

DRAFT Government Response Statement
to the
Recovery Strategy for the Nine-spotted Lady Beetle in Ontario

1 **Nine-spotted Lady Beetle**

2 **Ontario Government Response Statement**

3 **Protecting and Recovering Species at Risk in Ontario**

4 Species at risk recovery is a key part of protecting Ontario's biodiversity. The
5 *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative
6 commitment to protecting and recovering species at risk and their habitats.

7 Under the ESA, the Government of Ontario must ensure that a recovery strategy is
8 prepared for each species that is listed as endangered or threatened. A recovery
9 strategy provides science-based advice to government on what is required to achieve
10 recovery of a species.

11 Within nine months after a recovery strategy is prepared, the ESA requires the Ministry
12 to publish a statement summarizing the government's intended actions and priorities in
13 response to the recovery strategy. The response statement is the government's policy
14 response to the scientific advice provided in the recovery strategy. In addition to the
15 strategy, the government response statement considered (where available) input from
16 Indigenous communities and organizations, stakeholders, other jurisdictions, and
17 members of the public. It reflects the best available local and scientific knowledge,
18 including Traditional Ecological Knowledge where it has been shared by communities
19 and Knowledge Holders, as appropriate and may be adapted if new information
20 becomes available. In implementing the actions in the response statement, the ESA
21 allows the government to determine what is feasible, taking into account social, cultural
22 and economic factors.

23 The [Recovery Strategy for the Nine-spotted Lady Beetle \(*Cocchinella novemnotata*\) in](#)
24 [Ontario](#) was completed on May 30, 2018.

25 Nine-spotted Lady Beetle is a small (4.7-7.0 mm), pale orange to red insect in the lady
26 beetle family. The adult beetle is round with a dark line between its wing covers and
27 usually has nine spots. Adults can emit foul tasting chemicals when threatened and their
28 bright colours discourage predators from eating them.

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30 **Protecting and Recovering Nine-spotted Lady Beetle**

31 Nine-spotted Lady Beetle is listed as an endangered species under the ESA, which
32 protects both the insect and its habitat. The ESA prohibits harm or harassment of the
33 species and damage or destruction of its habitat without authorization. Such
34 authorization would require that conditions established by the Ontario government be
35 met.

36 The Nine-spotted Lady Beetle's historical range in North America covered most of
37 southern Canada and the continental United States to Mexico. The species was once
38 widely distributed in Canada and was commonly found from Vancouver Island east to
39 southern Québec. In recent years, the species has become increasingly rare with only
40 13 records in Canada in the last decade. The species was last recorded in Ontario in
41 1987. Recent Canadian observations of the species are concentrated in the western
42 provinces, although there have been recent records in jurisdictions adjacent to Ontario
43 in the last decade (i.e., Québec and the state of New York).

44 The latest species assessments and the provincial recovery strategy suggest that given
45 the lack of current records in Ontario, it is possible the species may have become
46 extirpated; however given its small size, the lack of targeted search effort, and records
47 in neighbouring jurisdictions, it is possible that individuals or small populations remain
48 that have not been detected. In addition, recent search efforts have been focused on
49 agricultural systems or urban centres rather than the more naturalized habitats where
50 the species is currently being located in other parts of its range.

51 Lady beetles are beneficial to ecosystems as they help to control agricultural and
52 garden pests. Both adult and larval Nine-spotted Lady Beetle feed primarily on aphids,
53 but can also consume other soft-bodied insects and mites as well as sap, pollen and
54 nectar. Lady beetles are highly mobile and are able to move between habitat types to
55 reach areas of high food abundance and concentrations of aphids. They are thought to
56 be able to fly up to 18 km in a single flight and up to 120 km under the right conditions.
57 In the past Nine-spotted Lady Beetle was found in a wide variety of habitat types
58 including urban, agricultural and natural areas. While the species was historically
59 common in agricultural crops including alfalfa, potatoes, corn, soybean and cotton as
60 well as in gardens, grass, clovers and weeds, recent survey efforts in its North
61 American range suggest the species may have become more specialized in its habitat
62 use. It is now most often associated with naturally open areas and areas of shrubs or
63 trees interspersed with open grassy areas.

