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RIVER HERRING STOCKS ALONG THE ATLANTIC COAST

by

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INTRODUCTION

In this document, river herring is a term applied collectively to the blueback herring (*Alosa aestivalis*) and the alewife (*Alosa pseudoharengus*). The coastal range of the blueback herring is from Nova Scotia to Florida (Hildebrand 1963). The coastal range of the alewife is farther north, from Newfoundland (Winters et al. 1973) to South Carolina (Berry 1964). In coastal rivers where the ranges overlap, the fisheries for the two species are mixed. Separation of the two species based on external appearance is difficult (Figure 1), and is usually based on eye size and color of the abdominal peritoneum (Scott and Crossman 1973). As such, landings data gathered on the two species typically have them lumped under the collective term "river herring."

River herring have been subjected to intensive exploitation along the Atlantic coast. Landings have considerably declined in most coastal states during the past ten years, parallel to a decline in reported landings of American and hickory shad. In response to the observed decline, the Mid-Atlantic Fishery Management Council has recommended that a comprehensive, coastwide management plan be prepared for shad and river herring (Bryson, pers. comm.). The purpose of this document is to summarize available information that can be used as a biological basis for such a plan. In addition, suggestions for future river herring research are presented.

LIFE CYCLE

Both river herring species are anadromous and are capable of completing their entire life cycle in fresh water (Scott and Crossman 1973; Prince and Barwich 1981).

Spawning

Blueback herring generally spawn later in the spring than alewives, when water temperatures are between 21 C and 24 C; alewives spawn when water temperatures are about 5 C cooler (Bigelow and Welsh 1925). A comparison of the spawning dates for the two species in Atlantic coastal rivers is presented in Table 1. The commonly-accepted premise that blueback herring do not ascend freshwater as far as alewives does not appear justifiable with respect to relatively large rivers and streams (Loesch and Lund 1977).

Fecundities of the two river herring species is quite similar; egg production is between 60,000 (Leim and Scott 1966) and 300,000 (Kissel 1974; Mayo 1974) eggs per female. Marcy (1969) found that most male blueback herring are mature at age 4 and most females at age 5 in the Connecticut River, while male and female alewives matured one year earlier. Most blueback herring are mature by age 3 in North Carolina (Tyus 1974).

Reported sex ratios of spawning blueback herring vary from 1:1 (Joseph and Davis 1965) to two males per female (Loesch and Lund 1977). In Damariscotta Lake, Maine, escapement runs of

alewives had significantly more females than males, although samples from the commercial fishery had a sex ratio of 1:1 (Libby 1981). Both alewives and blueback herring exhibit the characteristic of males dominating the earlier part of the spawning run and females dominating the later part. Repeat spawning is commonly observed for both species (Joseph and Davis 1965; Marcy 1969; Loesch and Lund 1977).

Early Life History

Eggs of both species of river herring are demersal and adhesive (Hildebrand 1963; Lippson and Moran 1974), although the adhesiveness of alewife eggs may be lost within several hours after fertilization (Cooper 1961). The egg incubation period lasts from two to four days for blueback herring and from two to five days for alewives, depending on water temperature (Boreman 1981). Yolksacs are completely absorbed by blueback herring larvae in 2-3 days (Jones et al. 1977), and by alewife larvae in 2-5 days (Cianci 1969; Jones et al. 1978). Boreman (1981) estimated the period between yolk absorption and attainment of the full complement of adult fin rays was 4-8 weeks for alewives and blueback herring in the Hudson River, based on observed abundance patterns. The wide range, though, may have been the result of the difference in spawning periods of the two species; a period of four weeks for each species was considered the more appropriate value (Boreman et al. 1982).

Distribution data collected in the Hudson River during 1974

and 1975 indicate alewives move downriver earlier than blueback herring (Boreman 1981). The more upriver distribution of blueback herring continued through the fall months. Emigration of juvenile alewives begins in June and lasts until late October in Rhode Island and Connecticut (Cooper 1961; Kissel 1969; Richkus 1975). Emigration of blueback herring in Connecticut is primarily from mid-September through October (Jones et al. 1978). Alewife emigration occurs throughout the summer in the Gulf of Maine region (Bigelow and Schroeder 1953). Some overwintering of river herring occurs in Chesapeake Bay (Hildebrand 1963), Delaware Bay (Smith 1971), and the Hudson River (Boreman 1981).

