

## ***Jefferson salamander***

*Ambystoma jeffersonianum*

### Status

Federal status: G4 N4, Not listed

NH state status: S2S3, Not listed

ME state status: N/A

This species hybridizes widely with the blue-spotted salamander, *Ambystoma laterale*. The hybrids are almost exclusively made up of females, and these females are unable to reproduce successfully without contribution of male gametes from one of the parent species. Because hybrid populations cannot exist alone, it is not valid to define them as separate species. Most hybrids are triploid. If genetic work is done, it can be determined which species is the greater contributor to an individual. Taxonomy of these species is very confusing and clouds the question of species status when many individuals are hybrids.

Population trends for Jefferson salamanders are unknown, however there is concern globally and regionally due to habitat loss and hybridization. It 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 concentration of the species' range in the northeast.

Expert panel had no information on historic or current conditions to determine outcomes for the WMNF. Range-wide and GMNF outcomes were C currently and D in the next 20 years. A decline in outcome was expected due to hybridization with blue-spotted salamanders. WMNF outcomes are assumed to be similar to GMNF outcomes, if the species occurs, given similar land management activities.

### Distribution

Hybridization with the blue-spotted salamander makes the delineation of the species' range rather difficult. Populations consisting of pure Jefferson salamanders, with no genetic contribution from other species, range from southern New York through northern Virginia and west through Kentucky. The zone of hybridization occurs from southern Canada through New England, New York and west through the Great Lakes region.

Bogart and Klemens found no sizable populations of pure *A. jeffersonianum* in their study in the Northeast. They found that *A. jeffersonianum* genes are widespread in eastern North America, but mostly reside in hybrids. They believe that this species is probably much less common than its published range suggests. In Vermont and New Hampshire, the majority of salamanders with blue spots are thought to be hybrids, with more genetic contribution from *A. laterale* than from *A. jeffersonianum*. 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.

The Reptile and Amphibian Reporting Project of the New Hampshire nongame program lists 13 towns, but does not distinguish among the different hybrids. The towns are: Ashland, Bradford, Hancock, Hart's Location, Holderness, Hollis, Keene, Lee, Lyme,

Sutton, Warner, Westmoreland, and Winchester. The only verified Jefferson salamander record is from Winchester, Cheshire County, in May 1984, and is a single male Jefferson with genotype JJ. The Hart's Location occurrence is on or near WMNF, but it is uncertain which species or type of hybrid it was.

Pure specimens of this species do not occur in Maine, although the Jefferson genotype is found in hybrid specimens. Blue-spotted salamanders and their associated hybrids (which contain the Jefferson genotype) have not been found to occur in the WMNF in Maine.

### Habitat

Jefferson salamanders require a mix of wetland and forested habitat. Vernal to semi-permanent pools are preferred breeding areas. Other wetlands such as shrub swamps may be used, but not as often as blue-spotted salamanders use them. Breeding pools usually lack fish, and must hold water into mid-summer to ensure survival of young. In New England, breeding pools may be shared with spotted (*Ambystoma maculatum*) and blue-spotted salamanders, and wood frogs (*Rana sylvatica*).

Egg masses are usually laid near the edges of the pool, attached to submerged branches or vegetation. These structures also provide cover for larvae. Pools with low pH are sometimes used, but survival of eggs and larvae are usually extremely low below a pH of 4.5. Breeding wetlands are usually surrounded by forest or a dense border of shrubs, especially alder, red maple, buttonbush, and dogwood.

Terrestrial habitat surrounding breeding pools is usually undisturbed, well-drained hardwood or mixed upland forests; hemlock forests are sometimes used as well. In New England, most specimens have been observed below 1700 feet in elevation. They are usually found in mature forest with rocky soils, a duff layer, pit and mound topography, logs >10 cm in diameter, and a relatively closed canopy, preferably 70% canopy closure or greater. Lowland areas prone to flooding are usually avoided. Areas are often rocky with a moderate to steep gradient. As adults, Jefferson salamanders spend much of the summer and fall under leaf litter or rotting logs or underground in small mammal burrows. These habitat features also provide suitable areas for hibernation. Habitat use in Vermont indicates a preference for logs and stumps, and a high density of vertical mammal tunnels.

### Limiting Factors

Most Jefferson salamanders in New England are hybrids. Hybridization among species may result in populations that are skewed towards females; ratios of 20 females to 1 male have been reported. Some researchers have suggested that a reduction in the number of males in the population will result in many non-viable eggs and possibly lead to the loss of some local populations.

Habitat loss is a serious threat to many salamanders, but the Jefferson salamander is especially intolerant to disturbance. Both vernal pools and surrounding mature forest habitats must be protected to maintain local populations. Many landowners currently protect wetlands. However small vernal pools that Jefferson salamanders typically use are sometimes overlooked in the dry season, or receive little or no protection.

Intense forest clearing and development near breeding areas not only eliminate habitat, but also isolate and reduce the suitability of remaining habitats. Roads near breeding pools can create barriers to salamander migration. Traffic on roads that cross breeding and terrestrial habitats may result in mortality of many individuals. The removal of suitable coarse woody debris from the forest floor eliminates important habitat features and could reduce local populations.

Some local populations may be threatened by pollution and collection of salamanders by humans. Many scientists are concerned that acid precipitation may lower pH levels in breeding ponds and these low pH levels may reduce the survival of eggs and larvae, as well as slow growth and increase deformities.

#### Viability concern

Species status is uncertain, but there appears to be extensive concern among experts due to habitat loss and the effects of hybridization. Panel outcomes indicate that the species may be at or just below the viability threshold now range-wide and regionally, and moving down toward a D outcome due to hybridization. Management may affect this species as well. Management impacts alone might not result in a viability concern, but they can add additional stress to populations already threatened by hybridization.

#### Management activities that might affect viability

Clearcut or seed tree harvest of Jefferson salamander terrestrial habitat would make habitat unsuitable for several decades. Openings created between terrestrial and breeding habitat could reduce suitability of the breeding habitat by limiting access. Research in Vermont indicates a preference for at least 70% canopy closure, so partial harvest could make habitat unsuitable if it would reduce canopy closure below this level. Forest practices such as on-site delimiting, slash management, and retention of scattered large trees and snags may increase coarse woody debris needed by this species.

Road construction adjacent to breeding wetlands or between wetlands and terrestrial habitat can reduce suitability of breeding habitat and increase mortality during migration to and from breeding habitats.

Management that alters the hydrology of a breeding site so that water is not retained into midsummer would eliminate suitable breeding habitat.

Stocking fish in suitable breeding habitats that would otherwise be fishless would reduce reproduction at the site.

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