Atlantic Sea Scallop

Placopecten magellanicus

Federal Listing	N/A
State Listing	SGCN
Global Rank	G5
State Rank	S5
Regional Status	

Photo by Sherie Gee, NOAA

Justification (Reason for Concern in NH)

Sea Scallops are a highly prized edible bivalve mollusk harvested for its adductor muscle. While a significant commercial fishery exists in other eastern US states, the commercial effort in New Hampshire is not well established or highly productive. Annual New Hampshire landings over the last decade range from 177,000 pounds to less than 1,000 pounds unshucked, with a clear drop in recent years. Recreationally, scallops are taken by dredge and SCUBA diving. Little is known about the population dynamics of scallop in New Hampshire waters except for anecdotal information from commercial harvesters and by sport divers. A limited qualitative survey was accomplished in 1997 but this only covered the Isles of Shoals (Gosport Harbor), waters offshore New Castle Island, and the outer reaches of Portsmouth Harbor (NHF&G, 1998. Because sea scallops are a valued molluscan bivalve, subject to both limited commercial and recreational harvest, it is important to consider the species in this document.

Distribution

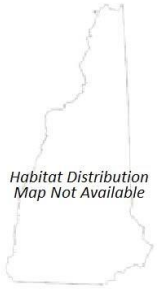
Atlantic sea scallops occur on the continental shelf of the eastern US seaboard from Gulf of St. Lawrence to North Carolina. In New Hampshire, they are found along the coast with concentrations near New Castle Island, along outer Portsmouth Harbor, and at the Isles of Shoals. Commercial harvest has produced modest catches offshore of the Isles of Shoals (NHF&G, 1997). Sea scallops may be found elsewhere along the New Hampshire coast, but there is a lack of information to document their location.

Habitat

The Atlantic sea scallop (*Placopecten magellanicus*) is a bivalve mollusk that inhabits the coastal waters of the continental shelf on the eastern seaboard (Packer, & Cargnelli, 1999). Scallops, unlike most bivalve mollusks, live on the surface of the bottom on a variety of substrate, but are most abundant on coarse firm sand/gravel which keeps them in waters relatively close to shore at depths less than 75 to 100 meters (Serchuk et al., 1983). Scallops synchronously spawn in later summer or fall, when both sperm and eggs are broadcast into the water column (Culliney, 1974). As free swimming planktonic larvae, they are distributed widely by ocean currents during a period of 30 to 40 days, after which they seek suitable substrate and attach using byssus threads (Tremblay et al, 1994). Once settled, their short range movement is possible but very limited. As adults, optimal growth occurs in cold water between 8°C and 12°C, and salinities consistent with open ocean (Mullen & Moring, 1986).

NH Wildlife Action Plan Habitats

- Marine



Distribution Map

Current Species and Habitat Condition in New Hampshire

Historically the sea scallop has been recognized as indigenous to New Hampshire. The scallop stocks were assessed in the late 1970's and 1990's by New Hampshire Fish and Game Department and even though it was determined no commercially significant scallop beds exist in New Hampshire, there is considerable recreational and limited commercial interest. Documented scallop beds exist from the mouth of the Piscataqua River in Portsmouth south to Fort Stark and at the Isle of shoals.

Population Management Status

In New Hampshire, sea scallops are strictly managed both for commercial harvest and for recreational taking (NEFMC, 1982). No special license is required for recreational harvesters, however commercial harvesters must obtain a resident commercial saltwater license. Harvesters must adhere to a minimum of three and a half inch shell height and a daily limit of 75 pounds shucked meat or 625 pounds unshucked shell. Recreational takers may use SCUBA or dredge and cannot sell their catch. Commercial gear for harvest is a specifically described dredge. All takers of scallop are held to a season of November 1 to April 14.

