

Species Status Assessment

Common Name: Thorny skate

Date Updated: 1/12/2024

Scientific Name: *Amblyraja radiata*

Updated by: Siobhan Keeling

Class: Chondrichthyes

Family: Rajidae

Species Synopsis (*a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York*):

The thorny skate is a temperate to arctic species distributed on both sides of the North Atlantic Ocean. The northwest Atlantic population occurs from Greenland and Hudson Bay, Canada, southward to South Carolina, most commonly at depths of 50 to 100 meters (Packer et al. 2003). Its geographic range includes contrasting population trends; the USA has experienced severe declines (80-90%) while Canadian and some northeast Atlantic populations have been relatively stable or increasing in recent years (Kulka et al. 2009, 2020). There is evidence indicating population segregation and division into subpopulations, but it is currently unknown if genetic mixing of subpopulations takes place in the northeast or northwest Atlantic stocks (Kyne et al. 2012). Thorny skate have been caught off the south shore of Long Island in the New York Bight, but they are most abundant in the Gulf of Maine and Georges Bank offshore strata with very few individuals caught in inshore Mid-Atlantic or Southern New England regions (NEFMC 2009). In recent years (2016-2021), there have been no catches of Thorny Skate in the NEFSC trawl survey within the NY Bight, but thorny skate been reported throughout the NY Bight in the NOAA observer program. In the U.S., thorny skate have been targeted and taken as by-catch in numerous fisheries and survey indices have declined steadily since the late 1970s. Commercial and recreational fisheries for thorny skate are now prohibited in the U.S. and management is coordinated by the Northeast Fishery Management Council (NEFMC) under the Northeast Skate Complex Fishery Management Plan of 2003. Despite management actions, U.S. populations have not recovered (New England Fishery Management Council, 2020). As a boreo-Arctic species, southern habitats may become less suitable with increases in temperature, resulting in ranges shifting northward (Kulka et al., 2020). The thorny skate was petitioned for listing under the ESA but a review in 2016 found that despite low biomass throughout the U.S. management area, there were no distant population segments, and the species was not at risk for extinction throughout all or a significant portion of their range (NMFS, 2017).

I. Status

a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed

b. Natural Heritage Program

i. **Global:** GNR, Unranked

ii. **New York:** SNR, Unranked **Tracked by NYNHP?:** No

Other Ranks:

-New York 2025 SGCN status: High Priority Species of Greatest Conservation Need

-IUCN Red List: vulnerable

-Northeast Regional SGCN: RSGCN

- COSEWIC: special concern (May 2012)

Status Discussion:

Although the overall abundance of thorny skate includes several hundred millions of individuals, the potential occurrence of subpopulations with different age and growth rates and the potential lack of protection under a continuing U.S. wing fishery warrant a global assessment of vulnerability by the IUCN (Kyne et al. 2012). Biomass of thorny skate has declined steadily in the southern portion of the Northwest Atlantic since the late 1970s. Abundance has recently declined to historic lows despite prohibition of landings in the U.S. (implemented in 2003). The Northeast Fishery Management Council (NEFMC) has determined that thorny skate stock is not experiencing overfishing but is overfished (NEFMC 2020). The most recent IUCN assessment in 2019 determined that Northwest Atlantic Southern population is critically endangered (Kulka et al., 2020).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Declining	severe abundance decline from 1980-present		-
Northeastern US	Yes	Declining	Declining	severe abundance decline in Mid-Atlantic Bight 1980-present		Yes
New York	Yes	Declining	Unknown	severe abundance decline 1980 – present		Yes
Connecticut	Yes	Declining	Unknown		Not listed	No
Massachusetts	Yes	Declining	Unknown		Not listed	No
New Jersey	Yes	Unknown	Unknown		Not listed	No
Pennsylvania	No	-	-			-
Vermont	No	-	-			-
Ontario	No	-	-			-
Quebec	Yes	Declining	Declining	severe abundance decline from mid 1970s – present	Special concern	-

Column options

Present?: Yes; No; Unknown; No data; (blank) or Choose an Item

Abundance and Distribution: Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item

SGCN?: Yes; No; Unknown; (blank) or Choose an item

Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

NOAA's NEFSC conducts spring and autumn bottom trawl surveys annually from Cape Hatteras, NC to the Gulf of Maine. NEFSC winter surveys focus on Southern New England and the Mid-Atlantic offshore regions. However, low catch efficiency for thorny skate may limit the applicability of this survey to monitor thorny skates. The NOAA observer program in the NY Bight does encounter thorny skates.

