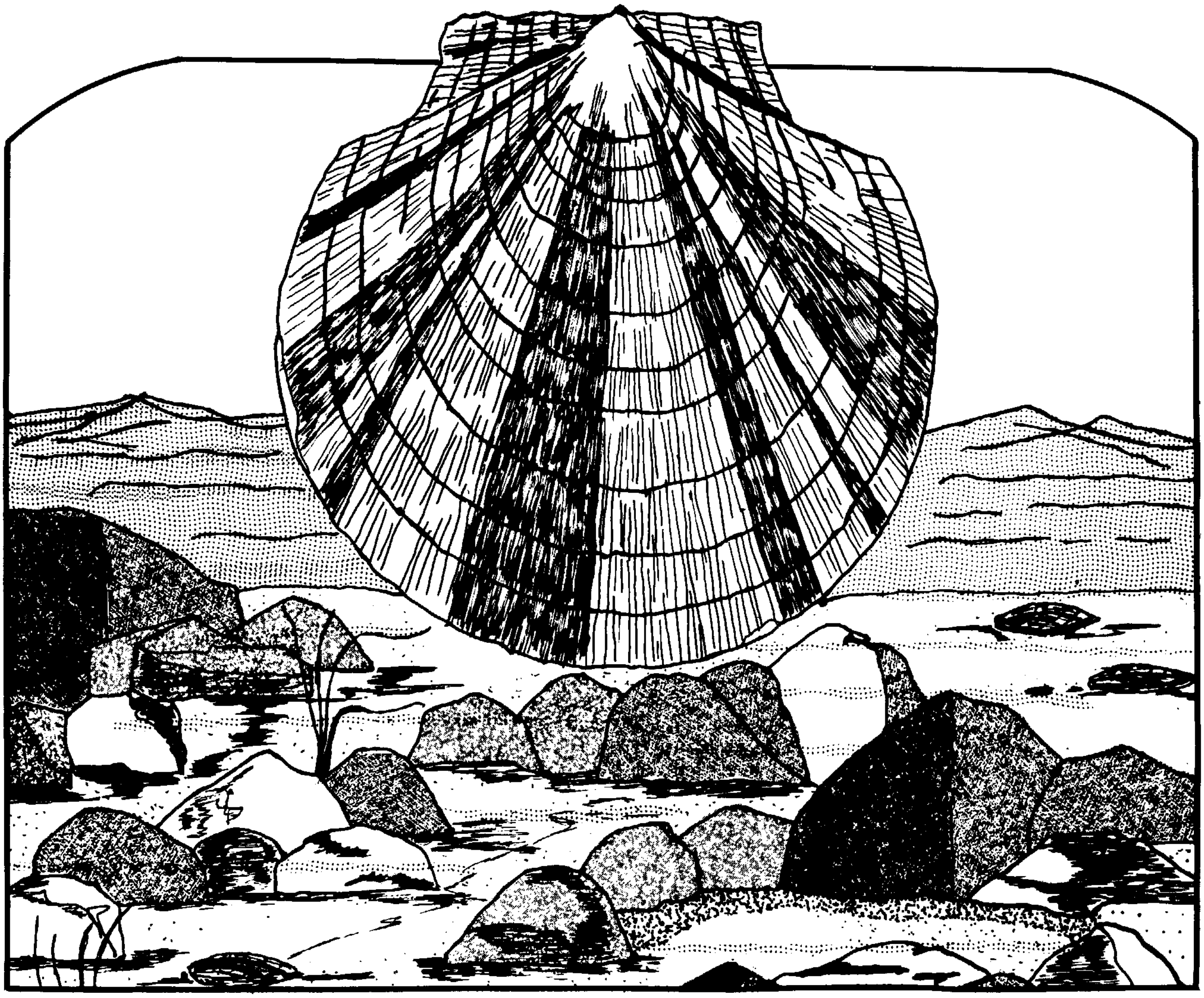
Biological Report 82 (11.67)
August 1986

TR EL-82-4

Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic)

SEA SCALLOP



Fish and Wildlife Service
U.S. Department of the Interior

Coastal Ecology Group
Waterways Experiment Station
U.S. Army Corps of Engineers

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Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic)

SEA SCALLOP

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PREFACE

This species profile is one of a series on coastal aquatic organisms, principally fish, of sport, commercial, or ecological importance. The profiles are designed to provide coastal managers, engineers, and biologists with a brief comprehensive sketch of the biological characteristics and environmental requirements of the species and to describe how populations of the species may be expected to react to environmental changes caused by coastal development. Each profile has sections on taxonomy, life history, ecological role, environmental requirements, and economic importance, if applicable. A three-ring binder is used for this series so that new profiles can be added as they are prepared. This project is jointly planned and financed by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.

