

Species Status Assessment

Class: Insecta

Family: Coccinellidae

Scientific Name: *Coccinella novemnotata*

Common Name: ninespotted lady beetle

Species synopsis:

Coccinella novemnotata is a small, oval-shaped insect that ranges from 4.7 to 7 mm. The head is broad with a pale spot between the eyes. Key characteristics for identifying *C. novemnotata* (also known as C-9) include a large ventral pale trapezoidal spot that extends posteriorly as far as the dorsal spot. The elytra have black spots that get smaller in size and in number until the scutellar spot. Typically, there are a total of nine spots, but the number can vary. Sexes are similar.

C-9 is typically found in open landscapes, especially agricultural land. Aphids are a preferred food.

Historically, this species' range included the Nearctic Region of the United States and southern Canada. It was once considered the most common lady beetle in New York and was named the state insect in 1989. Populations have sharply declined since the 1980s and the species has not been found in the Northeast with the exception of a small population at a farm in Suffolk County, New York (Cornell University 2013).

I. Status

a. Current and Legal Protected Status

- i. Federal None Candidate? No
- ii. New York None

b. Natural Heritage Program Rank

- i. Global G2
- ii. New York not ranked Tracked by NYNHP? no (but planning on it)

Other Rank:

Status Discussion:

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: 1987-present

b. Regional

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Regional Unit Considered: USFWS Region 5 Northeast

Time Frame Considered: 1987-present

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: 1987-present

Listing Status: SH SGCN? No

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 0 of 119 were C-9.

MASSACHUSETTS

Not Present

No data

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: 1989-present

Listing Status: not listed SGCN? N

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 0 of 471 were C-9.

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

i. Abundance

____ declining ____ increasing ____ stable **x** unknown

ii. Distribution:

____ declining ____ increasing ____ stable **x** unknown

Time frame considered: 1989-present_____

Listing Status: not listed_____ SGCN? Y_____

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 0 of 133 were C-9.

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

i. Abundance

____ declining ____ increasing ____ stable **x** unknown

ii. Distribution:

____ declining ____ increasing ____ stable **x** unknown

Time frame considered: 1989-present_____

Listing Status: On High Priority Candidate List_____

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 0 of 90 were C-9.

PENNSYLVANIA Not Present _____ No data _____

i. Abundance

___ declining ___ increasing ___ stable x unknown

ii. Distribution:

___ declining ___ increasing ___ stable x unknown

Time frame considered: 1989- present

Listing Status: not listed SGCN? N

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013); 0 of 407 were C-9.

QUEBEC Not Present _____ No data _____

i. Abundance

___ declining ___ increasing ___ stable x unknown

ii. Distribution:

___ declining ___ increasing ___ stable x unknown

Time frame considered: 1989-present

Listing Status: On High Priority Candidate List

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013); 0 of 101 were C-9.

VERMONT Not Present _____ No data _____

i. Abundance

___ declining ___ increasing ___ stable x unknown

ii. Distribution:

___ declining ___ increasing ___ stable x unknown

Time frame considered: 1989-present

Listing Status: not listed SGCN? N

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 0 of 172 were C-9.

d. NEW YORK

No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: 1970-present _____

Declines first noted during the 1980s. The Lost Ladybug Project (Cornell University 2013): 21 of 1639 were C-9; all were found on the same Long Island farm during the summer of 2011.

Monitoring in New York.

Regular surveys are not taking place, but there is a citizen science project (The Lost Ladybug Project) that started in 2000.

USDA APHIS surveys in 1993 found zero *C. novemnotata* during surveys in 11 Northeastern states, including New York (Harmon et al. 2007, The Lost Ladybug Project, 2013).

Trends Discussion:

C. novemnotata was once widespread and common across North America. As of December 2013, The Lost Ladybug Project reported sightings from only 14 states and two provinces. The majority of the sightings were from the western United States, especially dry, high elevations of Colorado and South Dakota and pan handle of Nebraska (Cornell University 2013). In 1993, USDA APHIS conducted comprehensive surveys in which no *C. novemnotata* were found in the Northeast (Harmon et al. 2007). More recent surveys have shown a sharp decline in the population and range of this species.

C. novemnotata is the state insect of New York. It was once considered the most common lady beetle in the state. The decline went largely unnoticed until the 1980s. The Lost Ladybug Project has

reported a single known location in New York with 21 lady beetles from an organic farm in Amagansett on 8/16/2011 (Cornell University 2013).

Year last collected:

Maryland 1987

Pennsylvania 1987

Delaware 1988

Maine 1992

Declines noted in Alabama, Mississippi since the 1990s. It is possibly extirpated from southern Ontario and is being considered for listing in Canada.

