Species at Risk Act
Recovery Strategy Series

Replacement of Sections 2.2.1, 2.2.2, 2.2.3 of the Recovery Strategy for Multi-Species at Risk in Maritime Meadows associated with Garry Oak Ecosystems in Canada

Island Marble
Taylor's Checkerspot
Bearded Owl-clover
Bear's-foot Sanicle
Coastal Scouler's Catchfly
Golden Paintbrush
Prairie Lupine
Purple Sanicle
Seaside Bird's-foot Lotus

2016

Canada

Replacement of Sections 2.2.1, 2.2.2, and 2.2.3 of the following Recovery Strategy

Parks Canada Agency. 2006. Recovery Strategy for Multi-species at Risk in Maritime Meadows Associated with Garry Oak Ecosystems in Canada. In Species at Risk Act Recovery Strategy Series. Ottawa: Parks Canada Agency. 93 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 (http://www.sararegistry.gc.ca).

Cover illustration: Left to right: © Andrew Fyson: Taylor's Checkerspot © Matt Fairbarns: Bearded Owl-clover, Golden Paintbrush, Bear's-foot Sanicle, Coastal Scouler's Catchfly, Purple Sanicle, © Hans Roemer: Prairie Lupine © Matt Fairbarns: Seaside Bird's-foot Lotus

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Introduction

This document replaces the first five paragraphs of section 2.2 and sections 2.2.1, 2.2.2, and 2.2.3 of the "Recovery Strategy for Multi-Species at Risk in Maritime Meadows associated with Garry Oak Ecosystems in Canada" (Parks Canada Agency 2006), which was posted on the Species at Risk Public Registry on August 11th 2006 (http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=873).

This document includes a partial identification of critical habitat for multiple species at risk in maritime meadows associated with Garry Oak ecosystems in British Columbia, Canada. The Government of Canada, in cooperation with the province and other partners, is continuing work that will lead to the identification of additional critical habitat in future recovery planning documents, in an effort to meet the population and distribution objectives for the recovery of multiple species at risk in maritime meadows associated with Garry Oak ecosystems in Canada in Canada.

2.2. Critical Habitat

Areas of critical habitat for Taylor's Checkerspot, Bearded Owl-clover, Bear's-foot Sanicle, Coastal Scouler's Catchfly, Golden Paintbrush, Prairie Lupine, Purple Sanicle, and Seaside Bird's-foot Lotus, 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 not sufficient to achieve the population and distribution objectives[1] for these species because additional habitat is required to create new populations for Bearded Owl-clover, Bear's-foot Sanicle, Coastal Scouler's Catchfly, Golden Paintbrush, Prairie Lupine, and Seaside Bird's-foot Lotus (Parks Canada Agency 2006). 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 2.2.4) 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; while some studies remain to be completed, the schedule of studies is still expected to provide the required information. Further, although the schedule of studies was formulated at a time when Taylor's Checkerspot was assumed to be extirpated from Canada, the studies listed are still considered adequate for this species. Because Island Marble is extirpated from Canada

[1] Population and distribution objectives in this action plan are the recovery goals and objectives in the recovery plan 2006

and reintroduction requires significant further studies, no critical habitat for this species is identified in this amendment. Information gaps for all species will be addressed by future studies as indicated in the schedule of studies in the recovery strategy. As information gaps are filled the identification of critical habitat will be revised.

The habitats of all the species covered by this amendment generally occur (or occurred) in maritime meadows on southeast Vancouver Island and the adjacent Gulf Islands and islets. These maritime meadow ecosystems are naturally fragmented, occur along shorelines and small islands and are characterized by mild winters with frequent coastal fogs and cool, dry summers. Some of these species also occur in associated ecosystems which include rocky coastal bluffs, slightly moist open deciduous or coniferous woodlands, open shrubby areas, and vernal pool margins (Parks Canada Agency 2006). To further characterize the habitat of these species, site and vegetation data were collected at most extant locations and are described for each species below. It is important to note that further study of habitat is needed to broaden or refine the biophysical attributes of critical habitat for each of these species.

2.2.1. Identification of Butterfly Critical Habitat

Critical Habitat for Island Marble

Despite significant search efforts, no extant populations have been recorded (Heron pers. comm. 2011) and little information on habitat, host plant associations, or site specific information at historic sightings is available; as such, no critical habitat can be identified at this time.

Critical Habitat for Taylor's Checkerspot

Critical habitat identification of the single known extant Canadian population for Taylor's Checkerspot is summarized in Table 1. Critical habitat for Taylor's Checkerspot is identified in this amendment to the extent possible based on the best available information.

Table 1: Summary of critical habitat identification for extant populations of Taylor's Checkerspot (*Euphydryas editha taylori*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Not recorded	Denman Island	2	Yes

Although Taylor's Checkerspot is known historically from maritime meadows ecosystems, the habitat of the only known extant population in Canada is characterized by modified open areas on Denman Island. Habitat descriptions for Taylor's Checkerspot include flat (< 15% slope) disturbed open habitats below 625 m in elevation with a southeast exposure, including moist to wet clearings, depressions, meadows, pastures, regenerating clear-cuts, logging roads, roadsides, logging landings and areas that have been disturbed by machinery. Field investigations conducted in 2007-2008 (Page *et al*. 2008a, Page *et al*. 2008b), studies completed as part of the updated COSEWIC status assessment for Taylor's Checkerspot (COSEWIC 2011), and data collected by the Denman Conservancy Association (J. Balke and A. Fyson pers. comm. 2012) have further characterized the habitat needs of Taylor's Checkerspot (described below).

Taylor's Checkerspot on Denman Island exists as a single population composed of several large subpopulations linked by open habitats, such as linear wetlands, roadways, or recently logged areas. With the exception of a few outlying sightings, areas where observations were concentrated are generally not separated from each other by distinct topographic barriers or large areas of unsuitable habitat; some observations have occurred in intervening areas between concentrations. This suggests that the population is spatially-structured with some dispersal of individuals between subpopulations. Maintenance of landscape connectivity between subpopulations to allow dispersal between subpopulations is essential to maintain the existence of the population as a whole.

Two types of dispersal are recognized for Taylor's Checkerspot: more frequent dispersal over a relatively short distance, and the relatively rare long-distance dispersal. It is known that adults of the closely related Bay Checkerspot (*Euphydryas editha bayensis*) may fly up to several hundred meters across open areas between larval host plant patches and nectar sources (Harrison *et al.* 1988). In general, migrations of individual butterflies across various species in the *Euphydryas* genus have been rarely found to exceed 2–3 km (Wahlberg *et al*. 2001). However, long-distance dispersal events have been documented as far as 6.4 km in the Bay Checkerspot subspecies (Murphy and Ehrlich 1980) and 6.8 km in the Glanville Fritillary (*Melitaea cinxia*), a related species of butterfly in Europe (van Nouhuys and Hanski 1999). Taylor's Checkerspot buterflies on Denman Island have been observed flying over tree barriers greater than 30 m in height and in open areas surrounded by continuous forest cover for more than 300 m (Balke and Fyson pers. comm. 2012). In 2008, a single adult Taylor's Checkerspot was photographed near Buckley Bay on Vancouver Island, 5.0 km from the nearest known subpopulation on Denman Island (Page *et al*., 2008b).This suggests long-distance dispersal events also occur for Taylor's Checkerspot. Dispersal corridors can be defined for short distance dispersal along corridors of suitable habitat; however, such corridors cannot be defined for rare long distance dispersal events which occur across unsuitable habitat.

On Denman Island, Taylor's Checkerspot butterflies are generally found in open areas distinguished by early seral plant communities. Plant communities that can contain abundant larval host plants and/or nectar plants include young clear cuts (1–15 years since logging), weedy areas of rural properties, unmown pastures, and roadsides. Figure 1 shows typical habitat for Taylor's Checkerspot on Denman Island.

Figure 1: Typical habitat supporting Taylor's Checkerspot in Canada (2009) (used with permission from J. Heron).

Geospatial location of areas containing critical habitat: Rather than providing hard boundaries, this recovery strategy sets out a series of rules describing the habitat that is required for the population of Taylor's Checkerspot. This is because landscape changes due to forest growth (e.g., due to forest stand regeneration) will cause some areas to become unsuitable and the species will no longer utilize them while other areas may become suitable and the species will disperse to these new locations. Within the geographical boundaries identified in Figure 2 (Denman Island) critical habitat is located in areas where the Taylor's Checkerspot breeds, lays eggs, and larva mature as well as dispersal corridors between those areas.

Critical habitat areas key to all life stages are identified where any two of the following criteria occur (Table 2):

- (a) At least ten unique adults have been observed during a single survey[2].
- (b) Immature life stages have been observed.
- (c) Two or more individuals where any one individual is within one km from at least one other individual and spread out such that the area covered by circles of radius 500 m around each individual is > 1 km^2 (any overlapping areas are only counted once).

Table 2. Lookup table using the three critical habitat criteria to determine whether an area is considered Taylor's Checkerspot critical habitat.

Observation	Area > 1 km^2	Area = or < 1 km^2
> 10 adults and 1 or more larva	Yes	Yes
> 10 adults and 0 larva	Yes	No
<10 adults and 1 or more larva	Yes	No
< 10 adults and 0 larva	No	No

When a group of individuals meets criteria (c) above, the boundary of critical habitat is defined as a minimum convex polygon around the habitat that is within 0.5 km of any recorded individual. In cases where larval host plants, nectar plants, and basking and mating sites extend outside this boundary, the boundary is adjusted to encompass contiguous areas of larval host plants, nectar plants, or basking and mating sites and these contiguous areas are also critical habitat.

Critical habitat areas to provide habitat for dispersal are identified when two separate critical habitat areas (as described above) are less than 2.5 km apart (edge to edge), a short range dispersal corridor between the two areas is also critical habitat. Short range dispersal corridors are the area between the areas of critical habitat bounded by the outer tangents between these two areas.

Areas greater than 2 ha in size, which do not match the biophysical attributes of critical habitat, are excluded from identification as critical habitat. For example, areas of dense tree canopy, wetlands with water during late spring/early summer, very dry areas not capable of supporting larval host plants or adult nectar sources, grass-dominated areas, and highly developed areas, are not critical habitat. Critical habitat does not include paved or improved roads, active agricultural

[2] It is accepted that individuals may be double counted in surveys as individuals are not marked or captured during most surveys.

fields, buildings, lawns, or other landscaped areas that do not contain the biophysical attributes of critical habitat.

Biophysical Attributes of Critical Habitat

- **Short Range dispersal Corridors**: There is only one biophysical critical habitat attribute of short-range dispersal corridors:
  - Open areas: characterized by low-growing vegetation interspersed with bare ground (such as exposed bedrock, exposed soil, gravel roads or trails, and exposed wood debris), and lack of woody canopy cover.
- **Critical habitat areas key to all life stages**: Biophysical attributes of critical habitat where Taylor's Checkerspot carries out all other parts of its life cycle are as follows:
  - Open areas: characterized by low-growing vegetation interspersed with bare ground (such as exposed bedrock, exposed soil, gravel roads or trails, and exposed wood debris), and lack of woody canopy cover.
  - Presence of one or more of the following: larval host plants, sheltered sites, and nectar plants.
- **Areas of larval host plants available during larval life stage(s)**: five plant species are known to be used by Taylor's Checkerspot as larval host plants: Marsh Speedwell (*Veronica scutellata*), Thyme-leaved Speedwell*[3] (*Veronica serpyllifolia var. serpyllifolia*), Lance-leaved Plantain* (*Plantago lanceolata*), Common Plantain* (*Plantago major*), and Common Centaury* (*Centaurium erythraea*) (less often utilised).
- **Sheltered sites**: sheltered sites used for diapause and pupation are poorly understood at this time, and are likely on the underside of leaves, leaf litter, wood debris, human-made objects or other cover within close proximity to larval host plant patches.
- **Areas of nectar plants available during flight period(s)**: Taylor's Checkerspot adults do not specialize in feeding on specific flowers, patches of abundant flowering plants are required near larval sites to provide nectar. Use appears to depend on what is available at the time rather than a preference for a given suite of species. Plants flowering during the flight period typically include Wild Strawberry (*Fragaria virginiana*), Spring Gold (*Lomatium utriculatum*), Woodland Strawberry (*Fragaria vesca*), Trailing Blackberry (*Rubus ursinus*), Creeping Buttercup* (*Ranunculus repens*) and others.

Existing roads, park fields and ditches do not contain the biophysical attributes of critical habitat.

The spatial delineation of the above habitat features (together comprising the biopohysical 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 above. More detailed information on the spatial location of critical habitat to support protection of Taylor's Checkerspot and its habitat may be requested, on a need-to-know basis, by contacting Environment Canada's Recovery Planning section.

[3] * Starred species are not native to coastal British Columbia. The non-native variety of March Speedwell *Veronica serpyllifolia* var. serpyllifolia is present and utilized on Denman Island (N. Page, pers. comm. 2015).

Critical Habitat Map Figure for Taylor's Checkerspot

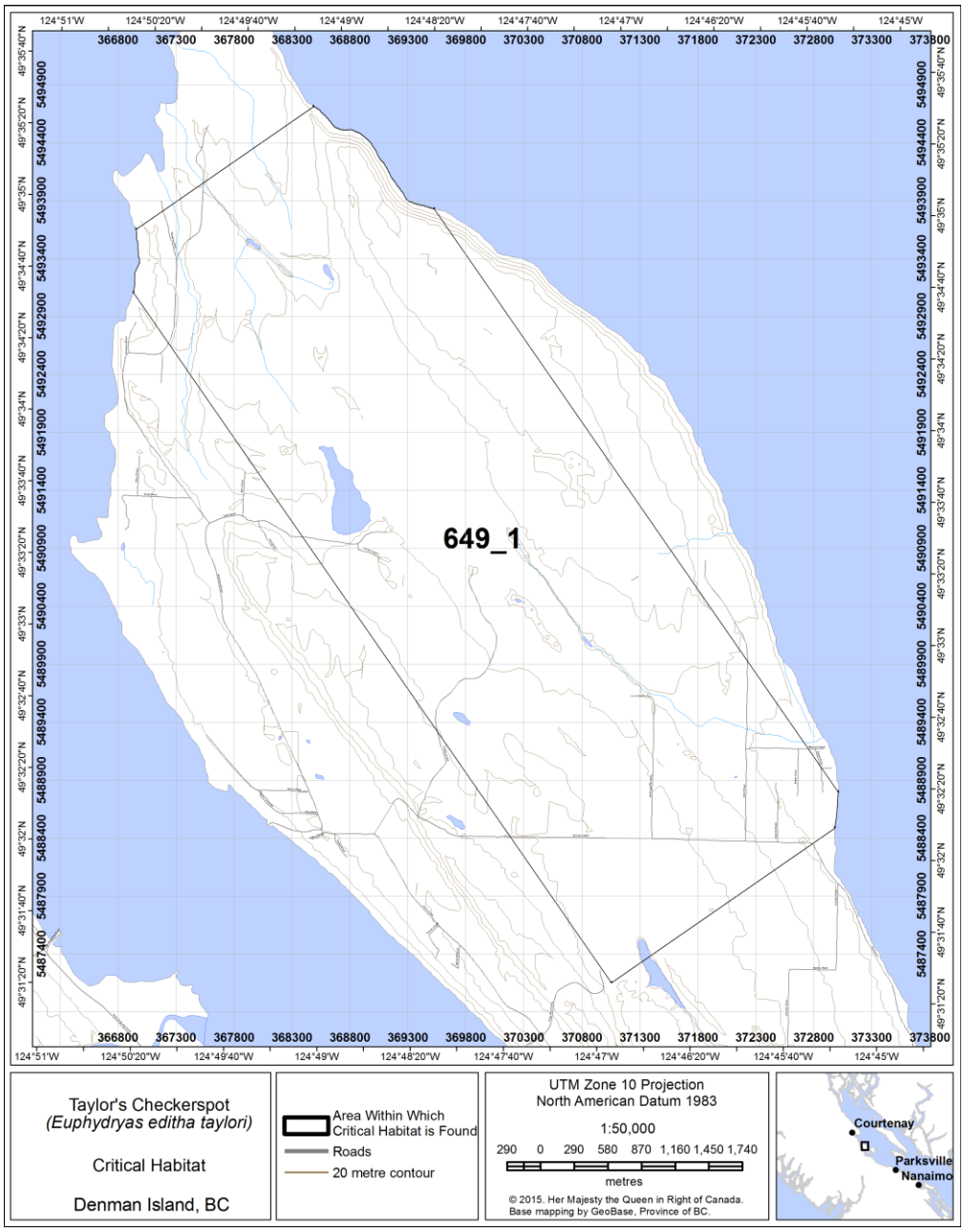

Figure 2: Area (~1918 ha) within which critical habitat for Taylor's Checkerspot is found at Denman Island. This area is on non-federal lands. The area of critical habitat within this area is approximately 809 ha.

2.2.2. Identification of Plant Critical Habitat

Geospatial location of areas containing critical habitat for plant species at risk in Maritime Meadows

Geospatial areas containing critical habitat are depicted as bounding areas (Figures 10-39). 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 patch[4] 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 plant species require high light conditions to germinate. The area surrounding the seed bank must be clear of shading shrubs and trees: this area is the canopy opening required by the species. The minimum size of canopy openings can be determined based on the height of vegetation able to grow in the area and cast shade on the plants (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 equal to the distance of its height. In addition, this area also allows for reproduction, growth and dispersal. For the species in this amendment, a default minimum canopy opening, based on the maximum height of the vegetation able to grow in the area, was applied unless more specific data was available.

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). Rain water is collected and stored in the surrounding area called the catchment. This catchment area is directly responsible for receiving and directing 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 and isolated within landscape-scale catchments.

Critical Habitat for Bearded Owl-clover

[4] 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).

All known extant populations for Bearded Owl-clover are summarized in Table 3. Critical habitat for Bearded Owl-clover is identified in this amendment to the extent possible based on best available information. Critical habitat remains to be described for the population on Strongtide Island. The schedule of studies outlines activities required to identify additional critical habitat necessary to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 3: Summary of critical habitat identification for extant populations of Bearded Owl-clover (*Triphysaria versicolor* ssp. *versicolor*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Harling Point	Harling Point	10	Yes
Victoria Golf Club	Gonzales Point	11	Yes
Ten Mile Point	Ten Mile Point	12	Yes
Glencoe Cove	Glencoe Cove	13	Yes
Mary Tod Island	Mary Tod Island	14	Yes
Cattle Point	Uplands Park /Cattle Point	15	Yes
Strongtide Island	Strongtide Island	N/A	No*

* Data required to identify critical habitat: adequate spatial precision; confirmation of species or habitat presence.

The habitat of Bearded Owl-clover in Canada generally occurs along the southeast coast of Vancouver Island and the Gulf Islands in Garry Oak and associated ecosystems. The habitat is characterized as moisture-receiving areas, such as wet meadows and vernal pool margins usually in areas of rock outcropping (Parks Canada 2006). Field investigations conducted in 2008-2009 helped to further characterize habitat needs of Bearded Owl-clover (Fairbarns 2008a; GOERT 2008; Fairbarns 2009).

