

**APPENDIX A**  
**REVIEW OF RESTORATION TARGETS PRESENTED IN EXISTING**  
**FISHERIES MANAGEMENT PLANS**

## **APPENDIX A**

As required by the Living Resources Subcommittee, measurable living resources and habitat restoration goals need be established. To achieve this task, stock status criteria or biological reference points must first be developed for determining the relative health of fish species populations managed under bi-state fishery management plans. To date, several preliminary reference points have been identified for various species including: striped bass, American shad, river herring, weakfish, summer flounder, and bluefish. The reference points were developed generally by using fishing mortality rates to establish minimum levels necessary to insure long term stock replacement and achieve some measurable stock restoration or protection target. Historical population estimates also were used to set targets for particular species where fishing mortality rates are not available or appropriate.

Fishery Management Plans (FMPs) developed by ASMFC, MAFMC, and MDNR were reviewed to identify potential reference points and targets for the species mentioned above along with blue crab, oyster, white perch, croaker, spot, black drum, red drum, black seabass, tautog, spanish mackerel, and American eel. Most of the FMPs state general qualitative goals such as "to improve yield from the fishery" or "to prevent overfishing and maintain the spawning stock", which would be difficult to develop into specific stock restoration or protection targets. Some quantitative information was available, however, and is described below.

ASMFC FMP Reviews, report 20, 1990.

### **Red Drum**

- Prohibition of harvest or possession of Atlantic red drum in or from the Exclusive Economic Zone until a 30% spawning stock biomass per recruit level is attained and until such time as a total allowable catch is specified by plan amendment that provides for harvest.
- States are requested through adoption of a ASMFC red drum management plan to achieve 30% escapement of juvenile fish to the adult stock by reducing the rate of fishing mortality through such actions as gear restrictions, closed seasons, quotas, size limits and bag limits.
- As a note, Maryland, Virginia, and the Potomac River Fisheries Commission implemented the 14" total length (TL) minimum size and daily possession limit of two fish over 32" TL.

**Shad and River Herring**

- Stock assessment subcommittee classified stock status as severely depleted and recommended 0% exploitation rate for both American shad and river herring in Maryland; however, no quantitative goals or targets were mentioned.

**Weakfish, Atlantic Croaker, and Spot**

- No quantitative goals or targets were stated.

**Bluefish**

- Provide the highest availability of bluefish to U.S. fishermen while maintaining, within limits, traditional uses of bluefish (defined as the commercial fishery not exceeding 20 percent of the total catch).

**ASMFC FMP for Spanish Mackerel, Report No. 18, 1990.**

- A mackerel stock shall be considered overfished if the spawning stock biomass per recruit (SSBR) is less than the target level percentage recommended by the assessment committee, and adopted by the councils. The target level percentage SSBR shall not be less than 20%.

**MDNR FMP for American Eel, by J.T. Krauthamer, J. Foster, and C. Bonzek, 1984.**

- No quantitative goals or targets were stated.

**MAFMC FMP for Bluefish Fishery, May 1989.**

- Same goal mentioned above under ASMFC FMP; the commercial fishery, on a coastwide basis, is limited to 20% of the total catch (recreational catch plus commercial landings) each year.

**MAFMC Amendment 2 to the FMP for Summer Flounder, May 1991.**

- Goal is to reduce fishing mortality on summer flounder; overfishing is defined as fishing in excess of the  $F_{max}$  level which is 0.23. Current fishing mortality rates are at least 6 fold higher than  $F_{max}$ . The target is to achieve  $F_{max}$  which would require that current exploitation rates are reduced by 73%. The council and ASMFC board adopted the following strategy:

Fishing mortality on summer flounder should be reduced to 0.53 in the first year of the management program and be maintained at that level through year 3. This requires a reduction in exploitation of approximately

47% in the first year. In year 4 and subsequent years, the target F would be  $F_{max}$  (0.23).

ASMFC Supplement to American Shad and River Herrings FMP, report No. 12, 1988.

- No quantitative goals or targets were stated.

ASMFC FMP for Weakfish, Report No. 7, 1985.

- No quantitative goals or targets were stated.

MDNR FMP for American and Hickory Shad and River Herring, by Martin Marietta Environmental Systems, March 1987.

- Stimulate a recovery of currently depressed stocks to levels existing in the late 1960s.

CBP FMP for alosids, including American shad, by Chesapeake Executive Council, 1989.

- Includes a target for the Upper Bay stock that prevents harvests until the stock increases for three consecutive years and reaches 500,000 adults during one of the three years. Achieving this target will trigger a limited fishery with an annual exploitation rate that does not exceed 10%.

**APPENDIX B**  
**JUVENILE AMERICAN SHAD CAPTURE DATA FROM THE MARYLAND**  
**DEPARTMENT OF NATURAL RESOURCES**  
**JUVENILE STRIPED BASS SEINE SURVEY**



SYSTEM1-Patuxent

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1957	18	0	18	
	5.39	0.00	5.39	
	100.00	0.00		
	5.50	0.00		
1958	16	2	18	
	4.79	0.60	5.39	
	88.89	11.11		
	4.89	28.57		
1959	10	0	10	
	2.99	0.00	2.99	
	100.00	0.00		
	3.06	0.00		
1960	5	5	10	
	1.50	1.50	2.99	
	50.00	50.00		
	1.53	71.43		
1982	8	0	8	
	2.40	0.00	2.40	
	100.00	0.00		
	2.45	0.00		
Total	327	7	334	
(Continued)	97.90	2.10	100.00	

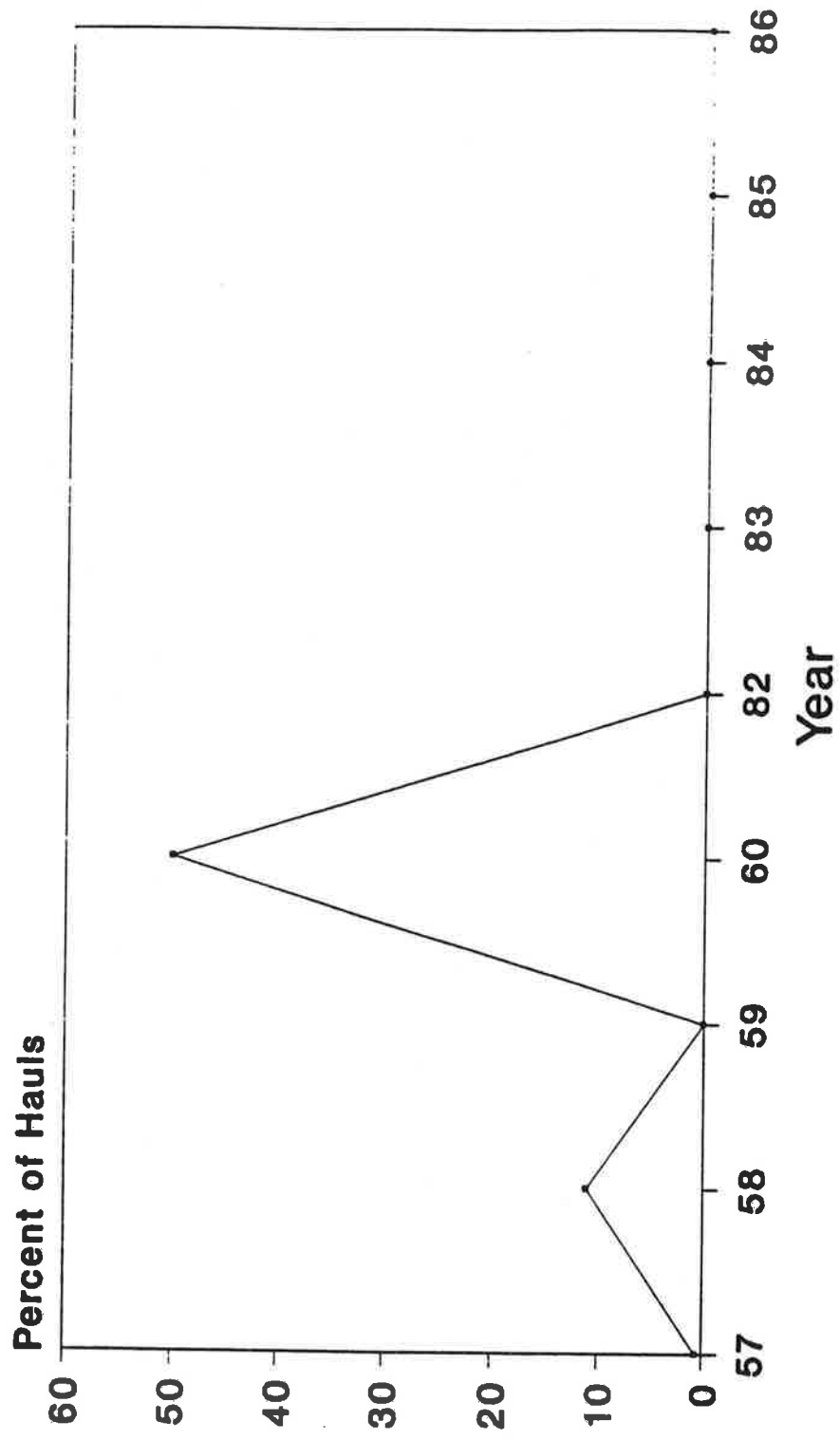
SYSTEM1=Patuxent

### TABLE OF YEAR BY RANK

YEAR	RANK		
Frequency Percent Row Pct Col Pct	absent	Present	Total
1983	162 48.50 100.00 49.54	0 0.00 0.00 0.00	162 48.50
1984	36 10.78 100.00 11.01	0 0.00 0.00 0.00	36 10.78
1985	36 10.78 100.00 11.01	0 0.00 0.00 0.00	36 10.78
1986	36 10.78 100.00 11.01	0 0.00 0.00 0.00	36 10.78
Total	327 97.90	7 2.10	334 100.00



# Seine Hauls Which Caught Shad Patuxent River



—•— One or more shad



SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency	absent	presen	Total	
Percent				
Row Pct				
Col Pct				
1957	12	0	12	
	1.90	0.00	1.90	
	100.00	0.00		
	1.92	0.00		
1958	13	1	14	
	2.06	0.16	2.22	
	92.86	7.14		
	2.08	16.67		
1959	8	0	8	
	1.27	0.00	1.27	
	100.00	0.00		
	1.28	0.00		
1960	6	2	8	
	0.95	0.32	1.27	
	75.00	25.00		
	0.96	33.33		
1961	16	0	16	
	2.53	0.00	2.53	
	100.00	0.00		
	2.56	0.00		
1962	14	2	16	
	2.22	0.32	2.53	
	87.50	12.50		
	2.24	33.33		
1963	16	0	16	
	2.53	0.00	2.53	
	100.00	0.00		
	2.56	0.00		
1964	16	0	16	
	2.53	0.00	2.53	
	100.00	0.00		
	2.56	0.00		
Total	526	6	632	
(Continued)	99.05	0.95	100.00	

