

Species Status Assessment

Class: Gastropoda
Family: Succineidae
Scientific Name: *Novisuccinea chittenangoensis*
Common Name: Chittenango Ovate Amber Snail

Species synopsis:

The Chittenango ovate amber snail (COAS) is an endemic terrestrial snail only known from a single location in Chittenango State Park of Madison County, New York. It is federally listed as a threatened species because of its rarity, narrow habitat range and population declines, and although protection measures have been implemented since listing, its status remains precarious. Its only known habitat is comprised of a ravine at the base of a 167-foot waterfall due to its requirement for cool, mild temperatures and misty conditions. This taxon was reportedly abundant when it was first discovered at Chittenango Falls in 1905 but declined severely due to competition with an invasive snail *Succinea* sp. B and human disturbance of its critical habitat. The population appears to be increasing since the start of a mark-release-recapture study in 2002 and the average population size over the last five survey years is estimated between 400 and 500 individuals (NYNHP 2013).

I. Status

a. Current and Legal Protected Status

- | | | | |
|--------------|------------------|------------|-----|
| i. Federal | Threatened | Candidate? | N/A |
| ii. New York | Endangered; SGCN | | |

b. Natural Heritage Program Rank

- | | | |
|--------------|----|-----------------------|
| i. Global | G1 | |
| ii. New York | S1 | Tracked by NYNHP? Yes |

Other Rank:

None

Status Discussion:

This species is state-ranked Critically Imperiled due to its extremely narrow range and small population size, although the single extant location is protected and located in a state park. It was originally proposed to be listed as a federally endangered species in 1976 due to its apparent declining population and limited range, but was ultimately listed as threatened in 1978 because of the presumed existence of a second colony in Tennessee and North Carolina. Since listing, it has been determined that the Tennessee/North Carolina snails are not the same species and the Chittenango Falls colony is the only known population in the world. Its recovery priority number is 5 (high of 1C to a low of 18), based on a high degree of threat, low recovery potential and taxonomic standing as a species. It was state-listed as endangered in 1977 by the NYSDEC.

II. Abundance and Distribution Trends**a. North America****i. Abundance**

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: _____

b. Regional**i. Abundance**

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Regional Unit Considered: _____ Chittenango Falls State Park _____

Time Frame Considered: _____ 2002 – 2007 _____

c. Adjacent States and Provinces

CONNECTICUT	Not Present <input checked="" type="checkbox"/>	No data _____
MASSACHUSETTS	Not Present <input checked="" type="checkbox"/>	No data _____
NEW JERSEY	Not Present <input checked="" type="checkbox"/>	No data _____
ONTARIO	Not Present <input checked="" type="checkbox"/>	No data _____
PENNSYLVANIA	Not Present <input checked="" type="checkbox"/>	No data _____
QUEBEC	Not Present <input checked="" type="checkbox"/>	No data _____
VERMONT	Not Present <input checked="" type="checkbox"/>	No data _____

d. NEW YORK **No data** _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: _____ 2002 - present _____

Monitoring in New York.

The NYSDEC and SUNY ESF have conducted mark-release –recapture studies almost every year from 2002-2007. Empty shells and *Succinea* sp. B individuals were removed during the surveys.

Trends Discussion:

Accurate population trends are not available for this species due to infrequent surveys, difficulty of surveying the falls habitat, and confusion of identification due to similarities with *Succinea* sp. B. and *Novisuccinea ovalis*. The COAS was described as abundant when it was first discovered at Chittenango Falls in 1905. Prior to 1982, no estimates were made on the size or status of the population. After conducting a mark-recapture study in a patch of watercress where the snails appeared most densely, Aloia and Ringler (1982) estimated a population of about 300 snails with a density of four snails per square meter of watercress habitat. In 1984, the counts indicated a

population of about 100 adults, whereas the population of *Succinea* sp. B expanded rapidly to an estimated 3,000 or greater snails. The recovery plan was completed in 2006 and full protection of the snail's habitat has been achieved and a captive population program is underway, but the status of this species is still precarious.

By 1990, the population had declined to fewer than 25 individuals and in the following years no more than 5 living animals were found during any surveys (NYNHP 2013). The short term trend is thought to be relatively stable (10% change) while the long term trend shows a decline of 70-90% (NatureServe 2013). Data from more recent mark-recapture studies shows the population is steadily increasing since no adults were observed in 1995 and the average population size is now estimated to be between 400 and 500 individuals (NYNHP 2013). Inter-year comparison of COAS captures shows decreasing trends as the season progressed, but this is likely due to the life history of the species and represents emergence from hibernation in the spring, peak activity during the highest food availability, and its movement back into protected areas in preparation for fall/winter hibernation (Whiteleather 2007).