Figure 3 shows typical habitat for Bearded Owl-clover. Common attributes of habitat for Bearded Owl-clover include:

- Level to gently sloping or depressed open rocky areas near ocean shoreline.
- Thin soils composed of glaciomarine sediment or coarse beach deposits, with small amounts of exposed mineral soil and fine litter.
- Moderately well drained soils: in the early growing season (March and April) the soil is moist to saturated and standing water is not typically present, by early summer the soil experiences significant water deficits.
- Herb layer is dominated by grasses, with some forbs.
- Woody material covering the soil surface is scarce.

Figure 3: Photo of typical Bearded Owl-clover habitat in Canada (2008) (used with permission from M. Fairbarns).

Biophysical attributes of critical habitat for Bearded Owl-clover

The common and specific attributes required for Bearded 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 Bearded Owl-clover includes the area where the species patch occurs, and (where relevant) one or both of the following habitat features:

- The minimum canopy opening: the default canopy opening required for light to reach the plants is an area defined by a 10 m distance surrounding each patch of plants in all directions (10 m is generally the maximum height attained by trees in the soils surrounding Bearded Owl-clover). Where shading from adjacent areas does not affect the ability of the habitat to support the patch, no minimum canopy opening is included.
- The catchment area: if external seepage is not considered to be critical for the patch, the catchment area is not included.

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 Bearded Owl-clover

and its habitat may be requested, on a need-to-know basis, by contacting Environment Canada's Recovery Planning section.

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

Within the geographical boundaries identified in Figure 10 (Harling Point), critical habitat is identified as the minimum canopy opening and catchment areas associated with the recorded location of each Bearded Owl-clover patch. Both the catchment areas and the minimum canopy opening are essential to the survival of this Bearded Owl-clover population (Fairbarns 2008a).

Within the geographical boundaries identified in Figure 11 (Gonzales Point), critical habitat is identified as the area occupied by the recorded location of each Bearded Owl-clover patch and its associated catchment area(s). Although seepage plays a significant role in determining the extent of habitat critical to the survival of the existing patch of plants, shading is not a significant issue for these patches (Fairbarns 2009).

At Ten Mile Point the Bearded Owl-clover population consists of discontinuous patches: one cluster to the south and one to the north (BC Conservation Data Centre 2011). GOERT (2008) and Fairbarns (2009) partially surveyed the population and confirmed the continued existence of the species and its habitat at this site and provided partial information on habitat and location. Data from the BC Conservation Data Center (2011) along with the information from GOERT (2008) and Fairbarns (2009) is accepted as the best available information for this site. Within the geographical boundaries identified in Figure 12 (Ten Mile Point), critical habitat is identified as the area occupied by each Bearded Owl-clover patch and any catchment areas associated with the recorded location of each Bearded Owl-clover patch (Fairbarns pers. comm. 2011; Fairbarns 2009). While the catchment areas have not yet been mapped, they are defined above and identified as critical habitat. Fairbarns (2009) determined that the southern patch did not depend on a minimum canopy opening. The northern portion of the population was not assessed, and until determined otherwise the critical habitat for the northern portion includes the default minimum canopy openings.

Within the geographical boundaries identified in Figure 13 (Glencoe Cove), Figure 14 (Mary Tod Island) and Figure 15 (Uplands Park/Cattle Point), critical habitat is identified as the area occupied by each recorded Bearded Owl-clover patch. Neither shading nor external seepage are thought to affect the survival of these populations (Fairbarns 2009).

Critical Habitat for Bear's-foot Sanicle

All known extant populations for Bear's-foot Sanicle are summarized in Table 4 (including one new population on Bedford Islands documented since the publication of the recovery strategy). Critical habitat for Bear's-foot Sanicle is identified in this amendment to the extent possible based on best available information. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 4: Summary of critical habitat identification for extant populations of Bear's-foot Sanicle (*Sanicula arctopoides*)

Population (as referenced in 2006 recovery strategy)	Location (as referenced in amendment)	Figure #	Critical Habitat Identification
Harling Point	Harling Point	10	Yes
Mary Tod Island	Mary Tod Island	14	Yes
Saxe Point	Saxe Point	16	Yes
Alpha Islet	Alpha Islet	17	Yes
Bentinck Island	Bentinck Island	18	Yes
Church Point	Church Point	19	Yes
Swordfish Island	Church Point/ Swordfish Island	19	Yes
Trial Island	Trial Islands	20	Yes
Discovery Island	Discovery Island	21	Yes
Not recorded	Bedford Islands	22	Yes

The habitat of Bear's-foot Sanicle in Canada is restricted to a small area in and near Victoria, British Columbia found within Garry Oak and associated ecosystems. The habitat is generally characterized as dry maritime meadow ecosystems (Parks Canada 2006). Field investigations conducted in 2008-2009 helped to further characterize habitat needs for Bear's-foot Sanicle (Fairbarns 2008a; Fairbarns 2009; Costanzo et al. 2009a).

Figure 4: Photo of typical Bear's-foot Sanicle habitat in Canada (2008) (used with permission from M. Fairbarns).

Figure 4 shows Bear's-foot Sanicle growing in typical habitat. Common attributes of Bear's-foot Sanicle habitat include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs is never substantial).
- Less than 20 m above sea level, with variable slopes (on steeper slopes the habitat is generally found on southwest aspects).
- Colluvial/residual or glaciomarine clay, silt or loam with a depth greater than 10 cm. Coarse fragments are often abundant in the soil profile but are rarely abundant at the surface.
- In the early growing season (October to March), the soils tend to remain moist. Soil moisture diminishes as the growing season progresses and by early summer the soil experiences significant water deficits for prolonged periods.

Woody material covering the soil surface is often absent and never abundant.

Biophysical attributes of critical habitat for Bear's-foot Sanicle

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

- The minimum canopy opening: the default canopy opening required for light to reach each patch 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 Bear's-foot Sanicle). For patches where shading from adjacent areas does not affect the ability of the habitat to support the patch, no minimum canopy opening is included.
- The catchment area: if external seepage is not considered to be critical for the patches, the catchment area is not included.

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 Bear's-foot Sanicle 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 Bear's-foot Sanicle

Within the geographical boundaries identified in Figure 16 (Saxe Point), critical habitat at Saxe Point is identified as the minimum canopy opening and the catchment area supporting each patch of Bear's-foot Sanicle plants within the boundaries (Costanzo *et al*. 2009).

Within the geographical boundaries identified in Figure 10 (Harling Pt.), Figure 17 (Alpha Islet), Figure 18 (Bentinck Island), Figure 19 (Church Point/Swordfish Island), and Figure 20 (Trial

Island), critical habitat is identified as the minimum canopy opening associated with the recorded location of each patch of Bear's-foot Sanicle (Fairbarns, 2008a). Data from Fairbarns (2008a) was supplemented with location data for Bentinck Island from other personal observations (Fairbarns 2007; Schiller *et al.* 2010).Within the geographical boundaries identified in Figure 14 (Mary Tod Island), Figure 21 (Discovery Island) and Figure 22 (Large Bedford Island), critical habitat is identified as the area occupied by each recorded Bear's-foot Sanicle patch. Neither shading nor external seepage are thought to be critical to the survival of these existing patches (Fairbarns 2009).

Critical Habitat for Coastal Scouler's Catchfly

All known extant populations for Coastal Scouler's Catchfly are summarized in Table 5. One population (Mount Tuam) discovered since the time of the recovery strategy, is also included here. Critical habitat for Coastal Scouler's Catchfly is identified in this amendment to the extent possible based on best available information. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 5: Summary of critical habitat identification for extant populations of Coastal Scouler's Catchfly (*Silene scouleri* ssp. *grandis*)

Population (as referenced in 2006 recovery strategy)	Location (as referenced in amendment)	Figure #	Critical Habitat Identification
Alpha Islet	Alpha Islet	17	Yes
Trial Island	Trial Islands	20	Yes
Little Trial Island	Trial Islands	20	Yes
Not recorded	Mount Tuam	23	Yes

The habitat of Coastal Scouler's Catchfly in Canada is restricted to a small area in and near Victoria, British Columbia found within Garry Oak and associated ecosystems. The habitat is generally characterized as dry to slightly moist maritime meadow ecosystems (Parks Canada 2006). Field investigations conducted between 2006 and 2010 helped to further characterize the habitat needs of Coastal Scouler's Catchfly (Fairbarns 2008a; Maslovat 2009; and Maslovat 2010).

Figure 5 shows typical habitat for Coastal Scouler's Catchfly in Canada. Common attributes of habitat for Scouler's Catchfly include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs is never substantial).
- Slopes up to 10% (on steeper slopes the habitat is generally found on southwest aspects).
- Thin soil composed of till or glaciomarine clay, silt or loam.
- In the early growing season (October to March), the soils tend to remain moist. 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 occasionally present but never abundant.

Figure 5: Photos of typical Habitat of Coastal Scouler's Catchfly at Trial Island (left) (2008) (used with permission from M. Fairbarns) and Mount Tuam (right) (2009) (used with permission from C. Maslovat) in Canada.

Biophysical attributes of critical habitat for Scouler's Catchfly

The common and specific attributes required for Scouler's Catchfly life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Scouler's Catchfly includes the area where the species patch occurs, and (where relevant) one or 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 Coastal Scouler's Catchfly).
- The catchment area: if external seepage is not considered to be critical for the patches, the catchment area is not included.

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 Scouler's Catchfly and its habitat may be requested, on a need-to-know basis, by contacting the Parks Canada Agency and/or Environment Canada's Recovery Planning section.

Delineation of biophysical attributes of critical habitat for Scouler's Catchfly

Within the geographical boundaries identified in Figure 23 (Mount Tuam), critical habitat at Mount Tuam is identified as the minimum canopy opening and the catchment area supporting each patch of Coastal Scouler's Catchfly plants. The steep topography at this site funnels moisture to the patches, which is thought to be critical to the survival of the individual patches within this population (Maslovat pers. comm. 2011). In general, the catchment areas define the northern (upslope) boundaries of the critical habitat, while the minimum canopy opening defines the boundaries to the east, west and south of each of the seven discontinuous patches on Mt.

Tuam. Although the habitat of this population cannot be described as a maritime meadow (due to the high elevation and distance from maritime influences) it shares many of the key habitat attributes in common with the low elevation populations (Maslovat 2009; Maslovat 2010).

Within the geographical boundaries identified in Figure 17 (Alpha Islet) and Figure 20 (Trial Islands), critical habitat is identified as the minimum canopy opening associated with the recorded location of each patch of Coastal Scouler's Catchfly. For each of these patches, the minimum canopy opening is essential to the survival of these Coastal Scouler's Catchfly populations (Fairbarns, 2008a).

Critical Habitat for Golden Paintbrush

All known extant populations for Golden Paintbrush are summarized in Table 6. Critical habitat for Golden Paintbrush is identified in this amendment to the extent possible based on best available information. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 6: Summary of critical habitat identification for extant populations of Golden Paintbrush (*Castilleja levisecta*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Alpha Islet	Alpha Islet	17	Yes
Trial Island	Trial Island	20	Yes

The habitat of Golden Paintbrush in Canada generally occurs along the southeast coast of Vancouver Island near Victoria and offshore islands in Garry Oak and associated ecosystems. The habitat is generally characterized as dry to slightly moist maritime meadow ecosystems (Parks Canada 2006). Field investigations conducted in 2008 helped to further characterize the habitat needs of Golden Paintbrush (Fairbarns 2008a).

Figure 6 shows typical habitat for Golden Paintbrush. Common attributes of habitat for Golden Paintbrush include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs is not substantial).
- Generally, on level to gently sloping terrain at low elevations.
- Glaciomarine and glaciodeltaic sediments with a depth of greater than 15 cm. The upper limits of soil depth occur on sites exposed to wind and salt spray. Coarse fragments are often abundant in the soil profile.
- In the early growing season (October to February), the soils are usually wet but rarely saturated. Soil moisture diminishes as the growing season progresses and a significant water deficit develops by the time the fruits are developing and the plants are senescing.
- Woody material covering the soil is usually present but rarely abundant.

Figure 6: Photo of typical Golden Paintbrush habitat in Canada (2008) (used with permission from M. Fairbarns).

Biophysical attributes of critical habitat for Golden Paintbrush

The common and specific attributes required for Golden Paintbrush life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings. Therefore critical habitat for Golden Paintbrush includes the area where the species patch occurs, and (where relevant) the following habitat feature:

- 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 Golden Paintbrush). For patches where shading from adjacent areas does not affect the ability of the habitat to support the patch, no minimum canopy opening is included.

The spatial delineation of the above habitat feature (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 Golden Paintbrush and its habitat may be requested, on a need-to-know basis, by contacting the Parks Canada Agency and/or Environment Canada's Recovery Planning section.

Delineation of biophysical attributes of critical habitat for Golden Paintbrush

Within the geographical boundaries identified in Figure 17 (Alpha Islet) and Figure 20 (Trial Island), critical habitat is identified as the minimum canopy opening associated with the recorded location of each Golden Paintbrush patch. For each of these patches, the minimum canopy opening is essential to the survival of these Golden Paintbrush populations (Fairbarns, 2008a).

Critical Habitat for Prairie Lupine

All known extant populations for Prairie Lupine are summarized in Table 7. Since the writing of the recovery strategy, a new population on Mount Helmcken was discovered, and the Mt. Braden and Mount Wells populations may both be extirpated (Roemer 2009) as they are no longer found there. Further analysis is needed to determine whether or not the habitat at these sites can support viable patches of Prairie Lupine. Critical habitat for Prairie Lupine is identified in this amendment to the extent possible based on best available information. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 7: Summary of critical habitat identification for extant populations of Prairie Lupine (*Lupinus lepidus*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Not recorded	Mt. Helmcken	24	Yes
Mount Wells	Mount Wells	N/A	No*
Mount Braden	Mt. Braden	N/A	No**
Mount McDonald	Mt. McDonald	25	Yes

*Data required to identify critical habitat: adequate spatial precision; confirmation of species or habitat presence

** Critical habitat at the Mount Braden location will be identified in a future recovery strategy update or action plan.

The habitat of Prairie Lupine in Canada generally occurs on southeast Vancouver Island within Garry Oak and associated ecosystems. The habitat is generally characterized by dry meadows, rock bluffs and open shrub lands (Parks Canada 2006). Field investigations were conducted in 2008-2009 (Maslovat 2008; Roemer 2009) to further characterize the habitat needs of Prairie Lupine.

Figure 7 shows typical habitat for Prairie Lupine. Common attributes of habitat for Praire Lupine include:

- Sunny areas with short or sparse vegetation (trees are absent and the cover of shrubs is not substantial).
- Generally on benches (level to gently sloping) of steep mountain slopes, primarily in upper slope and hill-crest situations with aspects ranging from SE to SW.
- Soils are thin and generally have no organic horizon. Surface mineral soil texture is a consistent sandy loam, slightly moist to dry.
- Soil drainage ranges from moderately well drained to very rapidly drained.
- No litter layer, to fragmentary little layer.
- Ground is mostly to almost totally, covered by moss and lichen.

Figure 7: Photo of typical habitat for Prairie Lupine in Canada (used with permission from H. Roemer). White arrows indicate slope position of patches on Mount McDonald.

Biophysical attributes of critical habitat for Prairie Lupine

The common and specific attributes required for Prairie Lupine life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and connective areas. Therefore critical habitat for Prairie Lupine includes the area where the species patch occurs, and (where relevant) one or both of the following habitat features:

- Canopy openings associated with a patch and any continuous open areas between patches; forested areas are not included in critical habitat (Roemer 2009; Maslovat 2008).
- Connective landscape features between canopy openings, where habitat quality and characteristics are continuous between patches (Roemer 2009).

The spatial delineation of the above habitat feature (comprising the biophysical attributes of critical habitat) has been completed for each population as indicated in Table 7 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 Prairie Lupine and its habitat may be requested, on a need-to-know basis, by contacting the Parks Canada Agency and/or Environment Canada's Recovery Planning section.

Delineation of biophysical attributes of critical habitat for Prairie Lupine

Within the geographical boundaries identified in Figure 24 (Mount Helmcken) and Figure 25 (Mount McDonald), critical habitat for Prairie Lupine is identified as follows.

The population of Prairie Lupine at Mount McDonald consists of 23 small patches in 7 clusters widely distributed over a large area of open rocky slopes and benches spanning about 1 km (Roemer 2009). Although the same combination of habitat attributes that support the Prairie Lupine patches may be found sporadically throughout this area, it is thought that some other biological peculiarities keep the patches small and few in number (Roemer 2009). To

accommodate the small patch sizes widely distributed over a large area and to include surrounding habitat for dispersal, critical habitat was identified to include landscape features and opportunities for connectivity when habitat quality and characteristics were continuous between patches (Roemer 2009). Similar criteria were used to identify critical habitat on Mount Helmcken (Maslovat 2008), but do not include opportunities for connectivity between patches due to a different survey methodology.

Critical Habitat for Purple Sanicle

All known extant populations for Purple Sanicle are summarized in Table 8. Critical habitat for Purple Sanicle is identified in this amendment to the extent possible based on the best available information. Critical habitat remains to be identified for the populations at Tzuhalem Indian Reserve, Bilston Creek, Dionoso Point Provincial Park, Little D'Arcy Island and Flora Islet. For these populations, the data required for critical habitat identification is stated. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 8: Summary of critical habitat identification for extant populations of Purple Sanicle (*Sanicula bipinnatifida*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Glencoe Cove	Glencoe Cove	13	Yes
Cattle Point	Uplands Park/Cattle Point	15	Yes
Alpha Islet	Alpha Islet	17	Yes
Trial Island	Trial Island	20	Yes
Discovery Island	Discovery Island	21	Yes
Albert Head	Albert Head	26	Yes
Thetis Lake	Seymour Hill	27	Yes
Not recorded	Beacon Hill	29	Yes
Holland Point	Holland Point	28	Yes
Near Francis King	Creed Road	30	Yes
Neild Road	Happy Valley	31	Yes
Macaulay Point	Macaulay Point	32	Yes
Mill Hill	Mill Hill	33	Yes
Mount Douglas	Mount Douglas	34	Yes
Tzuhalem E.R.	Mt. Tzuhalem	35	Yes
Brown Ridge, Saturna Island	Brown Ridge	36	Yes
Rithet's Bog	Rithet's Bog	37	Yes
Little D'Arcy Island	Little D'Arcy Island	N/A	No*
Not recorded	Bilston Creek	N/A	No**
Dionisio Park, Galiano Island	Dionisio Point Provincial Park	N/A	No*
Tzuhalem I.R.	Tzuhalem Indian Reserve	N/A	No*
Flora Islet	Flora Islet	N/A	No*

*Data required to identify critical habitat: adequate spatial precision; confirmation of species or habitat presence

** Data required to identify critical habitat: adequate spatial precision

The habitat of Purple Sanicle in Canada generally occurs along the southeast coast of Vancouver Island and the Gulf Islands within Garry Oak and associated ecosystems. The habitat is generally characterized as dry to slightly moist maritime meadow and open woodland ecosystems (Parks Canada 2006). To further characterize the habitat needs of Purple Sanicle, field investigations

were conducted between 2006 and 2010 (Fairbarns 2008a; Fairbarns 2008b; Fairbarns 2009; GOERT 2008; GOERT 2009; GOERT 2010; GOERT 2011; Costanzo *et al*. 2009b; Maslovat 2009).

