

Replacement of Sections 2.5 and 2.6 of the Recovery Strategy for Multi-Species at Risk in Vernal Pools and other Ephemeral Wet Areas associated with Garry Oak Ecosystems in Canada

Bog Bird's-foot Trefoil
Tall Woolly-heads
Water-plantain Buttercup
Kellogg's Rush
Rosy Owl-clover
Dwarf Sandwort



2016

Replacement of Sections 2.5 and 2.6 of the following Recovery Strategy:

Parks Canada Agency. 2006. Recovery Strategy for Multi-Species at Risk in Vernal Pools and other Ephemeral Wet Areas Associated with Garry Oak Ecosystems in Canada. In *Species at Risk Act Recovery Strategy Series*. Parks Canada Agency, Ottawa. 73 pp.

For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk Public Registry (www.sararegistry.gc.ca).

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Top Left: Water-plantain Buttercup, © M. Fairbarns, Top Centre: Tall Woolly-heads © A. Ceska, Top Right: Kellogg's Rush © R. Batten, Bottom Left: Rosy Owl-clover © M. Fairbarns, Bottom Centre: Bog Bird's-foot Trefoil © T. Kohler, Bottom Right: Dwarf Sandwort © M. Fairbarns

Également disponible en français sous le titre

« Remplacement des sections 2.5 et 2.6 du Programme de rétablissement multi-espèces visant les plantes en péril des mares printanières et autres milieux humides saisonniers associés aux chênaies de Garry au Canada »

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Paper format :

ISBN:978-0-660-06170-2

Catalogue no. En3-4/224-2016E

PDF format

ISBN: 978-0-660-06168-9

Catalogue no. En3-4/224-2016E-PDF

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Acknowledgements

The Garry Oak Ecosystems Recovery Team is thanked for their involvement in the development of this recovery strategy. The initial draft of this amendment was prepared by Todd Kohler of the Garry Oak Ecosystems Recovery Team (GOERT) Society. Thank you to the GOERT Plants at Risk Recovery Implementation Group for providing their valuable advice, knowledge and experience in the development of this recovery strategy amendment. Additional revision to this document has been made based on comments and edits provided by a number of organizations and partners including volunteers, contactors, nature conservancies, academic institutions, provincial, municipal and federal governments, and US collaborators. Thank you also to the numerous landowners and land managers for their support and stewardship activities.

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Introduction

This document replaces sections 2.5 and 2.6 of the “Recovery Strategy for Multi-Species at Risk in Vernal Pools and other Ephemeral Wet Areas associated with Garry Oak Ecosystems in Canada” (Parks Canada Agency 2006), which was posted on the Species at Risk Public Registry on August 11th 2006¹. In replacing sections 2.5 and 2.6 this amendment provides a partial identification of critical habitat for: Bog Bird’s-foot Trefoil (*Lotus pinnatus*), Tall Woolly-heads (*Psilocarphus elatior*), Water-plantain Buttercup (*Ranunculus alismifolius*), Kellogg’s Rush (*Juncus kelloggii*), Rosy Owl-clover (*Orthocarpus bracteosus*), and Dwarf Sandwort (*Minuartia pusilla*). The Government of Canada, in cooperation with the provinces and other partners, is continuing work that will lead to the identification of additional critical habitat in future recovery planning documents to meet the population and distribution objectives for the recovery of multiple species at risk in vernal pools and other ephemeral wet areas associated with Garry Oak ecosystems in Canada.

2.5. Critical Habitat

Areas of critical habitat for Bog Bird’s-foot Trefoil, Tall Woolly-heads, Water-plantain Buttercup, Kellogg’s Rush, Rosy Owl-clover, and Dwarf Sandwort are identified in this amendment. Critical habitat is defined in the *Species at Risk Act* as “...the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species” (Subsection 2(1)). Habitat for a terrestrial wildlife species is defined in the *Species at Risk Act* as “...the area or type of site where an individual or wildlife species naturally occurs or depends on directly or indirectly in order to carry out its life processes or formerly occurred and has the potential to be reintroduced” (Subsection 2(1)).

Critical habitat for the above mentioned species is identified in this amendment to the extent possible, based on the best available information. It is recognized that the critical habitat identified below is insufficient to achieve the population and distribution objectives² for these species because additional critical habitat is required to create new populations for these six species. More precise boundaries may be mapped, and additional critical habitat may be added in the future if ongoing research supports the inclusion of areas beyond those currently identified. The schedule of studies (Section 2.8 of the recovery strategy (Parks Canada Agency 2006)) outlines the activities required to identify additional critical habitat necessary to support the population and distribution objectives of each species; some studies remain to be completed and the schedule of studies is still expected to provide the required information. The identification of critical habitat will be revised as information gaps are filled.

The habitats of all the species covered by this amendment occur in vernal pool and other ephemeral wet areas on southeast Vancouver Island and the adjacent Gulf Islands and islets. In

¹ www.registrelep-sararegistry.gc.ca/document/default_e.cfm?documentID=875

² Population and distribution objectives in this action plan are the recovery goals and objectives in section 2.3 of the recovery 2006 plan.

addition to vernal pools, other ephemeral wet areas, such as vernal swales, vernal seeps, and seasonally wetted wetland margins are included in this amendment. These habitats occur within a larger mosaic of Garry Oak woodlands, maritime meadows, coastal bluffs, grasslands, rocky outcrops, and transitional forests that comprise Garry Oak and associated ecosystems (Fuchs 2001) and differ primarily in the period of annual inundation by water (Section 1.4 and Section 3 of the recovery strategy, Parks Canada 2006). To characterize the habitat of each species, site and vegetation data were collected at most extant locations and are presented below for each species. It is important to note that further study of habitat is needed to improve our understanding of the critical habitat features and attributes for each of these species.

2.5.1. Identification of the Species' Critical Habitat

Geospatial location of areas containing critical habitat for plant species at risk in Vernal Pools and Ephemeral Wet Areas

Geospatial areas containing critical habitat are depicted as bounding areas (Figures 7-19). These bounding areas are delineated based on the location of critical habitat attributes. Note that many of the mapped areas shown contain critical habitat for more than one species. Biophysical attributes of critical habitat are generalized below, and explained in more detail by species in subsequent sections.

Biophysical attributes of critical habitat for plant species at risk in Maritime Meadows

Within the geospatial areas containing critical habitat, critical habitat for plant species of maritime meadows is identified based on the patch³ areas currently occupied by the species, and surrounding habitat which provides the biophysical attributes that maintain it. The specific attributes required for species' life history functions in occupied and surrounding habitat overlap biophysically, geospatially, seasonally, and across life history stages. Within the habitat surrounding patch areas, two habitat features (the minimum canopy opening and the catchment area) are commonly required, and together comprise the biophysical attributes and identification of critical habitat for most species and sites (i.e., except where one or more of these features are not found to be relevant or limiting for the species). These features are explained below and referred to where relevant, in the species-specific critical habitat sections.

Many of the species require relatively unshaded light conditions to germinate and to support this light regime the area surrounding the seed bank must be clear of shading shrubs and trees: This surrounding area is the canopy opening required by the species. The minimum size of canopy openings can be determined based on the height that woody vegetation is able to grow in the area where it will cast shade on the plants or their seedbank (e.g., Spittlehouse *et al.*, 2004). An additional consideration with regards to canopy opening is that when tall vegetation falls, it will cover an area of ground proportional to its height. For the species in this amendment (unless

³ In the explanations below the term 'patch' refers to a group of several plants in close proximity or rarely a single plant. For the purposes of this amendment, the identification of 'patches' is based on survey work performed by a biologist familiar with the species. The term 'population' refers to groups of patches likely to interbreed with each other. This assessment is based on the 'Habitat-based Plant Element Occurrence Delimitation Guidance' and populations generally include patches within 1 km of each other unless otherwise specified (NatureServe 2011).

more specific data was available) a default minimum canopy opening of 20 meters was applied (based on the general maximum tree height in these areas).

In addition to canopy openings, specific hydrological characteristics are critical to the survival or recovery of many of these species. These hydrological characteristics are directly tied to rainfall (Graham 2004). Rainwater is collected and stored in the surrounding area called the catchment. This catchment area is directly responsible for receiving rainwater which flows along the prevailing topography to the plants. Surface water flow and subsurface seepage from these catchment areas are essential to the survival of several of the species addressed in this amendment. The catchment for each patch of plants is delineated by following the upslope high point of land which divides water flowing towards the plants, from water flowing away from the plants; in general, these catchment areas are relatively small (often < 0.5 ha) and isolated within landscape-scale catchments.

Populations of the four annual species addressed in this amendment (Tall Woolly-heads, Kellogg's Rush, Rosy Owl-clover and Dwarf Sandwort) are likely prone to large annual fluctuations (Parks Canada Agency 2006). While some habitat may not be used every year, the presence of plants in one year indicates that the habitat may be critical for storing seeds and boosting seed production in favourable years. All habitat used at any time by each patch of plants in each extant population is required to achieve the population and distribution objectives and is critical habitat. However, due to population fluctuations this habitat cannot be completely identified based on data from any single year; a long term data set is required to ensure the full range of population fluctuation is captured.

Critical Habitat for Bog Bird's-foot Trefoil

All known extant populations of Bog Bird's-foot Trefoil are summarized in Table 1 which also indicates whether critical habitat is identified for each population. Critical habitat for Bog Bird's-foot Trefoil is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 1: Summary of critical habitat identification for extant populations of Bog Bird's-foot Trefoil.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Gabriola Island	Gabriola Island	7	Yes
Harewood Plains	Harewood Plains	8	Yes
Woodley Range	Woodley Range	9	Yes
Nanaimo, Private Extension Rd.	Cinnabar Valley	10	Yes
Nanaimo White Rapids Rd.	Cinnabar Valley	11	Yes

The habitat of Bog Bird's-foot Trefoil in Canada occurs along the southeast coast of Vancouver Island and on the adjacent Gulf Islands. The habitat is characterized as vernal seeps, vernal wet meadows, creek margins, and other microsites that receive abundant moisture through the spring

but dry out during the summer (Parks Canada 2006). Field investigations conducted in 2008-2009 helped to further characterize the habitat needs of Bog Bird's-foot Trefoil (GOERT 2008 and 2009).

Figure 1 shows typical habitat for Bog Bird's-foot Trefoil. Common attributes of habitat for Bog Bird's-foot Trefoil include:

- Sunny areas with short or sparse vegetation (the cover of trees and shrubs is never substantial).
- Less than two hundred metres above sea level.
- Shallow soils derived from sedimentary rock.
- From late fall to spring, the soils tend to remain moist to saturated, but soil moisture diminishes as the growing season progresses and by summer the soil experiences significant water deficits.



Figure 1: Photo of typical Bog Bird's-foot Trefoil habitat in Canada (photo used with permission from Chris Junck).

