1963

Surface trawl surveys to determine the abundance of juvenile American shad (Alosa sapidissima) in the Pamunkey and Mattaponi rivers, 1952 -1956

William Henry Massmann

Virginia Institute of Marine Science

VIRGINIA INSTITUTE OF MARINE SCIENCE
GLOUCESTER POINT, VIRGINIA

SURFACE TRAWL SURVEYS TO DETERMINE THE ABUNDANCE OF JUVENILE AMERICAN SHAD IN THE PAMUNKEY AND MATTAPONI RIVERS, 1952-1956

W. H. Massmann

SPECIAL SCIENTIFIC REPORT NO. 46

October 1963

VIRGINIA INSTITUTE OF MARINE SCIENCE
GLOUCESTER POINT, VIRGINIA

SURFACE TRAWL SURVEYS TO DETERMINE THE ABUNDANCE OF JUVENILE AMERICAN SHAD (ALOSA SAPIDISSIMA) IN THE PAMUNKEY AND MATTAPONI RIVERS, 1952 - 1956

W. H. Massmann

W. J. Hargis, Jr.
Director

October 1963

SURFACE TRAWL SURVEYS TO DETERMINE THE ABUNDANCE OF JUVENILE AMERICAN SHAD (ALOSA SAPIDISSIMA) IN THE PAMUNKEY AND MATTAPONI RIVERS, 1952 - 1956

Surface trawl surveys were made to obtain estimates of the abundance of young shad in the Pamunkey and Mattaponi rivers in 1952 to 1956. These surveys were made during August or September, a period when juvenile shad were large enough to be caught by trawl, yet before the onset of fall migration seaward.

The surface trawl, described by Massmann et al.(1952, Trans. 17th N. Amer. Wildl. Conf.: 336-92) was 20 feet across the mouth and 7 feet deep while fishing. The net, towed at 2 knots for 15 minutes, sampled 1.4 acres of water. Generally, two successive hauls were made in each river section. Catches from successive tows were usually quite consistent.

The rivers were divided into 5-mile sections, the first section extending from previously established station 30 (30 nautical miles upriver from the York River mouth) to station 35. The remaining sections were located in a similar manner. The area of each section, measured by planimeter, is listed in Table 1. To estimate the number of shad in each section, the number of shad captured per acre was multiplied by the number of acres of water in the river section sampled. Estimates of abundance of young shad for 5-year period are listed in Tables 2-6.

The best method of measuring abundance of young shad in Virginia rivers was by sampling with a surface trawl. Use of this gear did not result in estimates of absolute abundance, however, for young shad were present in waters deeper than those sampled by trawl. Tests with a "double-decker", a surface trawl with a second net rigged to fish just

beneath it, have shown the abundance of shad in water from 7 to 14 feet was roughly comparable to their abundance near the surface. Shad were not uniformly distributed all the way to the bottom, for conventional otter trawl tows resulted in few specimens.

Shoal areas near shore could not be sampled by a surface trawl. Seining in these areas indicated that shad were present, but were not as abundant as in deeper waters. For estimates of abundance, the presence of shad in water deeper than those sampled by surface trawl is, to an extent, compensated by their scarcity in shallow waters. Rotenone sampling in tidal tributaries of the rivers indicated that few shad were present in these creeks. Most of those captured were found at the creek mouths.

Table 1. Areas of different sections of the Pamunkey and Mattaponi rivers as measured by planimeter

River section	Area in acres	
	Pamunkey	Mattaponi
30	985	805
35	890	595
40	865	780
45	955	760
50	1,475	735
55	945	195
60	305	-
65	185	-
70	115	-
Total	6,720	3,870

Table 2. Estimated numbers of shad in the Pamunkey and Mattaponi rivers, August 15-27, 1952

River section	Pamunkey		Mattaponi	
	No./acre	Estimated total	No./acre	Estimated total
30	0.0	0	0.0	0
35	0.7	1,000	2.1	1,000
40	9.3	8,000	41.4	32,000
45	4.3	4,000	121.4	92,000
50	11.4	17,000	(38.9) /1	29,000
55	24.3	23,000	9.3	2,000
60	(53.8) /1	16,000	-	-
65	134.8	25,000	-	-
70	18.9	2,000	-	-
Total		96,000		156,000

/1 Mattaponi River station 50 and Pamunkey River stations 60 to 70 were not sampled on this cruise. Numbers in parentheses are estimates based on the percentages of young shad taken at these stations on cruises made in succeeding years.

Table 3. Estimated numbers of shad in the Pamunkey and Mattaponi rivers, August 10 - September 17, 1953

River Section	Pamunkey No./acre	Pamunkey Estimated total	Mattaponi No./acre	Mattaponi Estimated total
30	0.0	0	0.0	0
35	0.0	0	2.5	1,000
40	0.0	0	40.7	32,000
45	31.4	30,000	601.0	457,000
50	7.8	12,000	197.5	145,000
55	24.3	23,000	67.9	13,000
60	68.3	21,000	-	-
65	171.2	32,000	-	-
70	24.0	3,000	-	-
Total		121,000		648,000

Table 4. Estimated numbers of shad in the Pamunkey and Mattaponi rivers

August 23 - September 17, 1954

River Section	Pamunkey		Mattaponi	
	No./acre	Estimated total	No./acre	Estimated total
30	0.0	0	0.0	0
35	0.7	1,000	1.1	1,000
40	0.4	1,000	25.4	20,000
45	45.7	44,000	172.9	131,000
50	68.9	102,000	131.8	97,000
55	35.7	34,000	(28.5) /1	6,000
60	111.8	34,000	-	-
65	53.6	10,000	-	-
70	432.0	50,000	-	-
Total		275,000		255,000

/1 Mattaponi River station 55 not sampled. Numbers in parentheses are estimates based on the percentages of young shad taken at this station on the 1953 cruise.

Table 5. Estimated numbers of shad in the Pamunkey and Mattaponi rivers, September 8 - 10, 1955

River section	Pamunkey No./acre	Pamunkey Estimated Total	Mattaponi No./acre	Mattaponi Estimated Total
30	1.4	1,000	0.0	0
35	0.0	0	2.9	2,000
40	1.4	1,000	4.3	3,000
45	3.9	37,000	0.7	1,000
50	0.4	1,000	72.9	54,000
55	15.7	15,000	(6.1) /1	1,000
60	14.6	4,000	-	-
65	57.9	11,000	-	-
70	2.9	1,000	-	-
Total		69,000		60,000

/1 Mattaponi River station 55 not sampled. Numbers in parentheses are based on the percentages of young shad taken at this station on the 1953 cruise.

Table 6. Estimated numbers of shad in the Pamunkey and Mattaponi rivers, September 24-25 and October 9, 1956

River section	Pamunkey No./acre	Pamunkey Estimated total	Mattaponi No./acre	Mattaponi Estimated total
30	$\leq$0.7	1,000	2.1	2,000
35	0.0	0	8.6	5,000
40	24.3	21,000	4.3	3,000
45	65.0	62,000	22.9	17,000
50	146.4	216,000	55.7	41,000
55	31.4	30,000	(6.9) /1	1,000
60	10.0	3,000	-	-
65	7.9	1,000	-	-
70	34.3	4,000	-	-
Total		337,000		69,000

/1 Mattaponi River station 55 not sampled. Numbers in parentheses are based on percentages of young shad taken at this station on the 1953 cruise.