

Species Status Assessment

Common Name: Barndoor skate

Date Updated: 11/14/2023

Scientific Name: *Dipturus laevis*

Updated by: Meaghan McCormack

Class: Chondrichthyes

Family: Rajidae

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

The barndoor skate is a marine cartilaginous fish that occurs on continental shelf habitat from the Grand Banks region off the coast of Newfoundland, Canada to Cape Hatteras, North Carolina. They are most common in Georges Bank, the Gulf of Maine and Southern New England (Kulka et al., 2020). It is the largest member of the Rajidae family residing in the Northwest Atlantic, occurring off the coast of New York from the shoreline to depths over 1000m, with highest concentrations from 61-140m (Cavanagh and Damon-Randall 2009). As a benthic fish, it prefers sand or gravel substrates in shallow waters and soft mud in deeper waters. Skates migrate seasonally in response to temperature changes, occurring in shallower water in the spring and autumn (Bigelow and Schroeder 1953). Its status as Special Concern in New York has largely been due to historical overfishing and continued issues with bycatch. The species experienced severe declines in the 1960s and remained a low biomass until the 2000s when the species began to rebound (Kulka et al., 2020). Possession of barndoor skate was prohibited between 2003 and 2017, which allowed the population to recover. In 2016, barndoor skates were considered rebuilt. As of 2018, barndoor skate is no longer over-fished and some harvest is permitted (NEFMC, 2022)

I. Status

a. Current legal protected Status

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

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G4G5

ii. **New York:** S3 **Tracked by NYNHP?:** No

Other Ranks:

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

-IUCN Red List: Least Concern (global); northeast US (least concern)

-Northeast Regional SGCN: SGCN

Status Discussion:

The species experienced severe declines in the 1960s and at one point was listed as a species of concern with NOAA fish and remained a low biomass until the 2000s when the species began to rebound (Kulka et al., 2020). Possession of barndoor skate was prohibited between 2003 and 2018. As of 2018, barndoor skate is no longer overfished, the stock is considered rebuilt, and some harvest is permitted. The most recent IUCN assessment in 2019 lists Barndoor skates as least concern in Northeast US (Kulka et al., 2020).

II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|-----------------|----------|------------|--------------|---------------|----------------|-------|
| North America | Yes | Increasing | Increasing | Last 20 years | | - |
| Northeastern US | Yes | Increasing | Stable | Last 20 years | | Yes |
| New York | Yes | Increasing | Increasing | Last 20 years | | Yes |
| Connecticut | Yes | Increasing | Stable | Last 20 years | Not listed | No |
| Massachusetts | Yes | Increasing | Stable | Last 20 years | Not listed | No |
| New Jersey | No data | Unknown | Unknown | | Not listed | No |
| Pennsylvania | No | - | - | | | - |
| Vermont | No | - | - | | | - |
| Ontario | No | - | - | | | - |
| Quebec | Yes | Increasing | Increasing | Last 20 years | Not listed | No |

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, which encounter barndoor skates in the New York Bight. In recent years, barndoor skates have also been sampled in the NYSDEC/SOMAS Nearshore trawl survey.

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

Although barndoor skate survey data showed a drastic decline from its peak values in the 1950s and 1960s to several zero indices throughout the 1970s and 1980s, numbers have been on a consistent rise since the 2000s. The 2019 and 2021 average NEFSC fall survey biomass index was 1.52 kg/tow, which above the biomass threshold reference point (0.78 kg/tow). The 2019 and 2021 average biomass index is below the BMSY proxy (1.57 kg/tow) (NEFMC, 2022).

Distribution Map

Dipturus laevis



Legend
■ EXTANT (RESIDENT)

Compiled by:
IUCN SSC Shark Specialist Group 2020



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or approval by IUCN.

Figure 1. Barndoor skate range and status (IUCN Redlist; Kulka et al., 2020)

