Species Status Assessment

Class: Amphibia
Family: Ambystomidae
Scientific Name: *Ambystoma jeffersonianum*
Common Name: Jefferson salamander

Species synopsis:

The distribution of the Jefferson salamander is restricted to the northeastern quarter of the United States extending as far to the southwest as Illinois and Kentucky; the species is represented in Canada only in a small area of southern Ontario. The habitat includes upland deciduous or mixed woodlands as well as bottomland forests adjacent to disturbed and agricultural lands. Breeding occurs in temporary ponds or semi-permanent wetlands (Gibbs et al. 2007).

Hybridization occurs between the Jefferson salamander and the blue-spotted salamander (*A. laterale*). 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 lead 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.

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 G4

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

Other Rank:
Species of Northeast Regional Conservation Concern (Therres 1999)
Species of Severe Concern and High Responsibility (NEPARC 2010)

Status Discussion:
Jefferson salamander is considered to be locally abundant in suitable habitat across New York. It has been designated as a Species of Regional Conservation in the Northeast due to its unknown population status and taxonomic uncertainty (Therres 1999). NEPARC (2010) lists Jefferson salamander as a Species of Severe Concern because more than 75% of northeastern states list it as SGCN, and as a High Responsibility Species because the Northeast comprises more than 50% of its distribution.

II. Abundance and Distribution Trends

a. North America

i. Abundance

____ declining ____increasing _____stable __X__ unknown

ii. Distribution:

____ declining ____increasing _____stable __X__ unknown

Time frame considered: _____

b. Regional (e.g., Atlantic Flyway, USFWS Region 5 – Northeast, Watershed, Hydrologic Unit)

i. Abundance

____ declining ____increasing ____stable __X__ unknown

ii. Distribution:

____ declining ____increasing ____stable __X__ unknown

Regional Unit Considered:_____Northeast_____
Time Frame Considered: _____

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: ___Not specified_____
Listing Status: _____Special Concern_____ SGCN? __Yes____

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

i. Abundance

____ declining ____increasing ____stable ____unknown

ii. Distribution:

____ declining ____increasing ____stable ____unknown

Time frame considered: _76 occurrences since 1980; no trend_____
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: _____
Listing Status: _____Special Concern_____ SGCN? __Yes___

ONTARIO **Not Present _____** **No data __X___**

i. **Abundance**

____ declining ____increasing _____stable ____unknown

ii. **Distribution:**

____ declining ____increasing _____stable ____unknown

Time frame considered: _____
Listing Status: _____Threatened_____

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

i. **Abundance**

__X__ declining ____increasing ____stable ____unknown

ii. **Distribution:**

__X__ declining ____increasing ____stable ____unknown

Time frame considered: ___Not Specified_____
Listing Status: _____Not Listed_____ SGCN? ___Yes___

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

i. **Abundance**

____ declining ____increasing _____stable ____unknown

ii. **Distribution:**

____ declining ____increasing _____stable ____unknown

Time frame considered: _____
Listing Status: _____

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

i. Abundance

____ declining ____increasing ____stable __X__ unknown

ii. Distribution:

____ declining ____increasing ____stable __X__ unknown

Time frame considered: _____
Listing Status: _____Special Concern_____ SGCN? __Yes____

d. NEW YORK **No data _____**

i. Abundance

____ declining ____increasing ____stable __X__ unknown

ii. Distribution:

____ declining ____increasing ____stable __X__ 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:

Population trends for Jefferson salamanders are unknown, but there is concern globally and regionally due to habitat loss and hybridization. Jefferson salamander was identified by the Northeast Technical Committee as a species of special concern due to a high risk of the species disappearing from the Northeast, lack of data, and a high percent of the range occurring in the Northeast. Some states have indicated a declining trend in the SWAP, as noted above.

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 in general and concern in northeastern states is based on known threats including loss of wetland habitat, road mortality, and acid rain.

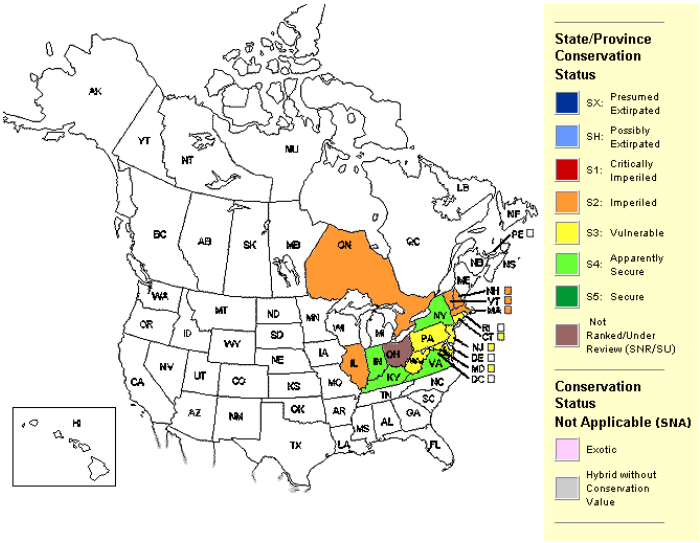

Figure 1: Conservation status of Jefferson salamander in the United States (NatureServe 2013).