Trends Discussion *(insert map of North American/regional distribution and status):*

The current population trend is decreasing according to the IUCN red list (Kulka et al. 2020). Skates have been reported in New England fishery landings since the late 1800s. However, landings never exceeded more than a few hundred metric tons until the rise of distant water fishing fleets in the 1960s. Historically, catches were never recorded by species (Sosebee 2006). Northeast Fishery Science Center (NEFSC) spring and autumn survey biomass indices for thorny skate have declined continuously since the 1960s. Thorny skate are currently overfished; biomass has declined from 5.6 kg/tow in the NEFSC bottom trawl survey in the 1970s to 0.15 kg/tow in 2019 and 2021 (NEFMC, 2022). In the twentieth year of a 25-year rebuilding plan, the thorny skate is only at 3.5% of the rebuilding target and shows no sign of rebuilding (NEFMC, 2023).

Distribution Map

Amblyraja radiata



Legend

■ EXTANT (RESIDENT)

Compiled by:

IUCN SSC Shark Specialist Group 2020

Figure 1. Thorny Skate range and global status (IUCN Redlist Kulka et al., 2020)

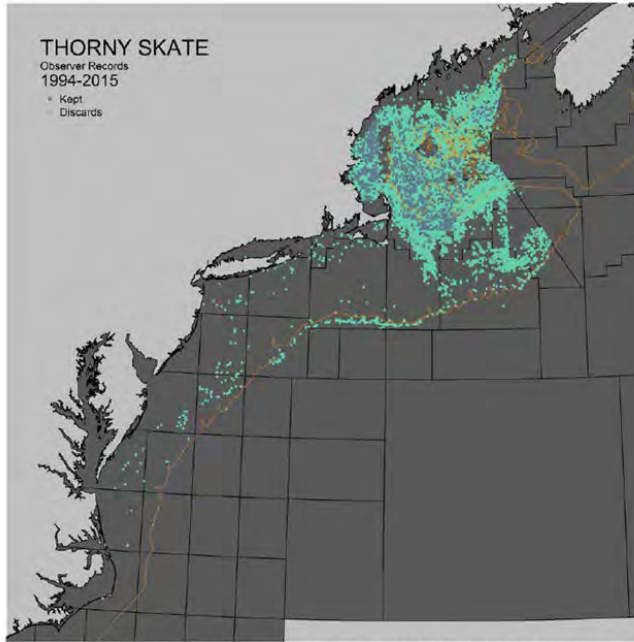


Figure 12. Kept and discards of thorny skate (*Amblyraja radiata*) from the observer program from 1994-2015.

Figure 2. Thorny skates from the NOAA observer program (1994-2015) (Sosebee et al. 2016)

1. Northwest Atlantic (South): Southern Gulf of St. Lawrence (4T), Canada (1971–2018): abundance (mature individuals), trawl; Scotian Shelf and Bay of Fundy (4VWX), Canada (1970–2017): abundance (mature individuals), trawl; Georges Banks, Canada/Gulf of Maine, USA (5Z) (1970–2017): abundance (mature individuals), trawl; Northeastern (NOAA–NEFSC) USA (1970–2017): standardized CPUE, kg/tow (Fall and Spring season), trawl.

