Species Status Assessment

Class: Actinopterygii
Family: Pleuronectidae
Scientific Name: *Pseudopleuronectes americanus*
Common Name: Winter flounder

Species synopsis:

The winter flounder is a demersal flatfish commonly found in North Atlantic Ocean estuaries and on the continental shelf. Winter flounder occur from the Gulf of St. Lawrence, Canada to North Carolina, although they are not abundant south of Delaware Bay. This species is one of the most abundant components of demersal fish in the Long Island Sound and Hudson-Raritan estuary and it is an important commercial and recreational fish throughout its range. Some adults move offshore to cooler, deeper waters during the spring and summer, returning in autumn prior to spawning. Since peak landing levels in 1966, winter flounder landings have experienced peaks and dips, with an overall decline to currently low levels. Threats to essential habitat and overfishing have been two of the major causes of decline of winter flounder, with dredging, pollution, nutrient enrichment, and impingement also contributing to mortality rates. Despite very low current fishing mortality, winter flounder populations around New York have not show any signs of recovery. Winter flounder are also essential prey for osprey in New York, and continued declines of flounder populations may lead to declines in osprey populations (NYSDEC 2005). The New York population is part of the southern New England/Mid-Atlantic (SNE/MA) stock unit managed by the Atlantic States Marine Fisheries Commission (ASMFC) in state waters.

I. Status

a. Current and Legal Protected Status

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

ii. New York Not listed; SGCN

b. Natural Heritage Program Rank

i. Global G5

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

Other Rank:
NY Natural Heritage Program - Watch List

Status Discussion:
Winter flounder stocks were most recently assessed at the 52nd Northeast Regional Stock Assessment Workshop in 2011, where the Stock Assessment Review Committee determined that the Southern New England/Mid-Atlantic (SNE/MA) winter flounder stock has a status of overfished and overfishing is not occurring, while the Gulf of Maine overfished status is not known and overfishing is not occurring (NEFSC 2011). The Georges Bank stock is no longer considered overfished and overfishing is not occurring (ASMFC 2012). The SNE/MA spawning stock biomass was estimated to be 15.6 million pounds in 2010, about 16% of the target 96.3 million pounds (see Figure 3; NESFC 2011).

II. Abundance and Distribution Trends

a. North America

i. Abundance

__X__ declining ____increasing _____stable ____unknown

ii. Distribution:

__X__ declining ____increasing _____stable ____unknown

Time frame considered: _____1980-present_____

b. Regional

i. Abundance

__X__ declining ____increasing ____stable _____unknown

ii. Distribution:

__X__ declining ____increasing ____stable _____unknown

Regional Unit Considered: __Severe abundance decline of SNE/MA stock
Time Frame Considered: _____1980 – present_____

c. Adjacent States and Provinces

CONNECTICUT **Not Present _____** **No data _____**

i. Abundance

__X__ declining ____ increasing ____ stable ____unknown

ii. Distribution:

__X__ declining ____ increasing ____ stable ____unknown

Time frame considered: Severe abundance decline from 1988-present
Listing Status: Not Listed SGCN? Yes

MASSACHUSETTS **Not Present _____** **No data _____**

i. Abundance

__X__ declining ____ increasing ____ stable ____unknown

ii. Distribution:

__X__ declining ____ increasing ____ stable ____unknown

Time frame considered: 1980-present
Listing Status: Not Listed SGCN? No

NEW JERSEY **Not Present _____** **No data _____**

i. Abundance

__X__ declining ____ increasing ____ stable ____unknown

ii. Distribution:

__X__ declining ____ increasing ____ stable ____unknown

Time frame considered: 1980-present
Listing Status: Not Listed SGCN? No

ONTARIO **Not Present __X____** **No data _____**

PENNSYLVANIA **Not Present __X____** **No data _____**

VERMONT **Not Present __X____** **No data _____**

QUEBEC **Not Present _____** **No data _____**

i. Abundance

__X__ declining ____increasing _____stable ____unknown

ii. Distribution:

____ declining ____increasing _____stable __X__ unknown

Time frame considered: _____**1960-present**_____

Listing Status: _____**Not Listed**_____

d. **NEW YORK** **No data _____**

i. Abundance

__X__ declining ____ increasing ____ stable _____ unknown

ii. Distribution:

__X__ declining ____ increasing ____ stable _____ unknown

Time frame considered: Severe decline in abundance from 1966-present

Monitoring in New York.