Biophysical attributes of critical habitat for Bog Bird's-foot Trefoil

The common and specific attributes required for Bog Bird's-foot Trefoil life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated

canopy openings and catchment areas. Therefore, critical habitat for Bog Bird's-foot Trefoil includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each patch of plants in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Bog Bird's-foot Trefoil).
- The rainwater/seepage catchment area.

Existing roads, park fields, and ditches are not critical habitat.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 1 based on the best available information. Detailed methods relating to habitat feature mapping (i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Bog Bird's-foot Trefoil and its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Bog Bird's-foot Trefoil

Within the geographical boundaries identified in Figure 7 (Gabriola Island), Figure 8 (Harewood Plains), and Figure 9 (Woodley Range), critical habitat is identified as the minimum canopy opening and the catchment area associated with the recorded location of each patch of Bog Bird's-foot Trefoil (GOERT 2008 and 2009). These populations were partially surveyed by GOERT (2008 and 2009); these surveys confirmed the continued existence of the species and its habitat at these locations and provided partial information on habitat and location. While the catchment areas have not yet been mapped, they are defined above and identified as critical habitat. Data from the BC Conservation Data Centre (2011) along with the information from GOERT (2008) is accepted as the best available information for the area occupied by the Harewood Plains population. For the portion of the Harewood Plains population that relies on data from the BC Conservation Data Centre, additional surveys are also necessary to refine the area occupied.

Within the geographical boundaries identified in Figure 10 and Figure 11 (Cinnabar Valley), critical habitat for the survival of these two populations is the minimum canopy opening and catchment area associated with the recorded location of each patch of Bog Bird's-foot Trefoil. While critical habitat remains to be mapped in detail for these populations, data from the B.C. Conservation Data Centre (2011) is accepted as best available information regarding the area occupied by Bog Bird's-foot Trefoil patches at these locations. Additional surveys are required at these locations to delineate occupied area and catchment areas which are expected to fall within the identified boundaries.

In total, as of July 2011, 30.9 ha of critical habitat has been identified for Bog Bird's-foot Trefoil.

Critical Habitat for Tall Woolly-heads

All known extant populations of Tall Woolly-heads are summarized in Table 2; this table indicates which populations of Tall Woolly-heads have critical habitat identified within this amendment. Where no critical habitat is identified, the data required for this purpose is stated. Critical habitat for Tall Woolly-heads is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 2: Summary of critical habitat identification for extant populations of Tall Woolly-heads.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Christmas Hill	Christmas Hill	12	Yes
Somenos Marsh	Somenos Creek	13 & 14	Yes
Uplands Park	Uplands Park/Cattle Point	15 & 16	Yes
Not recorded in recovery strategy	Scafe Hill	n/a	No*
*Data required to identify critical habitat: confirmation of species or habitat presence			

The habitat of Tall Woolly-heads in Canada is restricted to a small area in and near Victoria, British Columbia. The habitat is generally characterized as low-elevation vernal pools and other open, sometimes disturbed, vernal moist places (Parks Canada 2006). To further characterize the habitat of Tall Woolly-heads, field investigations were conducted in 2008-2009 (Costanzo *et al.*, 2009b and Fleming 2010).

Typical habitat for Tall Woolly-heads is depicted in Figure 2. Common attributes of Tall Woolly-heads habitat include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs and robust vascular plants is never substantial).
- Low elevation (< 120 m above sea level).
- On level to gently sloping terrain; topography is level to at least slightly depressed such that rain water flows towards the plants.
- Soils are imperfectly drained; receive seepage and/or surface runoff—the timing of water availability is a critical attribute: the site is dry in summer and wet in winter and spring.



Figure 2: Photo of typical Tall Woolly-heads habitat in Canada (used with permission from Brenda Costanzo).

Biophysical attributes of critical habitat for Tall Woolly-heads

The common and specific attributes required for Tall Woolly-heads life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore, critical habitat for Tall Woolly-heads includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each plant or patch of plants in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Tall Woolly-heads).
- The rainwater/seepage catchment area.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 2 based on the best available information. Detailed methods relating to habitat feature mapping (i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Tall Woolly-heads and its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Tall Woolly-heads

Within the geographical boundaries identified in Figure 12 (Christmas Hill), Figure 13 (Somenos Creek - East), Figure 14, (Somenos Creek - West), and Figure 15 (Uplands Park), Figure 16 (Cattle Point), critical habitat for the survival of these populations is the minimum canopy opening and catchment area associated with the recorded location of each patch of Tall Woolly-heads.

In total, as of July 2011, 7.2 ha of habitat which is critical to Tall Woolly-heads survival has been identified.

Studies (Costanzo *et al.*, 2009b and Fleming 2010) have been used to guide the location of boundaries within which critical habitat is found. It is expected that Costanzo *et al.*, 2009b and Fleming 2010 do not represent the maximum extent of annual variation in these populations and, therefore, do not represent the total habitat required for the survival of extant Tall Woolly-heads populations. It is expected that over time, continued monitoring which documents annual fluctuations in population extent and habitat use will provide data which more confidently characterizes the total habitat needed by this species.

Critical Habitat for Water-plantain Buttercup

All known extant populations of Water-plantain Buttercup are summarized in Table 3; this table indicates which populations of Water-plantain Buttercup have critical habitat identified within this amendment. Critical habitat for Water-plantain Buttercup is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 3: Summary of critical habitat identification for extant populations of Water-plantain Buttercup.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Uplands Park	Uplands/Cattle Point	15	Yes
Ballenas Island	Ballenas Island	17	Yes

The habitat of Water-plantain Buttercup in Canada is generally characterized as low elevation vernal pools and wet Garry Oak meadows (Parks Canada 2006). Field investigations conducted in 2005, 2007, and 2009 helped to further characterize the habitat of Water-plantain Buttercup (Fairbarns 2008 and Costanzo 2009). Typical habitat for Water-plantain Buttercup is depicted in Figure 3 and common attributes of Tall Woolly-heads habitat include:

- Sunny areas with short or sparse vegetation (the cover of trees and shrubs is never substantial).
- One to ten metres above sea level, in slight depressions.
- Glaciomarine clay, silt or loam, or coarse glaciofluvial material with a depth of >15 cm.
- Soils tend to be poorly drained. The soils tend to remain moist in the early growing season (January to March), but soil moisture diminishes as the growing season

progresses and by mid-summer the soil experiences significant water deficits for prolonged periods.

- Woody material covering the soil is usually absent.



Figure 3: Photo of typical Water-plantain Buttercup habitat in Canada (used with permission from Matt Fairbarns).

Biophysical attributes of critical habitat for Water-plantain Buttercup

The common and specific attributes required for Water-plantain Buttercup life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Water-plantain Buttercup includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each patch of plants in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Water-plantain Buttercup).
- The rainwater/seepage catchment area.

Existing roads, park fields, and ditches are not critical habitat.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 3 based on the best available information. Detailed methods relating to habitat feature mapping

(i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Water-plantain Buttercup and its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Water-plantain Buttercup

Within the geographical boundaries identified in Figure 15 (Uplands/Cattle Point) and Figure 17 (Ballenas Island), critical habitat for the survival of these populations is the minimum canopy opening and catchment area associated with the recorded location of each patch of Water-plantain Buttercup.

In total, as of July 2011, approximately 2.1 ha of habitat which is critical to Water-plantain Buttercup survival has been identified.

Critical Habitat for Kellogg's Rush

All known extant populations of Kellogg's Rush are summarized in Table 4; this table indicates which population of Kellogg's Rush have critical habitat identified within this amendment. Critical habitat for Kellogg's Rush is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 4: Summary of critical habitat identification for extant population of Kellogg's Rush.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Uplands Park	Uplands/Cattle Point	15	Yes

The habitat of Kellogg's Rush in Canada is restricted to a single population (with three subpopulations) near Victoria, British Columbia. This habitat is generally characterized as a vernal swale in a seasonally flooded Garry Oak meadow (Parks Canada 2006). Field investigations conducted in 2009 helped to further characterize the habitat of Kellogg's Rush (Costanzo *et al.*, 2009a). Typical habitat for Kellogg's Rush is depicted in Figure 4 and common attributes of Tall Woolly-heads habitat include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs and robust vascular plants is never substantial).
- Low elevation (<40 m above sea level).
- On level to gently sloping terrain; topography is level to at least slightly depressed such that rain water flows towards the plants.
- Soils are imperfectly drained; receive seepage and/or surface runoff—the timing of water availability is a critical attribute: the site is dry in summer and wet in winter and spring.



Figure 4: Photo of typical Kellogg's Rush habitat in Canada (used with permission from Brenda Costanzo).

Biophysical attributes of critical habitat for Kellogg's Rush

The common and specific attributes required for Kellogg's Rush life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Kellogg's Rush includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each plant or patch of plants in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Kellogg's Rush).
- The rainwater/seepage catchment area.

Existing roads, park fields, and ditches are not critical habitat.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 4 based on the best available information. Detailed methods relating to habitat feature mapping (i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Kellogg's Rush and

its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Kellogg's Rush

Within the geographical boundaries identified in Figure 15 (Uplands/Cattle Point), critical habitat for the survival of this population is the minimum canopy opening and catchment area associated with the recorded location of each patch of Kellogg's Rush.

It is expected that Costanzo *et al.*, 2009a does not represent the maximum extent of annual variation in this population and therefore does not represent the total habitat required for the survival of this sole extant Kellogg's Rush population. Costanzo *et al.*, 2009a has been used to guide the location of boundaries within which critical habitat is found. It is expected that over time, continued monitoring which documents annual fluctuations in population extent and habitat use will provide data which more confidently characterizes the total habitat needed by this species.

In total, as of July 2011, approximately 0.37 ha of habitat which is critical to Kellogg's Rush survival has been identified.

Critical Habitat for Rosy Owl-clover

All known extant populations of Rosy Owl-clover are summarized in Table 5; this table indicates which population of Rosy Owl-clover have critical habitat identified within this amendment. Critical habitat for Rosy Owl-clover is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 5: Summary of critical habitat identification for extant population of Rosy Owl-clover.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Trial Island	Trial Island	18	Yes

The habitat of Rosy Owl-clover in Canada occurs on a small island southeast of Vancouver Island. The habitat of the single known population in Canada is generally characterized as a sloping vernal seep (Parks Canada 2006). Field investigations conducted in 2006-2008 helped to further characterize the habitat of Rosy Owl-clover (Fairbarns 2008).

Typical habitat for Rosy Owl-clover is depicted in Figure 5 and common attributes of Rosy Owl-clover habitat include:

- Sunny areas with short or sparse vegetation (trees and shrubs are absent).
- Low elevation (1 to 10 metres above sea level).
- Topography is level to at least slightly depressed such that rain water flows towards the plants.
- Soils are glaciomarine clay-loam, with a depth of 5 to 15 cm. The soil surface is characterized by about 80% exposed mineral soil.
- Soils are imperfectly drained. The soil tends to remain moist to saturated for extended periods in the early growing season (April and May), but soil moisture diminishes as the growing season progresses and by early summer the soil experiences water deficits for prolonged periods.
- Woody material covering the soil is absent.



