Species Status Assessment

Common Name: Ribbed mussel **Date Updated:** March 2025

Scientific Name: *Geukensia demissa* **Minor Edits by:** NYSDEC Wildlife Section

Class: Bivalvia

Family: Mytilidae

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

The ribbed mussel, *Geukensia demissa* is a bivalve common in salt marshes and is often found in close association with smooth cordgrass, *Spartina alterniflora*. Although not a commercially valuable species, ribbed mussels have important ecological functions, as they filter large amounts of water, and also provide nutrients and stabilization for marsh grass. The ribbed mussel natively occurs from the Gulf of Saint Lawrence, Canada to the northeastern coast of Florida (Franz n.d.). This mussel was introduced by accident to San Francisco in the 1800s and several populations have established themselves in California and more recently Mexico (Torchin et al. 2005). Although much research exists on the ecological functions and importance of the ribbed mussel in salt marsh habitats, abundance, distribution and recent trends are not often studied nor cited. The current status of the ribbed mussel in New York is unknown, although it appears to be very abundant in some areas such as Jamaica Bay (Franz n.d.). Conservation of this species is important due to its many ecological functions in places where it occurs.

DEC is not aware of any additional data or new information on population trends or threats to this species since the last SWAP revision in 2015 to indicate a need for change in SGCN status.

I. Status

a. Current legal protected Status

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

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** Not ranked

ii. **New York:** Not ranked **Tracked by NYNHP?:** No

Other Ranks:

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

-IUCN Red List: Not listed

-Northeast Regional SGCN: Not listed

Status Discussion:

The current status of the ribbed mussel in New York waters is not discussed in the literature. With the local decline of smooth cordgrass, *Spartina alterniflora* it has been suggested that any threats to cordgrass may also be considered threats for the ribbed mussel (NYSDEC 2005).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Unknown	Unknown			-
Northeastern US	Yes	Unknown	Unknown			No
New York	Yes	Unknown	Unknown			Yes
Connecticut	No data	-	-			-
Massachusetts	No data	-	-			-
New Jersey	No data	-	-			-
Pennsylvania	No data	-	-			-
Vermont	No	-	-			-
Ontario	No	-	-			-
Quebec	No data	-	-			-

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 conducted in New York that target the ribbed mussel.

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

Trends in abundance of ribbed mussel are generally unknown, or undocumented, in North America and New York. It has been suggested that with the localized decline of smooth cordgrass, *S. alterniflora*, there is the potential for a decline in ribbed mussel abundance, as well (NYSDEC 2005). The NYSDEC's commercial harvest numbers do not separate mussels by species; however, in 2011 and 2012, 150 and 527 bushels of mussels were harvested, respectively (NYSDEC 2012).

