Species Status Assessment

Common Name: Marbled salamander **Date Updated:** January 3, 2025

Scientific Name: *Ambystoma opacum* **Updated By:** L. Pipino & W. Hoffman

Class: Amphibia

Family: Ambystomatidae

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

The marbled salamander occurs across much of the eastern United States from southern New England through northern Florida and westward to eastern Texas and Illinois (Petranka 1998). In New York, the species is limited to the southeastern part of the state. Adults are found in upland or floodplain deciduous forests and seem to prefer areas with dry, friable soils, as long as moist areas such as springs and seeps are nearby (Bishop 1941). Breeding occurs during the fall, when eggs are laid in forest depressions, which are then protected by the female until rains flood the area, and initiate hatching. While locally abundant in parts of its range, populations are thought to be declining, largely due to habitat loss and fragmentation resulting from urbanization.

I. Status

a. Current legal protected Status

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

ii. **New York:** Special Concern; SGCN

b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S3 **Tracked by NYNHP?:** Watch List

Other Ranks

-IUCN Red List: Least Concern
-COSEWIC: N/A
-Northeast Regional SGCN List (2023): Watchlist [Assessment Priority]
-NEPARC Regional List (2010): High Concern

Status Discussion:

The marbled salamander appears to be relatively stable across its range, with a large extent of occurrences in the eastern United States (NatureServe 2024), though local declines have been reported, largely due to habitat loss (IUCN 2021). The Northeast Partners in Amphibian and Reptile Conservation (NEPARC 2010) lists the marbled salamander as a species of High Concern because more than 50% of northeastern states list it as a Species of Greatest Conservation Need (SGCN). They are also included on the Northeast Regional SGCN List as a Watchlist Assessment Priority due to a lack of information on population status, history, and threats, and are aptly highlighted as being data deficient and needing additional assessment (Terwilliger 2023).

The species is listed as endangered in New Hampshire, threatened in Massachusetts and New Jersey, and special concern in Connecticut and New York. In New York, marbled salamanders are limited to the southeastern portion of the state: from the Catskill Mountains through the Hudson River valley and on Long Island (Gibbs et al. 2007). Numbers appear to have become reduced in New York due to habitat loss and fragmentation, especially on eastern Long Island and in lower Westchester County, although the species is still relatively common in other parts of its range in the state (Gibbs et al. 2007).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Stable	Stable	Since 1970s	G5, Not listed	
Northeastern US	Yes	Unknown	Unknown			Watchlist
New York	Yes	Unknown	Unknown		S3, Special Concern	Yes
Connecticut	Yes	Unknown	Unknown		S4, Not listed	Yes
Massachusetts	Yes	Unknown	Unknown	Since 1990s	S2, Threatened	Yes
New Jersey	Yes	Unknown	Unknown		S3, Threatened	Yes
Pennsylvania	Yes	Unknown	Stable	Last 10 years	S3, Not Listed	Yes
Vermont	No	N/A	N/A			
Ontario	No	N/A	N/A			
Quebec	No	N/A	N/A			

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):*

The New York Amphibian and Reptile Atlas Project (Herp Atlas), conducted from 1990-1999, documented the geographic distribution of all species of amphibians and reptiles in the state. The Herp Atlas database also includes pre-1990 records from various sources, such as museum records, researchers' field notes, agency reports, and published literature.

While there are currently no regular monitoring activities for the marbled salamander in New York, since 2009, the Amphibian Migrations and Road Crossings Project, led by the Hudson River Estuary Program, enlists volunteers to monitor seasonal migrations of amphibians within the Hudson River Valley (NYSDEC n.d.).

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

NatureServe (2024) notes a long-term trend in North America of “declines of less than 50% to relatively stable,” and a short-term trend of “declines of less than 30% to relatively stable.” While considered common in parts of its range, concern for the marbled salamander is based on its dependence on small, isolated seasonal wetlands, and knowledge of threats including loss, degradation, and fragmentation of both breeding and terrestrial habitat (Semlitsch 1998, Scott 2005). Road mortality, pollutants, and the effects of predicted climate change also threaten this species (Gibbs and Shriver 2005, Scott 2005).

