Northeast Invertebrate Fisheries

Unit 4

Rick Wahle

LARRY JACOBSON
DEBORAH HART
LISA HENDRICKSON
JOSEF IDOINE
TONI CHUTE

NMFS Northeast Fisheries Science Center

Woods Hole
Massachusetts

INTRODUCTION

Fisheries for offshore invertebrates, including crustaceans and mollusks, are the most valuable fisheries in the Northeast Region, with U.S. landings averaging 126,600 metric tons (t) per year (Table 4-1) and ex-vessel revenues averaging $884 million per year during 2004–06. The American lobster fishery ranked first in value, with average annual ex-vessel revenues of $406 million during 2004–06. The sea scallop fishery ranked second, with average annual revenues of $379 million. Landings of all other offshore invertebrates contributed roughly $98 million in additional revenue annually.

Several different Fishery Management Plans (FMP's) regulate the offshore harvest of invertebrate species in the region. These include the Atlantic Surfclam and Ocean Quahog FMP and Atlantic Mackerel, Squid, and Butterfish FMP (developed by the Mid-Atlantic Fishery Management Council), and the Atlantic Sea Scallop FMP and Deep-Sea Red Crab FMP (developed by the New England Fishery Management Council). The Atlantic States Marine Fisheries Commission (ASMFC), operating under an interstate compact, has implemented non-Federal FMP's for American Lobster and for Northern Shrimp. The ASMFC's Lobster FMP is in addition to a Federal FMP that deals with the smaller offshore lobster fishery components.

SPECIES AND STATUS

American Lobster

American lobsters are harvested with baited lobster traps (pots), although some incidental catch and bycatch of lobsters occurs in trawl fisheries targeting other species. The primary management controls are minimum and maximum size limits, maximum trap limits, release of ovigerous females

Photo above:
An American lobster resting on the sea floor off the coast of Rhode Island.

Table 4-1
Productivity in metric tons (t) and status of Northeast invertebrate fisheries resources.

Species/stock	Recent average yield (RAY)[1]	Current yield (CY)	Sustainable yield (MSY)	Stock level relative to B_{MSY}	Harvest rate	Stock status
American lobster[2]	41,303	Unknown	Unknown	Unknown		
Atlantic surfclam[3,4,5]	27,453	26,217	Unknown	Above	Not overfishing	Not overfished
Longfin inshore squid[6]	16,152	21,000	26,000	Unknown	Not overfishing	Not overfished
Northern shortfin squid[6,7]	17,351	Unknown	Unknown	Unknown	Not overfishing	Unknown
Northern shrimp	2,199	5,000	5,000	Unknown	Not overfishing	Not overfished
Ocean quahog[3,4,5]	16,720	24,189	55,238	Above	Not overfishing	Not overfished
Red deepsea crab	1,923	2,690	Unknown	Unknown	Not overfishing	Unknown
Sea scallop[3,8]	32,215	31,657	Unknown	Above	Not overfishing	Not overfished
Total	155,316					
U.S. Subtotal	126,600					

[1]2004–06 average; includes Canadian landings where available.
[2]Status determinations are made for individual stocks of American lobster: the Southern New England stock is overfishing and depleted; the Gulf of Maine and Georges Bank stocks are both not overfishing and not overfished.
[3]Yields are for shucked meat weights.
[4]RAY includes landings from both inshore (state) and offshore (U.S. EEZ) areas. CY and MSY refer only to offshore areas.
[5]Current yield (CY) is based on recent quotas.
[6]This species has a lifespan of less than one year and was not assessed during 2004–06.
[7]Does not include Canadian landings.
[8]Includes United States and Canadian portions of Georges Bank.

