

# Recovery Strategy for the Victoria's Owl-clover (*Castilleja victoriae*) in Canada

## Victoria's Owl-clover



2017



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For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the [Species at Risk \(SAR\) Public Registry](#)<sup>1</sup>.

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<sup>1</sup> <http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1>

# RECOVERY STRATEGY FOR THE VICTORIA'S OWL-CLOVER (*Castilleja victoriae*) IN CANADA

2017

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial, and territorial governments agreed to work together on legislation, programs, and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, the Government of British Columbia has given permission to the Government of Canada to adopt the *Recovery Plan for Victoria's Owl-clover (Castilleja victoriae) in British Columbia (Part 2)* under Section 44 of the *Species at Risk Act (SARA)*. Environment and Climate Change Canada has included a federal addition (Part 1) which completes the SARA requirements for this recovery strategy.

The federal recovery strategy for the Victoria's Owl-clover in Canada consists of two parts:

Part 1 – Federal Addition to the *Recovery Plan for Victoria's Owl-clover (Castilleja victoriae) in British Columbia*, prepared by Environment and Climate Change Canada.

Part 2 – *Recovery Plan for Victoria's Owl-clover (Castilleja victoriae) in British Columbia*, prepared by the British Columbia Ministry of Environment.

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Part 2 – *Recovery Plan for Victoria’s Owl-clover (Castilleja victoriae) in British Columbia*, prepared by the British Columbia Ministry of Environment.

**Part 1 – Federal Addition to the *Recovery Plan for Victoria's Owl-clover (Castilleja victoriae) in British Columbia*, prepared by Environment and Climate Change Canada**

## Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#)<sup>2</sup> agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change is the competent minister under SARA for the Victoria's Owl-clover and has prepared the federal component of this recovery strategy (Part 1), as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the Province of British Columbia, as per section 39(1) of SARA. SARA section 44 allows the Minister to adopt all or part of an existing plan for the species if it meets the requirements under SARA for content (sub-sections 41(1) or (2)). The Province of British Columbia provided the attached recovery plan for Victoria's Owl-clover (Part 2) as science advice to the jurisdictions responsible for managing the species in British Columbia. It was prepared in cooperation with Environment and Climate Change Canada.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment and Climate Change Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of Victoria's Owl-clover and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment and Climate Change Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

The recovery strategy sets the strategic direction to arrest or reverse the decline of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

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<sup>2</sup> <http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2>

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area<sup>3</sup> be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

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<sup>3</sup> These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Bird Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

## **Additions and Modifications to the Adopted Document**

The following sections have been included to address specific requirements of the federal *Species at Risk Act* (SARA) that are not addressed in the *Recovery Plan for Victoria's Owl-clover (Castilleja victoriae) in British Columbia* (Part 2 of this document, referred to henceforth as “the provincial recovery plan”), and/or to provide updated or additional information.

Under SARA, there are specific requirements and processes set out regarding the protection of critical habitat. Therefore, statements in the provincial recovery plan referring to protection of survival/recovery habitat may not directly correspond to federal requirements. Recovery measures dealing with the protection of habitat are adopted; however, whether these measures will result in protection of critical habitat under SARA will be assessed following publication of the final federal recovery strategy.

### **1. Critical Habitat**

This section replaces the “Section 7.1: Description of the Species' Survival/Recovery Habitat” section in the provincial recovery plan.

Section 41(1)(c) of SARA requires that recovery strategies include an identification of the species' critical habitat, to the extent possible, as well as examples of activities that are likely to result in its destruction. The provincial recovery plan for Victoria's Owl-clover includes a description of the biophysical attributes of survival/recovery habitat. This science advice was used to inform the following critical habitat sections in this federal recovery strategy.

Critical habitat for Victoria's Owl-clover is identified in this document to the extent possible; as responsible jurisdictions and/or other interested parties conduct research to address knowledge gaps, the existing critical habitat methodology and identification may be modified and/or refined to reflect new knowledge.

It is recognized that the critical habitat identified in this recovery strategy is insufficient to achieve the population and distribution objective for the species (Section 5.2 of the provincial recovery plan), because it does not identify habitat for re-introduction at two additional sites within the historic range (required to achieve historic levels prior to negative impacts of human activity). The feasibility and suitability of reintroduction at additional sites is currently unknown. A schedule of studies (Section 1.2) has been included which outlines the activities required to complete the identification of critical habitat. The identification of critical habitat will be updated when the information becomes available, either in a revised recovery strategy or action plan(s).

## 1.1 Identification of the Species' Critical Habitat

### Geospatial location of areas containing critical habitat

Victoria's Owl-clover is found in open areas in vernal seeps and along the margins of vernal pools<sup>4</sup>, near the coast of southeast Vancouver Island and adjacent small islands, in British Columbia. Critical habitat is identified for Victoria's Owl-clover at four locations (Figures 1 & 2); these align with populations provided in the provincial recovery plan:

- Gonzales Point (Figure 1)
- Harling Point (Figure 1)
- Trial Islands Ecological Reserve (Figure 1)
- Cattle Point (Figure 2)

The area containing critical habitat for Victoria's Owl-clover is based on two components: (1) areas occupied by individual plants or patches of plants within the past 25 years<sup>5</sup>, including the associated potential location error from GPS units (ranging up to 25 m uncertainty distance) around observations; and, (2) a 50 m distance (i.e., critical function zone distance<sup>6</sup>) to encompass immediately adjacent areas required for the persistence of local populations.

Although Cattle Point is characterized as "potentially extirpated" in the provincial recovery plan, it is considered to be important recovery habitat for this species. Recovery actions including habitat restoration and re-introduction are currently focused on this site.

### Biophysical attributes of Critical Habitat

Within the geospatial areas identified as containing critical habitat, critical habitat is identified wherever any of the following habitat types occur:

- Open/exposed habitats with short or sparse vegetation
- Coastal freshwater seeps and margins of vernal pools
- Shallow soils over gneissic bedrock knolls and benches

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<sup>4</sup> Vernal seeps are a result of shallow groundwater flow that emerges from sloping terrain while vernal pools are seasonally flooded depressions that form on top of impermeable layers such as hardpan, claypan, or bedrock. Both vernal seeps and vernal pools tend to dry up by late spring or early summer.

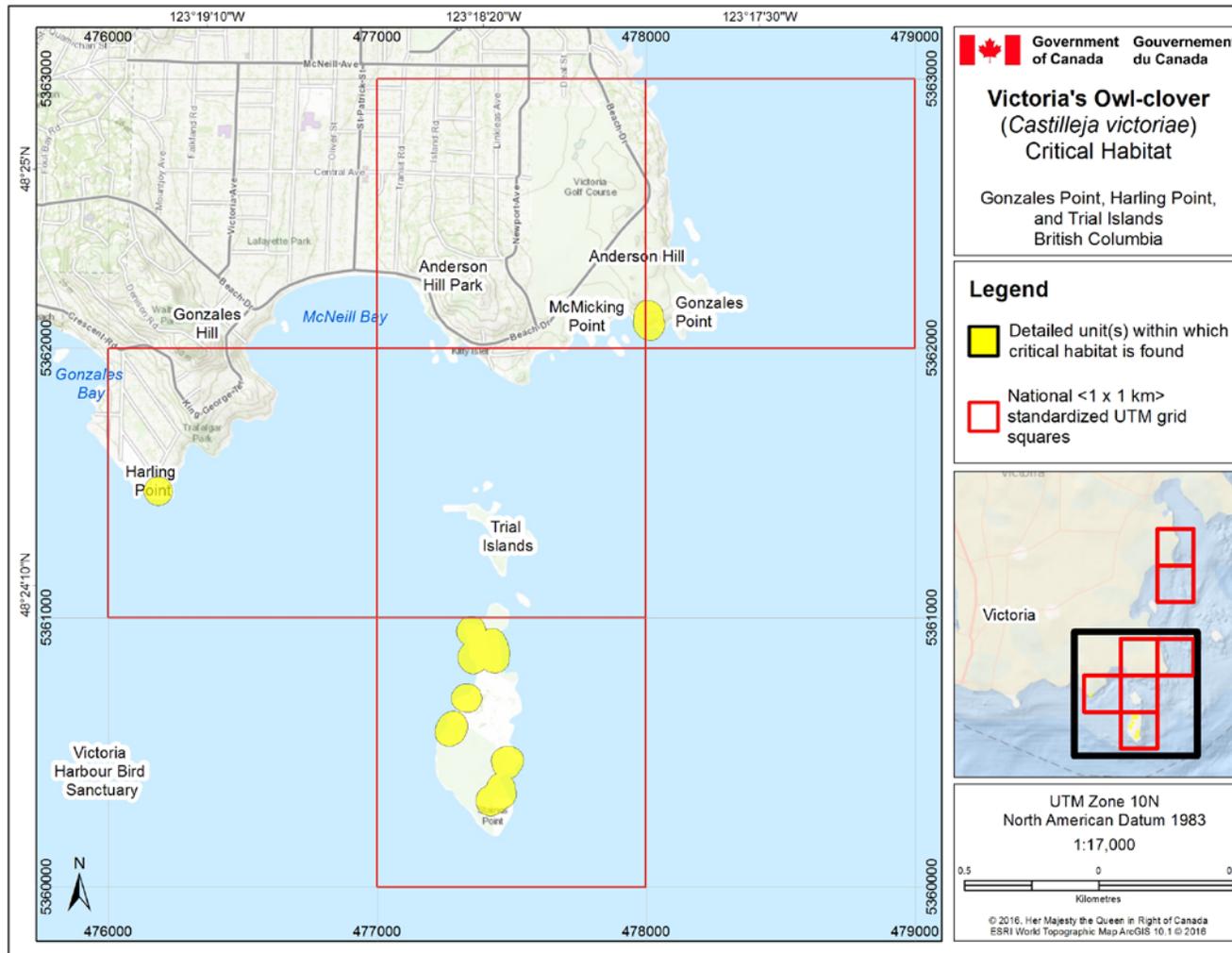
<sup>5</sup> Where habitat retains the potential to support an occurrence (either currently and/or through restoration efforts).

