

Purple Twayblade

Ontario Government Response Statement



Photo: Colin Jones

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.

Generally, 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 Purple Twayblade (*Liparis liliifolia*) in Ontario was completed on July 22, 2019.

Purple Twayblade is a small orchid that grows between 10 to 25 cm tall. It has two broad oval leaves and a single stalk that grows multiple translucent, purplish-brown flowers.

Protecting and Recovering Purple Twayblade

Purple Twayblade is listed as a threatened species under the ESA, which protects both the plant 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.

Globally, Purple Twayblade is found in North America. It occurs in the eastern and mid-western United States, from New England and Minnesota south to South Carolina and Oklahoma. In Canada, it is found in Ontario and Quebec, with the majority of populations occurring in southwestern Ontario in the Windsor-Essex area. Observations in eastern Ontario and western Quebec during the 21st Century demonstrate that the Canadian range extends over 260 km farther eastward than believed in the preceding century.

Based on the provincial recovery strategy, seven local populations are considered extant in Ontario with the possibility of recognizing three others. The Cedar Creek, Deyo's Woods and Happy Valley Forest populations have not been confirmed in 33, 22 and 19 years respectively, including during the most recent survey in 2008. The Frontenac Provincial Park population is currently considered extant, but Purple Twayblade has not been detected here since the area became permanently flooded by beaver activity. Given the lack of recent observations at these four sites, the number of extant populations in Ontario may be as low as three. Additionally, three populations are considered historical and three are considered extirpated (i.e., no longer exist). The total Ontario population is estimated at 2,320 plants with the largest known population occurring in the Spring Garden Natural Area with approximately 2,100 plants. Most Ontario populations are estimated to have fewer than 30 plants and are considered to have poor to fair viability. Additional survey and monitoring efforts would be beneficial to confirm the status and abundance of Purple Twayblade at historical and extant sites.

Purple Twayblade has been found in a wide range of habitats, including mixed deciduous forest, shrub-thicket, shrub alvar, forested swamps, tallgrass prairie and coniferous plantations, and can tolerate a variety of soil conditions, such as sand, silt, and a mix of clay with other soils. It prefers open to semi-open areas, with most Canadian populations occurring near the top of well-drained slopes. It can quickly colonize areas following a disturbance; therefore, disturbances that reduce tree cover (e.g., fires) are important in maintaining suitable habitat conditions. Despite a wide tolerance to a variety of habitat and soil conditions, the species' distribution is restricted by the presence and abundance of a specific mycorrhizal soil fungus in the genus *Tulasnella*. This fungus supplies orchid

seeds and seedlings with important nutrients until the plant is capable of photosynthesis and is critical for its existence. A greater understanding of the distribution of this fungus in southern Ontario would help to identify areas with potentially suitable habitat to inform Purple Twayblade recovery efforts.

Several knowledge gaps exist on the ecology and reproductive biology of Purple Twayblade. Although the species requires cross-pollination to produce viable seeds, the mechanism of pollination and the species' pollinators are currently unknown. As is true of many orchids, Purple Twayblade roots may remain in a dormant state when conditions are unfavourable; however, this has not been confirmed. Purple Twayblade seeds can remain viable in or on the soil (i.e., form a seed bank). It is unknown exactly how long the seeds remain viable but evidence suggests they can remain dormant for over four years. Further research on the pollinators, dormancy, and longevity of seeds will also help inform recovery efforts.

The main threats to Purple Twayblade are habitat loss from development (i.e., urban, residential, agricultural), invasive plants, and alterations to the natural disturbance regime (e.g., fire suppression). Forest succession without regular disturbance typically creates a more closed canopy and dense understory where conditions are not suitable for Purple Twayblade growth. Potential development in the Windsor-LaSalle area currently poses a threat to local populations on or near private property. Additionally, Garlic Mustard (*Alliaria petiolata*), Common Buckthorn (*Rhamnus cathartica*), and Scots Pine (*Pinus sylvestris*) have been documented at four sites where the species is found. These invasive plants are thought to threaten Purple Twayblade, but it is unknown exactly how they impact the species. Research suggests Garlic Mustard and Common Buckthorn may affect plant growth or development by interfering with the formation of the *Tulasnella* fungal association on which the species depends. Given the plant's obligate association with the mycorrhizal fungus, factors impacting the survival or persistence of the fungus may also threaten populations of Purple Twayblade.