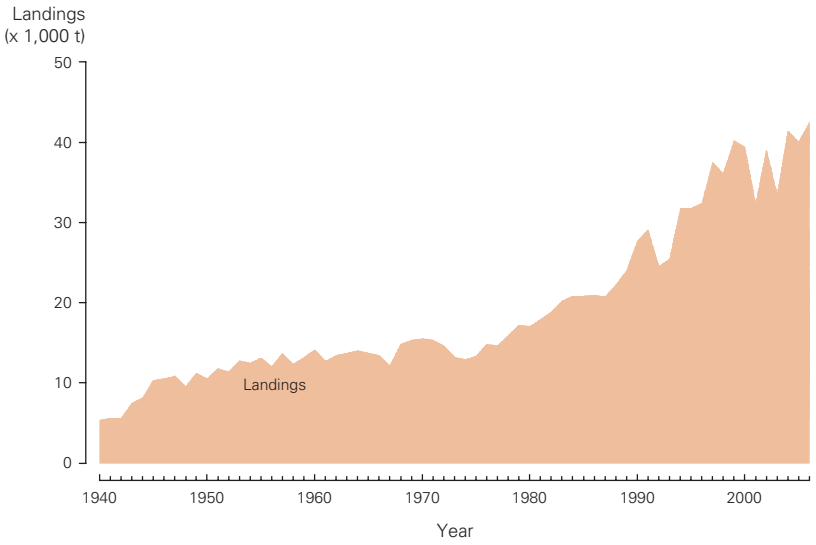


Figure 4-1
American lobster landings in metric tons (t), 1940–2006.

(egg bearing; also called eggers), and release of v-notched (tagged) females in some areas. Management of lobsters is area-specific, with fishermen often helping to develop management-area rules for their local components of the fishery.

High fishing mortality is a persistent problem in lobster fisheries along the northeast coast (ASMFC, 2006). With previous removals of relatively large individuals from the population, the lobster fishery has become increasingly dependent on small and young lobsters that reach a legal size just prior to capture. In some locations, more than 90% of the lobsters landed are new recruits to the fishery and many are not yet sexually mature. Commercial catch rates have markedly declined in nearshore areas, particularly in areas south of Cape Cod to Long Island Sound, where fishing is heaviest. Lobster abundance in the Gulf of Maine has remained high despite heavy fishing pressure, due to favorable environmental conditions for lobster reproduction and recruitment, in addition to beneficial effects of size limits and release of ovigerous and v-notched females.

American lobster landings during 2004–06 averaged 41,300 t (Table 4-1) while ex-vessel revenues averaged $406 million. Recent (2004–06) average landing levels were at or near record high levels since 1940 (Figure 4-1).

Sea Scallop

Sea scallops are harvested in U.S. waters on the Continental Shelf from Cape Hatteras north to the U.S.-Canada border on Georges Bank, and inside the Gulf of Maine. Dredges are the principal fishing gear, although otter trawls account for a small proportion of total landings (NEFSC, 2007a).

Management of the sea scallop fishery changed markedly in 1994 when regulations restricting the number of days at sea, vessel crew size, and dredge ring size began to be gradually implemented. Fishing has been prohibited in two areas of Georges Bank and in one area on Nantucket Shoals since 1994, except during highly controlled re-openings in 1999–2001 and since November 2004. These area closures were implemented primarily to protect groundfish, but have also benefited the scallop stock and fishery. In the Mid-Atlantic, there have been a number of rotational closures specifically for sea scallop management (two in 1998 and one each in 2004, 2007, and 2008). These areas are closed for 2–3 years to allow small scallops to grow to a larger size, and then reopened to limited fishing. The most successful of these rotational closures was the Elephant Trunk closure off Delaware Bay, where biomass built up to unprecedented levels during the 3-year 2004–06 closure. Landings during 2007 in the Elephant Trunk area were 7,000 t of meat, with an ex-vessel value of around $100 million. Landings are expected to continue at this level or higher during the planned 5-year controlled harvesting of this area.

The combination of effort controls and area closures have rapidly rebuilt the sea scallop fishery so that the biomass is now well above its target and landings are at record levels (Hart and Rago, 2006). The most recent sea scallop stock assessment (NEFSC, 2007a) indicated that biomass was 53% above its B_{MSY} proxy target level (Table 4-1). U.S. sea scallop landings during 2004–06 averaged 28,716 t (shucked meat weight) and were at or near record levels in all three years (Figure 4.2). Total ex-vessel value of the landings during the same period averaged $379 million per year, making it one of the most valuable fisheries in the United States and the most valuable wild scallop fishery in the world.

