# Species Status Assessment

**Class:** Mammalia
**Family:** Cricetidae
**Scientific Name:** Allegheny woodrat
**Common Name:** *Neotoma magister*

**Species synopsis**:

The Allegheny woodrat (*Neotoma magister*) is not closely related to the Eurasian rats, such as the Norway rat (*Rattus norvegicus*). It is more closely related to the white-footed deermouse (*Peromyscus leucopus*) (Wilson and Reeder 2005).

The species' range extends from western Connecticut (formerly), southeastern New York (virtually extirpated), northern New Jersey, and northern Pennsylvania southwestward through western Maryland, Tennessee, Kentucky, West Virginia, and northern and western Virginia to northeastern Alabama and northwestern North Carolina, with isolated populations north of the Ohio River in southern Ohio and southern Indiana (New York Natural Heritage Program, 2017). The Allegheny woodrat is at the northern extent of its range in New York State.

A decline in the numbers and range of the Allegheny woodrat was first noticed in the 1960s and the decline was considered severe by the mid-1970s. The species is believed to have been extirpated from the state by 1987. There is a single extant occurrence in New York that represents a recent (2001) rediscovery. The population at this location is small and possibly unstable. It is made up of immigrants that occasionally occupy a small patch of habitat in the Palisades on the New York-New Jersey border, which is the northern extreme of the habitat for the last remaining New Jersey woodrat population (NYSDEC 2005). A small population size makes the single New York site subject to extirpation.

## I. Status

### a. Current and Legal Protected Status

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

**ii. New York** Endangered

### b. Natural Heritage Program Rank

**i. Global** G3G4

**ii. New York** S1 **Tracked by NYNHP?** Yes

**Other Rank:**

IUCN Red List: NT - Near threatened
Species of Northeast Regional Conservation Concern (Therres 1999)

**Status Discussion:**

The Allegheny woodrat is at the northern extent of its range in New York State with only one extant occurrence in Rockland County. This species historically occurred in at least three counties in the Hudson River Valley, on the west side of the Hudson River, from the Palisades at the New York-New Jersey border north through the Hudson Highlands and the Shawangunk Ridge (Hicks, 1989a).

A 1990 reintroduction effort in the Shawangunks in Ulster County was unsuccessful due to subsequent infection by the raccoon roundworm (*Baylisascaris procyonis*) in the released animals (McGowan 1993). Raccoon roundworm poses a problem to Allegheny woodrats because their foraging behavior makes them more susceptible to encountering feces from raccoons (Logiudice 2001).

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**__X__ declining ____increasing _____stable _____unknown**

**ii. Distribution:**

**__X__ declining ____increasing _____stable ____unknown**

**Time frame considered:** ____Severe decline_____

### b. Regional

**i. Abundance**

**__X__ declining ____increasing ____stable _____unknown**

**ii. Distribution:**

**__X__ declining ____increasing ____stable _____unknown**

**Regional Unit Considered:**__Severe Decline in_Northeast _____
**Time Frame Considered:** ____Decline began in 1930s; drastic by 1960s_____

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present __X____** **No data _____**

**i. Abundance**

**____ declining ____ increasing ____ stable ____unknown**

**ii. Distribution:**

**____ declining ____ increasing ____ stable ____unknown**

Time frame considered: _Northeastern decline 1960s; CT extirpation date____ unknown_____
Listing Status: _____ Not listed (SH)/ SCX_____ SGCN? __Yes____

**NEW JERSEY** **Not Present _____** **No data _____**

i. **Abundance**

**__X__ declining ____ increasing ____ stable ____unknown**

ii. **Distribution:**

**__X__ declining ____ increasing ____ stable ____unknown**

Time frame considered: ___Several populations have been extirpated for at least 20 years; the single known remaining population has been relatively stable in recent years, based on trapping results in 1999-2001_____
Listing Status: _____Endangered_____(S1)_____ SGCN? ___Yes_____

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

i. **Abundance**

**__X__ declining ____increasing ____stable ____unknown**

ii. **Distribution:**

**__X__ declining ____increasing ____stable ____unknown**

Time frame considered: __Severe decline since the 1960s_____
Listing Status: _____Threatened___(S3)_____ SGCN? ___Yes_____

* PA Threatened Northeast Region Priority Species – warranting Federal prelisting consideration