Figure 5: Photo of typical Rosy Owl-clover habitat in Canada (used with permission from Matt Fairbarns).

Biophysical attributes of critical habitat for Rosy Owl-clover

The common and specific attributes required for Rosy Owl-clover life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Rosy Owl-clover includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each plant or patch of plants in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Rosy Owl-clover).
- The rainwater/seepage catchment area.

Existing roads, park fields, and ditches are not critical habitat.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 5 based on the best available information. Detailed methods relating to habitat feature mapping (i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Rosy Owl-clover and its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Rosy Owl-clover

Within the geographical boundaries identified in Figure 18 (Trial Island), critical habitat for the survival of the current population is the minimum canopy opening and catchment area associated with the recorded location of each patch of Rosy Owl-clover.

It is expected that Fairbarns 2008 does not represent the maximum extent of annual variation in this population and therefore does not represent the total habitat required for the survival of this sole extant Rosy Owl-clover population. The Fairbarns 2008 study has been used to guide the location of boundaries within which critical habitat is found. It is expected that over time, continued monitoring which documents annual fluctuations in population extent and habitat use will provide data which more confidently characterizes the total habitat needed by this species.

In total, as of July 2011, approximately 0.4 ha of habitat which is critical to Rosy Owl-clover survival has been identified.

Critical Habitat for Dwarf Sandwort

All known extant populations of Dwarf Sandwort are summarized in Table 6; this table indicates which population of Dwarf Sandwort have critical habitat identified within this amendment. Critical habitat for Dwarf Sandwort is identified in this amendment to the extent possible based on the best available information. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.8 of the recovery strategy, Parks Canada 2006).

Table 6: Summary of critical habitat identification for extant population of Dwarf Sandwort.

Population (as referenced in recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Rocky Point	Church Hill	19	Yes

The habitat of Dwarf Sandwort in Canada generally occurs along a narrow coastal fringe near Victoria on the southeast coast of Vancouver Island and offshore islands. The habitat is generally characterized as seepage and meadow ecosystems (Parks Canada 2006). Field investigations conducted in 2006-2007 helped to further characterize the habitat of Dwarf Sandwort (Fairbarns 2008).

Typical habitat for Dwarf Sandwort is depicted in Figure 6 and common attributes of Dwarf Sandwort habitat include:

- Sunny areas with short or sparse vegetation (trees and shrubs are absent).
- 1 to 5 metres above sea level.
- The slope angle ranges from 1-15% on west facing aspects.
- Soils are sandy deposits derived from basalt and andesite rock, with a depth of 1 to 20 cm. Coarse fragments range from 35% to 70% with only 1% of the surface with exposed bedrock. The soil surface is characterized by about 25% exposed mineral soil.
- Soils are imperfectly drained. The water table is at or near the soil surface in the early growing season (December to February), but soil moisture diminishes as the growing season progresses until soils are wet, but rarely saturated.
- Woody material covering the soil is scarce.



Figure 6: Photo of typical Dwarf Sandwort habitat in Canada (used with permission from Matt Fairbarns)

Biophysical attributes of critical habitat for Dwarf Sandwort

The common and specific attributes required for Dwarf Sandwort life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Dwarf Sandwort includes the area where the species' patch occurs, and both of the following habitat features:

- The minimum canopy opening; the default canopy opening required for light to reach the plants is the area defined by a 20 m distance surrounding each patch in all directions (20 m is generally the maximum height attained by trees in the soils surrounding Dwarf Sandwort).
- The rainwater/seepage catchment area.

Existing roads, park fields, and ditches are not critical habitat.

The spatial delineation of the above habitat features (together comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 6 based on the best available information. Detailed methods relating to habitat feature mapping (i.e., critical habitat identification) for each population are provided below. More detailed information on the spatial location of critical habitat to support protection of Dwarf Sandwort and its habitat may be requested, on a need-to-know basis, by contacting the [Environment Canada's Recovery Planning section](#).

Delineation of biophysical attributes of critical habitat for Dwarf Sandwort

Within the geographical boundaries identified in Figure 19 (Church Hill), critical habitat for the survival of the current population is the minimum canopy opening and catchment area associated with the recorded location of each patch of Dwarf Sandwort.

It is expected that Fairbarns 2008 does not represent the maximum extent of annual variation in this population and therefore does not represent the total habitat required for the survival of this sole extant Dwarf Sandwort population. The Fairbarns 2008 study has been used to guide the location of boundaries within which critical habitat is found. It is expected that over time, continued monitoring which documents annual fluctuations in population extent and habitat use will provide data which more confidently characterizes the total habitat needed by this species.

In total, as of July 2011, approximately 0.1 ha of habitat which is critical to Dwarf Sandwort survival has been identified.

2.5.2. Critical Habitat Map Figures

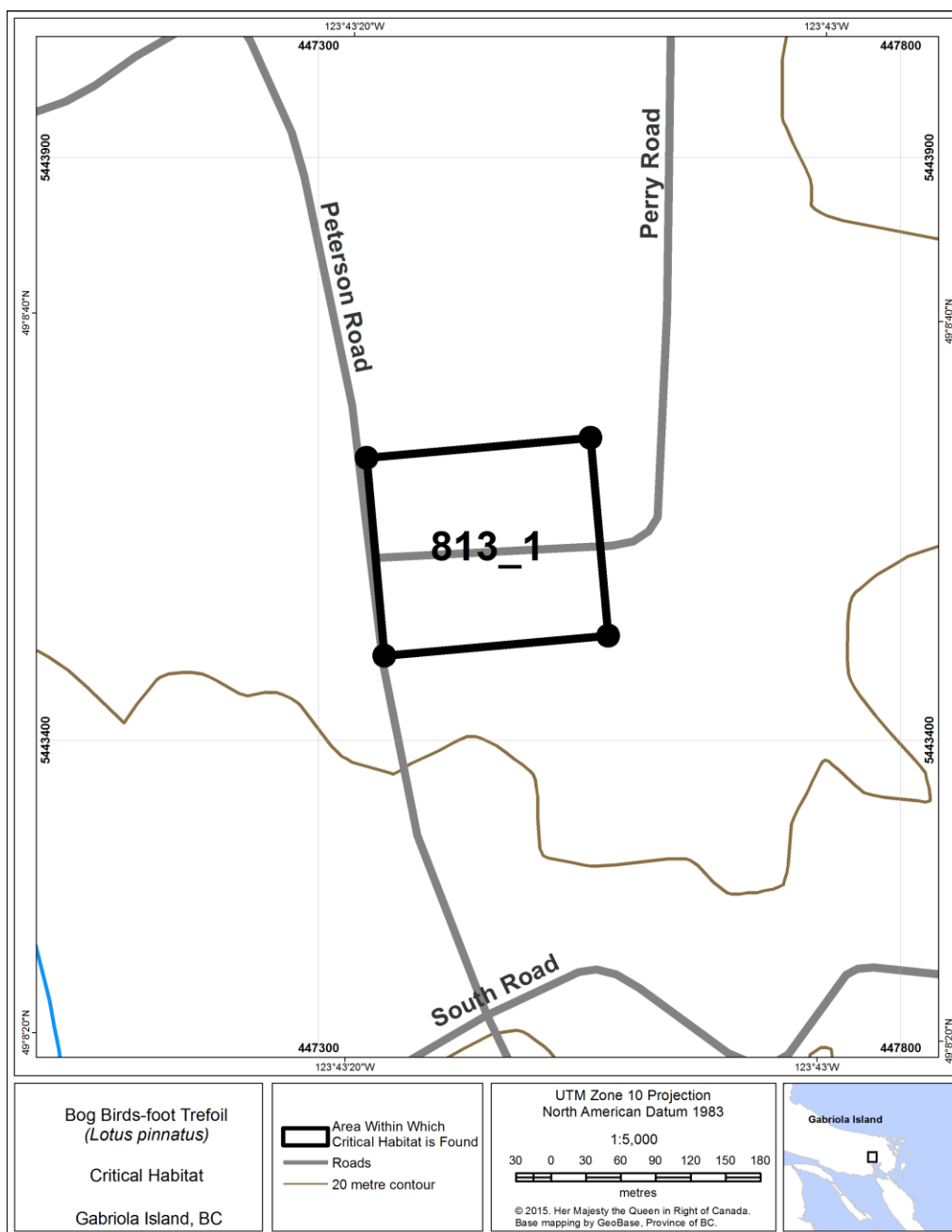


Figure 7: Area (~ 3.3 ha) within which critical habitat for Bog Bird's-foot Trefoil is found at Gabriola Island, Perry Road. This area is entirely on non-federal lands. The area of critical habitat within this area is approximately 0.2 ha. The critical habitat parcel 813_1 is bounded by a polygon as follows: commencing at a point with coordinates 447341, 5443643; thence 85° in a straight line to point 477533, 5443660; thence 175° in a straight line to 447549, 5443490; thence 265° in a straight line to a point 477357 5443472; thence 355° in a straight line to the commencement point (Zone10NAD1983).