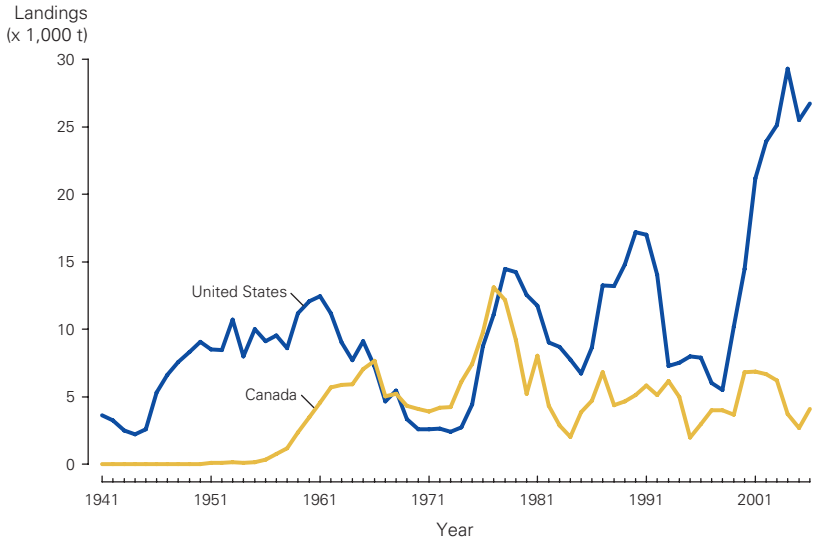


Figure 4-2
United States and Canadian landings in metric tons (t) of sea scallop, 1941–2006.

Atlantic Surfclam and Ocean Quahog

Atlantic surfclams and ocean quahogs are harvested primarily with hydraulic dredges. Most surfclam fishing occurs off New Jersey, while most fishing for quahog is off southern New England and Long Island. Fishing for both species has been prohibited on Georges Bank since late 1989 due to the possibility of paralytic shellfish poisoning from shellfish taken in that area. The primary management tool for these species is an Individual Transferable Quota (ITQ) system, enacted in 1990. This system allows individual quota shares for both species to be freely traded. The ITQ system has successfully rationalized harvesting capacity, promoted higher profitability, and helped to reduce fishing mortality (Serchuk and Murawski, 1997).

Surfclam landings increased steadily during the 1960's and early 1970's, peaking in 1974. Subsequently, poor reproduction and a surfclam die-off along the New Jersey coast in 1976 led to low stock biomass and reduced landings (NEFSC, 2007b). Large year-classes in 1976 and 1977 spawned off New Jersey and the Delmarva Peninsula, followed by consistent population-wide recruitment and reduced fishing pressure, have helped restore and maintain the surfclam stock. During 2004–06, annual landings from state and Federal waters averaged 27,453 t (shucked meat weight; Table 4-1), while annual ex-vessel revenues averaged $34.7 million per year.

Ocean quahogs inhabit relatively deep waters along the Mid-Atlantic Continental Shelf and on Georges Bank. As the surfclam resource declined in the late 1970's, a market for processed clam products developed and ocean quahog landings increased rapidly. Over the past two decades, the fisheries for ocean quahogs have moved progres-

William Millhouser, NOS

A Northern shortfin squid cruising over a sand flat.

sively northward from the Mid-Atlantic Bight to southern New England (NEFSC, 2007c). In the Gulf of Maine, where the species is found in relatively shallow nearshore waters, limited quantities of small ocean quahogs are harvested and sold as mahogany clams at relatively high prices for consumption in raw seafood restaurants (the half-shell market). Annual landings of ocean quahog during 2004–06 averaged 16,720 t (shucked meat weight; Table 4-1) with average annual ex-vessel revenues of $20.5 million.