**QUEBEC** **Not Present ___X___** **No data _____**

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

**ONTARIO** **Not Present ___X___** **No data _____**

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

**d. NEW YORK** **No data _____**

**i. Abundance**

**__X__ declining ____ increasing ____ stable _____ unknown**

**ii. Distribution:**

**__X__ declining ____ increasing ____ stable _____ unknown**

Time frame considered: __Decline 1960s, Considered extirpated by 1987 until rediscovery in 2001___

**Monitoring in New York.**

Surveys are not currently being conducted in New York. Field investigations were conducted by DEC beginning in 1978, with the majority of those surveys taking place in 1980 and 1981. Survey sites included the known historical range of the species and beyond, and were identified from USGS topographic maps by the presence of severe slopes with probable cliff and talus. Historical sites, and rock outcroppings identified during aerial and roadside surveys, were also searched (Hicks 1989b).

**Trends Discussion:**

Although it is the northern limit of the species range, there is a record of Allegheny woodrat occurrence at archeological sites in southeastern NY, which shows a historic range that extends as far as Albany (Hicks 1989a)

As recently as the mid-1960s, the woodrat could be found wherever large boulders accumulated in layers deep enough to form complex systems of passageways. Based on the evidence of sign found during field investigations in the early 1980s, it was concluded that woodrats occurred in every rock talus containing large boulders and substantial crevices within the historical range of the species in New York. Many of these sites showed the longevity of inactive middens, which varied from a few years to decades (Hicks 1989b).

Allegheny woodrats even occupied areas in New York that would be considered sub-marginal by 1980s survey standards because they lacked an accumulation of large boulders. Small, isolated sections of these areas that did qualify as suitable habitat could have only sustained small populations, and would be vulnerable to extirpation. The presence of woodrats in these sub-marginal sites suggests that they regularly received overflow of substantial populations elsewhere in large talus fields, or that the habitat requirements for the species had changed (Hicks 1989b).

By the mid-1970s, the Allegheny woodrat was in decline in the state. By 1980, biologists knew of only 5 extant sites, the last of which became extirpated in 1987.