Non-Spawning Adults

The offshore distribution of river herring between Cape Hatteras, North Carolina, and Nova Scotia was summarized by Neves (1981) from bottom trawl survey data collected by the National Marine Fisheries Service (NMFS) between 1963 and 1978. The range in ages of alewives collected in these surveys was 1-13 years and the range in fork lengths was 6-32 cm (Dery 1979). The survey data indicated that river herring were most abundant in Nantucket Shoals, Georges Bank, and the Gulf of Maine perimeter during the summer and autumn. Winter catches occurred from immediately south of Long Island to Nova Scotia, and spring catches were distributed throughout the sampling area. Most river herring were sampled at stations greater than 100 m in depth and at bottom temperatures of 4-6 C.

Limited tagging evidence indicates extensive coastwide migrations may be undertaken by river herring. Curtis (1971) reported blueback herring tagged in South Carolina were recovered as far north as Cape Cod. A blueback herring tagged and released in Croatan Sound, North Carolina, in April, 1974, was recovered by a West German trawler operating on Georges Bank in August, 1974. The fish travelled approximately 550 nautical miles in 110 days. Another blueback herring tagged on the same day and released at the same location was recaptured by a Polish trawler off New Jersey (M. Street, NC Division of Marine Fisheries, pers. comm.).

Trophic Relationships

Juvenile alewives are reported to be both species- and size-selective in their choice of food items, and juvenile blueback herring appear to be random feeders (Hoagman et al. 1973). The dominant food items in stomachs of juvenile blueback herring collected from the Connecticut River were *tendipedid* larvae and cladocerans (Scherer 1972). Juvenile alewives collected in Adirondack lakes were feeding on cyclopoid copepods and cladocerans (Hutchinson 1971). In the marine environment, blueback herring feed on copepods, pelagic shrimp, and early life stages of small fishes to the greatest extent (Scott and Crossman 1973). Alewives feed chiefly on euphausiids, mysids, molluscs, and chaetognaths (Maurer and Bowman 1975). Predators on river herring in estuaries include bluefish (Bigelow and Schroeder 1953; Texas Instruments, Inc. 1976a), striped bass, and white perch (Texas Instruments, Inc. 1976b).

Pathobiology

Alewives are parasitized by the larval forms of trematodes (Diplostomulum flexacaudum and Neascus sp.), a nematode (Contracaecum sp.), an acanthocephalan (Leptorhynchoides thecatus), the mollusc Glochidia, and the copepod Argulus alosae (Hoffman 1961). Sumner et al. (1913) found acanthocephala (Echinorhynchus acus), cestodes (Rhynchobothrium imparaspine, and Monostomum sp.), and copepods (Argulus alosae, Caligus rapax, and Lepeophtheirus edwardsi) in alewives. They also found the acanthocephalan Echinorhynchus acus in blueback herring. Gudger (1937) listed the colonial hydroid Obelia commensuralis attached to the back of a blueback herring captured in North Carolina. Infectious pancreatic necrosis (IPN), a viral infection common in menhaden (spinning disease), has been isolated in blueback herring (M. Newman, NMFS-Oxford, pers. comm.).

FISHERIES

River herring are sought primarily by commercial fishermen. The proportion of each species (alewife or blueback herring) in the river herring catch varies with latitude; however, based on juvenile production surveys, it is likely that alewives dominate the landings in the Gulf of Maine area and blueback herring dominate the landings further south. Since the southern extent of the range of alewife is South Carolina, landings in Florida are probably entirely blueback herring.

Commercial Fisheries (Domestic)

Reported commercial landings of river herring along the Atlantic Coast peaked in 1958 at 34,000 mt (75 million pounds) (Figure 2). The average annual landings since 1970, however, have been approximately 50 percent of the 1929-1970 average (Table 2). The Chesapeake Bay region (Maryland and Virginia) experienced the greatest decline in reported landings during the past ten years, from a 1929-1970 average of 11,000 mt (24 million pounds) per year to a 1971-1980 average of 3,400 mt (7.5 million pounds) per year.