SYSTEM1-Choptank

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	Row Pct	Col Pct	absent	presen	Total
1965	16	0	2.53	0.00	0	0	16
			100.00	0.00	2.56	0.00	2.53
1966	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
1967	23	1	3.64	0.16	0	0	24
			95.83	4.17	3.67	16.67	3.80
1968	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
1969	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
1970	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
1971	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
1972	24	0	3.80	0.00	0	0	24
			100.00	0.00	3.83	0.00	3.80
Total	626	6	99.05	0.95			632
(Continued)							100.00

SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	Row Pct	Col Pct	absent	presen	Total
1973		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1974		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1975		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1976		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1977		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1978		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1979		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
1980		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
		3.83	0.00				
Total		626	6				632
		99.05	0.95				100.00

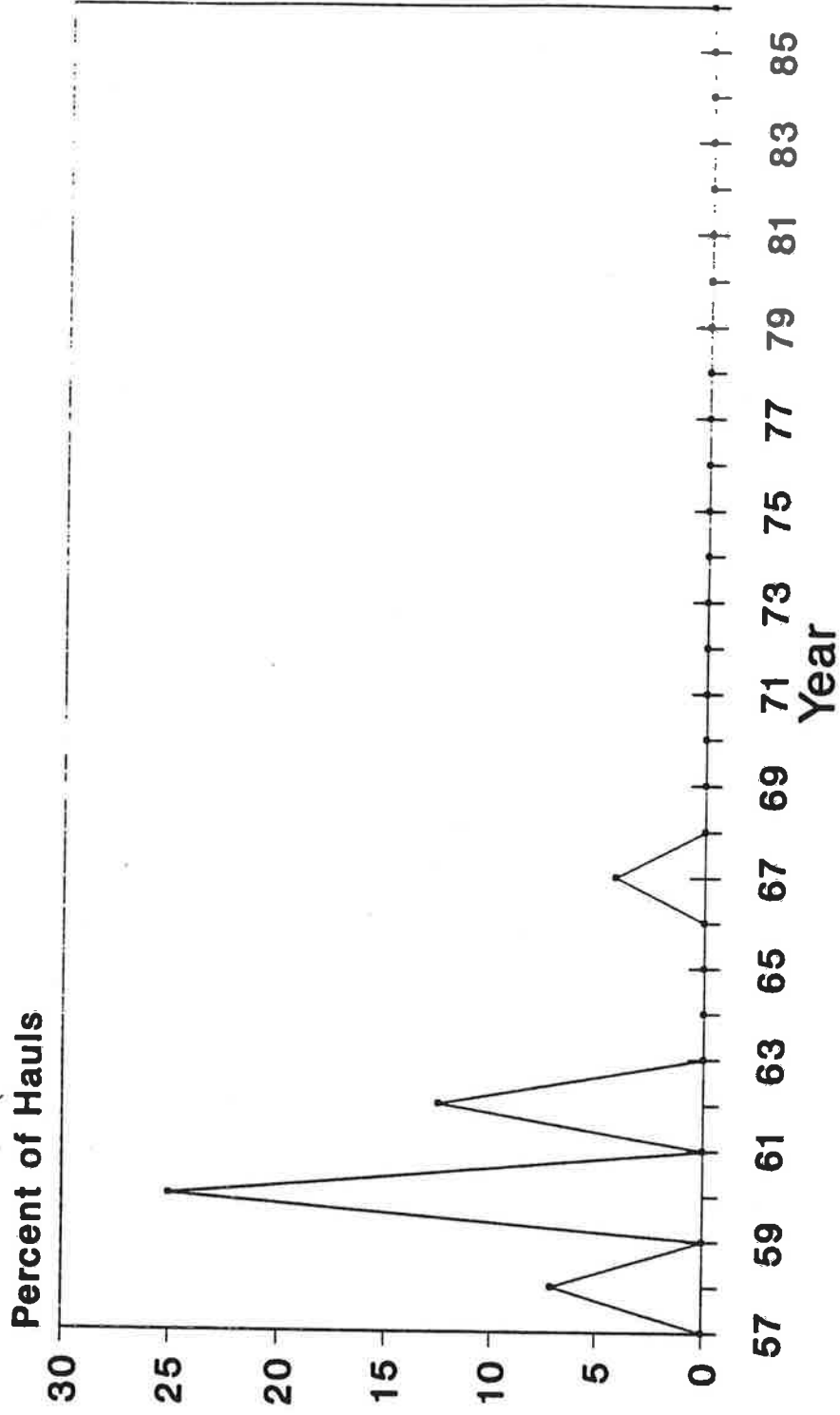
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SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	Row Pct	Col Pct	absent	presen	Total
1981		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
1982		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
1983		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
1984		30	0				30
		4.75	0.00				4.75
		100.00	0.00				
1985		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
1986		24	0				24
		3.80	0.00				3.80
		100.00	0.00				
Total		626	6				632
		99.05	0.95				100.00

# Seine Hauls Which Caught Shad Choptank River (Primary Sites)



—•— One or more shad





SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	Row Pct	Col Pct	absent	presen	Total
1957					16	0	16
					2.12	0.00	2.12
					100.00	0.00	
1958					2.14	0.00	
1959					16	1	17
					2.12	0.13	2.25
					94.12	5.88	
1960					2.14	16.67	
1961					10	0	10
					1.32	0.00	1.32
					100.00	0.00	
1962					1.34	0.00	
1963					10	2	12
					1.32	0.26	1.59
					83.33	16.67	
1964					1.34	33.33	
1965					16	0	16
					2.12	0.00	2.12
					100.00	0.00	
1966					2.14	0.00	
1967					14	2	16
					1.85	0.26	2.12
					87.50	12.50	
1968					1.87	33.33	
1969					16	0	16
					2.12	0.00	2.12
					100.00	0.00	
1970					2.14	0.00	
1971					14	0	14
					1.85	0.26	2.12
					87.50	12.50	
1972					1.87	33.33	
1973					16	0	16
					2.12	0.00	2.12
					100.00	0.00	
1974					2.14	0.00	
1975					16	0	16
					2.12	0.00	2.12
					100.00	0.00	
1976					2.14	0.00	
Total					749	6	755
(Continued)					99.21	0.79	100.00

SYSTEMI-Choptank

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent Row Pct Col Pct	absent	presen	Total
1965		16 2.12 100.00 2.14	0 0.00 0.00 0.00	16 2.12	
1966		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
1967		23 3.05 95.83 3.07	1 0.13 4.17 16.67	24 3.18	
1968		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
1969		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
1970		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
1971		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
1972		24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	
Total		749 99.21	6 0.79	755 100.00	

(Continued)

SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK				
Frequency Percent Row Pct Col Pct	absent	presen	Total		
1973	24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	3.18	
1974	24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	3.18	
1975	24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	3.18	
1976	24 3.18 100.00 3.20	0 0.00 0.00 0.00	24 3.18	3.18	
1977	30 3.97 100.00 4.01	0 0.00 0.00 0.00	30 3.97	3.97	
1978	30 3.97 100.00 4.01	0 0.00 0.00 0.00	30 3.97	3.97	
1979	30 3.97 100.00 4.01	0 0.00 0.00 0.00	30 3.97	3.97	
1980	36 4.77 100.00 4.81	0 0.00 0.00 0.00	36 4.77	4.77	
Total	749 99.21	6 0.79	755	100.00	

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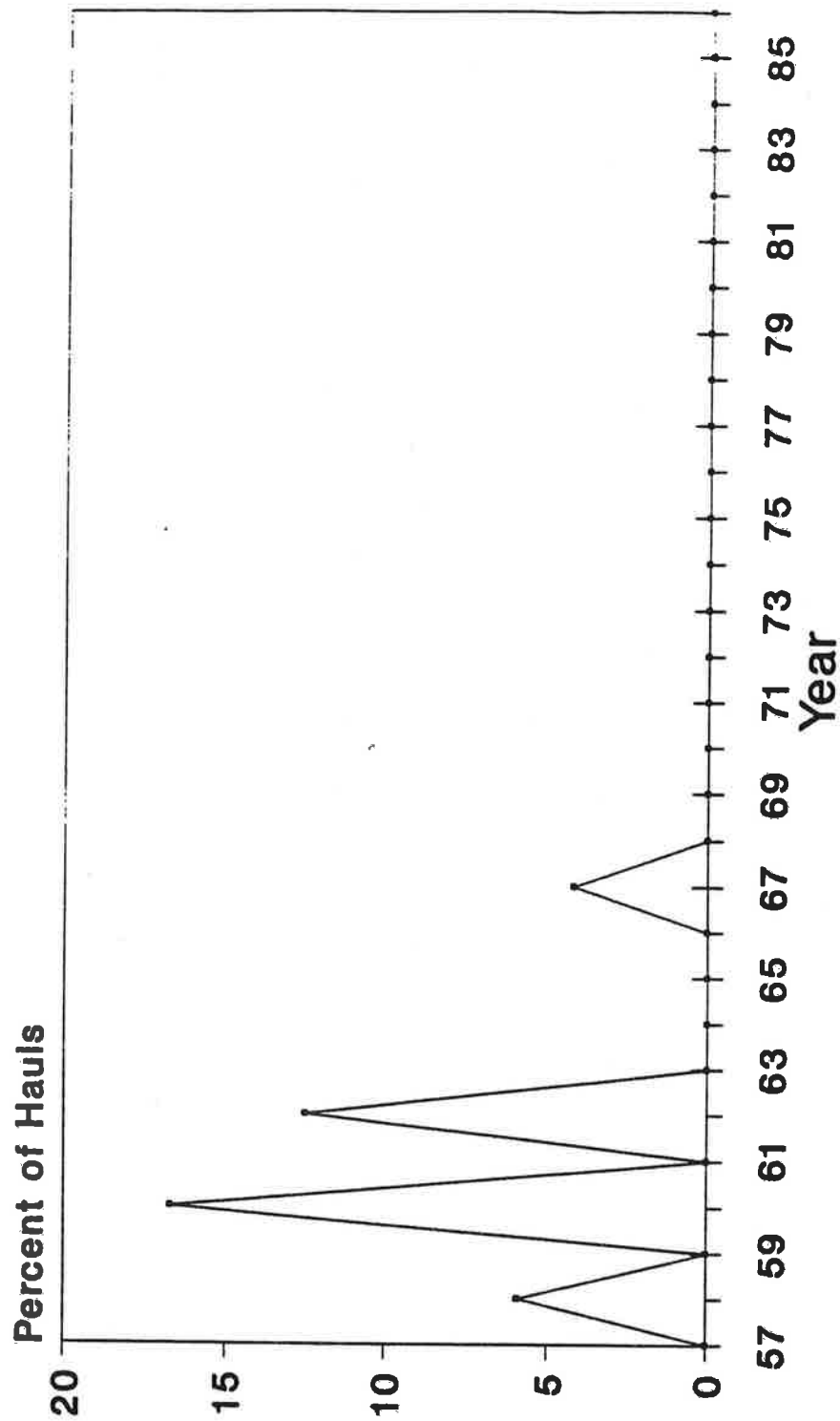
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SYSTEM1=Choptank