<sup>6</sup> Critical function zone distance has been defined as the threshold habitat fragment size required for maintaining constituent microhabitat properties for a species (e.g., critical light, moisture, humidity levels necessary for survival). Existing research provides a logical basis for suggesting a minimum critical function zone distance of 50 m for rare plant species occurrences (see: [www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=6A845288-1#\\_Toc285808423](http://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=6A845288-1#_Toc285808423)).<sup>7</sup>  
[www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1](http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1)

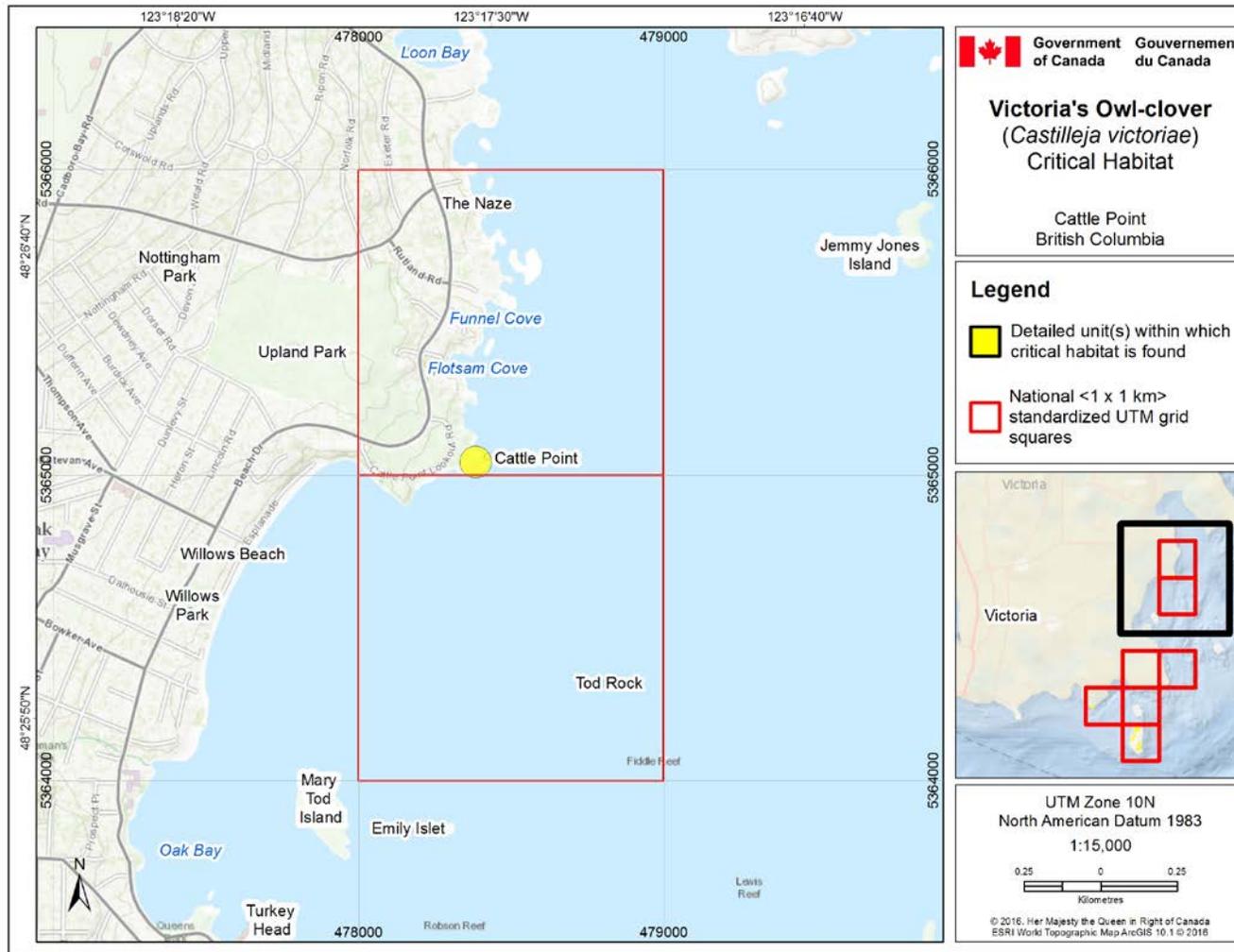
The soils in these habitat types tend to be saturated for most of the winter and early spring, becoming very dry in summer. Victoria's Owl-clover is thought to be a root hemiparasite (Fairbarns and Egger 2007) and therefore may require a host plant for partial nutrient sources. The host plant for Victoria's Owl-clover is unknown but may be an assemblage of species.

Biophysical attributes of critical habitat include the vegetation (composition and abundance of plant species), substrates, and related hydrological properties that comprise the habitat types described above. The areas containing critical habitat for Victoria's Owl-clover (totalling 11.4 ha) are presented in Figures 1 and 2. Critical habitat for the Victoria's Owl-clover in Canada occurs within the shaded yellow polygons (units) shown on each map where the critical habitat criteria described in this section are met. The biophysical attributes required by Victoria's Owl-clover overlap geospatially within suitable habitat types, in that they combine to provide an ecological context for the species at sites where it occurs. Therefore the shaded yellow polygons (units) shown on each map represent identified critical habitat, excepting only those features that clearly do not meet the needs of the species. These include: (i) existing anthropogenic infrastructure (e.g., buildings), (ii) areas below the highest tide mark, and (iii) areas dominated by woody vegetation (trees, shrubs) and/or large perennials. These features do not possess the attributes required by Victoria's Owl-clover and they are not identified as critical habitat.

The 1 km x 1 km UTM grid overlay shown on Figures 1 and 2 is a standardized national grid system that highlights the general geographic area containing critical habitat, for land use planning and/or environmental assessment purposes.



**Figure 1.** Critical habitat for Victoria's Owl-clover at Gonzales Point, Harling Point and Trial Islands, B.C. is represented by the shaded yellow polygons (units), in accordance with the criteria set out in Section 1.1. The 1 km x 1 km UTM grid overlay (red outline) shown on this figure is a standardized national grid system that indicates the general geographic area within which critical habitat is found. Areas outside of the shaded yellow polygons do not contain critical habitat.



**Figure 2.** Critical habitat for Victoria's Owl-clover at Cattle Point, B.C. is represented by the shaded yellow polygon (unit), in accordance with the criteria set out in Section 1.1. The 1 km x 1 km UTM grid overlay (red outline) shown on this figure is a standardized national grid system that indicates the general geographic area within which critical habitat is found. Areas outside of the shaded yellow polygon do not contain critical habitat.

## 1.2 Schedule of Studies to Identify Critical Habitat

The following schedule of studies (Table 1) outlines the activity required to complete the identification of critical habitat for Victoria's Owl-clover:

**Table 1.** Schedule of studies to identify critical habitat for Victoria's Owl-clover.

Description of activity	Rationale	Timeline
Identify two new/additional sites for Victoria's Owl-clover that are within the species' historical range in Canada, suitable for habitat restoration, and feasible to use as recovery habitat; where feasible, deliberately reintroduce the species into restored habitat.	This activity is required such that sufficient critical habitat is identified to meet the population and distribution (recovery) objective (section 5.3 in the provincial recovery plan).	2017 - 2022

## 1.3 Activities Likely to Result in Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time. Activities described in Table 2 include those likely to cause destruction of critical habitat for the species; however, destructive activities are not limited to those listed. Additional information on the negative effects of these activities is provided in "Description of the Threats" (Section 4.2) in the provincial recovery plan.

