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KEY INFORMATION

Areas of Concern

West Greenland, Hudson Bay, Atlantic coast of Labrador, east and south coasts of Newfoundland, Grand Banks, Gulf of St. Lawrence and outer coast of Nova Scotia, to the Gulf of Maine, and westward and southward along the continental shelf to New York; may stray to South Carolina.

Year Identified as “Species of Concern”
2004

Factors for Decline

- Commercial fishing
- Bycatch
- Predation
- Competition

Conservation Designations

IUCN: Not Evaluated

American Fisheries Society: Vulnerable

Brief Species Description:

The thorny skate is one of seven species of skates that occur off the northeastern coast of North America from Labrador to South Carolina (Figure 1). This species is characterized by a row of 11 to 19 large thorns running down the midline of the back and tail (Bigelow and Schroeder 1953; Collette and Klein-MacPhee 2002). Thorny skate are generally brown dorsally with a white ventral surface. They may reach lengths of over 39 inches (1 m), but maximum size varies over its range. The Northeast Fisheries Science Center (NEFSC) bottom trawl surveys indicate that in the U.S., thorny skate are most abundant in the Gulf of Maine and Georges Bank offshore strata regions, with very few fish caught in inshore, Southern New England, or Mid-Atlantic regions.

According to Collette and Klein-MacPhee (2002), females deposit a single fertilized egg capsule which ranges in size from 2 to 4 inches (48 to 96 mm) in length and 1.33 to 3 inches (34 to 77 mm) in width. While females with fully formed egg capsules are captured year round, the percentage of mature females with capsules is highest during the summer (Collette and Klein-MacPhee (2002). Under laboratory conditions, embryonic development of thorny skate lasted for 2 to 2.5 years while in the low temperature environment of the Barents Sea, development took 2.5 to 3 years (NEFSC 2003).

Thorny skate feed on [benthic](#) invertebrates and fish. Larger thorny skate over 24 inches (>60 cm) long feed primarily on squid and fishes such as herring, redfish, sculpins, wolffish, mackerel, sand lance and flatfish, while smaller skates 8 to 24 inches (20-60 cm) long feed mostly on polychaetes, euphausiids, and decapods (Collette and Klein-MacPhee, 2002).

Thorny skates are found over a wide variety of substrates including sand, broken shell, gravel, pebbles and soft mud and are primarily found from 20 to 3900 feet (6-1200 m) deep (Collette and Klein-MacPhee, 2002). They appear to make seasonal migrations, which have been noted on the Scotian Shelf and the Grand Banks, but specific details on the spatial patterns and timing are lacking (NEFSC 2003).



Rationale for “Species of Concern” Listing:

Demographic and Genetic Diversity Concerns:

No genetic work has been completed for thorny skate, but the continuous distribution, lack of physical barriers on the Grand Banks, and a synchronous migration indicate that the [stock](#) found predominantly in the Grand Banks region represents a single reproductive population (Kulka *et al.* 2006). Also, morphometric work completed by Templeman in the late 1980s does not provide any evidence of variation across this region (Kulka *et al.* 2006). It is possible that this may represent a transboundary stock, and therefore, it may require conservation measures both in the U.S. and Canada.

The NEFSC survey abundance indices for thorny skate have declined over the last 30 years. Peak abundance and biomass from NEFSC spring and autumn surveys were during the early 1970s (NEFSC 2000). The Skate Stock Assessment and Fishery Evaluation Report (2001) shows that thorny skate abundance has declined steadily since the late 1970s, reaching historically low values in 1998 and 1999, which are only 10 to 15% of the peak observed in the 1970s.

The median length of thorny skate in NEFSC survey catches has ranged from 12 inches (31 cm) in the 1988 autumn survey to 25 inches (63 cm) in the 1971 autumn survey. According to the New England Fishery Management Council (NEFMC) (2001), there has been a downward trend in median length of survey catch through most of the survey time series, but median length has been recently increasing in autumn surveys, and is currently 16 to 20 inches (40-50 cm). Kulka *et al.* (2006) report that the area occupied by thorny skate on the Grand Banks has continued to decline and the density has continued to increase at the center of the mass of the species. They also note that for other species, hyper-aggregation has been demonstrated to be a precursor to collapse (cited from Rose and Kulka 1999).

Currently, there are insufficient data on age and growth to determine fishing mortality rates. Three-year averages of the autumn biomass indices are used to evaluate the current status with respect to the biomass reference points. The 2003-2005 NEFSC autumn survey average is 0.56 kg/tow, below both the biomass target of 4.41 kg/tow and the threshold of 2.20 kg/tow, indicating an [overfished](#)