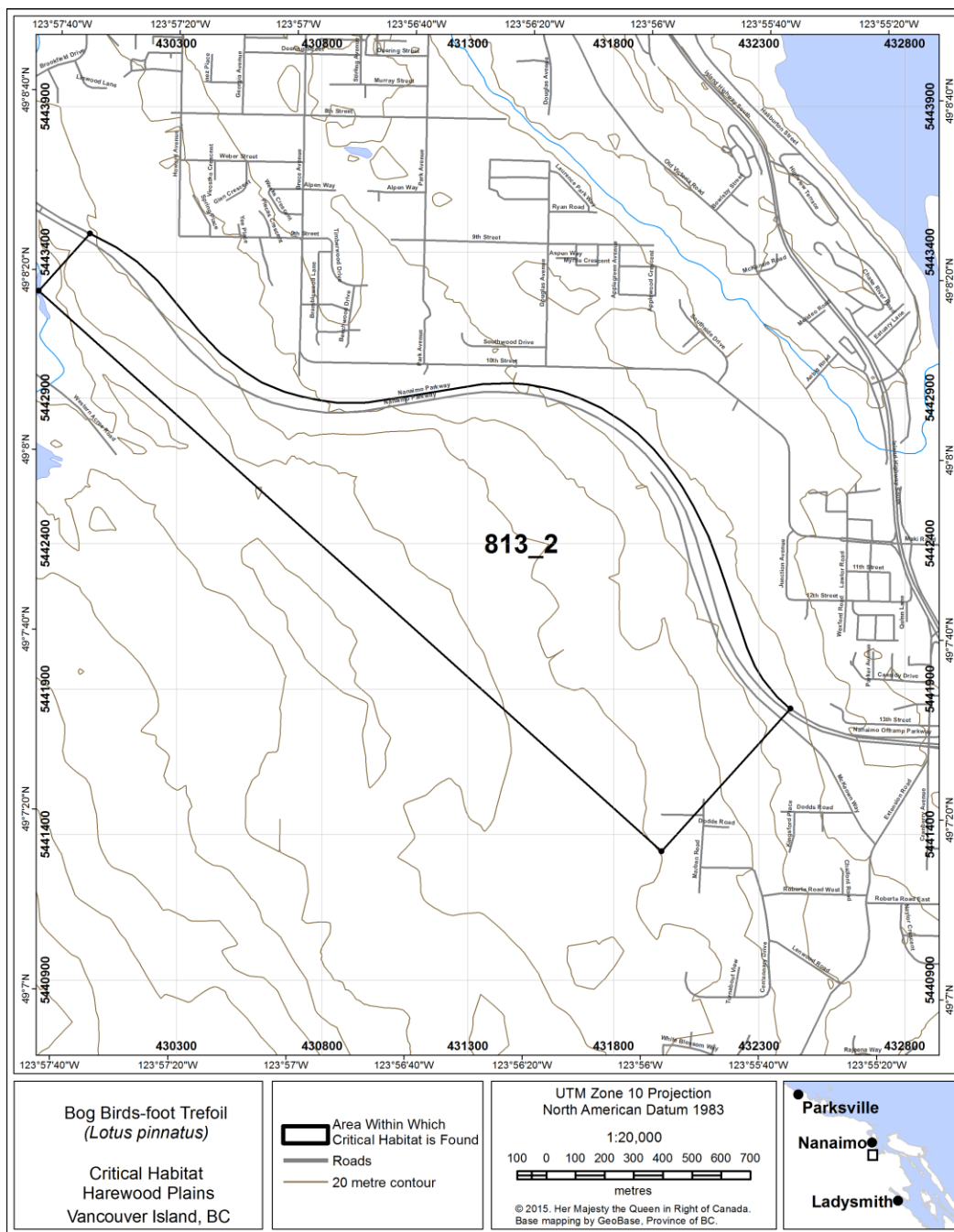


Figure 8: Area (~182.9 ha) within which critical habitat for Bog Bird's-foot Trefoil is found at Harewood Plains. This area is on non-federal lands. The area of critical habitat within this area is approximately 18.5 ha. The critical habitat parcel 813_2 is bounded by a polygon as follows: commencing at a point with coordinates 429828, 5443268; thence 42° in a straight line to point 430004, 5443464; thence in a southeast direction along the western boundary of Highway 1 to 432407, 5441833; thence 222° in a straight line to point 431966, 5441342; thence 312° in a straight line to the commencement point (Zone10NAD1983).

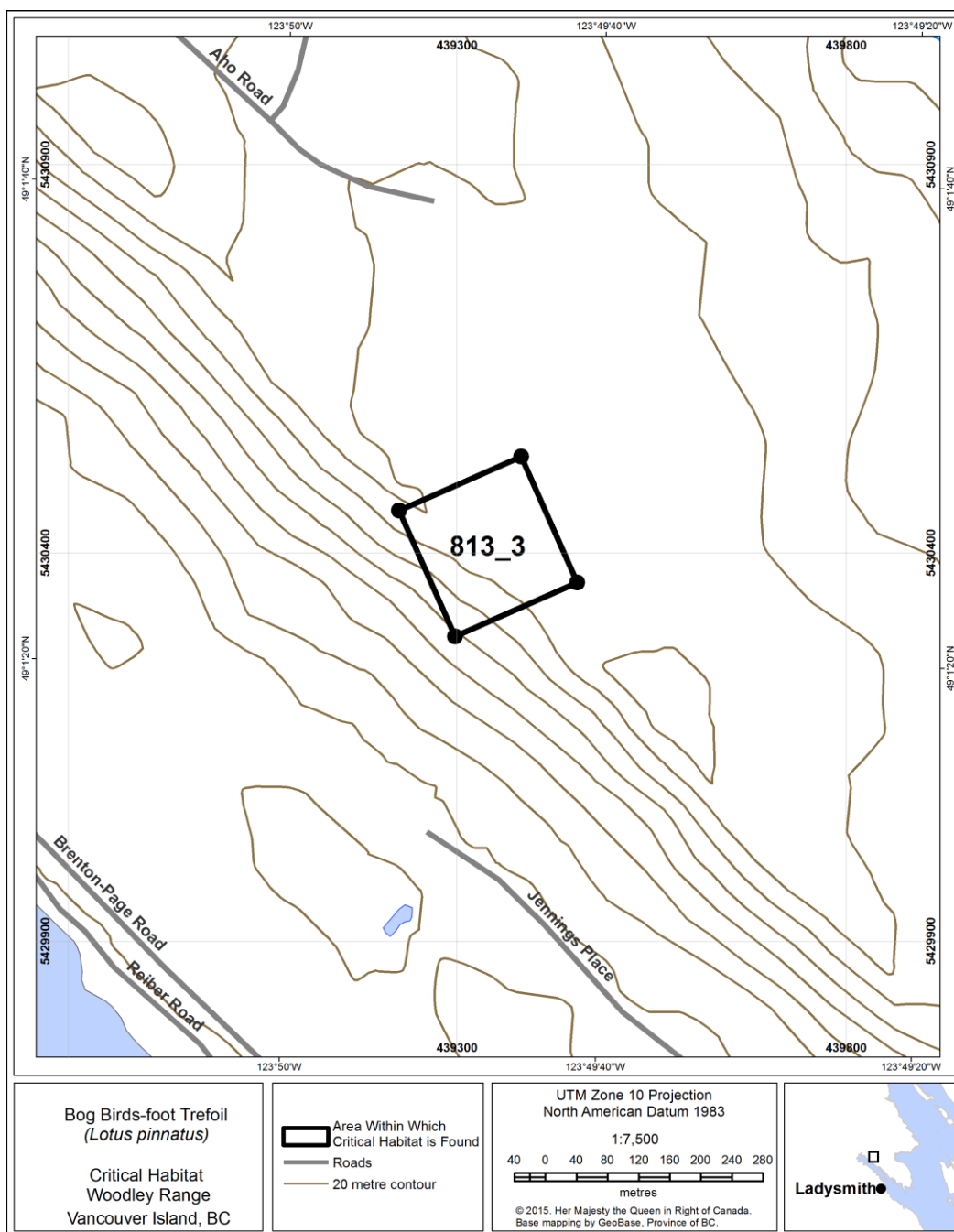


Figure 9: Area (~ 3.0 ha) within which critical habitat for Bog Bird's-foot Trefoil is found at Woodley Range. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.2 ha. The critical habitat parcel 813_3 is bounded by a polygon as follows: commencing at a point with coordinates 439225, 5430455; thence 66° in a straight line to point 439382, 5430524; thence 157° in a straight line to point 439454, 5430362; thence 246° in a straight line to point 439297, 5430292; thence 336° in a straight line to the commencement point (Zone10NAD1983).

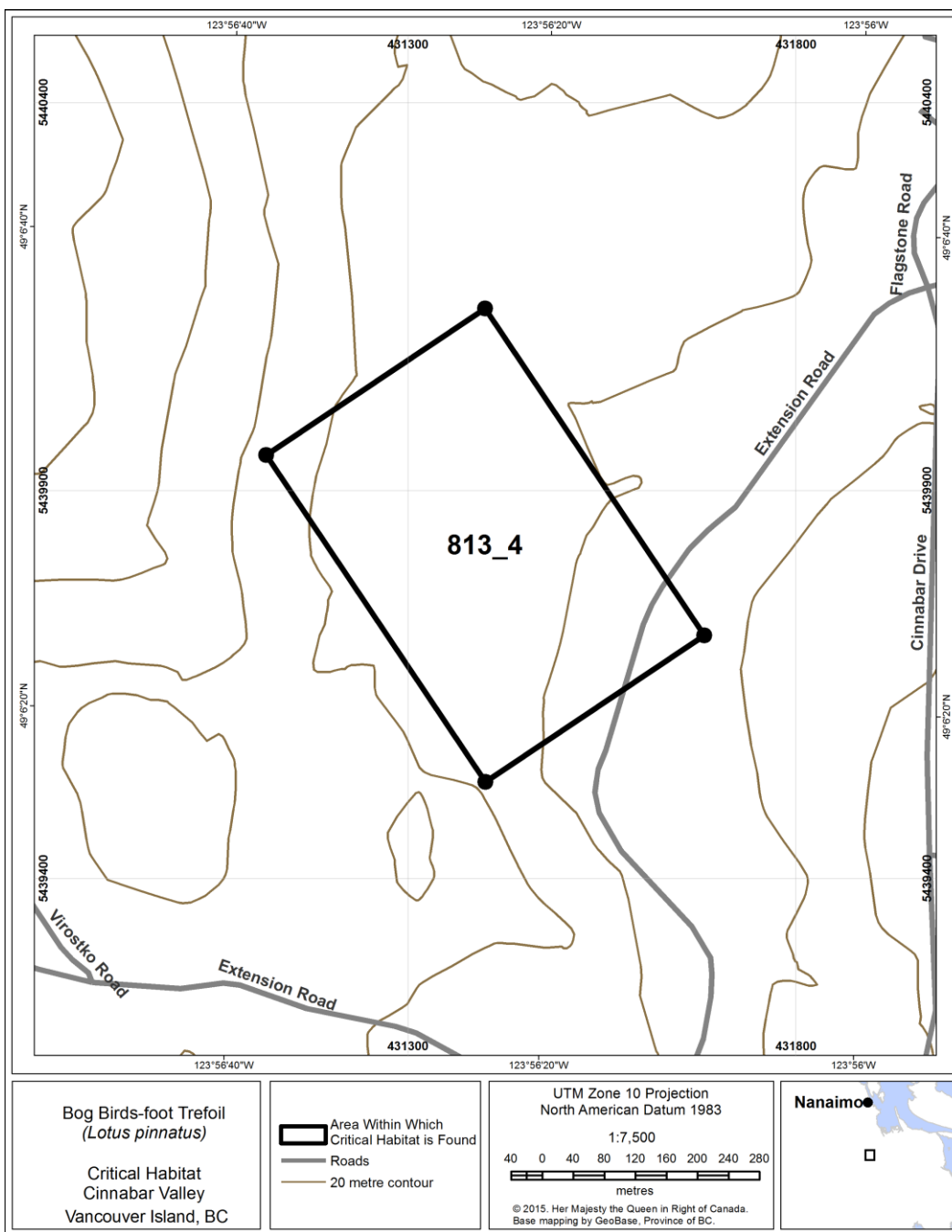


Figure 10: Area (~ 17.2 ha) within which critical habitat for Bog Bird's-foot Trefoil is found at Cinnabar Valley. This area is on non-federal lands. The area of critical habitat within this area is approximately 5.3 ha. The critical habitat parcel 813_4 is bounded by a polygon as follows: commencing at a point with coordinates 431118, 5439946; thence 56° in a straight line to point 431400, 5440134; thence 147° in a straight line to point 431682, 5439713; thence 236° in a straight line to point 431400, 5439524; thence 326° in a straight line to the commencement point.