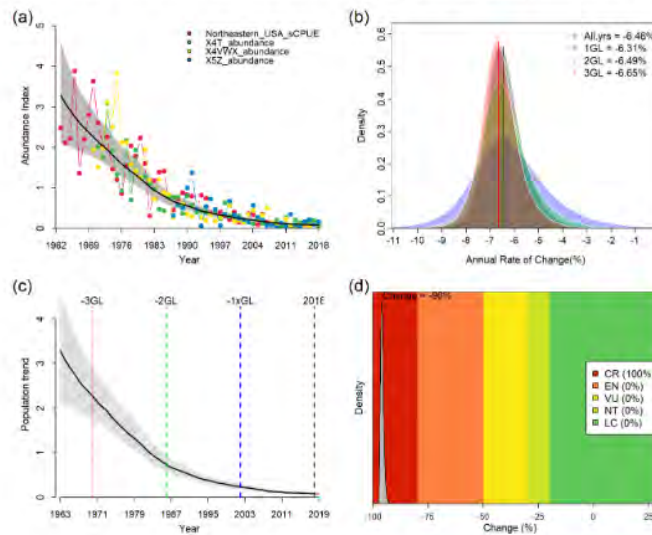


Figure 1. JARA results for *Amblyraja radiata* in the 4T, 4VWX (Canada), 5Z (Canada/USA), NOAA–NEFSC (USA) showing (a) the JARA fit to the observed time-series, (b) the posterior probability for the percentage annual population change calculated from all the observed data (in grey) and from the last 1 generation length of data (in blue), 2 generation length of data (in green), and 3 generation length of data (in red) with the mean (solid lines) shown relative to a stable population (% change = 0, black dashed line), (c) the observed (black line) and predicted (red line) population trajectory over three generations (48 years, dashed grey lines), and (d) the median decline over three generation lengths (dashed line) and corresponding probabilities for rates of population decline falling within the IUCN Red List category.

Figure 3. Thorny Skate status in the Northwest Atlantic (South) (IUCN Redlist Kulka et al., 2020)

Source: NEFMC (2022).

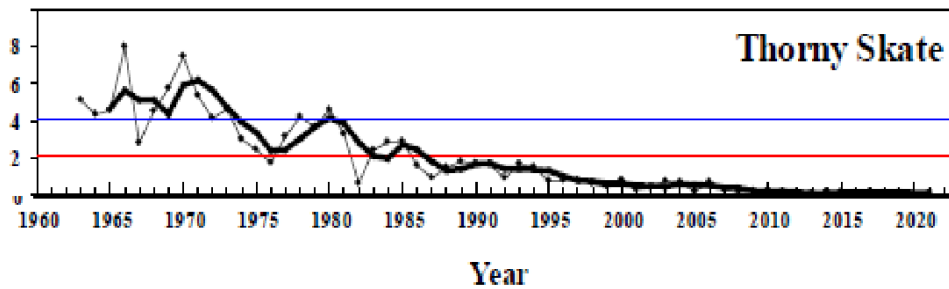


Figure 4. Thorny Skate biomass (kg/tow) from the NEFSC Bottom Trawl (NEFMC, 2022)

III. New York Rarity *(provide map, numbers, and percent of state occupied)*

Thorny skates are most abundant in the Gulf of Maine and the Georges Bank with very few fish caught in inshore Mid-Atlantic regions (NOAA 2009).