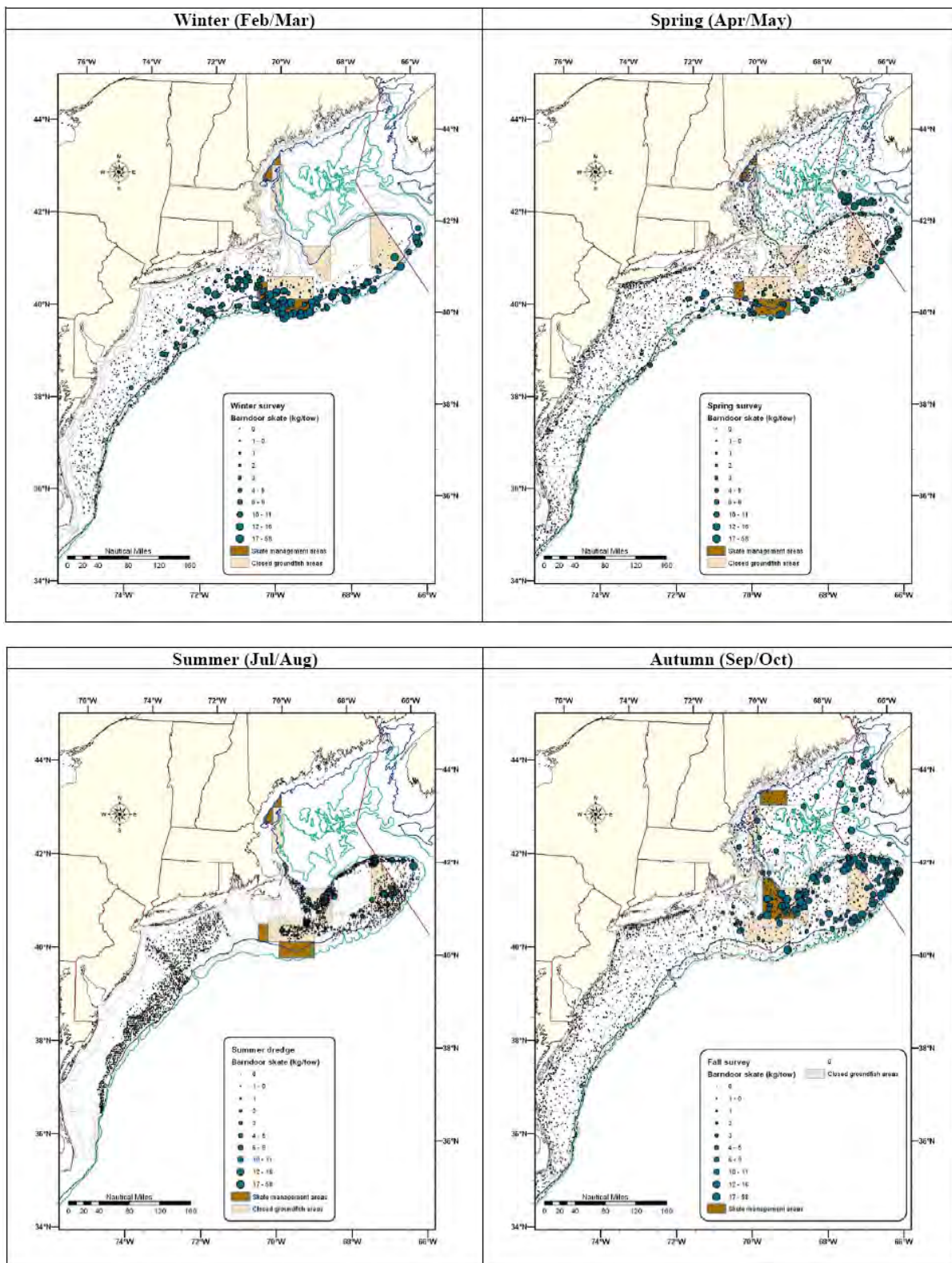


Figure 2. Barndoor skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys (NEFMC 2009).

Northeastern USA: Standardized CPUE (1970-2017), NOAA-NEFSC (USA), Survey kg/tow (Fall season).