**Table 2.** Examples of activities likely to result in destruction of critical habitat for Victoria's Owl-clover.

Description of activity	Description of effect on attributes of habitat	Additional Information including related IUCN threat <sup>a</sup>
Human use of landscape that results in significant adverse effects <sup>b</sup> , such as recreational use (creation of trails, roads, or picnic areas)	Causes destruction of critical habitat via disturbance and/or compaction of soils to the extent that it is no longer suitable for Victoria's Owl-clover (growing plants and/or seed germination).  Also causes destruction by increased invasive plant introduction/encroachment. Invasive alien plants can compete with Victoria's Owl-clover and alter the availability of light, water, and nutrients in the habitat, such that it is no longer suitable for the species.	Related IUCN-CMP threats: #6.1, 8.1  The population at Harling Point is subject to direct destruction of critical habitat through visitor trampling and/or picnicking.  It is more likely that critical habitat will be destroyed if these activities occur during the growing season.
Dumping of waste (e.g., plant material or garbage)	Deposited debris alters the availability of suitable substrate, light, water, and nutrients, such that the habitat is no longer suitable for Victoria's Owl-clover.  Also causes destruction by increased invasive plant introduction/encroachment (see above).	Related IUCN-CMP threats: #9.4, 8.1:  This is mainly an historical threat at Trial Island; in the past there has been garbage and plant debris piled in various areas on the island. It is possible this activity may occur again in the future, as work is continuing on the island.  When garbage piles are removed, non-native invasive plants can encroach newly disturbed soils and indirectly destroy Victoria's Owl-clover critical habitat.
Conversion of natural landscape areas for development (e.g., tourism & recreation), and/or development (expansion or modification) of human infrastructure.	This activity can destroy critical habitat via habitat alteration such that it is no longer suitable for Victoria's Owl-clover, e.g., soil burial, disturbance, or compaction; shading (by introduced plants or nearby structures); altered moisture regime (impounded drainage, or reduced water flow to the plants through ditching or diversion of subsurface water by built structures).  Also causes destruction by increased invasive plant introduction/encroachment (see above).	Related IUCN-CMP threats: #1.3, 6.3, 8.1  The population at Gonzales Point occurs on the Royal Victoria Golf Course. The fairway where this population is located could possibly be extended and (if so) is likely to destroy critical habitat for the species.  One subpopulation at Trial Island is over top of the water supply line, which may need repair in the future. It is more likely that critical habitat will be destroyed if this repair is done during the growing season.

<sup>a</sup> Threat classification is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system ([www.conservationmeasures.org](http://www.conservationmeasures.org)).

<sup>b</sup> Significant adverse effects are those that negatively impact the species' survival and recovery. Success of the species' survival and recovery will be assessed by the adopted population and distribution (recovery) objective, and the associated performance measures set out in this document, that: the distribution and abundance of Victoria's Owl-clover has been maintained, i.e., population size and extent of occurrence or area of occupancy at each site is stable and/or increasing.

## 2. Measuring Progress

This section replaces the “Section 8: Measuring Progress” section in the provincial recovery plan.

Priority actions for Victoria's Owl-clover are included in Table 3 of the provincial recovery plan. The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives:

- The distribution of Victoria's Owl-clover in Canada has been maintained (i.e., extent of occurrence has not decreased);
- The abundance of Victoria's Owl-clover in Canada has been maintained (i.e., population sizes have not decreased);
- The distribution and abundance of Victoria's Owl-clover in Canada is increased, where feasible, through newly identified and/or re-established populations.

Measurements of population size (as measured during peak flowering times) should allow for annual effects in numbers of flowering plants and related variation in annual monitoring results, i.e., trends in annual estimates are to be evaluated over the course of a longer time period, for example, over a five year interval.

## 3. Statement on Action Plans

One or more action plans for Victoria's Owl-clover will be posted on the Species at Risk Public Registry by 2022.

## 4. Effects on the Environment and Other Species

This section replaces “Section 9: Effects on Other Species” section in the provincial recovery plan.

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#)<sup>7</sup>. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the [Federal Sustainable Development Strategy](#)'s<sup>8</sup> (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental

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<sup>7</sup> [www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1](http://www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1)

<sup>8</sup> [www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1](http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1)

effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

The distributions of many other provincially and federally at-risk plant species overlap with Victoria's Owl-clover. Recovery planning activities for Victoria's Owl-clover are expected to benefit co-occurring rare species in vernal pools and seeps within Garry Oak Ecosystems, through habitat protection and management of threats. Recovery planning activities for Victoria's Owl-clover will be implemented with consideration for all co-occurring species at risk, such that there are no negative impacts to these species or their habitats.

## **5. References**

Fairbarns, M. and J.M. Egger. 2007. *Castilleja victoriae* (Orobanchaceae): a new rare species from southeastern Vancouver Island, British Columbia, Canada, and the adjacent San Juan Islands, Washington, U.S.A. *Madroño* 54(4):334–342.

**Part 2 – *Recovery plan for Victoria’s owl-clover (Castilleja victoriae) in British Columbia* prepared by the British Columbia Ministry of Environment.**

## Recovery Plan for Victoria's Owl-clover (*Castilleja victoriae*) in British Columbia



Prepared by B.C. Ministry of Environment



May 2015

## **About the British Columbia Recovery Strategy Series**

This series presents the recovery documents that are prepared as advice to the Province of British Columbia on the general approach required to recover species at risk. The Province prepares recovery documents to ensure coordinated conservation actions and to meet its commitments to recover species at risk under the *Accord for the Protection of Species at Risk in Canada* and the *Canada–British Columbia Agreement on Species at Risk*.

### **What is recovery?**

Species at risk recovery is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

### **What is a provincial recovery document?**

Recovery documents summarize the best available scientific and traditional information of a species or ecosystem to identify goals, objectives, and strategic approaches that provide a coordinated direction for recovery. These documents outline what is and what is not known about a species or ecosystem, identify threats to the species or ecosystem, and explain what should be done to mitigate those threats, as well as provide information on habitat needed for survival and recovery of the species. This information may be summarized in a recovery strategy followed by one or more action plans. The purpose of an action plan is to offer more detailed information to guide implementation of the recovery of a species or ecosystem. When sufficient information to guide implementation can be included from the onset, all of the information is presented together in a recovery plan.

Information in provincial recovery documents may be adopted by Environment Canada for inclusion in federal recovery documents that the federal agencies prepare to meet their commitments to recover species at risk under the *Species at Risk Act*.

### **What's next?**

The Province of British Columbia accepts the information in these documents as advice to inform implementation of recovery measures, including decisions regarding measures to protect habitat for the species.

Success in the recovery of a species depends on the commitment and cooperation of many different constituencies that may be involved in implementing the directions set out in this document. All British Columbians are encouraged to participate in these efforts.

### **For more information**

To learn more about species at risk recovery in British Columbia, please visit the B.C. Ministry of Environment Recovery Planning webpage at:

<http://www.env.gov.bc.ca/wld/recoveryplans/rcvry1.htm>

**Recovery Plan for Victoria's Owl-clover (*Castilleja victoriae*) in British  
Columbia**

**Prepared by the B.C. Ministry of Environment**

**May 2015**

## **Recommended citation**

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## **Cover illustration/photograph**

Matt Fairbarns

## **Additional copies**

Additional copies can be downloaded from the B.C. Ministry of Environment Recovery Planning webpage at:

<<http://www.env.gov.bc.ca/wld/recoveryplans/rcvry1.htm>>

## Disclaimer

This recovery plan has been prepared by the British Columbia Ministry of Environment, as advice to the responsible jurisdictions and organizations that may be involved in recovering the species. The B.C. Ministry of Environment has received this advice as part of fulfilling its commitments under the *Accord for the Protection of Species at Risk in Canada* and the *Canada–British Columbia Agreement on Species at Risk*.

This document identifies the recovery strategies and actions that are deemed necessary, based on the best available scientific and traditional information, to recover Victoria's owl-clover populations in British Columbia. Recovery actions to achieve the goals and objectives identified herein are subject to the priorities and budgetary constraints of participatory agencies and organizations. These goals, objectives, and recovery approaches may be modified in the future to accommodate new findings.

The responsible jurisdictions have had an opportunity to review this document. However, this document does not necessarily represent the official positions of the agencies.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that may be involved in implementing the directions set out in this plan. The B.C. Ministry of Environment encourages all British Columbians to participate in the recovery of Victoria's owl-clover.