Many local marbled salamander breeding sites have been eliminated by conversion of habitat to intensive human uses, and such losses continue (Petranka 1998). Trends for New York's marbled salamander populations appear to be declining over the past several decades; however, there is insufficient data on population number or population sizes from which to determine relative health of populations.

Figure 1. Marbled salamander distribution (IUCN Red List 2021)

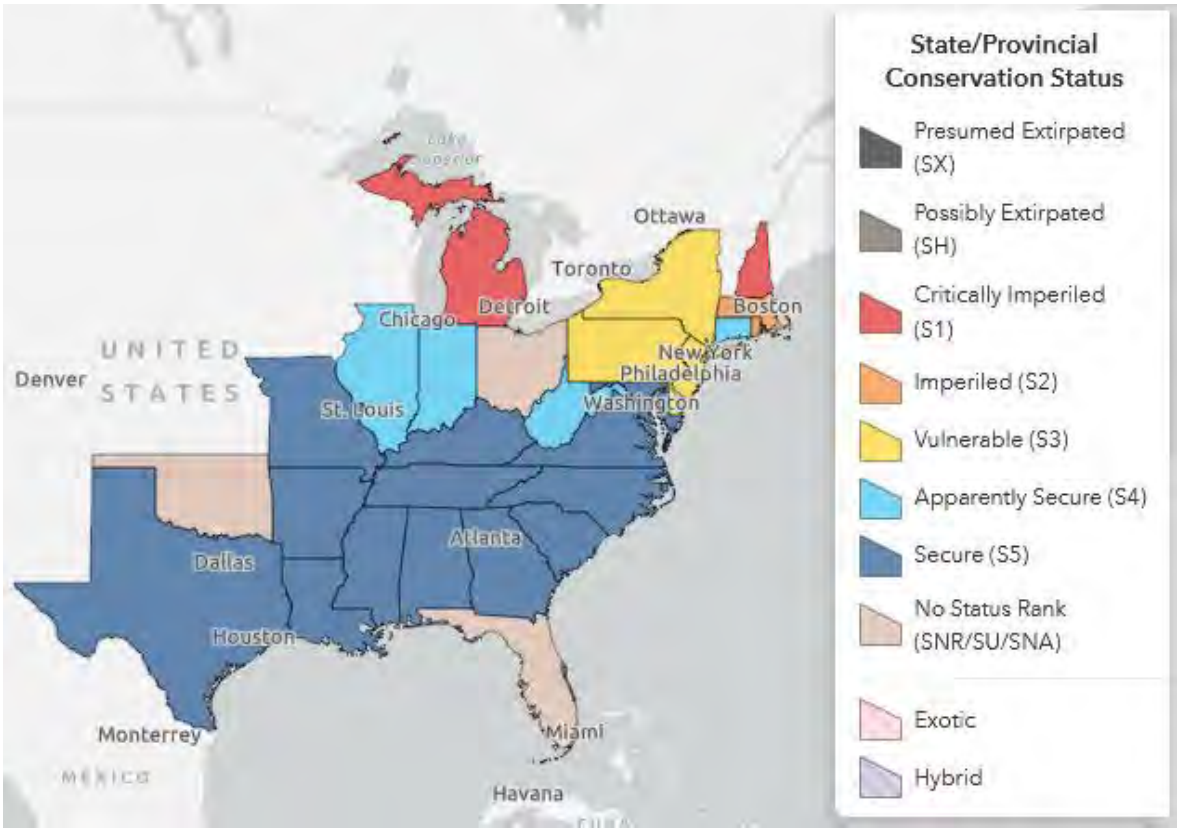

Figure 2. Conservation Status of marbled salamander (NatureServe 2024)