Northern Shrimp

Northern shrimp occur at the southern extent of the species' geographical range in the Gulf of Maine. As a result, higher shrimp abundances are generally associated with lower than average water temperatures. Northern shrimp are harvested using small-mesh trawls and inshore traps. The fishery began as an inshore winter fishery during the late 1930's and expanded in the 1960's to a year-round offshore fishery with peak landings of 12,800 t in 1969 (Clark et al., 2000). The stock collapsed during the mid 1970's and the fishery was closed from mid May 1977 to February 1979. Since 1980, fishing has been restricted to the December–May period. Landings were between 3,000–5,000 t during the mid 1980's and early 1990's, increased to 9,200 t in 1996, and subsequently sharply declined. According to the most recent stock assessment (Hunter et al., 2007; NEFSC, 2007d), annual landings averaged 2,199 t during 2004–06 (Table 4-1), while annual revenues averaged $2.3 million.

Longfin Inshore Squid

The east coast U.S. stock of longfin inshore squid is distributed between the Gulf of Maine and south of Cape Hatteras, where they are harvested primarily with bottom trawls in commercial fisheries. Longfin inshore squid live less than 1 year, grow rapidly, migrate seasonally, and spawn year-round (Hatfield and Cadrin, 2002; Macy and Brodziak, 2001). Availability and abundance of this short-lived species are strongly affected by environmental factors, causing annual landings to fluctuate from year to year (Brodziak and Hendrickson, 1999; Dawe et al., 2007). Fishing patterns reflect the seasonal distributions of the stock, with offshore catches from October to March and inshore landings from April through September. The main management tools are seasonal fishing quotas that limit landings. During 1982–2003, landings averaged 15,100 t. Recent average landings (2004–06) increased slightly to 16,152 t (Table 4-1) with average annual ex-vessel revenues of $27.5 million.

Northern Shortfin Squid

The northern shortfin squid stock is distributed from Cape Hatteras to Newfoundland. Northern shortfin squid are harvested in U.S. waters between Cape Hatteras and Georges Bank, mainly by bottom trawls, but fisheries also occur in nearshore waters off Newfoundland, Canada, and historically on the Scotian Shelf. Living for less than 1 year, this species grows rapidly and undertakes seasonal migrations covering long distances (Hendrickson, 2004; Hendrickson and Holmes, 2004). Similar to longfin inshore squid, the distribution and abundance of northern shortfin squid are also influenced by oceanographic factors (Brodziak and Hendrickson, 1999; Dawe et al., 2007).

The U.S. fishery for northern shortfin squid generally occurs during June–October in offshore waters of the Mid-Atlantic Bight. Larger vessels catch and freeze squid at sea, while smaller ves-

sels land fresh squid. A foreign fishery for shortfin squid existed during the 1970's and 1980's with a peak in total landings of 180,000 t in 1979, 90% of which were from Canadian waters. The international fishery collapsed in the early 1980's, and since 1983, U.S. domestic fisheries have accounted for most of the landings. Research surveys and fishery data indicate that the northern shortfin squid stock has been in a low-productivity regime since 1982. During 1982–2003, total landings averaged 14,721 t and U.S. landings averaged 9,348 t (Hendrickson et al., 2005). U.S. landings during 2004–06 averaged 17,351 t and were much higher than the long-term average (Table 4-1). Ex-vessel revenues averaged $11 million during the same period.