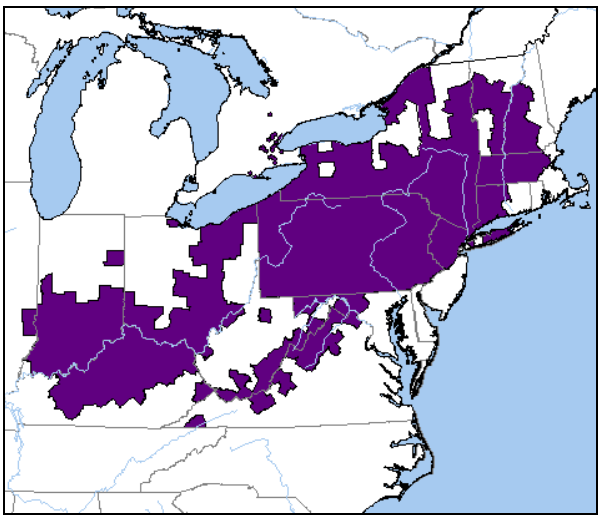

Figure 2: Distribution of Jefferson salamander in the United States (NatureServe 2013). Data developed as part of the Global Amphibian Assessment and provided by IUCN-World Conservation Union, Conservation International and NatureServe.

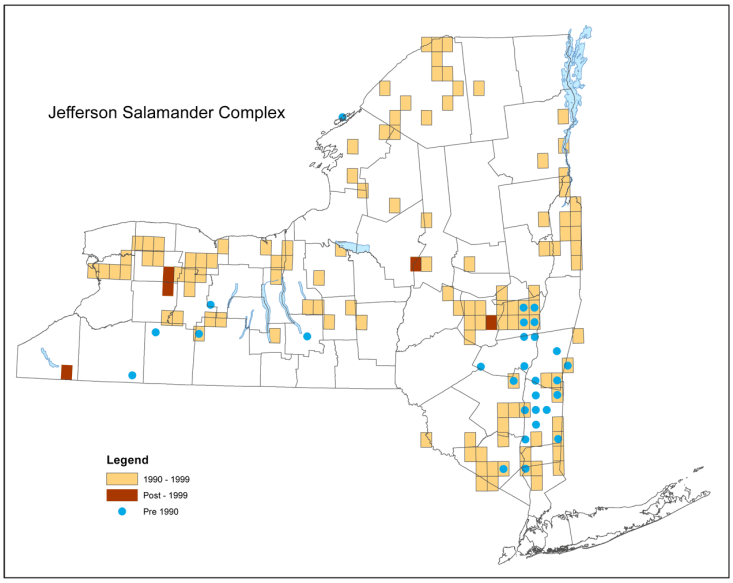

Figure 3: Distribution of Jefferson salamander complex in New York (NYS Herpetology database, NYSDEC).

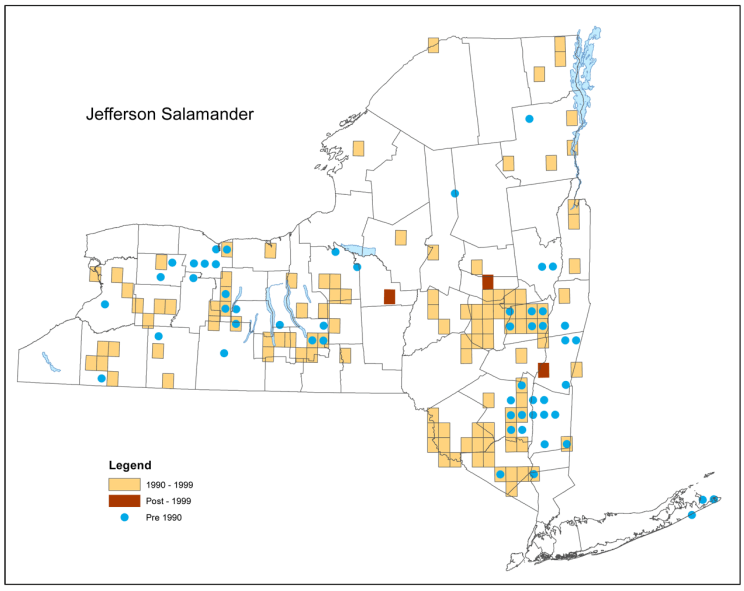

Figure 4: Distribution of Jefferson salamander in New York (NYS Herpetology database, NYSDEC).