## **ACKNOWLEDGEMENTS**

Brenda Costanzo (B.C. Ministry of Environment [MOE]) prepared this recovery plan. Additional assistance was provided by Matt Fairbarns (consultant), Jenifer Penny and Marta Donovan (B.C. Conservation Data Centre [CDC]), Peter Fielder (MOE), Dave Spittlehouse (MFLNRO), Katrina Stipek (CDC), Leah Westereng (MOE), and Byron Woods (MFLNRO). Additional comments were provided by Matt Huntley and Kella Sadler (Environment Canada, Canadian Wildlife Service, Pacific and Yukon Region), and Conan Webb (Environment Canada, Parks Canada Agency). The Land Based Investment Strategy funded the threats assessment.

## EXECUTIVE SUMMARY

Victoria's owl-clover (*Castilleja victoriae*) is a small annual herb 2–20 cm in height. The stem leaves are dull reddish-purple to reddish-brown, lobed, hairy (sometimes glandular sticky), and arranged alternately up the single stem. Flowers are arranged in compact spike-bearing bracts, which are 3–7 lobed. Sepals are pale green to dull reddish-brown, 8–12 mm long and cleft into four lobes. Petals are lemon-yellow and fused into a 2-lipped flower, 10–18 mm in length. Victoria's owl-clover generally grows in Garry oak ecosystems within the Coastal Douglas-fir biogeoclimatic zone (CDFmm) maritime moist variant, in open areas in vernal seeps and along the margins of vernal pools within 50 m of the shoreline.

Victoria's owl-clover was designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is on Schedule 1 of the *Species at Risk Act* (SARA).<sup>1</sup> In British Columbia, Victoria's owl-clover is ranked S1 (imperiled) by the Conservation Data Centre and is on the provincial Red list. The B.C. Conservation Framework ranks Victoria's owl-clover as a priority 1 under goal 1 and goal 3 (1 = contribute to global efforts for species and ecosystem conservation; and 3 = maintain the diversity of native species and ecosystems). Recovery is considered to be biologically and technically feasible.

Threats to this species are recreational activities, invasive non-native species, problematic native species and climate change. As well, the species is limited by small population size and is restricted to seasonally wet microhabitats within the highly fragmented and declining Garry oak ecosystem.

The population and distribution goal is to maintain all known extant populations and any future populations of Victoria's owl-clover that may be found or re-established within the species' historical distribution range in British Columbia.

The following are the recovery objectives:

1. to protect known populations and habitats of Victoria's owl-clover throughout the B.C. range;
2. to confirm the distribution of Victoria's owl-clover (including new locations) and to reliably determine population trends;
3. to assess, create, and implement a plan to mitigate the main threats to Victoria's owl-clover populations (e.g., recreational activities and invasive species); and
4. to determine if extirpated populations can be restored or re-established within the historical range (e.g. one population at Cattle Point), and if deemed feasible, reintroduce the species.
5. to determine if population augmentation is necessary to maintain two extant populations (Gonzales Point and Harling Point).

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<sup>1</sup> Species that were designated at risk by COSEWIC before October 1999 must be reassessed using revised criteria before they can be considered for addition to Schedule 1 of SARA. After they have been assessed, the Governor in Council may, on the recommendation of the Minister, decide on whether they should be added to the List of Wildlife Species at Risk. The protection and/or conservation measures afforded by SARA apply only to species once they are on Schedule 1.

## RECOVERY FEASIBILITY SUMMARY

The recovery of Victoria's owl-clover in B.C. is considered technically and biologically feasible based on the criteria outlined by the Government of Canada (2009):

1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.

YES. There are extant individuals in Canada that are reproducing.

2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.

UNKNOWN. Sufficient suitable habitat is available to support known extant populations, however it is unknown if additional suitable habitat could be made available to support re-establishment of populations in unoccupied areas.

3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.

YES. Primary threats (e.g., recreational activities, invasive species, problematic native species and climate change) to the species or its habitat can be avoided or mitigated through recovery actions in cooperation with land managers.

4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.

YES. Recovery techniques for habitat restoration and reintroduction exist, and best management practices could be developed to achieve the population and distribution objectives.

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## 1 COSEWIC\* SPECIES ASSESSMENT INFORMATION

**Assessment Summary** – April 2010

**Common Name:**\*\*Victoria's Owl-clover

**Scientific Name:** \*\**Castilleja victoriae*

**Status:** Endangered

**Reason for Designation:** This small annual herb is confined to a very small area of British Columbia and one site in adjacent Washington State. The species is restricted to seasonally wet microhabitats within the highly fragmented and declining Garry Oak ecosystem. Five of the nine Canadian populations disappeared before 1957 and one other population may have been recently extirpated. The three to four extant populations are subject to ongoing competition with several invasive exotic plants and two of the populations are very small and occur in areas used for recreational activities where trampling is a continued problem.

**Occurrence:** British Columbia

**Status History:** Designated Endangered in April 2010.

\* Committee on the Status of Endangered Wildlife in Canada.

\*\* Common and scientific names reported in this recovery plan follow the naming conventions of the B.C. Conservation Data Centre, which may be different from names reported by COSEWIC.

## 2 SPECIES STATUS INFORMATION

<b>Victoria's owl-clover<sup>a</sup></b>		
<b>Legal Designation:</b>		
<a href="#">FRPA:</a> <sup>b</sup> No	B.C. <i>Wildlife Act:</i> <sup>c</sup> No	<a href="#">SARA:</a> <sup>d</sup> <a href="#">Schedule 1</a> –Endangered (2012)
<a href="#">OGAA:</a> <sup>b</sup> No		
<b>Conservation Status<sup>e</sup></b>		
B.C. List: Red	B.C. Rank: S1 (2009)	<a href="#">National Rank:</a> N1 (2012) Global Rank: G1 (2007)
Other <a href="#">Subnational Ranks:</a> <sup>f</sup> WA (S1)		
<b>B.C. Conservation Framework (CF)<sup>g</sup></b>		
Goal 1: Contribute to global efforts for species and ecosystem conservation.		Priority: <sup>h</sup> 1 (2010)
Goal 2: Prevent species and ecosystems from becoming at risk.		Priority: 6(2010)
Goal 3: Maintain the diversity of native species and ecosystems.		Priority: 1(2010)
<a href="#">CF Action Groups:</a> <sup>g</sup>	Compile Status Report; Planning; List under <i>Wildlife Act</i> ; Send to COSEWIC; Habitat Protection; Habitat Restoration; Private Land Stewardship; Species and Population Management	

<sup>a</sup> Data source: B.C. Conservation Data Centre (2015) unless otherwise noted.

<sup>b</sup> No = not listed in one of the categories of wildlife that requires special management attention to address the impacts of forest and range activities on Crown land under the *Forest and Range Practices Act* (FRPA; Province of British Columbia 2002) and/or the impacts of oil and gas activities on Crown land under the *Oil and Gas Activities Act* (OGAA; Province of British Columbia 2008).

<sup>c</sup> No = not designated as wildlife under the B.C. *Wildlife Act* (Province of British Columbia 1982).

<sup>d</sup> Schedule 1 = found on the List of Wildlife Species at Risk under the *Species at Risk Act* (SARA). This species was designated at risk by COSEWIC before October 1999 and must be reassessed using revised criteria before it can be considered for addition to Schedule 1 of SARA.

<sup>e</sup> S = subnational; N = national; G = global; T = refers to the subspecies level; B = breeding; X = presumed extirpated; H = possibly extirpated; 1 = critically imperiled; 2 = imperiled; 3 = special concern, vulnerable to extirpation or extinction; 4 = apparently secure; 5 = demonstrably widespread, abundant, and secure; NA = not applicable; NR = unranked; U = unrankable.

<sup>f</sup> Data source: NatureServe (2015).

<sup>g</sup> Data source: B.C. Ministry of Environment (2010).

<sup>h</sup> Six-level scale: Priority 1 (highest priority) through to Priority 6 (lowest priority).

### 3 SPECIES INFORMATION

#### 3.1 Species Description

Victoria's owl-clover (*Castilleja victoriae*) is a small annual herb 2–20 cm in height, which is thought to be a root hemiparasite<sup>2</sup>. The stem leaves are dull reddish-purple to reddish-brown, lobed, hairy, sometimes glandular and sticky, and arranged alternately up the single or occasionally branched stem. Flowers are arranged in a compact spike-bearing bracts, which are 3–7 lobed. Sepals are pale green to dull reddish-brown, 8–12 mm long and cleft into four lobes. Petals are lemon-yellow and fused into a 2-lipped flower, 10–18 mm in length. Fruiting capsules are 5–6 mm in length and ovate (oval) in shape (Fairbarns and Egger 2007; COSEWIC 2010).

#### 3.2 Populations and Distribution

##### Distribution

Globally, Victoria's owl-clover is restricted to southern Vancouver Island and small islands near Victoria, British Columbia, and in the San Juan Islands in Washington State within 50 m of the shoreline (COSEWIC 2010) (Figure 1).

