/Use=1	Anne Arundel	State-supplied	
813	D/D	Long Point County Park/Use=1	Cecil	State-supplied	
814	B/D	Betterton Marinas/Use=1	Kent	State-supplied	
141	B/D	Day Ridge Beach/Unknown Usage	Anne Arundel	Alex. Draft Co.	5 (D4)
142	D/D	Woodland Beach /Unknown Usage	Anne Arundel	Alex. Draft Co.	5 (D4)
143	B/D	North Beach /Unknown Usage	Calvert	Alex. Draft Co.	7 (A4)

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
144	B/D	Chesapeake Beach /Unknown Usage	Calvert	Alex. Draft Co.	7 (A4/5)
145	B/D	Breezy Point /Unknown Usage	Calvert	Alex. Draft Co.	7 (B7)
146	B/B	Camp Kaufman /Unknown Usage	Calvert	Alex. Draft Co.	7 (B8)
147	B/B	Cedar Grove Beach /Unknown Usage	Dorchester	Alex. Draft Co.	8 (D7)
148	B/D	Long Beach /Unknown Usage	Calvert	Alex. Draft Co.	9 (B4)
149	B/D	Sandy Hill Beach /Unknown Usage	Wicomico	Alex. Draft Co.	10 (F8)
151	B/D	Fenwick Island Beach /Unknown Usage	Worcester	Alex. Draft Co.	11 (D)
152	B/D	Assateague Island Nat'l Shore /Unknown Usage	Worcester	Alex. Draft Co.	14 B/C (5/6)
787	B/D	Solomon's Island /Unknown Usage	Calvert	Alex. Draft Co.	
153	B/D	Wicomico Beach /Unknown Usage	Charles	Alex. Draft Co.	22 (B3)
154	B/D	Sandyland Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	22 (B3)
155	B/D	White Point Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	22 (K2)
156	B/B	Lane Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	22 (M2)
157	B/D	McKay Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	22 (M3)
158	B/D	St. George Island Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	23 (C4)
159	B/D	St. Jerome Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	23 (F1)

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
160	B/B	Scotland Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	23 (C2)
161	B/B	Golden Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	24 (D5)
162	B/B	Flying Point Beach /Unknown Usage	St. Mary's	Alex. Draft Co.	1 (E3)
783	B/B	Dohemia Beach /Unknown Usage	Cecil	Alex. Draft Co.	
784	B/B	Dohemia River Bridge (Rt. 213) /Unknown Usage	Cecil	Alex. Draft Co.	2 (C5)
051	B/B	Blue Dolphin Marina /Unknown Usage	Cecil	Alex. Draft Co.	
122	B/B	Gunpowder St. Park Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (C6)
163	B/B	Dundee Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (C6)
164	B/B	Miami Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (D8)
125	B/B	Long Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (A7)
126	B/B	Middle View Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (A8)
127	B/B	Bauren Schmidt Beach /Unknown Usage	Baltimore	Alex. Draft Co.	1 (A8)
129	B/B	Chrystal Beach /Unknown Usage	Cecil	Alex. Draft Co.	1 (A5) 2 (A5)
130	B/B	Buttonwood Beach /Unknown Usage	Cecil	Alex. Draft Co.	2 (A5)
134	B/B	Port Herman /Unknown Usage	Cecil	Alex. Draft Co.	2 (D3)
131	B/B	Hollywood Beach /Unknown Usage	Cecil	Alex. Draft Co.	2 (D3)