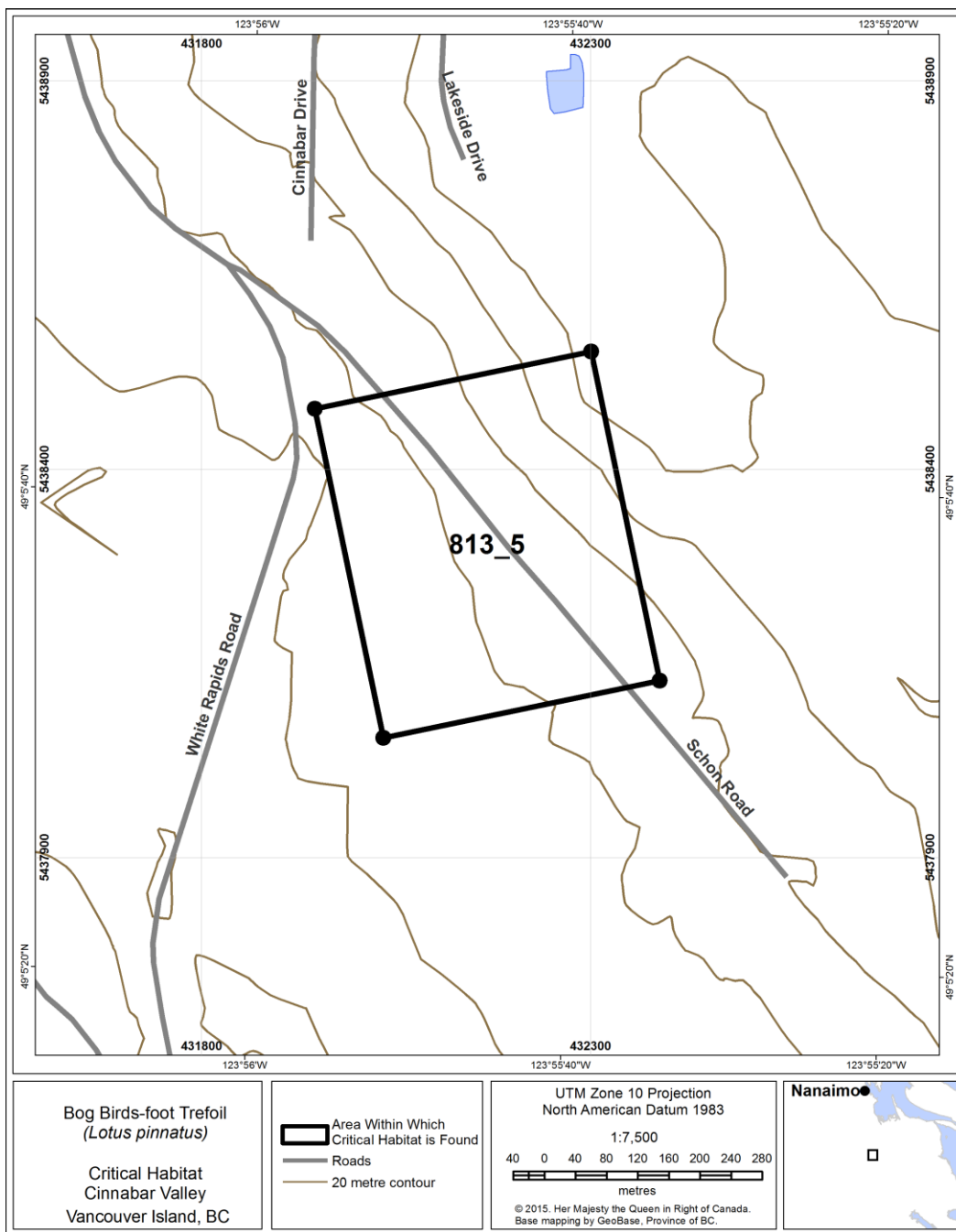


Figure 11: Area (~ 15.7 ha) within which critical habitat for Bog Bird's-foot Trefoil is found at Cinnabar Valley. This area is on non-federal lands. The area of critical habitat within this area is approximately 6.7 ha. The critical habitat parcel 813_5 is bounded by a polygon as follows: commencing at a point with coordinates 431945, 5438478; thence 78° in a straight line to point 432301, 5438552; thence 168° in a straight line to point 432389, 5438128; thence 258° in a straight line to point 432033, 5438054; thence 348° in a straight line to the commencement point (Zone10NAD1983).

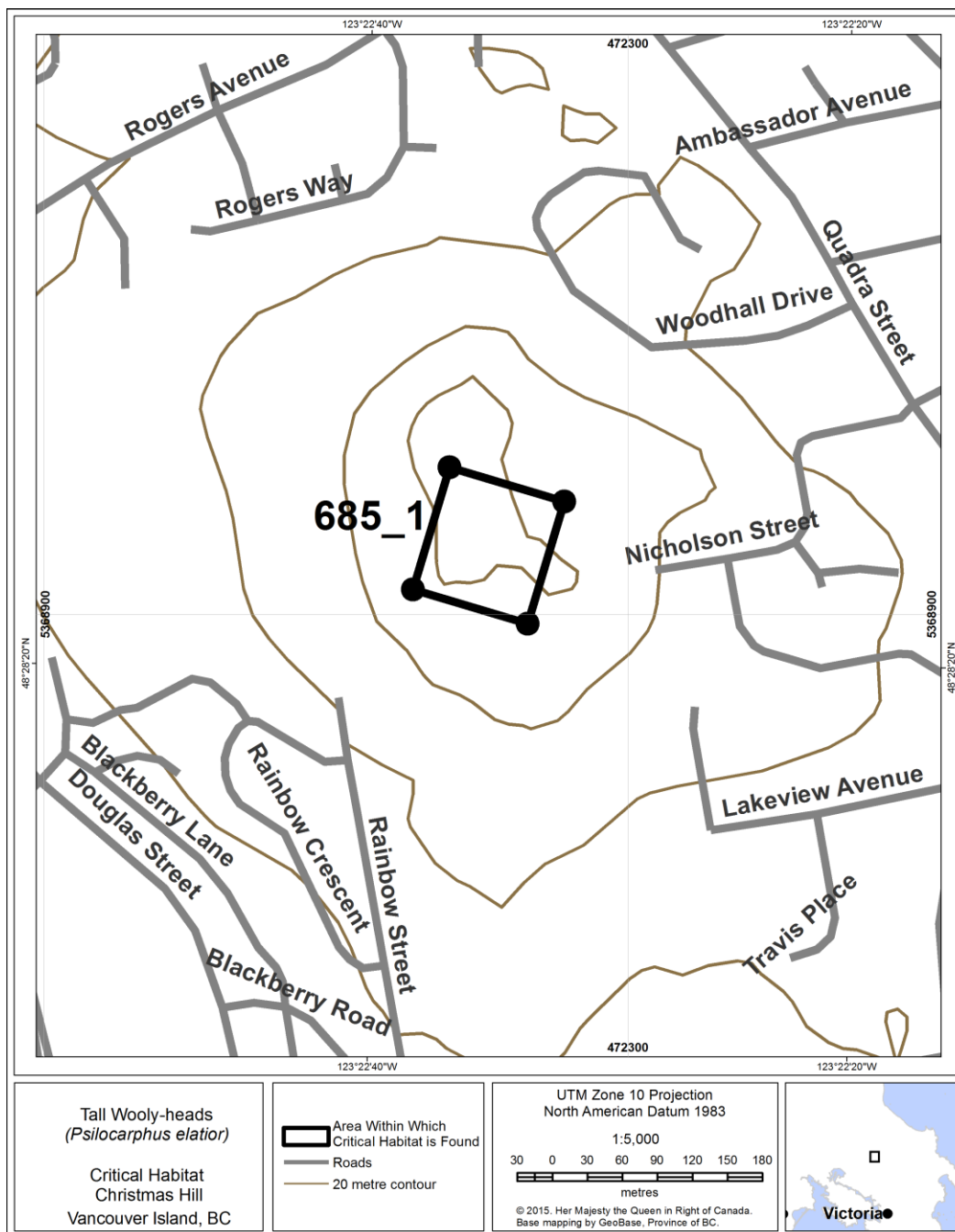


Figure 12: Area (~ 1.1 ha) within which critical habitat for Tall Woolly-heads is found Christmas Hill. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.4 ha. The critical habitat parcel 685_1 is bounded by a polygon as follows: commencing at a point with coordinates 472147, 5369026; thence 107° in a straight line to point 472246, 5368997; thence 197° in a straight line to a point 472214, 5368892; thence 287° in a straight line to a point 472216, 5368822; thence 17° in a straight line to the commencement point (Zone10NAD1983).