Regulatory Protection (for explanations, see Appendix I)

- Harvest permit - season/take regulations
- NHFG Rule FIS 607.02: addresses the harvest of sea scallops
- RSA 211.49 a & b: Licenses required to sell marine species
- RSA 211.62 New Hampshire law that outlines gear/season/harvest/permit regulations
- 50 CFR 648: Scallop fishery regulations managed by New England Fishery Management Council (NEFMC) and NOAA Marine Fisheries Service (NMFS) in Federal waters

Quality of Habitat

Sea scallops require adequate substrate and cold temperatures (8-12°C). The coastal waters of the New Hampshire/Maine border provide suitable sand/gravel substrate near shore and out to the Isle of Shoals. Optimal temperatures occur just offshore and in depths less than 100 feet. Suitable habitat exists from the mouth of the Piscataqua River south to Fort Stark, and at the Isle of Shoals. It is possible a more extensive survey of the nearshore coastal waters could reveal more suitable scallop habitat.

Habitat Protection Status

Currently there is no habitat management plan for sea scallops in New Hampshire.

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Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Species and habitat impacts from increasing sea surface temperatures (Threat Rank: High)

Climate change is expected to increase sea surface temperatures. Increases in sea surface temperatures may lead to shifts and or expansions of species range that could negatively influence scallop by competition or predation. Temperature induced changes would have significant impacts on suitable scallop habitat, growth, disease, or mortality.

Temperature plays a vital role in the survival and distribution of sea scallop larvae in the Gulf of Maine (NEMFC, 1982). Shellfish larvae exposed to higher temperatures are more susceptible to disease and increased bacteria growth. Mass mortality has been observed when scallop larvae exceed thermal tolerances (Culliney, 1974).

Habitat and species impacts from resource depletion resulting from commercial harvest (Threat Rank: High)

Fishing and harvesting causes direct mortality to the species. Commercial harvest, although not significant in New Hampshire, may adversely impact a variety of benthic species associated with scallop habitat. Both commercial and recreational scallop harvesters must adhere to strict harvest regulations.

The harvest of sea scallops is managed by the New England Fisheries Management Council, and is outlined in the comprehensive management plan for scallops. Commercial and recreational harvest occurs in the state of New Hampshire and is therefore managed through license and harvest regulations (Fis 607.02).

Species and habitat impacts from ocean acidification (Threat Rank: Medium)

Anthropogenic sources of CO2 in the atmosphere react with seawater to form carbonic acid (H2CO3). Carbonic acid dissociates to form bicarbonate (HCO3) and hydrogen (H+) resulting in a decrease in seawater pH. The formation of additional hydrogen ions favors the increased formation of bicarbonate ions over carbonate ions (CO23-). Fewer carbonate ions hinders the formation of calcium carbonate (CaCO3) which is an important process for building and maintaining shells in sea scallops and other shellfish.

One third of all anthropogenic sources of CO2 over the past 200 years have been stored in the ocean. More acidic oceans due to increased CO2 would affect organisms that require calcium carbonate to synthesize and maintain shell. The effect of ocean acidification is suggested to inhibit the growth and survival of larval shellfish, which may adversely affect shellfish populations (Talmage et al., 2010).

Habitat impacts from gear effects related to commercial harvest (Threat Rank: Medium)

Commercial harvesters in the state of New Hampshire use specific size dredges to fish for sea scallops. Scallop dredges use teeth that dig and scour the sediment collecting scallops and anything else in its path. The use of dredges causes physical damage to the seafloor (habitat) as well as direct mortality to a variety of benthic organisms.

The implications of commercial scallop gear on habitat and benthic fauna is well documented in literature (Collie et al., 1997; Thrush et al., 2002). Dredges are designed to specifically target and collect scallops on the seafloor. The effects of dredges can also be observed to cause destruction and mortality to large epifaunal and infaunal organisms within the path of the gear (Eleftheriou et al., 1992).

Habitat impacts from disease (neoplasia) (Threat Rank: Medium)

The effect of disease on shellfish is of great concern. There is an increased risk of exposure to harmful human pollutants as sea scallops inhabit tidal and nearshore waters. Pollutants collect and concentrate in various tissues of bivalves, and these harmful chemicals and pathogens could result in human health risks. Furthermore, the continuous year-round filter feeding behavior of bivalves and their ability to establish large dense shellfish beds, pose serious potential for large pervasive outbreaks.