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

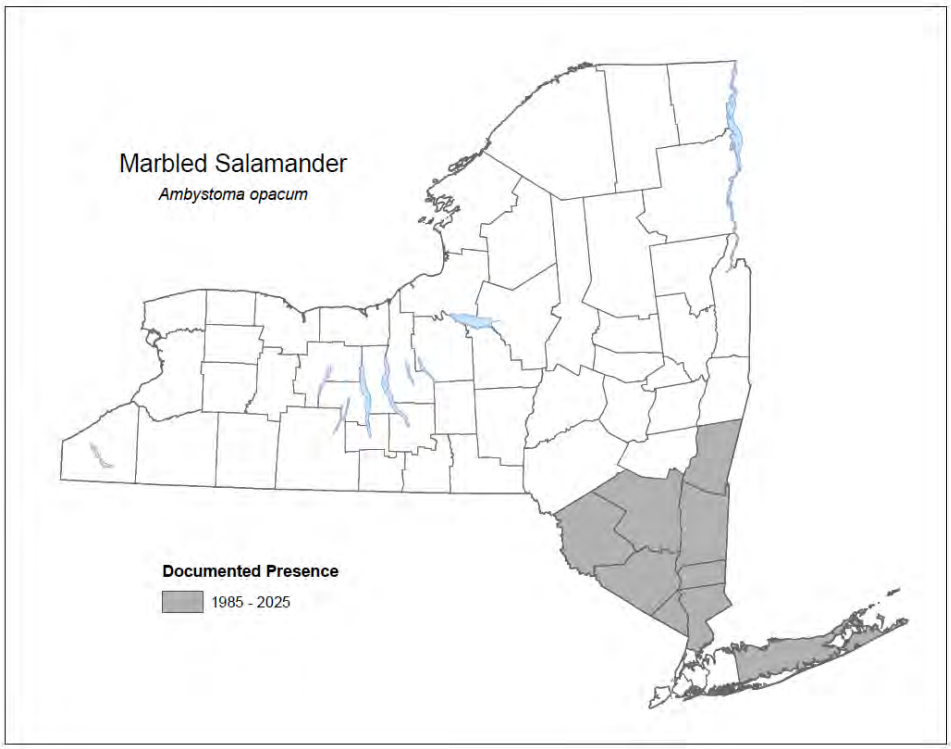

Figure 3: Distribution of marbled salamander in New York State, 1985-2025 (NYSDEC)

Details of historic and current occurrence:

The New York Amphibian and Reptile Atlas (1990-1999) documented marbled salamanders in 46 survey quads (USGS 7.5 minute topographic quadrangle), which are concentrated in the southeastern portion of the state, including eastern Long Island. There is a noticeable gap in western Long Island where development is extensive, and numbers have also become reduced in Westchester County (Gibbs et al. 2007). In early accounts, marbled salamanders are described as common but secretive; however, no data on population sizes were collected before the 1960s.

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):*

1. Oak Forest
2. Hardwood Swamp
3. Coastal Plain Pond
4. Floodplain Forests
5. Vernal Pool
6. Coastal Hardwoods

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
Yes	Yes	Declining	wetlands declining since 1970s; forests 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:

Adult and juvenile marbled salamanders inhabit relatively mature upland and floodplain deciduous and mixed deciduous-coniferous forests and woodlands (Gibbs et al. 2007). Bishop (1941) noted that this salamander seems to prefer forests with dry, friable soils and well-drained slopes as long as moist areas are nearby. Marbled salamanders use imbedded rocks, logs, leaf litter or other debris as cover objects (Klemens 1993), and likely use small mammal burrows as shelter throughout the year, and as hibernacula in the winter (DeGraaf and Yamasaki 2001).
Breeding occurs during the fall in forest depressions that fill with autumnal rains. To sustain a viable marbled salamander population, a wetland must hold standing water throughout much of the fall, winter, and spring, so that the salamander larvae have sufficient time to grow and metamorphose (Bishop 1941). Merovich and Howard (2000) noted that constructed pools may be used for breeding, but pools older than 30 years are generally preferred. Streambeds may be used as migration routes (Gibbs 1998).

V. Species Demographic, 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):*

Unlike most of New York's *Ambystoma* species, marbled salamanders have the unusual distinction of breeding during the fall rather than the spring (Gibbs et al. 2007). Migration to breeding sites typically takes place during late summer or early fall, depending on rain or other high-humidity events. Migration occurs at night, often during or after rain, and males are typically the first to move to breeding sites with females following shortly thereafter. Courtship and mating occurs on land, and may take place at the breeding depressions, or during the migration (Gibbs et al. 2007).