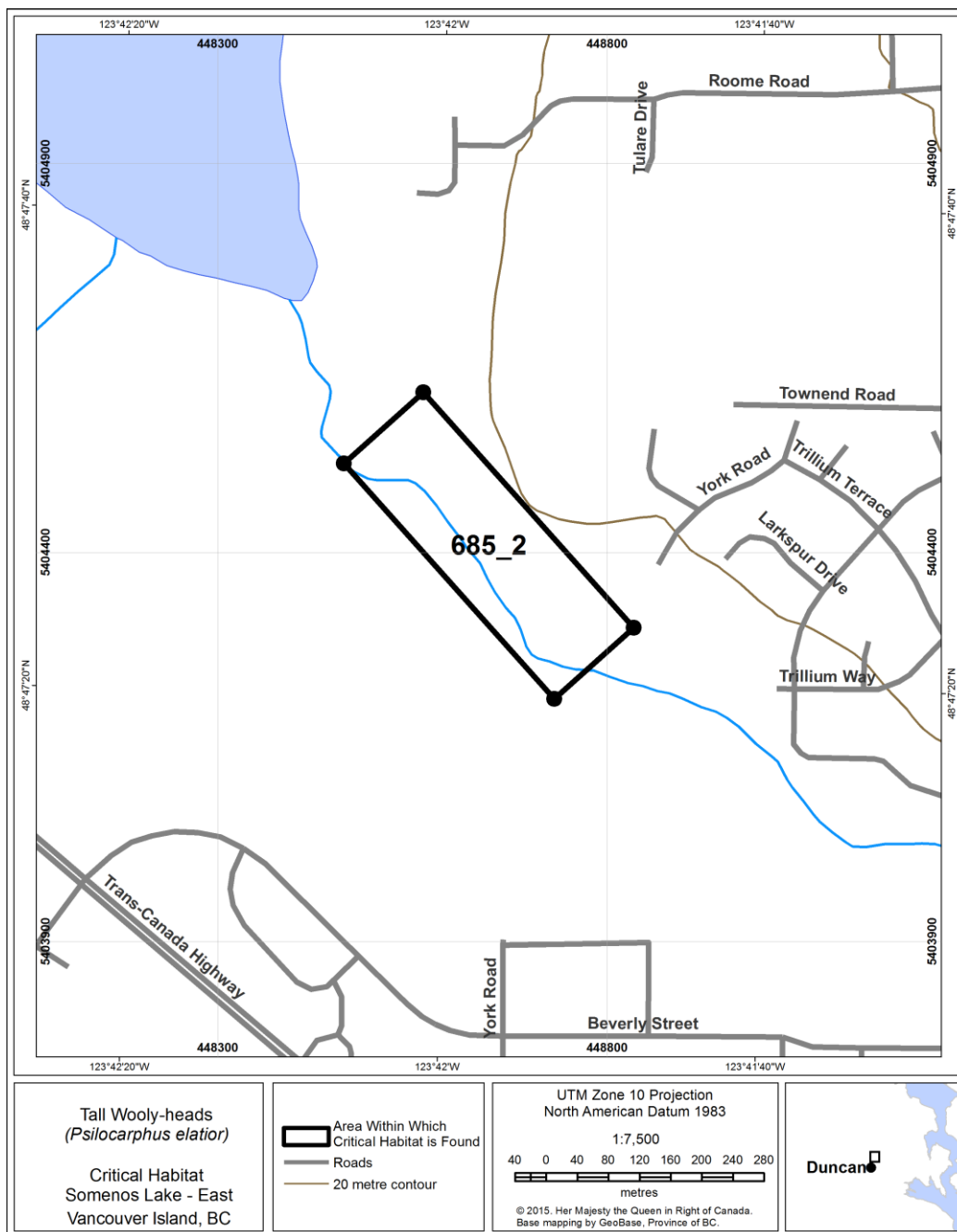


Figure 13: Area (~ 5.6 ha) within which critical habitat for Tall Woolly-heads is found at Somenos Creek. This area is on non-federal and federal lands. The area of critical habitat within this area is approximately 2.3 ha. The critical habitat parcel 685_2 is bounded by a polygon as follows: commencing at a point with coordinates 448564, 5404606; thence 48° in a straight line to point 448834, 5404303; thence 138° in a straight line to 448732, 5404212; thence 228° in a straight line to point 448462, 5404514; thence 318° in a straight line to the commencement point (Zone10NAD1983).

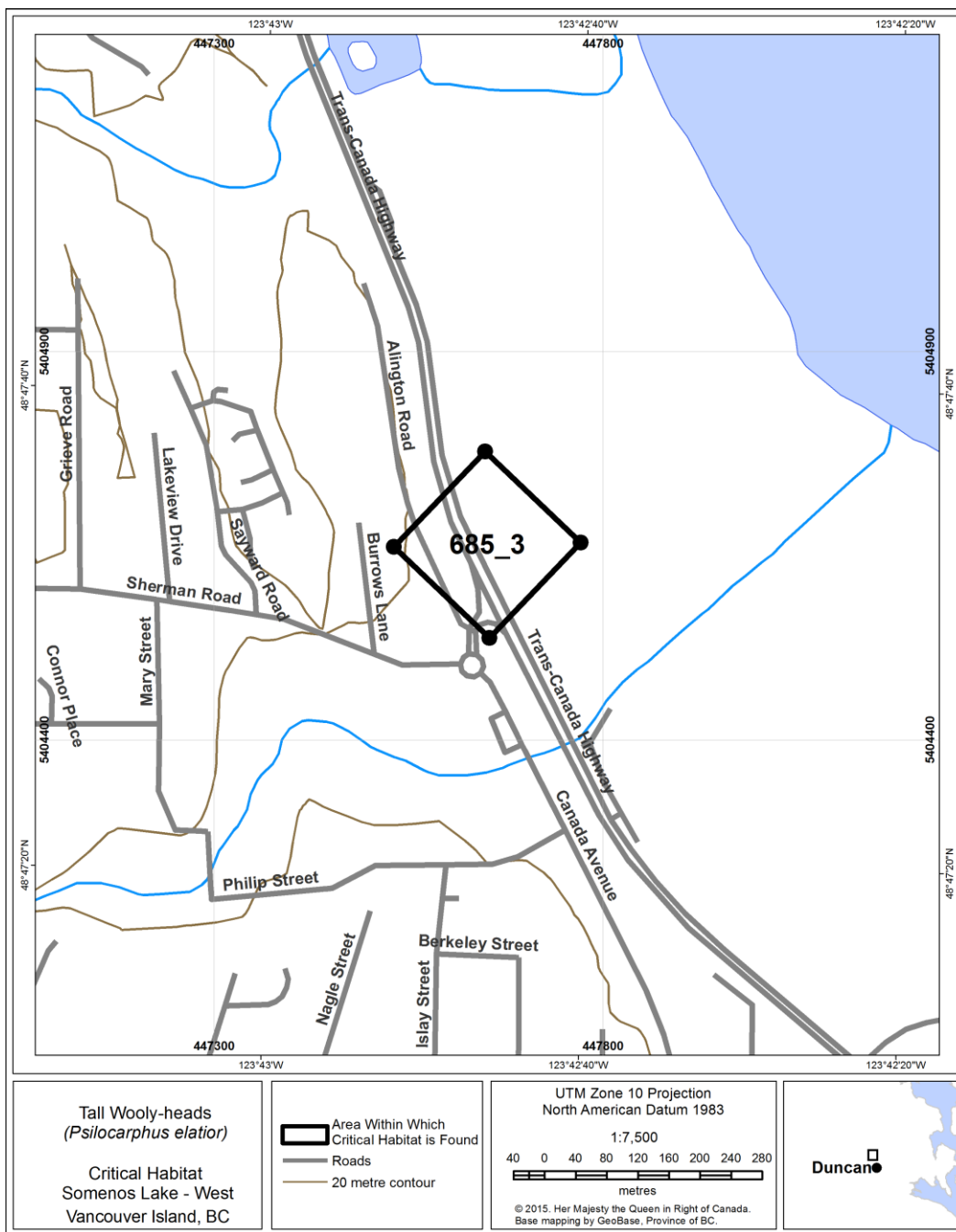


Figure 14: Area (~ 2.9 ha) within which critical habitat for Tall Woolly-heads is found at Somenos Creek. This area is on non-federal and federal lands. The area of critical habitat within this area is approximately 0.1 ha. The critical habitat parcel 685_3 is bounded by a polygon as follows: commencing at a point with coordinates 447531, 5404648; thence 44° in a straight line to point 447648, 5404771; thence 134° in a straight line to 447771, 5404654; thence 224° to point 447654, 5404531; thence 314° in a straight line to the commencement point (Zone10NAD1983).

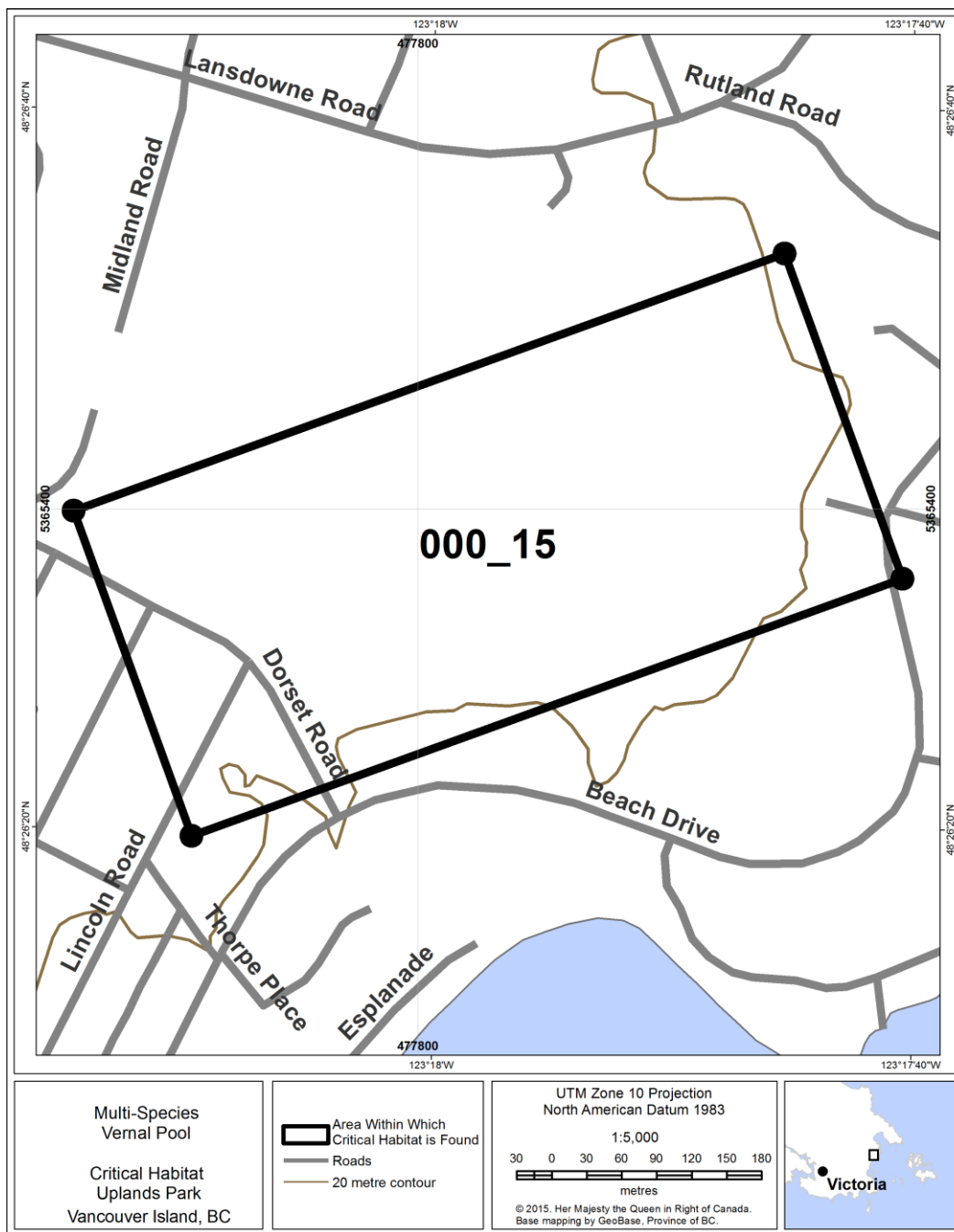


Figure 15: Area (~ 19.2 ha) within which critical habitat for Kellogg's Rush, Tall Woolly-heads, and Water-plantain Buttercup is found at Uplands/Cattle Point. This area is on non-federal lands. The area of critical habitat within this area is approximately 5.2 ha. The critical habitat parcel 000_15 is bounded by a polygon as follows: commencing at a point with coordinates 477505, 5365399; thence 70° in a straight line to point 478114, 5365619; thence 160° in a straight line to 478215, 5365340; thence 250° in a straight line to point 477606, 5365120; thence 340° in a straight line to the commencement point (Zone10NAD1983).

