Species Status Assessment

Common Name: Bay scallop **Date Updated:** December 14, 2023

Scientific Name: *Argopecten irradians* **Updated by:** Debra Barnes

Class: Bivalvia

Family: Pectinidae

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

The bay scallop, Argopecten irradians, is a short-lived marine bivalve common along the eastern coast of the United States. Their distribution in North America ranges from Cape Cod, Massachusetts to Laguna Madre, Texas (Fay et al. 1983). Three subspecies exist along this range with the New England and mid-Atlantic, Argopecten irradians irradians overlapping in southern New Jersey with A.i. concentricus (Fay et al. 1983). Bay scallops can live in a variety of habitats but eelgrass beds appear to be preferential, providing shelter from predators and, due to reduced water velocity, an accumulation of particulate matter on which they can filter-feed (MacKenzie 2008b, Fay et al. 1983, Peterson et al. 1984). Although never as large as oyster and clam fisheries, historically, bay scallops did support a thriving fishery in Massachusetts, New York, and North Carolina (MacKenzie 2008a). However, due to mass eelgrass die-offs in the 1930s and 1980s (from wasting disease and brown tide, respectively), bay scallop abundance and subsequent harvest plummeted (MacKenzie 2008a). Bay scallop populations in New York, and other coastal areas, have yet to return to their historic levels and this is believed to be tied to low densities of spawning stock (resulting in low fertilization success) and loss of their optimal habitat, eelgrass beds (Tettlebach and Smith 2009, Fonseca and Uhrin 2009).

I. Status

a. Current legal protected Status

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

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G5

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

Other Ranks:

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

-IUCN Red List:

-Northeast Regional SGCN: Yes

Status Discussion:

Throughout the twentieth century bay scallops have witnessed precipitous declines coinciding with loss of eelgrass beds. Populations in New York and other coastal areas have been unable to return to historic levels. Bay scallops currently have no state or federal protection status. Additionally, they have received a secure global rank (G5) and have not been ranked by New York's Natural Heritage Program. After further brown tide blooms in 1986 and 1987, Peconic bay scallop populations were nearly extirpated (Tettelbach & Wenzel, 1993) and commercial landings declined to 1% of historical, pre-brown tide levels. In response to these mortality events, a large-

scale restoration program was developed using hatchery-reared scallops which brought the fishery back to landings of more than 100,000 lbs in 2017-2018. In summer of 2019, there was a catastrophic die-off of adult bay scallops and collapse of the fishery in Peconic Bays. Similar large-scale adult scallop die-offs were documented in the summers of 2020 through 2022. Scientists theorize that the mortality events are due to physiological stress during bay scallop spawning which was exacerbated by high summer water temperatures (mid-80s) and low dissolved oxygen, and further compounded by an outbreak of a coccidian parasite discovered for the first time in Peconic bay scallops. New York sent a letter to the US Commerce Secretary in December 2019 to request a federal fishery disaster declaration for the bay scallop fishery in the Peconic Estuary of eastern Long Island due to the catastrophic die-off of adult scallops and collapse of the fishery (NYS Letter 2019). The US Commerce Department declared a federal fishery disaster for the 2019-2020 bay scallop fishery in 2021 (US Commerce Secretary 2021). NOAA's NMFS notified NYS by letter in September 2022 that New York would receive an award of $796,133 to address the impacts of the fishery disaster event and support restoration of this important resource (NOAA Letter September 2022).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Declining	1980s-present		-
Northeastern US	Yes	Declining	Declining	1980s-present		Yes
New York	Yes	Declining	Declining	1980s-present		Yes
Connecticut	Yes	Declining	Declining	1962-present		Yes
Massachusetts	Yes	Declining	Declining	1985-present		No
New Jersey	Yes	Declining	Declining	1968-present		No
Pennsylvania	No	-	-			-
Vermont	No	-	-			-
Ontario	No	-	-			-
Quebec	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):*

There are currently no monitoring activities or regular surveys specific to the bay scallop that are conducted by the NYSDEC. Cornell Cooperative Extension (CCE) of Suffolk County monitors the abundance and spawning success of bay scallops which have been planted in New York waters primarily in Peconic Bays (Tettlebach and Smith 2009; Tettelbach et al 2013 and 2015). Following the catastrophic die-off of adult scallops in 2019 and subsequent years, more comprehensive surveys were conducted by CCE with additional funding from NYSDEC. Bay scallop disease monitoring was conducted by Stony Brook University's Marine Animal Disease Laboratory (Allam et al 2019-2023).