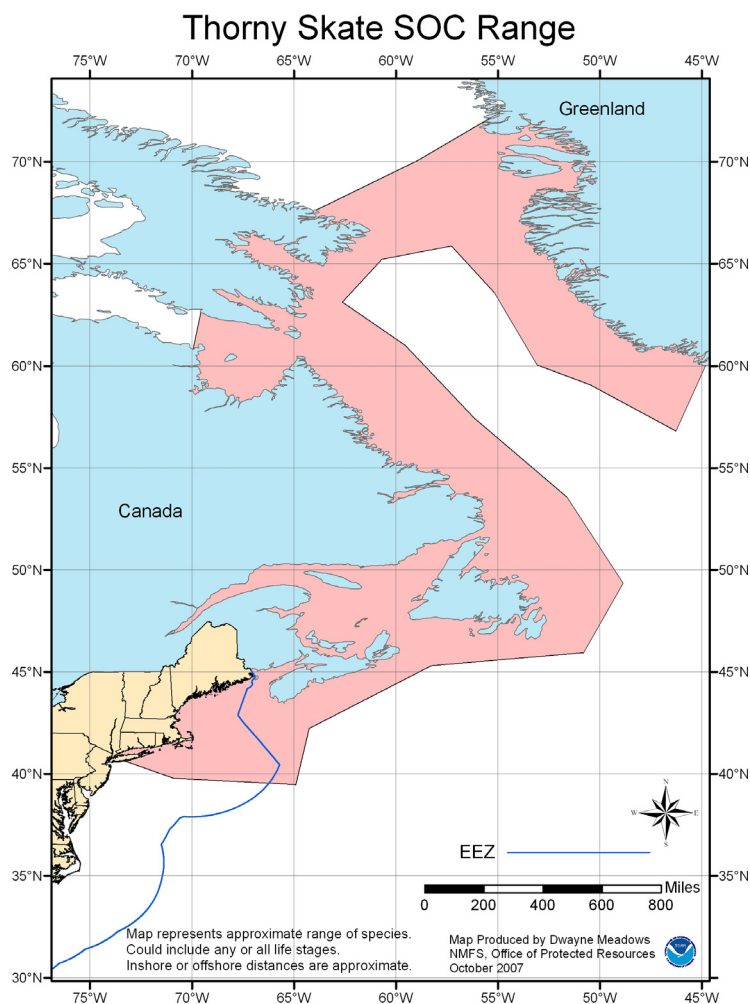


Figure 1. Thorny skate species of concern range.



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condition (44th Northeast Regional Stock Assessment Workshop 2007). [Overfishing](#) was determined to be occurring as of late 2008.

Factors for Decline:

The most significant threat to thorny skate is fishing. The principal commercial fishing method used to catch skates is otter trawling. Skates are frequently taken as [bycatch](#) during ground fishing operations and discarded. Recreational landings are insignificant. Thorny skate is not a preferred species for use in the skate wing fishery, and the distribution of this species only slightly overlaps with the geographic area of the most significant portion of the fisheries for skate wings and bait. Thorny skates are tough-skinned making them difficult to put through a skinning machine. Vessels targeting skates are primarily from southern New England ports and are targeting a combination of little skates and juvenile winter skates (NEFMC 2002).

According to Kulka *et al.* (2006), Spain, Portugal, and Russia have had a directed fishery for skate (primarily thorny skate) outside of Canada's 200-mile limit on the Tail of the Grand Banks since the mid-1980s. Thorny skates were taken only as bycatch in Canadian fisheries prior to 1993; however, Canadian fleets now fish at the outer fringe of where skate are aggregated on the Grand Banks, where the skate are the largest (Kulka *et al.* 2006). Commercial landings for skate in Canada are not species specific; however, based on observer catch data, 90% of skates landed are thorny skate (Kulka *et al.* 2006).

Thorny skate embryos are eaten by halibut, goosefish, Greenland sharks, and predatory gastropods (NEFSC 2003). According to Kulka and Mowbray (1998), thorny skate near Newfoundland were eaten by seals, sharks, and halibut (cited in NEFSC 2003). Possible competition for prey resources exist between thorny skate and smooth skate; however, this most likely poses a limited threat to the species as thorny skate are more widespread than smooth skate (NEFSC 2003).

Status Reviews/Research Underway: None.

Data Deficiencies:

Available data suggest that the Grand Banks stock represents a single breeding unit; however, stock structure has not been confirmed. Information on individual growth rates and details on the age structure of thorny skate populations is also needed (Kulka *et al.* 2006). Information is also needed on age validation in this species. The stock-recruit relationships should be examined using NEFSC trawl survey data. The trophic interactions between skates and other groundfish should be investigated. It is possible that annual fluctuations in water temperature and other environmental factors may lead to shifts in the range and distribution of this species, but this has not been verified.

Existing Protections and Conservation Actions:

The northeast skate complex Fishery Management Plan (FMP) was enacted in 2003. The FMP applies to federal waters from Maine to Cape Hatteras, North Carolina and includes the following measures: requires landing permits for all vessels, operators, and dealers engaged in any aspect of the skate fishery; a requirement to report skate landings by individual species and skate discard by general categories (large/small); a prohibition on possession of barndoor and thorny skate and a partial ban on smooth skate in the Gulf of Maine (GOM) as defined by the GOM Regulated Mesh Area Boundary; overfishing definitions for each of the seven species in the Northern skate complex; a



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rebuilding program for overfished skate species; a baseline of management measures in other fisheries that benefit skates; and a process for reviewing changes to the baseline of management measures in other fisheries that benefit skates.

In June 2004, the International Union for Conservation of Nature and Natural Resources' (IUCN) Shark Specialist Group convened a workshop to evaluate the status of nearly 200 regional species of sharks and rays. At this workshop, they recommended that the New England population of thorny skate be listed by IUCN as "Critically Endangered." Also in 2004, parties to the Northwest Atlantic Fisheries Organization agreed to establish a total allowable catch (TAC) for thorny skates in Canadian and international waters around the Grand Bank. The final agreement resulted in a TAC of 13,500 metric tons for 2005-2007.

References:

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Northeast Fisheries Science Center. 2003. Essential Fish Habitat Source Document: Thorny Skate, *Amblyraja radiata*, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-178.

Point(s) of contact for questions or further information:

For further information on this Species of Concern, or on the Species of Concern Program in general, please contact NMFS, Office of Protected Resources, 1315 East West Highway, Silver Spring, MD 20910, (301) 713-1401, soc.list@noaa.gov; <http://www.nmfs.noaa.gov/pr/species/concern/>, or Kimberly Damon-Randall, NMFS, Northeast Region, One Blackburn Drive, Gloucester, MA 01930-2295, (978) 281-9328, x6535, Kimberly.Damon-Randall@noaa.gov.