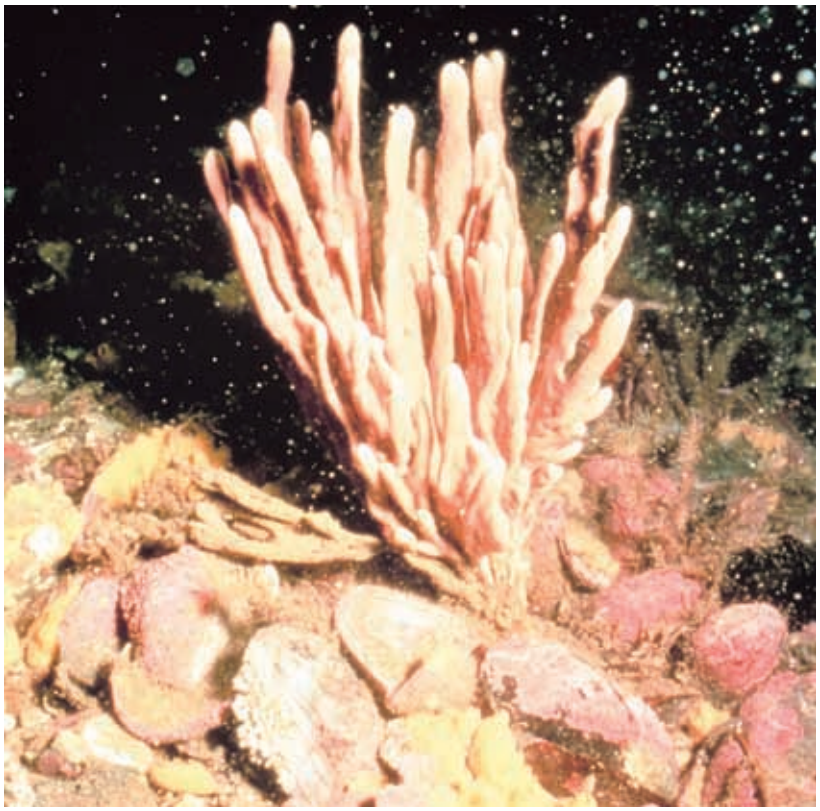
Red Deepsea Crab

Red deepsea crabs inhabit deep waters of the Continental Shelf, slope, and canyons, with most of the biomass occurring between 320 and 640 m (1,050 to 2,100 ft.). The southern New England stock is thought to be genetically distinct from the stock off the coast of Florida and in the Gulf of Mexico (Weinberg et al., 2003). Growth is thought to be slow, and individuals may reach a maximum age of about 15 years. Red deepsea crabs have been fished off the U.S. Atlantic coast since the early 1970's, primarily with baited traps. Male crabs are typically harvested when they reach about 115 mm (4½ inches) carapace width, but all female crabs must be released. Surveys completed in 2005 (Weinberg and Keith, 2003; Wahle et al., 2008) indicated that the proportion of large males in the harvested population off southern New England is lower than during the 1970's.

Developments in the deep-sea red crab fishery led to a new survey (Wahle et al., 2008), a new FMP in 2002, and an updated stock assessment completed in 2007 (NEFSC, 2006). Prior to 2006, the most recent stock assessment for red crabs was completed in the late 1970's.

During 1995–2003, U.S. landings of red crab were fairly stable and averaged 1,944 t. Recent (2004–06) landings averaged 1,923 t per year (Table 4-1) while ex-vessel revenues averaged $3.6 million.

OAR/National Undersea Research Program



Gravel-cobble bottoms off the coast of Maine are favored scallop grounds.

ISSUES

Rotational Area Management for Sea Scallops

The key to increasing fishery yields and revenues in the sea scallop fishery and maintaining relatively high stock biomass levels is reducing harvest rates on young scallops that are still growing rapidly and shifting effort towards the larger, slow-growing individuals with the highest meat yields. Rotation between management areas (Hart, 2003) and a larger minimum ring size for commercial scallop dredges are particularly important in this regard. Under rotational management, some areas are closed to fishing to allow small scallops to grow. Larger rings (used to construct the bag which closes the dredge) allow small scallops to pass through commercial scallop dredges and increase efficiency for catching larger scallops. This approach is expected to improve yields from the fishery, while reducing total fishing effort on the stock and related environmental impacts.

William B. Folsom, NMFS

Scallop dredgers in Seaford, Virginia.

Amendment 10 to the Sea Scallop FMP, in effect since 2004, implements these approaches in the sea scallop fishery.

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