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

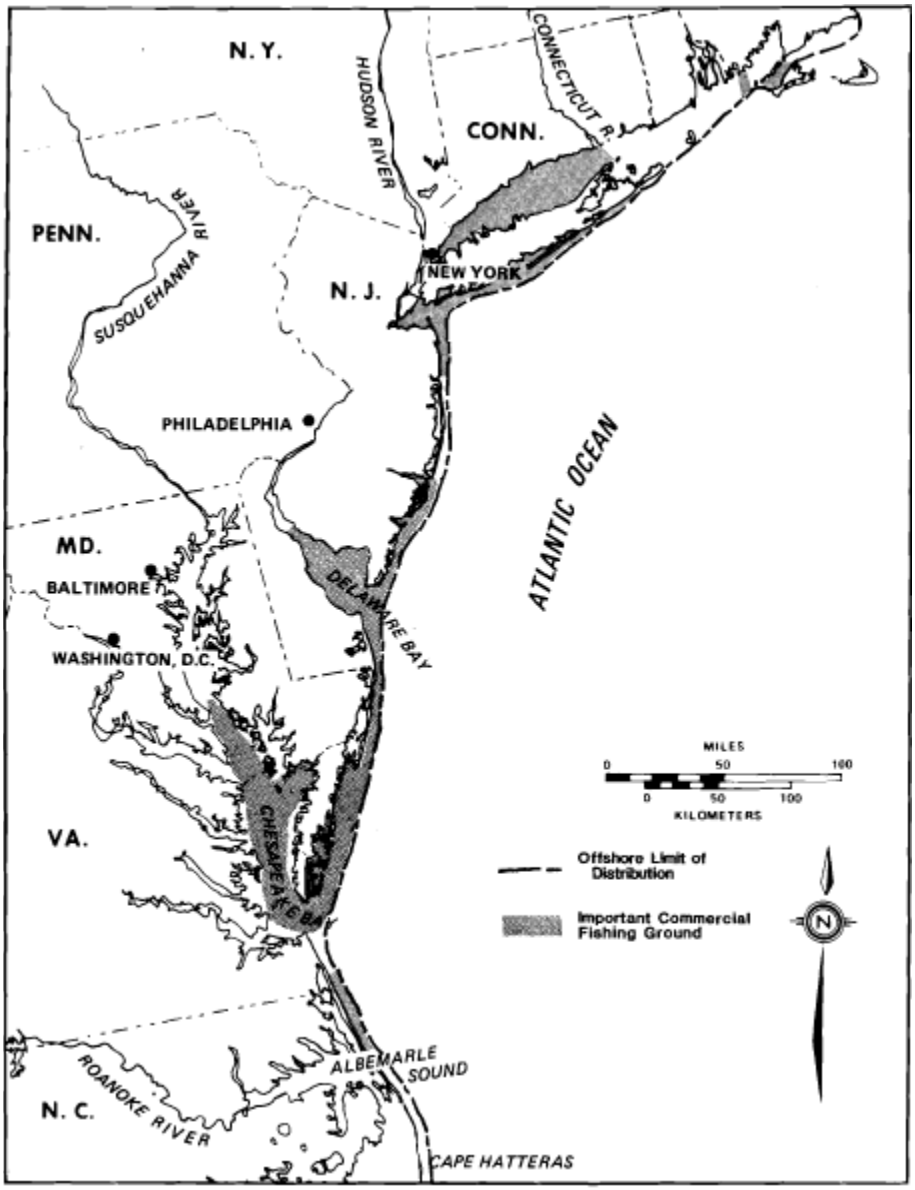

Figure 1. Mid-Atlantic distribution of the bay scallop, *Argopecten irradians* (Fay et al. 1983).