Suggestions or questions regarding this report should be directed to one of the following addresses.

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CONVERSION TABLE

Metric to U.S. Customary

Multiply	By	To Obtain
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
kilometers (km)	0.6214	miles
square meters (m^2)	10.76	square feet
square kilometers (km^2)	0.3861	square miles
hectares (ha)	2.471	acres
liters (l)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (g)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (t)	2205.0	pounds
metric tons	1.102	short tons
kilocalories (kcal)	3.968	British thermal units
Celsius degrees	1.8(°C) + 32	Fahrenheit degrees

U.S. Customary to Metric

Multiply	By	To Obtain
inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
acres	0.4047	hectares
square miles (mi^2)	2.590	square kilometers
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
short tons (ton)	0.9072	metric tons
British thermal units (Btu)	0.2520	kilocalories
Fahrenheit degrees	0.5556(°F - 32)	Celsius degrees

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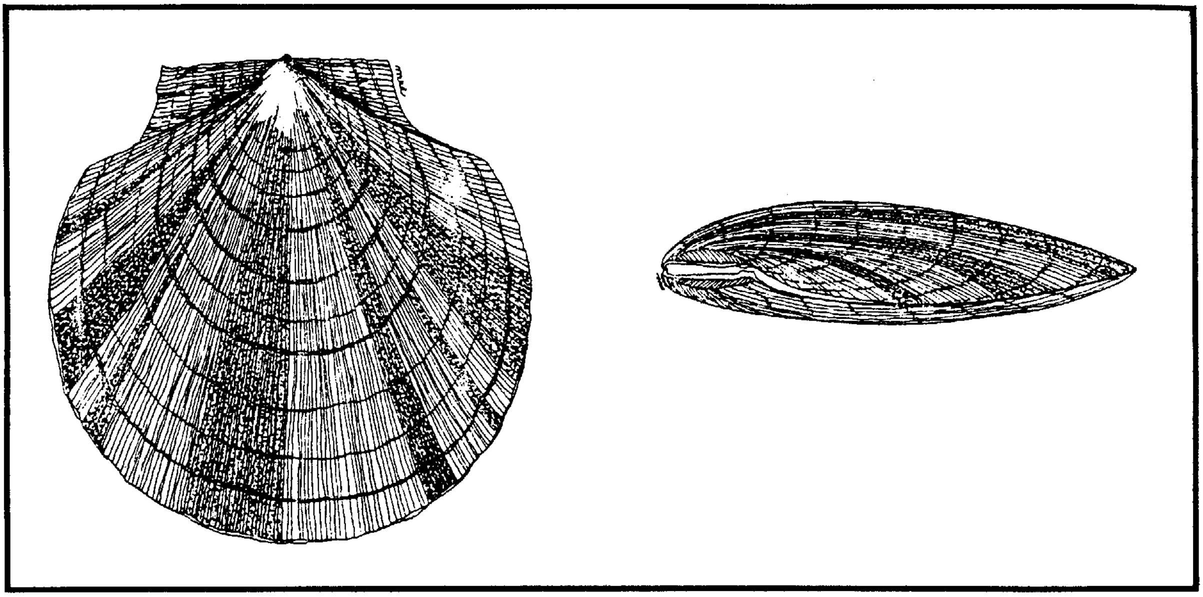

Figure 1. Sea scallop (Placopecten magellanicus).

SEA SCALLOP

NOMENCLATURE/TAXONOMY/RANGE

Scientific name ...... Placopecten magellanicus (Gmelin)
Preferred common name ... Sea scallop (Figure 1)
Other common names ... Atlantic deep sea scallop, giant scallop, ocean scallop, smooth scallop
Phylum .... Mollusca
Class .... Bivalvia
Order .... Pterioida
Family .... Pectinidae

Geographical range: The sea scallop inhabits Atlantic coastal waters from the Gulf of St. Lawrence (Posgay 1957) to Cape Hatteras, North Carolina (Porter 1974). Sea scallops are most abundant on Georges Bank and the Mid-Atlantic shelf, and less abundant along the coast of Maine, the Bay of Fundy, and the Gulf of St. Lawrence (MacKenzie 1979). North of Cape Cod, the sea scallop lives just below the low tide mark and, on occasion, intertidally along the coast of Maine (MacKenzie 1979). South of Cape Cod, it is restricted to deeper, cooler waters. Sea scallops rarely occupy waters deeper than 110 m (Posgay 1979). Scallops are commercially harvested over their entire range (see Figure 2 for the North Atlantic region distribution of the sea scallop).