Use of commercial landings of river herring reported by the NMFS for estimation of exploitation rates and stock sizes is inhibited by the fact that effort (in terms of number of gear or size of gear fished) is not reported on each species. Therefore, for species like alewife and blueback herring that are landed along with other species using the same gear (e.g., menhaden, spot, and shad), estimation of effort using the NMFS data is imprecise and probably inaccurate. Catch and effort data specific to some river herring stocks are available through other surveys and have been used to estimate stock size and fishing mortality (see Johnson et al. 1979; Loesch and Kriete 1981; Walton 1981). Hoagman et al. (1973) estimated that river herring stocks from New York to North Carolina could support an annual maximum sustainable yield between 23,000-28,000 mt (51-62 million pounds). This range of values is below the level of commercial landings (foreign and domestic) reported for the late 1960's to

early 1970's, indicating that excessive exploitation may have caused the decline in landings levels since then.

Commercial Fisheries (Foreign)

Reported landings of river herring by foreign vessels of the Atlantic Coast of the United States peaked in 1969 at close to 36,200 mt (80 million pounds) then declined precipitously (Figure 2 and Table 3). Between 1967 and 1976 reported landings from foreign vessels accounted for 46 percent of the total commercial catch of river herring. Most of the foreign catch has been from the Georges Bank - Southern New England area, with the remainder taken off of Chesapeake Bay.

Since March 1, 1977, the foreign fishery in the Fishery Conservation Zone of the United States has been managed by the Preliminary Fishery Management Plan (PMP) for the Foreign Trawl Fisheries of the Northwest Atlantic. The PMP established an optimum yield of 10,000 mt (22 million pounds) for river herring, of which the United States capacity was 9,500 mt (20.9 million pounds). This left 500 mt (1.1 million pounds) allocated to the foreign fishery. The 1977 PMP also restricted the foreign by-catch of river herring to one percent or 2,500 kg (whichever is greater) of all fish on board, or collectively (with bluefish, scup, sea bass, weakfish, croaker, spot, American shad, and tautog) to 7.5 percent or 12,000 kg (whichever is greater) of all fish on board (42 FR 9978; 17 February 1977). The 1978 final foreign fishing regulations published on November 28, 1977 (42 FR

60681-60699) continued the allocation of 500 mt (1.1 million pounds) of river herring to the foreign fishery. No substantive changes in the PMP affecting river herring allocations have been made since 1977.

Recreational Fisheries

River herring are sought by sport fishermen in many, if not all, coastal states. In Delaware, the Nanticoke River supports a small sport fishery in association with the American shad fishery (R. Miller, pers. comm.). Sport fishermen landed approximately 200,000 pounds of river herring in North Carolina during the early to mid-1970's, using dip nets and gill nets in many small coastal streams (M. Street, pers. comm.). In South Carolina, a recreational fishery for river herring exists in the upper reaches of most river systems, utilizing hoop and bow nets (B. McCord, pers. comm.). The Salt-Water Angling Surveys conducted by NMFS (1960: Clark 1962; 1965: Deuel and Clark 1967; 1970: Deuel 1973; 1974: Deuel, pers. comm.; 1979: U. S. Department of Commerce 1980) did not include river herring (1960) or lumped river herring with other species (1965, 1970, 1974, and 1979).

SURVEY BIOMASS INDICES

A stratified random survey with bottom trawls has been conducted on the continental shelf between Nova Scotia and Cape Hatteras every fall since 1963 by the National Marine Fisheries Service. Spring surveys of similar design have been conducted since

1968. Grosslein (1969) and Clark (1979) provide further details on the sampling design and methods. Although catches of river herring were low compared to other species, some interesting relationships are apparent among the abundance indices in the different sampling regions (Gulf of Maine, Georges Bank, Southern New England, and Middle Atlantic). The indices are log-transformed average weights per tow (Table 4).

The abundance indices for river herring in the Georges Bank (fall) and Southern New England (spring) surveys exhibited a significant decline between 1963 and 1980, while the Gulf of Maine indices (fall and spring) exhibited a significant increase (Table 4). The remaining indices (Georges Bank - spring, Southern New England - fall, and Middle Atlantic - spring) showed no significant trends. The difference in trends between the Gulf of Maine region and the regions further south may be due to species differences, since alewives predominate river herring landings only in the Gulf of Maine region.

DISCUSSION

Analyses of the river herring landings and survey abundance indices indicate that stocks along the Atlantic coast show a wide variability in trends and associations. This variability may be due to species differences or differences among the individual populations of a species. As such, the contribution that each stock makes to the coastal fisheries is a key factor in management. Until accurate stock and species separation techniques are

developed, the impact of controlling offshore fisheries will remain unknown. Coastwide migratory patterns as exhibited by striped bass, American shad, bluefish, and weakfish are still undetected for river herring; therefore, even a generalized appraisal of stock contribution is not possible. The magnitude of river herring abundance and spawning locations makes a coastwide tagging program impractical, and alternate means of stock identification (e.g. using morphometrics and electrophoresis) will be necessary.