##### Populations

In British Columbia, there are three extant populations<sup>3</sup> (Trial Island, Gonzales Point, Harling Point). Additionally there is one historical (Ten Mile Point), one extirpated (Lesser Trial Island), and one potentially extirpated population (Cattle Point) (COSEWIC 2010; B.C. Conservation Data Centre 2015) (Figure 1, Table 1).

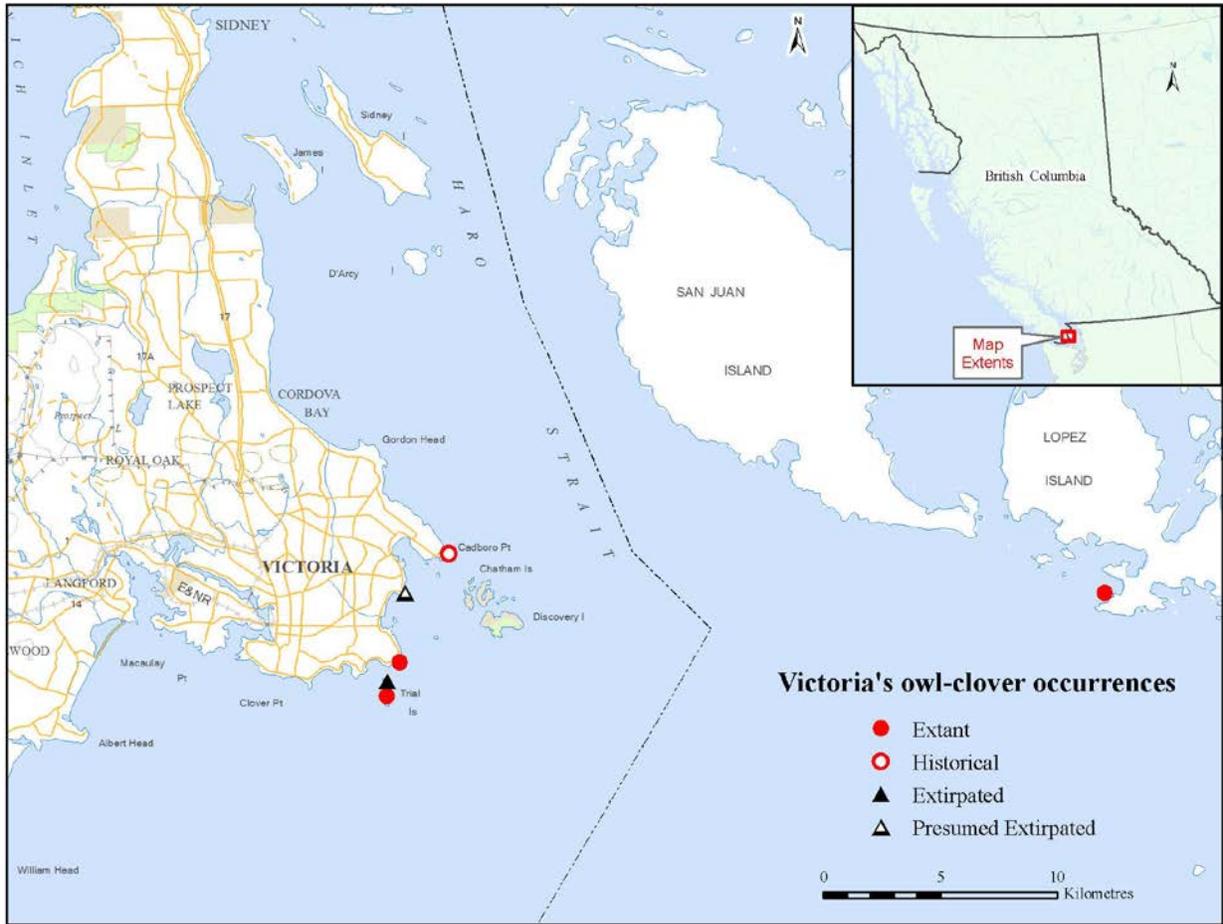
In 2011, populations consisted of 103 individuals at Gonzales Point and 86 individuals at Harling Point. On Trial Island Victoria's owl-clover counts done in 2006 determined that there was a range of 7000–8000 individuals, with the largest subpopulation (9 subpopulations<sup>4</sup>) consisting of 6456 individuals (COSEWIC 2010).

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<sup>2</sup> Hemiparasite is a plant which is parasitic but is also photosynthetic, obtaining water and mineral nutrients from a host plant, and sometimes part of their organic nutrients as well.

<sup>3</sup> Populations are defined in this report following element occurrence specification by NatureServe (2015), which defines populations being separated by at least 1 km from one another.

<sup>4</sup> Subpopulations are within 1 km of one another (NatureServe 2015).



**Figure 1.** Victoria's owl-clover global distribution (B.C. Conservation Data Centre 2015).

**Table 1.** Status<sup>5</sup> and description of Victoria's owl-clover populations in B.C.

<b>Population name</b>	<b>BC CDC EO<sup>a</sup>#</b>	<b>Status and description</b>	<b>Land tenure</b>
Gonzales Point; golf course	EO13	2011: 103 reproducing plants and many others withered before flowering (Fairbarns 2012) 2009: similar numbers to 2008 (M. Fairbarns, pers. comm., 2014). <b>EXTANT</b> .  2008: 86 over 3 x 1 m; 33 over 2 x 0.5 m (~2 m apart) (M. Fairbarns, pers. comm., 2014)	Private
Harling Point	EO12	2011: 86 plants (Fairbarns 2012). <b>EXTANT</b>  2008 <sup>b</sup> : 167 individuals (M. Fairbarns, pers. comm., 2014).  1953-06-11: One colony noted, growing in an open, flat area among rocks (Royal British Columbia Museum herbarium; University of Victoria herbarium).	Private
Trial Islands Ecological Reserve	EO2	2011: several thousand plants in 9 subpopulations (Fairbarns 2012). <b>EXTANT</b>  2006-SP: 9 subpopulations comprised of 7000 to 8000 plants, occupying an area of 600 m <sup>2</sup> . The largest subpopulation consisted of 6456 individuals (BC CDC 2015).  2002-06-13: 2000 flowering plants in 8 subpopulations over 2500 m <sup>2</sup> in open sites in shallow soils that are moist in winter and dry by summer.  2001-04: 5 subpopulations with the largest consisting of 4200 individuals (M. Fairbarns, pers. comm., 2006).  1999-06-06: Observed, no stem count; flat (observed by Donovan and Penny 1999).  1998-07-25: 40–60 flowering plants over 5 m <sup>2</sup> in one of two patches.  1976-06-20: Collected (Royal British Columbia Museum herbarium).	Provincial/Federal [ <i>Note subpopulation tenure are:</i> 2 <i>Provincial;</i> 3 <i>Federal;</i> 2 <i>Provincial/Federal;</i> 2 <i>Provincial/Provincial Leased.</i> ]

<sup>5</sup> Extant: occurrence has been recently verified as still existing. Historical: used when there is a lack of recent field information verifying the continued existence of the occurrence. Generally, if there is no known survey for 20 to 40 years for a plant occurrence it should be considered historical.

Population name	BC CDC EO <sup>a</sup> #	Status and description	Land tenure
Cattle Point	EO9	<p>Observed at Cattle Point since 1961, but population has been in decline. <b>POSSIBLY EXTIRPATED.</b></p> <p>2004 to 2007: No plants could be found.</p> <p>2004-SP: 10 or less plants covering less than 10 m<sup>2</sup> (B.C. Conservation Data Centre 2015).</p> <p>2003-04-14: Flowering plants on the margin of a vernal pool; (observed by Fairbarns and Penny 2003).</p> <p>1993-07-07: 85 plants in three populations; 1975-07-25: Seed collected.</p> <p>1966-07-20: Collected on treeless rocky outcrop.</p> <p>1961-06-21: Collected.</p> <p>1961-05-25: Common in a few places.</p>	Municipal
Ten Mile Point	EO3	<p>First observed in 1939, this population has not been observed since 1954, despite an extensive, directed survey in 2003, 2004, and 2005 in preparation for a COSEWIC status report (B.C. Conservation Data Centre 2015). <b>HISTORICAL.</b></p> <p>1954-05-24: Collected (Royal British Columbia Museum herbarium).</p> <p>1942-05-22: Just above beach, confined to one small bay (University of British Columbia herbarium).</p> <p>1942-05-21: Only found on rocks at south end of point (Canadian Museum of Nature).</p> <p>1940-05-21: Collected (Biosystematics Research Centre).</p> <p>1939-05-21: Collected at "lot near Maynard Cove, grassy beach with broom."</p>	Unknown
Trial Islands Ecological Reserve, Lesser Trial Island	EO11	<p>1953-06-11: One colony noted, growing in an open, flat area among rocks (Royal British Columbia Museum herbarium; University of Victoria herbarium). <b>EXTIRPATED.</b></p>	Provincial

<sup>a</sup> Element Occurrence numbers from the B.C. Conservation Data Centre. Refer to BC Species and Ecosystem Explorer webpage at: <<http://www.env.gov.bc.ca/atrisk/toolintro.html>>.