III. New York Rarity, if known:

Historic (select one)	**# of Animals**	**# of Locations**	**% of State**
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

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.

Current	**# of Animals**	**# of Locations**	**% of State**
	_____	_____	15%

Details of current occurrence:

The New York Amphibian and Reptile Atlas (1990-99) documented Jefferson salamander in 112 survey quads (15%). Jefferson salamander complex was reported in 119 survey quads. During the Atlas period, there were 185 survey quads statewide with records of either Jefferson salamander or Jefferson salamander complex. Since 2000, records for the complex were added to the NY Herpetology database in an additional 8 survey quads and in an additional 3 quads for pure Jefferson salamander.

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
__X__ 26-50	Distance to core population:
____ 1-25	_____

Rarity Discussion:

In an extensive survey of New England and New York, Bogart and Klemens (1997) did not find any "sizable" populations. The Northeast comprises greater than 50% of the distribution in the United States (NEPARC).

IV. Primary Habitat or Community Type:

1. Mixed Northern Hardwoods
2. Hardwood Swamp
3. Vernal Pool
4. Northern Swamp

Habitat or Community Type Trend in New York:

__X__ Declining ____Stable __X__ Increasing ____Unknown

Time frame of decline/increase: __wetlands declining since 1970s, forests stable_____

Habitat Specialist? __X__ Yes _____ No

Indicator Species? __X__ Yes _____ No

Habitat Discussion:

Jefferson salamanders occur in deciduous forest and mixed deciduous-coniferous forests with abundant tree stumps and downed logs that provide shelter. They also occur in bottomland forests adjacent to disturbed and agricultural lands. Breeding occurs in ephemeral pools and in semi-permanent wetlands adjacent to woodland habitats. Breeding pools are generally cool, slightly turbid, and with a forested shoreline and emergent vegetation on the bottom. Fish-free ponds are preferred but some populations will breed where fish are present (Gibbs et al. 2007).

V. 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:

Summarized from Gibbs et al. (2007): Breeding occurs in early March through April when rainy nights inspire movement of males to breeding pools. Females arrive a few days after males and mating occurs in the pond for the next several days to two weeks. Each female lays 100-300 eggs per season. Loose masses of 20-30 eggs are attached to submerged vegetation. Eggs hatch in 2-3 weeks into aquatic larvae, which metamorphose into terrestrial juveniles in mid-July to the end of August. Sexual maturity is attained at three years of age. Larvae are predated upon by predacious diving beetles, larval dragonflies, larger larval salamanders, snakes, and fish where present. Terrestrial juveniles and adults are preyed upon by snakes, birds, and mammals.

The home range of Jefferson salamanders varies from 11 – 1,950 square feet in males and 100 – 1,227 square feet in females and migration distances have been reported from a mean 69 feet to 826 feet from breeding ponds (Colburn 2004).

VI. Threats:

Known threats to all salamanders include loss and degradation of habitat due to conversion of land to agriculture and urban areas. Jefferson salamanders appear to be especially sensitive to disturbance. 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. Acidification of breeding ponds affects productivity in Jefferson salamanders. Sites with lower pH have fewer egg masses and higher concentrations of aluminum and sulfate. Breeding is most successful where pH is between 5 and 6 (see Gibbs et al. 2007).

Roads negatively affect blue-spotted salamander abundance in roadside habitats (deMaynadier and Hunter 2000); Jefferson salamanders may travel up to 477 feet to breeding pools (Semlitsch 1998). 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).

Jefferson salamanders interbreed with blue-spotted 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. Jefferson salamanders may have been outcompeted by blue-spotted salamanders in some areas.

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). Climate change that affects hydroperiod and/or water temperature of

breeding 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).

First identified in the 1960s (Granoff et al. 1965), ranaviruses have been shown to cause mortality in at least 14 families and more than 70 individual species of amphibians, including Jefferson salamanders (Miller et al. 2011).

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

_____ No ____ Unknown

__X__ 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:

Semlitsch (1998) reviewed literature on several Ambystoma species and concluded that a radius of less than 200 meters around a breeding pond would likely encompass the terrestrial habitat used by more than 95 percent of adults. A study of radio-tagged Jefferson salamanders and spotted salamanders in Vermont supports this conclusion (Faccio 2003).

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

Conservation Actions	
Action Category	**Action**
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 Jefferson 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.

VII. References

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