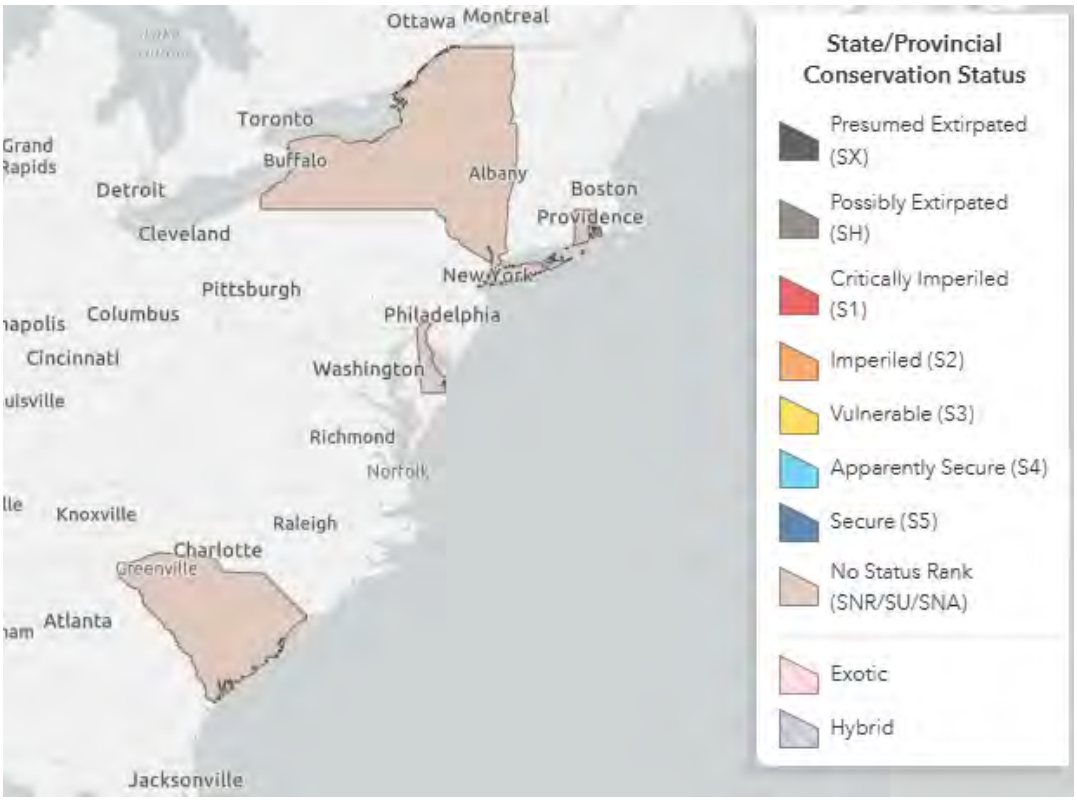

Figure 1. Conservation status of ribbed mussel in North America (NatureServe 2024).

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

Details of historic and current occurrence:

Ribbed mussels have historically been found in salt marshes around Long Island and in the lower Hudson (NYSDEC 2005). Ribbed mussels are currently found in salt marshes around Long Island and in the lower Hudson with Franz (n.d.) noting large abundances in Jamaica Bay, New York (NYSDEC 2005, Franz n.d.). Ribbed mussels are not considered rare in New York and appear in dense aggregations throughout the intertidal zone in salt marshes. They tend to be denser and more abundant along the marsh edge as opposed to the higher marsh (Franz n.d.).

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, Brackish Intertidal, Tidal Wetland, Low Marsh

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
Yes	Yes	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:

Ribbed mussels are found in salt marshes ranging from the Gulf of Saint Lawrence, Canada to northeastern Florida (Franz n.d.). They were accidentally introduced to San Francisco in the late 1800s and have since established themselves in several California Bays and most recently, western Mexico (Torchin et al. 2005). Typically found in the greatest numbers along the marsh or bank edge at the low to mid intertidal level, they can also be found higher up in the intertidal zone (Nielson and Franz 1995). *G. demissa* are usually in dense aggregations in soft bottom habitats (i.e. marsh mud) and around the culms of smooth cordgrass, *Spartina alterniflora*. Being intertidal dwellers, ribbed mussels can withstand constant fluctuations in air exposure, temperature, food availability, and salinity. Average daily temperatures over 45°C and higher have been shown to increase mortality in this species (Jost and Helmuth 2007). Jost and Helmuth (2007) have found that in areas of dense marsh grass, temperatures are higher, due to a suggested loss of convection from decreasing wind velocity near the base of marsh plants. However, the main determinant of body temperature is vertical positioning in the sediment (Jost and Helmuth 2007). In high marsh areas, mussels provide nutrients for *S. alterniflora* in turn increasing growth of the plant. In the lower marsh they bind sediments, increasing stabilization of the substrate and preventing marsh erosion. These positive interactions with *S. alterniflora* increase overall primary productivity in salt marshes (Bertness 1984).

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):*

Ribbed mussels are dioecious and spawn from mid to late summer (Franz n.d.) During settlement, they attach to roots of cordgrass or other hard surfaces by means of byssal threads (Waite et al. 1989). Recruitment is highest on the marsh edge where adult mussels aggregate, suggesting that settlement on or near adults is either preferential or survivorship is higher in those areas (Nielson and Franz 1995). Some juveniles can migrate from their original settlement site undergoing, “microhabitat selection,” but overall distribution in the marsh is still determined by initial recruitment (Nielson and Franz 1995).

Ribbed mussels have been aged up to 15 years in high marsh areas, with populations in the low marsh generally reaching six or seven years (Franz n.d.). Ribbed mussels mature during their second growing

season in the low marsh and during their third or fourth growing seasons in the high marsh (Franz 1996). When maturation is reached appears to be a function of body weight rather than age (Franz 1996). Within the intertidal distribution of ribbed mussels, Borrero (1987) found that there exists a significant delay in the gametogenic cycle moving from the low to high marsh. A consequence of exposure time, mussels at the high tide mark are exposed to air for longer, thus have reduced feeding time, ultimately delaying the timing of maturation by up to one year (Franz 1996).