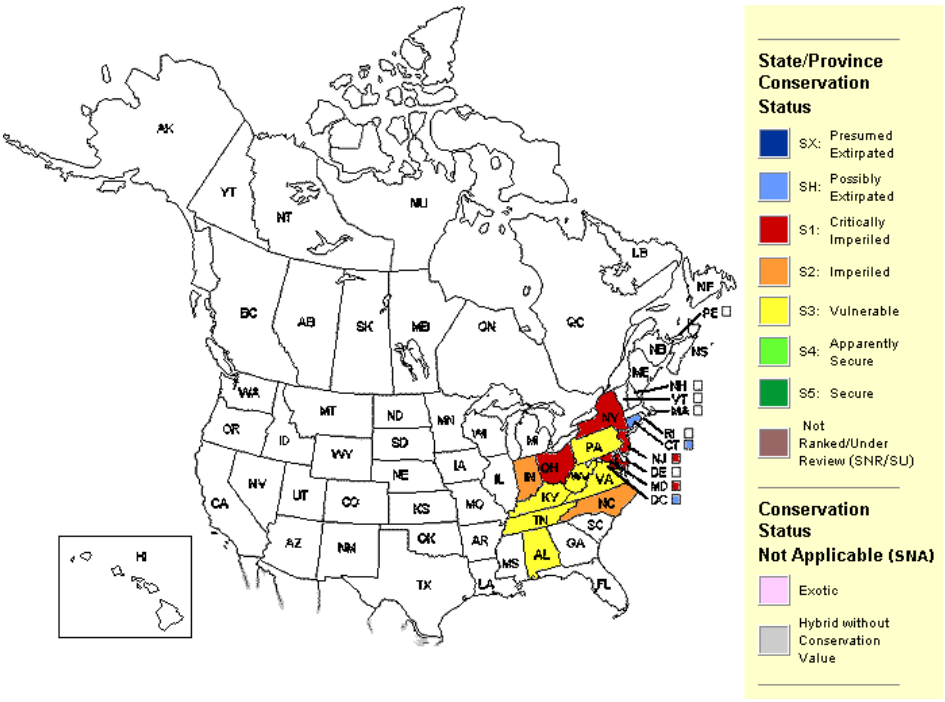


**Figure 1.** Conservation status of the Allegheny woodrat in North America (NatureServe 2012).

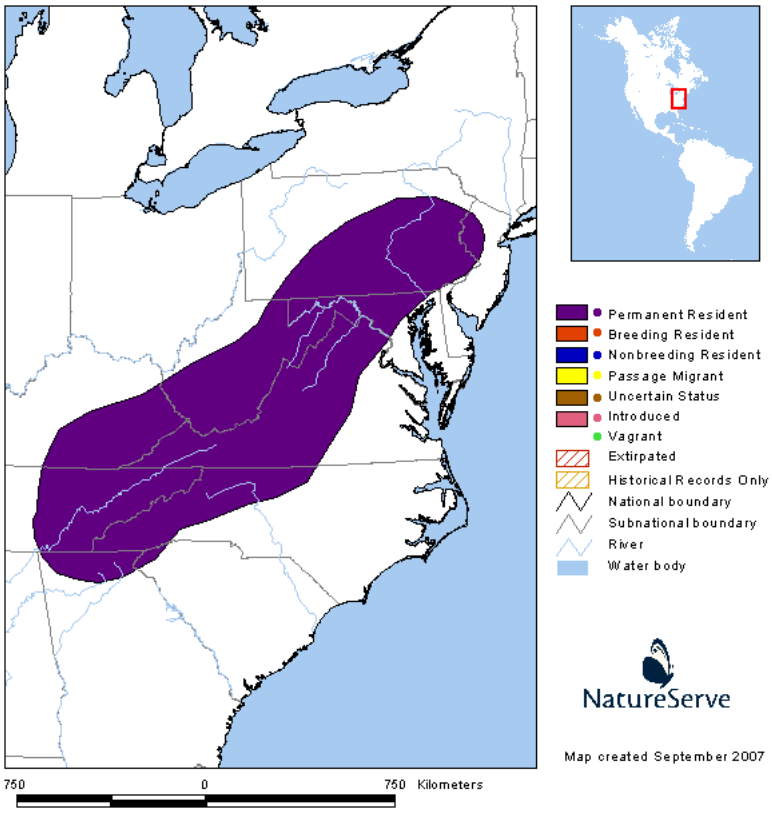


**Figure 2**. Distribution of the Allegheny woodrat in North America (NatureServe 2012).

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

| Historic | # of Animals | # of Locations | % of State |
|---|---|---|---|
| **prior to 1970** | _____ | _____ | _____ |
| **prior to 1980** | _____ | _____ | _____ |
| **prior to 1990** | _____ | 31 | _____ |

**Details of historic occurrence:**

Records are known for 31 historical sites within 4 counties (Rockland, Orange, Ulster, and an accepted but suspicious record from Westchester (Hicks 1989b).

| Current | # of Animals | # of Locations | % of State |
|---|---|---|---|
| | 6 | 1 | <1% |

**Details of current occurrence:**

The species was rediscovered in the Palisades in 2001 and this is thought to be only extant site in the state. There is a slim chance some could still exist at Storm King Mountain where they were extant but in severe decline in the mid-1980s, and where the last known remaining individuals were live-trapped for a captive breeding program in the late 1980s. Four individuals were trapped at the Palisades in 2001 and two were trapped in 2003. Additional evidence (i.e., fresh droppings) was also noted during both surveys. It is difficult to estimate the numbers that are present in the New York portion of the site, but it is likely that the population in New York is small and fluctuates.

**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** | ~200 mi |

## IV. Primary Habitat or Community Type :

**1.** Cliff and Talus

**2.** Surface Mining

**3.** Caves and Tunnels

**4.** Oak Forest

**5.** Erosional Bluff

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

**____ Declining ____Stable ____ Increasing __X__ Unknown**

**Time frame of decline/increase: _____**

**Habitat Specialist? __X__ Yes _____ No**

**Indicator Species? _____ Yes __X__ No**

**Habitat Discussion:**

Throughout the range, the Allegheny woodrat is associated with extensive rocky areas. The areas where the woodrats make their dens include rock outcrops and ledges with associated boulders and talus slopes. (Howell 1921, Poole 1940). Woodrat habitat also includes caves and former mines in these rocky locations (e.g., old iron mines in the Hudson River Valley). Woodrats tend to avoid humans, but the species has been reported to use abandoned buildings (A.C.Hicks, pers. comm). The habitats that formerly supported woodrat populations are generally at higher elevations, although in New York the species has been documented to occur along the Hudson River at or near sea level. During winter, woodrats tend to remain in caves and crevices. While home ranges may overlap, each woodrat defends its own den (Poole 1940).