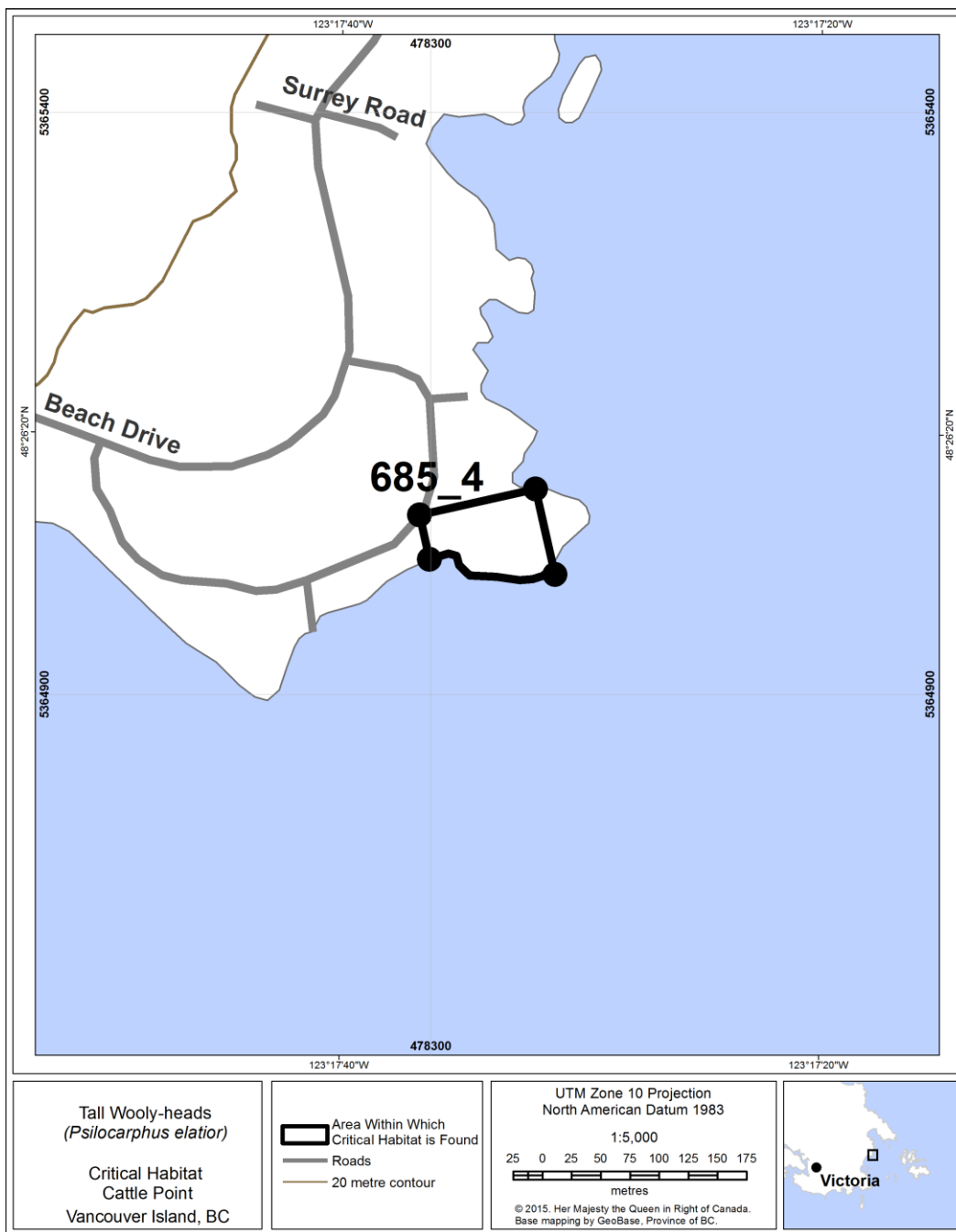


Figure 16: Area (~0.6 ha) within which critical habitat for Tall Woolly-heads is found at Uplands/Cattle Point. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.2 ha. The critical habitat parcel 685_4 is bounded by a polygon as follows: commencing at a point with coordinates 478290, 5365054; thence 77° in a straight line to point 478390, 5365076; thence 166° in a straight line to 478406, 5365003; thence west along the coastline to point 478299, 5365015; thence 347° in a straight line to the commencement point (Zone10NAD1983).

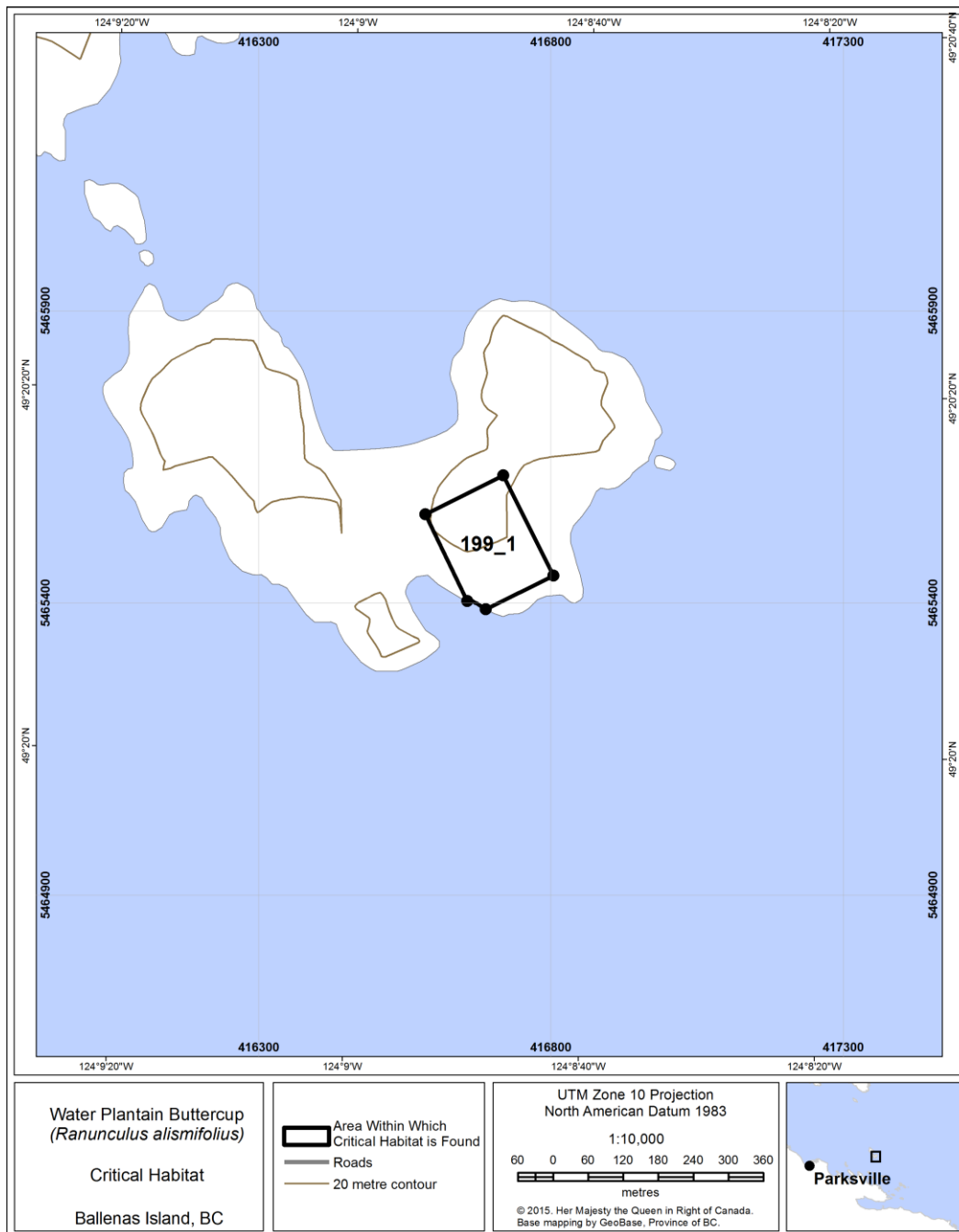


Figure 17: Area (~ 2.8 ha) within which critical habitat for Water-plantain Buttercup is found at Ballenas Island. This area is on federal lands. The area of critical habitat within this area is approximately 1.5 ha. The critical habitat parcel 199_1 is bounded by a polygon as follows: Commencing at a point with coordinates 416585, 5465552; thence 63° in a straight line to point 416718, 5465619; thence 153° in a straight line to a point 416804, 5465447; thence 242° to a point 416689, 5465389; thence along the Ballenas Island shoreline to point 416657, 5465404; thence 335 ° in a straight line to the commencement point (Zone10NAD1983).