Unlike other bivalve species brown tide, *Aureococcus anophagefferens* had no physiological effect on *Geukensia demissa* (Gainey and Shumway 1991). In the intertidal zone where feeding time is limited, it is an advantageous adaptation to be able to feed on a wide variety of food particles. Ribbed mussels have adapted to their fluctuating intertidal habitat by ingesting and deriving nutrients from a wide range of food material including: detrital cellulose from vascular plants, small-sized bacteria, heterotrophic protists, cyanobacteria, microphytobenthos, and phytoplankton (Espinosa et al. 2008). Despite this varied diet, they are still considered selective feeders because when food quality is “high” they will preferentially ingest it over less quality food (Espinosa et al. 2008).

Size, growth, and settlement rates of the ribbed mussel all decrease with increasing tidal height, however, survivorship and longevity increase with increasing tidal height (Bertness and Grosholz 1985). In large aggregations, growth rate is reduced, but mortality (from factors other than intraspecific competition) is reduced (Bertness and Grosholz 1985). Major sources of mortality for the ribbed mussel are predation on smaller mussels by crabs, and the dislodgement from the marsh edge by winter ice (Bertness and Grosholz 1985). Erosion of the marsh edge can cause mussels to fall and be buried by sediment or can leave them open to predation by birds and crabs (Franz n.d.). Mussels buried deeply within the mud or those with stronger attachment strength witness decreased rates of mortality by crabs (Lin 1996).

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	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
7. Natural System Modifications	7.3 Other Ecosystem Modifications	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.1 Invasive Non-Native Plants & Animals	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 3: Threats to ribbed mussel.

There are no threats discussed in the literature that are specific to the ribbed mussel. However, declines in smooth cordgrass, and salt marshes could also potentially cause declines in the ribbed mussel (NYSDEC 2005). The invasive reed, *Phragmites australis* is dominating many North American salt marshes and could be causing ecological shifts and a decrease in biodiversity (Chambers et al. 1999). One study has shown that ribbed mussels occur in just as many, or in greater numbers around *Phragmites australis*, when compared to *Spartina alterniflora* (McClary 2004). However, McClary (2004) precautions that this finding may only be specific to this study area and may not be representative of all marsh. Continued monitoring of native marsh grass decline, and the potential impacts on native species should occur.

Due to their large abundances in salt marsh areas, and their ability to filter large amounts of water, decreases in ribbed mussel abundance could result in increased phytoplankton abundance and decreased water clarity, ultimately resulting in decreased dissolved oxygen levels (Franz n.d.). Their capacity to filter large volumes of water can result in increased light availability for submerged aquatic vegetation and other benthic photosynthesizers (NYSDEC 2005). Ribbed mussels also have the potential to act as a sink for anthropogenic nitrogen (NYSDEC 2005). The pseudofeces of ribbed mussels contain the organic nitrogen from planktonic organisms. These pseudofeces would either be stored in the marsh sediment or removed by microbial denitrification (Franz n.d.). These important ecological functions could be lost if ribbed mussel populations are not maintained in New York waters.

Although it does occur, harvesting of ribbed mussels does not appear to be a major threat. Ribbed mussels are not a popular food species, thus they are unlikely targeted heavily for harvest. Commercially, there is a very small amount of mussels taken each year in New York and this species is generally harvested for use as bait (J. O'Dwyer pers. comm.).

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

Yes: ü **No:** _____ **Unknown:** _____

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

The NYSDEC has regulations in place for the commercial and recreational harvest of the ribbed mussel. The recreational limit is one bushel per day, however, no more than one bushel per day (combined volume) of oysters, clams, and mussels is allowed. Commercially, any number is allowed to be harvested. There is no size limit but ribbed mussels may not be taken by mechanical means (NYSDEC 2013). Additionally, in regards to *G. demissa*'s habitat, the Tidal Wetlands Act provides protection for all tidal wetlands under Article 25 of the NYS Conservation Law.

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

Loss of the ribbed mussel's primary habitat, salt marshes and more specifically *S. alterniflora*, should be mitigated in order to conserve this ecologically important species. Surveys for general abundance and monitoring efforts should be established in New York waters in order to assess if any declines are occurring either in conjunction with, or independently of marsh loss. Although not historically or currently harvested in any great numbers, overharvest is always a possibility with marine resources and as such, harvest of this species should be monitored and managed appropriately.

Action Category	Action	Description
C.7 Legislative and Regulatory Framework or Tools	C.7.1.3.0 Create amend, or influence regulation	Regulate ribbed mussel harvesting
C.8 Research and Monitoring	C.8.1.1.1 Characterization, demographic study, population, or inventory	Survey for ribbed mussel abundance to detect any declines

Table 3: Recommended conservation actions for ribbed mussel.

VII. References

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