Commercial and recreational landings are recorded for the Southern New England/Mid-Atlantic stocks to monitor catches. Winter flounder are frequently caught in the Long Island Sound Trawl Surveys run by the CT DEEP Marine Fisheries Division. The Northeast Fisheries Science Center (NEFSC) has conducted bottom trawl surveys since 1963, deriving distribution and abundance data of on a variety of marine species, including the winter flounder throughout its range. The NYSDEC has conducted a small mesh trawl survey targeting juvenile finfish since 1985, running from May through October in the Peconic Bay. The NYSDEC also gathers data on young-of-the-year and juvenile fish as part of its Western Long Island Beach Seine Survey. This survey runs from May through October and has been conducted since 1985.

Trends Discussion:

Declines in winter flounder stock have impaired fisheries in New York, where commercial catch is less than 9% of peak levels observed during the 1980s and recreational catch is less than 2% of peak levels (Sagarese and Frisk 2011). Spawning stock biomass peaked at 44.3 million pounds in 1982, declining to a low of 9.9 million pounds in 2005. After Amendment I to the ASMFC FMP, spawning stock biomass has increased to nearly 15.6 million lbs. in 2010 (NEFSC 2011).

Within the southern New England/Mid-Atlantic stock of winter flounder, commercial landings have declined from 1964-2011 with periodic peaks and dips (see fig. 4). After reaching a historical peak in 1966 of 26.4 million lbs., harvest levels have fallen to the lowest ever in 2010 with 383,604 lbs. (NEFSC 2011). These low landings may be due to the federal waters retention prohibition, which requires that catch be released, and the limit of 50 lbs. of bycatch within state waters. The commercial fishery accounts for about 90% of total harvest through this region.

Recreational landings peaked in 1984 with 12.1 million lbs. and have declined to an all time low in 2010 with 61,729 lbs. By 2010, landings fell to a historic low of 62,000 lbs., likely due to the federal retention prohibition and 2-fish bag limit for recreational fishing in state waters (see fig. 4; ASMFC 2012).

The NYSDEC's small mesh trawl survey caught a total of 659 winter flounder in June and July of 2011, an increase from the survey's low in 2002 of 83 individuals, but still much lower than the survey maximum (25,782) in 1992 (NEFSC 2011).