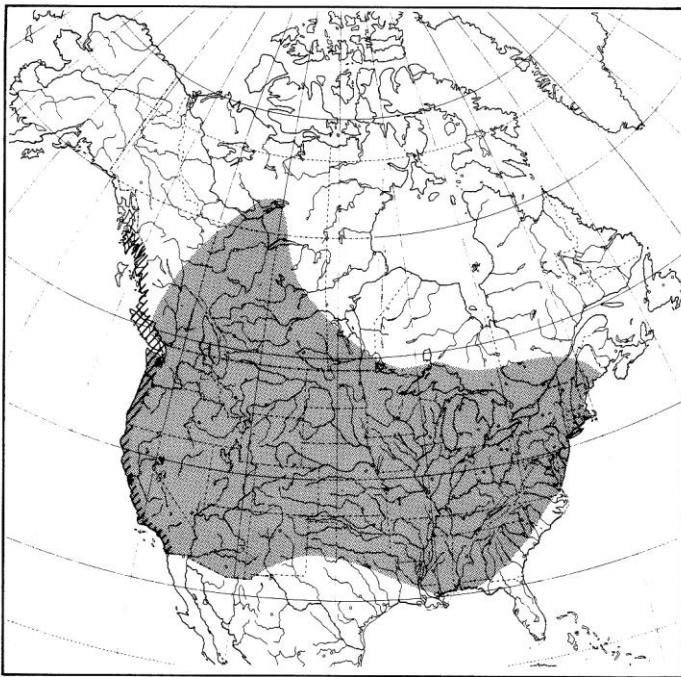
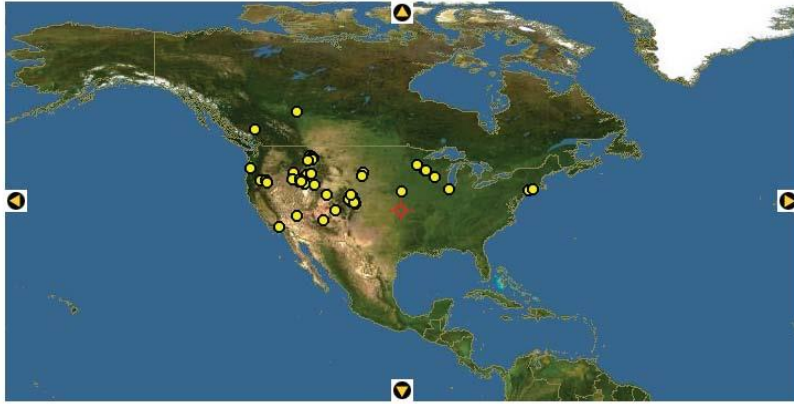
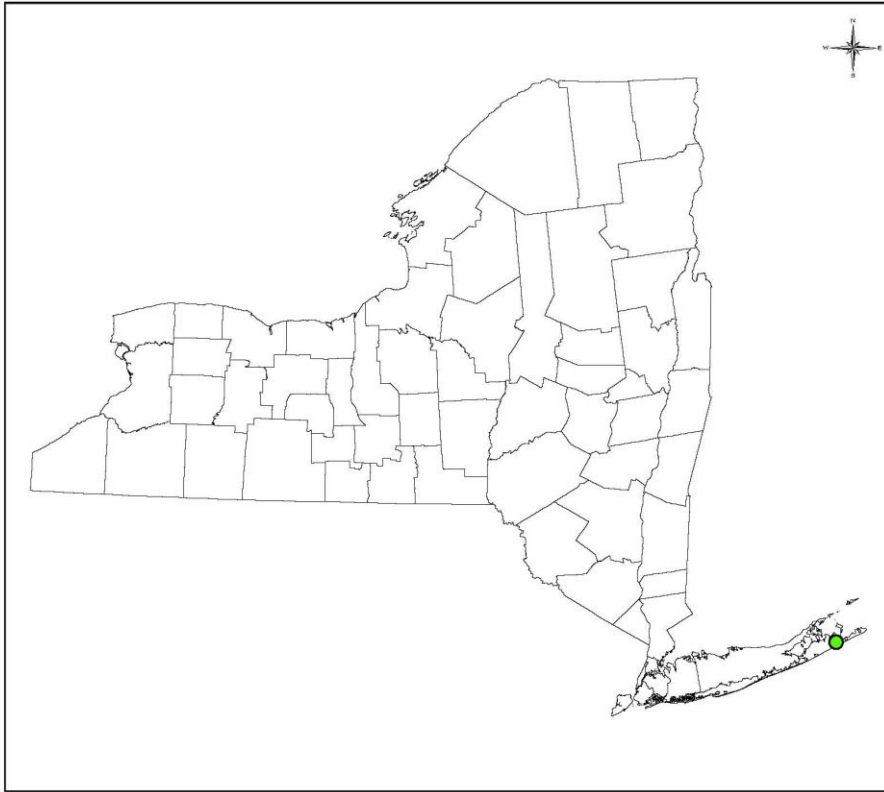


Fig. 644. Distribution. *Coccinella johnsoni* (cross hatch, west coast); *C. novemnotata*.

