

## Species Status Assessment

<b>Class:</b>	Amphibia
<b>Family:</b>	Ambystomatidae
<b>Scientific Name:</b>	<i>Ambystoma laterale</i>
<b>Common Name:</b>	Blue-spotted salamander

### Species synopsis:

The blue-spotted salamander has the northernmost distribution of any *Ambystoma* species, occurring in east-central North America as far north as Labrador, with its distribution dipping southward into the northeastern United States only as far as northern New Jersey. In New York, this salamander occurs in a patchy distribution outside of high elevation areas; its occurrence on Long Island is only in the farthest eastern reaches. Blue-spotted salamander habitat is the moist forest floor of deciduous or mixed woodlands near ephemeral bodies of water. Reliable population trends are not available for this salamander.

Hybridization occurs between blue-spotted salamander and Jefferson salamander (*A. jeffersonianum*). Broadly referred to as the Jefferson complex, the variety of hybrids includes up to five different chromosomal combinations. Some of the hybrids have been called Tremblay's salamander or silvery salamander, but most references are to "Jefferson complex." This unusual situation has led to difficulty in defining the distribution of blue-spotted salamander and Jefferson salamander, the hybrids of which are very difficult to distinguish, typically, without genetic testing in conjunction with their appearance. In Connecticut, the blue-spotted diploid and the blue-spotted complex have been listed individually, as Threatened and Special Concern respectively but no other state or province has made this distinction in listing status.

**I. Status**

**a. Current and Legal Protected Status**

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

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

**b. Natural Heritage Program Rank**

i. **Global**      G5

ii. **New York**    S4      **Tracked by NYNHP?**    No

**Other Rank:**

Species of Northeast Regional Conservation Concern (Therres 1999)  
Severe Concern (NEPARC 2010)

**Status Discussion:**

Blue-spotted salamander is considered to be locally abundant in suitable habitat across New York. It has been designated as a species of Regional Conservation Concern in the Northeast due to its unknown population status and taxonomic uncertainty (Therres 1999). NEPARC (2010) lists blue-spotted salamander as a Species of Severe Concern because more than 75% of northeastern states listed it in their Wildlife Action Plans.

**II. Abundance and Distribution Trends**

**a. North America**

**i. Abundance**

X declining    \_\_\_ increasing      X stable    \_\_\_ unknown

**ii. Distribution:**

X declining    \_\_\_ increasing      X stable    \_\_\_ unknown

**Time frame considered:** stable to declining by 30% (NatureServe 2012)

**b. Regional**

**i. Abundance**

declining  increasing  stable  unknown

**ii. Distribution:**

declining  increasing  stable  unknown

Regional Unit Considered: Northeast

Time Frame Considered: \_\_\_\_\_

**c. Adjacent States and Provinces**

**CONNECTICUT** Not Present  No data

**i. Abundance**

declining  increasing  stable  unknown

**ii. Distribution:**

declining  increasing  stable  unknown

Time frame considered: Not specified

Listing Status: diploid= Threatened; complex= SC SGCN? Yes

**MASSACHUSETTS** Not Present  No data

**i. Abundance**

declining  increasing  stable  unknown

**ii. Distribution:**

declining  increasing  stable  unknown

Time frame considered: 160 occurrences since 1980; no trend available

Listing Status: Special Concern SGCN? Yes

**NEW JERSEY**                      Not Present \_\_\_\_\_      No data   X  

**i. Abundance**

\_\_\_\_ declining    \_\_\_\_ increasing            \_\_\_\_ stable            \_\_\_\_ unknown

**ii. Distribution:**

\_\_\_\_ declining    \_\_\_\_ increasing            \_\_\_\_ stable            \_\_\_\_ unknown

Time frame considered:   No trend information available  

Listing Status:                   Endangered                        SGCN?   Yes  

**ONTARIO**                              Not Present \_\_\_\_\_              No data \_\_\_\_\_

**i. Abundance**

\_\_\_\_ declining    \_\_\_\_ increasing              X   stable            \_\_\_\_ unknown

**ii. Distribution:**

\_\_\_\_ declining    \_\_\_\_ increasing              X   stable            \_\_\_\_ unknown