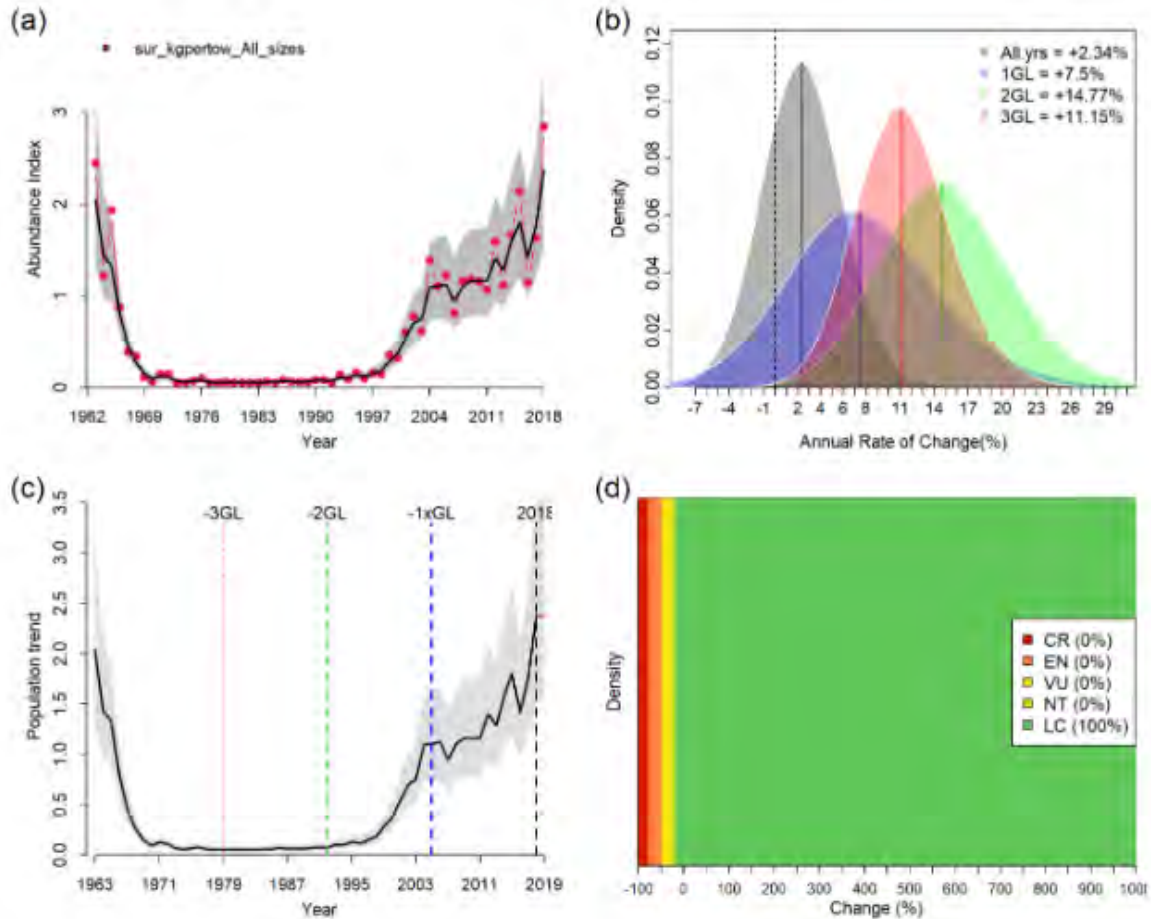


Figure 3. JARA results for *Dipturus laevis* in the NOAA-NEFSC (USA) showing (a) the JARA fit to the observed time-series, (b) the posterior probability for the percentage annual population change calculated from all the observed data (in grey), from the last 1 generation length of data (in blue), from the last 2 generation length of data (in green), from the last 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 (39 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. Barndoor skate Northeast U.S. trends (NatureServe; Kulka et al, 2020)

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

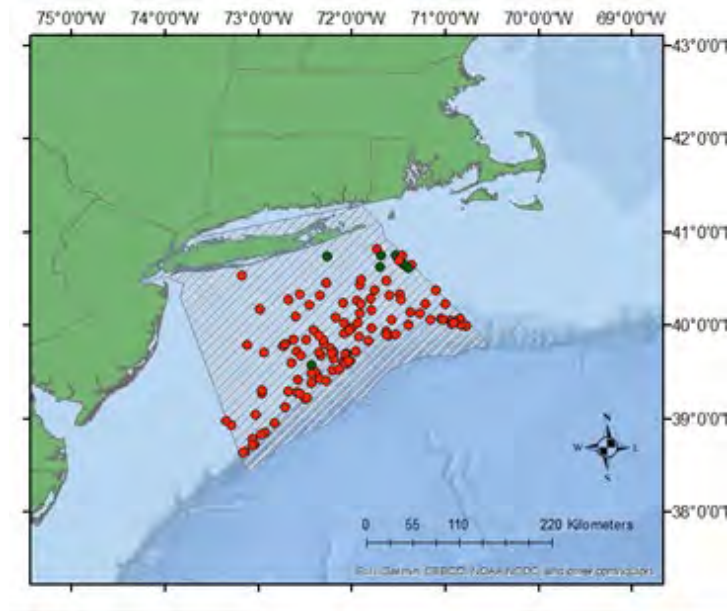


Figure 4. Records of barndoor skate in the New York Bight from the NEFSC bottom trawl survey and NYS DEC/SOMAS Nearshore Survey (spring = red and green = fall).