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency	absent	presen	Total	
Percent				
Row Pct				
Col Pct				
1981	36	0	36	
	4.77	0.00	4.77	
	100.00	0.00		
	4.81	0.00		
1982	36	0	36	
	4.77	0.00	4.77	
	100.00	0.00		
	4.81	0.00		
1983	44	0	44	
	5.83	0.00	5.83	
	100.00	0.00		
	5.87	0.00		
1984	42	0	42	
	5.56	0.00	5.56	
	100.00	0.00		
	5.61	0.00		
1985	36	0	36	
	4.77	0.00	4.77	
	100.00	0.00		
	4.81	0.00		
1986	36	0	36	
	4.77	0.00	4.77	
	100.00	0.00		
	4.81	0.00		
Total	749	6	755	
	99.21	0.79	100.00	

# Seine Hauls Which Caught Shad Choptank River



—•— One or more shad



SYSTEM1=Nanticoke

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent Row Pct Col Pct	absent	presen	Total
1957		10 1.61 100.00 1.78	0 0.00 0.00 0.00		10 1.61
1958		10 1.61 90.91 1.78	1 0.16 9.09 1.67		11 1.77
1959		5 0.80 83.33 0.89	1 0.16 16.67 1.67		6 0.96
1960		2 0.32 33.33 0.36	4 0.64 66.67 6.67		6 0.96
1961		10 1.61 71.43 1.78	4 0.64 28.57 6.67		14 2.25
1962		12 1.93 75.00 2.13	4 0.64 25.00 6.67		16 2.57
1963		15 2.41 93.75 2.66	1 0.16 6.25 1.67		16 2.57
1964		14 2.25 87.50 2.49	2 0.32 12.50 3.33		16 2.57
Total		563 90.37	60 9.63		623 100.00

(Continued)

SYSTEM1=Nanticoke

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	absent	presen	Total
1965	15	1			16
	2.41	0.16			2.57
	93.75	6.25			
	2.66	1.67			
1966	23	1			24
	3.69	0.16			3.85
	95.83	4.17			
	4.09	1.67			
1967	13	11			24
	2.09	1.77			3.85
	54.17	45.83			
	2.31	18.33			
1968	19	5			24
	3.05	0.80			3.85
	79.17	20.83			
	3.37	8.33			
1969	21	3			24
	3.37	0.48			3.85
	87.50	12.50			
	3.73	5.00			
1970	23	1			24
	3.69	0.16			3.85
	95.83	4.17			
	4.09	1.67			
1971	20	4			24
	3.21	0.64			3.85
	83.33	16.67			
	3.55	6.67			
1972	23	1			24
	3.69	0.16			3.85
	95.83	4.17			
	4.09	1.67			
Total	563	60			623
(Continued)	90.37	9.63			100.00



SYSTEM=Nanticoke

TABLE OF YEAR BY RANK

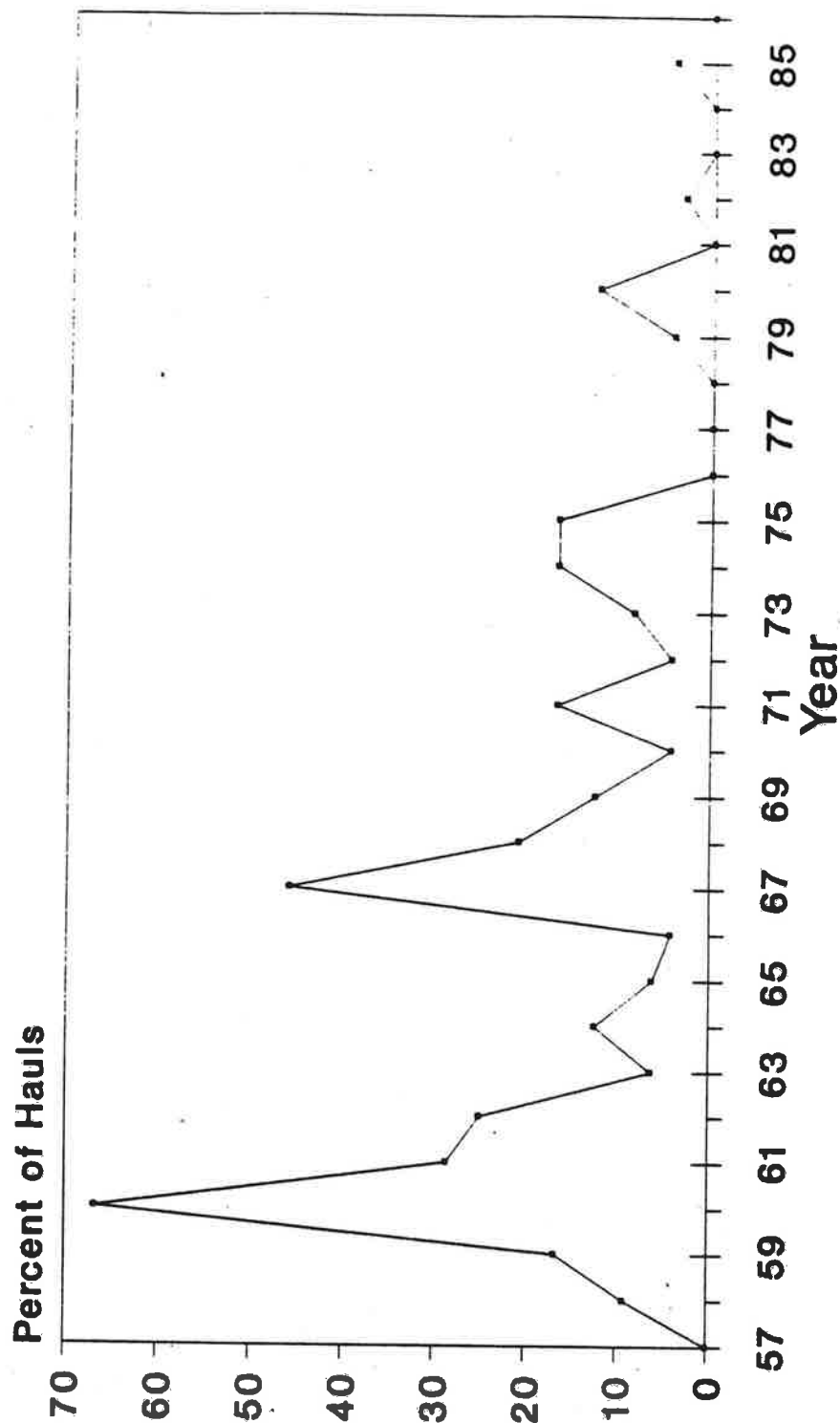
YEAR	RANK			
Frequency	Percent	Row Pct	Col Pct	Total
absent	present			
1973	22	2	3.53	24
	91.67	8.33	3.91	3.85
1974	20	4	3.21	24
	83.33	16.67	3.55	3.85
1975	20	4	3.21	24
	83.33	16.67	3.55	3.85
1976	24	0	3.85	24
	100.00	0.00	4.26	3.85
1977	24	0	3.85	24
	100.00	0.00	4.26	3.85
1978	24	0	3.85	24
	100.00	0.00	4.26	3.85
1979	23	1	3.69	24
	95.83	4.17	4.09	3.85
1980	21	3	3.37	24
	87.50	12.50	3.73	3.85
Total	563	60	90.37	623
(Continued)			9.63	100.00

SYSTEM=Nanticoke

TABLE OF YEAR BY RANK

YEAR	RANK			
	Frequency			
	Percent			
Row Pct				
Col Pct	absent	presen	Total	
1981	24	0	24	
	3.85	0.00	3.85	
	100.00	0.00		
	4.26	0.00		
1982	31	1	32	
	4.98	0.16	5.14	
	96.88	3.13		
	5.51	1.67		
1983	24	0	24	
	3.85	0.00	3.85	
	100.00	0.00		
	4.26	0.00		
1984	24	0	24	
	3.85	0.00	3.85	
	100.00	0.00		
	4.26	0.00		
1985	23	1	24	
	3.69	0.16	3.85	
	95.83	4.17		
	4.09	1.67		
1986	24	0	24	
	3.85	0.00	3.85	
	100.00	0.00		
	4.26	0.00		
Total	563	60	623	
	90.37	9.63	100.00	

# Seine Hauls Which Caught Shad Nanticoke River (Primary Sites)



—•— One or more shad



SYSTEM1=Nanticoke

TABLE OF YEAR BY RANK

YEAR	RANK				
Frequency Percent Row Pct Col Pct	absent	presen	Total		
1957	14 1.90 100.00 2.09	0 0.00 0.00 0.00	14 1.90 1.90		
1958	14 1.90 93.33 2.09	1 0.14 6.67 1.52	15 2.04		
1959	7 0.95 87.50 1.04	1 0.14 12.50 1.52	8 1.09		
1960	4 0.54 50.00 0.60	4 0.54 50.00 6.06	8 1.09		
1961	10 1.36 71.43 1.49	4 0.54 28.57 6.06	14 1.90		
1962	12 1.63 75.00 1.79	4 0.54 25.00 6.06	16 2.17		
1963	15 2.04 93.75 2.24	1 0.14 6.25 1.52	16 2.17		
1964	14 1.90 87.50 2.09	2 0.27 12.50 3.03	16 2.17		
Total	671 91.04	66 8.96	737 100.00		
(Continued)					