<sup>b</sup> This was observed on May 25, 2008, not 2009 as was stated in the status report.

### 3.3 Habitat and Biological Needs of Victoria's Owl-Clover

Victoria's owl-clover occurs on southeastern Vancouver Island within the Coastal Douglas-fir biogeoclimatic zone (CDFmm) maritime moist variant in Garry oak ecosystems. This zone has a Mediterranean-like climate with dry, cool summers and mild winters which influence the life history of this species (COSEWIC 2010). Victoria's owl-clover grows in open areas in vernal seeps and along the margins of vernal pools within 50 m of the shoreline at elevation of 1–5 m above sea level. These shallow ephemeral pools usually are comprised of a thin soil layer (usually < 5–15 cm deep) over gneissic bedrock in between knolls and benches and thus are imperfectly drained (Fairbarns 2012). This thin soil layer also restricts the growth of woody plants and large perennials (Fairbarns and Egger 2007), which otherwise would fill in suitable habitat for Victoria's owl-clover. The habitat is saturated for most of the winter and early spring, becoming very dry by the start of summer (COSEWIC 2010; Fairbarns 2012).

Victoria's owl-clover is thought to be a root hemiparasite (Fairbarns and Egger 2007) and therefore may require a host plant for partial nutrient sources. This means the species needs to grow in close association with plants which photosynthesize, however the host plant is unknown but may be an assemblage of species (M. Fairbarns, pers. comm., 2015). The commonly associated species occurring in the same habitat as Victoria's owl-clover are listed in the next paragraph.

Commonly associated species include (\* = non-native) *Aira caryophylla*\* (silver hairgrass), *Acmispon americanus* (= *Lotus unifoliolatus*; Spanish-clover), *Armeria maritima* (thrift), *Cerastium glomeratum* (sticky chickweed), *Festuca rubra* (red fescue), *Grindelia stricta* (Oregon gumweed), *Hypochaeris glabra*\* (smooth cat's-ear), *Hypochaeris radicata*\* (hairy cat's-ear), *Juncus bufonius* (toad rush), *Montia fontana* (blinks), *Plagiobothrys scouleri* var. *scouleri* (Scouler's popcornflower), *Plantago elongata* (slender plantain), *Plantago lanceolata*\* (ribwort plantain), *Plantago maritima* ssp. *juncooides* (sea plantain), *Prunella vulgaris*\* (self-heal), *Silene gallica*\* (small-flowered catchfly), *Spergularia macrotheca* var. *macrotheca* (beach sand-spurry), *Trifolium depauperatum* var. *depauperatum* (poverty clover), and *Vulpia bromoides*\* (barren fescue) (Fairbarns and Egger 2007; Fairbarns 2012; M. Fairbarns, pers. comm., 2014). Other associated plant species include *Agrostis microphylla* (small-leaved bentgrass), *Anagallis minima* (chaffweed), *Anthoxanthum odoratum*\* (sweet vernalgrass), *Bellis perennis*\* (English daisy), *Bromus hordeaceus*\* (soft brome), *Callitriche marginata* (winged water-starwort), *Carex obnupta* (slough sedge), *Deschampsia caespitosa* (tufted hairgrass), *Geranium molle*\* (dovefoot geranium), *Holcus lanatus*\* (common velvet-grass), *Hordeum murinum* ssp. *murinum*\* (wall barley), *Limnanthes macounii* (Macoun's meadow-foam), *Myosurus minimus* (tiny mousetail), *Poa annua*\* (annual bluegrass), *Potentilla anserina* (common silverweed), *Psilocarphus elatior* (tall woolly-heads), *Rumex acetosella*\* (sheep sorrel), *Spergularia rubra*\* (red sand-spurry), *Trifolium dubium*\* (small hop-clover) (Fairbarns 2012; B.C. Conservation Data Centre 2015; M. Fairbarns, pers. comm., 2014).

### 3.4 Limiting Factors

Limiting factors are generally not human induced and include characteristics that make the species or ecosystem less likely to respond to recovery/conservation efforts (e.g., small population size).

Victoria's owl-clover has poor dispersal ability (Fairbarns and Egger 2007): it has no mechanism for seed dispersal and the seeds fall by gravity from the dried capsules. There are also recruitment issues within the species potentially due to lack of host species (i.e., one or more of the commonly-associated species listed in section 3.3) in the surrounding habitat.

## 4 THREATS

Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational) (Salafsky *et al.* 2008). For purposes of threat assessment, only present and future threats are considered.<sup>6</sup> Threats do not include limiting factors, which are presented in Section 3.4.<sup>7</sup>

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<sup>6</sup> Past threats may be recorded but are not used in the calculation of Threat Impact. Effects of past threats (if not continuing) are taken into consideration when determining long- and/or short-term trend factors (Master *et al.* 2012).

<sup>7</sup> It is important to distinguish between limiting factors and threats. Limiting factors are generally not human induced and include characteristics that make the species or ecosystem less likely to respond to recovery/conservation efforts (e.g., inbreeding depression, small population size, and genetic isolation; or likelihood of regeneration or recolonization for ecosystems).

## 4.1 Threat Assessment

The threat classification below is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system and is consistent with methods used by the B.C. Conservation Data Centre and the B.C. Conservation Framework. For a detailed description of the threat classification system, see the Open Standards website (Open Standards 2014). Threats may be observed, inferred, or projected to occur in the near term. Threats are characterized here in terms of scope, severity, and timing. Threat “impact” is calculated from scope and severity. For information on how the values are assigned, see [Master \*et al.\* \(2012\)](#) and table footnotes for details. Threats for the Victoria's owl-clover were assessed for the entire province (Table 2).

**Table 2.** Threat classification table for Victoria's owl-clover in British Columbia.

Threat # <sup>a</sup>	Threat description	Impact <sup>b</sup>	Scope <sup>c</sup>	Severity <sup>d</sup>	Timing <sup>e</sup>	Population(s) or location(s) or site(s)
1	Residential & commercial development	Negligible	Negligible	Extreme	Moderate	
1.3	Tourism & recreation areas	Negligible	Negligible	Extreme	Moderate	Gonzales Point (EO13)
4	Transportation & service corridors					
4.2	Utility & service lines	Not calculated (Outside of timeframe)			Insignificant /Negligible	Trial Island (EO2)
6	Human intrusions & disturbance	Low	Small	Slight	High	
6.1	Recreational activities	Low	Small	Slight	High	Gonzales (EO13) and Harling Points (EO12), Trial Island (EO2; EO11)
6.3	Work & other activities	Negligible	Small	Negligible	Low	Trial Island (EO2)
8	Invasive & other problematic species & genes	Medium	Pervasive	Moderate	High	
8.1	Invasive non-native/alien species	Medium-low	Pervasive	Moderate-slight	High	Gonzales (EO13) and Harling Points (EO12), Trial Island (EO2; EO11)
8.2	Problematic native species	Medium	Large	Moderate	High	Trial Island (EO2; EO11)

Threat # <sup>a</sup>	Threat description	Impact <sup>b</sup>	Scope <sup>c</sup>	Severity <sup>d</sup>	Timing <sup>e</sup>	Population(s) or location(s) or site(s)
9	Pollution	Negligible	Negligible	Negligible	Low	
9.4	Garbage & solid waste	Negligible	Negligible	Extreme	Moderate	Trial Island (EO2)
11	Climate change & severe weather	High-medium	Pervasive	Serious-moderate	Moderate	
11.2	Droughts	High-medium	Pervasive	Serious-moderate	Moderate	Gonzales (EO13) and Harling Points (EO12), Trial Island (EO2; EO11)

<sup>a</sup> Threat numbers are provided for Level 1 threats (i.e., whole numbers) and Level 2 threats (i.e., numbers with decimals).

<sup>b</sup> **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on severity and scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment time (e.g., timing is insignificant/negligible [past threat] or low [possible threat in long term]); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

<sup>c</sup> **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species’ population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).

<sup>d</sup> **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or 3-generation timeframe. For this species a 10-year timeframe was used. Usually measured as the degree of reduction of the species’ population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).

<sup>e</sup> **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [ $< 10$  years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

## 4.2 Description of Threats

The overall province-wide Threat Impact for this species is High.<sup>8</sup> This overall threat considers the cumulative impacts of multiple threats. The major threats are recreation activities and invasive species (Table 2). Details are discussed below under the Threat Level 1 headings.