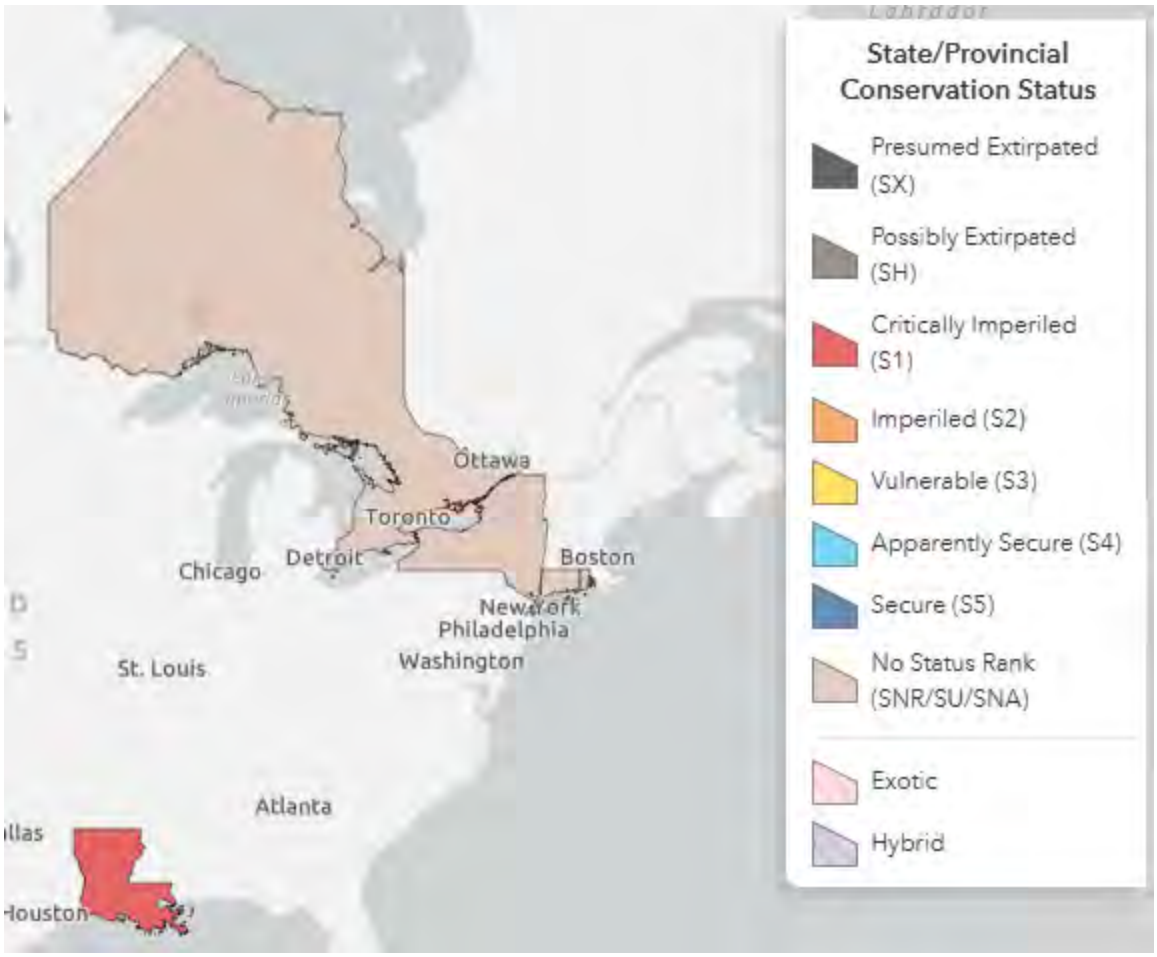

Figure 2. Conservation status of bay scallop in North America (NatureServe 2024).