Range map (Gordon 1985) prior to recent decline.



Coccinella novemnotata range map 2000-2013 (Cornell University 2013)



New York State Range Map for *Coccinella novemnotata* (ninespotted lady beetle) 2000-2013 (The Lost Ladybug Project 2013)

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:

While it's difficult to assign numbers concerning the historical range, there were small studies in the last 100 years that give some indications of the population status. In 1924, a study in Ithaca found that C-9 made up 13% of the Coccinellidae. Another study in 1971 shows a decline with a maximum of one C-9 per 100 stems counted (weekly). Another study on Long Island from 1956-1958 found C-9 represented 19% of the Coccinellidae population in a potato crop. USDA records show that C-9 was not common in the Northeast in the 1980s or early-1990s (Harmon et al. 2007). It has not been found in any Northeastern state except New York in recent years.

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
	__21__	__1__	__<1%__

Details of current occurrence:

There is one known location where approximately 21 individuals have been found on a farm in Amagansett in Suffolk County (Cornell University 2013).

New York's Contribution to Species North American Range:

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

Rarity Discussion:

As of 2013, there is only one known New York population in Amagansett in Suffolk County. In general, there have been notable declines throughout *C. novemnotata*'s range. Since the beginning of The Lost Ladybug Project (Cornell University 2013) in 2000, this species has not been found in any state or Canadian province that borders New York.

IV. Primary Habitat or Community Type:

1. Agricultural
2. Open Shrubland/grassland
- 3.

Habitat or Community Type Trend in New York:

Declining Stable Increasing Unknown

Time frame of decline/increase: 1880s_____

Habitat Specialist? Yes No

Indicator Species? Yes No

Stephens and Losey (2003) suggested lady beetles are a good indicator of ecological health because of their sensitivity to natural enemies and anthropogenic influences.

Habitat Discussion:

The preferred habitat is open landscape such as grasslands and agricultural land. Preferred agricultural crops include: alfalfa, clover, corn, potatoes, and soybeans. Suburban areas and wooded habitats have also been reported as suitable habitat. The Lost Ladybug Project (Cornell University 2013) reported the following habitats across North America: yard/backyard, woods/trees, garden (fava bean), meadow (non-agricultural- grass/weed), bushes/shrubs, wetland, and soil/rock/sand (not shore).

Agricultural land has been declining in New York since the 1880s. Between 1940 and 1997, there was a 57% decline in farmed land in New York (Harmon et al. 2007).

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**

This species is a year-round resident.

Species Demographics and Life History Discussion:

C. novemnotata larvae hatch from eggs after four days and undergo four instars before pupating. It takes approximately four to five days to reach the third instar. Seven days later, the larvae are at the pre-pupal stage for one day before pupating and metamorphosing. Adults emerge approximately four days after pupating. Elytra harden after one day. Sexual maturity is reached two to four days after emergence (Losey et al 2012). Adults are polygynandrous and breed for several weeks. The last generation overwinters (Ijaz 2013). (Summary: 20 days from egg to adult; adults live/mate for several weeks.)

This species is diurnal. Movement is either flight or crawling.

Interspecies depredation and cannibalism have been documented. *Perilitus coccinellae*, a braconid wasp, parasitizes lady beetles (Ijaz 2013). Microsporidia, a pathogen, has been documented and its impact on this species is under investigation (Cornell University 2013).

It appears that competition with other aphid-eating insects, such as *C. septempunctata*, may be leading to smaller ninespotted ladybeetles. This leads to higher mortality and lower fecundity (Losey et al 2012, The Lost Ladybug Project 2013). Losey et al (2012) found that simply limiting the number of aphids has a significant effect on the C-9's size. The size of the field collected specimens was similar to lab-reared beetles that were fed 5 aphids per day. Survival for this group in the lab

was 23% compared to the highest survival rate of 75% for lady beetles that were fed 21 aphids per day.

VI. Threats:

1. While it is difficult to prove, it appears this species has been displaced by the nonnative C-7. C-7 and C-9 use similar habitats. Note: Some field collected C-9 were significantly smaller than their laboratory offspring which had constant access to aphids. These recently collected field specimens are also smaller than specimens at Cornell University that were collected between 1909 and 1972. Smaller adults have lower survival and fecundity. C-9 may be smaller as a result of competition with C-7 (Lost Ladybug Project, 2013).
2. A decline in farming (farm/open habitat loss) has decreased the available suitable habitat.
3. C-9 appears to be sensitive pesticide use (Stephens and Losey 2003).

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

No Unknown
 Yes

The preservation of farm land via conservation easements would help preserve/conserves suitable habitat. Sustainable and/or organic farming practices would be beneficial.

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

Conservation Actions	
Action Category	Action
1 Species Management	Species Re-introduction
2 Species Management	Ex-Situ Conservation (laboratory rearing)
3 Livelihood, Economic & Other Incentives	Conservation Payment (farmland conservation)
4	

VII. References

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