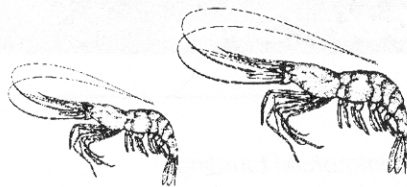


Northern Shrimp

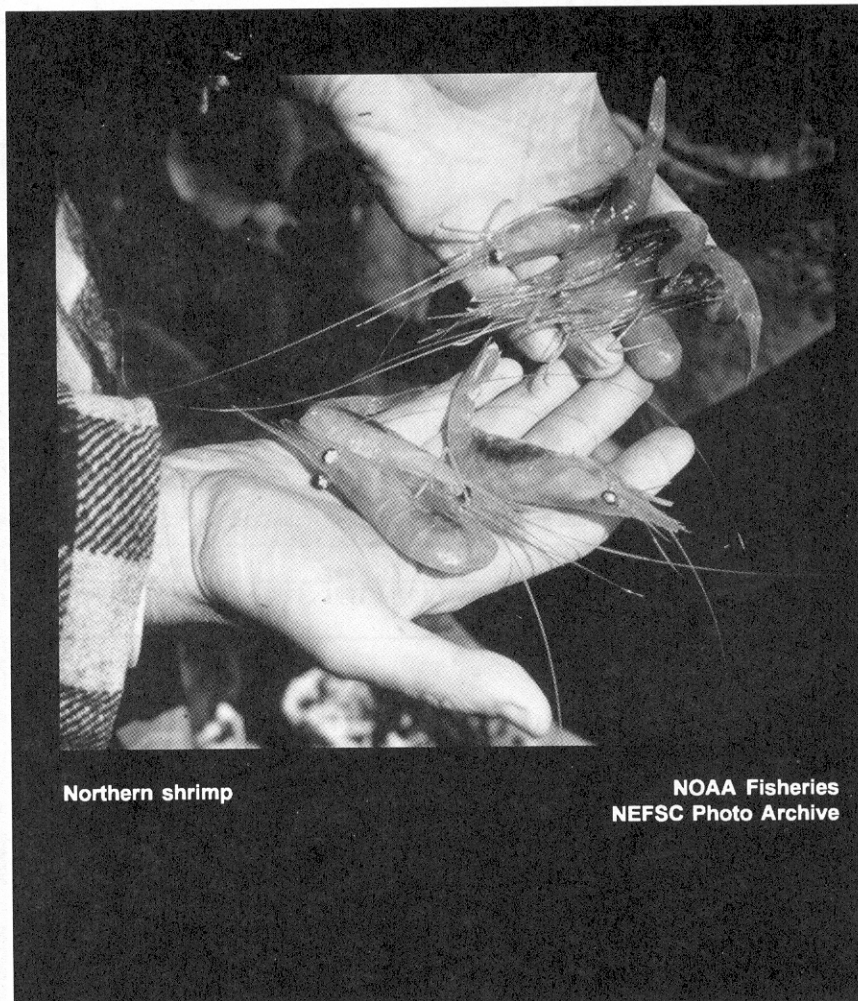


by S.X. Cadrin

Northern or pink shrimp, *Pandalus borealis*, are distributed discontinuously throughout boreal waters of the North Atlantic, North Pacific and Arctic Oceans. In the Gulf of Maine, northern shrimp are considered to comprise a unit stock. They inhabit soft mud bottom at depths of approximately 10 to 300 m (2-165 fathoms), most commonly in the cold waters of the southwest Gulf of Maine. The Gulf of Maine is the southern limit of the species' distribution in the North Atlantic, and temperature is an important factor in ontogenetic rates and reproductive success for this stock.

Northern shrimp are protandrous hermaphrodites. In the Gulf of Maine, they generally spawn as males in their third summer; they subsequently undergo transition and become mature females in their fourth year. After spawning and egg extrusion in summer, ovigerous females move to coastal waters in late autumn, where eggs hatch in wintertime. Juveniles remain inshore for over a year and then migrate offshore as they begin to mature.

A directed otter trawl fishery for northern shrimp began in coastal waters of the Gulf of Maine during the winter months in the 1930s. In the 1960s, landings rose rapidly to a peak of 12,800 mt in 1969 with the expansion of an offshore, year-round fishery; and approximately 11,000 mt were landed annually from 1970-1972. After 1972, landings declined rapidly, leading to increasingly restrictive management measures and closure of the fishery in 1978. The fishery reopened in 1979 and landings increased gradually to 5,000 mt for 1987; the 1988-1994 annual average was 3,400 mt. Landings then increased to 6,800 mt