### IUCN-CMP Threat 1. Residential & commercial development

#### 1.3 Tourism & recreation areas

One population at Gonzales Point occurs on the Royal Victoria Golf Course. The fairway where this population is located could possibly be extended and likely destroy the habitat and kill the plant population. If this development occurs, the population will be extirpated. Currently this expansion is on hold (M. Fairbarns, pers. comm., 2014).

### IUCN-CMP Threat 4. Transportation & service corridors

#### 4.2 Utility & service lines

The communications towers on Crown lands on Trial Island have recently been replaced, removing the old guy-wired towers and building stand-alone communication towers. There was no effect to the population of Victoria's owl clover on Trial by this activity (J. Miskelly, pers. comm., 2015). These utility and service lines can be expected to be upgraded at some point in the future.

### IUCN-CMP Threat 6. Human intrusions & disturbance

#### 6.1 Recreational activities

At the Harling Point location (< 1% of the overall population), there is a significant threat of extirpation due to direct mortality from visitors trampling, picnicking, and sitting on the plants. In the Gonzales Point location, the plants occur in two small areas along the rocky shoreline. There would have to be a direct trampling of plants by humans to cause direct mortality, but the probability of this is likely low (M. Fairbarns, pers. comm., 2014). For Trial Island, where there are eight subpopulations, there are minimal recreational activities on the island since most of the area is an ecological reserve or federal lands. The area is monitored by B.C. Provincial Park Wardens as well as the lighthouse keepers employed by the federal government. The highest threat of damage is the use of the trail system by the lighthouse keepers; however, the probability of damage is very slight (M. Fairbarns, pers. comm., 2014).

#### 6.3 Work & other activities

There have been discussions on Vancouver Island concerning the rights of First Nations peoples to harvest camas (*Camassia* spp.) as a food source on their traditional lands. There could be

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<sup>8</sup> The overall threat impact was calculated following Master *et al.* (2012) using the number of Level 1 Threats assigned to this species where timing = High or Moderate, which included 1 High-Medium, 1 Medium, and 1 Low (Table 2). The overall threat impact considers the cumulative impacts of multiple threats.

direct mortality to Victoria's owl-clover if this was to occur, but likely it would be an insignificant overall impact (M. Fairbarns, pers. comm., 2014).

On Trial Island, in the past there have been two sewer line excavations (one sewer line burst), plus one water line excavation for repairs to these lines (M. Fairbarns, pers. comm., 2014). One subpopulation of Victoria's owl-clover is over top of the water line on Trial Island, which may need repair in the future. If this repair is done during the growing season, the plants may be killed, and any excavation will deplete or eliminate the seed bank. As well, soil disturbance will encourage the establishment of invasive plants and increase the competition for light, water and nutrients (M. Fairbarns, pers. comm., 2015).

Restoration activities for the communications tower replacement continue (J. Miskelly, pers. comm., 2015) under the direction of the Ministry of Forest, Lands and Natural Resource Operations.

## **IUCN-CMP Threat 8. Invasive & other problematic species & genes**

### 8.1 Invasive & non-native species

Invasive plants have invaded suitable habitat for Victoria's owl-clover altering the habitat by displacing native bunchgrass community that would have been dominated by *Danthonia californica* (California oatgrass) and *Deschampsia cespitosa* (tufted hairgrass) (B.C. Conservation Data Centre 2015). The invasive grass species include *Agrostis capillaris* (colonial bentgrass), *Aira praecox* (early hairgrass), *Aira caryophyllea* (silver hairgrass), *Anthoxanthum odoratum* (sweet vernalgrass), *Bromus hordeaceus* (soft brome), *Cynosurus echinatus* (hedgehog dogtail), *Dactylis glomerata* (orchard grass), *Holcus lanatus* (common velvet-grass), *Hordeum* spp. (barley), *Lolium perenne* (perennial ryegrass), *Poa annua* (annual bluegrass), *Poa pratensis* (Kentucky bluegrass), *Vulpia bromoides* (barren fescue). Invasive forbs include *Bellis perennis* (English daisy), *Geranium molle* (dovefoot geranium), *Hypochaeris glabra* (smooth cat's-ear), *Hypochaeris radicata*, (hairy cat's ear), *Plantago lanceolata* (ribwort plantain), *Rumex acetosella* (sheep sorrel), *Silene gallica* (small-flowered catchfly), *Spergularia rubra* (red sand-spurry) (Fairbarns and Egger 2007; M. Fairbarns, pers. comm., 2014). The Victoria owl-clover population on the Chain Island was probably lost due to competition with invasive species as most of the upland habitat has been overtaken by annual grasses such as annual bluegrass (COSEWIC 2010).

The invasive plant species that threaten Victoria's owl-clover the most are carpet burweed (*Soliva sessilis*) and mossy stonecrop (*Crassula tillaea*), which occur at Cattle Point in Oak Bay near the extant locations. These species can be easily transported on the feet of birds or humans to the current populations of Victoria's owl-clover. As Victoria's owl-clover grows in areas that other plants normally cannot occupy (i.e., areas subjected to winter inundation followed by summer drought), and germinate in April, other plants will not have used the same habitat at the same time. However, carpet burweed and mossy stonecrop do occupy the same habitat as Victoria's owl-clover and could cover the areas that Victoria's owl-clover use for germination and establishment (M. Fairbarns, pers. comm., 2014).

### 8.2 Problematic native species

Non-migratory Canada Geese inhabit Trial Island and are continually trampling, foraging, and defecating on the areas in which Victoria's owl-clover grows. The highest amount of damage is caused by foraging of the geese leaving the ground denuded and muddy thereby causing habitat alteration. As well, the geese may also consume Victoria's owl-clover and its seeds (M. Fairbarns, pers. comm., 2014).

There have been efforts over the past two years to discourage the geese from nesting and foraging on the island. Any reduction in the geese breeding population during the growing and reproduction time of Victoria's owl-clover would be beneficial to the species (M. Fairbarns, pers. comm., 2014).

## **IUCN-CMP Threat 9. Pollution**

### 9.4 Garbage & solid waste

In the past on Trial Island, there has been garbage piled in various areas on the island; in one case there was a pile on top of subpopulation #8 for several months. If the garbage is piled on the plants during the growing season, the plants underneath will be killed. As well, since the habitat is altered after garbage piling, non-native invasive plants tend to invade the habitat and out-compete Victoria's owl-clover. Work is continuing on the island, raising the possibility that this could occur again (M. Fairbarns, pers. comm., 2014).

## **IUCN-CMP Threat 11. Climate change & severe weather**

### 11.2 Drought

Victoria's owl-clover would not be able to grow and reproduce if the summer drought begins earlier. An earlier onset of summer drought in June by two weeks over two years could affect seed production in Victoria's owl-clover (M. Fairbarns, pers. comm., 2014) by restricting soil moisture required for germination. This species is not a seed banker; seeds germinate or perish within the year they are produced (rather than remaining in the soil until conditions are appropriate for germination), hence it is more predisposed to population collapse.

There have already been declines in fecundity during drought years, however, it is not the severity of the drought that would affect Victoria's owl-clover, but the actual timing of the occurrence of the drought. The small size and limited reproductive output of the species, combined with the fact that it is distributed within a narrow biogeoclimatic range in Canada, makes it highly vulnerable to local impacts of climate change.

## **5 RECOVERY GOAL AND OBJECTIVES**

### **5.1 Recovery (Population and Distribution) Goal**

The population and distribution goal is to maintain all known extant populations and any future populations of Victoria's owl-clover that may be found or re-established within the species' historical distribution range in British Columbia.

## 5.2 Rationale for the Recovery (Population and Distribution) Goal

In British Columbia, the distribution of Victoria's owl-clover is restricted to the Victoria area (first record from 1893) and has been subject to continuing loss of suitable and/or potentially suitable habitat since European settlement. Suitable habitat, i.e., vernal seeps within maritime meadow complexes within 50 m of the ocean edge in the southern tip of Saanich, Oak Bay and Victoria, as well as the Oak Bay Islands (e.g., Discovery and Chatham) (M. Fairbarns, pers. comm., 2015), is estimated to never have exceeded 100 ha (COSEWIC 2010). As Victoria's owl-clover has a small geographical distribution and is currently low in population numbers at two locations, with one location with 98% of the global population (COSEWIC 2010), it is important that all extant populations (as well as any populations found in the future) and their habitat be maintained. Population augmentation may be necessary to maintain at least two of the populations, given the extremely small number of individuals that are currently present at these sites (M. Fairbarns, pers. comm., 2015).

Where feasible, the goal includes the objective to restore and re-introduce Victoria's owl-clover populations at up to three sites within the historic range (i.e. to achieve historic levels prior to negative impacts of human activity). Feasibility of these recovery actions will be evaluated. As a short-term goal, re-introduction efforts will focus on one extirpated site (i.e., Cattle Point). This presumed extirpated location is in a protected area (a municipal park), and the last known location is already enclosed within a protective fence (M. Fairbarns, pers. comm., 2015). Once knowledge gaps have been fulfilled, the recovery goal can be refined.