SYSTEMI-Manticoke

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1965	15	1	16	
	2.04	0.14	2.17	
	93.75	6.25		
	2.24	1.52		
1966	23	1	24	
	3.12	0.14	3.26	
	95.83	4.17		
	3.43	1.52		
1967	13	11	24	
	1.76	1.49	3.26	
	54.17	45.83		
	1.94	16.67		
1968	19	5	24	
	2.58	0.68	3.26	
	79.17	20.83		
	2.83	7.58		
1969	21	3	24	
	2.85	0.41	3.26	
	87.50	12.50		
	3.13	4.55		
1970	23	1	24	
	3.12	0.14	3.26	
	95.83	4.17		
	3.43	1.52		
1971	20	4	24	
	2.71	0.54	3.26	
	83.33	16.67		
	2.98	6.06		
1972	23	1	24	
	3.12	0.14	3.26	
	95.83	4.17		
	3.43	1.52		
Total	671	66	737	
(Continued)	91.04	8.96	100.00	

SYSTEM=Nanticoke

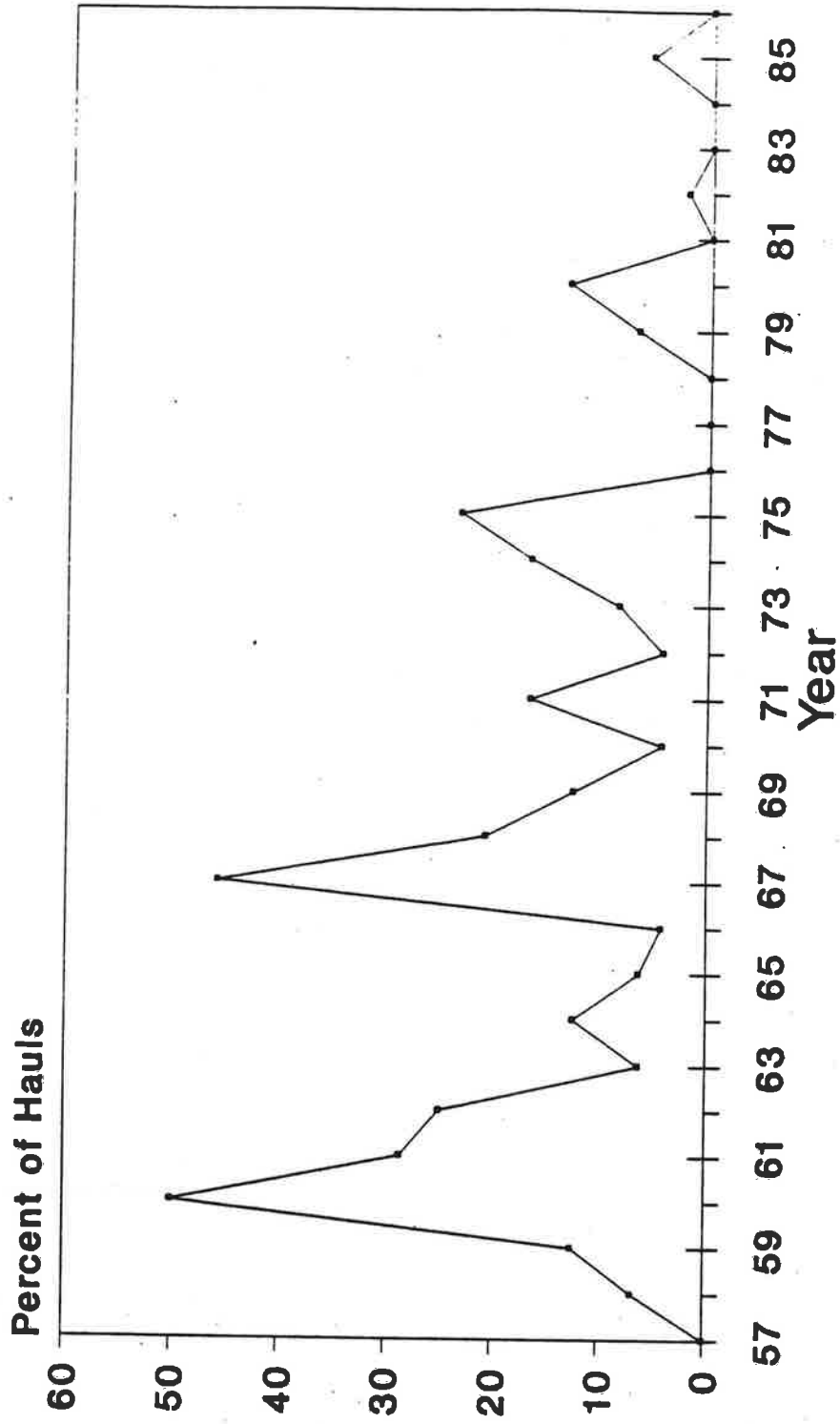
TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1973	22	2	24	
	2.99	0.27	3.26	
	91.67	8.33		
	3.28	3.03		
1974	20	4	24	
	2.71	0.54	3.26	
	83.33	16.67		
	2.98	6.06		
1975	23	7	30	
	3.12	0.95	4.07	
	76.67	23.33		
	3.43	10.61		
1976	30	0	30	
	4.07	0.00	4.07	
	100.00	0.00		
	4.47	0.00		
1977	30	0	30	
	4.07	0.00	4.07	
	100.00	0.00		
	4.47	0.00		
1978	30	0	30	
	4.07	0.00	4.07	
	100.00	0.00		
	4.47	0.00		
1979	28	2	30	
	3.80	0.27	4.07	
	93.33	6.67		
	4.17	3.03		
1980	26	4	30	
	3.53	0.54	4.07	
	86.67	13.33		
	3.87	6.06		
Total	671	66	737	
(Continued)	91.04	8.96	100.00	





# Seine Hauls Which Caught Shad Nanticoke River



—●— One or more shad



SYSTEM1=Upper Bay

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1957	28	0	28	
	2.54	0.00	2.54	
	100.00	0.00		
	3.07	0.00		
1958	13	11	24	
	1.18	1.00	2.18	
	54.17	45.83		
	1.43	5.79		
1959	5	7	12	
	0.45	0.64	1.09	
	41.67	58.33		
	0.55	3.68		
1960	0	14	14	
	0.00	1.27	1.27	
	0.00	100.00		
	0.00	7.37		
1961	7	19	26	
	0.64	1.72	2.36	
	26.92	73.08		
	0.77	10.00		
1962	9	19	28	
	0.82	1.72	2.54	
	32.14	67.86		
	0.99	10.00		
1963	18	10	28	
	1.63	0.91	2.54	
	64.29	35.71		
	1.97	5.26		
1964	23	5	28	
	2.09	0.45	2.54	
	82.14	17.86		
	2.52	2.63		
Total	912	190	1102	
(Continued)	82.76	17.24	100.00	

SYSTEM1=Upper Bay

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1965	24	4	28	
	2.18	0.36	2.54	
	85.71	14.29		
	2.63	2.11		
1966	18	24	42	
	1.63	2.18	3.81	
	42.86	57.14		
	1.97	12.63		
1967	32	10	42	
	2.90	0.91	3.81	
	76.19	23.81		
	3.51	5.26		
1968	24	18	42	
	2.18	1.63	3.81	
	57.14	42.86		
	2.63	9.47		
1969	23	19	42	
	2.09	1.72	3.81	
	54.76	45.24		
	2.52	10.00		
1970	31	11	42	
	2.81	1.00	3.81	
	73.81	26.19		
	3.40	5.79		
1971	33	9	42	
	2.99	0.82	3.81	
	78.57	21.43		
	3.62	4.74		
1972	36	6	42	
	3.27	0.54	3.81	
	85.71	14.29		
	3.95	3.16		
Total	912	190	1102	
(Continued)	82.76	17.24	100.00	

----- SYSTEM1=Upper Bay -----

TABLE OF YEAR BY RANK

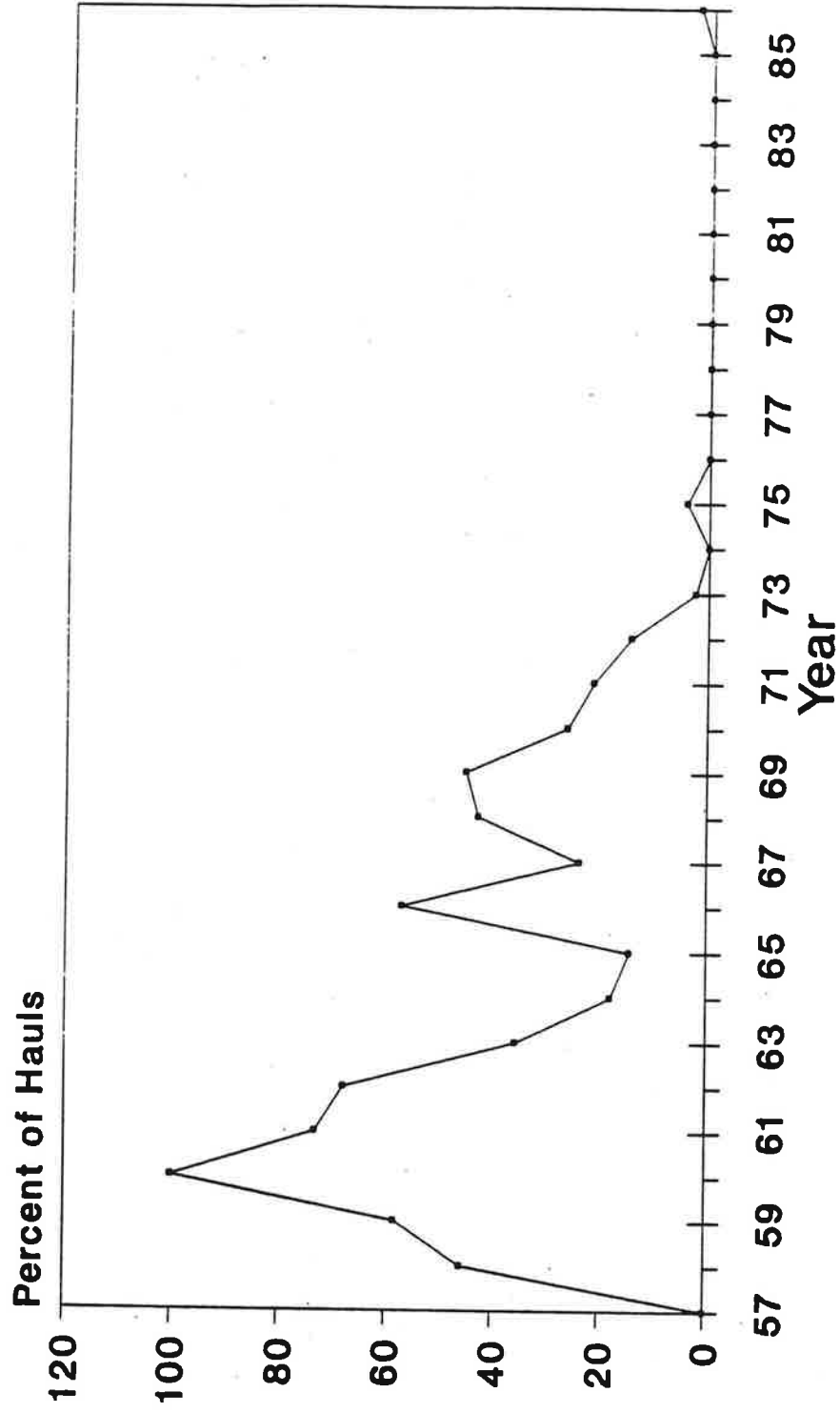
YEAR	RANK			
	Frequency Percent			
Row Pct		absent	presen	Total
Col Pct				
1973		41	1	42
	3.72	0.09		3.81
	97.62	2.38		
	4.50	0.53		
1974		40	0	40
	3.63	0.00		3.63
	100.00	0.00		
	4.39	0.00		
1975		46	2	48
	4.17	0.18		4.36
	95.83	4.17		
	5.04	1.05		
1976		42	0	42
	3.81	0.00		3.81
	100.00	0.00		
	4.61	0.00		
1977		42	0	42
	3.81	0.00		3.81
	100.00	0.00		
	4.61	0.00		
1978		42	0	42
	3.81	0.00		3.81
	100.00	0.00		
	4.61	0.00		
1979		42	0	42
	3.81	0.00		3.81
	100.00	0.00		
	4.61	0.00		
1980		42	0	42
	3.81	0.00		3.81
	100.00	0.00		
	4.61	0.00		
Total		912	190	1102
(Continued)		82.76	17.24	100.00