Factors blamed for the observed declines in river herring stocks are fishing (foreign and domestic), dams, and pollution. However, the relative contribution each factor has made towards the declines remains undefined. The only factor that can be quantified accurately is the amount of available spawning and nursery habitat that has been lost through the blockage of streams and rivers by dams. The impact of fishing on a particular stock is difficult to quantify because of the importance of where and when exploitation of the stock occurs. For example, less than five percent escapement from the alewife fishery in Damariscotta Lake, Maine, has been sufficient to maintain the population (Walton 1981). Most studies on the effects of pollution on fish survival are restricted to laboratory investigations which emphasize effects on the individual rather than on the population (Kanciruk et al. in press). Fishing and pollution should be assessed in relation to other stresses the river herring are subjected to during their life cycle, including predation, starvation, and physical and chemical factors (temperature patterns, dissolved

gases, turbidity, etc.).

Restoration of river herring stocks to former levels of abundance should include recognition of the possible positive and negative impacts on cohabitant species. For example, impacts on other species could result from increased competition for food between river herring larvae and other larvae, and increases in the by-catch of other species could occur in an expanded river herring fishery.

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Table 1. Spawning Dates for Blueback Herring and Alewife
Along the Atlantic Coast

Species	Water Body	Spawning Dates	Reference
Blueback Herring	Potomac River	Mid-April to mid-May	Hildebrand 1963
	Delaware River	Late April through mid-June	Smith 1971
	Connecticut	Late April to mid-September	Loesch 1969
Alewife	North Carolina	Early April (peak)	Tyus 1974
	Maryland	Late March through April	Jones et al. 1978
	Delaware River	Early April through mid-May	Smith 1971
	Connecticut	Late March or early April to mid-July	Kissel 1969
	Rhode Island	Early May (peak)	Cooper 1961
	Maine	Early May to early June	Walton 1961

Table 2. Average Annual Reported Landings of River Herring
in the Commercial Fishery Along the Atlantic Coast

State/Region	Average Landings (000 Pounds)		
	1929-1980	1929-1970	1971-1980
Maine	2545	2474	2844
New Hampshire	53	63	10
Massachusetts	3897	4708	493
Rhode Island	140	168	23
Connecticut	169	200	41
New England	6804	7613	3411
New York	142	175	5
New Jersey	102	124	10
Delaware	211	261	<1
Middle Atlantic*	456	562	15
Maryland	3497	4105	940
Virginia	17214	19757	6533
Chesapeake	20711	23862	7473
North Carolina	10333	10961	7692
South Carolina	315	316	309
Florida**	179	209	1
South Atlantic**	12523	11486	11431
Atlantic Coast**	40494	43522	22330

Source: U. S. Department of Commerce, Current Fishery Statistics

*Includes Pennsylvania (1929-1934)

**1978-1980 not included

Table 3. Reported Landings of River Herring (000 Pounds) in ICNAF Areas 5 and 6 by Foreign Vessels

YEAR	BUL	GDR	POL	ROM	SPA	USSR	TOTAL
1964	0	0	0	0	0	0	0
1965	0	0	0	0	0	0	0
1966	0	0	0	0	0	0	0
1967	0	0	0	0	0	14356	14356
1968	0	0	0	0	0	49184	49184
1969	1133	249	0	0	0	78322	79704
1970	1481	419	0	0	0	42083	43983
1971	2291	18538	3101	2015	0	22029	47974
1972	1129	7674	4162	0	0	14756	27721
1973	972	3593	7167	0	0	2348	14080
1974	1704	5862	2399	556	0	1042	11563
1975	1219	4676	137	0	0	1433	7465
1976	564	2778	31	0	0	539	3912
1977	0	152	0	0	0	264	416
1978	0	0	0	0	23	25	48
1979	0	0	4	0	0	24	28
1980	0	0	0	0	4	0	4

Table 4. NMFS Bottom Trawl Survey Biomass Indices, Expressed as log-Transformed Average Weight (kg) per Tow, for River Herring off the Atlantic Coast