After mating, the female will construct a nest under leaf litter or woody debris in a portion of the dry wetland basin. She then lays a clutch of 50-200 or more eggs singly in the depression (Gibbs et al. 2007). Parental care of the unhatched eggs is vital to nest survival, and the female remains with the eggs, curled around them and turning them periodically, until fall rains fill the depression (Petranka 1998). Flooding of the nest initiates hatching, and larvae remain in the frozen pool through the winter and rapidly increase their feeding, and growth, as ice thaws. By spring, marbled salamander larvae are generally large enough to feed on the newly hatched larvae of other salamanders with an intensity that can affect which species persist in a local area (Cortwright and Nelson 1990).

Marbled salamander larvae undergo metamorphosis in May through July (Gibbs et al. 2007), and disperse from natal wetlands into the surrounding forest. Sexual maturity is reached in 1-6 years, and most individuals return to their natal wetland to breed (Scott 1994). However, one study in Massachusetts documented a juvenile dispersal rate of 9%, with some individuals moving to wetlands >1000 m from their natal breeding sites (Gamble et al. 2007).

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

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent*	Severity*	Immediacy*	Trend	Certainty
1. Residential and Commercial	1.1 Housing & Urban Areas	Choose an item. (loss/degradation of habitat to development)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
4. Transportation & Service Corridors	4.1 Roads & Railroads	4.1.1 Roads (roadkill)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
5. Biological Resource Use	5.1 Hunting & Collecting Terrestrial Animals	5.1.4 Poaching/persecution of terrestrial animals	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens	8.4.2 Viral pathogens (ranavirus)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.4 Pathogens	8.4.3 Fungal pathogens (chytrid)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.2 Industrial & Military Effluents	9.2.5 Mercury	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.5 Air-Borne Pollutants	9.5.1 Acid rain	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.3 Changes in Temperature Regimes	Choose an item. (precipitation timing)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.4 Changes in Precipitation & Hydrological Regimes	Choose an item.(water temperature and drying)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 1. Threats to marbled salamander

Threats Discussion:

Known threats to all salamanders include habitat loss and degradation due to land conversion for agriculture and urban areas. Petranka (1998) noted that thousands of local populations of marbled salamanders have already been eliminated due to habitat loss. Residential and commercial development can affect marbled salamander breeding habitat (i.e., verna pools), as well as upland habitats and migration corridors. The filling of vernal pools for development and agriculture results in the immediate loss of breeding habitat, and increases the distance individuals have to travel to reach potential breeding sites. Gibbs (1998) suggested that Ambystomatids may be predisposed to local extinction caused by habitat fragmentation, and Windmiller (1996) noted that increasing urbanization reduces mole salamander abundance and may exclude them from otherwise suitable areas.

Along with urbanization, roads can present a significant threat to marbled salamander abundance in roadside habitats, as they can be a substantial source of mortality during migrations (deMaynadier and Hunter 2000). Roads may also act as partial barriers to dispersal, which could result in decreased gene flow between populations, and inhibit juvenile dispersal to new locations. Runoff from roads can also reduce the quality of vernal pools. As an obligate vernal pool species, marbled salamanders are particularly sensitive to degradation of water quality from a variety of pollution sources including runoff, such as increased salt levels, sedimentation, and pesticides. Acid deposition may also threaten marbled salamander populations. Anderson and Johnson (2018) conducted a study on the effect of varying substrate pHs on marbled salamanders, and found that acidification of substrates, attributed to strip mining operations in Appalachia, negatively affected the growth rates and overall fitness of individuals.

Emerging diseases also pose a threat to marbled salamanders. The chytrid fungus, *Batrachochytrium dendrobatidis* (Bd), first described in 1998 (Longcore et al. 1999), has become a disease of global concern, with a recent study finding Bd-infection in 72% of sampled countries and 54% of amphibian species tested (Monzon et al. 2020). Bd-infection has been identified in marbled salamanders, (Kinney et al. 2011) and other pathogens such as *B. salamandivorans (Bsal)* and ranavirus may also pose risks.