Figure 8 shows typical habitat for Purple Sanicle. Common attributes of habitat for Purple Sanicle include:

- Sunny areas with short or sparse vegetation (trees are generally absent and the cover of shrubs is never substantial). On steep slopes patches can occur within a Douglas-fir woodland as the steep slopes allow considerable light to pass through.
- One to 300 metres above sea level with slope angle ranging from 0-60%.
- Soil parent material varies considerably and includes colluvial/residual materials, glaciodeltaic deposits, till or glaciomarine clay, silt or loam with a depth greater than 10 cm, coarse fragments are often abundant in the soil profile, but may be virtually absent. The soil surface is characterized by relatively small amounts of exposed mineral and fine litter.
- In the early growing season (February to March), the soils tend to remain moist, but soil moisture diminishes as the growing season progresses and a significant water deficit develops by mid-summer.
- Woody material covering the soil is often present, but never abundant.

Figure 8: Photo of typical Purple Sanicle habitat in Canada (2008) (used with permission from M. Fairbarns).

Biophysical attributes of critical habitat for Purple Sanicle

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

- The minimum canopy opening: the default minimum 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 Purple Sanicle). At one location, shading from adjacent areas does not affect the ability of the site to support the existing plants, and therefore, no minimum canopy opening is included.
- The catchment area: the catchment area is not included for most populations because external seepage is currently only considered to be critical for two of them.

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 8 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 Purple Sanicle and its habitat may be requested, on a need-to-know basis, by contacting the Parks Canada Agency and/or Environment Canada's Recovery Planning section.

Delineation of biophysical attributes of critical habitat for Purple Sanicle

Within the geographical boundaries identified in Figure 26 (Albert Head) and Figure 27 (Seymour Hill), critical habitat is identified as the minimum canopy opening and the catchment areas associated with the recorded location of each patch of Purple Sanicle. For these populations, both the catchment and the minimum canopy opening are essential to the survival of the Purple Sanicle patches (Fairbarns, 2008a; Fairbarns, 2008b; Schiller pers. comm. 2011).

Within the geographical boundaries identified in Figure 13 (Glencoe Cove), Figure 15 (Uplands Park/Cattle Point), Figure 17 (Alpha Islet), Figure 20 (Trial Islands), Figure 28 (Beacon Hill/Holland Point), Figure 30 (Creed Road), Figure 31 (Happy Valley), Figure 32 (Macaulay Pt), Figure 33 (Mill Hill), Figure 34 (Mount Douglas), Figure 35 (Mount Tzuhalem), Figure 36 (Brown Ridge) and Figure 37 (Rithet's Bog), critical habitat is identified as the minimum canopy opening associated with the recorded location of each patch of Purple Sanicle. The minimum canopy opening is essential to the survival of these Purple Sanicle patches (Fairbarns 2008a; Fairbarns 2008b; Fairbarns 2009; Costanzo *et al*. 2009b; GOERT 2008; GOERT 2009; GOERT 2011; Maslovat 2009). For Macaulay Point, Fairbarns (2008a) data was supplemented with location data from Miskelly (2008; 2009 pers. obs.).

While detailed data was collected for most of the Purple Sanicle population at Holland Point, in Figure 28 mentioned above (Beacon Hill/Holland Point), only partial data was available for the most northerly Purple Sanicle patch at Holland Point and the Purple Sanicle population at Beacon Hill Park. Data provided by Fairbarns for the northern patch of the Holland Point

population (pers. obs. 2010) and the Purple Sanicle data mapped by the BC Conservation Data Center (2011) at Beacon Hill, is accepted as the best available information for the area occupied by these patches. Further information was gathered by local experts (Hook and Fairbarns pers. comm. 2011) who confirmed location data and confirmed that the habitat still persists and that the plants have been observed within the last 5 years. Collection of more detailed data for this population is necessary in the future. The default minimum canopy opening is identified as critical habitat for this population.

Within the geographical boundaries identified in Figure 21 (Discovery Island), critical habitat is identified as the area occupied by each recorded Purple Sanicle patch. Neither shading nor external seepage are thought to affect the survival of this population (Fairbarns 2009).

Critical Habitat for Seaside Bird's-foot Lotus

All known extant populations for Seaside Bird's-foot Lotus are summarized in Table 9. Critical habitat is identified in this amendment to the extent possible based on best available information. The schedule of studies outlines activities required to identify additional critical habitat to support the population and distribution objectives (Section 2.2.4 of the recovery strategy, Parks Canada 2006).

Table 9: Summary of critical habitat identification for extant populations of Seaside Bird's-foot Lotus (*Lotus formosissimus*)

Population (as referenced in 2006 recovery strategy)	Population (as referenced in amendment)	Figure #	Critical Habitat Identification
Bentinck Island	Bentinck Island	18	Yes
Church Point	Church Point	19	Yes
Trial Island	Trial Islands	20	Yes
Rocky Point	Cape Calver	38	Yes
William Head	William Head	39	Yes

The habitat of Seaside Bird's-foot Lotus in Canada generally occurs along a narrow coastal fringe near Victoria on the southeast coast of Vancouver Island and offshore islands within Garry Oak and associated ecosystems. The habitat is generally characterized as seepage and meadow ecosystems (Parks Canada 2006). To further characterize the habitat needs of Seaside Bird's-foot Lotus, field investigations were conducted between 2006 and 2008 (Fairbarns, 2008a).

Figure 9 shows typical habitat for Seaside Bird's-foot Lotus. Common attributes of habitat for Seaside Bird's-foot Lotus include:

- Sunny areas with short or sparse vegetation (trees are generally absent and the cover of shrubs is never substantial).
- 1 to 80 metres above sea level, the slope angle ranges from 0-70% and the aspect is variable, though on steeper slopes patches are generally on west facing aspects.
- Soil parent material varies considerably and may consist of colluvial/residual or glaciomarine clay, silt or loam with a depth of 5 to >30 cm. Coarse fragments are often abundant in the soil profile, but may be virtually absent. The soil surface is characterized by relatively small amounts of exposed mineral and fine litter.

- In the early growing season (January to March) soils tend to remain moist. Soil moisture diminishes as the growing season progresses and a significant water deficit develops by mid-summer.
- Woody material covering the soil is usually present, but rarely abundant.

Figure 9: Photo of typical Seaside Bird's-foot Lotus habitat in Canada (2008) (used with permission from M. Fairbarns).

Biophysical attributes of critical habitat for Seaside Bird's-foot Lotus

The common and specific attributes required for Seaside Bird's-foot Lotus life history functions overlap biophysically, geospatially, seasonally, and across life history stages within associated canopy openings and/or catchment areas. Therefore critical habitat for Seaside Bird's-foot Lotus 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 Seaside Bird's-foot Lotus).
- The catchment areas.

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 9 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 Seaside Bird's-foot Lotus and its habitat may be requested, on a need-to-know basis, by contacting the Parks Canada Agency and/or Environment Canada's Recovery Planning section.

Delineation of biophysical attributes of critical habitat for Seaside Bird's-foot Lotus

Within the geographical boundaries identified in Figure 18 (Bentinck Island), Figure 19 (Church Point), Figure 20 (Trial Islands), Figure 38 (Cape Calver), and Figure 39 (William Head), critical habitat is identified as the minimum canopy opening and catchment areas associated with the recorded location of each patch of Seaside Bird's-foot Lotus. For each of these populations both the catchment and minimum canopy opening are essential to the survival of the Seaside Bird's-foot Lotus patches (Fairbarns, 2008a). For Bentinck Island, Fairbarns (2008a) data was supplemented with location data from Miskelly (2009 pers. obs.).

Critical Habitat Map Figures for Plants

Figure 10: Area (~0.9 ha) within which critical habitat for Bearded Owl-clover and Bear's-foot Sanicle is found at Harling Point. This area is on non-federal land. The area of critical habitat within this area is approximately 0.2 ha.

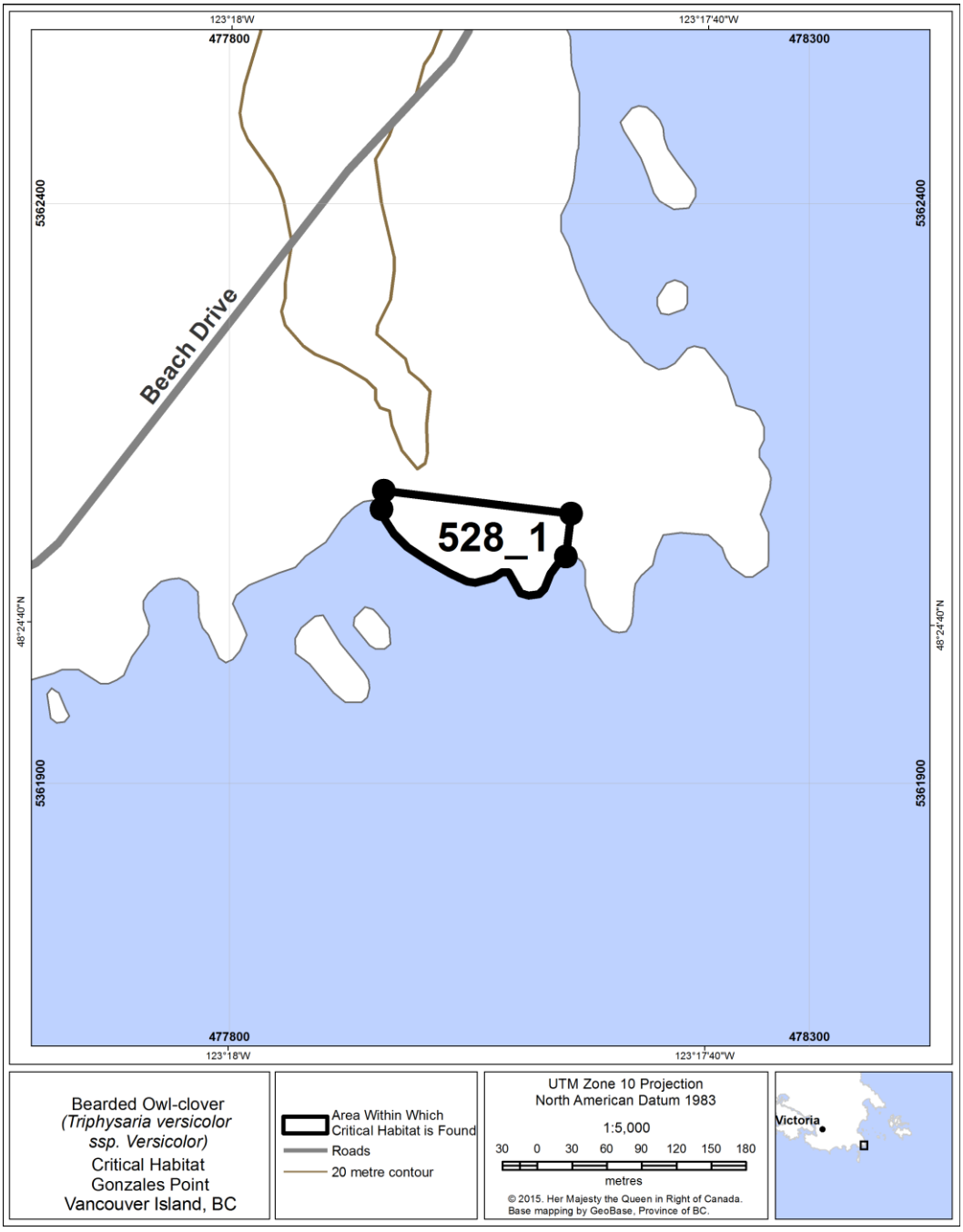

Figure 11: Area (~ 0.9 ha) within which critical habitat for Bearded Owl-clover is found at Gonzales Point. This area is non-federal lands. The area of critical habitat within this area is approximately 0.3 ha.

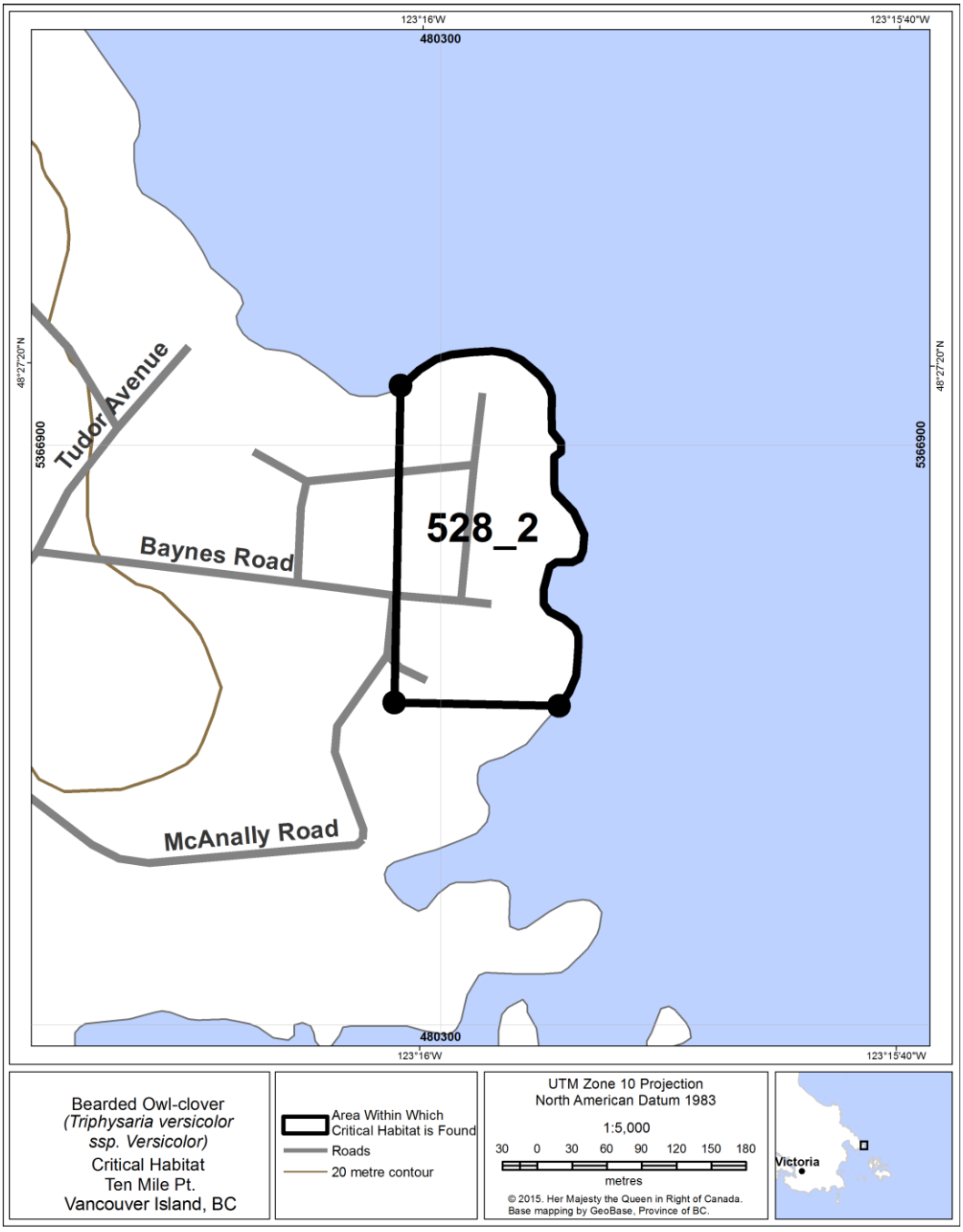

Figure 12: Area (~ 4.2 ha) within which critical habitat for Bearded Owl-clover is found at Ten Mile Point. This area is on non-federal lands. Approximately 0.2 ha of critical habitat has been identified within this area.

Figure 13: Area (~ 4.3 ha) within which critical habitat for Bearded Owl-clover and Purple Sanicle is found at Glencoe Cove. This area is non-federal land. The area of critical habitat within this area is located within 75 metres of the coastline and includes approximately 0.6 ha. Critical habitat parcel 000_2 is bounded by the Glencoe Cove/Kwatsech Park property boundary.

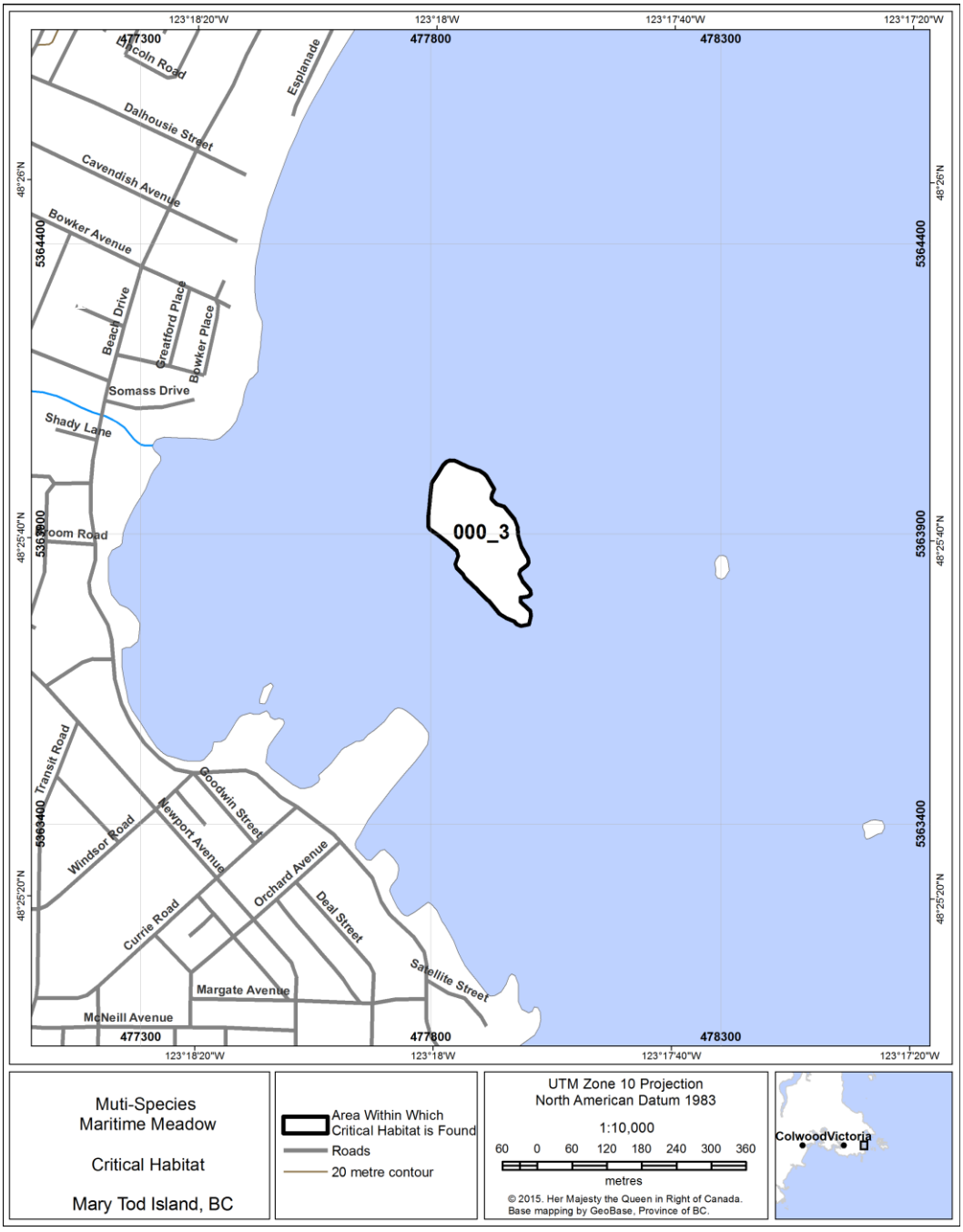

Figure 14: Area (~2.8 ha) within which critical habitat for Bearded Owl-clover and Bear's-foot Sanicle is found at Mary Tod Island. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.4 ha. Critical habitat parcel 000_3 is bounded by the coastline of Mary Tod Island.