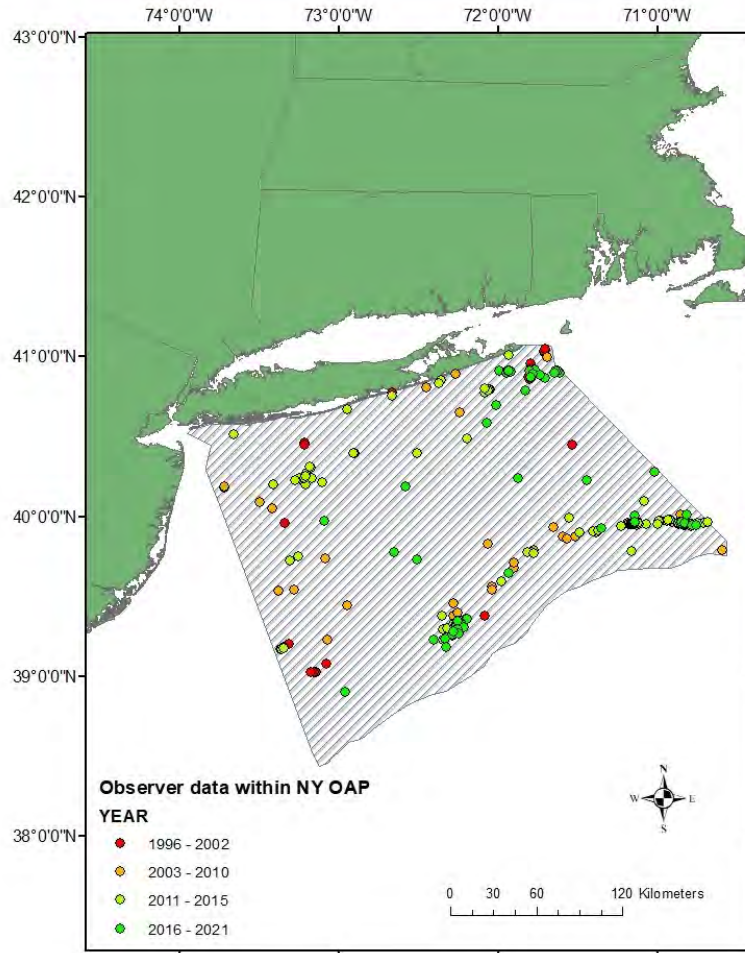


Figure 5: Records of Thorny Skate in New York from the NOAA observer program

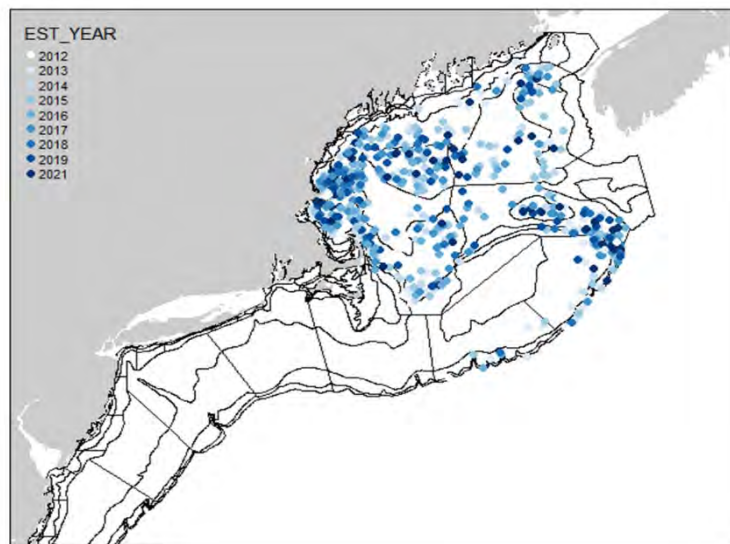


Figure 6. Records of Thorny Skate in the NEFSC bottom trawl survey. Low catch efficiency may contribute to the lack of species detections in the New York Bight (Sosebee et al., 2016)

Details of historic and current occurrence:

Individuals were observed at depths of 786-896 meters off New York by Bigelow and Schroeder in 1953 and an isolated specimen was found off Long Island at 59 meters offshore (Packer et al. 2003). Thorny skate are encountered in the NY Bight in the NOAA observer program. In recent years, they have not been encountered in the NEFSC bottom trawl survey.

New York’s Contribution to Species North American Range:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Peripheral	

Column options

Percent of North American Range in NY: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item

Classification of NY Range: Core; Peripheral; Disjunct; (blank) or Choose an item

IV. Primary Habitat or Community Type (from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):

- a. Marine, Deep Subtidal
- b. Marine, Deep Subtidal, Benthic Geomorphology, Benthic Flat

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/Community Trend	Time frame of Decline/Increase
No	No	Stable	

Column options

Habitat Specialist and Indicator Species: Yes; No; Unknown; (blank) or Choose an item

Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

Thorny skate are found over a variety of bottom substrates including sand, mud, gravel, broken shell and pebbles (Kulka et al. 2009). This species is demersal and are usually found at 25 to 440m depths. They occur in nearshore regions up to 1,400m depths and occupy continental and insular shelves (Kulka et al. 2020). It occurs in water temperature ranging from -1.3°C to 14°C, with highest concentrations between 2.5°C and 5°C (Packer et al. 2003). Skates generally don’t undergo large-scale migrations, but they do move seasonally in response to changing water temperatures, moving offshore in summer and early autumn and returning inshore during winter and spring. The thorny skate is an opportunistic feeder on the most abundant and available prey species including crustaceans, squids, bony fishes, and polychaetae worms (Kulka et al. 2009).