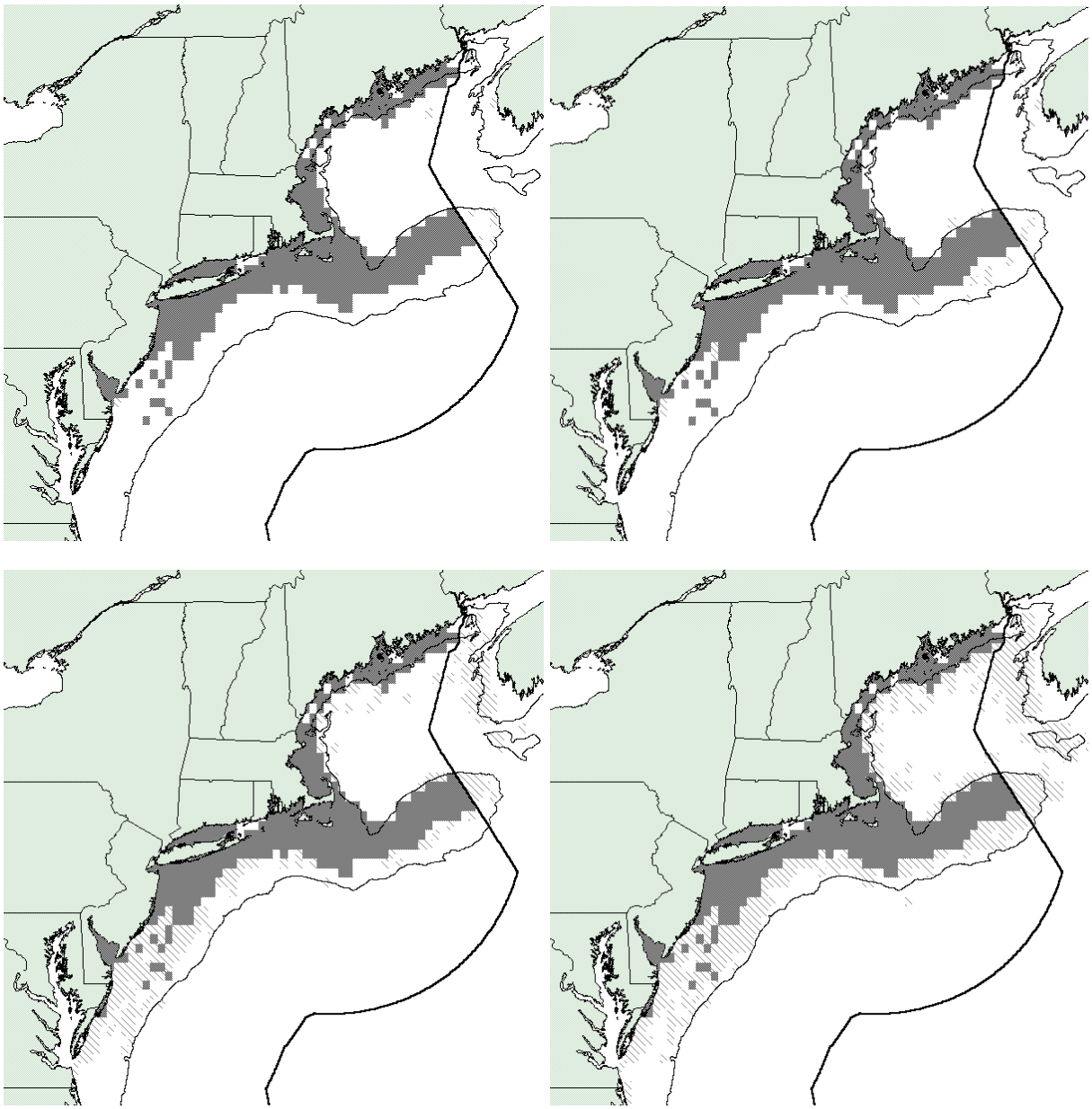

Figure 1. Essential fish habitat for the winter flounder (top left: eggs, top right: larvae, bottom left: juveniles, bottom right: adults) designated by the New England Fishery Management Council (Pereira et al. 1999).

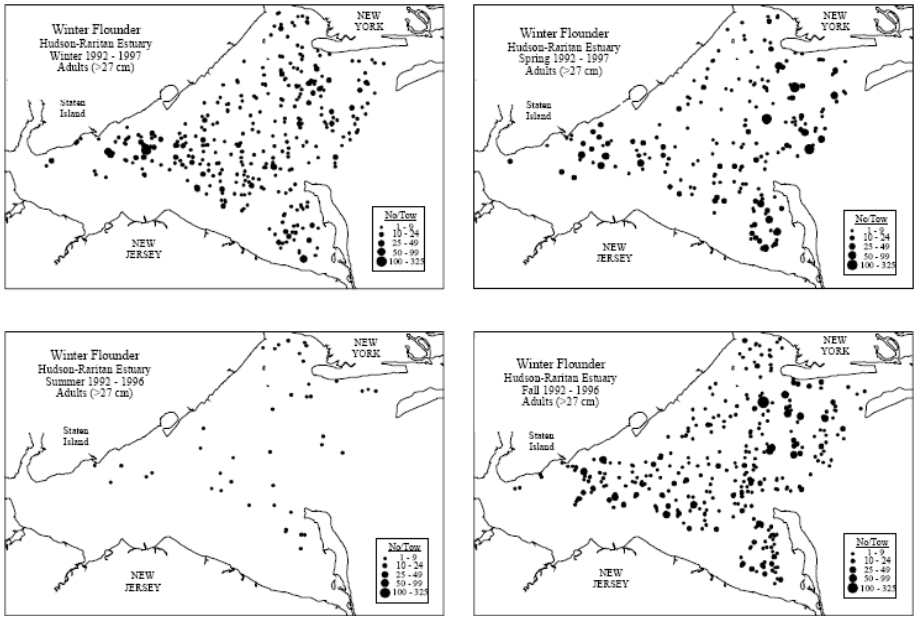

Figure 2. Distribution and abundance of adult winter flounder collected in the Hudson-Raritan estuary, based on Hudson-Raritan trawl surveys during winter (January-March), spring (April and June), summer (July-August) and fall (October-December) from January 1992 to June 1997 (Pereira et al. 1999).