## 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:**

The generally nocturnal Allegheny woodrat is a solitary and territorial animal, except during the breeding season and when raising young. Allegheny woodrats are found in population clusters, largely due to the patchiness of the habitat that the species occupies and these clusters function as metapopulations (Hassinger *et al.* 1996). The home range is small and has been reported as 0.26 to 0.6 ha (approximately 0.6 to 1.5 acres, Wright and Hall 1996). Foraging takes place mainly within the rocky habitat, but may extend beyond the rocks for up to 160 meters (525 feet) (Wright and Hall 1996). Woodrats can disperse significant distances between patches of suitable habitat, from 0.3 to 1 km (McGowan 1993) or greater, but as distances increase, the odds of successfully traveling between patches of rock may decrease.

Female woodrats may become sexually mature in 5 to 6 months with some females breeding in the same season as their birth, although they usually become sexually mature the following spring(Wiley 1980, Hicks 1989a). The breeding season is reported as late winter to late summer, with a gestation period of 30 to 38 days (Birney 1973, NYSDEC 2013), and the young are born from March to September (Merritt 1987, Females usually produce 1 or 2 litters of 1 to 3 young annually (Hicks 1989a).

Both males and females inhabit dens among rocks and generally stay within rocky habitats except when searching for food or mates, or during natal dispersal (Poole 1940). An adult male was reported to have moved 3, 615 m in 49 days (Thomas 2001). The longest movement recorded for a female was 405 m (Monty and Feldhamer 2002). In a study of 34 radio-tagged woodrats, mean home range for males was 6.5 +/- 1.8 ha and for females was 2.2 +/- 0.3 ha (Castleberry *et al.* 2001).

The lifespan of the Allegheny woodrat has been reported to be more than 3 years in the wild (Thomas 2001) but, as mortality is normally high, the average may be significantly shorter. Woodrats are primarily herbivores and eat a variety of food items including green leafy material, twigs, nuts, berries, and seeds (Hicks 1989a,). Fungi may be a significant part of the diet (Newcombe 1930). The seed pods of royal paulownia (*Paulonia tomentosa*) have been reported as winter food in New Jersey (Beans 1992) and this plant is present in the single extant location in New York.

## VI. Threats:

Four main causes for population declines have been suggested. These include increased predation by great horned owls (Monty and Feldhamer 2002), changes in the landscape including forest fragmentation and changing forest composition (Balcom and Yahner 1996), reduced availability of acorns (McManus and McIntyre 1981) and American chestnuts (Wood and Shanks 1959), and infection with raccoon roundworm (McGowan 1993 a & b).

An unsuccessful reintroduction effort in 1990 proved the degree of threat by raccoon roundworm. The eggs of *B. procyonis* are contained within raccoon feces and contaminate the soil when the feces decompose. Because raccoons are often attracted to the same rocky sites preferred by woodrats, an increase in raccoon numbers plus the woodrat's collecting behavior put the species at great risk of infection (LoGiudice 2000, McGowan 1993a) which leads to eventual death (Kazacos and Boyce 1989, Kazacos *et al.* 1981). The *B. procyonis infection* rate of raccoons in the Midwest and northeast is 68-82%, and eggs in infected feces may remain viable for at least 5-6 years (Kazacos and Boyce 1989).

Gypsy moth defoliation affects mast production (McManus and McIntyre, 1981). Removal of mature mast producers reduces local food resources and causes woodrats to have to travel farther to collect food; the additional exposure may lead to higher predation mortality (Castleberry 2001). In the past, the American chestnut (*Castanea dentata*) provided a source of hard mast for woodrats (Howell 1921, Poole 1940a, Balcom and Yahner 1996). If woodrat populations are isolated from sources of recruitment, and are seasonally dependent on mast crops, drastic reductions of mast production over severe consecutive years could result in possible extinctions (Hicks 1989b).