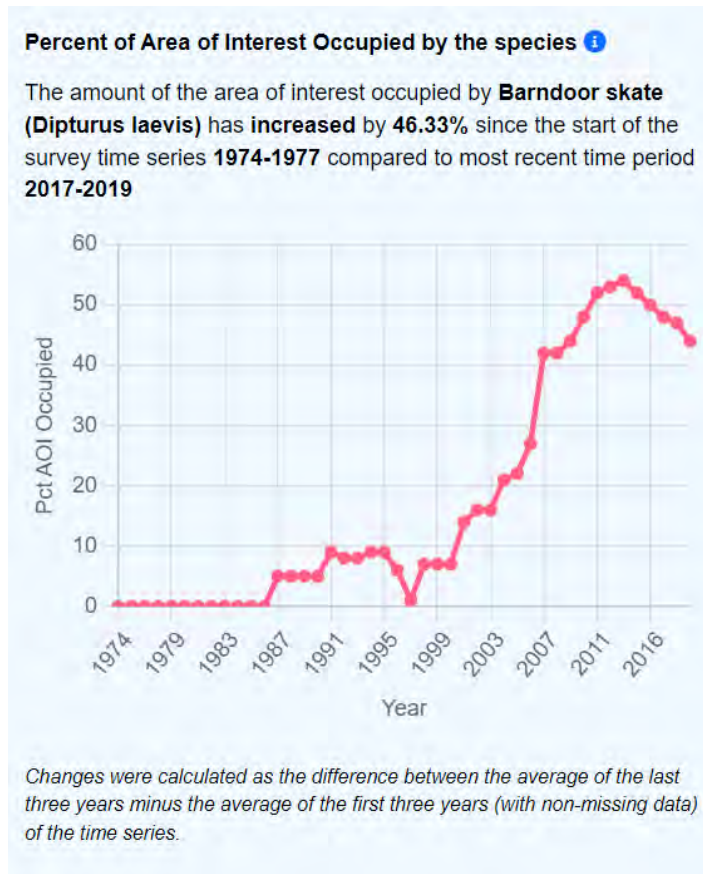


Figure 5. Barndoor Skate: Percent Area Occupied within the NY Bight based on NEFSC data (source: <https://apps-st.fisheries.noaa.gov/dismap/DisMAP.html>)

Details of historic and current occurrence:

After analyzing trawl catch rates between August 1943 and October 1944, Bigelow and Schroeder (1953) estimated 120 barndoor skate individuals per 1800m² in the eastern end of Long Island Sound. Off southern New England, 44 mid-winter hauls in 86 to 123m depth and 63 hauls in May at 40 to 430m depth yielded 441 barndoor skates from a total of 748 skates of all skate species (Cavanagh and Damon-Randall 2009). The areas of highest concentrations were Georges Bank, Gulf of Maine, the central Scotian Shelf and Southern New England. Individuals have been caught off the southern shore of Long Island in NEFSC trawl surveys as recently as 222, most commonly during spring months.

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 Shallow Subtidal
- c. 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:

Barndoor skates occur near the shoreline in winter and spring and migrate out to the continental shelf during summer and autumn. They are found on mud bottoms as well as on sand and gravel occurring from the shoreline to about 740m in the marine deep subtidal zone, although they are most abundant at depths less than 150m (Bigelow and Schroeder 2002, Packer et al. 2003). Their wide depth distribution may be because they are able to live in a wide range of temperatures (McEachran and Musick 1975, Scott and Scott 1988).

V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/Catadromous? |
|----------------|--------------------|-----------------|------------------|------------------|-------------------------|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

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):

There has been some debate on the life history characteristics of the barndoor skate, with older estimates of age to maturity at 11-12 years and newer numbers suggesting 7 years (Gedamke et al. 2005). They are relatively large skates, with some specimens in the Gulf of Maine measuring up to 180 cm TL (Bigelow and Schroeder, 1953). Maximum egg production averages at 47 eggs/yr, while some studies suggest numbers up to 115 eggs/yr (Cavanagh et al. 2009, Packer et al. 2007). Females are oviparous and lay heavily armored eggs in sandy or muddy flats at 27 to 46m depths, with hatching occurring after about 1 year (Packer et al. 2007). Highest egg deposition occurs in the fall (10 to 12 eggs per month) and hatching rates are relatively high at 73% (Cavanagh et al. 2009). Barndoor skates are a long lived species, with an average life span of approximately 50 years (Cavanagh et al. 2009). Due to the broad temperature range of barndoor skates (about 1 to 20°C) and wide salinity tolerance (21 to 60 ppt), they have the ability to disperse and colonize new waters. Due to its slow growth, late maturity, and large size, barndoor skates are highly vulnerable to overfishing and often included in bycatch.