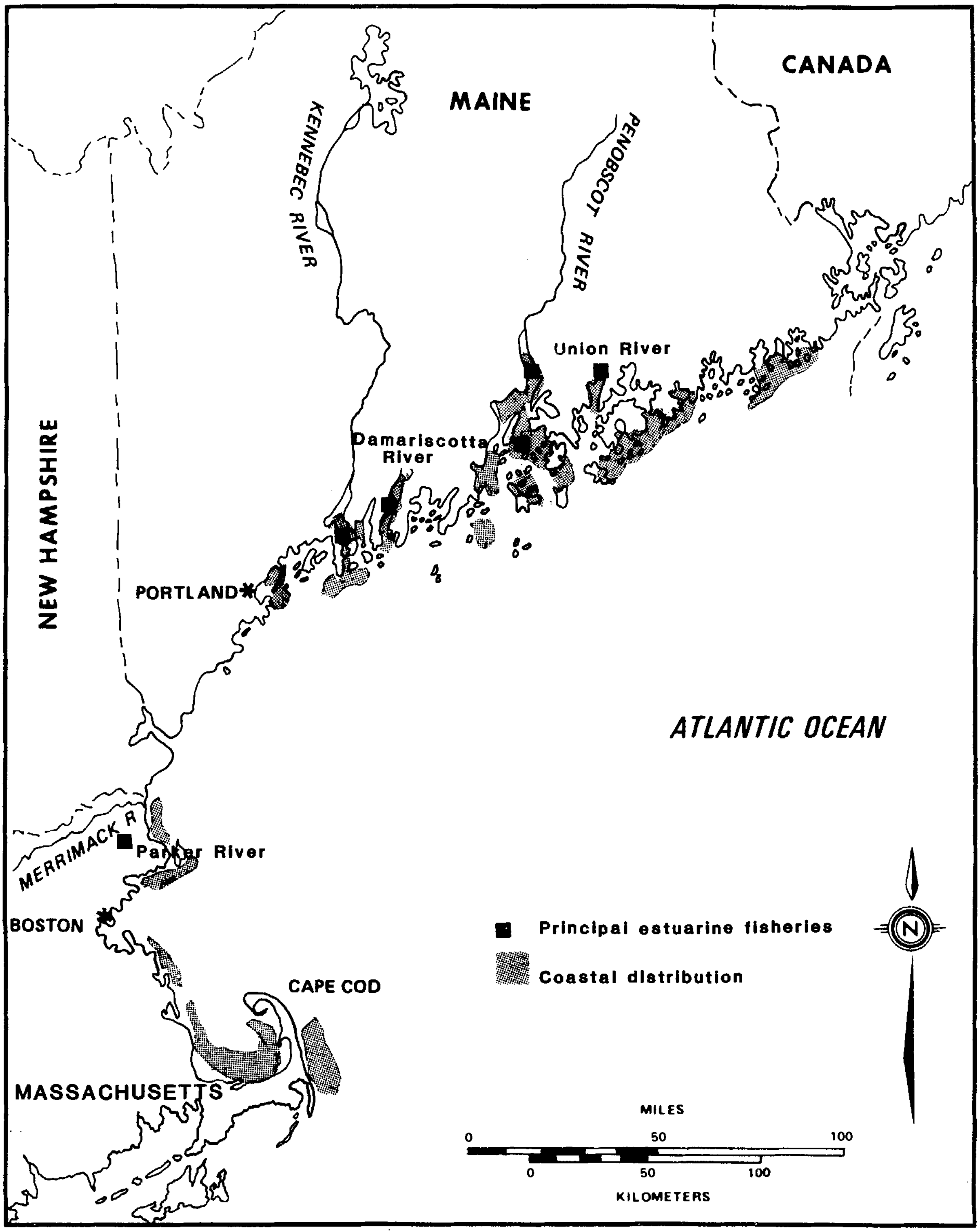

Figure 2. Coastal distribution of the sea scallop (Placopecten magellanicus).

MORPHOLOGY/IDENTIFICATION AIDS

The following is summarized from MacKenzie (1979).