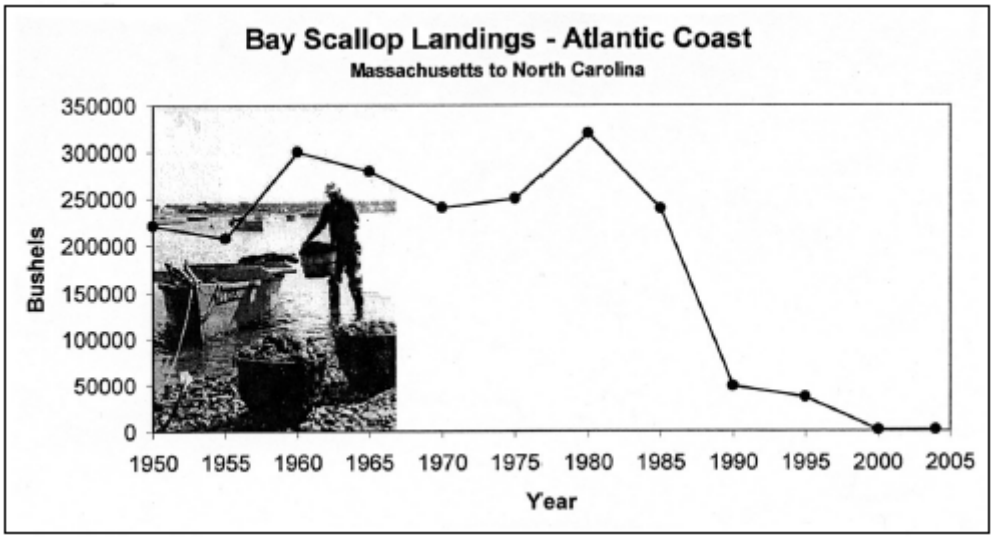

Figure 2. The landings of bay scallops (in number of bushels) from Massachusetts to North Carolina (Mackenzie 2008a).

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

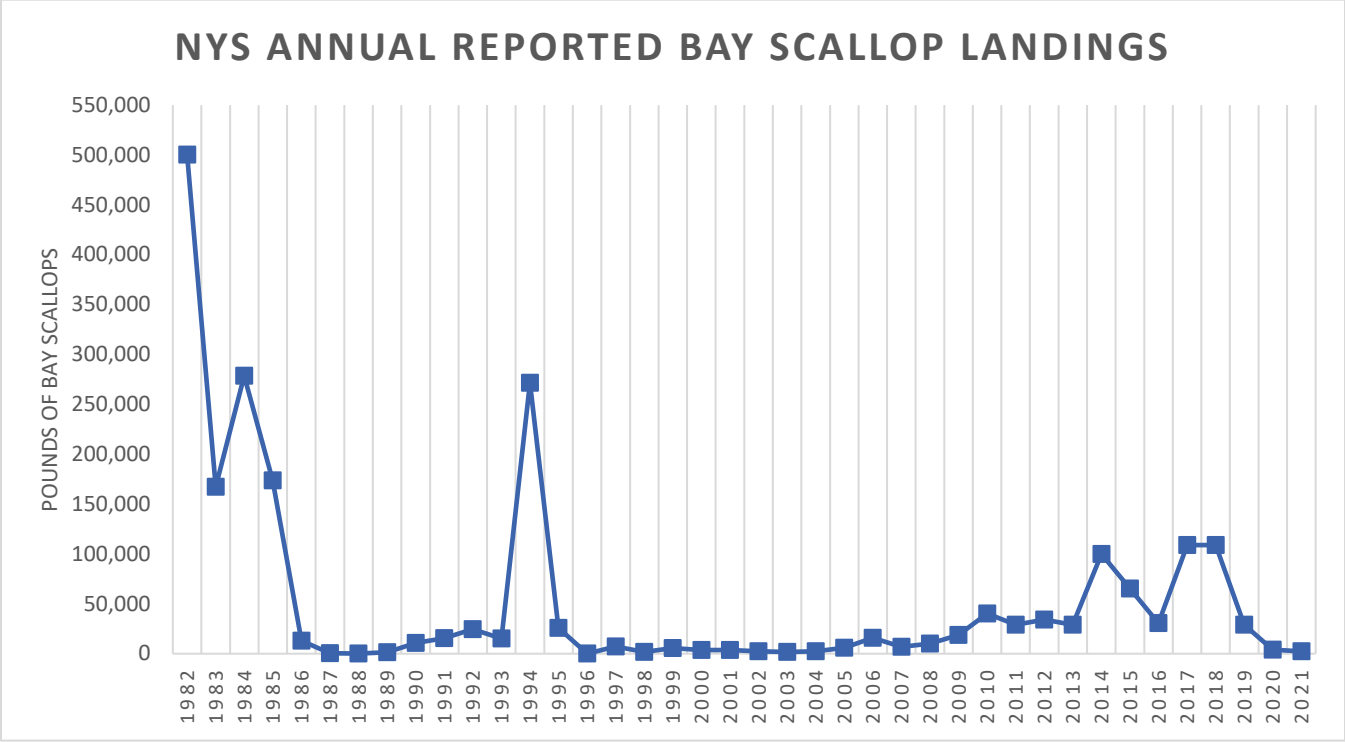

Figure 3: Records of bay scallop in New York.

Details of historic and current occurrence:

Historically, bay scallops were harvested on Long Island from: Peconic and Gardiners Bays and tributaries, Oyster Bay Harbor, Huntington and Northport Bay Complex, Great South Bay, Mecox Bay, and Shinnecock Bay. Since the 1930s, scallops have not been present in Oyster Bay Harbor following the eelgrass die-off (MacKenzie 2008b). Bay scallops are present in Peconic and Gardiners Bay and tributaries in low abundance and in south shore bays.

