

**SURVEYS FOR BLUE-GREY TAILDROPPER AND OTHER
GASTROPODS AT RISK IN THE CAPITAL REGIONAL DISTRICT,
AUTUMN 2012**



Juvenile Blue-grey Taildropper from Devonian Regional Park on Garry Oak leaf; found and photographed by Melissa Frey in May 2012.

Prepared for
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EXECUTIVE SUMMARY

The endangered Blue-grey Taildropper is a small native forest-dwelling slug that is known from only a few sites in Canada, all of which are within the Capital Regional District (CRD). Since 2006, CRD Regional Parks have sponsored annual surveys for this and other native slug and snail species at risk. In 2010, Habitat Acquisition Trust added the Blue-grey Taildropper as a focal species for its stewardship program, so expanding survey coverage and community outreach efforts. This year's project builds on these previous efforts with the overall goal of obtaining more information on the distribution and habitat use of the species and involving landowners and managers in stewardship of this species and associated forest floor fauna.

The objectives in 2012 were to (1) initiate a habitat suitability analysis to aid in targeting survey efforts and to guide management activities; (2) survey suitable habitats for the Blue-grey Taildropper within the CRD Regional Parks and Trails System; (3) involve private landowners in surveys and stewardship, especially near known occurrences; and (4) provide management recommendations.

To identify areas where the Blue-grey Taildropper is likely to occur, we produced a preliminary habitat map based on known locations of the slugs and their habitats on Vancouver Island. Polygons around known sites and potentially suitable woodland habitats within these polygons were mapped. Woodland and forest habitats can be delineated at a finer scale on the ground for conservation or management purposes, as needed. The map shows that much suitable habitat for the species also exists outside of these polygons within and around woodlands, and further survey efforts can target these areas. Road densities in the delineated polygons indicate that habitats near known sites are extremely fragmented, limiting natural dispersal of slugs and leading to increasing isolation of populations.

To survey for slugs in parks and on private lands, we used cardboard cover-objects that have previously proven successful for locating this and other slugs and snails with minimal disturbance to the habitat. The study sites were located within six CRD parks: Elk/Beaver Lake, Francis-King, Matheson Lake, Mill Hill, Roche Cove, and Thetis Lake regional parks. One Saanich park, Calvert Municipal Park, and ten sites on private residential lands, in Highlands, Langford, Prospect Lake, and Saanich, were also surveyed. Overall, there were 201 sampling stations and 350 cover-objects at 22 sites. We inspected the cover-objects repeatedly (4 – 6 times) for gastropods in October – November, a period when the Blue-grey Taildropper is detected most readily. CRD Parks volunteers assisted us in surveys within regional parks. In addition, landowners checked cover-objects on their lands multiple times.

Cover-object surveys in 2012 detected 21 species of terrestrial gastropods: four species of native and four species of introduced slugs, and 13 species of native snails. The provincially blue-listed Scarletback Taildropper (*Prophysaon vanatta*) was found at two sites, Francis-King Regional Park and near Prospect Lake on private land. The Blue-grey Taildropper was not found at any of the sites, including three sites with observations in previous years. A record of a juvenile Blue-grey Taildropper from

Devonian Regional Park, found in May 2012 during the Metchosin Bioblitz, was reported to us. There are numerous previous observations from this park. A 3-month drought from July to mid-October in 2012 probably stressed gastropod populations, including the Blue-grey Taildropper, and contributed to the lack of observations in the autumn.

The main proximate threats to Blue-grey Taildropper populations in CRD and Saanich parks include various combinations of the following: excessive trail networks, off-trail mountain bike and ATV use, invasive plants and animals, and forest encroachment into Arbutus and Garry Oak ecosystems. Site-specific recommendations include removal of invasive Laurel-leaved Daphne from Blue-grey Taildropper habitat at Thetis Lake, where it is spreading and replacing native understory vegetation. The effects of climate change, including the predicted increase in summer droughts, are more difficult to mitigate. The maintenance of a land base supporting a diversity of suitable habitats and moisture regimes over a wide area within the CRD will help to sustain the species over the long term.