The marbled salamander was classified as “highly vulnerable” to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011). Climate change that affects hydroperiod and/or water temperature of vernal pools could have significant impacts on productivity (Rowe and Dunson 1995) and may increase the frequency of fungal outbreaks (Gibbs et al. 2007).

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:

In 2006, the State of New York adopted legislation (ECL section 11-0107 sub 2) that gave all native frogs, turtles, snakes, lizards and salamanders legal protection as game species, and no salamander species are open to harvest. The legislation also outlaws the sale of any native species of herpetofauna regardless of its origin.

Under Article 24 of the New York State Environmental Conservation Law, the Freshwater Wetlands Act provides protection for wetlands greater than 12.4 acres in size, as well as smaller wetlands of ‘Unusual Importance’ that meet one of 11 newly established criteria, including if it has habitat for an essential

behavior of an endangered or threatened species or species of special concern, or if it is a vernal pool that is known to be productive for amphibian breeding. Beginning in 2028, the default size threshold of regulated wetlands will decrease from 12.4 acres to 7.4 acres.

The U.S. Army Corps of Engineers also protects wetlands, irrespective of size, under Section 404 of the Clean Water Act. Under Article 15 Title 5 of the New York State Environmental Conservation Law, the Protection of Waters program provides protection for the state's water resources, including rivers, streams, lakes, and ponds.

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

Semlitsch (1998) reviewed literature on several Ambystoma species and concluded that a radius between 150-200 meters around a breeding pond would likely encompass the terrestrial habitat used by more than 95 percent of adults. A study by Gamble et al. (2006) recorded juvenile marbled salamanders emigrating at greater distances between 111 – 1230m from natal ponds. Protection of not only breeding ponds, but also upland habitats is critical to the conservation of this species.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for vernal pool salamanders, which includes the marbled salamander. Actions that have been accomplished, or where progress has been made, are indicated with a check.

Easement acquisition:

____ Secure wetland and adjacent upland habitats critical to species survival by acquisition of conservation easements, or by other land protection mechanisms.

Habitat management:

____ Develop and implement measures to manage reductions of wetland habitat quality caused by invasive plants, by offroad vehicles, and by introductions of fish and other predatory species.

Habitat research:

____ Enable research to further document extent of upland habitat required by vernal pond breeding salamanders.

____ Develop standardized habitat survey protocols, and implement survey protocols at all known and potentially suitable sites, to document the character, quality and extent of occupied habitat.

Life history research:

____ Document life history parameters specific to New York populations of the species, including age and sex ratios, longevity, age at sexual maturity, survivorship of young, predator-prey relationships, and wetland/upland habitat requirements.

Modify regulation:

___✓ Modify Freshwater Wetlands Act, in order to protect wetlands smaller than 12.4 acres where they support species of conservation concern, and in order to expand the protected upland buffer beyond the 100-foot limit where necessary.

___✓ Adopt into New York's Environmental Conservation Law provisions which designate tiger salamander, marbled salamander, Jefferson salamander and blue-spotted salamander as protected small game species.

Other action:

____ Determine significance of specific threats to populations of species in this group, and formulate management options to control significant threats.

Population monitoring:

____ Conduct periodic re-survey of known sites of species occurrence, in order to detect population trends.

Statewide baseline survey:

____ Develop standardized population survey protocols, and implement survey protocols at all known and potentially suitable sites, to document the extent of occupied habitat.

____ Develop standardized population survey protocols, and implement survey protocols at all known and potentially suitable sites, to document the statewide distribution of species in this group.

Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection) - https://www.iucnredlist.org/resources/conservation-actions-classification-scheme

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.0.0.0 Direct Habitat Management	Site/Area management
A.2 Direct Species Management	A.2.0.0.0 Direct Species Management	Invasive/problematic species control
C.6 Design and Plan Conservation	C.6.0.0.0 Design and plan conservation	Resource/habitat protection
C.6 Design and Plan Conservation	C.6.5.1.3 Develop a conservation, management, or restoration plan for protected private lands	Habitat and natural process restoration
C.7 Legislative and Regulatory Framework or Tools	C.7.1.2.0 Create, amend, or influence legislation	Legislation

Table 2. Recommended conservation actions for the marbled salamander.

VII. References

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