Time frame considered:   Not specified  

Listing Status:                   Not Listed                  

**PENNSYLVANIA**                      Not Present \_\_\_\_\_              No data \_\_\_\_\_

**i. Abundance**

\_\_\_\_ declining    \_\_\_\_ increasing            \_\_\_\_ stable              X   unknown

**ii. Distribution:**

\_\_\_\_ declining    \_\_\_\_ increasing            \_\_\_\_ stable              X   unknown

Time frame considered:   First discovered in 2000  

Listing Status:                   Endangered                        SGCN?   No



**d. NEW YORK**

No data \_\_\_\_\_

**i. Abundance**

\_\_\_ declining \_\_\_ increasing \_\_\_ stable \_\_\_ unknown

**ii. Distribution:**

\_\_\_ declining \_\_\_ increasing \_\_\_ stable \_\_\_ unknown

Time frame considered: \_\_\_\_\_

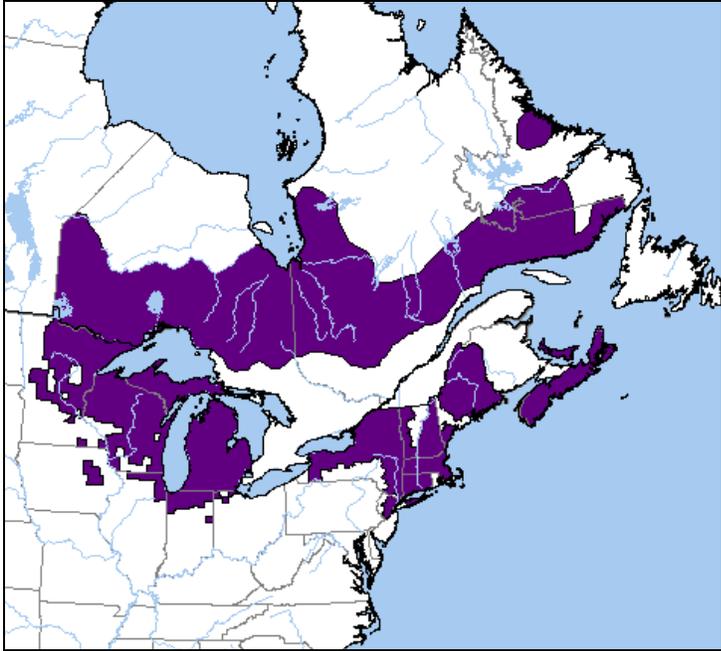
**Monitoring in New York.**

There are currently no regular monitoring activities in New York. The NY Amphibian and Reptile Atlas (Herp Atlas) was conducted in 1990-99. The Herp Atlas database also includes historic records from prior to 1990; these records are primarily a compilation of museum records and researchers' field notes.

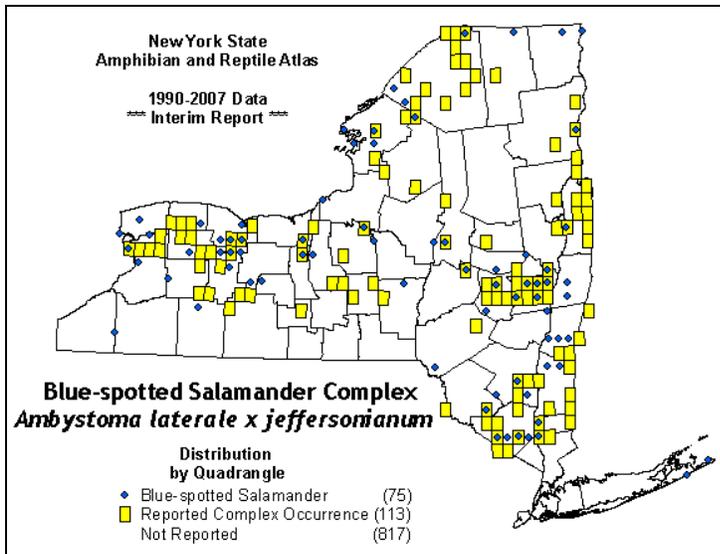
**Trends Discussion:**

NatureServe (2012) notes a long-term trend in North America of "stable to declining by 50%," and a short-term trend of "stable to declining by 30%." Reliable trends are not available for salamanders and concern in northeastern states is based on known threats including loss of wetland habitat, road mortality, and acid rain.