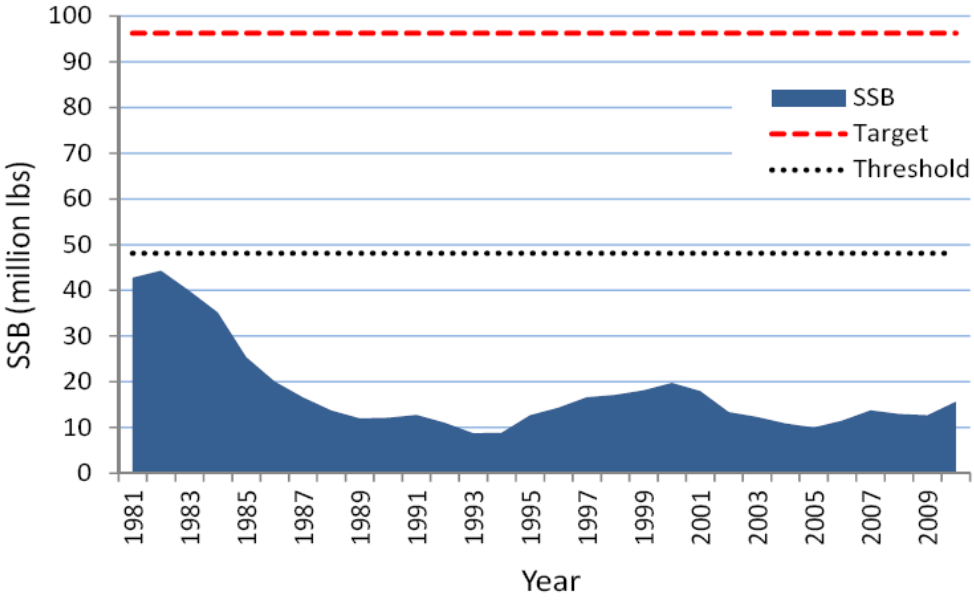

Figure 3. Southern New England/Mid-Atlantic winter flounder spawning stock biomass (SSB) and biological reference points (NEFSC 2011).

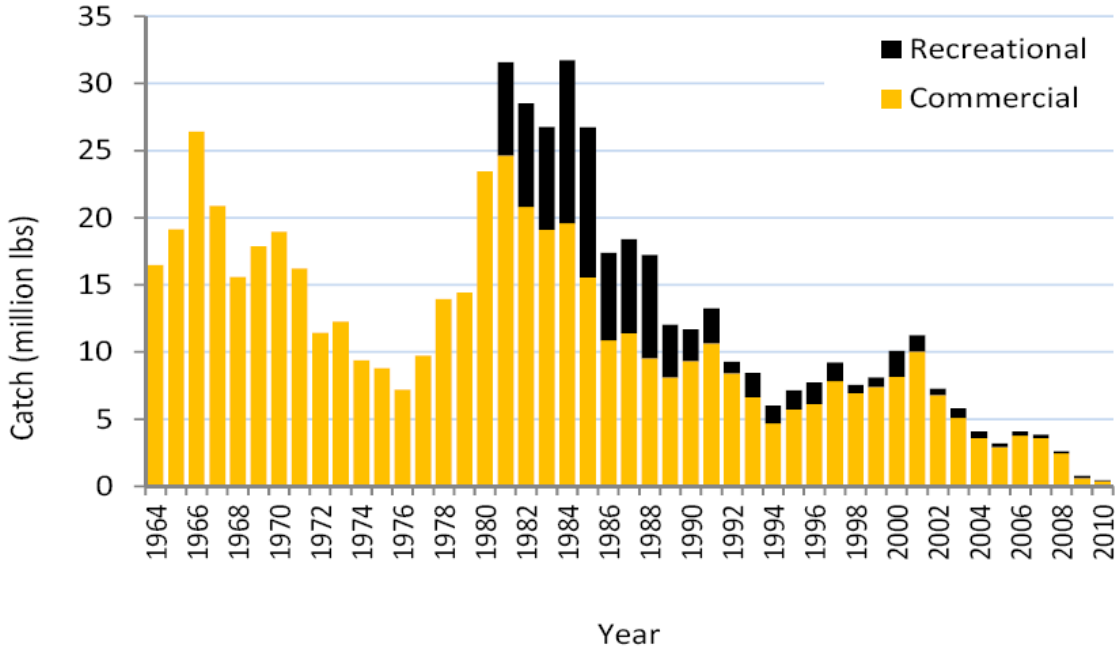

Figure 4. Commercial and recreational landings for Southern New England/Mid-Atlantic winter flounder (SAW52 2011).