SYSTEM1=Upper Bay

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent	Row Pct	Col Pct	absent	presen	Total
1981		42	0	3.81	0.00	42	3.81
		100.00	0.00	4.61	0.00		
1982		42	0	3.81	0.00	42	3.81
		100.00	0.00	4.61	0.00		
1983		42	0	3.81	0.00	42	3.81
		100.00	0.00	4.61	0.00		
1984		42	0	3.81	0.00	42	3.81
		100.00	0.00	4.61	0.00		
1985		42	0	3.81	0.00	42	3.81
		100.00	0.00	4.61	0.00		
1986		41	1	3.72	0.09	42	3.81
		97.62	2.38	4.50	0.53		
Total		912	190	82.76	17.24	1102	100.00

# Seine Hauls Which Caught Shad Upper Bay (Primary Sites)



—•— One or more shad





TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1957	32 2.35 100.00 2.76	0 0.00 0.00 0.00	32 2.35	
1958	13 0.96 46.43 1.12	15 1.10 53.57 7.43	28 2.06	
1959	6 0.44 42.86 0.52	8 0.59 57.14 3.96	14 1.03	
1960	0 0.00 0.00 0.00	16 1.18 100.00 7.92	16 1.18	
1961	7 0.51 25.00 0.60	21 1.54 75.00 10.40	28 2.06	
1962	9 0.66 32.14 0.78	19 1.40 67.86 9.41	28 2.06	
1963	18 1.32 64.29 1.55	10 0.73 35.71 4.95	28 2.06	
1964	23 1.69 82.14 1.98	5 0.37 17.86 2.48	28 2.06	
Total	1159 85.16	202 14.84	1361 100.00	

(Continued)

SYSTEM=Upper Bay

TABLE OF YEAR BY RANK

YEAR	RANK			
	Frequency			
	Percent			
Col Pct	absent	presen	Total	
1965	24	4	28	
	1.76	0.29	2.06	
	85.71	14.29		
	2.07	1.98		
1966	18	24	42	
	1.32	1.76	3.09	
	42.86	57.14		
	1.55	11.88		
1967	32	10	42	
	2.35	0.73	3.09	
	76.19	23.81		
	2.76	4.95		
1968	24	18	42	
	1.76	1.32	3.09	
	57.14	42.86		
	2.07	8.91		
1969	23	19	42	
	1.69	1.40	3.09	
	54.76	45.24		
	1.98	9.41		
1970	31	11	42	
	2.28	0.81	3.09	
	73.81	26.19		
	2.67	5.45		
1971	33	9	42	
	2.42	0.66	3.09	
	78.57	21.43		
	2.85	4.46		
1972	36	6	42	
	2.65	0.44	3.09	
	85.71	14.29		
	3.11	2.97		
Total	1159	202	1361	
(Continued)	85.16	14.84	100.00	

TABLE OF YEAR BY RANK

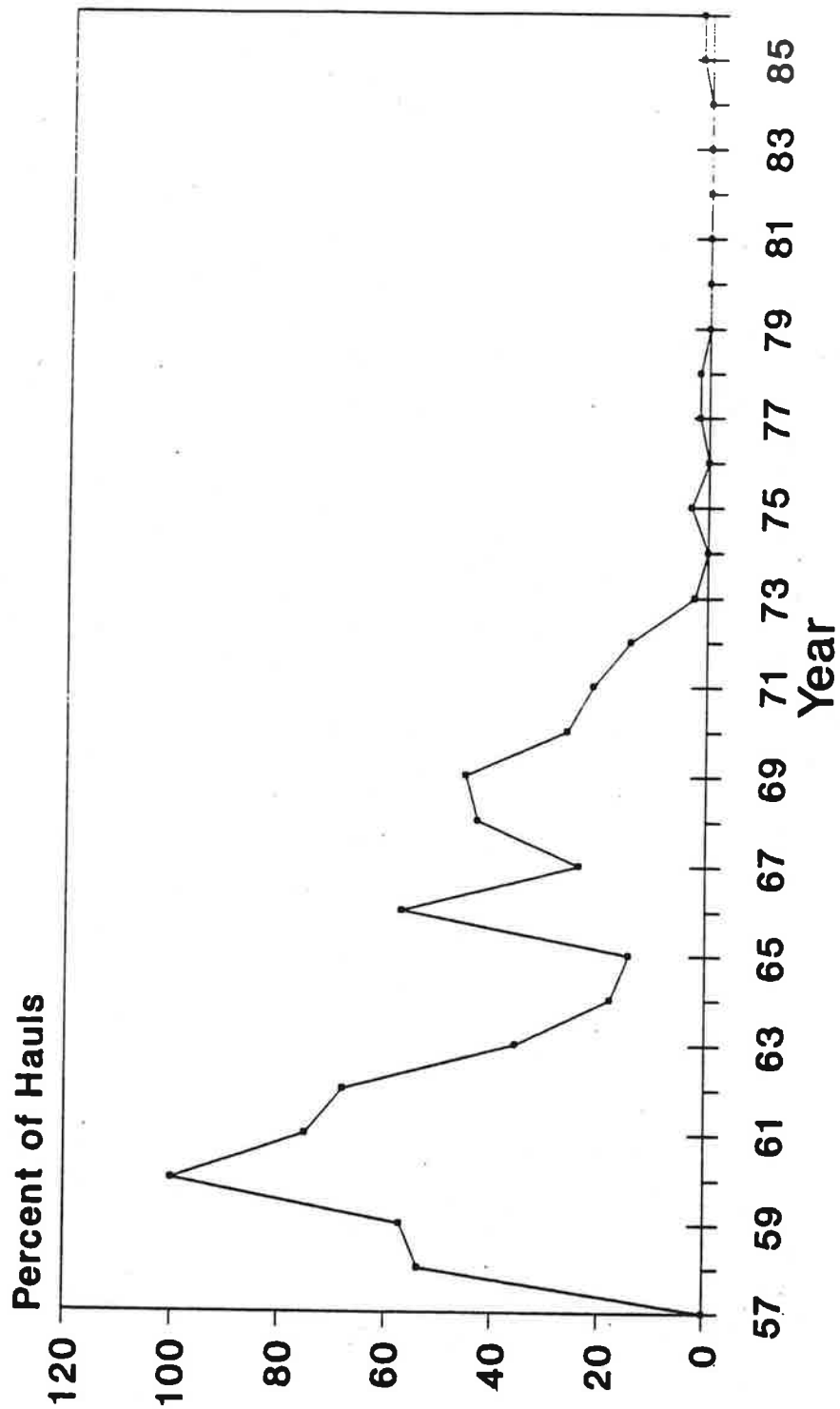
YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1973	41	1	42	
	3.01	0.07	3.09	
	97.62	2.38		
	3.54	0.50		
1974	50	0	50	
	3.67	0.00	3.67	
	100.00	0.00		
	4.31	0.00		
1975	60	2	62	
	4.41	0.15	4.56	
	96.77	3.23		
	5.18	0.99		
1976	60	0	60	
	4.41	0.00	4.41	
	100.00	0.00		
	5.18	0.00		
1977	59	1	60	
	4.34	0.07	4.41	
	98.33	1.67		
	5.09	0.50		
1978	57	1	58	
	4.19	0.07	4.26	
	98.28	1.72		
	4.92	0.50		
1979	60	0	60	
	4.41	0.00	4.41	
	100.00	0.00		
	5.18	0.00		
1980	60	0	60	
	4.41	0.00	4.41	
	100.00	0.00		
	5.18	0.00		
Total	1159	202	1361	
(Continued)	85.16	14.84	100.00	

SYSTEM=Upper Bay

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1981	60	0	60	
	4.41	0.00	4.41	
	100.00	0.00		
	5.18	0.00		
1982	61	0	61	
	4.48	0.00	4.48	
	100.00	0.00		
	5.26	0.00		
1983	66	0	66	
	4.85	0.00	4.85	
	100.00	0.00		
	5.69	0.00		
1984	66	0	66	
	4.85	0.00	4.85	
	100.00	0.00		
	5.69	0.00		
1985	65	1	66	
	4.78	0.07	4.85	
	98.48	1.52		
	5.61	0.50		
1986	65	1	66	
	4.78	0.07	4.85	
	98.48	1.52		
	5.61	0.50		
Total	1159	202	1361	
	85.16	14.84	100.00	

# Seine Hauls Which Caught Shad Upper Bay



—•— One or more shad



SYSTEM1=POTOMAC

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	present	Total	
1957	14	0	14	
	1.18	0.00	1.18	
	100.00	0.00		
	1.44	0.00		
1958	14	5	19	
	1.18	0.42	1.60	
	73.68	26.32		
	1.44	2.39		
1959	10	0	10	
	0.84	0.00	0.84	
	100.00	0.00		
	1.03	0.00		
1960	6	4	10	
	0.51	0.34	0.84	
	60.00	40.00		
	0.62	1.91		
1961	26	4	30	
	2.20	0.34	2.53	
	86.67	13.33		
	2.67	1.91		
1962	17	11	28	
	1.44	0.93	2.36	
	60.71	39.29		
	1.74	5.26		
1963	20	8	28	
	1.69	0.68	2.36	
	71.43	28.57		
	2.05	3.83		
1964	21	7	28	
	1.77	0.59	2.36	
	75.00	25.00		
	2.15	3.35		
Total	975	209	1184	
(Continued)	82.35	17.65	100.00	