## 5.3 Recovery Objectives

The following are the recovery objectives:

1. to protect<sup>9</sup> known populations and habitats of Victoria's owl-clover throughout the B.C. range;
2. to confirm the distribution of Victoria's owl-clover (including new locations) and to reliably determine population trends;
3. to assess, create, and implement a plan to mitigate the main threats to Victoria's owl-clover populations (e.g., recreational activities and invasive species); and
4. to determine if extirpated populations can be restored or re-established within the historical range (e.g. one population at Cattle Point), and if deemed feasible, reintroduce the species;

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<sup>9</sup> Protection can be achieved through various mechanisms including: voluntary stewardship agreements, conservation covenants, sale by willing vendors on private lands, land use designations, protected areas, and mitigation of threats.

5. to determine if population augmentation is necessary to maintain two extant populations (Gonzales Point and Harling Point).

## 6 APPROACHES TO MEET RECOVERY OBJECTIVES

### 6.1 Actions Already Completed or Underway

The following actions have been categorized by the action groups of the B.C. Conservation Framework (B.C. Ministry of Environment 2010). Status of the action group for this species is given in parentheses.

#### **Compile Status Report (completed)**

- COSEWIC report completed (COSEWIC 2010). Update due 2020.

#### **Send to COSEWIC (completed)**

- Victoria's owl-clover assessed as Endangered (COSEWIC 2010). Re-assessment due 2020.

#### **Planning (in progress)**

- B.C. Recovery Plan completed (this document, 2015).

#### **Habitat Protection (in progress)**

- Two subpopulations on Trial Island are within a provincial ecological reserve, and two more subpopulations overlap between the ecological reserve and Crown land lease on Trial Island. The species is afforded protection on the ecological reserve lands through the legal provisions of the B.C. *Ecological Reserves Act*.

#### **Habitat Restoration and Private Land Stewardship (in progress)**

- Harling Point is the subject of restoration efforts being led by with the Garry Oak Ecosystems Recovery Team (GOERT) with assistance from the Habitat Stewardship Fund and Parks Canada Agency. GOERT is removing invasive species on the site and is aware of Victoria's owl-clover and other plant species at risk on this site. A restoration plan is in place (<http://www.goert.ca/activities/2014/07/harling-point-restoration-project-issues-and-opportunities/>).
- Trial Island has been undergoing restoration actions following a restoration plan developed and led by GOERT since 2011 (<http://www.goert.ca/activities/2011/10/trial-island/>) with funding provided by Environment Canada.
- Trial Island is also subject to a further restoration work on the Crown-leased lands due to the communications tower replacement, which is being carried out under contract to a communications company. This restoration is part of the conditions of the communications lease.
- Capital Regional District has led two years of Canada Goose management on Trial Island, (M. Fairbarns, pers. comm., 2014) particularly for the protection of rare plants including Victoria's owl-clover.

#### **Species and Population Management (in progress)**

- Public education by GOERT on Garry oak and associated ecosystems at risk is ongoing.

## 6.2 Recovery Action Table

**Table 3.** Recovery actions for Victoria's owl-clover.

<b>Recovery objective</b>	<b>Actions to meet objectives</b>	<b>Threat<sup>a</sup> or concern addressed</b>	<b>Priority<sup>b</sup></b>
1	Determine appropriate measures to protect habitat.	6.1; 6.3; 8.1; 8.2	Essential
	Develop stewardship agreements, conservation covenants with private landowners.	6.1; 6.3	Essential
	Develop best management practices for the species.	6.1; 6.3; 8.1; 8.2	Necessary
	Advise landowners on best management practices to mitigate threats.	6.1; 6.3; 8.1; 8.2	Necessary
	Develop or refine site-specific management plans for protected areas and federal lands to reduce or remove threats to populations and habitat.	6.1; 6.3; 8.1; 8.2	Necessary
	Manage known occurrences of the species in a way that minimizes impact.	6.1; 6.3; 8.1; 8.2	Necessary
2	Develop and implement a monitoring protocol that provides reliable estimates of population size and trends.	Knowledge gaps	Beneficial
3	Monitor population to assess the effects of threats	6.1; 6.3; 8.1; 8.2	Beneficial
	Monitor locations to assess the effects of any management actions taken to mitigate threats.	6.1; 6.3; 8.1; 8.2	Beneficial
4 and 5	Determine the feasibility and suitability of the Cattle Point (presumed extirpated) location for reintroduction.	Knowledge gap	Necessary
	Determine the feasibility and suitability of habitat restoration and population augmentation at two other sites within the species' historical range in BC (Gonzales Point and Harling Point).	Knowledge gap	Beneficial
	Investigate propagation methodologies to determine requirements for seed germination.	Knowledge gap	Beneficial
	Develop an augmentation or restoration plan with landowners if feasible.	Knowledge gap	Beneficial
	Augment or re-introduce the populations where feasible.	Habitat loss or degradation	Beneficial

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<sup>a</sup> Threat numbers according to the IUCN-CMP classification (see Table 2 for details).

<sup>b</sup> Essential (urgent and important, needs to start immediately); Necessary (important but not urgent, action can start in 2–5 years); or Beneficial (action is beneficial and could start at any time that was feasible).

## 7 INFORMATION ON HABITAT NEEDED TO MEET RECOVERY GOAL

To meet the population and distribution goal for this species, it is recommended that specific habitat attributes be identified for Victoria's owl-clover. In addition, it is recommended that locations of habitat be geospatially described on the landscape to mitigate habitat threats and to facilitate actions for meeting the population and distribution goal.

### 7.1 Description of Survival/Recovery Habitat

A description of the species habitat has been provided in Section 3.3 based on the current knowledge of the habitat occupied by the species. Although some aspects of the species' habitat requirements require further study (knowledge gaps are identified in the recovery action table), the following described the biophysical attributes of survival/recovery habitat based on our best available information:

- open grassy areas within 50 m of the shoreline and 1–5 m above sea level;
- Coastal Douglas-fir biogeoclimatic zone, maritime moist variant (CDFmm) associated with Garry oak and associated ecosystems;
- coastal freshwater seeps and margins of vernal pools;
- shallow soils over gneissic bedrock knolls and benches; and
- soils saturated for most of the winter and early spring becoming very dry in summer.

## 8 MEASURING PROGRESS

The following performance measures provide a way to define and measure progress toward achieving the recovery (population and distribution) goal and recovery objectives. Performance measures are listed below for each objective for the next five years.

### Measurable(s) for Objective 1

- All known extant locations of Victoria's owl-clover have stewardship agreements or site-specific management plans established.

### Measurable(s) for Objective 2

- Population monitoring indicates known locations are still extant and population data have been gathered to help determine long-term trends

### Measurable(s) for Objective 3

- Effects of the main threats to the populations have been investigated and reduced through mitigating actions at all known locations.

### Measurable(s) for Objective 4 and 5

- The feasibility for reintroduction or augmentation has been assessed. Potential habitat has been investigated, and if feasible, the population is augmented or reintroduced.

## 9 EFFECTS ON OTHER SPECIES

Many other rare plant species occur in vernal pools and seeps with Victoria's owl-clover. Currently at two extant locations there are other plant species at risk that could benefit from recovery actions including: *Alopecurus carolinianus* (Carolina meadow-foxtail), *Castilleja levisecta* (golden paintbrush), *Crassula aquatica* (pigmyweed), *Entosthodon fascicularis* (banded cord-moss), *Hosackia gracilis* (= *Lotus formosissimus*; seaside bird's foot lotus), *Limnanthes macounii* (Macoun's meadow-foam), *Lupinus densiflorus* var. *densiflorus* (dense-flowered lupine), *Microseris bigelovii* (coast microseris), *Orthocarpus bracteosus* (rosy owl-clover), *Polygonum paronychia* (black knotweed), *Ranunculus californicus* (California buttercup), *Sanicula bipinnatifida* (purple sanicle), *Sidalcea hendersonii* (Henderson's checker-mallow), *Silene scouleri* ssp. *grandis* (coastal Scouler's catchfly), and *Triphysaria versicolor* ssp. *versicolor* (bearded owl-clover) (Fairbarns 2012; B.C. Conservation Data Centre 2015).

Ecosystems and species at Victoria's owl-clover locations are expected to benefit from habitat protection and management of threats. Recovery planning activities for Victoria's owl-clover will be implemented with consideration for all co-occurring species at risk, such that there are no negative impacts to co-occurring species at risk or their habitats.

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**Personal Communications**

Matt Fairbarns, Consultant, Victoria, B.C.

James Miskelly, Consultant, Victoria, B.C.