Transverse Lady Beetle

Ontario Government Response Statement

Protecting and Recovering Species at Risk in Ontario

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

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

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

The Recovery Strategy for the Transverse Lady Beetle (Coccinella transversoguttata) in Ontario was completed on July 22, 2019.

Transverse Lady Beetle is a small (5 – 7.8 mm in length), round, orange to red, insect in the lady beetle family. They are distinguished from other lady beetles by a distinctive black band and four elongated black spots on their wing covers. Historically, the Transverse Lady Beetle was one of the more common lady beetles in Canada. Lady Beetles play an important role in the ecosystem as they help to control agricultural and garden pests.

Protecting and Recovering Transverse Lady Beetle

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

The Transverse Lady Beetle is a wide-ranging species historically occurring globally from coast to coast across Canada and the United States. Out of the 13 Canadian provinces and territories where this species was historically abundant, there are no recent records (post 2001) in five provinces (Saskatchewan, Ontario, New Brunswick, Nova Scotia and Prince Edward Island). Recent Canadian observations of the species indicate the species is persisting in low numbers in the Alberta, Manitoba, Quebec and Newfoundland. In Yukon, the Northwest Territories, British Columbia and possibly Nunavut, however, this species seems to be abundant and common. The species was last recorded in Ontario in 1990, although records from jurisdictions adjacent to Ontario (Quebec, Manitoba and Michigan) and its broad range across the boreal forest of Canada suggest that it may persist in Ontario, particularly in northern areas, but have gone undetected.

The Transverse Lady Beetle has four morphologically distinct developmental life stages: egg, larva, pupa and adult and likely has two generations per year, possibly three depending on climatic conditions. Adults of the spring generation can undergo a period of inactivity (aestivation) to avoid high summer temperatures, and lay eggs in early autumn. Adults of the autumn generation congregate to overwinter and become active and reproduce when temperatures warm in the early spring. Lady beetle eggs, including those of the Transverse Lady Beetle, are typically deposited on a wide range of plants that are likely to support aphids, the primary prey source of both larvae and adults. It is possible that lady beetles also lay unfertilized eggs as another food source for young larvae. Larvae of closely related species hatch from eggs after approximately three days, developing through four instars over 10 to 12 days before turning into a pupa. Pupation averages approximately five days at which time adults emerge and their forewings harden. Mating likely begins shortly after adult emergence.

Adults and larvae of lady beetles feed primarily on aphids, but most lady beetle species also feed opportunistically on other soft-bodied insects and mites, in addition to sap, nectar and pollen. Transverse Lady Beetles are habitat generalists occurring across a wide range of habitats. This lady beetle inhabits agricultural areas, suburban gardens, parks, forests, grasslands, meadows, sand dune edges, riparian areas and other natural

areas. This broad habitat range reflects their ability to exploit different vegetation types seasonally and as the abundance of prey fluctuates. While there are no data available on the dispersal rates of Transverse Lady Beetle, in general, lady beetles are very mobile, display low site fidelity, and engage in both short (few hundred metres) and long (18 – 120 km) distance dispersal. Lady beetle distribution and dispersal is likely driven by prey availability and density with individuals expected to disperse when food resources are limited.

Lady beetles are beneficial to ecosystems and play an important economic role as biological control agents as predators to a large variety of aphid species and other garden and agricultural pests. Historically, Transverse Lady Beetle was one of the more abundant lady beetles found in agricultural areas on crops, especially alfalfa (*Medicago sativa*). The significant declines in this species, and lady beetles in general, has led to public interest in their conservation and their role in ecosystem function.

The greatest knowledge gap related to Transverse Lady Beetle is its current distribution in Ontario. The full historic range in Ontario, especially northern areas, has not been surveyed. Since distribution data are generally unavailable, population trends in Ontario are also unknown, including direct causes of decline and any specific threats which may be impacting populations.