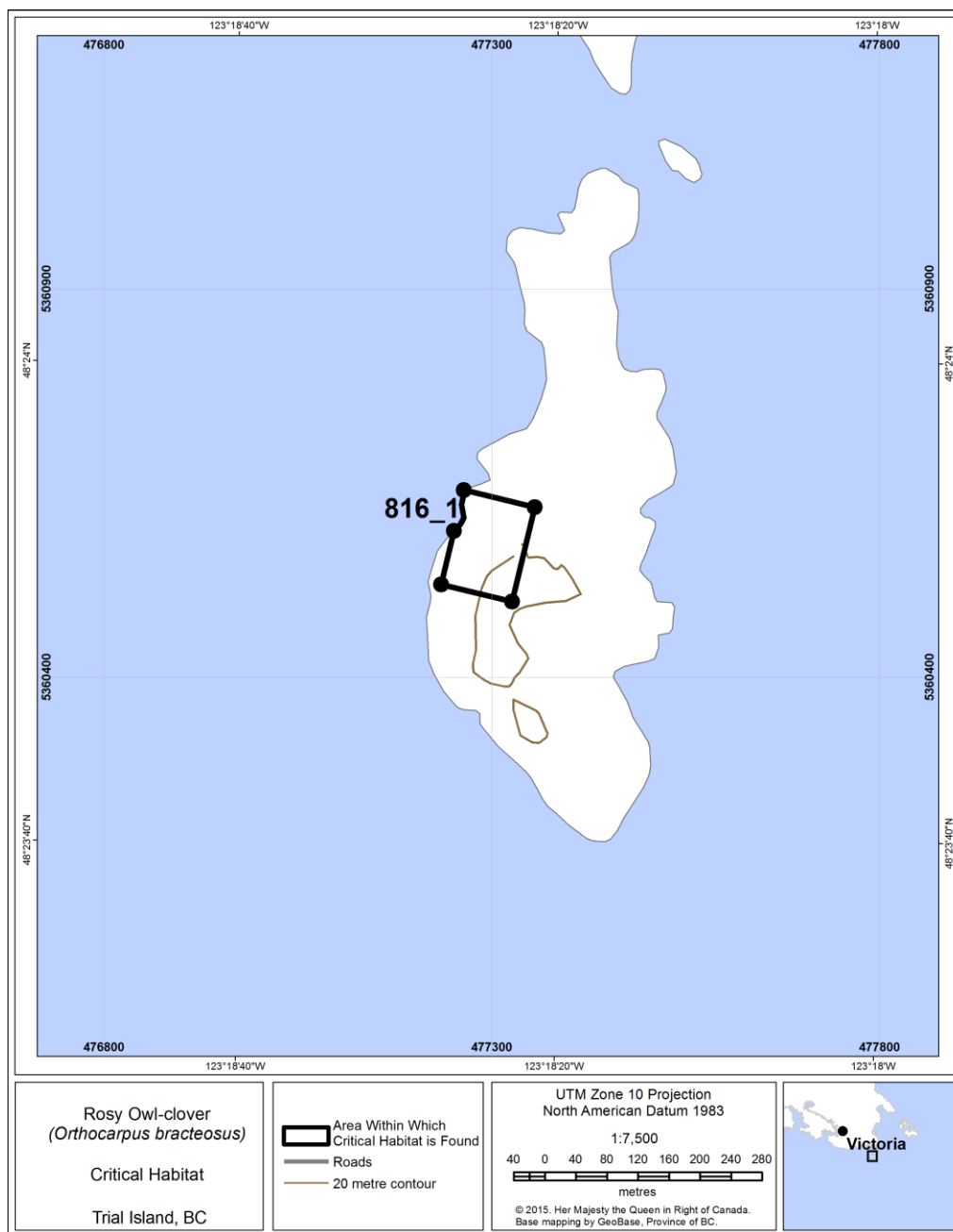


Figure 18: Area (~ 1.2 ha) within which critical habitat for Rosy Owl-clover is found at Trial Island. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.4 ha (0.3 ha on BC Ecological Reserve and 0.1 ha on BC Provincial Crown land). The critical habitat parcel 816_1 is bounded by a polygon as follows: commencing at a point with coordinates 477264, 5360641; thence 104° in a straight line to point 477356, 5360619; thence 194° in a straight line to 477326, 5360497; thence 284° in a straight line to 477235, 5360519; thence 14° in a straight line to 477251, 5360588; thence along the coastline to the commencement point (Zone10NAD1983).

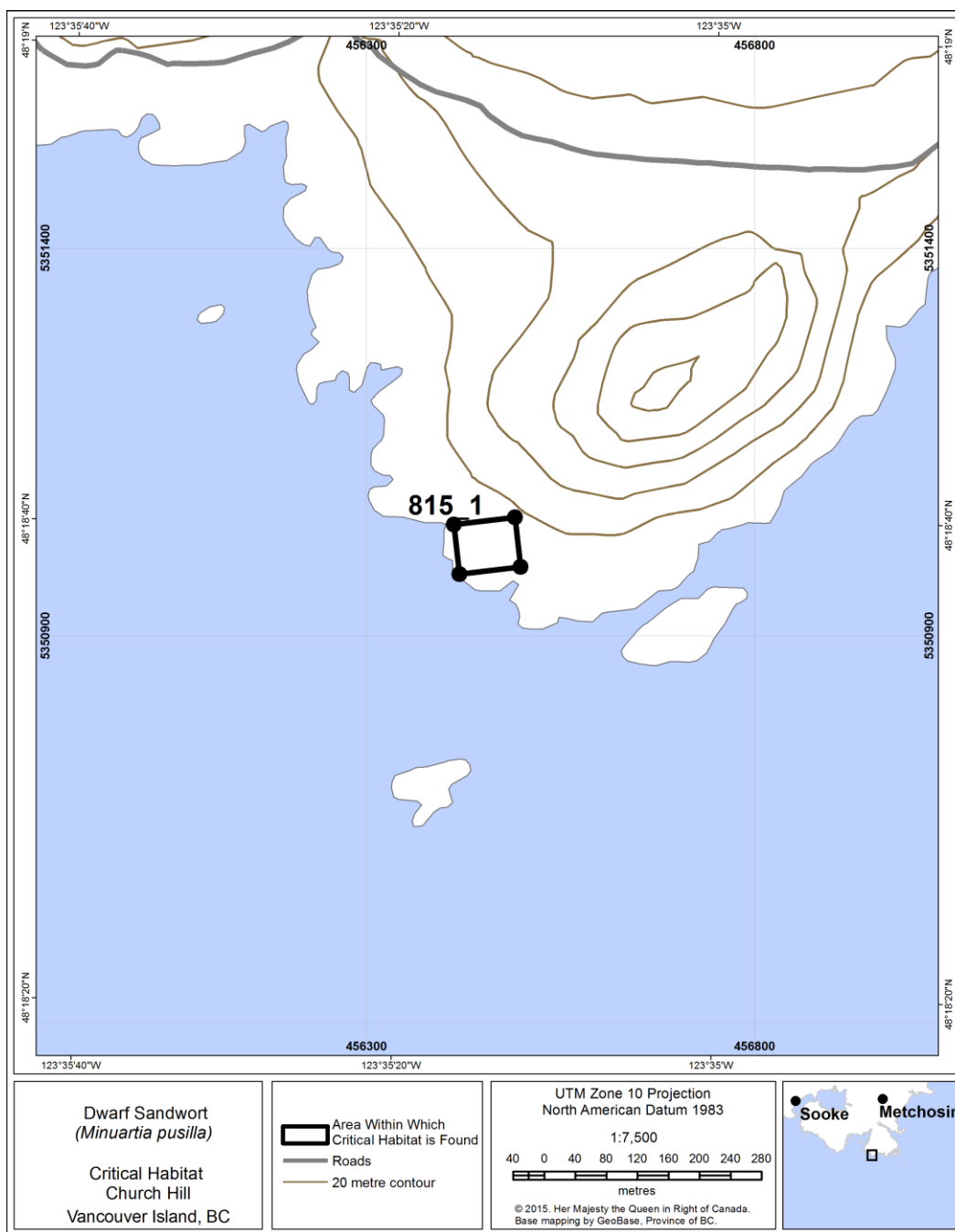


Figure 19: Area (~ 0.5 ha) within which critical habitat for Dwarf Sandwort is found at Church Hill. This area is on Federal lands. The area of critical habitat within this area is approximately 0.1 ha. The critical habitat parcel 815_1 is bounded by a polygon as follows: Commencing at a point with coordinates 456412, 5351043; thence 85° in a straight line to point 456491, 5351053; thence 172° in a straight line to point 456499, 5350989; thence 263° in a straight line point 456420, 5350980; thence 353° in a straight line to the commencement point (Zone10NAD1983).

2.6. Examples of activities likely to result in destruction of critical habitat

Examples of activities likely to destroy critical habitat are provided below for Bog Bird's-foot Trefoil, Tall Woolly-heads, Water-plantain Buttercup, Kellogg's Rush, and Rosy Owl-clover, (Table 7). There are no activities likely to result in destruction of Dwarf Sandwort critical habitat because sufficient protection is in place to make destructive activities unlikely to occur.

Destruction of critical habitat will result if any part of the critical habitat is degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from single or multiple activities at one point in time or from the cumulative effects of one or more activities over time. It is important to note that some activities have the potential to destroy critical habitat even if they occur outside the area identified as critical habitat and also, that if carefully conducted the negative effects of some of these activities can be mitigated such that the activity will have no, or even a positive, effect on the habitat.

Table 7: Examples of activities likely to result in the destruction of critical habitat.

Activity	Effect of activity on critical habitat	Potentially Affected Species [†]	Most likely populations
Urban and rural development (e.g., vegetation removal, clearing and levelling, soil removal or deposition, construction of physical structures such as buildings).	This activity can cause direct habitat conversion, altering hydrological regimes and fragmenting habitats. This disrupts life cycle processes, causes physiological stress, and limits dispersal.	BBT	Woodley Range
		TW	Somenos Creek
Road building and maintenance activities (e.g., ditching, grading, infilling, culvert installation, stockpiling of materials).	Alteration of hydrological regime that leads to changes in the ability of the basin to capture water. For instance, decreased late season capture of water may accelerate withering and death of plants and thereby reduce seed production. On the other hand, increased early-season capture may retard germination and thereby shorten the growing period and reduce seed production.	BBT	Gabriola Island
			Woodley Range
			Harewood Plains
		TW	Somenos Creek
	In addition, this activity is likely to introduce invasive alien species and negatively affect the native species diversity (Lilley and Vellend 2009) resulting in the destruction of the habitat by altering the species composition. See damaging recreational use for effects of invasive alien species.		
	See dumping of waste below for effects of stockpiling of materials.		

Activity	Effect of activity on critical habitat	Potentially Affected Species [†]	Most likely populations
Intensive recreational use (e.g., ATV, motorcycle and bicycle use, bicycle jump construction, intensive walking/jogging, and dog exercising).	Soil compaction leading to altered habitat attributes. Plants may become stressed and die or be unable to germinate due to impaired ability of the habitat to provide suitable soil moisture or light availability.	BBT	Woodley Range Harewood Plains
		KR	Uplands/Cattle Point
		TW	Uplands/Cattle Point Christmas Hill
		WPB	Uplands/Cattle Point
	These activities are most likely to destroy critical habitat through soil erosion in the area occupied and/or alteration of drainage patterns.		
	Nitrogen enrichment from dog feces leading to changes in nutrients that provide the necessary habitat conditions. Nutrient enrichment from this source might be sufficient to encourage algal blooms that in turn affect water oxygen/CO ₂ balance, light penetration, and other aspects of water quality, with potentially negative consequences for plant flowering, germination, and seedling survival rates. Additional nitrogen may also encourage the spread of invasive alien plant species which may in turn alter habitat attributes.		
	In addition, this activity is likely to introduce or spread invasive alien plant species. Invasive alien plant species compete with native species and alter the availability of light, water, and nutrients in the habitat, such that the habitat would not provide the required habitat conditions.		

Activity	Effect of activity on critical habitat	Potentially Affected Species [†]	Most likely populations
Landscape maintenance activities (e.g., development and maintenance or modification of trails, stockpiling of materials, transport of heavy materials, dredging, installation of park benches, picnic tables, signs, fencing, or establishment of flower beds)	These activities can cause direct land conversion, soil compaction and associated hydrological effects, altered moisture regimes (e.g., impounded drainage, or reduced water flow to the plants through ditching or diversion of subsurface water by built structures), and introduction of alien species [e.g., intentional plantings or accidental introductions such as facilitated by unclean machinery (see recreational use for effect of invasive alien species)].	KR	Uplands/Cattle Point
		TW	Somenos Creek
		WPB	Uplands/Cattle Point
		ROC	Trial Island
Dumping of waste (e.g., plant material or dredged material).	See dumping of waste for effects of piling of plant debris and construction materials.		
Dumping of waste (e.g., plant material or dredged material).	Increased debris reduces the ability of the habitat to support germination and growth due to a lack of light and is likely to introduce invasive alien plants (see recreational use for effect of invasive alien species).	TW	Somenos Creek Uplands/Cattle Point

[†]BBT= Bog Bird's-foot Trefoil, TW=Tall Woolly-heads, WPB=Water-plantain Buttercup, KR=Kellogg's Rush
ROC=Rosy Owl-clover.

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