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
132	B/B	Riverside Beach/Unknown Usage	Cecil	Alex. Draft Co.	2 (L4)
133	B/B	Charlestown Manor Beach/Unknown Usage	Cecil	Alex. Draft Co.	2 (M2)
135	B/B	Red Point Beach/Unknown Usage	Cecil	Alex. Draft Co.	2 (M5)
137	B/B	Altoona Beach/Unknown Usage	Anne Arundel	Alex. Draft Co.	3 (C5)
136	B/B	Point Pleasant/Unknown Usage	Anne Arundel	Alex. Draft Co.	3 (A4) & (5)
138	B/B	Alpine Beach/Unknown Usage	Anne Arundel	Alex. Draft Co.	3 (E5)
139	B/B	Rocky Point Beach/Unknown Usage	Baltimore	Alex. Draft Co.	3 (F1)
140	B/B	Tolchester/Unknown Usage	Kent	Alex. Draft Co.	3 (L3)
124	B/B	Sandy Point Beach/Unknown Usage	Anne Arundel	Alex. Draft Co.	5 (F1)
791	P/R	Salisbury Public Ramp/Low Usage	Wicomico	State-supplied	
792	P/R	Deal Island/Low Usage	Somerset	State-supplied	
819	P/R	Popes Creek Marina/Low Usage	Charles	State-supplied	
233	P/R	Cobb Island Marinas/Low Usage	Charles	State-supplied	
820	P/R	St. George Island/Low Usage	Charles	State-supplied	
821	P/R	Broomes Island Marinas/Low Usage	Calvert	State-supplied	
824	P/R	Anne Arundel County dock/Low Usage	Anne Arundel	State-supplied	

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
387	P/R	Pirates Cove/Low Usage	Anne Arundel	State-supplied	
829	P/R	Rock Hall Public Ramp/Low Usage / Eliminate <i>sailboats only</i>	Kent	State-supplied	
793	P/R	Chestertown Public Ramp/Low Usage	Kent	State-supplied	
831	P/R	Kent Narrows Marina & Livery Ramps/Low Usage	Queen Anne's	State-supplied	
815	P/R	Claiborne Ferry/ Low Usage	Talbot	State-supplied	
801	P/R	Oak Creek Public Ramp/Low Usage	Talbot	State-supplied	
833	P/R	Oxford, Oxford Public Ramp /Low Usage	Caroline	State-supplied	
797	P/R	Vienna Public R, Seasonal	Dorchester	State-supplied	
803	P/R	Sharptown Public Ramp, Seasonal	Wicomico	State-supplied	
088	P/R	Fairwinds Marina/Low Usage	Anne Arundel	State-supplied	
796	P/R	Bowleys Point Yacht Basin/Low Usage	Anne Arundel Baltimore	State-supplied	
794	P/R	Fletcher's Boat House (Georgetown) Seasonal	D.C.	State-supplied	
811	P/R	Nanjemay Creek Public Ramp/Seasonal	Charles	State-supplied	
806	P/R	Wynn-Schiebles Fishing Center/Low Usage	Charles St. Mary's	State-supplied	
802	P/R	Truxton Park/Low Usage	Anne Arundel	State-supplied	
799	P/R	Laplum, Seasonal/Low Usage	Harford	State-supplied	
128	P/R	Elk Neck State Park/Seasonal/Low Usage	Cecil	State-supplied	

SITE CODE	MODE	SITE DESCRIPTION	COUNTY	SOURCE	MAP LOCATION
826	P/R	Marinas at Rt. 213/Low Usage	Cecil	State-supplied	
800	P/R	Wye Landing/Low Usage	Talbot	State-supplied	
834	P/R	Tilghman Public Ramp/Low Usage	Talbot	State-supplied	
817	P/R	Mattapeake Public Fishing Pier/Low Usage	Queen Annes	State-supplied	
793	P/R	Chestertown Public Ramp	Kent		
794	P/R	Fletcher's Boat House (Georgetown)	D.C.		
795	P/R	Salisbury Public Ramp	Wicomico		
796	P/R	Bowbys Point Yacht Basin	Anne Arundel		
797	P/R	Vienna Public Ramp	Dorchester		
798	P/R	Kent Narrows Marina & Livery Ramps	Queen Anne's		
799	P/R	Eapidum	Harford		
800	P/R	Wye Landing	Talbot		
802	P/R	Truxton Park on the Severn River	Anne Arundel		
803	P/R	Sharptown Public Ramp	Wicomico		
804	P/R	Lipponcott Livery near Gibson Island	Anne Arundel		