Blue-spotted salamanders have been documented across New York including Long Island, except for parts of central New York and the southern tier counties that border Pennsylvania. Populations on eastern Long Island may be the only pure lineages of this species in the state (Gibbs et al. 2007).



**Figure 1:** Distribution of blue-spotted salamander in North America (NatureServe 2012). Data developed as part of the Global Amphibian Assessment and provided by IUCN-World Conservation Union, Conservation International and NatureServe.



**Figure 2:** Distribution of blue-spotted salamander complex in New York (NYS Amphibian and Reptile Atlas)

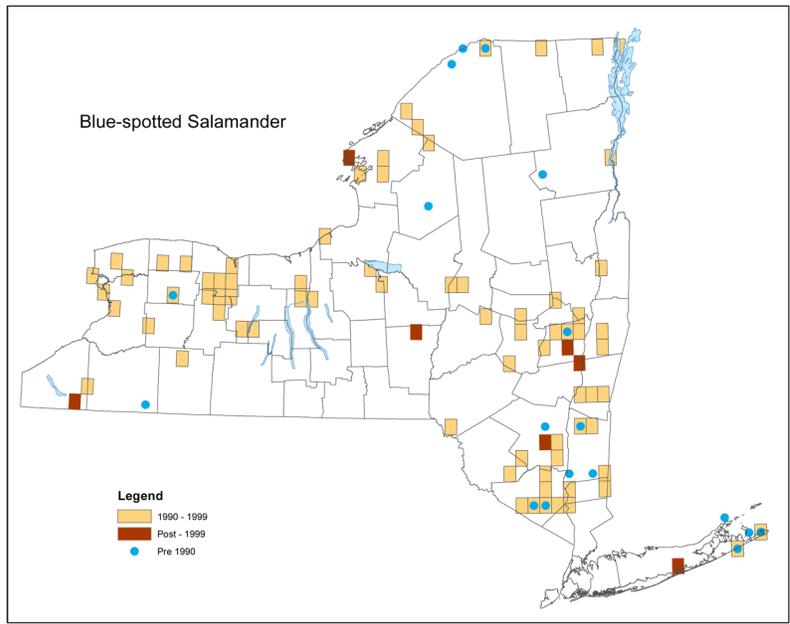


Figure 3: Distribution of blue-spotted salamander in New York (NYS Amphibian and Reptile Atlas)

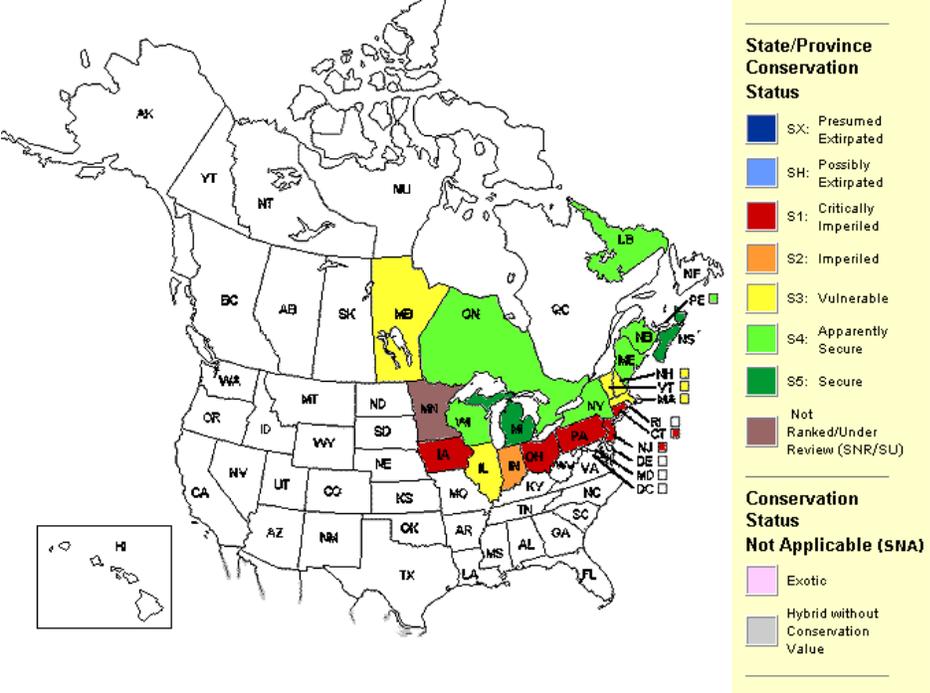


Figure 4: Conservation status of blue-spotted salamander in North America (NatureServe 2012).