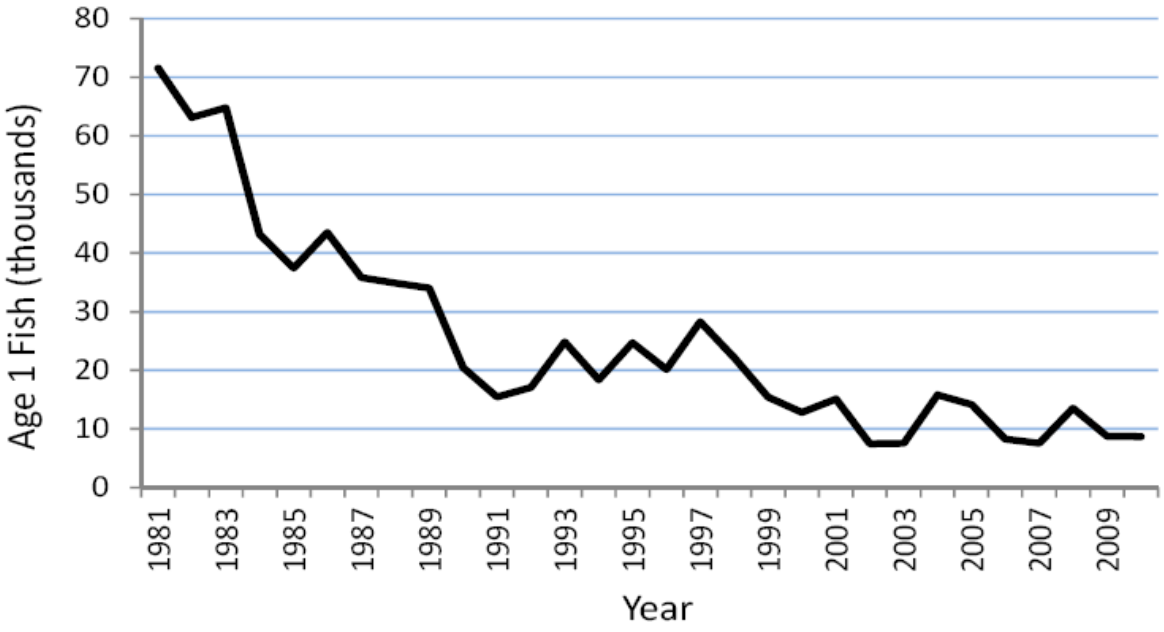

Figure 5. Southern New England/Mid-Atlantic winter flounder recruitment (NEFSC 2011).

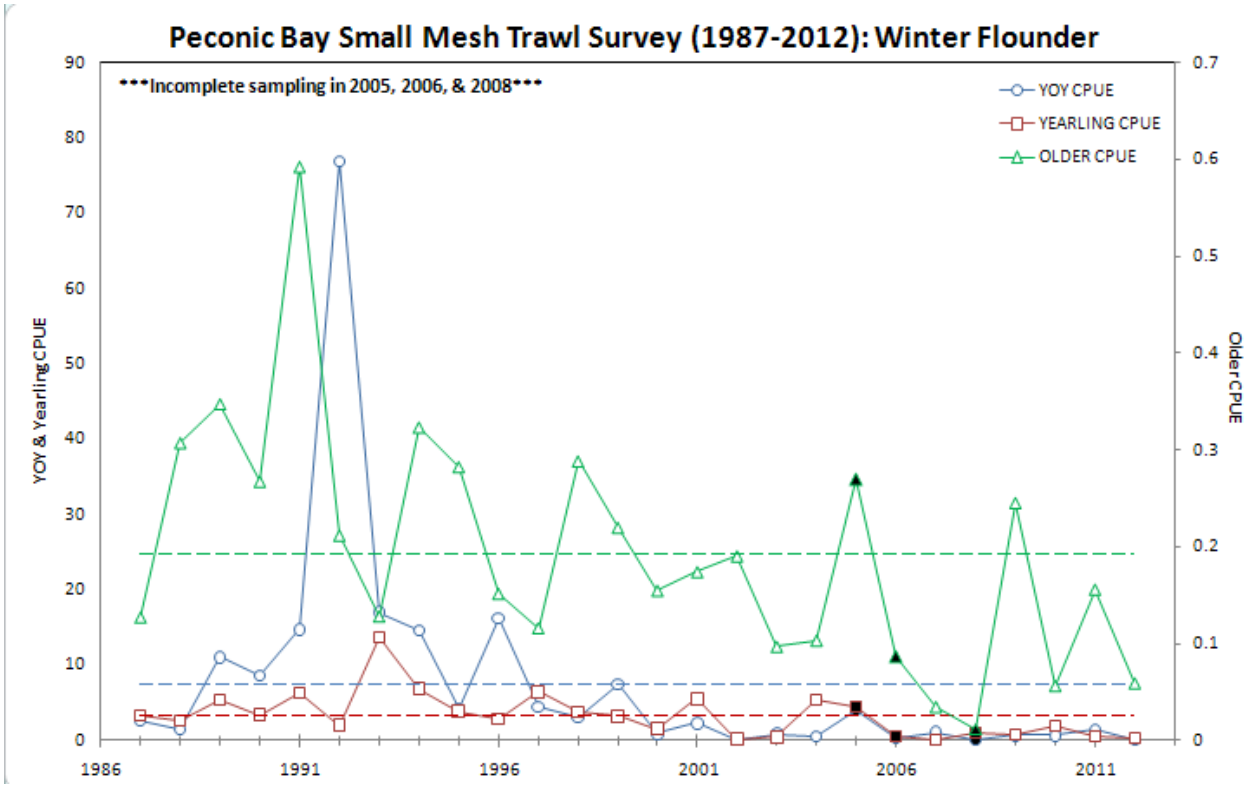

Figure 6. Catch-per-unit-effort (CPUE) for young-of-the-year (YOY), yearling, and older winter flounder in the Peconic Bay. Data from the NYSDEC's Peconic Bay Small Mesh Trawl Survey (NYSDEC 2012).