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64 Nine-spotted Lady Beetle are relatively short-lived and can have two generations per
65 year. The species lays its eggs in clusters on plants near prey sources such as aphids
66 in order to provide larvae with a food source upon hatching. They may also lay infertile
67 eggs along with the fertile eggs as a food source. Larvae hatch after three to four days,
68 form a pupa seven to nine days later, and emerge as adults after an additional five to
69 six days. Mating begins shortly after adults emerge. Nine-spotted Lady Beetle is cold
70 tolerant and the fall generation of adults congregate and overwinter in well-ventilated
71 areas such as under stones, rock crevices, thick clumps of grass, leaf litter or in tree
72 bark. The spring generation is also able to undergo a period of inactivity (aestivation) in
73 order to avoid high summer temperatures. Unlike introduced non-native species of lady
74 beetles, Nine-spotted Lady Beetles generally do not bite or invade homes to overwinter.

75 Declines in native lady beetle species have been identified by examining changes in
76 insect collections over time. In recent decades, the abundance of several native lady
77 beetle species (including Nine-spotted Lady Beetle) has decreased while collections of
78 non-native lady beetle species have increased. Declines appear to have been more
79 severe in Ontario and southern Québec than in other parts of the Canadian range. Most
80 lady beetles observed in southern Canada are now non-native lady beetle species.
81 While the direct causes of Nine-spotted Lady Beetle decline are not known, they are
82 thought to include the introduction of non-native lady beetle species, pesticide use, and
83 changes in land use and agricultural practices.

84 In North America, non-native species such as Seven-spotted Lady Beetle (*Coccinella*
85 *septempunctata*) and Multi-coloured Asian Lady Beetle (*Harmonia axyridis*) have been
86 introduced both unintentionally and intentionally for the biological control of agricultural
87 pests. Although a direct link has not been identified, declines in Nine-spotted Lady
88 Beetle generally coincide with the establishment of non-native lady beetles. It is thought
89 that non-native lady beetles affect native lady beetles through competition for aphid food
90 resources, predation and the introduction of pathogens and parasites. The presence of
91 non-native beetles in areas formerly occupied by Nine-spotted Lady Beetle may also
92 prevent the species from reoccupying those areas. A common native species of lady
93 beetle, Convergent Lady Beetle (*Hippodamia convergens*), is widely available for
94 purchase and shipment in North America for the purpose of garden and agricultural pest
95 control and its movement and release may also spread parasites and pathogens.

96 The species may be affected by the use of pesticides (including neonicotinoids) which
97 may reduce the abundance of their aphid prey as well as cause direct mortality and
98 negatively impact reproduction. The use of aphid control measures (e.g., introduction of
99 predators, parasites, etc.) may also reduce food availability for native lady beetles.
100 Although Nine-spotted Lady Beetle was once considered a habitat generalist,

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101 development of land and changes in farming practices (e.g., removal of hedgerows and
102 buffer strips, abandonment of marginal farm land, changes in crop type) may also have
103 resulted in changes in food availability and contributed to declining numbers.

104 Given uncertainty about the status of the species in Ontario as well as what caused its
105 steep decline in abundance, it is difficult to determine whether Nine-spotted Lady Beetle
106 can be expected to persist in the province. Similarly, it is unknown whether
107 augmentation or reintroduction efforts might be successful if they were undertaken. For
108 these reasons, the government supports protection and recovery efforts that will
109 increase our knowledge of the species and inform future protection and recovery
110 actions. The government also supports actions that minimize potential threats and
111 improve habitat conditions, particularly those that benefit pollinators and other species
112 at risk. As knowledge gaps are filled, the information can support implementation of
113 protection and recovery activities, including determining whether reintroduction or
114 augmentation is necessary and feasible.

Government's Recovery Goal

The government's goal for the recovery of Nine-spotted Lady Beetle is to support the persistence of the species in Ontario by filling knowledge gaps related to the species' current status and distribution, habitat use, and threats in order to better inform protection and recovery actions. The government supports investigating the necessity and feasibility of reintroduction and of augmenting existing populations.