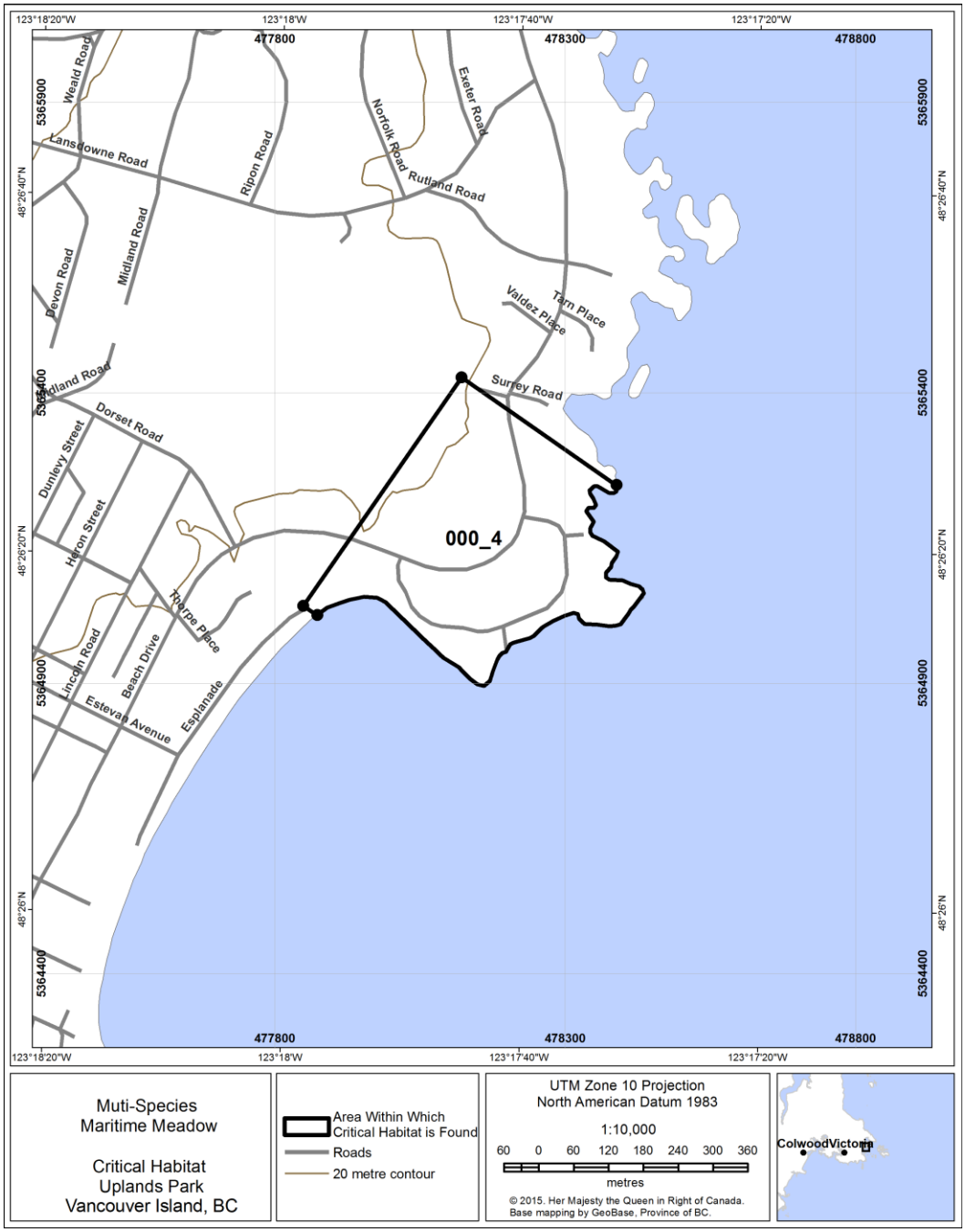

Figure 15: Area (~15.4 ha) within which critical habitat for Bearded Owl-clover and Purple Sanicle is found at Uplands Park/Cattle Point. This area is on non-federal lands. The area of critical habitat within this area is approximately 2.1 ha.

Figure 16: Area (~ 1.2 ha) within which critical habitat for Bear's-foot Sanicle is found at Saxe Point. This area is on non-federal land. The area of critical habitat within this area is approximately 0.7 ha.

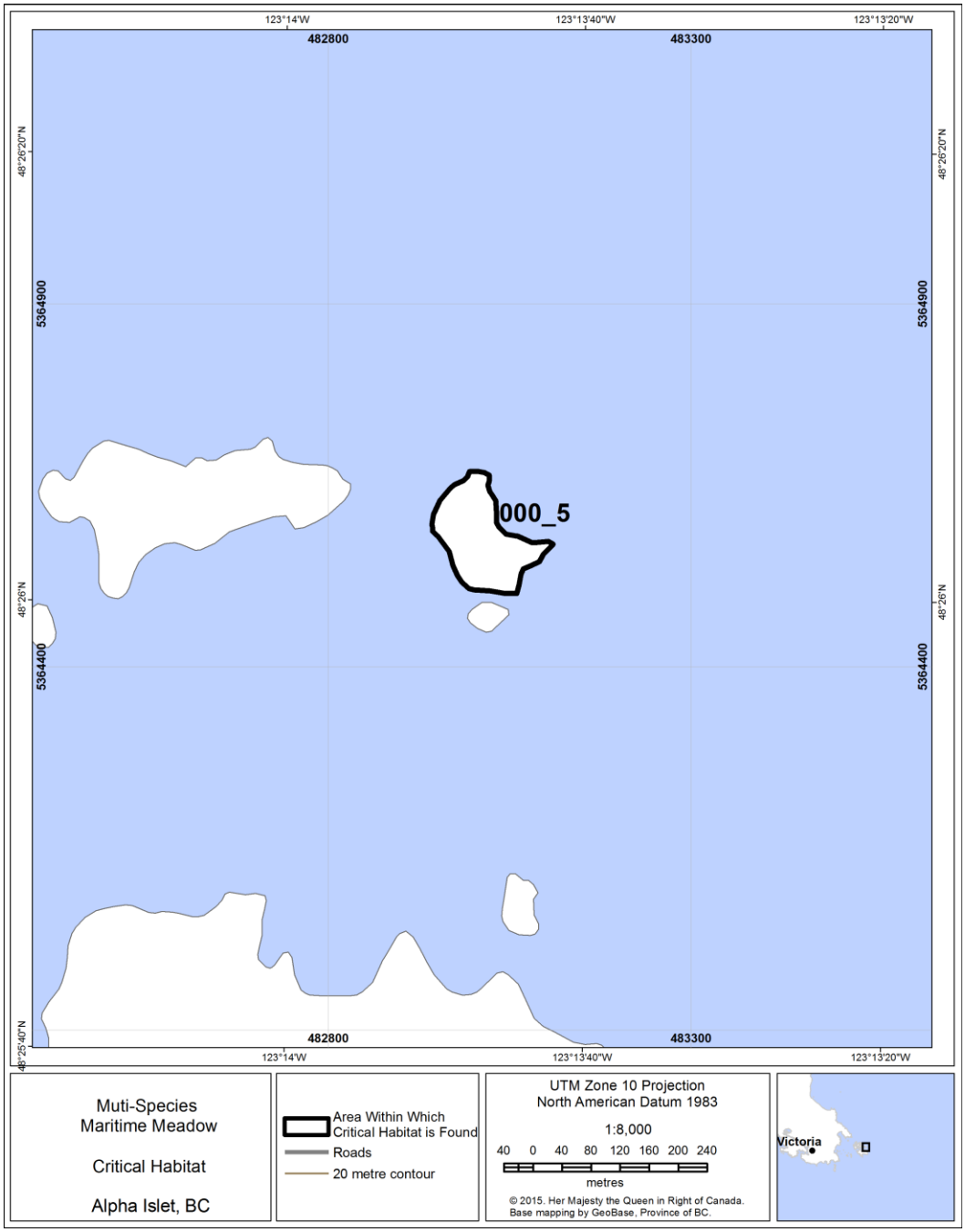

Figure 17: Area (~ 1.4 ha) within which critical habitat for Bear's-foot Sanicle, Coastal Scouler's Catchfly, Golden Paintbrush, and Purple Sanicle are found at Alpha Islet. This area is on non-federal land. The area of critical habitat within this area is approximately 0.4 ha. The critical habitat parcel 000_5 is bounded by the coastline of Alpha Islet.

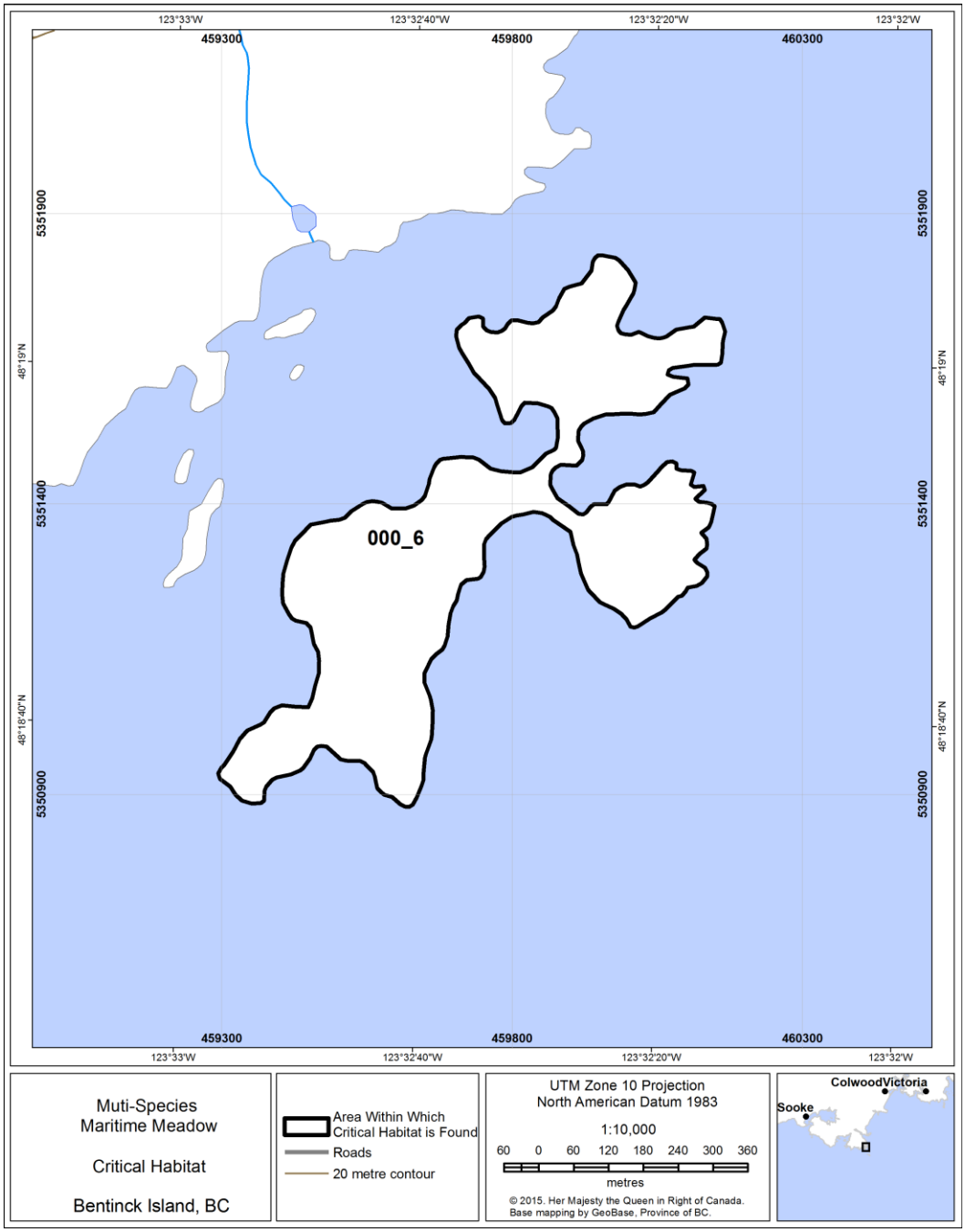

Figure 18: Area (~ 26.8 ha) within which critical habitat for Bear's-foot Sanicle and Seaside Bird's-foot Lotus is found at Bentinck Island. This area is on federal land. The area of critical habitat within this area is approximately 1.1 ha. The critical habitat parcel 000_6 is bounded by the coastline of Bentinck Island.

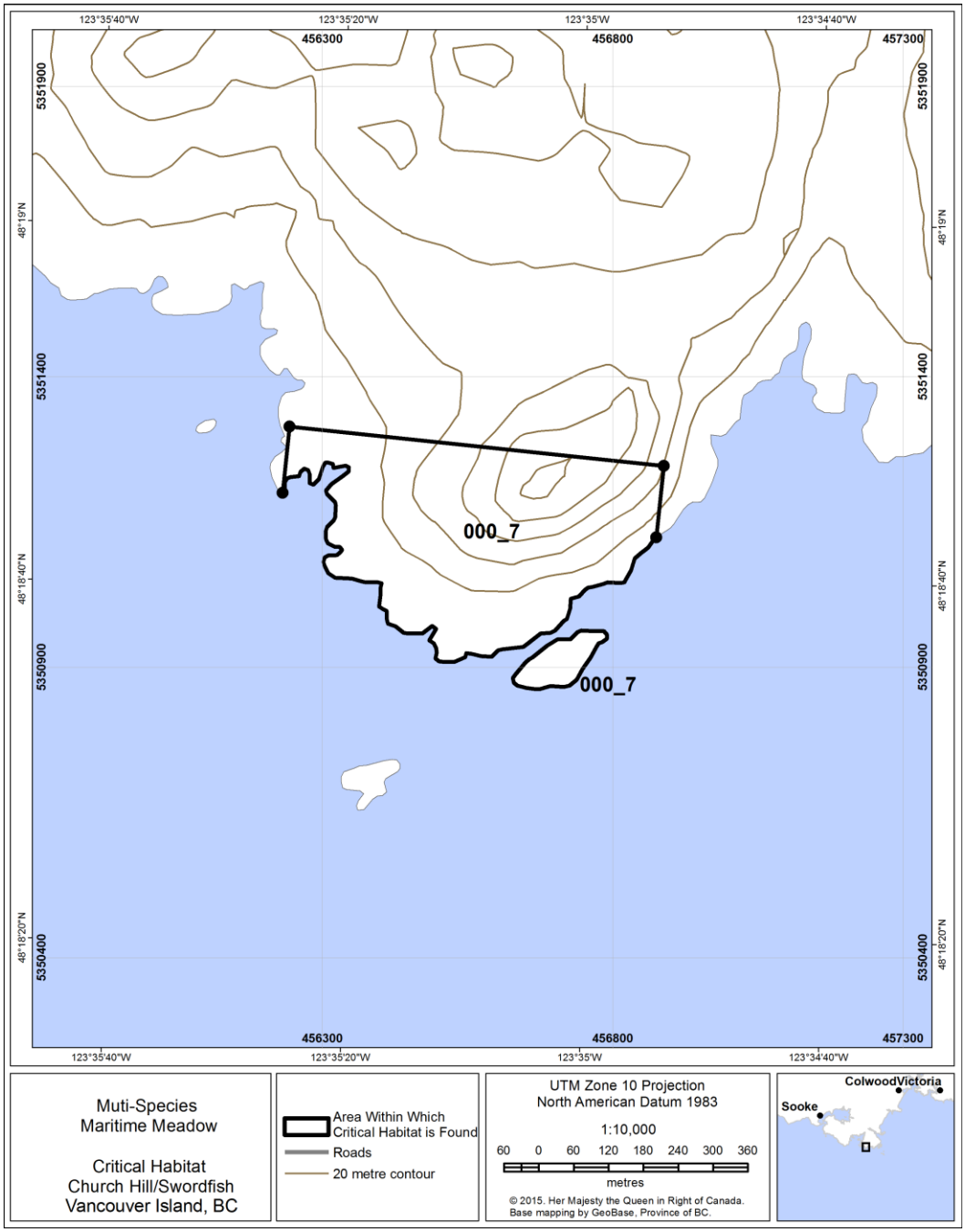

Figure 19: Area (~ 17.6 ha) within which critical habitat for Bear's-foot Sanicle and Seaside Bird's-foot Lotus is found at Church Point / Swordfish Island. This area is on federal land. The area of critical habitat within this area is approximately 1.7 ha.

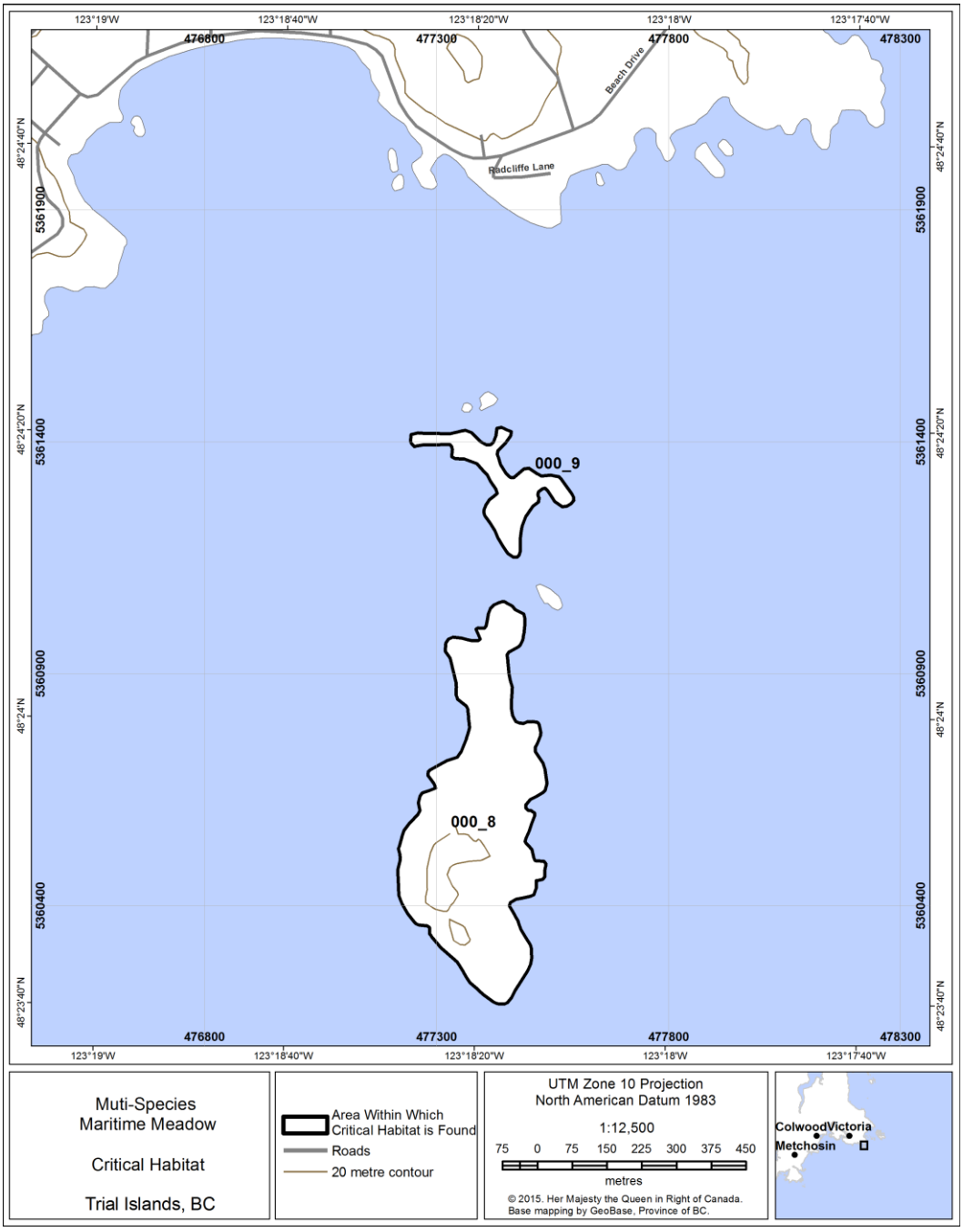

Figure 20: Area (~ 18.5 ha) within which critical habitat for Bear's-foot Sanicle, Coastal Scouler's Catchfly, Golden Paintbrush, Purple Sanicle, and Seaside Bird's-foot Lotus are found at Trial Islands. The area of critical habitat within this area for all species is approximately 10.7 ha with approximately 1.9 ha on federal land and approximately 8.8 ha on non-federal land. The critical habitat parcel 000_8 is bounded by the coastline of Trial Island and the critical habitat parcel 000_9 is bounded by the coastline of Little Trial Island (UTM Zone10, NAD1983, North Azimuth).