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. Estuarine

b. Brackish Shallow Subtidal

c. Deep Subtidal

d. Marine Eelgrass Meadow

e. Shellfish Bed

f. Aquatic Bed/Benthic Geomorphology

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
-	-	Unknown	

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:

Bay scallops are found on the Atlantic coast from Cape Cod, Massachusetts to the Gulf of Mexico near Texas. Their distribution is primarily estuarine or near-coastal usually being found no more than three miles offshore (Fay et al. 1983). Bay scallops can live on a variety of substrates but eelgrass beds appear to be preferential habitat (Fay et al. 1983). Not only does this habitat protect bay scallops from predation during all life stages, but is an optimal place to feed and grow due to a reduction in water velocity and subsequent accumulation of food material in these beds (Mackenzie 2008b, Fay et al. 1983; Peterson et al. 1984). Spawning in or near eelgrass beds is also thought to significantly increase concentrations of gametes thus ultimately resulting in an increased chance of fertilization (MacKenzie 2008b). Fay *et al.* (1983) cites a preferential depth of 0.3 to 10 meters, with bay scallops being found as deep as 18 meters. Various life stages of the bay scallop have preferential salinities and temperatures at which they function optimally (Fay et al. 1983).

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):*

Bay scallops are relatively short-lived, becoming sexually mature at one year, and generally do not live for more than two years. Timing at which maturity is reached is based on age rather than size, resulting in a range of sizes for mature scallops (Fay et al. 1983). As protandrous hermaphrodites, bay scallops first function as males and then females. They alternate the release of sperm and eggs during spawning events and as a consequence of this pattern, bay scallops do not generally self-fertilize (Fay et al. 1983). Fecundity is considered high in bay scallops with millions of eggs released during a season (Mackenzie 2008b), and Tettlebach and Smith (2009) citing a fecundity of five million eggs. Since bay scallops are short-lived they generally only spawn once during their life. Spawning time varies throughout the scallop's geographic range. In and around Long Island, peak spawning typically occurs when water temperatures begin to increase, generally in June and July (Fay et al. 1983). Formation of the gametes, or gametogenesis, and spawning events are both linked to water temperature and food availability (Fay et al. 2009).

Fertilized eggs quickly begin to develop with 15 to 20°C being an optimal temperature for cellular cleavage to begin. Within a day or two the embryos develop into veliger larvae (Fay et al. 1983).

In hatcheries, larval scallops grow only when fed specific phytoplankton species, thus larval survival is linked to the presence or absence of these species. Predation and water temperature are also factors affecting larval survival (MacKenzie 2008b). Bay scallops reach their “spat,” or juvenile phase in about ten to 14 days after fertilization. On average it takes two weeks to go from fertilization to juvenile settlement, but this can take anywhere from ten to 19 days depending on water temperature and food availability (Fay et al. 1983). Juveniles typically settle and attach to seagrass blades by means of byssal threads. Juveniles do not do well in areas of high silt, thus they settle above the seafloor (i.e. attached to the ends of seagrass blades) to avoid predators and increase survivorship. Juvenile bay scallops can settle on a variety of substrates but eelgrass beds appear to be preferential habitat. Juveniles primarily move by use of their foot until they reach adulthood. Although bay scallops retain their foot throughout adulthood, they rely on swimming as their main form of locomotion. This free-swimming behavior is seen in many members of the scallop family and is a unique trait amongst bivalves (Fay et al. 1983).

Year-to-year recruitment of bay scallops is erratic and cannot be directly predicted from the adult spawning population (MacKenzie 2008b). Since bay scallops only spawn once during their life, recruitment is dependent on the success of the previous year’s spawn (NYSDEC 2005). A variety of predators exist for the various life stages of *A. irradians*. Predators include green crabs, blue crabs, oyster drills, tautog, scup, northern puffer, herring gulls, and other birds (MacKenzie 2008b, Fay et al. 1983).