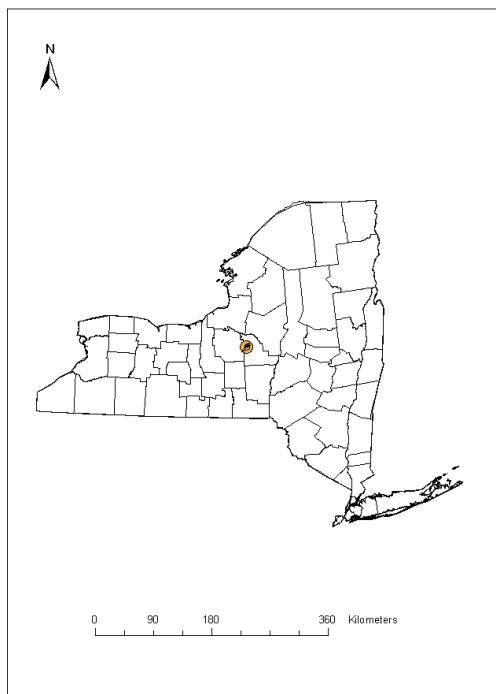


Figure 1. Location of the Chittenango Falls State Park colony of the Chittenango ovate amber snail, Madison County, New York (USFWS 2003).

III. New York Rarity, if known:

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	_____	_____	_____
prior to 1980	<u>~500</u>	<u>1</u>	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

The population in 1974 was estimated to be about 500 individuals. In 1984, about 100 snails were observed; in 1986 4 were observed during one survey and 2 during a later survey; in 1989 10 individuals were observed, in 1991 2-3 snails, and 4 snails in 1992 using a careful invasive searching technique. Founders were collected in 1992 for a captive breeding population. No snails were found in 1995; 1 was found in 1999, and 12 were observed in 2001.

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

Details of current occurrence:

Recent occurrences are as follows: 2001- 12 snails observed; 2002- 106 snails captured, 43 recaptured; 2003- 100 snails captured, 37 recaptured; 2004- 329 snails captured with 93 recaptured, an additional 61 juveniles were captured but not tagged and 28 snails were captured and tagged during a secondary search; 2005- 463 snails captured and an additional 48 juveniles captured but not tagged; 2006- not surveyed; 2007- 282 snails captured, 52 additional juveniles captured and not tagged.

New York's Contribution to Species North American Range:

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

IV. Primary Habitat or Community Type:

1. Vegetated Slope/Cliff Wall
2. Headwater/Creek

Habitat or Community Type Trend in New York:

Declining Stable Increasing Unknown

Time frame of decline/increase: _____

Habitat Specialist? Yes No

Indicator Species? Yes No

Habitat Discussion:

The habitat of the COAS lies within the ravine at the base of the 167 foot waterfall formed by Chittenango Creek as it flows north from Cazenovia Lake toward Oneida Lake. This north-south oriented ravine forms a deep gorge that is shaded or partially shaded throughout most of the growing season, resulting in a relatively cool summer microclimate, and a relatively warm winter microclimate.

The COAS prefers cool, partially sunlit areas of lush herbaceous growth within the spray zone of the Falls. They occur on the vegetated slopes adjacent to the waterfall, preferring the moderate climate and high humidity. Spring thaws and periodic major rainfall events tend to remove vegetation from significant portions of the primary habitat. The only sloping weedy talus is on the east side of the falls and therefore individuals are not present on the west side.

Five parameters have significance in habitat considerations: humidity, substrate, temperature, vegetation, and water quality. They require a substrate, either derived from limestone dolomite or rich in calcium carbonate from other sources; the dynamic nature of the habitat does not allow for the development of soil. They require sustained, very high humidity, and active snails were only found where relative humidity approached 100%. The COAS has a narrow thermal niche, requiring cool, mild-temperatures, and relatively changing conditions provided by the waterfalls and mist. During warmer periods, individuals tend to retreat to cool areas provided by the moist rock and moss, or aestivate in vegetation, while during cold winter temperatures individuals are believed to retreat into the rocks, cracks, or fissures and remain inactive. They are generally found at temperatures from 12 – 20°C. Most of the spray zone is covered with patches of various mosses, liverworts, and other low herbaceous vegetation including *Eupatorium purpureum*, *Angelica atropurpurea*, *Nasturtium officianale*, and *Aster* spp. The actual effect of water pollutants on this species is unclear since it is a terrestrial snail, but it is presumed that clean water is necessary to maintain essential habitat and a healthy population.

Aquatic gastropods are frequently used as bioindicators because they are sensitive to water quality and habitat alteration (Callil and Junk 2001, Salanki et al. 2003).