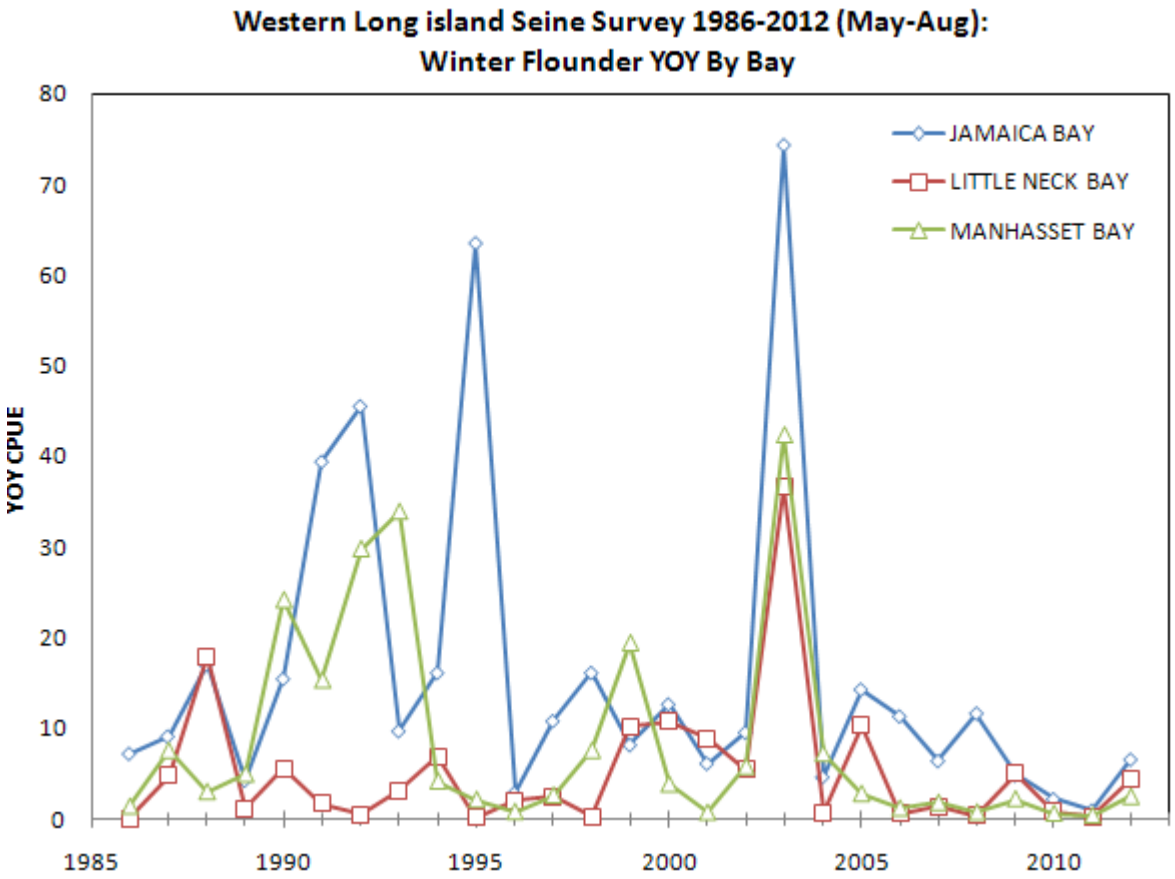

Figure 7. Catch-per-unit-effort (CPUE) for young-of-the-year (YOY) winter flounder in Jamaica Bay, Little Neck Bay, and Manhasset Bay. Data taken from NYSDEC's Western Long Island Seine Survey (NYSDEC 2012).

III. New York Rarity, if known:

Historic	# of Animals	# of Locations	% of State
prior to 1970	_____	**2**	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

Winter flounder have historically occurred throughout the Long Island Sound and Hudson-Raritan estuary.

Current	# of Animals	# of Locations	% of State
	_____	**2**	_____

Details of current occurrence:

Winter flounder still occur throughout the Long Island Sound and Hudson-Raritan estuary.