Year	<u>G. of Maine</u>		<u>Georges Bank</u>		<u>S. New Eng.</u>		<u>Mid-Atlantic</u>
	Fall	Spring	Fall	Spring	Fall	Spring	Spring
1963	0.17	-	0.29	-	0.23	-	-
1964	0.01	-	0.29	-	0.41	-	-
1965	0.03	-	0.38	-	0.69	-	-
1966	0.08	-	0.45	-	0.32	-	-
1967	0.14	-	0.51	-	0.60	-	-
1968	0.02	0.09	0.24	0.06	0.11	0.64	0.83
1969	0.04	0.06	0.28	0.06	0.03	0.51	1.40
1970	0.10	0.09	0.13	0.02	0.13	0.82	0.05
1971	0.08	0.14	0.07	0.08	0.02	0.68	0.36
1972	0.14	0.10	0.09	0.04	0.03	0.57	0.06
1973	0.08	0.28	0.10	0.36	0.00	1.82	1.13
1974	0.08	0.04	0.00	0.13	0.00	1.17	0.30
1975	0.10	0.44	0.00	0.20	0.01	0.55	0.35
1976	0.23	0.55	0.01	0.15	0.00	0.93	0.17
1977	0.21	0.29	0.02	0.13	0.05	1.15	0.28
1978	0.21	0.44	0.01	0.21	0.02	1.30	0.57
1979	0.10	0.37	0.02	0.08	0.04	0.86	0.76
1980	0.19	0.24	0.02	0.15	0.10	0.83	1.21

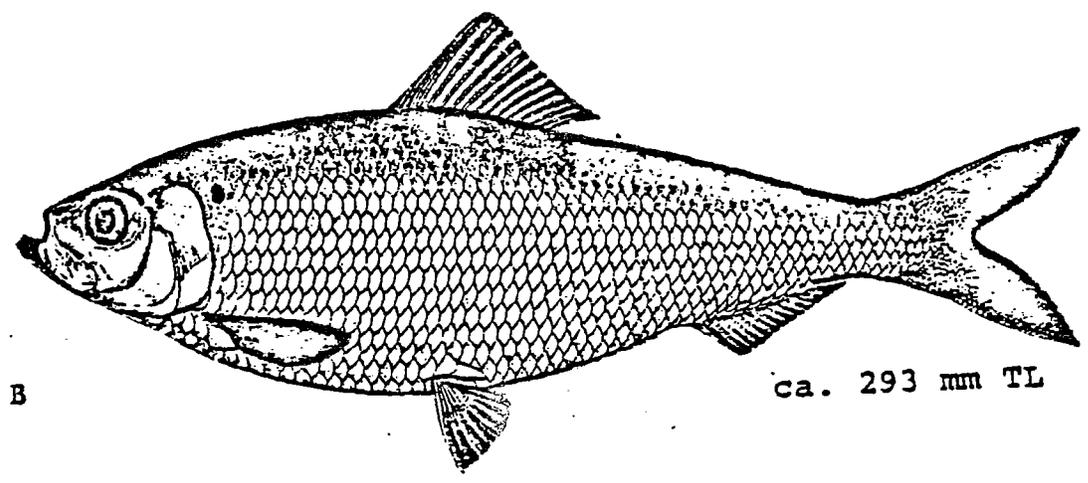
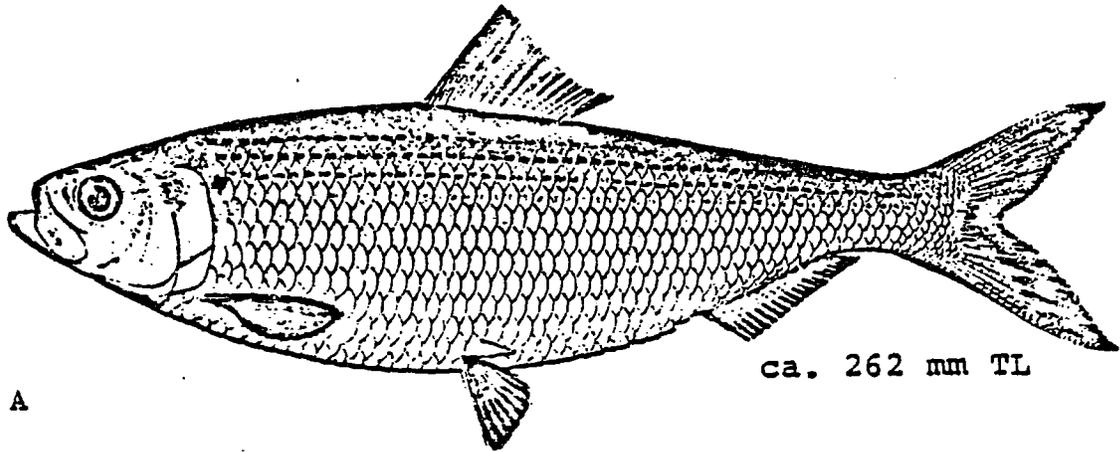


Figure 1. The blueback herring, Alosa aestivalis (A), and alewife, Alosa pseudoharengus(B).