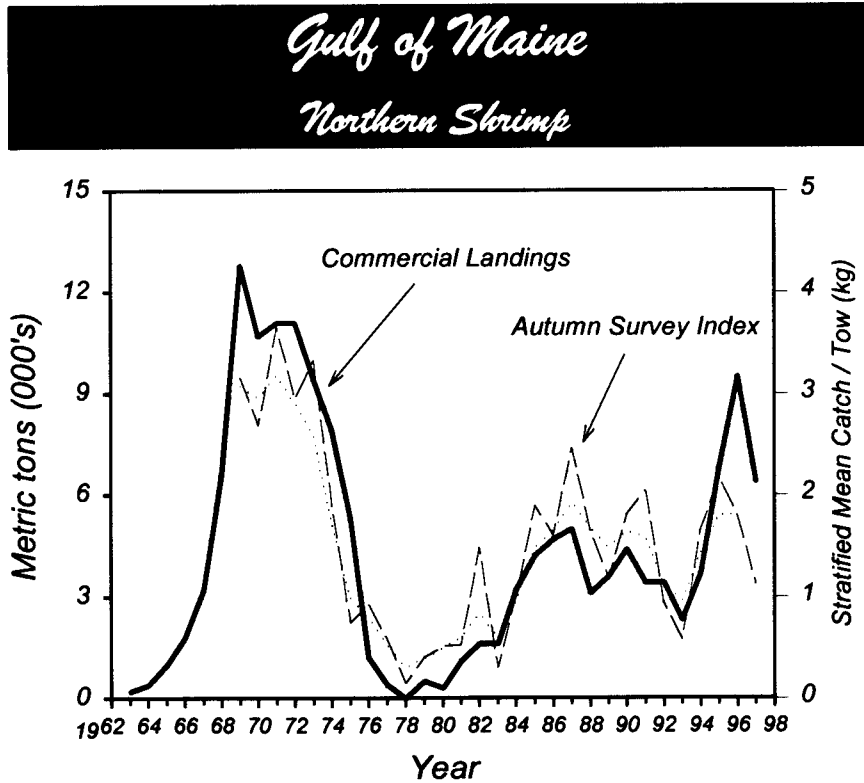
Northern shrimp

NOAA Fisheries
NEFSC Photo Archive

in 1995 and to 9,100 mt in 1996. The latter figure has been exceeded only during the five years prior to the 1970s stock collapse. The 1997 total was 6,300 mt. Nominal fishing effort increased in the late 1960s to average 16,000 trips for the 1970-1972 fishing seasons. Effort decreased rapidly in the 1970s, but has increased considerably since the 1978 closure. The number of trips peaked at about 12,000 in 1987, decreased to 6,000 in 1994, and again increased to 12,000 trips in 1996. The fishery is managed via gear re-

strictions and seasonal limits (set within a 183-day "window" from December through May) under the authority of the Atlantic States Marine Fisheries Commission (ASMFC).

Stock biomass is currently monitored by the NEFSC autumn bottom trawl survey and the ASMFC summer shrimp survey. The NEFSC autumn survey biomass index declined to very low levels during the late 1970s and has since increased somewhat. However, stock biomass is now below average and fishing mortality appears to



“Continued high exploitation rates will increase the potential for overfishing and resultant stock collapse.”

be high. Abundance of large shrimp at the end of the 1996 fishing season was the lowest since the early 1980s. Exploitation rates increased from 11-29% from 1985-1995 to 53% in 1996. Exploitation rates at or near this level were associated with stock collapse in the mid-1970s. Continued high exploitation rates will increase the potential for overfishing and resultant stock collapse.

Table 30.1 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	1.8	5.0	3.1	3.6	4.4	3.4	3.4	2.3	3.7	6.8	9.1
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total nominal catch	1.8	5.0	3.1	3.6	4.4	3.4	3.4	2.3	3.7	6.8	9.1

For further information

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NEFSC [Northeast Fisheries Science Center]. 1997. [Report of the] 25th Northeast Regional Stock Assessment Workshop (25th SAW), Stock Assessment Review Committee (SARC) consensus summary of assessments. Woods Hole, MA: NOAA/NMFS/NEFSC. *NEFSC Ref. Doc.* 97-14.

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Summary Status

- Long-term potential catch = 5,000 mt
 - Stock Biomass
 - for long-term potential catch = 31,000 mt
 - Importance of recreational fishery = Insignificant
 - Management = Interstate FMP for northern shrimp(ASMFC)
 - Status of exploitation = Overexploited
 - Age at 50% maturity (females) = 3½ years
 - Size at 50% maturity (females) = 26mm carapace length (1.0 in.)
 - Assessment level = Stage-structured (DeLury)
 - Overfishing definition = None
 - Fishing mortality rate corresponding to overfishing definition = N/A
- M = 0.25 F_{0.1} = 0.46 F_{max} = 0.77 F₁₉₉₆ = 0.90**