121 Actions

122 Protecting and recovering species at risk is a shared responsibility. No single agency or
123 organization has the knowledge, authority or financial resources to protect and recover
124 all of Ontario's species at risk. Successful recovery requires inter-governmental co-
125 operation and the involvement of many individuals, organizations and communities. In
126 developing the government response statement, the government considered what
127 actions are feasible for the government to lead directly and what actions are feasible for
128 the government to support its conservation partners to undertake.

129 Government-led Actions

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131 To help protect and recover Nine-spotted Lady Beetle, the government will directly
132 undertake the following actions:

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- 133 • Work with partners and stakeholders to support pollinator health in Ontario
134 through actions such as integrated pest management and education.
- 135 • Educate other agencies and authorities involved in planning and environmental
136 assessment processes on the protection requirements under the ESA.
- 137 • Encourage the submission of Nine-spotted Lady Beetle data to Ontario’s central
138 repository through the citizen science projects that they receive data from (e.g.,
139 [iNaturalist](#)) and directly through the [Natural Heritage Information Centre](#).
- 140 • Undertake communications and outreach to increase public awareness of
141 species at risk in Ontario.
- 142 • Continue to protect Nine-spotted Lady Beetle and its habitat through the ESA.
- 143 • Support conservation, agency, municipal and industry partners, and Indigenous
144 communities and organizations to undertake activities to protect and recover
145 Nine-spotted Lady Beetle. Support will be provided where appropriate through
146 funding, agreements, permits (including conditions) and/or advisory services.
- 147 • Encourage collaboration, and establish and communicate annual priority actions
148 for government support in order to reduce duplication of efforts.

149 **Government-supported Actions**

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151 The government endorses the following actions as being necessary for the protection
152 and recovery of Nine-spotted Lady Beetle. Actions identified as “high” will be given
153 priority consideration for funding under the Species at Risk Stewardship Program.
154 Where reasonable, the government will also consider the priority assigned to these
155 actions when reviewing and issuing authorizations under the ESA. Other organizations
156 are encouraged to consider these priorities when developing projects or mitigation plans
157 related to species at risk. The government will focus its support on these high-priority
158 actions over the next five years.

159 **Focus Area: Inventory and Monitoring**

160 **Objective:** Investigate whether Nine-spotted Lady Beetle is present in Ontario and if
161 located, monitor existing populations, their habitat and site-specific threats.

162 In order to better focus actions to support protection and recovery of Nine-spotted Lady
163 Beetle in Ontario, it is important to understand whether the species is still present in the
164 province, and if so, where it is found. The use of standard survey methods and

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165 undertaking surveys in the types of habitat where the species has recently been found
166 in other jurisdictions will help provide more certainty in the results. If populations are
167 found to be present in Ontario, continued monitoring of their status, habitat conditions
168 and site-specific threats will help monitor progress toward meeting the recovery goal
169 and inform future recovery actions.

170 **Actions:**

- 171 1. **(High)** Develop, implement and promote a standardized survey
172 protocol to confirm whether Nine-spotted Lady Beetle is present
173 in Ontario. Surveys should:
- 174 ○ include the identification of all lady beetle species
175 observed; and,
 - 176 ○ prioritize efforts in naturally open areas and early
177 successional habitats.
- 178 2. At locations where the species is found to be present, develop
179 and implement a monitoring program that includes identification
180 and monitoring of habitat conditions and site-specific threats.
- 181 3. Engage volunteers to participate in citizen science survey and
182 monitoring efforts for native lady beetles, including Nine-spotted
183 Lady Beetle (e.g. iNaturalist, the Lost Ladybug Project).

185 Focus Area:	Research
186 Objective:	Improve knowledge of the Nine-spotted Lady Beetle and its habitat, 187 the threats impacting the species, and the feasibility of population 188 management actions (i.e., augmentation or reintroduction).

189 Further information related to the decline of the species is needed to support effective
190 protection and recovery efforts. If populations of Nine-spotted Lady Beetle are found to
191 remain in Ontario, it is vital to understand what factors have allowed them to persist
192 while other populations have been lost. As the species is found throughout North
193 America and has experienced declines in all parts of its range, research and
194 collaboration with other jurisdictions is likely to provide helpful insight into causes of
195 decline as well as current threats and ways to mitigate them. In addition to improving
196 knowledge of threats, identifying the minimum viable population size, and determining
197 whether it is feasible to rear the species in captivity will support an assessment of
198 whether augmentation or reintroduction efforts are appropriate.