Adult

The shell of the adult sea scallop is large, 12.5 to 20.0 cm long, subcircular, and compressed. (Length is defined as the farthest distance across the shell on a line parallel to the hinge line. Height is the farthest distance across the shell perpendicular to the hinge line. Width is the distance from the top to the bottom across both shells.) The two valves are subequal, hinged dorsally, and meet along the ventral margin, except for a small gap between them near the dorsal hinge line. The right valve rests on the bottom. Radial ribs are present along with concentric lamellae or growth lines. This sculpturing is more prominent on the left valve. The left valve is usually reddish-brown in color but may be lavender or yellow. The right valve is pale cream or white. The wings on the left valve are nearly equal; the wings on the right valve differ in that the anterior wing contains a byssal notch. The inner surface is lustrous and smooth with distinct adductor muscle and pallial scars (roughened areas may be present due to secretions laid down to repair damage from boring organisms). The adductor muscle scar is located slightly posterior and dorsal to the center of the valves and is slightly larger on the left valve.

Juvenile

Most juvenile sea scallops, 5 mm long and larger, resemble the adults. The valves are higher than long, with a less noticeable gap near the dorsal hinge-line. The sculpturing is more pronounced on the left valve; radial lines are lacking on the right valve. The adductor muscle scar is well off center.

REASON FOR INCLUSION IN SERIES

The sea scallop supports one of the most valuable shellfisheries (second only to the American lobster in 1982) along the United States eastern seaboard. In 1982, 21.3 million pounds of shucked sea scallops worth $78.1 million were landed in the United States (Thompson 1983). North of Cape Cod, sea scallops are highly valued by scuba divers.

In some waters, sea scallops are commonly overfished and those near industrial centers are exposed to contaminants. Little is known about the life history and environmental requirements of the sea scallop.

LIFE HISTORY

Spawning

Sea scallops in Port au Port Bay, Newfoundland, reach sexual maturity and spawn for the first time at age 1, just after the formation of the first growth ring (Naidu 1969). Sexes are usually separate. Examples of exceptions are two hermaphrodites among about 3,000 scallops examined from Georges Bank waters (Merrill and Burch 1960) and 42 of about 3,000 examined from Port au Port Bay, Newfoundland (Naidu 1970). In 1975, the sex ratio reported for Georges Bank in 1975 was 1:1, but the ratio for the Middle Atlantic shelf was 1.4 males to 1 female (MacKenzie et al. 1978).

Spawning season occurs later as one moves from south to north and has been reported as July along North Carolina and Virginia coasts (Serchuk et al. 1969), as late July to mid-August offshore on the shelf (MacKenzie et al. 1978), as late September near the Isles of Shoals, New Hampshire (Culliney 1974), and late September or early October in the Georges Bank area (Posgay and Norman 1958). Two spawning seasons were reported for Port au Port Bay, Newfoundland: a small one in early summer and a much larger one lasting from late August to October (Naidu 1970). The temperature during spawning also varies among locations. In 1966, scallops spawned in Port au Port Bay as temperatures fell from 16.1 to 4.2 °C (Naidu 1970). In 1973, scallops spawned when the water temperature was 14 °C in the Isles of Shoals waters, and 10 °C in the laboratory (Culliney 1974). In 1975, spawning temperatures ranged from 9 to 11.2 °C in Georges Bank waters and from 6.5 to 11 °C in Middle Atlantic shelf waters (MacKenzie et al. 1978). The duration of the spawning season has been reported to be as short as 1 week in Georges Bank waters (Posgay 1979) and as long as 5 weeks in Port au Port Bay (Naidu 1970).

Fecundity and Eggs

A female scallop releases as many as one million eggs a year. The larger the female the more eggs produced (MacKenzie 1979). The eggs are fertilized in the water after mass spawning. Spawning in the fall may be triggered by a rise in bottom water temperature that follows the breakdown of the thermocline (Posgay 1979). Dickie (1955) attributes the onset of spawning to tidal cycles, and Naidu (1970) observed that spawning usually coincides with strong onshore winds and rough seas. Naidu postulates that spawning may be initiated by prolonged exposure to physical shocks.

Sea scallop eggs are 64 microns in diameter and pink and brown in color. In the laboratory, the eggs hatch within 30 to 40 hours of fertilization at 15 °C and 32 ppt salinity (Culliney 1974). The eggs and larvae are planktonic (Merrill 1961).

Larvae

Little is known about the length of the planktonic larval stage of the sea scallop. The following observations were drawn from laboratory studies by Culliney (1974). Thirty to 40 hours after spawning, sea scallop embryos hatch into motile ciliated gastrulae that average 69 microns long and 63 microns high. By the fourth day, the young scallops become typical shelled straight-hinge veligers that average 105 microns long and 82 microns high. Development takes place at water temperatures from 12 °C to 18 °C. By 13 days, the larvae reach a length of 175 microns and a height of 150 microns.