The specific range-wide causes of declines of the Transverse Lady Beetle are unknown, and similar decreases in other historically abundant lady beetles, such as the Nine-spotted Lady Beetle (*Coccinella novemnotata*), have also been observed. Possible threats to the Transverse Lady Beetle in Ontario may include negative interactions with non-native lady beetle species, introduction of pathogens, habitat loss due to changes in urban and agricultural land use and agricultural pesticide use to control aphids (their main prey).

At least 179 non-native lady beetle species have been introduced in North America. This has led to nine non-native species becoming well-established in Canada, many of which continue to be widely available and released for biological control of agricultural pests. Two in particular, Seven-spotted Lady Beetle (*Coccinella septempunctata*) and Multicolored Asian Beetle (*Harmonia axyridis*), are habitat generalists that have become highly invasive throughout North America. Non-native lady beetles are considered one of the possible threats to this species through competition, predation, and introduction of pathogens that cause disease. Non-native lady beetles tend to be less commonly found in places where Transverse Lady Beetle still remains.

In urban and agricultural areas, the Transverse Lady Beetle may directly be impacted by a variety of pesticides. Pesticides may also indirectly impact lady beetles by eliminating their food supply.

Given uncertainties in the distribution of this species in Ontario, it is difficult to confirm the current population level and whether it is sufficient to maintain a self-sustaining population in Ontario. In addition, many knowledge gaps on the species' biology and threats must be addressed in order to understand the most significant threats to this species' survival and inform recovery planning. Surveys in under-sampled areas and ongoing monitoring and research is recommended to fill these knowledge gaps. In the meantime, focusing recovery and stewardship efforts in areas of historical Transverse Lady Beetle populations and areas with suitable habitat may help minimize further declines. Given that significant search effort in recent years has failed to detect the species, additional research and recovery efforts may be needed to maintain the persistence of species in Ontario.

The biological and technical feasibility of reintroducing or augmenting Transverse Lady Beetle are unknown. Further research is needed to determine whether reintroduction or augmentation are necessary and feasible to support the recovery of the species. In determining whether reintroduction or augmentation are necessary and feasible, social and economic factors, the likelihood of success, long-term contribution to species recovery, and the resources required may be considered, at the appropriate scale, in addition to biological and technical feasibility.

Government's Recovery Goal

The government's goal for the recovery of Transverse 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 or augmentation of existing populations.

Actions

Protecting and recovering species at risk is a shared responsibility. No single agency or organization has the knowledge, authority or financial resources to protect and recover all of Ontario's species at risk. Successful recovery requires inter-governmental co-operation and the involvement of many individuals, organizations and communities. In developing the government response statement, the government considered what

actions are feasible for the government to lead directly and what actions are feasible for the government to support its conservation partners to undertake.

Government-led Actions

To help protect and recover Transverse Lady Beetle, the government will directly undertake the following actions:

- Work with partners and stakeholders to support beneficial insects in Ontario through actions such as education and promoting integrated pest management and best management practices.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of Transverse Lady Beetle data to the Ontario's central repository through the citizen science projects that they receive data from (i.e., iNaturalist.ca) and directly through the Natural Heritage Information Centre.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.
- Continue to protect Transverse Lady Beetle and its habitat through the ESA.
- Support conservation, agency, municipal and industry partners, and Indigenous communities and organizations to undertake activities to protect and recover Transverse Lady Beetle. Support will be provided where appropriate through funding, agreements, permits (including conditions) and/or advisory services.
- Encourage collaboration, and establish and communicate annual priority actions for government support in order to reduce duplication of efforts.
- Conduct a review of progress toward the protection and recovery of Transverse Lady Beetle within five years of the publication of this document.

Government-supported Actions

The government endorses the following actions as being necessary for the protection and recovery of Transverse Lady Beetle. Actions identified as "high" may be given priority consideration for funding under the Species at Risk Stewardship Program. Where reasonable, the government will also consider the priority assigned to these actions when reviewing and issuing authorizations under the ESA. Other organizations

are encouraged to consider these priorities when developing projects or mitigation plans related to species at risk.

Focus Area:	**Inventory and Monitoring**
Objective:	Investigate whether Transverse Lady Beetle is present in Ontario and if located, monitor existing populations, their habitat and site-specific threats.