**III. New York Rarity, if known:**

Historic (select one)	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

**Details of historic occurrence:**

Several factors have contributed to problems in delineating the historic range of the blue-spotted salamander including past misidentification and confusion with the Jefferson salamander and the hybridizations that occur between these two species in areas of range overlap. Prior to about 1964, almost all Jefferson or blue-spotted salamanders, and their associated hybrids, were referred to as *A. jeffersonianum*, so historic records are questionable without further analysis. Generally, the northern part of western New York; northern New York and eastern part of southeast New York.

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
	_____	_____	8%

**Details of current occurrence:**

The NYS Amphibian and Reptile Atlas (1990-1999) documented blue-spotted salamander in 75 survey quads (8%). Since 2000, records were added to the NY Herpetology database in 7 additional quads, including one on Long Island west of known areas.

**New York's Contribution to Species North American Range:**

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

**Rarity Discussion:**

The Northeast comprises less than 50% of the distribution in the United States (NEPARC).

**IV. Primary Habitat or Community Type:**

1. Mixed Northern Hardwoods
2. Hardwood Swamp
3. Mixed Hardwood Swamp
4. Vernal Pool
5. Wet Meadow/Shrub Swamp

**Habitat or Community Type Trend in New York:**

Declining       Stable       Increasing       Unknown

Time frame of decline/increase: wetland loss since 1970s; forests stable

Habitat Specialist?                       Yes       No

Indicator Species?                       Yes       No

**Habitat Discussion:**

The blue-spotted salamander is not a strong burrower, and can usually be found under logs, leaf litter and other ground cover. It occurs in damp deciduous or deciduous-coniferous forests, as well as open areas including pastures and grassy fields that support permanent or ephemeral pools or ponds. It is occasionally found in areas of sandy soils, but is also associated with bogs, marshes and other poorly drained sites. Blue-spotted salamanders in New Jersey occupied a lowland mix of true swamp woodland and cattail marsh and adjacent highland hardwood forests (Nyman et al. 1988, Klemens 1993).

The breeding habitat of the blue-spotted salamander is a vernal or permanent pool/pond (formed by ground water seepage, surface runoff and/or precipitation), 20-40 yards long and approximately 3' in depth. The ponds usually have mud bottoms and thick vegetation above and below the water's surface. The blue-spotted salamander is considered a vernal pool indicator species (Calhoun and Klemens 2002).

**V. New York Species Demographics and Life History**

- Breeder in New York**
  - Summer Resident**
  - Winter Resident**
  - Anadromous**
- Non-breeder in New York**
  - Summer Resident**
  - Winter Resident**
  - Catadromous**
- Migratory only**
- Unknown**

**Species Demographics and Life History Discussion:**

The blue-spotted salamander is a secretive animal during the non-breeding season, and spends much time under various ground cover of leaf litter, rocks, logs and burrows in a mixed or hardwood forest habitat. They are not strong burrowers, however and can be found close to or on the ground's surface.

The breeding season extends from March to April and is initiated by a mass migration of individuals from their winter woodland habitats to their breeding pools. Migration is generally a nocturnal activity in response to optimal levels of precipitation (snowmelt), humidity and temperature. The timing of migration varies from year to year with climatic variation. Males of the species are among the first wave of migrants to arrive at the pools. Male migration, once initiated, is continuous until the pool, suitable cover or severe weather conditions are encountered. Females wait for stable, favorable conditions before migration is undertaken.

In the breeding pool, competition for females is intense, with unpaired males attempting to break apart amplexic pairs. Thus, pairs are scattered throughout the pool bottom rather than producing aggregations characteristic of the genus. The female deposits eggs within two days after insemination singly or in masses of up to four eggs. These are often attached to leaves, rocks and other bottom debris or loosely scattered amid the pond litter.