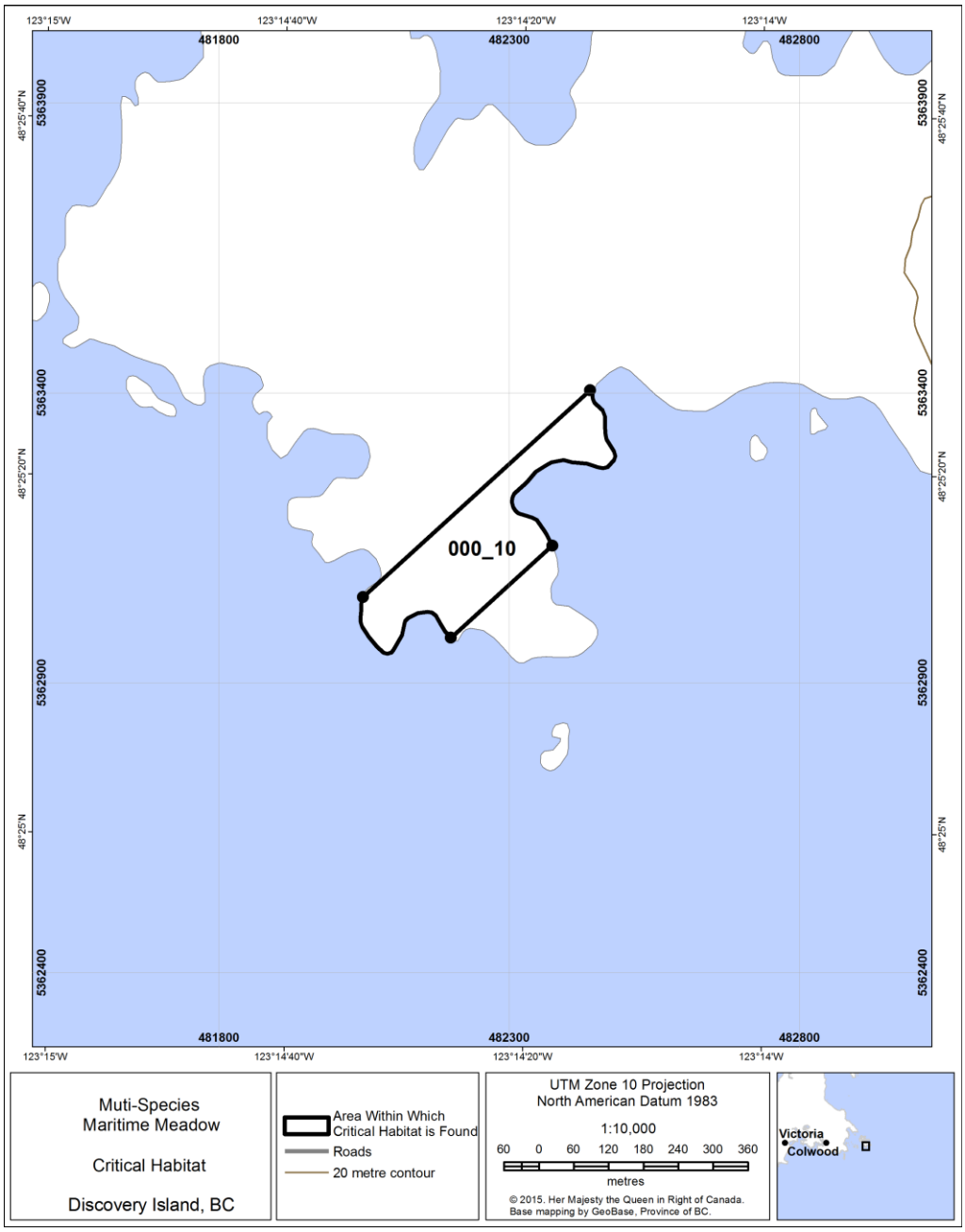

Figure 21: Area (~ 6.0 ha) within which critical habitat for Bear's-foot Sanicle and Purple Sanicle are found at Discovery Island. This area is on non-federal land. The area of critical habitat within this area is approximately 0.4 ha.

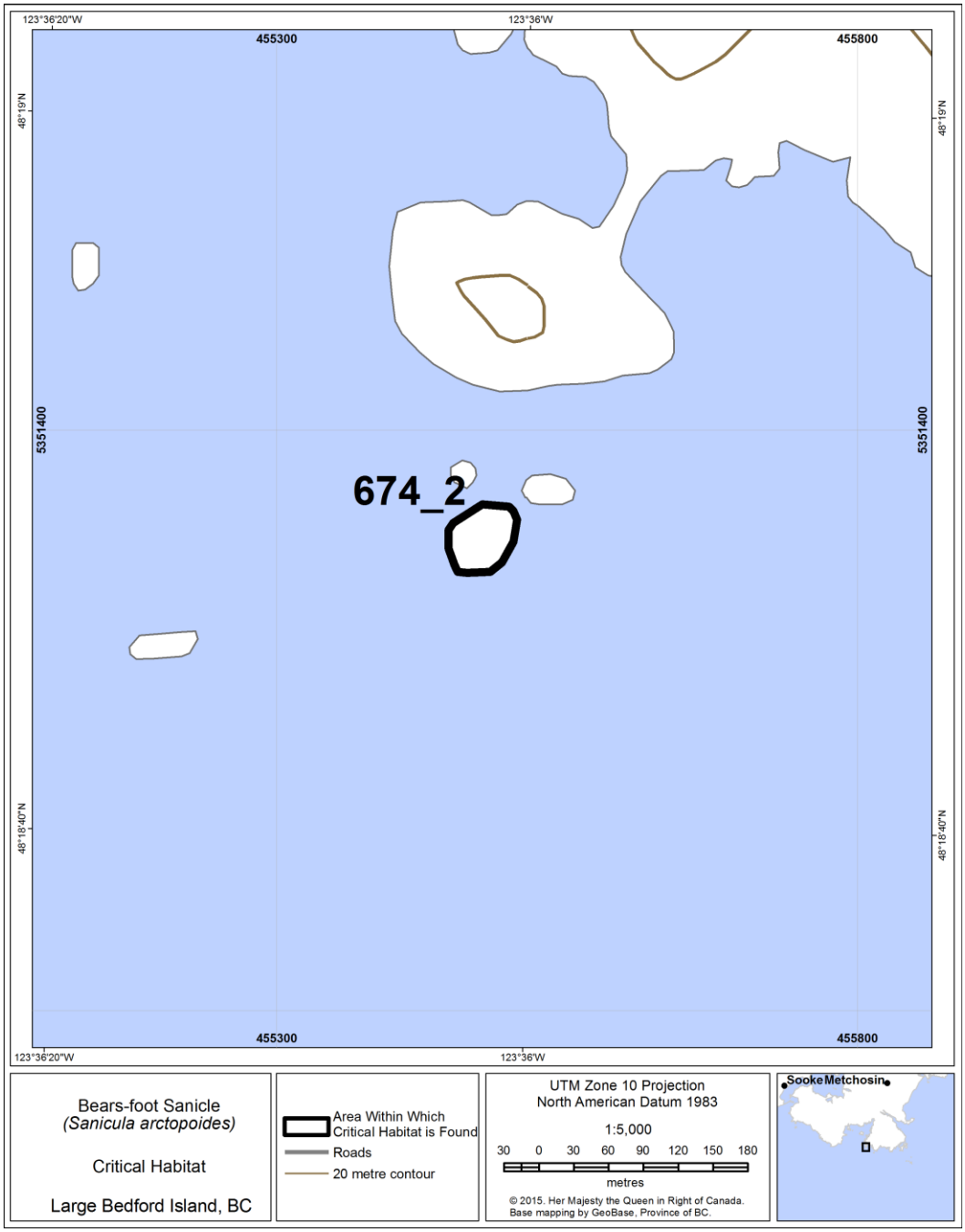

Figure 22: Area (~0.3 ha) within which critical habitat for Bear's-foot Sanicle is found on Large Bedford Island. This area is on federal land. The area of critical habitat within this area is approximately 0.05 ha. The critical habitat parcel 674_2 is bounded by the coastline of Large Bedford Island.

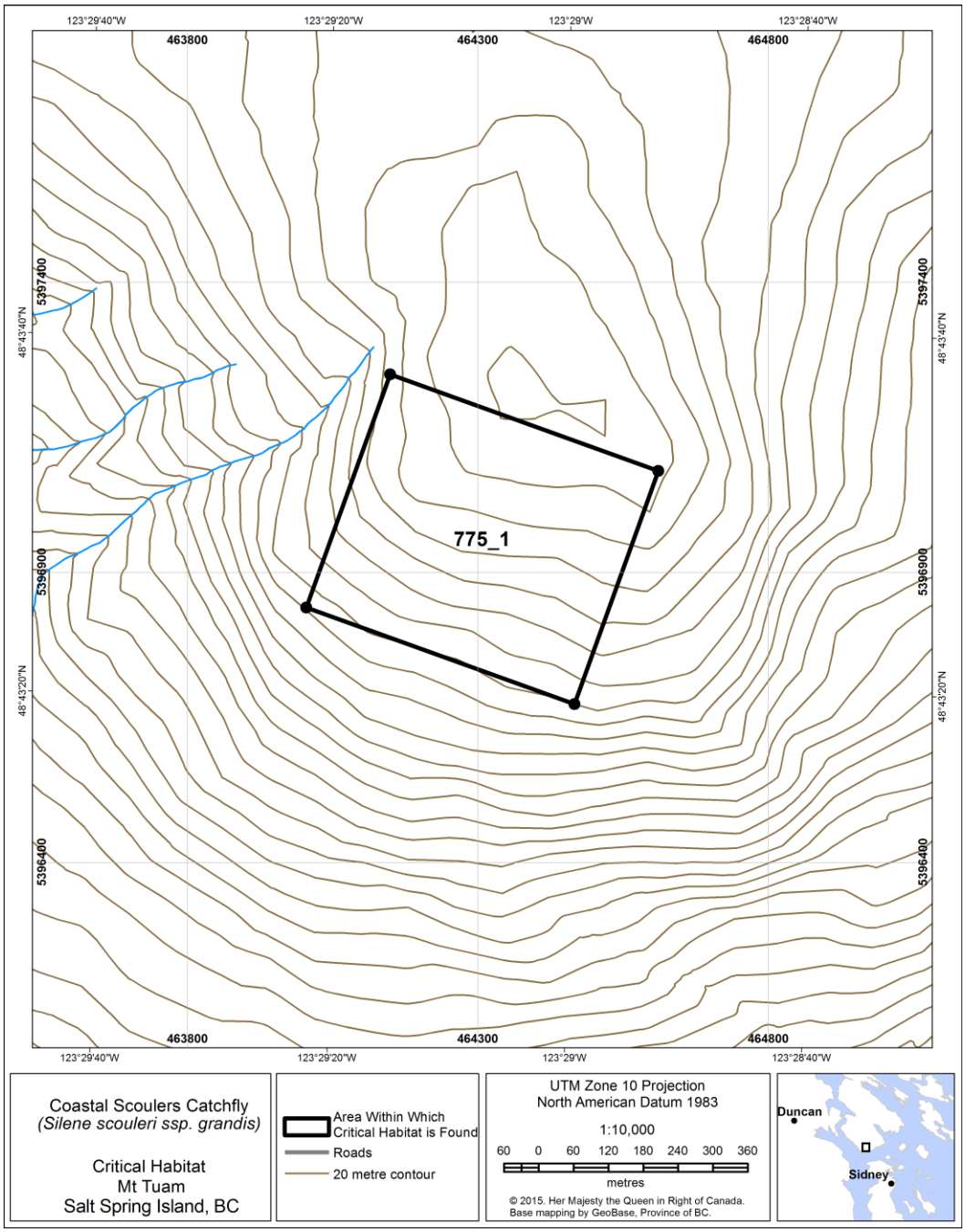

Figure 23: Area (~ 20.9 ha) within which critical habitat for Coastal Scouler's Catchfly is found at Mt. Tuam. The area of critical habitat within this area is approximately 5.6 ha with approximately 1.3 ha on federal land and approximately 4.3 ha on non-federal land.

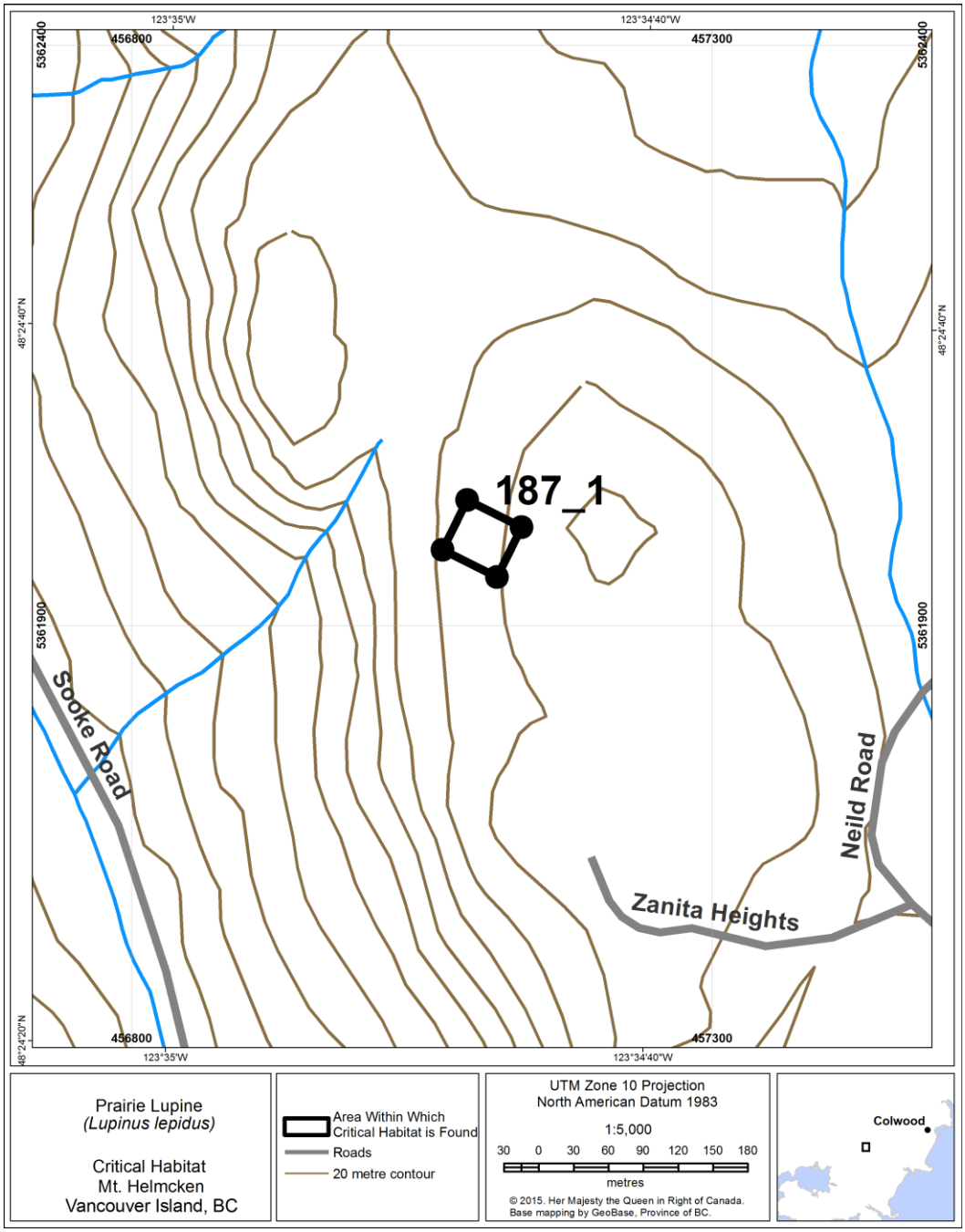

Figure 24: Area (~0.3 ha) within which critical habitat for Prairie Lupine is found at Mount Helmcken. This area is on non-federal land. The area of critical habitat within this area is approximately 0.02 ha.