On the 23rd day of development, typical bivalve veliger eyespots appear and, by the 28th day, over 50% of the larvae possess a functional foot characteristic of the presettling pediveliger stage. Pediveliger larvae are about 279 microns long and 242 microns high.

Scallop larvae remain planktonic for over a month after hatching (Posgay 1979). The first spatfall of laboratory-spawned larvae was 35 days after hatching (Culliney 1974). Planktonic scallop larvae in the sea may be transported out of the spawning area by predominant currents (Posgay 1979). This observation led Posgay (1979) to postulate that none of the large North Atlantic scallop populations (with the exception of the Georges Bank population) are self populated by their own larvae and spat. For example, spatfall on the Continental Shelf opposite Chesapeake Bay may come from larvae spawned from scallops on the Continental Shelf opposite Delaware Bay. This area, in turn, may receive its spatfall from scallops on the shelf opposite the mouth of the Hudson River, which may be populated by larvae escaping from Georges Bank. Georges Bank has a semipersistent gyre that probably retains most larvae produced there; consequently, sea scallop populations on Georges Bank might be self repopulating. Based on spat settling behavior observed in the laboratory, pediveligers develop a thick strong byssus and crawl around extensively in search of a hard surface for attachment (Culliney 1974). The spat attach themselves to the underside of shell fragments and other solid materials on the bottom. This behavior may protect the spat from epibenthic predators, such as crabs. Once attached, the pediveligers begin metamorphosis into the adult form. The larvae are able to delay metamorphosis for up to 1 month while searching for appropriate substrate (Culliney 1974).

Because scallop spat attach to navigation buoys located only in areas of the buoys that were free of other mollusks, Merrill and Edwards (1976) concluded that scallops do not compete well with the other mollusks for food or space. Young scallops frequently settle on the bryzoan, Gemelleria (Baird 1953). It is believed that sea scallops prefer shell fragments and other animals for setting because young scallops are unable to survive on shifting sand bottoms (Merrill and Edwards 1976).

Adult

Young adults larger than 10 mm long detach from the epibenthic substrate and settle on the bottom (Dow 1969). Scallops are relatively active until they are about 8 cm long, swimming in response to disturbances such as predation (Baird 1954) and commercial dredging (Caddy 1968).

Scallops swim by rapidly closing the valves and forcing water through ports situated on the wings. Swimming scallops move through the water with the hinge aft. Each contraction moves the scallop about 125 cm (Posgay 1950). Some move at ground speeds of 67 cm/sec for distances up to 4 m (Caddy 1968), and, while swimming, scallops may be carried long distances by currents. Currents may be a means of migration for smaller scallops (Baird 1954).

Large adult scallops (> 9 cm long) do not migrate (Baird 1954; Caddy 1968; Posgay 1981). Large scallops are recessed in the sediment and do not usually move unless physically disturbed (Caddy 1968).

THE FISHERY

The U.S. commercial scallop fishery began in 1884 with the discovery of several nearshore scallop beds near Mount Desert Island, Maine (Smith 1891). The U.S. fishery operated on a small scale until the 1930's when the large scallop beds of Georges Bank began to be heavily exploited. Canadian fishermen entered the Georges Bank scallop fishery in the mid 1950's, and by the mid 1960's they took more scallops than the U.S. fishermen (Serchuk et al. 1969). In those years the U.S. scallop fleet concentrated on the scallop stocks of the Mid-Atlantic shelf (Posgay 1968).

Scallops reach a commercially attractive size in their fifth or sixth year of life when they comprise over 90% of the landings (Posgay 1982). The success or failure of a particular year class can have a major effect on the commercial catch 5 to 6 years later. Fluctuating year-class strengths probably account for the large fluctuations in the quantity of scallops landed from one year to the next (Table 1).

The U.S. landings of sea scallop meats in 1982 were 9,693 metric tons valued at $78.1 million. Canada, the only other country to extensively gather harvest scallops within the U.S. Fishery Conservation Zone in

Table 1. U.S. and Canadian sea scallop landings (metric tons of meat) from Canada and the northeast U.S. coast, 1887-1982 (source: International Commission for North Atlantic Fisheries: Subarea 5 and Statistical Area 6).