New York's Contribution to Species North American Range:

% of NA Range in New York	Classification of New York Range
____ 100 (endemic)	**__X__ Core**
____ 76-99	**____ Peripheral**
____ 51-75	**____ Disjunct**
____ 26-50	**Distance to core population:**
__X__ 1-25	_____

IV. Primary Habitat or Community Type:

1. Demersal
2. Estuarine, Brackish Deep Subtidal, Benthic Geomorphology
3. Estuarine, Brackish Shallow Subtidal, Benthic Geomorphology

4. Estuarine, Brackish Shallow Subtidal, Aquatic Bed

Habitat or Community Type Trend in New York:

__ Declining __X__ Stable ____ Increasing ____Unknown

Time frame of decline/increase: _____

Habitat Specialist? _____ Yes __X__ No

Indicator Species? _____ Yes __X__ No

Habitat Discussion:

Eggs require bottom habitats with a substrate of sand, mud or gravel in the inshore areas of southern New England. Temperatures must be less than 10˚C, salinities between 10-30%, and water depths less than 5 meters. Larvae require pelagic and bottom waters with depths less than 6 meters and surface temperatures less than 15˚C. Young-of-the-year (YOY) and juveniles both require bottom habitats and will occur where temperatures are below 28˚C at depths of 1 to 50 meters (Periera et al. 1999). While YOY and juveniles reside permanently in the estuaries, adults may leave the estuary in late spring/summer, migrating to deeper, cooler portions of estuaries or to offshore areas, returning in autumn prior to spawning. Vegetated habitat, such as submerged aquatic vegetation and macroalgal beds, also provide important nursery habitat for juveniles (ASMFC 2012).

In New York, two distinct behavioral groups have been identified: an inshore contingent that is present in coastal bays year-round, and an offshore contingent of larger individuals that travels inshore during winter to spawn (Sagarese and Frisk 2011). In contrast to the expectations in previous literature, Sagarese and Frisk (2011) documented adult winter flounder occurring in Shinnecock Bay, NY during all seasons, with 89% occurring between May and October when they should have been offshore in cooler water. Habitat degradation from dredging, pollution, runoff, nutrient enrichment, and construction of inshore structures has increased mortality rates of winter flounder.

New York Species Demographics and Life History:

__X__ Breeder in New York

__X__ Summer Resident

__X__ Winter Resident

_____ Anadromous

_____ Non-breeder in New York

_____ Summer Resident

_____ Winter Resident

_____ Catadromous

_____ Migratory only

_____Unknown

Species Demographics and Life History Discussion:

Winter flounder spawn from winter through spring, with peaks during February and March in northern latitudes. Major egg production in New England waters occurs before temperatures reach 3.3˚C with an upper limit of 4.4 to 5.6˚C. Average age at maturity is between 1.9 to 3 years for both males and females in the Long Island Sound. Maturity is most likely related to size, not age of the individual. Females produce from 435,000 to over 3.3 million eggs per year, spawning over a two-month period, with the majority of spawning events involving more than one male, which potentially maximizes fertilization success (Pereira et al. 1999). Eggs of the winter flounder clump together in masses on the bottom of inshore areas, hatching 15 to 18 days after being released. Five to six weeks after hatching, the planktonic larval flounder begin to undergo metamorphosis and become increasingly bottom-dwelling. Eight weeks after hatching, the larval fish have undergone complete metamorphosis and are in their demersal, right-eyed form. Larval, YOY, juvenile, and adult winter flounder are all a source of prey for a variety of organisms. Some of these predators include but are not limited to: the small medusa *Sarsia tubulosa*, young bluefish, windowpane and summer flounders, striped bass, sea robins, and a variety of birds (Pereira et al. 1999). The life span of a winter flounder is estimated at 15 to 20 years. In general, winter flounder are opportunistic feeders, usually feeding on the most abundant and available prey source (Carlson et al. 1997).

V. Threats:

Habitat alteration and degradation by dredging, point and non-point source runoff, toxic pollution, and construction of in-water and shoreline structures have negatively affected winter flounder populations in New York waters. Nutrient enrichment of estuaries from wastewater treatment plants, agricultural runoff, and atmospheric deposition have degraded critical estuarine habitat through the winter flounder's range. Suspended sediments from dredging, boating activities, and bottom-tending fishing gear also have the potential to negatively impact winter flounder. Impingement from power plants also contributes to mortality rates, mostly for eggs, larvae, and juveniles. Heimbuch et al. (2007) reported 9,101 impingements of winter flounder at one power plant (Charles Poletti Power Plant, Lawrence Point, NY) during 2002, resulting in 100% mortality. Chang et al. (1998) found that frequencies of certain diseases in winter flounder liver are strongly associated with contaminant levels in sediments of their habitats.