The larvae hatch approximately 30 days after deposition. The larval period and size at metamorphosis of *A. laterale* is variable, but generally occurs between early July to mid-September with lengths ranging from 24.5-38.4mm. Larval period was found to increase with increased number of larvae with in a pool. This increased larval density also tends to decrease the size required to metamorphose. This demonstration of transformation plasticity may allow the blue-spotted salamander to use less permanent ponds unsuitable for other salamander species.

Interbreeding of blue-spotted salamander and Jefferson salamander produces polyploidy hybrids in as many as five different chromosomal combinations (Petranka 1998, Hunter et al. 1999). The unisexual (all female) hybrids reproduce through parthenogenesis.

## **VI. Threats:**

Known threats to all salamanders include loss and degradation of habitat due to conversion of land to agriculture and urban areas. Blue-spotted salamanders will tolerate habitat disturbance in some suburban areas (Klemens 1993). As an obligate vernal pool species, blue-spotted salamanders are sensitive to degradation of water quality from a variety of pollution sources including household garbage, agriculture runoff, pesticides, and siltation. Acid deposition may result in embryo death and larval deformities, though studies have been contradictory; blue-spotted salamanders in eastern Massachusetts appear to be tolerant of acidic conditions and can hatch successfully in pH as low as 4.0 (Massachusetts Division of Fisheries & Wildlife 2005). Roads negatively affect blue-spotted salamander abundance in roadside habitats, as they are a significant source of mortality (deMaynadier and Hunter 2000). Logging affects vernal pool obligates by disrupting migratory movements, introducing roads, and reducing water quality. In addition, reforestation of commercial forests with coniferous species is detrimental to species that rely on a mixed forest habitat (NH State Wildlife Action Plan 2005).

Blue-spotted salamanders interbreed with Jefferson salamanders to produce unisexual hybrids—usually female—that have three, four or even five complete sets of chromosomes (such individuals are referred to, respectively, as triploid, tetraploid or pentaploid) in their DNA rather than the usual two sets (diploid). Such hybridization has the potential to dilute diploid populations of either species.

The chytrid fungus, *Batrachochytrium dendrobatidis* (Bd), first described in 1998 (Longcore et al. 1999), is a fungal pathogen that has affected more than 200 amphibian species in 6 countries (Skerratt et al. 2007). Blue-spotted salamander mortality was not observed in a study that exposed individuals to the disease (Gahl et al. 2012). Although not yet identified in blue-spotted salamanders, ranaviruses have been shown to cause mortality in at least 14 families and more than 70 individual species of amphibians, (Miller 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). Global warming may also increase the frequency of fungal outbreaks (Gibbs et al. 2007).

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

No     Unknown

Yes

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.

The Freshwater Wetlands Act provides protection for wetlands greater than 12.4 acres in size under Article 24 of the NYS Conservation Law. The Army Corps of Engineers has the authority to regulate smaller wetlands in New York State, and the DEC has the authority to regulate smaller wetlands that are of unusual local importance. The seasonal woodland pools that are required for breeding have no regulatory protection in New York State.

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

Protection of habitat. Tunnels that allow salamanders to cross roads that bisect upland habitat and breeding pools have been proven effective for *Ambystoma* species (Pagnucco 2012). The NJ SWAP recommends a 300m buffer around wetlands.

deMaynadier and Houlahan (2007) conclude that partial harvesting of the immediate upland forest around a vernal pool is compatible with the conservation of vernal pool obligate amphibians, provided that Habitat Management Guidelines are followed. These guidelines include a vernal pool protection zone of (31 m [100 ft]), and a vernal pool life zone (31-122 m [100-400 ft]).

Conservation actions following IUCN taxonomy are categorized in the table below.

<b>Conservation Actions</b>	
<b>Action Category</b>	<b>Action</b>
Land/Water Protection	Resource & Habitat Protection
Land/Water Management	Site/Area Management
Land/Water Management	Habitat and Natural Process Restoration
Land/Water Management	Invasive/Problematic Species Control
Law/Policy	Legislation

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for vernal pool salamanders, which includes blue-spotted salamander.

**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 enhancement:**

- \_\_\_ Employ restoration techniques for tiger salamanders at selected sites as needed, including head starting, and repatriation/relocation strategies.

**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.

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