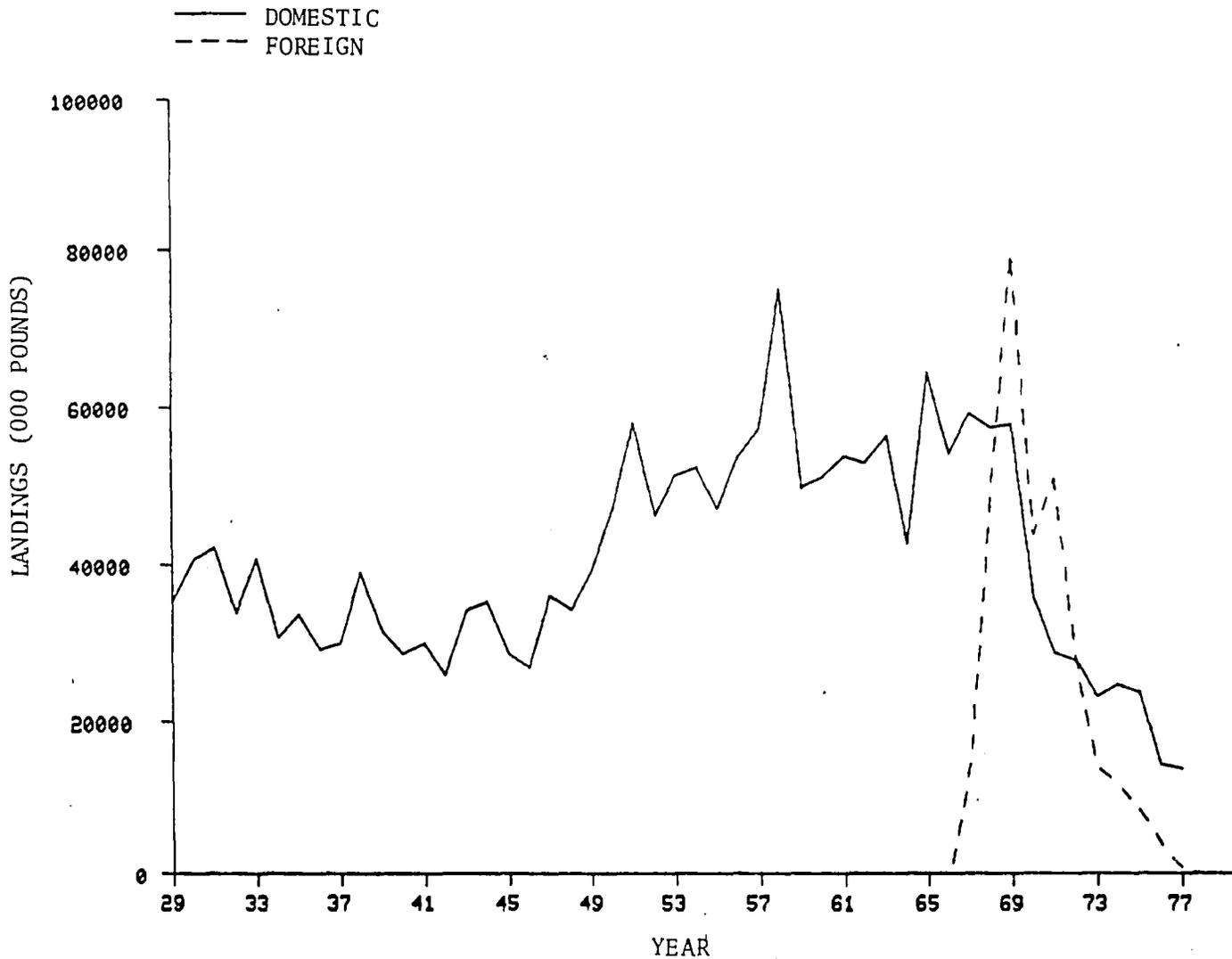


Figure 2. Reported commercial landings of river herring in the domestic and foreign fisheries, 1929-1977.