Year	USA	Year	USA	Canada	Total
1887[a]	112	1943	2,508		
1888	91	1944	2,209		
1889	141	1945	2,590		
1892	53	1946	5,236		
1897	435	1947	6,647		
1898	156	1948	7,546		
1899	24	1949	8,299		
1900	79	1950	9,063		
1901	286	1951	8,503	91	8,594
1902	61	1952	8,451	91	8,542
1903	62	1953	10,713	136	10,849
1904	216	1954	7,997	91	8,088
1905	200	1955	10,036	136	10,172
1906	255	1956	9,102	317	9,419
1907	236	1957	9,523	771	10,294
1908	834	1958	8,608	1,470	10,078
1909	843	1959	11,178	2,721	13,899
1910	919	1960	12,065	3,390	15,455
1911	663	1961	12,456	4,549	17,005
1912	842	1962	11,174	5,694	16,868
1913	353	1963	9,044	5,877	14,921
1914	386	1964	7,721	5,901	13,622
1916	266	1965	9,104	7,027	16,131
1919	89	1966	7,237	6,641	14,878
1921	38	1967	4,646	5,007	9,653
1924	154	1968	5,474	5,227	10,701
1926	506	1969	3,362	4,304	7,666
1928	216	1970	2,613	4,082	6,695
1929	1,130	1971	2,593	3,894	6,487
1930	1,111	1972	2,654	4,162	6,816
1931	1,058	1973	2,401	4,208	6,609
1932	1,517	1974	2,721	6,115	8,836
1933	2,009	1975	4,422	7,387	11,809
1934	54	1976	8,712	9,745	18,457
1935	1,955	1977	11,068	13,036	24,104
1937	3,989	1978[b]	14,075	12,123	26,828
1938	4,041	1979	14,303	9,204	23,507
1939	4,440	1980	13,069	5,236	18,308
1940	3,467	1981	13,762	7,946	21,708
1941	144	1982	9,693	4,312	14,005
1942	3,258				

[a] Data for 1877-1977 taken from Serchuk et al. (1979).
[b] Data for 1978-82 taken from Thompson (1980, 1981, 1982, 1983).

1982, landed 4,312.4 metric tons (Thompson 1983). Over 75% of all scallops landed in the United States in 1982 were landed in New England states, and most of those were landed in Massachusetts (Table 2).

The sea scallop is gathered commercially over its entire range, wherever its abundance is sufficiently high. Maine is the only State (or Province) that imposes a season (November 1 to April 14) in its territorial waters.

Scallops are usually fished with dredges. Dredge size and type varies with locality. Scallop dredges operated from vessels in Georges Bank and Mid-Atlantic Shelf waters are about 3-4 m wide (MacKenzie 1979). In some inshore waters in Maine and Canada, where the bottom is gravelly and rocky, dredges 1-1.3 m wide are towed as singles, doubles, or triples. Caddy (1968) observed dredge efficiency and found that dredges are more efficient in capturing the large, less active scallops and less efficient in capturing the smaller, more active scallops.

In rocky nearshore areas, scuba divers gather scallops commercially (Walton 1979). The catch is sold to

Table 2. Sea scallop landings (in thousands of pounds and thousands of dollars) and price per pound for the New England States, 1977-82 (National Marine Fisheries Service, unpubl. data).

State	Year 1977	1978	1979	1980	1981	1982
Connecticut						
lb	94	94	198	-	-	50
Dollars	160	160	493	-	-	250
Price/lb	$1.70	$1.70	$2.49	-	-	$5.00
Maine						
lb	395	908	1,163	-	3,734	1,733
Dollars	754	2,246	3,878	-	15,095	6,810
Price/lb	$1.91	$2.47	$3.33	-	$4.04	$3.93
Massachusetts						
lb	16,322	16,141	14,114	11,799	14,453	13,762
Dollars	27,240	40,931	47,908	47,313	59,213	49,112
Price/lb	$1.65	$2.54	$3.39	$4.01	$4.10	$3.57
New Hampshire						
lb	-	-	60	49	-	-
Dollars	-	-	196	200	-	-
Price/lb	-	-	$3.27	$4.08	-	-
Rhode Island						
lb	100	355	764	1,815	-	318
Dollars	157	974	2,703	6,892	-	1,075
Price/lb	$1.57	$2.74	$3.54	$3.80	-	$3.38

local restaurants and tourists but no catch data are reported. Scuba divers are subject to the same open season (November 1 to April 14) as commercial fishermen.