SYSTEM1-Potomac

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1965	16 1.35 57.14 1.64	12 1.01 42.86 5.74	28 2.36	
1966	26 2.20 61.90 2.67	16 1.35 38.10 7.66	42 3.55	
1967	28 2.36 66.67 2.87	14 1.18 33.33 6.70	42 3.55	
1968	35 2.96 83.33 3.59	7 0.59 16.67 3.35	42 3.55	
1969	42 3.55 100.00 4.31	0 0.00 0.00 0.00	42 3.55	
1970	26 2.20 61.90 2.67	16 1.35 38.10 7.66	42 3.55	
1971	27 2.28 64.29 2.77	15 1.27 35.71 7.18	42 3.55	
1972	23 1.94 54.76 2.36	19 1.60 45.24 9.09	42 3.55	
Total	975 82.35	209 17.65	1184 100.00	

(Continued)



SYSTEM1=POTOMAC

TABLE OF YEAR BY RANK

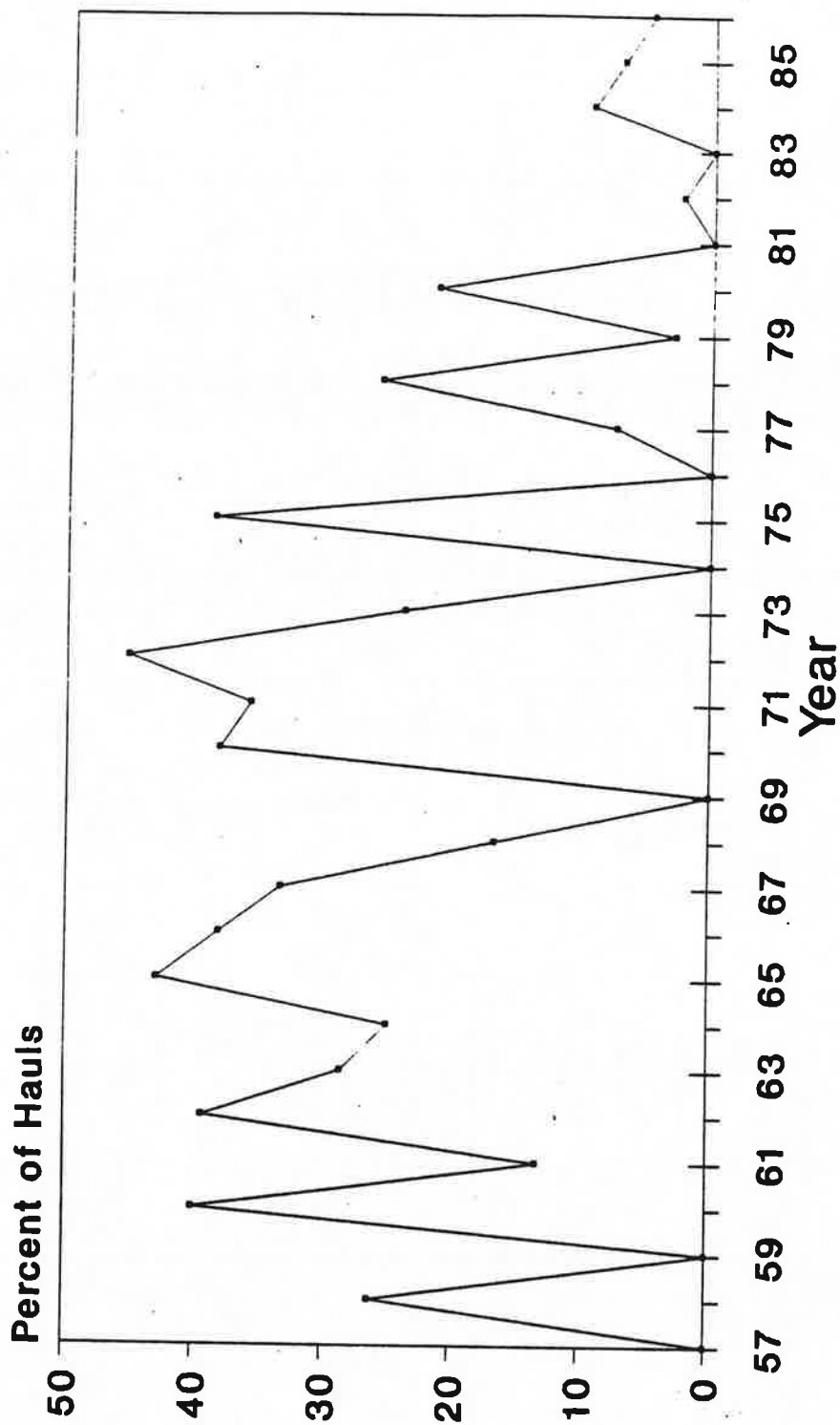
YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1973	32	10	42	
	2.70	0.84	3.55	
	76.19	23.81		
	3.28	4.78		
1974	42	0	42	
	3.55	0.00	3.55	
	100.00	0.00		
	4.31	0.00		
1975	27	17	44	
	2.28	1.44	3.72	
	61.36	38.64		
	2.77	8.13		
1976	66	0	66	
	5.57	0.00	5.57	
	100.00	0.00		
	6.77	0.00		
1977	63	5	68	
	5.32	0.42	5.74	
	92.65	7.35		
	6.46	2.39		
1978	52	18	70	
	4.39	1.52	5.91	
	74.29	25.71		
	5.33	8.61		
1979	67	2	69	
	5.66	0.17	5.83	
	97.10	2.90		
	6.87	0.96		
1980	33	9	42	
	2.79	0.76	3.55	
	78.57	21.43		
	3.38	4.31		
Total	975	209	1184	
(Continued)	82.35	17.65	100.00	

SYSTEM1-Potomac

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent Row Pct Col Pct	absent	presen	Total
1981		42	0	42	42
		3.55	0.00	3.55	3.55
		100.00	0.00		
1982		41	1	42	42
		3.46	0.08	3.55	3.55
		97.62	2.38		
1983		42	0	42	42
		3.55	0.00	3.55	3.55
		100.00	0.00		
1984		38	4	42	42
		3.21	0.34	3.55	3.55
		90.48	9.52		
1985		39	3	42	42
		3.29	0.25	3.55	3.55
		92.86	7.14		
1986		40	2	42	42
		3.38	0.17	3.55	3.55
		95.24	4.76		
Total		975	209	1184	1184
		82.35	17.65	100.00	100.00

# Seine Hauls Which Caught Shad Potomac River (Primary Sites)



—•— One or more shad



SYSTEM1-Potomac

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1957	22	0	22	
	1.36	0.00	1.36	
	100.00	0.00		
	1.58	0.00		
1958	22	5	27	
	1.36	0.31	1.67	
	81.48	18.52		
	1.58	2.23		
1959	14	0	14	
	0.87	0.00	0.87	
	100.00	0.00		
	1.01	0.00		
1960	10	4	14	
	0.62	0.25	0.87	
	71.43	28.57		
	0.72	1.79		
1961	30	4	34	
	1.86	0.25	2.10	
	88.24	11.76		
	2.16	1.79		
1962	21	11	32	
	1.30	0.68	1.98	
	65.63	34.38		
	1.51	4.91		
1963	25	9	34	
	1.55	0.56	2.10	
	73.53	26.47		
	1.80	4.02		
1964	25	7	32	
	1.55	0.43	1.98	
	78.13	21.88		
	1.80	3.13		
Total	1392	224	1616	
	86.14	13.86	100.00	

(Continued)

SYSTEM1=Potomac

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent Row Pct Col Pct	absent	presen	Total
1965		20	12	32	
		1.24	0.74	1.98	
		62.50	37.50		
		1.44	5.36		
1966		32	16	48	
		1.98	0.99	2.97	
		66.67	33.33		
		2.30	7.14		
1967		34	14	48	
		2.10	0.87	2.97	
		70.83	29.17		
		2.44	6.25		
1968		41	7	48	
		2.54	0.43	2.97	
		85.42	14.58		
		2.95	3.13		
1969		47	1	48	
		2.91	0.06	2.97	
		97.92	2.08		
		3.38	0.45		
1970		32	16	48	
		1.98	0.99	2.97	
		66.67	33.33		
		2.30	7.14		
1971		27	15	42	
		1.67	0.93	2.60	
		64.29	35.71		
		1.94	6.70		
1972		23	19	42	
		1.42	1.18	2.60	
		54.76	45.24		
		1.65	8.48		
Total		1392	224	1616	
(Continued)		86.14	13.86	100.00	

SYSTEM1-POTOMAC

TABLE OF YEAR BY RANK

YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1973	32	10	42	
	1.98	0.62	2.60	
	76.19	23.81		
	2.30	4.46		
1974	46	0	46	
	2.85	0.00	2.85	
	100.00	0.00		
	3.30	0.00		
1975	33	17	50	
	2.04	1.05	3.09	
	66.00	34.00		
	2.37	7.59		
1976	110	0	110	
	6.81	0.00	6.81	
	100.00	0.00		
	7.90	0.00		
1977	115	9	124	
	7.12	0.56	7.67	
	92.74	7.26		
	8.26	4.02		
1978	102	22	124	
	6.31	1.36	7.67	
	82.26	17.74		
	7.33	9.82		
1979	122	3	125	
	7.55	0.19	7.74	
	97.60	2.40		
	8.76	1.34		
1980	48	12	60	
	2.97	0.74	3.71	
	80.00	20.00		
	3.45	5.36		
Total	1392	224	1616	
	86.14	13.86	100.00	

(Continued)