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	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.2 Problematic Native Plants & Animals	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.2 Changes in Geological Regimes	11.2.1 Changes in pH of habitats	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 2: Threats to bay scallop

Habitat loss, primarily loss of eelgrass beds, is a major threat facing bay scallops in New York waters, and throughout their range. Bay scallop harvest rates plummeted after eelgrass die-offs in the 1930s and 1980s (MacKenzie 2008a). Wasting disease and harmful algal blooms, such as brown tide were the major contributors to these die-offs (Fonseca and Uhrin 2009). Currently, turbidity caused from sediment runoff, along with point and non-point source nutrient loading are believed to be preventing eelgrass recovery (Fonseca and Uhrin 2009). Additionally, eelgrass can be physically destroyed by a number of factors including various types of fishing gear, dredging, recreational boating, and the building of bulkheads, marinas, and docks (NYSDEC 2009). Since bay scallops depend on eelgrass beds for protection from predators as well as for an optimal feeding habitat, trying to restore bay scallop populations without focusing on restoration of eelgrass beds will most likely prove futile.

Ocean acidification as a consequence of increasing concentrations of carbon dioxide (CO2) is a problem for organisms that synthesize calcium carbonate exoskeletons and shells, including the bay scallop (Barrett et al. 2011). When studied under the concentrations of CO2 that are projected to occur in the future, *A. irradians* experienced delayed metamorphosis and decreased larval survivorship and size (Talmage and Gobler 2009). It is hypothesized that those bivalves which are able to survive and adapt will have decreased shell strength, potentially making them more vulnerable to predation and disease and ultimately making it difficult to rebuild wild stocks in the Long Island Sound and other areas (Barrett et al. 2011).

Global warming and increases in water temperatures during the summer months when bay scallops are spawning have been implicated as an environmental stressor and increased disease prevalence which has been identified as contributing factors in scallop mortalities.

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:

New York currently has several recreational and commercial restrictions in place for the harvest of bay scallops. One bushel per day is permitted for recreational harvest. For commercial harvest ten bushels per person or 20 bushels per boat are allowed to be taken. There is a 2 ¼ inch size limit, as measured from the hinge to the mid bill, and an annual ring must be present to ensure that bay scallops spawn at least once prior to be taken. Dredges are allowed but have a maximum length restriction. It is prohibited to use dredges on Sunday or to use any mechanical means to retrieve one's dredge. Bay scallops that are cultured under the proper permits from the NYSDEC are exempt from size limits. Bay scallops may only be harvested from the first Monday in November through the 31st of March. Primarily for public safety purposes, shellfish, including bay scallops, may only be taken from NYSDEC certified areas (NYSDEC 2023).

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

The successful conservation of bay scallops in New York relies heavily on restoring eelgrass beds. Cornell Cooperative Extension of Suffolk County's eelgrass program focuses on plantings and restoration efforts on Long Island to help mitigate the continued loss of this habitat. Many of the noted threats are affecting eelgrass habitat, which in turn is affecting bay scallop abundance. The continued proper management of bay scallop harvest is important even if bay scallops are to rebound to historic levels. This species' year-to-year recruitment fluctuates greatly and depends on

the previous year's spawning success (MacKenzie 2008b). It is important to ensure that the short-lived scallop has an opportunity to spawn in order to increase chances of successful fertilization.

With low densities of spawners, in order for the population to rebound, natural mortality must be reduced (i.e. reduction of predators) or the spawning stock must be boosted (Tettlebach and Smith 2009). The designation of spawner sanctuaries may help to increase the chance of successful fertilization and subsequent recruitment (NYSDEC 2005). The Easthampton Town Hatchery and Cornell Cooperative Extension have both seen success at sites where harvest was limited, and densities of spawners were high (Rossi-Snook 2012, Tettlebach and Smith 2009).

In response to the catastrophic die-off of adult scallops, research on selective breeding and development of superior scallop stocks are needed to support the restoration of self-sustaining bay scallop populations in New York waters (Allam and Tettelbach 2023).

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.1.2.0 Biological Management - Plants	Protect and restore submerged aquatic vegetation (SAVs); identify locations of important habitats (eel grass, SAVs) capable of supporting bay scallops
A.2 Direct Species Management	A.2.3.2.0 Breeding or raising outside of natural habitat	Breed bay scallops in marine hatcheries; selective breeding to optimize restoration; genomic selection for increased water temperatures
C.8 Research and Monitoring	C.8.1.1.0 Field Research	Conduct surveys to determine recruitment, survival, and geographical distribution of bay scallops
C.8 Research and Monitoring	C.8.2.1.2 Monitoring and evaluating the results of project activities	Develop a program to monitor restoration plans of bay scallops

Table 2: Recommended conservation actions for bay scallop.

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