GROWTH CHARACTERISTICS

The age and growth rate of scallops are calculated by reading annual rings formed on the shell in early spring (Posgay 1979), or empirically by tagging, releasing, and recapturing live scallops (Merrill et al. 1966). The first identifiable ring is formed when the scallop is 1.5 years old and about 20 mm long. The first actual ring is formed when the scallop is 0.5 year old and about 7 mm long but this ring is weak and rapidly wears off (Posgay 1979). Growth in the first several years is rapid. Between the 3rd and 5th years of life, the height of the scallop increases about 50% to 80% and meat weight increases up to 400%. Scallops in age group 7 provide maximum yields of meat per scallop in the waters of Georges Bank and the Mid-Atlantic shelf (MacKenzie 1979). After age 8, the annual growth increment falls to less than 10% per year (Serchuk et al. 1969). The age-height relationship of the sea scallop for the coast of Maine (Dow 1969) is as follows:

Age (year)	Height (mm)
0.5	2
1.5	5-12
2.5	56
3.5	74
4.5	89
5.5	104
6.5	112
7.5	119
8.5	125
9.5	130

These average heights of scallops the same age are slightly smaller than those reported by Serchuk et al. (1969) for Georges Bank, the Gulf of Maine, and the Mid-Atlantic shelf.

POPULATION DYNAMICS

Little is known about the density and distribution of planktonic sea scallop larvae. The abundance of juveniles has been estimated by sampling spatfalls (Larsen and Lee 1978) and by calculating juvenile densities on navigation buoys (Merrill and Edwards 1976). Samples of spatfalls from the Nantucket Shoals lightship buoy revealed a juvenile scallop density of 392/m^2. Scallops ranged in height from 0.5 mm (just settled) to 13.2 mm (about one year old) according to Merrill and Edwards (1976). In contrast, a 5-minute tow with a scallop dredge over the substrate below the buoy collected only 7 adult scallops. The estimated spat density at Georges Bank in February of 1977 ranged from 2 to 123/m^2. In May, the density was about 2 to 63 spat/m^2.

The percentages of adult scallops at different depths (Table 3) were determined from samples from 144 stations in the Georges Bank waters in 1975, and 57 stations on the Middle Atlantic shelf (MacKenzie et al. 1978).

Table 3. The percentage of adult scallops at different depths, adjusted to equal sampling intensity, for Georges Bank and Middle Atlantic shelf waters in 1975.

Sampling area	Depths (m)	Percentage
Georges Bank	37 to 50	13
	51 to 75	54
	76 to 100	33
Middle Atlantic shelf	31 to 50	25
	51 to 75	75
	76 to 80	<0.5

In 1960, the density of adult scallops was about 1 per square meter for the 274 km^2 northern edge of Georges Bank (Caddy 1971). The population estimate was about 270 million. Scallop density varies with substrate. In 1967, in the Northumberland Strait of the Gulf of St. Lawrence, estimated densities were 4.2 adult scallops/m^2 on sandy bottoms and 1.4/m^2 on mud bottoms.

An equation for estimating natural mortality was proposed by Dickie (1955). His method is based on the observation that the two valves (clappers) of dead scallops remain attached for a known period (Merrill and Posgay 1964). Natural mortality is computed by the equation:

$$M = (C/L)\ (52/t)$$

C is the number of pairs of attached clappers in the sample, L is the number of live scallops in the sample, and t is the average time in weeks that the clappers remain attached. From this equation, Merrill and Posgay (1964) obtained an instantaneous natural mortality of 0.1045 for Georges Bank scallops. This value translates into an annual natural physiological mortality of 9.9%.

ECOLOGICAL ROLE

Feeding Habits

Larval scallops were raised on a diet of the phytoplankter, *Isochrysis galbana*, at concentrations ranging from 5,000 to 50,000 cells/ml (Culliney 1974). Spat were raised on a mixture of *I. galbana* and *Chrysomonas salina* at a concentration of about 10,000 cells/ml. Adult scallops are filter feeders, feeding on plankton and organic detritus (MacKenzie 1979). Adults have been kept alive on a diet of the diatom *Phaeodactylum tricornutum* (Bourne 1964).

Predation

A list of known predators of larval sea scallops includes a wide variety of planktivores (MacKenzie 1979). The major natural predators of juvenile and adult scallops are as follows: rock crab, *Cancer irroratus*, lobster, *Homarus americanus* (Elner and Jamieson 1979; Jamieson et al. 1982), starfish, *Asterias vulgaris* (Caddy 1968, 1973; Dickie and Medcof 1963; Dow 1969; Medcof and Bourne 1964), and *Crossaster papposus* (Medcof and Bourne 1964), moonsnail, *Lunatia heros* (Dickie and Medcof 1963), a burrowing anemone, *Ceriantheopsis americanus* (MacKenzie 1979), Atlantic cod, *Gadus morhua*, American plaice, *Hippoglossoides platessoides*, and Atlantic wolffish, *Anarhichas lupus* (Medcof and Bourne 1964).