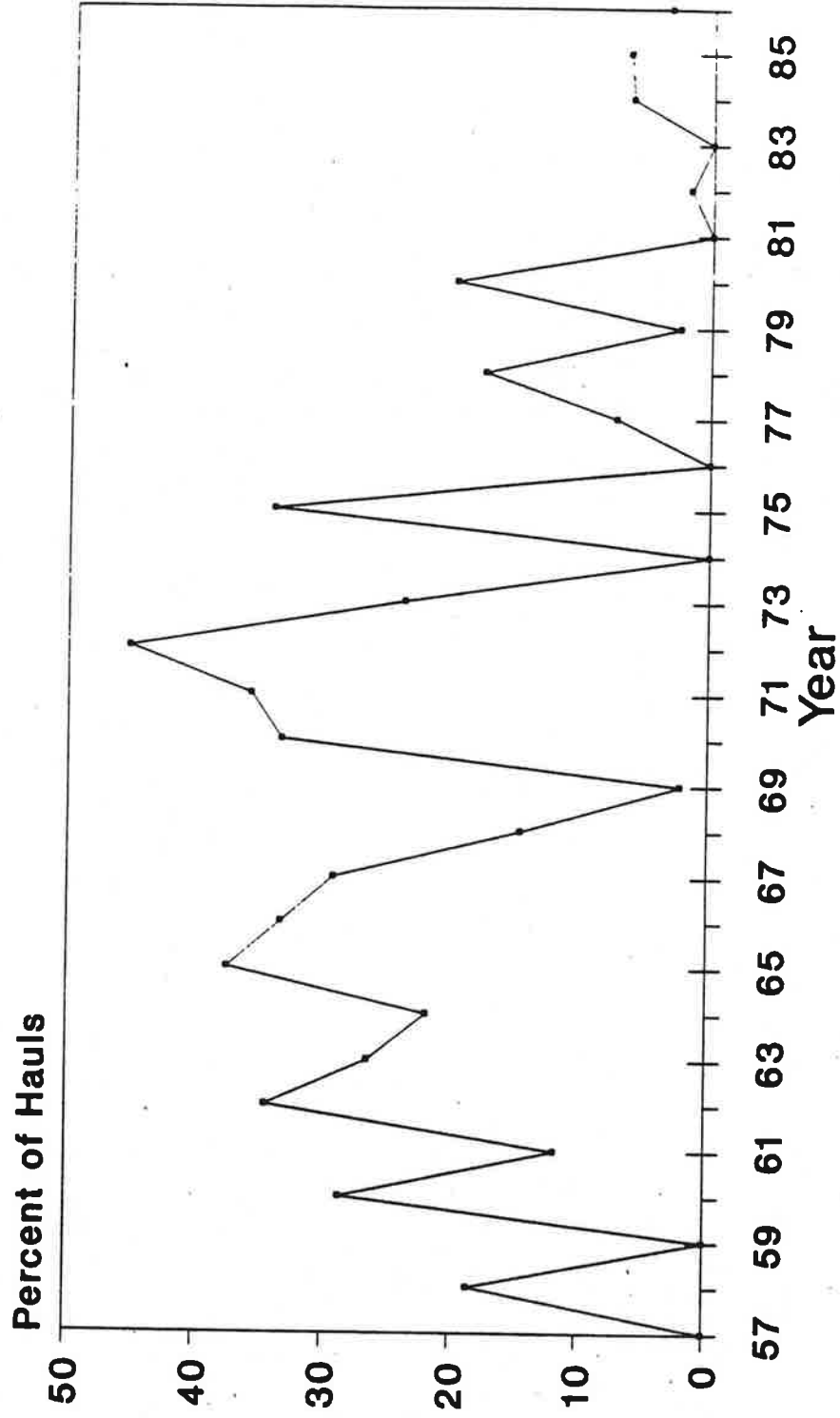
SYSTEM1-Potomac

TABLE OF YEAR BY RANK

YEAR	RANK		Frequency Percent		absent   presen		Total
	Row Pct	Col Pct					
1981			60	0			60
			3.71	0.00			3.71
			100.00	0.00			
1982			4.31	0.00			
			59	1			60
1983			3.65	0.06			3.71
			98.33	1.67			
			4.24	0.45			
1984							
			64	0			64
			3.96	0.00			3.96
1985			100.00	0.00			
			4.60	0.00			
1986			60	4			64
			3.71	0.25			3.96
			93.75	6.25			
1987			4.31	1.79			
			58	4			62
1988			3.59	0.25			3.84
			93.55	6.45			
			4.17	1.79			
1989							
			58	2			60
			3.59	0.12			3.71
1990			96.67	3.33			
			4.17	0.89			
Total			1392	224			1616
			86.14	13.86			100.00



# Seine Hauls Which Caught Shad Potomac River



—•— One or more shad



SYSTEM=James

TABLE OF YEAR BY RANK

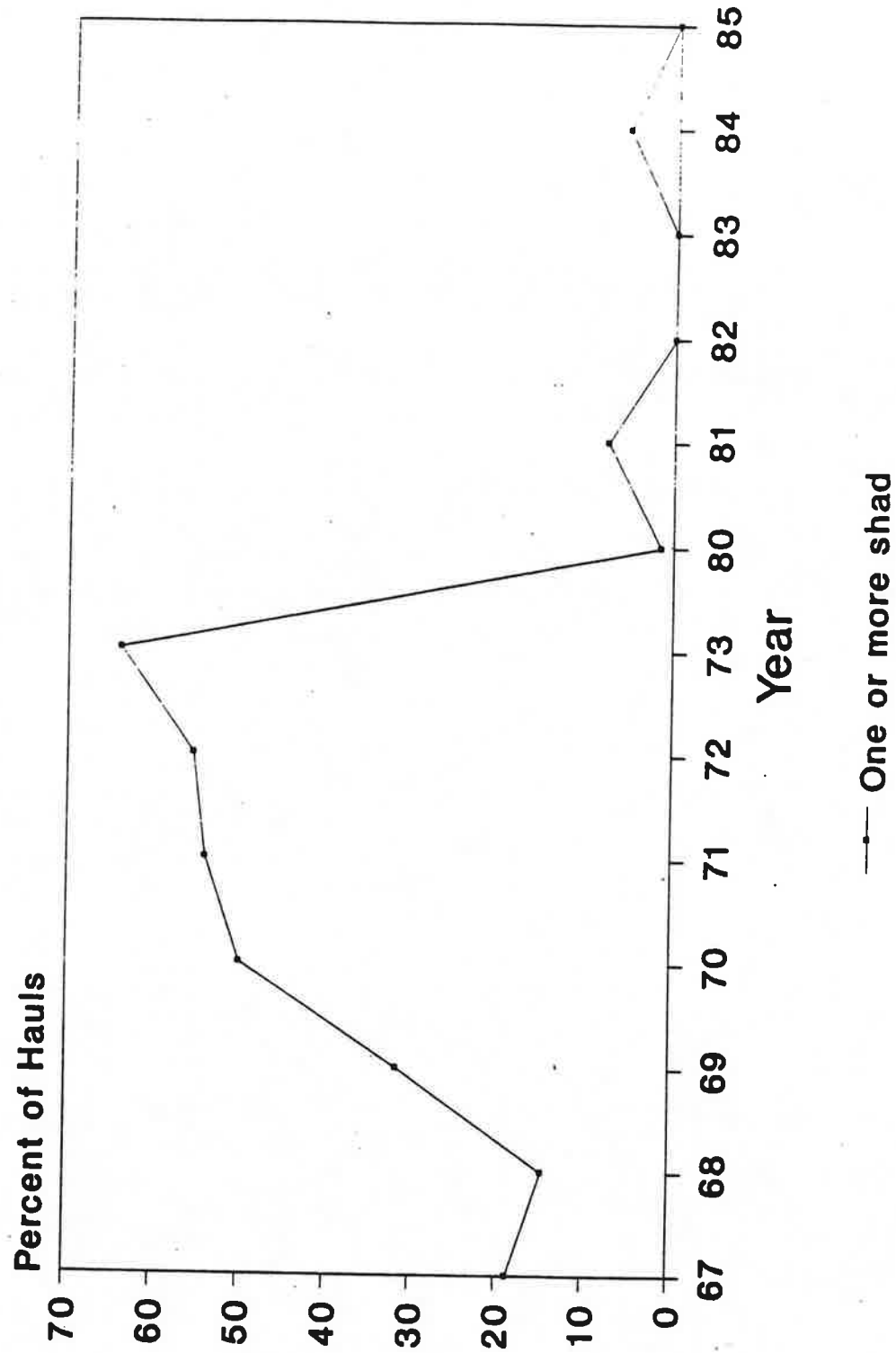
YEAR	RANK			
Frequency				
Percent				
Row Pct				
Col Pct	absent	presen	Total	
1967	35	8	43	
	5.03	1.15	6.18	
	81.40	18.60		
	6.76	4.49		
1968	41	7	48	
	5.89	1.01	6.90	
	85.42	14.58		
	7.92	3.93		
1969	39	18	57	
	5.60	2.59	8.19	
	68.42	31.58		
	7.53	10.11		
1970	32	32	64	
	4.60	4.60	9.20	
	50.00	50.00		
	6.18	17.98		
1971	29	34	63	
	4.17	4.89	9.05	
	46.03	53.97		
	5.60	19.10		
1972	25	31	56	
	3.59	4.45	8.05	
	44.64	55.36		
	4.83	17.42		
1973	22	39	61	
	3.16	5.60	8.76	
	36.07	63.93		
	4.25	21.91		
Total	518	178	696	
(Continued)	74.43	25.57	100.00	

SYSTEM=James

TABLE OF YEAR BY RANK

YEAR	RANK			
	Frequency			
Row Pct	Percent			
Col Pct	absent	presen	Total	
1980	67	1	68	
	9.63	0.14	9.77	
	98.53	1.47		
	12.93	0.56		
1981	72	6	78	
	10.34	0.86	11.21	
	92.31	7.69		
	13.90	3.37		
1982	37	0	37	
	5.32	0.00	5.32	
	100.00	0.00		
	7.14	0.00		
1983	37	0	37	
	5.32	0.00	5.32	
	100.00	0.00		
	7.14	0.00		
1984	34	2	36	
	4.89	0.29	5.17	
	94.44	5.56		
	6.56	1.12		
1985	48	0	48	
	6.90	0.00	6.90	
	100.00	0.00		
	9.27	0.00		
Total	518	178	696	
	74.43	25.57	100.00	

# Seine Hauls Which Caught Shad James River





SYSTEM=York

TABLE OF YEAR BY RANK

YEAR	RANK	Frequency Percent Row Pct Col Pct	absent	presen	Total
1967		31	16	47	5.23
		3.45	1.78		
		65.96	34.04		
		5.59	4.66		
1968		56	8	64	7.13
		6.24	0.89		
		87.50	12.50		
		10.09	2.33		
1969		37	27	64	7.13
		4.12	3.01		
		57.81	42.19		
		6.67	7.87		
1970		45	19	64	7.13
		5.01	2.12		
		70.31	29.69		
		8.11	5.54		
1971		45	19	64	7.13
		5.01	2.12		
		70.31	29.69		
		8.11	5.54		
1972		110	58	168	18.71
		12.25	6.46		
		65.48	34.52		
		19.82	16.91		
1973		39	39	78	8.69
		4.34	4.34		
		50.00	50.00		
		7.03	11.37		
Total		555	343	898	
		61.80	38.20	100.00	