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

Barndoor skates were primarily harvested for use as lobster bait and sold in the skate wing export market for human consumption. Between 2003 and 2017, possession and landing of barndoor skate was prohibited and it is assumed that more vessels land skate wings as an incidental catch in mixed fisheries than as a target species (Cavanagh and Damon-Randall 2009; Kulka et al., 2020). The discard mortality rate of barndoor skate captured by commercial fishing gear is one of the biggest unknown factors in skate population dynamics. A common concern for marine populations is the effect of changing ocean conditions as a result of climate change, but because of their k-selected nature, barndoor skates may be more resilient to such changes in the environment. Despite being a cold water species, they have not shifted in range as expected (https://www.st.nmfs.noaa.gov/Assets/ecosystems/climate/images/species-results/pdfs/Barndoor_Skate.pdf). Mobile fishing gear may have a negative impact on the bottom habitat of the barndoor skate, but there is no current evidence that bottom trawling is impacting skate populations. Since 2018, some possession of barndoor skates has been allowed.

| 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 (harvest and 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 barndoor skate.

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 Fisheries Management Plan (implemented 9/18/2003 by New England Fishery Management Council) developed management measures to end overfishing and rebuild these resources in accordance with the Magnuson-Stevens Fishery Conservation and Management Act. Management measures apply to vessels fishing within the Skate Management Unit, which covers federal waters from 35° 15.3'N latitude, starting at Cape Hatteras, northward to the US-Canadian border, and extending eastward from shore to the outer boundary of the Exclusive Economic Zone. Management measures included a requirement to report skate landings by individual species and skate discard by general categories (large/small), and a prohibition on possession, retention, or landing of barndoor skate. The plan also includes a rebuilding program for overfished skate species, essential fish habitat designations, and a baseline of management measures in other fisheries that benefit skates (Cavanagh and Damon-Randall 2009). As of 2016, barndoor skate stocks were considered rebuilt and some possession has been allowed since 2018. There is now some possession allowed (e.g., 25% of overall skate catch is permitted on directed wing fishery trips only).

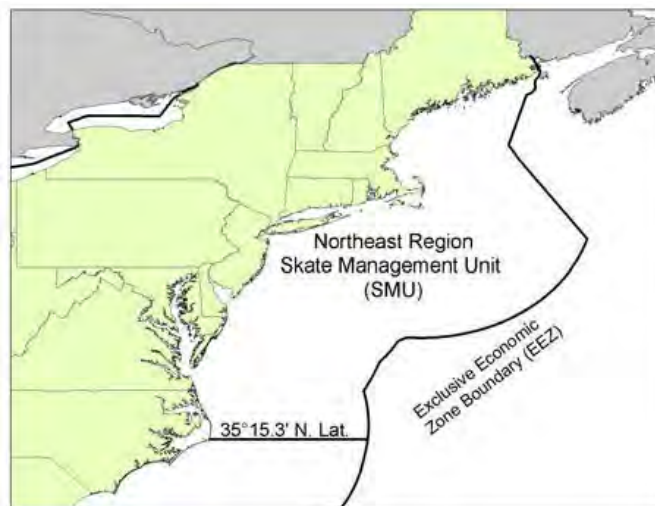


Figure 6. Map of Northeast Region Skate Management Unit (NOAA National Marine Fisheries Service)

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

Support the Skate Fisheries Management Plan and continue to implement restrictions on landings of barndoor skate.

| Action Category | Action | Description |
|-------------------------------------|---------------------------------------|---|
| A.2 Direct Species Management | A.2.1.0.0 Stewarding wild individuals | Continue management of the fishery through the FMP |
| B.4 Law Enforcement and Prosecution | B.4.0.0.0 Detection and intervention | Enforce regulations, and reduce bycatch and illegal fishing |

Table 2. Recommended conservation actions for barndoor skate

VII. References

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