Appendix I. Reported commercial landings of river herring in states along the Atlantic coast, in thousands of pounds.

DATE	ME	NH	MA	RI	CT	NY	NJ	DE	PA	MD	VA	NC	SC	FL
1929	2821.00	58.00	1386.00	119.00	9.00	852.00	248.00	123.00	5.00	5924.00	12570.00	10767.00	0.00	408.00
1930	2129.00	0.00	1790.00	186.00	1.00	631.00	1464.00	3193.00	2.00	5741.00	15387.00	9838.00	2.00	366.00
1931	2796.00	0.00	2212.00	127.00	27.00	790.00	390.00	2434.00	42.00	7827.00	17239.00	7993.00	0.00	321.00
1932	2296.00	20.00	1164.00	73.00	19.00	446.00	103.00	1735.00	10.00	7553.00	13852.00	6584.00	0.00	80.00
1933	1703.00	0.00	923.00	176.00	15.00	218.00	14.00	1149.00	9.00	6550.00	19177.00	10741.00	0.00	148.00
1934	2539.00	0.00	941.00	116.00	17.00	289.00	28.00	652.00	5.00	5234.00	5846.00	14897.00	0.00	215.00
1935	3374.00	0.00	959.00	55.00	18.00	359.00	41.00	155.00	0.00	4229.00	10974.00	13413.00	0.00	224.00
1936	3096.00	0.00	1023.00	137.00	52.00	291.00	232.00	113.00	0.00	3369.00	8689.00	11928.00	0.00	232.00
1937	2818.00	0.00	1086.00	218.00	85.00	222.00	423.00	70.00	0.00	3819.00	15064.00	5817.00	0.00	400.00
1938	3140.00	0.00	958.00	181.00	28.00	66.00	8.00	47.00	0.00	5397.00	17691.00	11219.00	0.00	392.00
1939	2954.00	0.00	946.00	23.00	14.00	61.00	35.00	149.00	0.00	4398.00	14831.00	7714.00	0.00	320.00
1940	2260.00	0.00	879.00	20.00	34.00	62.00	35.00	124.00	0.00	4679.00	11433.00	8707.00	0.00	408.00
1941	2314.00	104.00	932.00	110.00	20.00	282.00	47.00	68.00	0.00	5061.00	11951.00	8570.00	0.00	412.00
1942	2368.00	207.00	984.00	200.00	6.00	399.00	58.00	11.00	0.00	3422.00	9258.00	8433.00	0.00	416.00
1943	3432.00	455.00	4032.00	200.00	37.00	214.00	36.00	97.00	0.00	3463.00	13550.00	8296.00	0.00	420.00
1944	2526.00	218.00	2266.00	175.00	12.00	10.00	40.00	33.00	0.00	3504.00	17841.00	8159.00	0.00	424.00
1945	1358.00	163.00	988.00	0.00	20.00	261.00	14.00	90.00	0.00	2584.00	14619.00	8022.00	0.00	428.00
1946	1225.00	119.00	1249.00	217.00	3.00	123.00	169.00	51.00	0.00	3497.00	12029.00	7702.00	0.00	414.00
1947	1499.00	74.00	633.00	751.00	4.00	89.00	324.00	12.00	0.00	2746.00	22173.00	7382.00	0.00	400.00
1948	1868.00	80.00	468.00	317.00	675.00	132.00	171.00	6.00	0.00	3720.00	19365.00	7063.00	0.00	386.00
1949	3281.00	4.00	502.00	134.00	1146.00	99.00	20.00	26.00	0.00	4965.00	22003.00	6743.00	0.00	372.00
1950	3166.00	0.00	270.00	312.00	1948.00	104.00	29.00	47.00	0.00	5926.00	28702.00	6423.00	0.00	358.00
1951	3479.00	0.00	276.00	905.00	490.00	75.00	7.00	37.00	0.00	6752.00	32604.00	12535.00	0.00	514.00
1952	2783.00	0.00	1905.00	181.00	1061.00	90.00	1.00	122.00	0.00	4494.00	28841.00	6510.00	0.00	278.00
1953	2443.00	0.00	5535.00	216.00	340.00	57.00	9.00	104.00	0.00	4653.00	23976.00	13842.00	0.00	0.00