V. Species Demographics and Life History

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/Catadromous?
Yes	-	-	Yes	Yes	-

Column options

First 5 fields: Yes; No; Unknown; (blank) or Choose an item

Anadromous/Catadromous: Anadromous; Catadromous; (blank) or Choose an item

Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Thorny skate are oviparous and reproduce year round, although the highest percentage of mature females producing capsules is during the summer (NOAA 2009). In low temperature environments of northern latitudes, females may deposit 10-20 egg capsules a year, each containing one fertilized egg (Packer et al. 2003). Gestation under laboratory conditions lasted 2 to 2.5 years, while in low temperature environments development averages 2.5 to 3 years (NOAA 2009). Females reach maturity at 38.4 to 87.3 cm (TL) and produce 10 to 45 egg cases per year. Out of these egg cases, only 38% hatch. Males reach maturity at 44 to 83 cm (TL) and thorny skates hatch at a size of 10.4 to 11.4 cm (TL) (Kulka et al. 2020).

The maximum size of individuals varies geographically over the species range; a longitudinally increasing trend in size at sexual maturity is observed as this species moves south from Labrador (Kulka et al. 2009). In the Northwest Atlantic, thorny skates reach 111cm total length (TL), while in the North Sea they reach a maximum size of 66cm (TL). In the North Sea, thorny skates mature at 5.6 years while the Northwest Atlantic thorny skates mature at 11 years. Generation length is 10.6 years in the North Sea and 16 years in the Northwest Atlantic (Kulka et al. 2020). The most common source of mortality is fishing, although predation of egg capsules also occurs.

VI.Threats (from NY 2015 SWAP or newly described)

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent	Severity	Immediacy	Trend	Certainty
5. Biological Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.2 Commercial fishing (bycatch)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
5. Biological Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.3 Poaching/persecution of aquatic species	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.1 Habitat Shifting & Alteration	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 1. Threats to thorny skate.

The most significant threat to thorny skate is fishing, primarily from commercial ground fishing and scallop dredging operations. The thorny skate is frequently taken as by-catch and discarded; recreational and foreign landings are considered insignificant (NOAA 2009). Although this species is not preferred for use in the skate wing fishery, its distribution overlaps with the most significant portion of the skate wing and bait fisheries. Thorny skate embryos suffer from substantial predation and are eaten by halibut, goosefish, Greenland sharks, and predatory gastropods while adults may be eaten by seals, sharks and halibut (NOAA 2009). Competition for prey resources may exist between thorny and smooth skate, although studies indicate this may be a limited threat as thorny skate are more widespread with a generalist diet (NOAA 2009). The species has experienced range constriction consistent with climate change. As a cold water species, climate change is a growing threat to the species sub nationally. The NEFMC also considered the growing gray seal population as a potential threat.

Are there regulatory mechanisms that protect the species or its habitat in New York?

Yes:

No:

Unknown:

If yes, describe mechanism and whether adequate to protect species/habitat:

The Skate Complex Fishery Management Plan (FMP) was implemented in 2003 and applies to federal waters from Maine to Cape Hatteras, North Carolina. The FMP includes reporting requirements by individual species, prohibition on overfished species such as the thorny skate, and trip limits for the skate wing fishery. The North Atlantic Fisheries Organization (NAFO) set the world’s first international quota in 2005 by establishing a total allowable catch (TAC) limit for skates (primarily for the thorny skate).

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Species-specific fishery independent data is needed to better understand the status of thorny skate in New York. Compliance with the requirements of the FMP and implementation of new rules and regulations consistent with those developed by the NMFS would support the recovery of this species throughout its range. The NEFMC published an update on the Thorny Skate rebuilding plan in 2023 stating that “Proposed approaches to address thorny skate rebuilding include continued possession prohibition, gear-modifications or time-area closures targeted to the gear type and/or areas where thorny skate are most encountered, and revisiting the thorny skate rebuilding plan” (NEFMC, 2023). Climate change and range constriction to cooler and/or deeper waters is a threat at the subnational and national level.

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.3.1.5 Modify visiting periods	Time-area closures to reduce bycatch

Action Category	Action	Description
C.7 Legislative and Regulatory Framework or Tools	C.7.1.2.1 Federal legislation	Gear-modification
C.7 Legislative and Regulatory Framework or Tools	C.7.2.2.0 Create or amend best practices or guidelines	Continued possession prohibition

Table 2. Recommended conservation actions for thorny skate.

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