Other potential threats include plants being consumed (i.e. herbivory) and habitat alteration by invasive invertebrates, grazing by White-tailed Deer (*Odocoileus virginianus*), and the application of herbicides, fungicides and other pesticides. The use of chemicals near Purple Twayblade habitat may impact populations by destroying or depleting soil mycorrhizae populations or by reducing the availability of pollinators. Further investigation on whether these threats are currently impacting Ontario populations is required to develop and implement appropriate recovery actions. Although flooding has occurred at the Frontenac Provincial Park population, the impact of prolonged flooding on Purple Twayblade is not fully known.

Continued monitoring at this site would be beneficial to determine the species' presence/absence, its tolerance to prolonged submersion, and whether any suitable habitat remains at this location.

The *Tulasnella* fungus, upon which Purple Twayblade depends, is more widely distributed than the orchid at some sites where it occurs. This suggests that Purple Twayblade recruitment is limited by the failure of seeds to disperse to suitable locations, which is related to the patchy distribution and abundance of *Tulasnella* fungus within occupied sites and the randomness of seed dispersal.

Several knowledge gaps exist on the status, biology and threats of Purple Twayblade populations that will require further research to support effective implementation of recovery actions. Ontario's protection and recovery approaches will focus on actions to increase understanding, manage populations and promote awareness. Research, survey and monitoring actions will help increase understanding of the species' ecology (e.g., mycorrhizal relationship, pollinators), threats, distribution and population viability. Recovery actions will address threats, biological limitations and habitat conditions. Promoting awareness will raise consciousness of the species, its habitat requirements and actions that can be taken to minimize threats. Information about the status and viability of those populations that have not been recently confirmed and the effectiveness of management actions in improving species viability will help focus recovery efforts and inform decisions as to what additional population management actions (e.g., augmentation) are required.

Government's Recovery Goal

The government's goal for the recovery of Purple Twayblade in Ontario is to maintain existing or newly discovered extant populations and support increases in abundance and distribution by reducing threats and addressing biological limitations, where feasible and appropriate.

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 Purple Twayblade, the government will directly undertake the following actions:

- Continue to protect Purple Twayblade and its habitat through the ESA.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of Purple Twayblade data to Ontario's central repository through the NHIC (Rare species of Ontario) project in iNaturalist and directly through the Natural Heritage Information Centre.
- Continue to support conservation, agency, municipal and industry partners, and Indigenous communities and organizations to undertake activities to protect and recover Purple Twayblade. Support will be provided where appropriate through funding, agreements, permits (including conditions) and/or advisory services.
- Evaluate the relationship of the Town of LaSalle Candidate Natural Heritage Area CH3-M11, the McAuliffe Woods Conservation Area and the Canard River – Mitchell Property populations to other known populations to determine the number of extant populations.
- Continue to implement the Ontario Invasive Species Strategic Plan (2012) to address the invasive species (e.g., Garlic Mustard) that threaten Purple Twayblade.
- Conduct a review of progress toward the protection and recovery of Purple Twayblade 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 Purple Twayblade. 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: Research and Monitoring

Objective: Increase knowledge of the species' biology, distribution, and threats and actions that can be taken to address them.

Recent efforts to survey Purple Twayblade populations has contributed to our knowledge of the species' status, abundance and distribution in Ontario. Given the potential for species to remain dormant underground and that seeds are likely to remain viable in the seed bank, continued monitoring

(including seed bank surveys) at historical locations and/or sites that have had no recent observations will be important to confirm the species' status and availability of suitable habitat. In addition, continued inventory and monitoring at extant sites will be required to assess population trends, habitat conditions and site-specific threats to help prioritize recovery actions. Several knowledge gaps exist on the species' biology, viability, reproductive biology, factors influencing its establishment and the impacts of potential threats such as herbivory. Further research is necessary to help fill these knowledge gaps and evaluate the effectiveness of management and restoration techniques to inform appropriate recovery actions for the species' and its habitat.