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 COAS mates from May through July, ovipositing from June through July. They are hermaphroditic, however it is unclear if self-fertilization is possible. Egg clusters of about 8-14 eggs are deposited at the base of plants, under matted vegetation, or in loose wet soil. The young snails hatch in two to three weeks and are believed to reach maturity in five to eight months, or the spring following hatching. Their life span is approximately two and a half years, similar to those in captive populations.

The COAS feeds on microflora and must obtain high levels of calcium carbonate from their environment for proper shell formation. Predators include carabid, staphylinid and lampyrid beetles, and sciomyzid larvae, many of which specialize in feeding upon snails. Other predators may include the northern two-lined, northern dusky, and Allegheny mountain dusky salamanders, which are common in the talus and on the ledges, and various small mammals or birds which are often seen in or near the habitat.

VI. Threats:

The primary threat to this species is its small population size and extremely limited range. Its existence at only one site makes it extremely vulnerable to a catastrophic event that would destroy the whole population. Factors thought to adversely affect the snail population include water pollution, inadvertent habitat disturbance by humans, environmental sensitivity, and the introduction of a closely related pest species. Most of the Chittenango Creek watershed is used for agriculture, with fertilizers, herbicides and pesticides entering the drainage. Road salt also causes high salinity in the watershed. Although water quality appears to be high overall, short pulses of polluted runoff could be detrimental to the small population.

Although destruction of habitat due to development is not an issue at Chittenango Falls State Park, habitat has been modified by human disturbance. Over 100,000 visitors come to the Park annually to engage in outdoor recreational activities; dislodged rocks, talus, and vegetation from anglers or hikers can cause serious harm to individuals and their eggs or can seriously degrade the habitat. Park managers direct visitors away from the critical habitat and the immediate area of the falls is relatively inaccessible but despite these safeguards, some trampling and overturned rocks are observed and may be severely affecting reproductive success.

In 1984, the *Succinea* sp. b snail was found at Chittenango Falls, probably introduced by accident from Europe. It is outcompeting the COAS for food, breeding or wintering habitat and recent censusing of the snails indicates that the pest species outnumbers the COAS by at least 50 to 1. *Succinea* sp. B has become widespread throughout Chittenango Creek drainage basin both upstream and downstream, including habitat that might otherwise be suitable for the COAS. It is not clear whether the two species have the potential for hybridization and genetic studies are needed to determine their taxonomic relationship and whether any hybridization is occurring. Data indicates these species are capable of coexisting at the falls as long as the ratio of sp. B to COAS doesn't increase 3-6 times over current levels due to spatial portioning at very local scales through differential use of living and dead plant material and differential selection of plant species (Campbell et al. 2010).

The Chittenango ovate amber snail was classified as “extremely vulnerable” to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011). Because it has a limited range and narrow ecological niche, it is more vulnerable and stressed by change than wider-ranging species. Spring thaws and periodic major rainfall events tend to remove vegetation from significant portions of the primary habitat, so more frequent and intense storms due to climate change may have detrimental effects on the primary habitat and the snails themselves. Because the COAS relies on the humid and moist environment provided by the falls, temperature extremes could desiccate individuals in the summer or not provide enough warmth in the winter. It is likely intolerant of large fluctuations in light, temperature, and humidity.

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

No Unknown
 Yes

The Chittenango ovate amber snail is listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

It is also protected as a federally-listed threatened species. In 1983 the U.S. Fish and Wildlife Service approved the Chittenango Ovate Amber Snail Recovery Plan, providing a detailed outline of activities essential to the protection of a self-sustaining colony.

The Freshwater Wetlands Act provides protection for regulated 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 Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

The only globally known location of this species, Chittenango Falls State Park, is fully protected as a state park administered by the New York State Office of Parks, Recreation and Historic Preservation.

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

Management is necessary to sustain the only known population of the COAS; without intervention it will become extinct. The primary strategy for recovery of this species is to stabilize the extant population at Chittenango Falls. Two necessary conditions for stabilization are: maintaining (or increasing) the baseline population size of the natural colony, and maintaining multiple captive populations.

Actions Needed (USFWS 2006):

- 1- Continue to protect the population and its habitat at Chittenango Falls
- 2- Conduct genetics research
- 3- Expand data on the biological and environmental requirements of the COAS
- 4- Research techniques for the removal of *Succinea* sp. B from the habitat at the Falls
- 5- Increase the population size and broaden the distribution of the COAS as feasible
- 6- Review and track progress

Recovery of this species in part requires strict protection of its habitat (restrict access to the immediate population area) and a reduction of contaminants entering the creek. Removal of *Succinea* sp. B is likely assisting in the population rebounding and should be continued.

VII. References

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