In some areas, including caves popular with spelunkers, human disturbance has been implicated in the disappearance of woodrat populations (Kirkland 1986). These woodrats do seem to avoid areas of human habitation or heavy human use, but many sites where they have disappeared are remote and rarely visited by people and Balcom and Yahner (1996) concluded there was no evidence that this contributed to the decline.

The species has not been assessed at this time, but is has been identified by The New York Natural Heritage Program, the NYS Department of Environmental Conservation, and the Nature Conservancy as a second-priority species recommended for assessment of vulnerability to predicted climate change (Schlesinger *et al.* 2011).

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

**_____ No** **____ Unknown**

**__X__ Yes**

The Allegheny woodrat 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.

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

A state recovery plan was developed and drafted by Hicks (1989) with the goal of perpetuating woodrat populations within New York State. The primary objective involved identification or establishment of at least 5 woodrat populations under protective management, each of which was to exceed the minimum viable population size for the species. Each was required to have a stable or increasing population in excess of the minimum viable population size for 10 years. The establishment of at least 5 geographically distinct woodrat populations in large talus areas that once harbored woodrats seemed at the time to be feasible based solely on the availability of talus. The determination of how many individuals are needed to sustain a population of Allegheny woodrats has yet to be determined and is a research need.

Objectives of the drafted plan were as follows:

1. *Confirm the current size and distribution of New York's woodrat population.*
    a. *Re-survey all historic and potential woodrat sites and all sites surveyed in the early 1980s for signs of woodrat activity.*
    b. *Trap all sites where current occupation is suspected.*
    c. *Determine the size of any newly discovered population.*
2. *Accurately assess the taxonomic status of the subspecies N. f. magister.*
    a. *Conduct genetic studies to determine if N. f. magister is a subspecies or a full species.*
3. *Determine the frequency of past range expansions and contractions for the subspecies.*
    a. *Determine the uniqueness of isolated populations in nearby areas where woodrats still exist through genetic studies.*
    b. *Determine the period of isolation for these populations and estimate their status (e.g. declining or stable) through genetic studies.*
4. *Sustain, through captive breeding, the closest remaining gene pool of New York woodrats.*
    a. *Establish techniques for captive breeding.*
    b. *Maintain the remaining New York male woodrat in captivity and breed him to the maximum extent possible with the closest nearby females. Maintain progeny in captivity.*

c. *Determine location for collection and collect additional woodrats for the captive breeding program.*

d. *Establish and maintain a reliable supply of animals of New York origin for use in:*

i. *Determining the cause or causes of decline.*

ii. *Testing solutions to the causes of the decline.*

iii. *Re-establishing a viable population of woodrats in New York.*

5. *Determine the cause or causes of decline of the Allegheny woodrat.*

a. *Investigate potential causes of decline that have been identified.*

i. *Raccoon roundworm infection*

ii. *Food depletion (possibly due to gypsy moth infestation)*

iii. *Climate change*

b. *Identify and investigate additional causes of decline.*

6. *Rectify, if feasible, factors that are contributing to the species decline.*

a. *Address identified causes of decline and determine costs and effectiveness of needed solutions.*

7. *Evaluate the feasibility of restoration.*

a. *Determine minimum viable population size per colony.*

b. *Develop restoration procedures.*

c. *Determine cost of restoration.*

8. *Restore woodrats to New York.*

a. *Implement restoration.*

b. *Monitor results to determine both short and long term success of the project.*

At this time, management actions are unlikely as the chance of establishing a viable population of Allegheny woodrats appears bleak. Recovery would seem to require a substantial and long term decline in raccoon numbers or decrease in their *B. procyonis* infection rate. Given the ability of raccoons to thrive near human development, and trends away from raccoon hunting and trapping, such a decline is unlikely. Research in areas where woodrats still exist, or perhaps further experimental research in New York, might shed additional light on the problems faced by the species.

Conservation actions following IUCN taxonomy are categorized in the table.

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| Species Management | Species reintroduction |

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the Allegheny woodrat.

**Habitat monitoring:**

___ Monitor raccoon latrine densities within historical woodrat sites following the protocol designed by DEC in 1990 (DEC files).

**Relocation/ reintroduction:**

___ Conduct an experimental release of woodrats at appropriate sites and monitor the results through radio tracking and live trapping.

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