Actions:

1. **(High)** Develop and implement a standard inventory and monitoring program for Purple Twayblade. The program should be designed and implemented in such a manner that it may contribute to research actions. It should aim to:
 - monitor and assess population abundance, trends, and demographics (including seed bank) at extant sites;
 - confirm the status at historical sites and sites with no recent observations (i.e., Deyo's Woods, Happy Valley Forest, Frontenac Provincial Park);
 - monitor and document habitat features and conditions, and site-specific threats at all known populations; and,
 - identify and survey additional suitable sites for the presence and/or absence of Purple Twayblade.
2. **(High)** Undertake collaborative research to increase understanding of Purple Twayblade population dynamics, population viability and factors that affect it. This may include:
 - investigating the species' reproductive biology (e.g., seed bank dynamics, pollinators);
 - determining Purple Twayblade population viability thresholds at existing sites;
 - evaluate detectability of both adult plants and viable seeds;
 - investigating mycorrhizal associations including the distribution and abundance at occupied sites; and,
 - studying factors influencing establishment (e.g., germination requirements, seedling competitiveness).
3. Conduct research to identify the optimal methods for maintaining and restoring Purple Twayblade populations. This may include:
 - evaluating the effectiveness and suitability of habitat management and restoration techniques (e.g., invasive species removal, canopy thinning, prescribed burning) for occupied and potential sites; and,
 - investigating methods for within-site assisted seed dispersal (to microsites where *Tulasnella* is present), transplanting, and propagation.

Focus Area: Management and Habitat Protection

Objective: Maintain or improve species distribution and the quality of habitat available for Purple Twayblade and reduce threats.

Purple Twayblade populations occur on private and public lands. Collaborative efforts between landowners and community partners should focus on maintaining and/or improving habitat and minimizing threats. Purple Twayblade populations face several threats and limitations including habitat loss from development activities, invasive species, forest succession and difficulty optimizing use of areas where *Tulasnella* is present. Undertaking habitat related management and restoration activities at extant locations including implementing best management practices will help support the species' recovery. In addition, opportunities for restoration at historical sites with suitable habitat should be explored given the possibility that individuals may remain dormant underground and the viability of seeds in the seed bank. At extant or historical sites where habitat restoration or enhancement efforts are determined to be ineffective or insufficient, additional actions may be required to support long-term population viability.

Actions:

4. **(High)** Undertake habitat related management and restoration techniques to maintain and/or restore habitat or optimize its' use at existing locations, where appropriate. Emphasis should be placed on:
 - identifying and mitigating threats affecting the species (e.g., forest succession, invasive species, and herbivory);
 - prioritizing sites containing the mycorrhizal fungi and in close proximity to existing Purple Twayblade populations to support natural expansion and/or re-establishment;
 - implementing within-site assisted seed dispersal where suitable conditions exist; and,
 - working collaboratively with landowners to implement best management practices to maintain or improve habitat quality within and adjacent to occupied areas.
5. In collaboration with landowners and local agencies implement, monitor and adapt actions identified as necessary and feasible to maintain or increase populations at appropriate sites where habitat enhancement efforts are determined to be insufficient. Activities may include:
 - assisted seed dispersal from viable populated sites to existing sites with established populations of mycorrhizal fungus; and
 - augmenting populations through propagation and transplantation if population size or composition is insufficient to maintain a viable population.

6. As opportunities arise, work with landowners and community partners to support the securement of Purple Twayblade habitat through existing land securement and stewardship programs.

Focus Area: Awareness

Objective: Increase awareness of the species, its habitat requirements and actions that can be taken to minimize threats.

Purple Twayblade occurs on public land managed by municipalities and conservation organizations, and on private land. Collaboration amongst organizations and landowners will be necessary to effectively implement recovery actions, help improve efficiencies and reduce duplication of efforts. Education and outreach will help to increase awareness of the species, its threats and potential management actions to reduce threats to the species' and its habitat. Promoting the use of best management practices to land users will also support the species' recovery.

Actions:

7. Collaborate with organizations, land managers, land users and Indigenous communities and organizations to promote awareness of Purple Twayblade by sharing information on:
 - how to identify the species;
 - the species' habitat requirements;
 - the protection afforded to the species and its habitat under the ESA; and,
 - actions that can be taken to reduce threats to the species and its habitat (e.g., distributing best management practices to land users).

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. The review will help identify if adjustments are needed to achieve the protection and recovery of Purple Twayblade.

Acknowledgement

We would like to thank all those who participated in the development of the Recovery Strategy and Government Response Statement for the Purple Twayblade (*Liparis liliifolia*) 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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