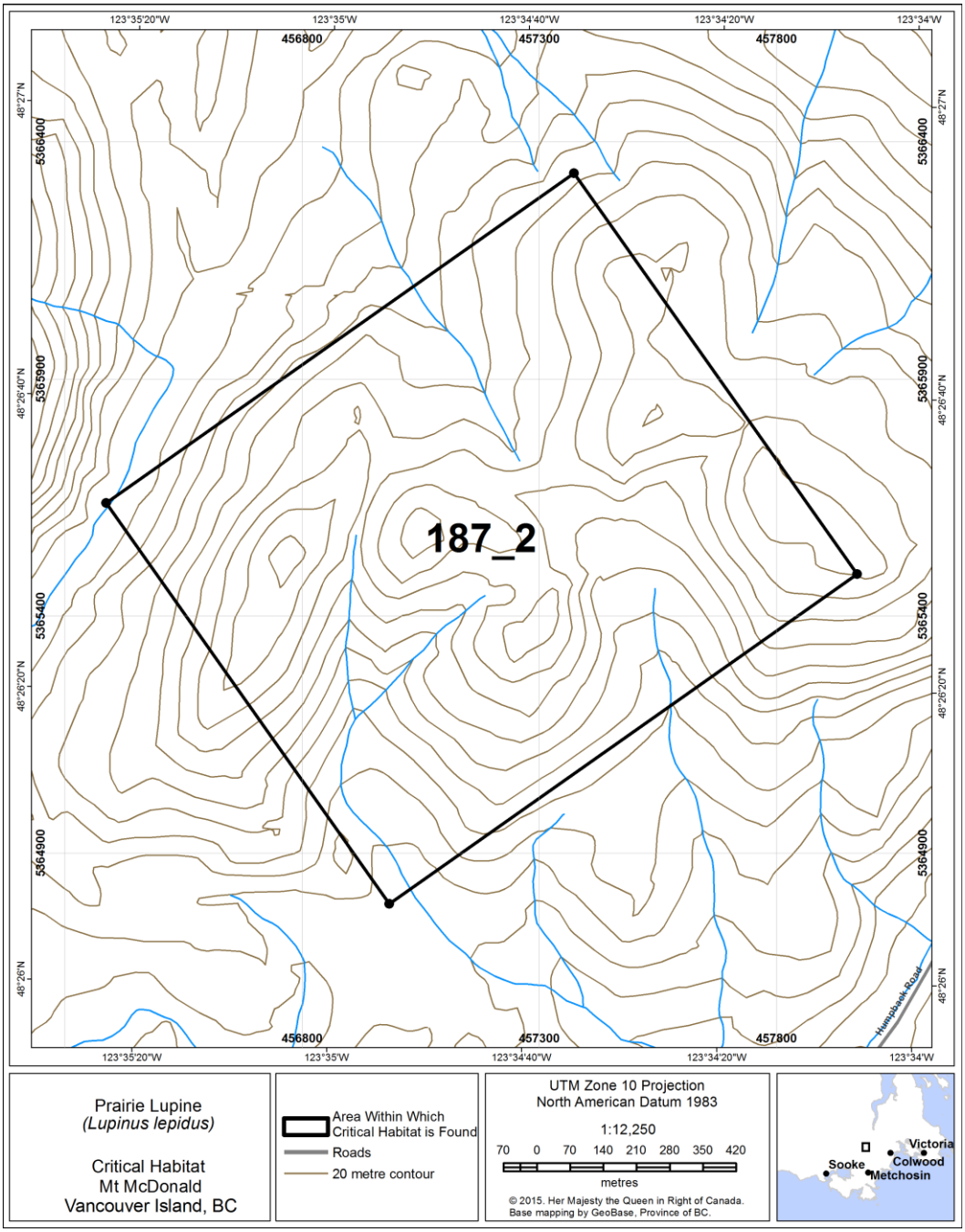

Figure 25: Area (~ 124.9 ha) within which critical habitat for Prairie Lupine is found at Mount McDonald. This area is on non-federal land. The area of critical habitat within this area is approximately 6.02 ha.

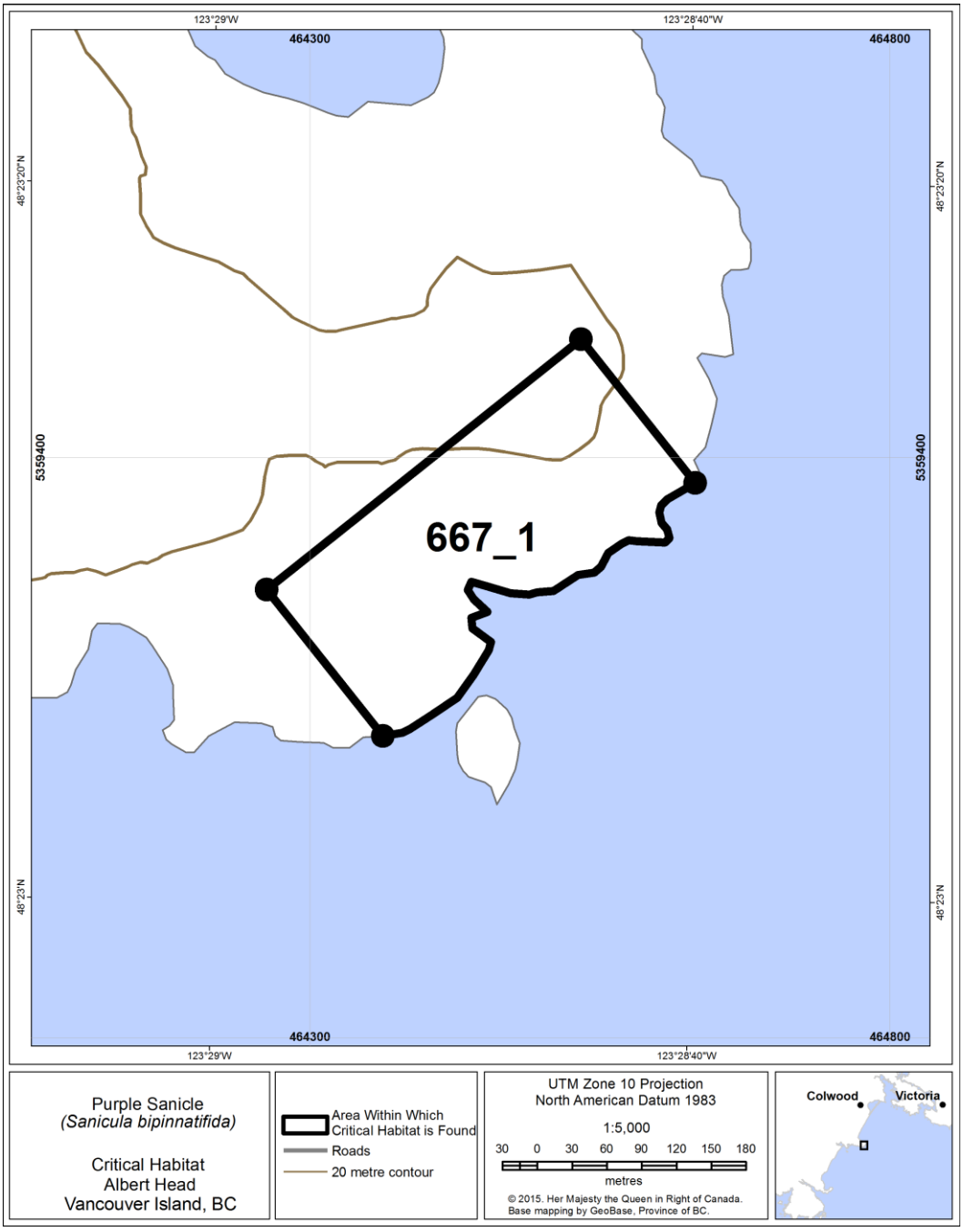

Figure 26: Area (~ 5.5 ha) within which critical habitat for Purple Sanicle is found at Albert Head. This area is on federal land. The area of critical habitat within this area is approximately 2.4 ha.

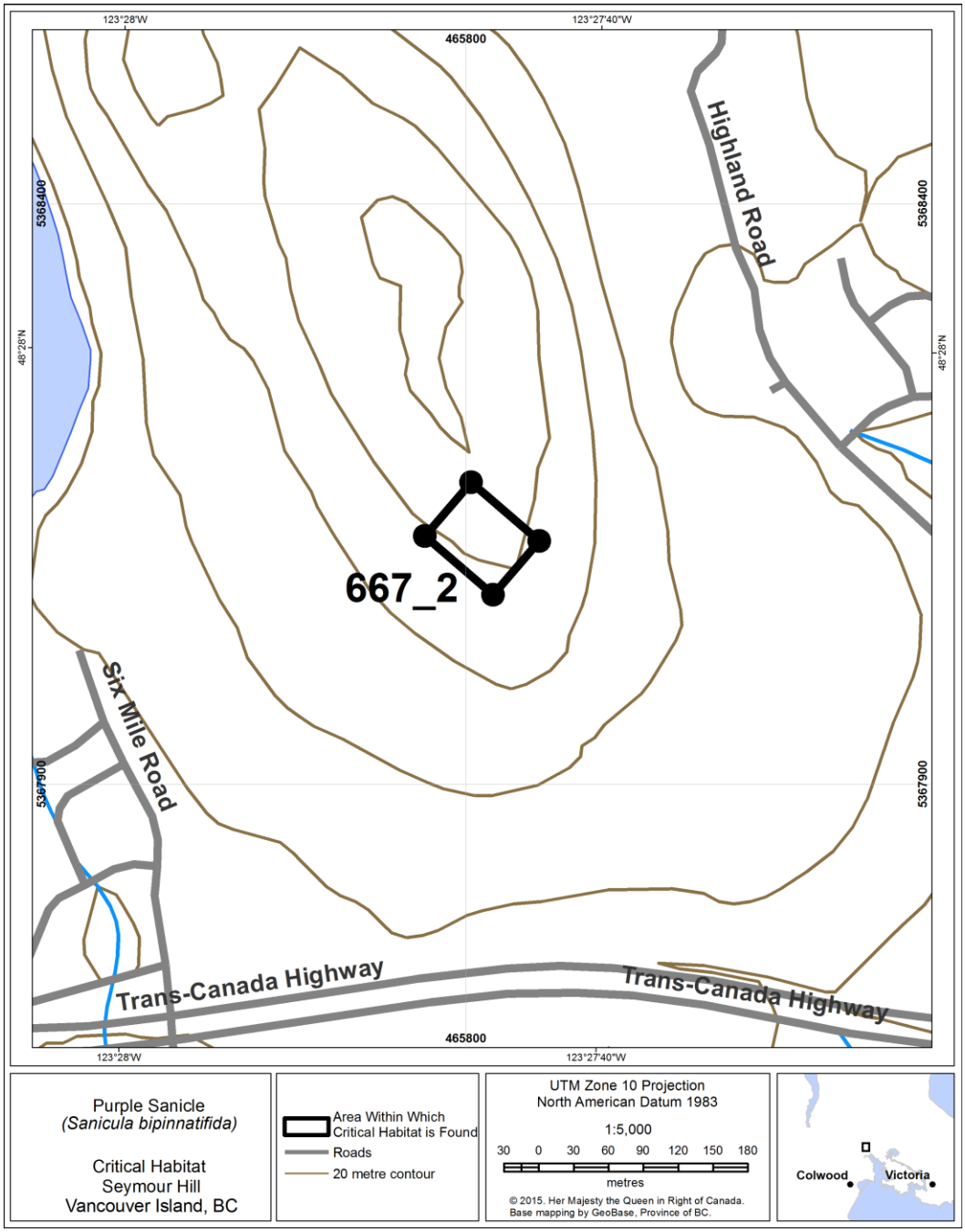

Figure 27: Area (~ 0.5 ha) within which critical habitat for Purple Sanicle is found at Seymour Hill. This area is on non-federal land. The area of critical habitat within this area is approximately 0.1 ha.

Figure 28: (~ 2 ha) within which critical habitat for Purple Sanicle is found at Holland Point. This area is on non-federal land. The area of critical habitat within this area is approximately 0.3 ha.

Figure 29: Area (~ 1.4 ha) within which critical habitat for Purple Sanicle is found at Beacon Hill Park. This area is on non-federal land. The area of critical habitat within this area is approximately 0.6 ha.

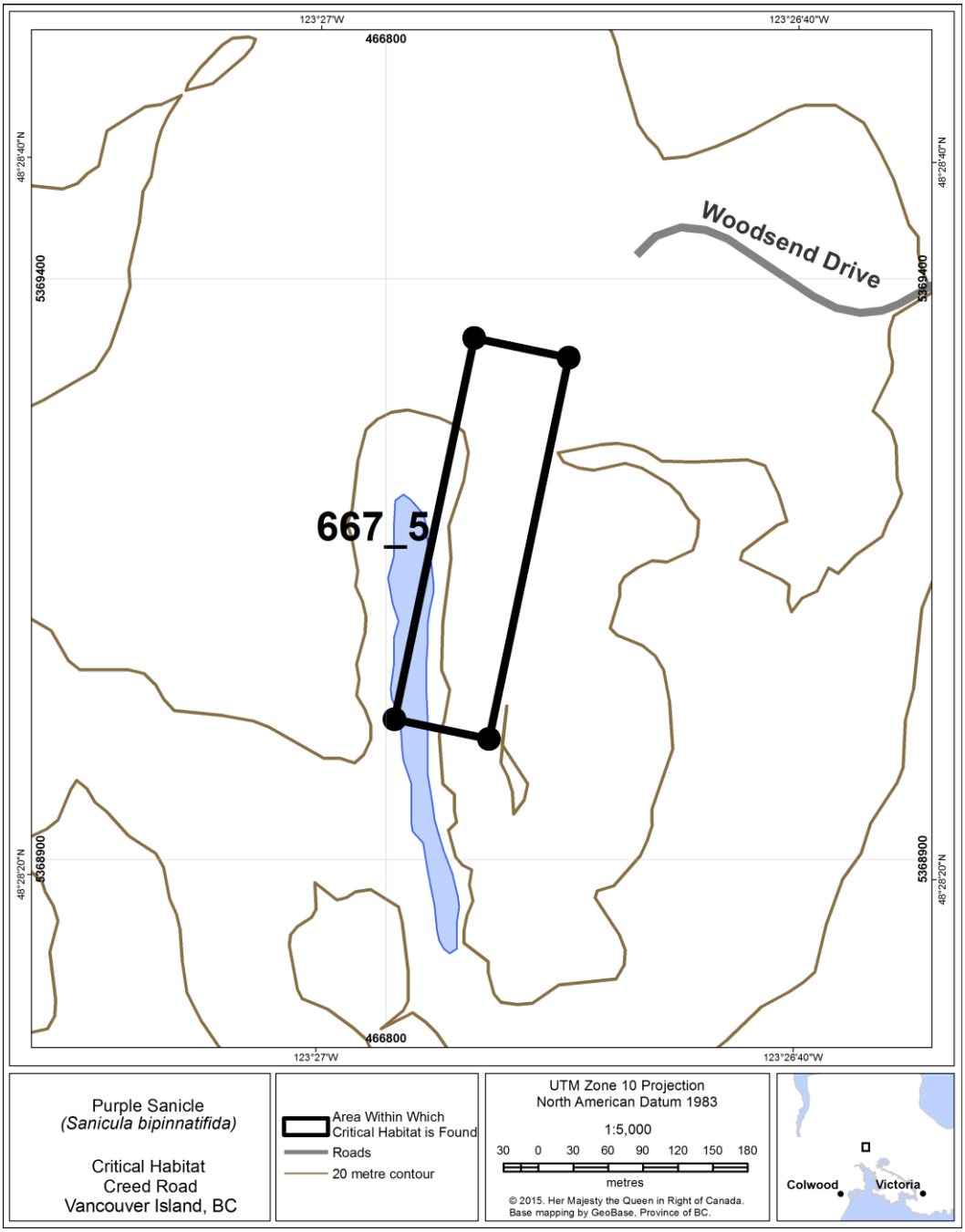

Figure 30: Area (~ 2.8 ha) within which critical habitat for Purple Sanicle is found at Creed Rd. This area is on non-federal land. The area of critical habitat within this area is approximately 0.4 ha.

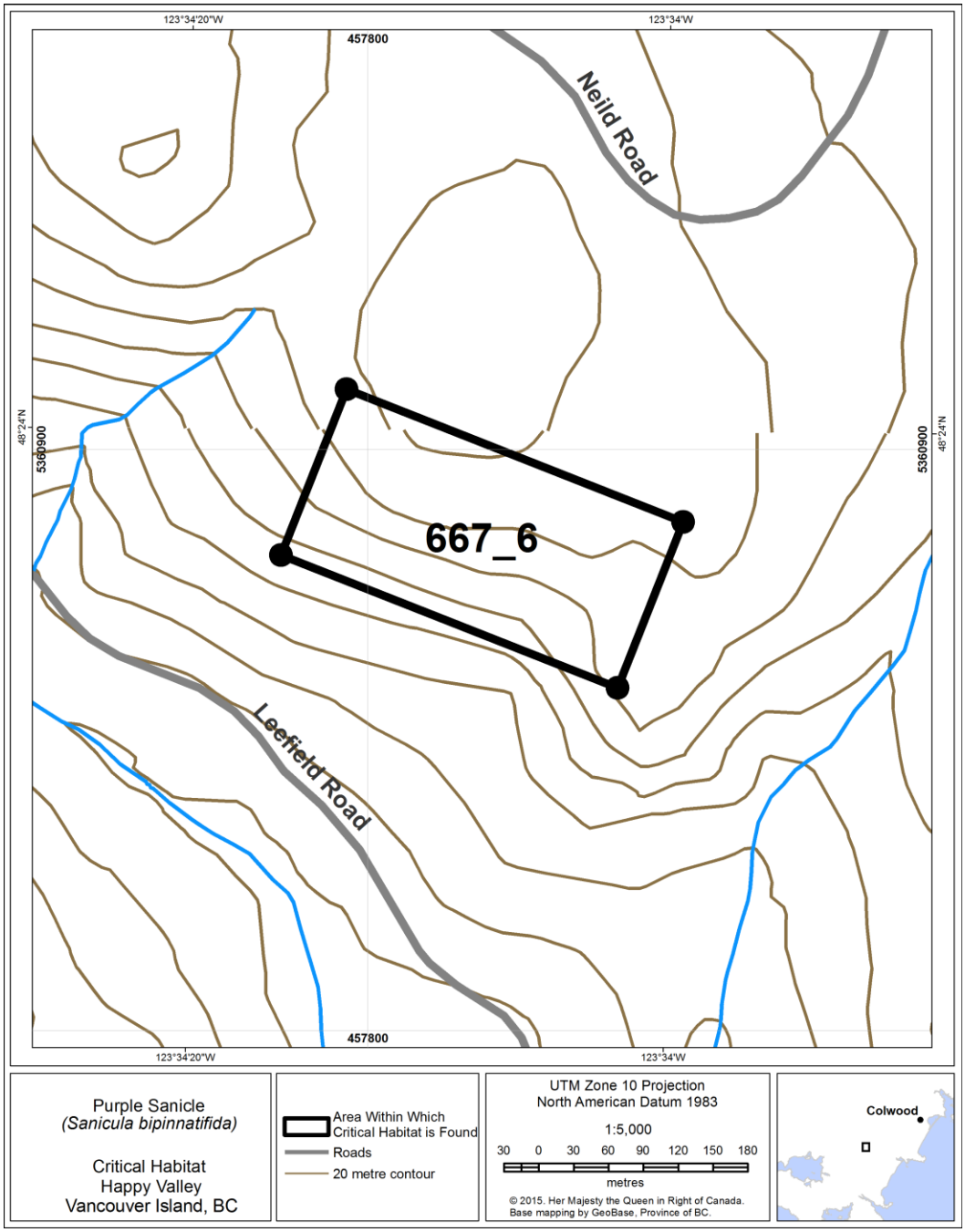

Figure 31: Area (~4.8 ha) within which critical habitat for Purple Sanicle is found at Happy Valley. This area is on non-federal land. The area of critical habitat within this area is approximately 1.7 ha.