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Actions:

4. **(High)** Undertake collaborative research to better understand potential causes of decline and current threats, such as the effects of introduced non-native lady beetles, pathogens and parasites, and pesticides on both the Nine-spotted Lady Beetle and its prey.
5. **(High)** At locations where the species is found to be present, investigate the specific habitat conditions and/or mechanisms that support the persistence of Nine-spotted Lady Beetle.
6. Investigate the necessity and feasibility of augmenting the species at confirmed locations or reintroducing the species in areas with suitable habitat. Actions may include:
 - assessing whether current threats can be sufficiently mitigated or reversed in order to enable successful augmentation or reintroduction;
 - undertaking population viability analysis for extant populations; and,
 - evaluating the feasibility of captive rearing and release, including identifying potential source populations.

Focus Area:	Stewardship and Awareness
Objective:	Increase public awareness of and engagement in actions to protect and recover Nine-spotted Lady Beetle.

The areas in which Nine-spotted Lady Beetle were historically found in Ontario are used for a variety of purposes including agriculture, recreation and gardening. As a result, a number of groups and organizations can contribute to implementing recovery actions and promoting awareness of species at risk. Although the current status of Nine-spotted Lady Beetle in Ontario is uncertain, habitat restoration and enhancement activities that result in suitable habitat for the species while addressing the needs of other species at risk are beneficial. These actions will help to ensure that sufficient habitat is available should the species increase in abundance while also benefitting other species at risk. If populations of Nine-spotted Lady Beetle are detected in Ontario, habitat restoration and enhancement activities should be undertaken where they are expected to benefit the existing population(s). Collaboration between organizations will support coordinated implementation of actions, improve efficiency and prevent duplication of efforts.

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Actions:

7. Undertake habitat restoration and/or enhancement to improve habitat quality and availability for Nine-spotted Lady Beetle in Ontario. Emphasis should be placed on:
 - suitable locations for Nine-Spotted Lady Beetle where activities result in improved habitat for multiple species at risk (e.g., pollinator habitat restoration, grassland stewardship initiatives); and,
 - locations where the species is found to be present and where habitat restoration or enhancement is deemed beneficial.
8. Collaborate with organizations, landowners, land managers, and Indigenous communities and organizations to promote awareness of native lady beetles, including Nine-spotted Lady Beetle, among people engaged in agricultural, gardening and stewardship activities in Ontario by sharing information on:
 - how to identify the species;
 - the species' habitat requirements;
 - the benefits of native lady beetles for pest control;
 - protection afforded to the species and its habitat under the ESA; and,
 - actions that can be taken to avoid or minimize impacts to the species and its habitat including reducing use of insecticides and maintaining habitat such as hedge rows and buffer strips.

261 **Implementing Actions**

262 Financial support for the implementation of actions may be available through the
263 Species at Risk Stewardship Program. Conservation partners are encouraged to
264 discuss project proposals related to the actions in this response statement with program
265 staff. The Ontario government can also advise if any authorizations under the ESA or
266 other legislation may be required to undertake the project.

267 Implementation of the actions may be subject to changing priorities across the multitude
268 of species at risk, available resources and the capacity of partners to undertake

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269 recovery activities. Where appropriate, the implementation of actions for multiple
270 species will be co-ordinated across government response statements.

271 **Reviewing Progress**

272 The ESA requires the Ontario government to conduct a review of progress towards
273 protecting and recovering a species not later than five years from the publication of this
274 response statement. The review will help identify if adjustments are needed to achieve
275 the protection and recovery of Nine-spotted Lady Beetle.

276 **Acknowledgement**

277 We would like to thank all those who participated in the development of the Recovery
278 Strategy for the Nine-spotted Lady Beetle (*Cocchinella novemnotata*) in Ontario for their
279 dedication to protecting and recovering species at risk.

280 **For Additional Information:**

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282 Visit the species at risk website at ontario.ca/speciesatrisk

283 Contact the Natural Resources Information and Support Centre

284 1-800-667-1940

285 TTY 1-866-686-6072

286 nrisc@ontario.ca