(Continued)

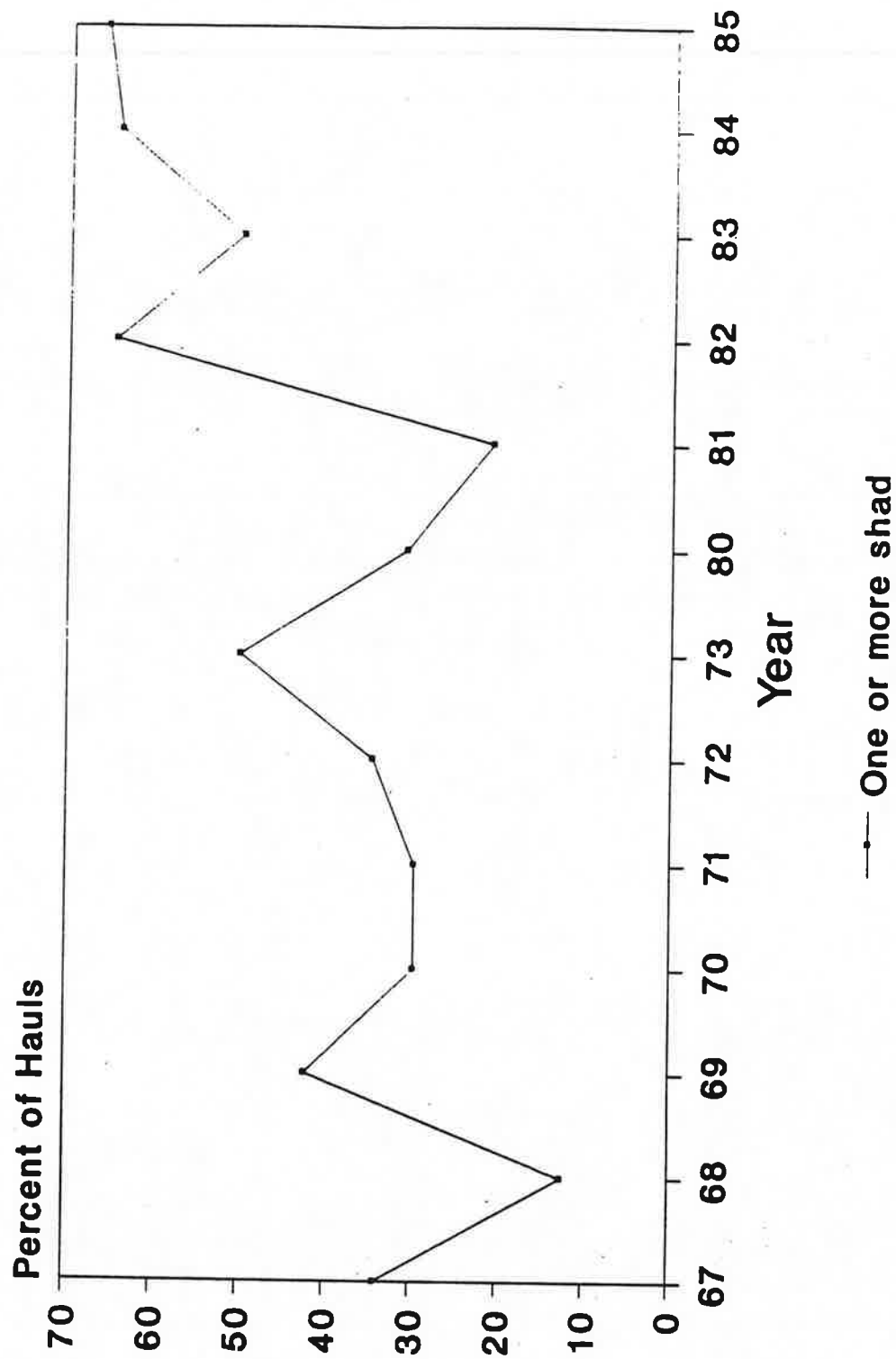
SYSTEM=York

TABLE OF YEAR BY RANK

YEAR	RANK			
	Frequency Percent Row Pct Col Pct	absent	presen	Total
1980		52	23	75
		5.79	2.56	8.35
		69.33	30.67	
		9.37	6.71	
1981		68	18	86
		7.57	2.00	9.58
		79.07	20.93	
		12.25	5.25	
1982		17	31	48
		1.89	3.45	5.35
		35.42	64.58	
		3.06	9.04	
1983		21	21	42
		2.34	2.34	4.68
		50.00	50.00	
		3.78	6.12	
1984		15	27	42
		1.67	3.01	4.68
		35.71	64.29	
		2.70	7.87	
1985		19	37	56
		2.12	4.12	6.24
		33.93	66.07	
		3.42	10.79	
Total		555	343	898
		61.80	38.20	100.00



# Seine Hauls Which Caught Shad York River





SYSTEM=Rappa

TABLE OF YEAR BY RANK

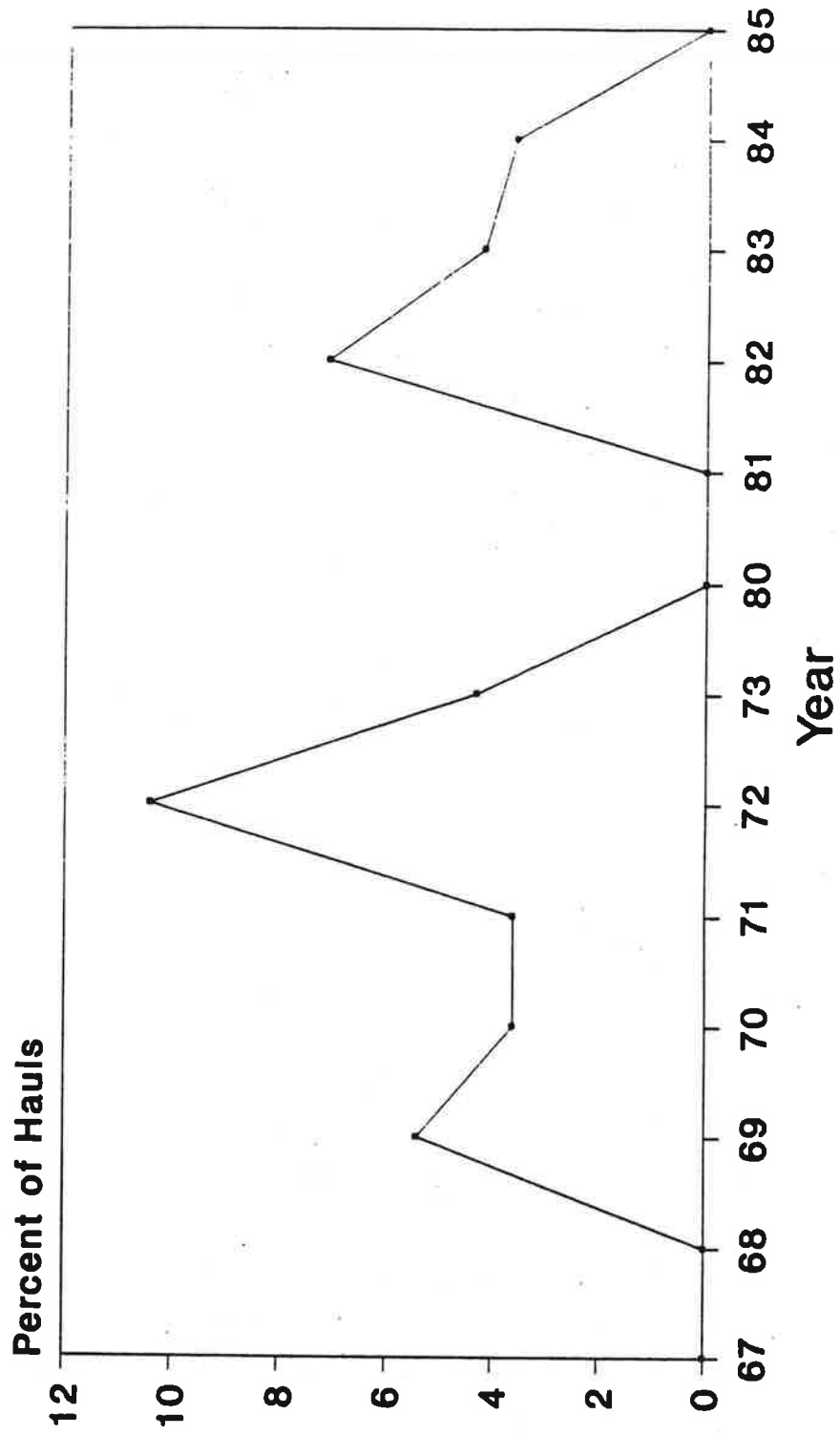
YEAR	RANK			
Frequency Percent Row Pct Col Pct	absent	presen	Total	
1967	55	0	55	
	9.63	0.00	9.63	
	100.00	0.00		
	9.95	0.00		
1968	56	0	56	
	9.81	0.00	9.81	
	100.00	0.00		
	10.13	0.00		
1969	53	3	56	
	9.28	0.53	9.81	
	94.64	5.36		
	9.58	16.67		
1970	53	2	55	
	9.28	0.35	9.63	
	96.36	3.64		
	9.58	11.11		
1971	54	2	56	
	9.46	0.35	9.81	
	96.43	3.57		
	9.76	11.11		
1972	43	5	48	
	7.53	0.88	8.41	
	89.58	10.42		
	7.78	27.78		
1973	45	2	47	
	7.88	0.35	8.23	
	95.74	4.26		
	8.14	11.11		
Total	553	18	571	
(Continued)	96.85	3.15	100.00	

SYSTEM=Rappa

TABLE OF YEAR BY RANK

YEAR	RANK			
	Frequency Percent			
Row Pct				
Col Pct	absent	presen	Total	
1980	34	0	34	
	5.95	0.00	5.95	
	100.00	0.00		
	6.15	0.00		
1981	46	0	46	
	8.06	0.00	8.06	
	100.00	0.00		
	8.32	0.00		
1982	26	2	28	
	4.55	0.35	4.90	
	92.86	7.14		
	4.70	11.11		
1983	23	1	24	
	4.03	0.18	4.20	
	95.83	4.17		
	4.16	5.56		
1984	27	1	28	
	4.73	0.18	4.90	
	96.43	3.57		
	4.88	5.56		
1985	38	0	38	
	6.65	0.00	6.65	
	100.00	0.00		
	6.87	0.00		
Total	553	18	571	
	96.85	3.15	100.00	

# Seine Hauls Which Caught Shad Rappahannock River



—•— One or more shad