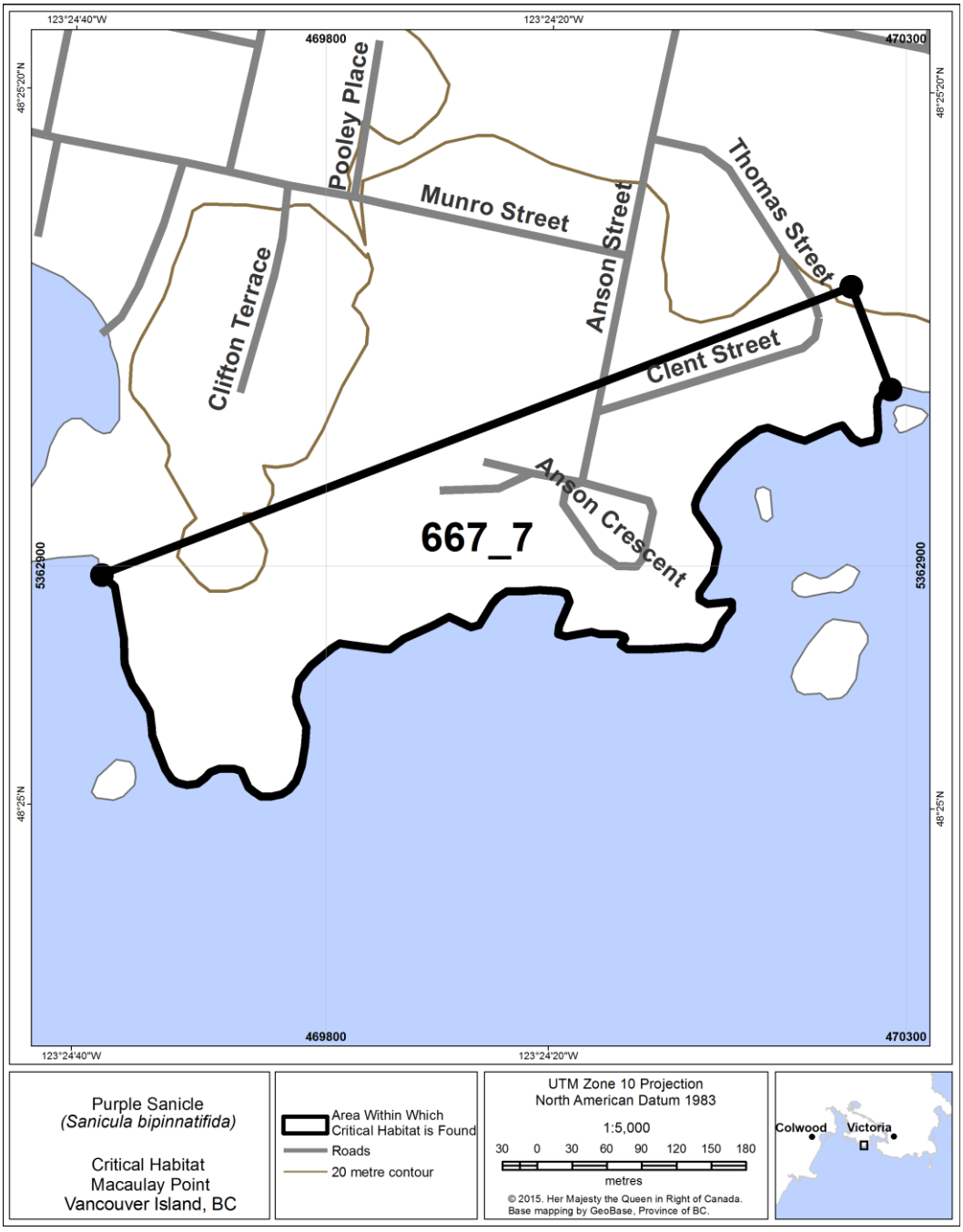

Figure 32: Area (~ 15.8 ha) within which critical habitat for Purple Sanicle is found at Macaulay Point. This area includes properties on both federal and non-federal lands. The area of critical habitat within this area is approximately 1.0 ha.

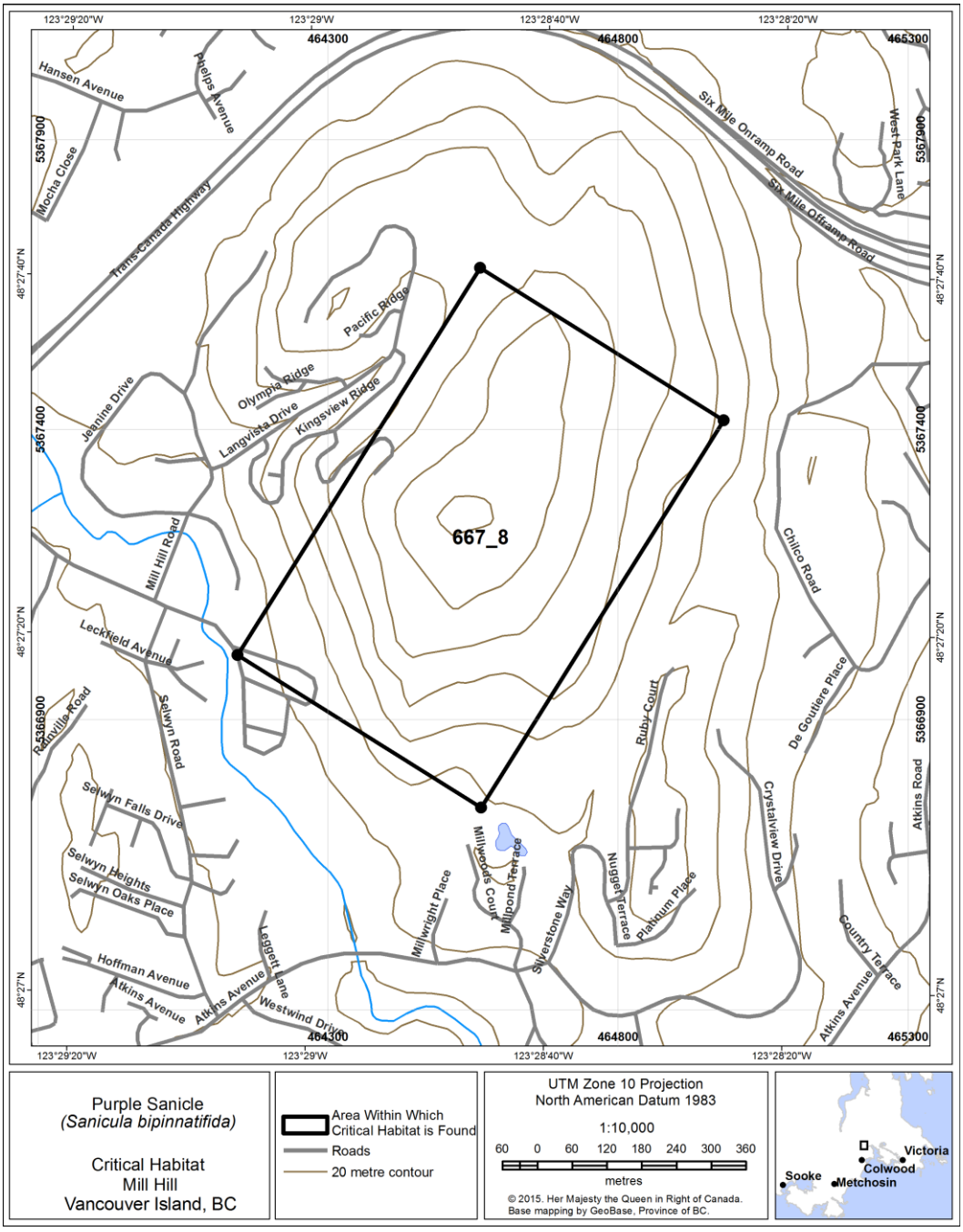

Figure 33: Area (~ 39.1 ha) within which critical habitat for Purple Sanicle is found at Mill Hill. This area is on non-federal land. The area of critical habitat within this area is approximately 9.5 ha.

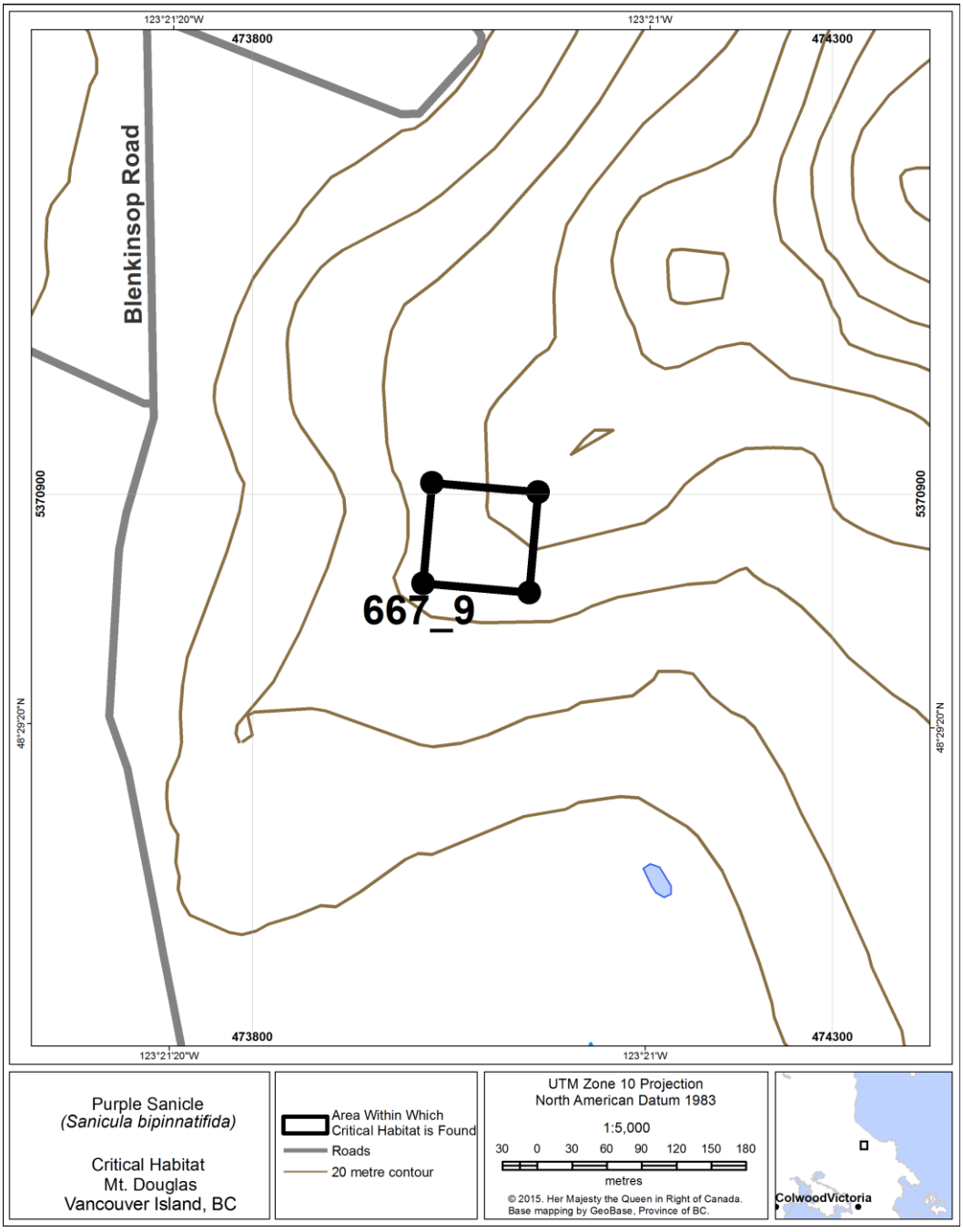

Figure 34: Area (~0.8 ha) within which critical habitat for Purple Sanicle is found at Mount Douglas Park. This area is on non-federal land. The area of critical habitat within this area is approximately 0.3 ha.

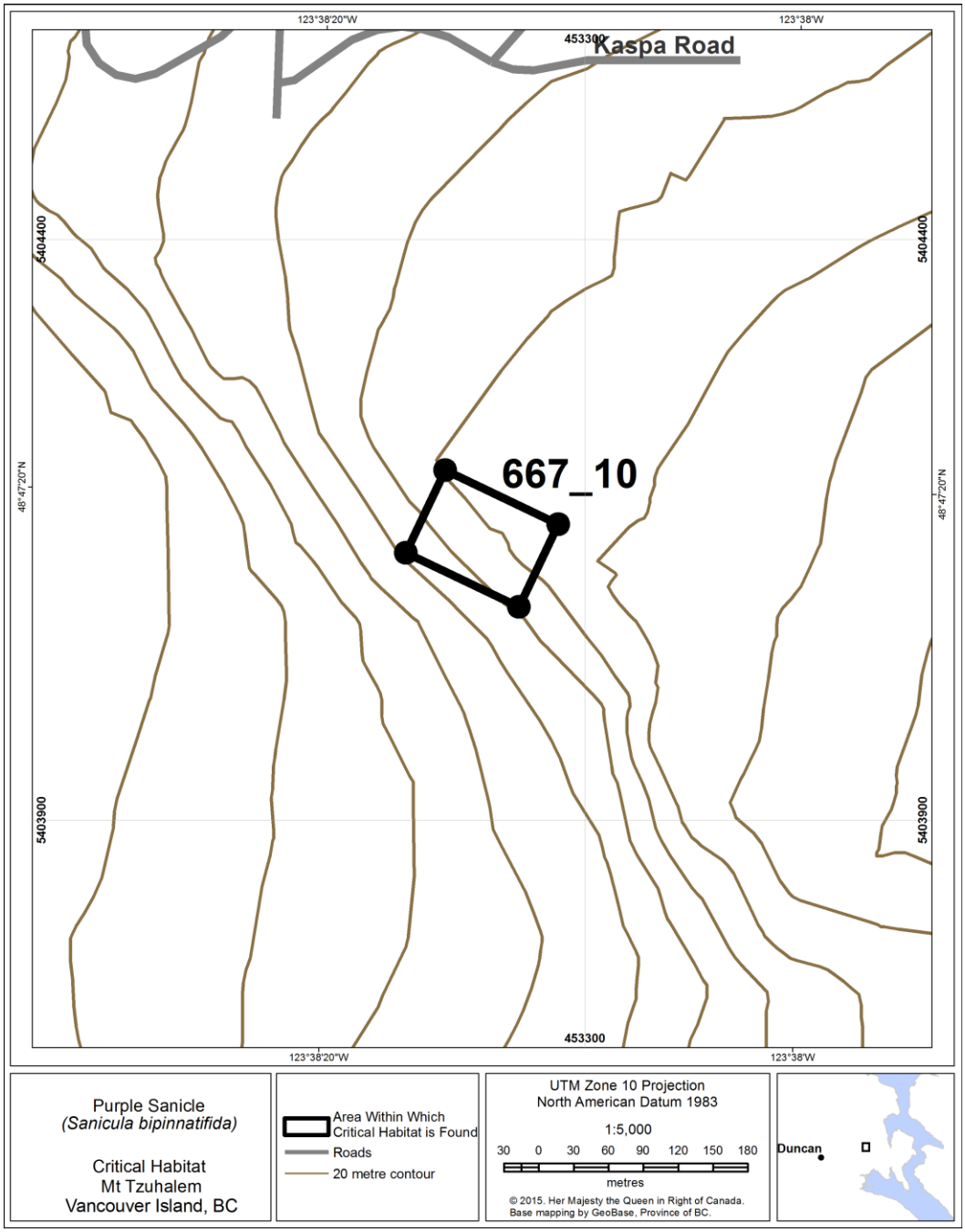

Figure 35: Area (~ 0.9 ha) within which critical habitat for Purple Sanicle is found at Mount Tzuhalem. This area is on non-federal land. The area of critical habitat within this area is approximately 0.3 ha.

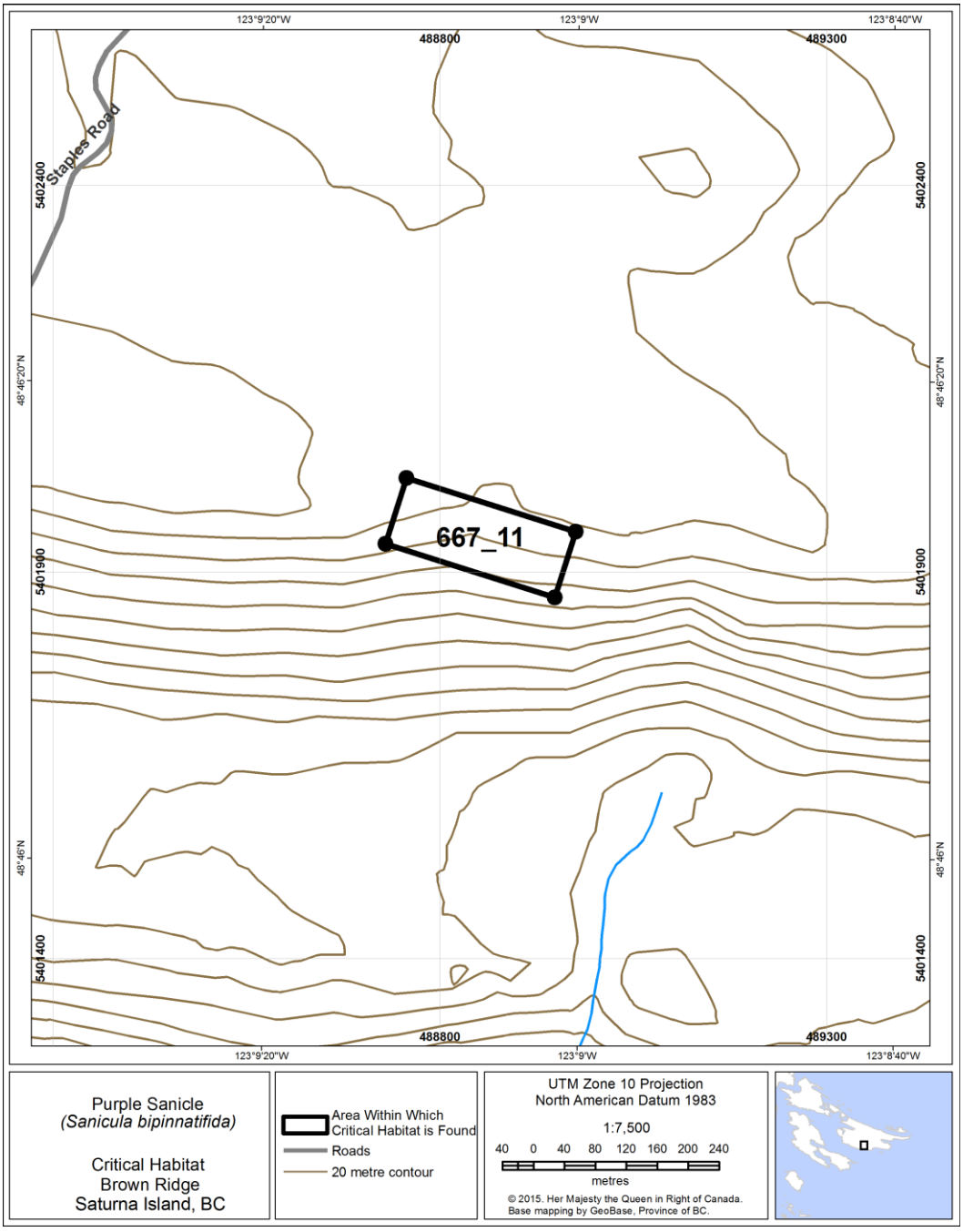

Figure 36: Area (~ 2.0 ha) within which critical habitat for Purple Sanicle is found at Brown Ridge. This area is on non-federal lands. The area of critical habitat within this area is approximately 0.6 ha.