Transverse Lady Beetle likely occurred throughout much of the province of Ontario previously, although the northern portions are under-surveyed. Confirming the presence or absence of the species in Ontario will help determine where recovery efforts are best focused. The use of standard survey methods and undertaking surveys in the type of habitat where the species has recently been found in other jurisdictions will help provide more certainty in the results. Monitoring the proportion of Transverse Lady Beetle to non-native lady beetles at surveyed sites will help fill knowledge gaps in trends in these data over time. If populations are found to be present in Ontario, implementation of long-term monitoring will aid in understanding the species' status, habitat conditions and site-specific threats and determine whether habitat management actions may be required.

Actions:

1. **(High)** Develop, implement and promote a standardized survey protocol to confirm whether Transverse Lady Beetle is present in Ontario. Surveys should:
    - include the identification of all lady beetle species observed, with specific emphasis on also documenting Seven-spotted Lady Beetle and Multicolored Asian Lady Beetle; and,
    - prioritize efforts in naturally open vegetated areas and early successional habitats, especially in northern Ontario where non-native lady beetles may be less abundant.
2. At locations where the species is found to be present, develop and implement a monitoring program that includes identification and monitoring of habitat conditions and site-specific threats.
3. Engage volunteers to participate in citizen science survey and monitoring efforts for native lady beetles, including Transverse Lady Beetle (e.g., iNaturalist, the Lost Ladybug Project).

Focus Area:	**Research and Population Management**
Objective:	Improve knowledge of the Transverse Lady Beetle and its habitat, the threats impacting the species, and the feasibility of population management actions (i.e., augmentation or reintroduction).

Further information related to the decline of the species is needed to support effective protection and recovery efforts. Research is required to understand what may have caused declines as well as what factors have allowed the species to persist in some areas while other populations have been lost. Investigating the species' response to various threats will help focus recovery efforts on actions that will have the most benefit for the species. As the species is found throughout North America, research and collaboration with other jurisdictions could provide helpful insight into causes of decline as well as current threats and ways to mitigate them. Addressing these and other knowledge gaps, including identifying the minimum viable population size, will provide information to determine the species' ability to maintain self-sustaining populations. Further research and investigation into the feasibility and necessity of reintroducing or augmenting populations will inform future recovery efforts for Transverse Lady Beetle in Ontario. Research will also include assessment and consideration of potential impacts of recovery actions on other species.

Actions:

4. **(High)** Undertake collaborative research, including work with other jurisdictions, 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 (e.g., neonicotinoids) on both the Transverse 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 Transverse 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 Transverse Lady Beetle.

Raising awareness amongst the public, local landowners and organizations of the Transverse Lady Beetle, as well as how to reduce threats to the species and how to enhance their habitat will help promote and encourage protection of the species and its habitat in Ontario. If populations of Transverse 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.

Actions:

7. Undertake habitat restoration and/or enhancement to improve habitat quality and availability for Transverse Lady Beetle in Ontario. Emphasis should be placed on:
    - suitable locations for Transverse 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 Transverse 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 pesticides, implementing integrated pest management and maintaining habitat such as hedge rows and buffer strips.

Implementing Actions

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

Implementation of the actions may be subject to changing priorities across the multitude of species at risk, available resources and the capacity of partners to undertake recovery activities. Where appropriate, the implementation of actions for multiple species will be co-ordinated across government response statements.

Reviewing Progress

The ESA requires the Ontario government to conduct a review of progress towards protecting and recovering a species no later than the time specified in the species' government response statement, or not later than five years after the government response statement is published if no time is specified. The review will help identify if adjustments are needed to achieve the protection and recovery of Transverse Lady Beetle.

Acknowledgement

We would like to thank all those who participated in the development of the Recovery Strategy for the Transverse Lady Beetle (*Coccinella transversoguttata)* in Ontario for their dedication to protecting and recovering species at risk.

For Additional Information:

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

Contact the Ministry of the Environment, Conservation and Parks

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