1954	3296.00	0.00	3020.00	17.00	973.00	84.00	0.00	76.00	0.00	3981.00	27930.00	12758.00	0.00	51.00
1955	3779.00	0.00	2621.00	46.00	890.00	102.00	23.00	1.00	0.00	5145.00	21843.00	12648.00	0.00	57.00
1956	4588.00	0.00	8922.00	55.00	79.00	68.00	22.00	1.00	0.00	5026.00	22107.00	12554.00	0.00	77.00
1957	3969.00	75.00	19027.00	29.00	63.00	56.00	8.00	8.00	0.00	3410.00	18758.00	11773.00	0.00	30.00
1958	3095.00	60.00	33815.00	12.00	10.00	66.00	1.00	0.00	0.00	4391.00	18361.00	14914.00	0.00	127.00
1959	1631.00	80.00	11618.00	341.00	8.00	46.00	2.00	0.00	0.00	4484.00	17447.00	14154.00	0.00	16.00
1960	1412.00	95.00	17651.00	0.00	20.00	38.00	3.00	3.00	0.00	3525.00	15464.00	12815.00	0.00	26.00
1961	1667.00	100.00	20838.00	0.00	6.00	303.00	633.00	90.00	0.00	2444.00	15526.00	11951.00	0.00	2.00
1962	1682.00	125.00	8276.00	0.00	19.00	243.00	480.00	118.00	0.00	2378.00	25300.00	14302.00	0.00	0.00
1963	1480.00	150.00	11735.00	129.00	3.00	32.00	3.00	0.00	0.00	1466.00	26085.00	15100.00	0.00	23.00
1964	1480.00	75.00	5529.00	140.00	15.00	37.00	14.00	0.00	0.00	1314.00	26640.00	7561.00	0.00	2.00
1965	3106.00	125.00	6935.00	210.00	24.00	24.00	22.00	0.00	0.00	2092.00	36200.00	12826.00	2760.00	21.00
1966	1786.00	75.00	6633.00	192.00	7.00	4.00	12.00	0.00	0.00	1433.00	28535.00	12519.00	2817.00	0.00
1967	1617.00	65.00	5432.00	186.00	23.00	4.00	9.00	0.00	0.00	2337.00	28107.00	18486.00	2802.00	0.00
1968	2249.00	41.00	117.00	203.00	33.00	7.00	8.00	0.00	0.00	3963.00	32319.00	15525.00	2820.00	0.00
1969	1768.00	38.00	100.00	215.00	11.00	9.00	5.00	0.00	0.00	3458.00	30446.00	19672.00	1975.00	0.00
1970	1623.00	31.00	1156.00	144.00	122.00	11.00	8.00	0.00	0.00	2065.00	19046.00	11521.00	100.00	0.00
1971	1954.00	25.00	222.00	53.00	25.00	0.00	10.00	0.00	0.00	2811.00	10285.00	12722.00	718.00	0.00
1972	2216.00	24.00	1907.00	34.00	23.00	0.00	15.00	0.00	0.00	1690.00	10451.00	11237.00	297.00	0.00
1973	2691.00	22.00	695.00	15.00	14.00	22.00	7.00	1.00	0.00	2031.00	9269.00	7926.00	433.00	0.00
1974	3310.00	0.00	229.00	36.00	17.00	15.00	11.00	0.00	0.00	1388.00	13342.00	6210.00	87.00	0.00
1975	3768.00	0.00	1717.00	41.00	36.00	15.00	9.00	1.00	0.00	718.00	11360.00	5952.00	18.00	2.00
1976	3395.00	0.00	45.00	34.00	67.00	1.00	11.00	0.00	0.00	126.00	4238.00	6402.00	67.00	1.00
1977	3374.00	12.00	30.00	3.00	64.00	0.00	11.00	1.00	0.00	65.00	1390.00	8523.00	282.00	1.00
1978	2781.00	11.00	40.00	2.00	61.00	0.00	2.00	0.00	0.00	248.00	2127.00	6608.00	196.00	0.00
1979	2305.00	10.00	38.00	6.00	40.00	0.00	7.00	0.00	0.00	143.00	1688.00	5119.00	334.00	0.00
1980	2645.00	0.00	5.00	2.00	63.00	0.00	19.00	0.00	0.00	180.00	1184.00	6219.00	661.00	0.00

Source: U.S. Dept. of Commerce, Current Fishery Statistics
Dots indicate interpolated values