According to Caddy (1968, 1973), scallops that had been injured by commercial drag operations are preyed upon by several species of ground fish, e.g. the sculpins, *Myoxocephalus* sp., and the winter flounder, *Pseudopleuronectes americanus*. Laboratory studies show that juvenile lobsters prey on scallops larger than themselves, and that prey size tends to increase with the size of the predator (Elner and Jamieson 1979). Because of the large size of adult scallops, rock crabs and lobsters feed more on the smaller, more abundant juvenile scallops (Jamieson et al. 1982).

Symbiosis

A form of commensalism has been reported between the sea scallop and the juvenile red hake *Urophycis chuss* (Goode 1884). Small hake (less than 12 cm) live inside the mantle cavities of sea scallops (Wigley and Theroux 1971). Scallops less than 110 mm high apparently are too small, and scallops longer than 300 mm are too large to harbor juvenile hake (Wigley and Theroux 1971; Garman 1983). Hake larger than 300 mm seem to require thigmotactic security and live outside the scallops but touching them. The importance of this association is not clearly understood, but it may have some biological benefits to one or both species (Garman 1983).

ENVIRONMENTAL REQUIREMENTS

Temperature

Sea scallops spawn at temperatures between 14 and 16 °C in New Hampshire, and between 10 and 15 °C in the laboratory (Culliney 1974). Scallops spawn in Newfoundland at temperatures between 4.2 and 16.1 °C (Naidu 1970). Spawning may be triggered by a rapid drop in temperature in the fall (Posgay 1979). A strong correlation ($r = 0.8$) has been found between the temperature at the time of spawning and commercial landings 6 years later (Dow 1971; Sutcliffe et al. 1977; Caddy 1979). This correlation is strong evidence that water temperature is a dominant factor in determining spawning success and year class abundance. Excessively low summer temperature may delay or even prevent spawning and larval development (Medcof and Bourne 1964).

Little is known about the importance of water temperature on larval survival and development. Larvae raised under laboratory conditions grew well at a temperature of 15 °C, but few survived at 19 °C (Culliney 1974).

The high lethal temperature for adult sea scallops ranges from 20 to 24 °C, depending on the acclimation temperature (Dickie 1958; Posgay 1953). The 20 °C isotherm largely determines the southern distribution of sea scallops (MacKenzie 1979). A sudden rise in water temperature over scallop beds can induce mass mortality. (Merrill and Posgay 1964). The optimum temperature for the growth of adult sea scallops is 10 °C. Growth rates drop 5% at 8 °C and 20% at 12 °C. Mean annual temperatures for Georges Bank waters range from 8° to 12 °C (Merrill et al. 1961).

Salinity

Sea scallops usually inhabit waters with salinities characteristic of oceanic waters (MacKenzie 1979). Salinity tolerances of adult sea scallops have not been studied, but Culliney (1974) examined the effects of different salinities on scallop larvae by moving larvae from sea water (32 ppt salinity) into water of the test salinity. Larvae exposed to a salinity of 10.5 ppt for 42 h showed prolonged shock, but by the end of the experiment were moving about vigorously. A salinity of 16.9 ppt produced an initial shock but larvae recovered quickly (within 2 h). Juveniles exposed to a salinity of 21 ppt acted normally. These studies indicate that scallop larvae are somewhat euryhaline and may be able to survive in some estuaries.

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16. Abstract (Limit: 200 words)

Species profiles are literature summaries of taxonomy, life history, and environmental requirements of coastal fishes and aquatic invertebrates. They are prepared to assist with impact assessment. The sea scallop, Placopecten magellanicus, is a commercially important shellfish found from North Carolina to the Gulf of St. Lawrence in intertidal to deep waters. Scallops spawn at age 1 from July to October, releasing up to one million eggs each year. Up to 8 cm in size, scallops are active in response to disturbances, but those over 9 cm in size do not move. The U.S. commercial fishery has been active for over 100 years, and landings in 1982 were 9,700 t, valued at $78 million. Over 75% of the commercial landings of all scallops occur in New England, principally in Massachusetts. Scallops are collected by commercial dredges and scuba divers. A wide variety of animals prey on scallops, and predation by several species of fishes may increase following injuries caused by commercial dredges.

17. Document Analysis a. Descriptors
Shellfish
Growth
Fisheries
Salinity
Temperature
Feeding habits
Life cycles
Sea scallop

b. Identifiers/Open-Ended Terms
Sea Scallop
Plactopecten magellanicus
Habitat requirements

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