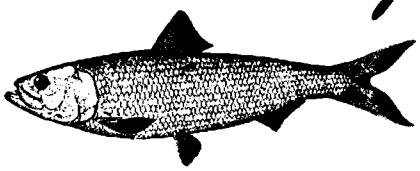
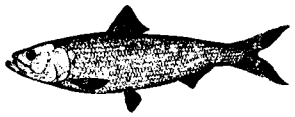
Atlantic Herring





by K. Friedland

The Atlantic herring, *Clupea harengus*, is widely distributed in continental shelf waters from Labrador to Cape Hatteras. Important commercial fisheries for juvenile herring (ages 1 to 3) have existed since the last century along the coasts of Maine and New Brunswick. Development of large-scale fisheries for adult herring is comparatively recent, primarily occurring in the western Gulf of Maine, on Georges Bank, and on the Scotian Shelf. Gulf of Maine herring migrate from summer feeding grounds along the Maine coast to southern New England and Mid-Atlantic areas during winter, with larger individuals tending to migrate further distances. Tagging experiments have also provided evidence of intermixing of Gulf of Maine-Scotian Shelf herring during different phases of the annual migration.

Spawning in the Gulf of Maine occurs during late August-October, beginning in northern locations and progressing southward. Atlantic herring are not fully mature until age 4. Age at maturity varies annually and appears to change in response to density dependent effects. Herring eggs are demersal and are typically deposited on gravel substrates. Primary spawning locations off the northeastern United States are located on the Maine coast, Jeffreys Ledge, Nantucket Shoals, and Georges Bank. Incubation is temperature dependent, but usually occurs within 7 to 10 days. Larvae metamorphose by late spring into juvenile brit herring that may form large aggregations in coastal waters during summer. By age 2, juvenile herring are fully vulnerable to coastal fisheries using both fixed and mobile gear.

In the past, the herring resource along the East Coast of the United States was divided into the Gulf of Maine and Georges Bank stocks. There is genetic and tagging evidence that both support and refute this stock division. Of greater concern to those managing the resource is the fact that fishery-independent measures of abundance for herring include contributions of fish originating from both spawning areas. As a consequence, herring from the Gulf of Maine and Georges Bank have been combined for assessment purposes into a single coastal stock complex. This approach has many advantages over the separate stock approach, but also poses a number of technical and management challenges.

Total landings for the coastal stock complex have changed substantially since the 1960s. Landings averaged 94,500 mt from 1992 to 1996, whereas three decades ago they exceeded 300,000 mt. Recreational landings have been negligible. Changes in commercial landings trends are best understood by examining changes in regional fisheries that exploit the stock complex.

The fishery in the Gulf of Maine consists of fixed and mobile gear fisheries in coastal waters. Landings in the coastal fishery have averaged 79,700 mt over the last two decades. There has been a great deal of annual variability in the landings, but there is little evidence of any long-term trend. However, there have been changes in the distribution of landings between the two principal gear types: mobile and fixed gear. Over the past five years, more than 90 percent of Maine herring landings were taken by mobile gear, compared with less than 50 percent during the 1970s. This shift appears to be related to reduced availability of herring to the fixed-gear fisheries. In addition, mobile gear landings include increasing catches made by mid-water trawlers. Due to recent declines in export markets for adult herring, a significant proportion of the catch has not been used for human consumption.

The herring fishery on Georges Bank was initiated in 1961 by distant-water fleets. Landings peaked in 1968 at 373,600 mt and subsequently declined to only 43,500 mt in 1976 as the fishery collapsed. There has been no directed fishery for Atlantic herring on Georges Bank since that time.

Estimates of stock biomass (all ages) for the coastal stock complex were in excess of 1 million mt before the collapse associated with the Georges Bank fishery. After the collapse, stock size estimates declined to less than 100,000 mt. In the early 1980s, fishing by distant-water fleets ended and the stock complex began to rebuild. Stock biomass has increased significantly in recent years, primarily due to increased spawning first on Nantucket Shoals and later on Georges Bank. The offshore spawning component, which represents the largest historic component of the stock complex, appears to have recovered from its collapse during the early 1970s. Stock biomass is expected to remain high in the near future, as recent recruitment appears to have been strong.

A management plan has been adopted by the Atlantic States Marine Fisheries Commission (ASMFC) which provides guidance on the allocation of herring to internal waters processing operations and regulations concerning spawning closures. A Pre-

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liminary Management Plan is also in force which provides guidance on the development of joint venture processing in the exclusive economic zone. A Fishery Management Plan is being developed by the New England Fishery Management Council (NEFMC) in coordination with the ASMFC.

For further information

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Coastal Stock Complex

Atlantic Herring

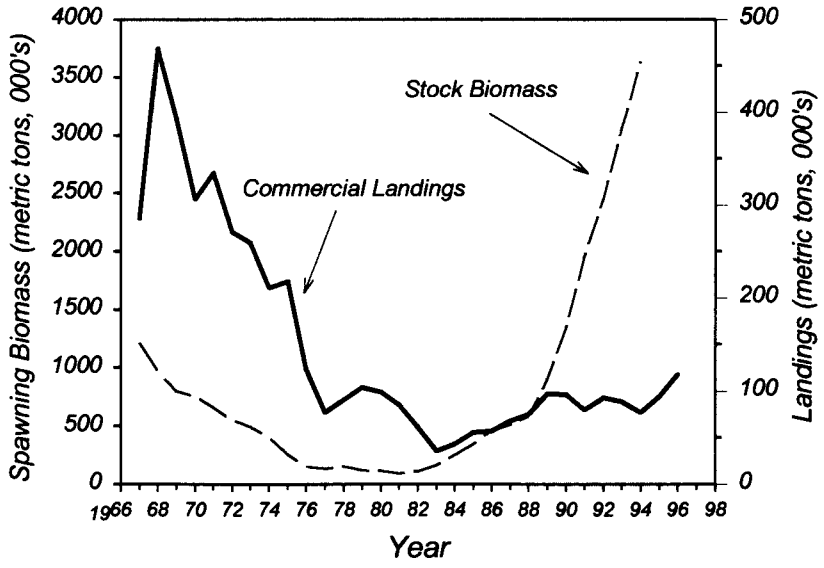

Table 21.1 Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1977-86 Average	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
U.S. recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	46.4	40.4	41.2	53.1	57.0	55.3	61.2	57.1	54.3	76.1	103.7
Canada	23.5	27.3	33.4	44.1	38.8	24.6	32.0	31.6	22.2	18.2	15.9
Other	1.0	-	-	-	-	-	-	-	-	-	-
Total nominal catch[1]	70.9	67.8	74.7	97.2	95.8	79.9	93.2	88.7	76.6	94.4	119.6

[1]Age groups 1 and older

Summary Status

Long-term potential catch[1]	=	285,000 mt
SSB for long-term potential catch[1]	=	619,000 mt
Importance of recreational fishery	=	Insignificant
Management	=	Under ASMFC Plan, PMP
Status of exploitation	=	Underexploited
Age at 50% maturity	=	2.9 years, males 3.0 years, females
Size at 50% maturity	=	25.3 cm (10.0 in.), males 25.4 cm (10.0 in.), females
Assessment level	=	Age structured
Overfishing definition	=	20% MSP
Fishing mortality rate corresponding to overfishing definition	=	$F_{20\%} = 0.29$

M = 0.20 **$F_{0.1}$ = 0.20** **F_{max} = 0.40** **F_{1996} = Unknown**

[1]Estimates from preliminary analysis of MSY