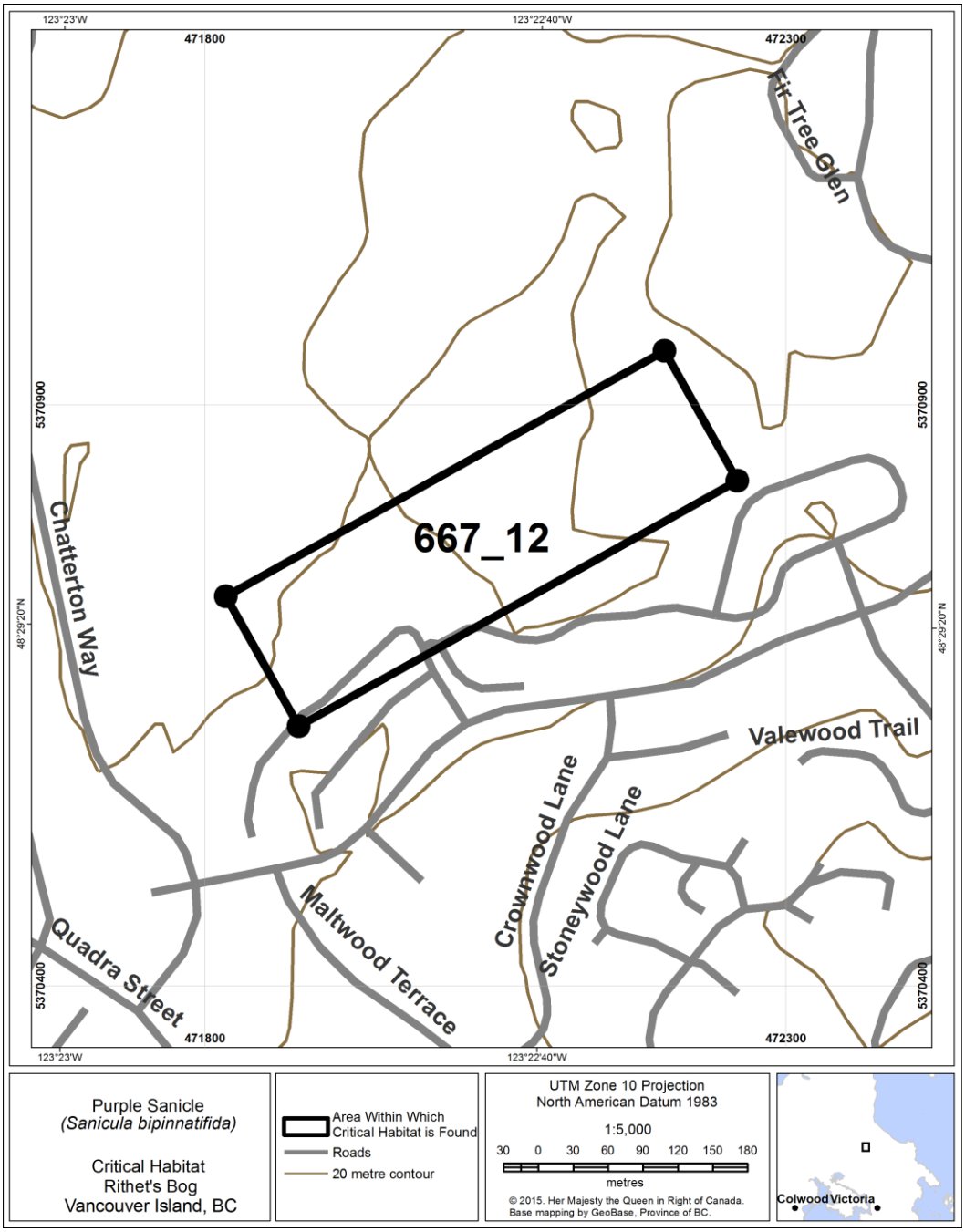

Figure 37: Area (~ 5.5 ha) within which critical habitat for Purple Sanicle is found at Rithet's Bog Conservation Area. This area is on non-federal land. The area of critical habitat within this area is approximately 0.4 ha.

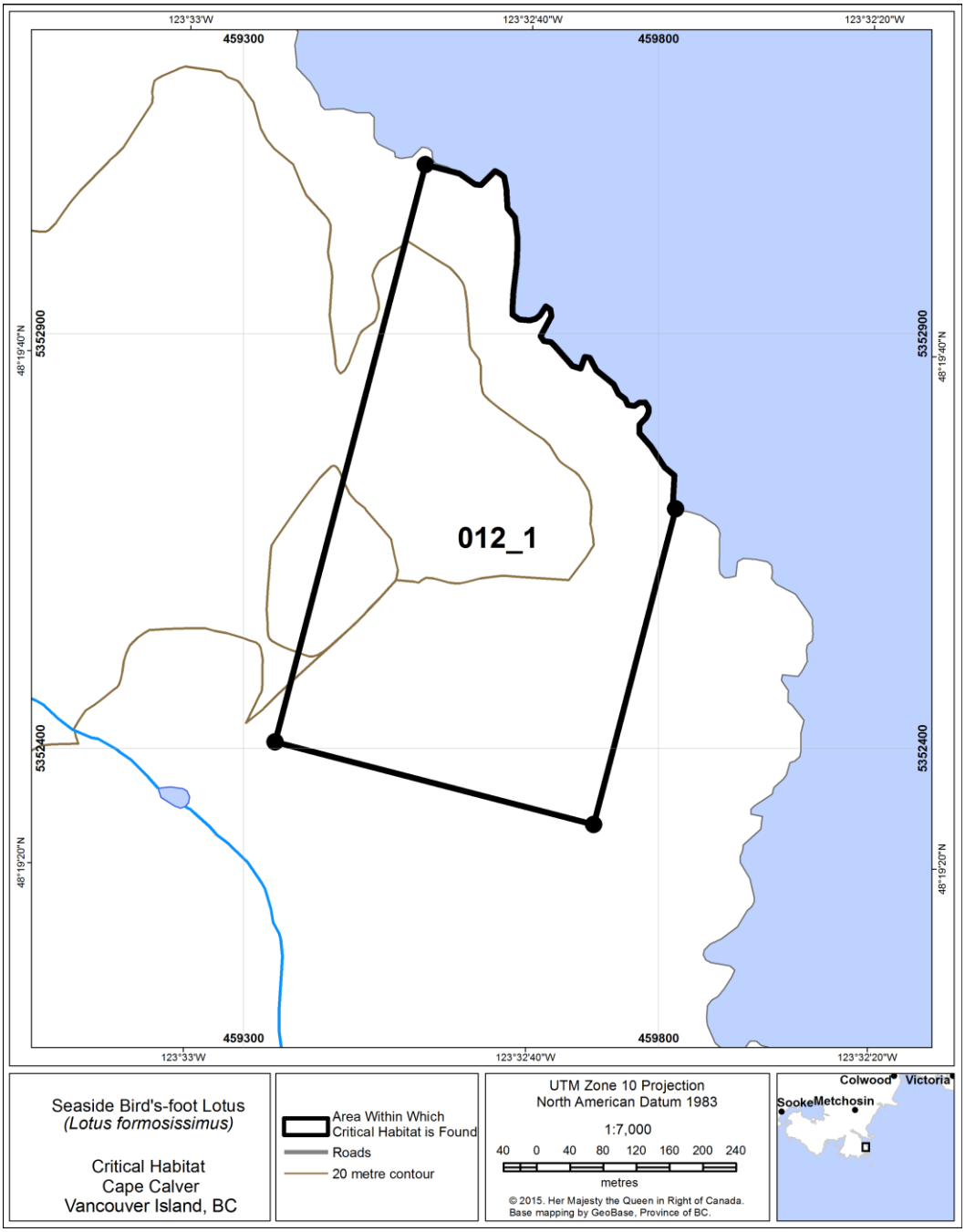

Figure 38: Area (~ 23.1 ha) within which critical habitat for Seaside Bird's-foot Lotus is found at Cape Calver. This area is on federal land. The area of critical habitat within this area is approximately 3.2 ha.

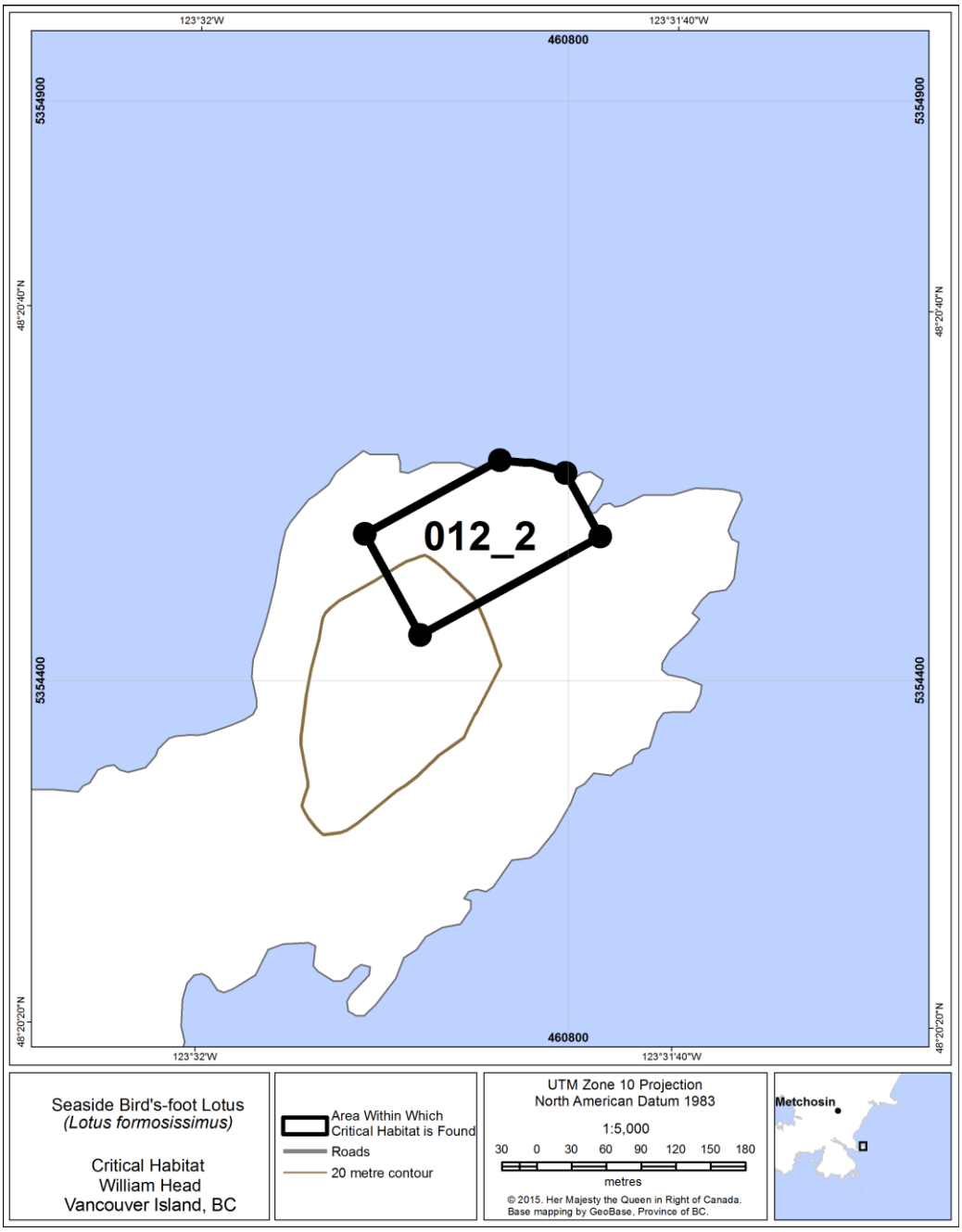

Figure 39: Area (~ 1.7 ha) within which critical habitat for Seaside Bird's-foot Lotus is found at William Head. This area is on federal land. The area of critical habitat within this area is approximately 0.8 ha.

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

Examples of activities likely to destroy critical habitat are provided below for Taylor's Checkerspot (Table 10) and the plant species (Table 11). Destruction of critical habitat will result if any part of the critical habitat is degraded, either permanently or temporarily, such that it

cannot serve its function when needed by the species. Destruction may result from one or more activities, at a single point in time or cumulative activities over time. It is important to note that some activities have the potential to destroy critical habitat from outside the 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 10: Examples of activities likely to result in the destruction of critical habitat for Taylor's Checkerspot on Denman Island

Activity	Effect of activity on critical habitat
Urban and rural development (e.g., vegetation removal, site clearing and levelling, soil removal or deposition, construction of physical structures such as buildings).	This activity can cause direct land conversion resulting in the loss of critical habitat attributes such that the habitat is not able to support egg laying, larval feeding, adult feeding, and refuge.
Intensive recreational use (e.g., vehicle use, foot traffic, and horseback riding).	This activity is likely to result in physical damage to or destruction of host plant patches and adult nectar plants. Repeated trampling can result in physical damage to or destruction of host plants causing loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, adult feeding, and refuge. These activities can also result in compaction or disturbance of the ground near the host plant. This may affect both the surrounding substrate or the host plant, or both causing loss of biological functions such as egg laying, larval feeding, larval refuge, larval hibernation, pupation, adult feeding, and refuge.
Road construction and maintenance activities (e.g., ditching, grading, infilling, culvert installation).	These activities are likely to alter the moisture regime which will reduce the ability of the substrate to support host plants, some of which depend on open, seasonally wet areas as habitat. Activities which alter natural drainage patterns and soil moisture regimes could result in loss of habitat for larval host plants and adult nectar sources, causing loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, adult feeding, and refuge. Types of disturbances which may alter hydrology include road building. These activities can also result in compaction or disturbance of the ground near the host plant (see *intensive recreational use* for effects).
Livestock grazing and introduction of herbivores.	Intensive domestic livestock grazing is likely to result in loss or degradation of biophysical attributes of critical habitat causing loss of biophysical attributes of critical habitat such that the habitat is not able to support egg laying, larval feeding, adult feeding, and refuge. These activities can also result in compaction or disturbance of the ground near the host plant (see intensive *recreational use* for effects).

Activity	Effect of activity on critical habitat
Landscape maintenance activities (e.g., digging -- installation of park benches, picnic tables, signs, fencing, establishment of garden beds development and maintenance or modification of trails --, stockpiling of materials, transport of heavy materials, bank stabilization).	These activities can result in loss of biophysical attributes of critical habitat that are essential to the survival and recovery to Taylor's Checkerspot. Planting or introduction of plants can cause interspecies competition causing loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, larval refuge, larval hibernation, pupation, adult feeding, and refuge. Digging can result in compaction or disturbance of the ground near the host plant. This may affect the surrounding substrate or the host plant, or both causing loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, larval refuge, larval hibernation, pupation, adult feeding, and refuge. Herbicide application can result in loss or degradation of the host plant causing loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, adult feeding, and refuge
Harvesting (including removal of host plants).	This activity can result in destruction of host plants either by direct take or incidental damage resulting in loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, adult feeding, and refuge.
Deposition of fertilizers or waste materials.	These activities are likely to alter soil conditions supporting host plants, resulting loss of biophysical attributes of critical habitat such that the habitat is not able to provide for egg laying, larval feeding, larval refuge, larval hibernation, pupation, adult feeding, and refuge.

Table 11: Examples of activities likely to result in the destruction of critical habitat for the plant species.

Activity	Effect of activity on critical habitat	Most likely Affected Species[5]	Most likely population
Urban and rural development (e.g., vegetation removal, site 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 dispersion of GOE maritime meadow species to new sites	BOC	Ten Mile Point

5 BOC= Bearded Owl-clover, BFS=Bear's-foot Sanicle, CSC=Coastal Scouler's Catchfly, GP=Golden Paintbrush, PL=Prairie Lupine, PS=Purple Sanicle, SBL=Seaside Bird's-foot Lotus.

Activity	Effect of activity on critical habitat	Most likely Affected Species[6]	Most likely population
Intensive recreational use (e.g., vehicle use, walking, dog walking)[7]	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, texture, or light availability. 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 soil nutrients that provide necessary habitat conditions. In addition, this activity is likely to introduce and/or increase the spread of invasive alien plant species. These will compete with native species and alter the availability of light, water, and nutrients in the habitat, such that the habitat would not provide the necessary habitat conditions required by these species.	BOC	Harling Point, Ten Mile Point, Uplands Park/Cattle Point, Mary Tod Island, Glencoe Cove
		BFS	Harling Point, Mary Tod Island
		CSC	Trial Islands, Mount Tuam
		GP	Trial Islands
		PL	Mount McDonald, Mount Helmcken
		PS	Mill Hill, Seymour Hill, Uplands Park/Cattle Point, Brown Ridge, Trial Islands, Macaulay Point, Glencoe Cove, Happy Valley, Creed Rd., Mount Douglas
		SBL	Trial Islands, Bentinck Island
Road construction and maintenance activities (e.g., ditching, grading, infilling, culvert installation)	Alteration of hydrological regime could lead to changes in the ability of the site to capture water. For instance, a decrease in late season water capture 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. In addition, this activity is likely to introduce invasive alien plant species and negatively affect the native species diversity (Lilley and Velland 2009), resulting in the destruction of the habitat by altering the species composition. See damaging recreational use for effects of invasive alien plant species.	BOC	10 Mile Point
		PL	Mount McDonald

[6] BOC= Bearded Owl-clover, BFS=Bear's-foot Sanicle, CSC=Coastal Scouler's Catchfly, GP=Golden Paintbrush, PL=Prairie Lupine, PS=Purple Sanicle, SBL=Seaside Bird's-foot Lotus.

[7] At this time it is understood that some level of light recreation is compatible with the habitat, however, thresholds for what level of intensity becomes damaging are unknown at this time. If the population size and/or availability of attributes show a decline at any given site, this would indicate that the habitat (and associated recreational/use regime) does not support the recovery of the species.

Activity	Effect of activity on critical habitat	Most likely Affected Species[8]	Most likely population
Landscape maintenance activities (e.g., digging -- installation of park benches, picnic tables, signs, fencing, establishment of garden beds development and maintenance or modification of trails --, stockpiling of materials, transport of heavy materials, bank stabilization)	These activities can cause direct land conversion, soil compaction and associated hydrological effects, and alter 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 invasive alien plant species (e.g., intentional plantings or accidental introductions such as facilitated by unclean machinery- see recreational use for effect of invasive alien plant species). Bank stabilization at Cattle Point would probably be detrimental as it would lead to thicker vegetation which would disrupt the nature of the minimum canopy opening.	BOC	Saxe Pt., Trial Islands, Ten Mile Point, Uplands Park/Cattle Point, Gonzales Point, Glencoe Cove, Harling Point
		BFS	Trial Islands, Saxe Point, Harling Point
		CSC	Trial Islands
		GP	Trial Islands
		PS	Trial Islands, Creed Road
		SBL	Trial Islands
		PS	Brown Ridge

8 BOC= Bearded Owl-clover, BFS=Bear's-foot Sanicle, CSC=Coastal Scouler's Catchfly, GP=Golden Paintbrush, PL=Prairie Lupine, PS=Purple Sanicle, SBL=Seaside Bird's-foot Lotus.

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