Warm winter temperatures can negatively impact recruitment of winter flounder, resulting in low reproductive rates (NEFSC 2011). Although direct effects of climate change on winter flounder have yet to be researched, changes in ocean temperatures and habitat shifting and alteration are likely to have negative effects on reproduction, behavior, and distribution (Harley et al. 2006). The effects of increasing concentrations of CO^2 and ocean acidification on winter flounder eggs and larva are also being studied in order to better understand the consequences of these environmental changes (Chambers et al. 2012)

Tagging studies on winter flounder have shown that these fish exhibit spawning-site fidelity, meaning that they often return to the same areas where they were hatched. Continued fishing pressure on these subpopulations could potentially cause localized depletion. Also, landings alone may not be representative of the actual loss to the population when spawning females are harvested, since they are the most productive part of the population (ASMFC 2009). Although it was typically thought that marine fish are not prone to inbreeding, O'Leary *et al.* (2012) found that in six different New York estuaries there was a remarkably low number of effective breeders over a one to year period. Decreased genetic diversity can potentially weaken a population and in the case of the already depleted winter flounder populations, this is a cause for concern.

There are several other threats to winter flounder in New York waters that have been or are currently being researched. The northern expansion of blue crabs has been shown to be an important source of mortality for YOY and small juvenile winter flounder (Collier et al. 2012). Increased predation from crabs and other predators, such as summer flounder, may be contributing to recruitment failure in New York waters (Hine et al. 2012). In heavily polluted areas in Jamaica Bay, NY, YOY flounder have been found with ovo-testes due to high concentrations of endocrine disrupters in the water. Subsequent studies demonstrated that this endocrine disrupter causes female biased sex ratios, an additional cause for concern for the species' population (McElroy et al. 2006)

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

_____ No ____ Unknown

__X__ Yes

Since 1992, management of the winter flounder fishery has been coordinated by the Atlantic States Marine Fisheries Commission (ASMFC) in state waters and the New England Fishery Management Council (NEFMC) in federal waters. Amendment 1 (2005) to the FMP completely replaces all previous management measures put for by the ASMFC to manage the inshore stocks (GOM, SNE/MA) of winter flounder. Since the implementation of Amendment 1, there has been the addition of two subsequent Addenda (I and II) in 2009 and 2012. The inshore FMP works with states from Maine to Delaware to, "promote stock rebuilding and management of the winter flounder fishery in a manner that is biologically, economically, socially and ecologically sound," with focus on, "rebuilding of the inshore and estuarine component of the winter flounder stock" (ASMFC 2005). The New York population is part of the southern New England/Mid-Atlantic (SNE/MA) stock unit, including the waters south of Cape Cod to the Delaware-Maryland border. The Georges Bank stock is managed by the NEFMC under Amendment 17 and Framework 47 to the Northeast Multispecies FMP, due to its offshore occurrence (ASMFC 2012a). In order to adequately protect and conserve the species, cooperative management between the states and federal waters is essential due to the migratory nature of the winter flounder (ASMFC 2012a).

New York's commercial regulations do not allow, at any time, for the use of gill or trammel nets while fishing for winter flounder. The regulations also include size limits (total length in inches) and trip limits (as measured in poundage). There are several open seasons for commercial winter flounder harvest, and each season is associated with its own permitted gear type (NYSDEC 2013a). Currently, recreational fishing for winter flounder in New York runs from April 1st to May 30th and the minimum size limit is 12 inches with a two fish daily possession limit (NYSDEC 2013b). The federal rule established by the NEFMC prohibits any taking of SNE/MA winter flounder from offshore waters (ASMFC 2012a).

As part of the Sustainable Fisheries Act (1996) reauthorization and amendment to the Magnuson-Stevens Fisheries Conservation and Management Act, it is the responsibility of the regional management councils to adequately protect essential fish habitat (EFH). EFH is defined as, "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity" (Pereira et al. 1999). Although this regulatory mechanism is not specific to winter flounder, the designation of spawning habitat for this species has resulted in the denial of dredging permits for inshore estuaries in the Mid-Atlantic and New England regions in winter and spring (Grotheus et al. 2006).

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

Habitat restoration and protection throughout the Hudson-Long Island basin are important for the winter flounder. Fisheries-independent surveys should be expanded. Collection of new and updated

data regarding the life history status and habitat use of this species would lead to a better understanding of life stage interactions relative to survival between life stages as well as importance of specific habitats for each life stage (NYSDEC 2005). Effects of temperature changes on flounder behavior, distribution, and reproduction should be studied to plan for changing ocean conditions. Continued protection and restoration of submerged aquatic vegetation beds is necessary to support juvenile flounder populations. Continued implementation of the ASMFC's and NEFMC's FMPs will help lead to the production of sustainable stocks of winter flounder.

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Date last revised: January 28, 2014