A significantly higher mortality among shellfish infected with neoplasia in comparison to individuals lacking the disease has been observed (Brousseau & Baglivot, 1991). Although sources of the disease is not well established, environmental stressors such as water temperature, pollutants, industrial contaminants (i.e., hydrocarbons), and anoxic zones resulting from eutrophication, may have the greatest role in shellfish mortality.

Habitat impacts from introduced or invasive species (Threat Rank: Medium)

Introduced or invasive species are commonly transported and introduced to marine environments by vessels, bilge water, and debris. Some exotic pets or aquarium fish released also have the potential to become established and compete with native species. Warming sea temperatures and large storm events play a role in introducing historically non-native species into new environments.

Green crabs (*Carcinus maenas*) are well known predators of scallops and many species of shellfish (Ropes, 1968). Green crabs are a pervasive threat to native shellfish communities and have been implicated in the reduction and destruction of many shellfish species. Colonial tunicates (e.g., *Didemnum vexillum*) can also pose a threat to sea scallops by inhibiting larval settlement and survival (Morris et al., 2009).

Habitat impacts from mercury deposition (Threat Rank: Medium)

Mercury is released into the environment as a result of human activity such as coal burning, mining, and industrial processes. Mercury ultimately makes its way into the marine environment through river and watershed inputs, as well as atmospheric deposition.

Shellfish, which live sedentary benthic lives, filtering seawater are susceptible to chemical influences, which collect and concentrate in their tissues. Mercury and other heavy metals have been shown to affect oysters on the cellular level, impacting their immune functions (Gagnaire et al., 2004).

Habitat degradation from oil spills (Threat Rank: Medium)

Oil introduced into the marine environment can have lethal and sublethal effects on a variety of marine life across all life stages. Oil has the potential to come in contact with marine life through various industrial and shipping processes that occur in our coastal waters. Oil spills pose the biggest threat with the potential to disperse large amounts of oil into the marine environment.

Shellfish exposed to crude oil have been shown to exhibit changes in respiration, reproductive development, feeding, growth rates, behavior, biochemistry, and increased mortality. Shellfish exposed to crude oil in the marine environment could lead to population decreases (Stekoll et al., 1980).

List of Lower Ranking Threats:

Habitat impacts from marine debris

Habitat degradation from nutrients from shore and ships

Habitat impacts and mortality from power plant effluent causing thermal pollution

Habitat degradation from lead

Habitat degradation from shore-based contamination

Habitat degradation from dredging and the dumping of spoils

Habitat conversion from turbine development and underwater lines, and oil and gas drilling

Habitat and species impacts from phenology shifts

Habitat impacts from increased wave action that causes bottom disturbance

Habitat impacts from increased storm events that send plumes including erosion, sedimentation, and salinity changes

Actions to benefit this Species or Habitat in NH

Consistent and timely comprehensive surveys of suitable habitat and scallop stocks to determine the full extent and health of sea scallop populations in New Hampshire.

Objective:
More research on scallop distribution and abundance would be beneficial in determining the health of the scallop population in New Hampshire, which is necessary for the management of a sustainable fishery.

General Strategy:
Although sea scallops are managed for harvest, few surveys or assessments have been conducted on the scallop populations that inhabit our coastal waters. Quantitative monitoring of known sea scallop beds around Portsmouth Harbor south to Fort Stark. Exploratory scallop dredging and SCUBA dives to find and map potentially unknown scallop populations and habitat along New Hampshire's coast.

Political Location:
Statewide

Watershed Location:
Coastal Watershed

References, Data Sources and Authors

Data Sources
Information on Atlantic sea scallops threats was taken from agency data, scientific literature, and Fisheries Management Plan.

Data Quality
Threats to Atlantic sea scallops and their habitat are outlined in the NEFMC Fisheries Management Plan. While every threat may not be covered by the Fisheries Management Plan various threats to shellfish are well documented in scientific literature.

2015 Authors:
NH Fish and Game

2005 Authors:
N/A

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