The following activities are recommended for 2013:

- Refine the habitat suitability map for the Blue-grey Taildropper, including fine-scale delineation of suitable habitat within identified polygons.
- Continue surveys within CRD Regional Parks and Trails System in an effort to better delineate the distribution of this species.
 - Survey parks where suitable habitat exists but where the species has not been found.
 - Resurvey selected sites with known occurrences to obtain information on life history, densities, and persistence of populations.
- Continue working with municipalities and private landowners, targeting areas near known occurrences and other areas with suitable habitat, as identified from habitat mapping.

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1.0 INTRODUCTION

The Blue-grey Taildropper (*Prophysaon coeruleum*) is a small forest slug that is listed as endangered in Canada (COSEWIC 2006). There are only a few Canadian records of the species, all of which are from the Capital Regional District (CRD) on southern Vancouver Island. The Blue-grey Taildropper is one of four species of taildroppers, native slugs of the genus *Prophysaon*, which occur on Vancouver Island. The slugs are named after their ability to detach the end of their tail in response to an attack by a predator.

This project is part of Habitat Acquisition Trust's (HAT) stewardship program, continuing previous efforts aimed towards conservation of species at risk and their habitats throughout CRD. HAT has conducted surveys and community outreach with the Blue-grey Taildropper as a focal species since 2010 (Ovaska and Sopuck 2010, 2012). This year's project builds on these studies and on surveys conducted previously in CRD Regional Parks and Trails System on behalf of CRD Parks (Ovaska and Sopuck 2006, 2007, 2008, 2009).

The goal for 2012 is to clarify the distribution and habitat use of the Blue-grey Taildropper and to engage landowners and managers in stewardship activities. This report presents the results of surveys conducted for the Blue-grey Taildropper in six CRD Parks, a Saanich municipal park, and private properties in autumn 2012.

2.0 OBJECTIVES

The objectives for 2012 were as follows:

- Initiate a habitat suitability analysis to aid in targeting survey efforts and to guide management activities.
- Survey suitable habitats for the Blue-grey Taildropper within the CRD Regional Parks and Trails System in an effort to better delineate the distribution of this species.
- Work with private landowners and install artificial cover-objects on properties with potentially suitable habitat for the species, targeting areas near known occurrences.
- Describe habitats and threats at sites where the Blue-grey Taildropper is found, and provide management recommendations.

3.0 METHODS

3.1 Habitat assessment

To identify areas where the Blue-grey Taildropper is likely to occur, we produced a preliminary habitat map based on known locations of the slugs and their habitats on Vancouver Island. It was not feasible to produce a conventional habitat suitability map based on solely habitat categories or features due to lack of adequate information on the species' habitat requirements. Furthermore, moist microhabitat conditions required

by the slugs cannot be discerned from available habitat mapping that is usually done at relatively coarse scales.

We used ARC GIS to produce a map, consisting of the following layers:

1. Minimum convex polygon placed around known distribution records of the species (also referred to as extent of occurrence), which was surrounded by a 3-km wide buffer zone; areas of ocean were clipped.
2. A circular area with a radius of 2 km was placed around each known occurrence or group of occurrences; where the buffer zones of two or more occurrences overlapped, the circles were merged into a single polygon; areas of ocean were clipped.
3. Woodland habitat polygons (WD) from CRD Sensitive Ecosystem Inventory were added as a habitat layer; a 200 m-wide buffer was placed around each woodland polygon. The layer was derived from CRD Natural Areas Atlas (2012).

Woodlands consist of relatively open canopy forests with Garry Oak, often mixed with Douglas-fir and Arbutus; Trembling Aspen may occur at wetter sites (MoE undated). Woodlands often form on or around rocky outcrops or areas dominated by bedrock that are unsuitable for conifer expansion. Woodland was chosen as the most relevant of the available habitat layers because most of Blue-grey Taildropper records from CRD are either from woodlands, including Garry Oak and Arbutus ecosystems, or their fringes; the slugs have been found in the moist forest surrounding Garry Oak knolls on several occasions. The Terrestrial Herbaceous ecosystem type was considered but rejected because it includes open rocky hilltop habitats that may be too dry for the slugs.

Road densities were calculated from CRD Natural Areas Atlas (2012).

3.2 Survey methods and effort

Study sites

From the habitat map, we identified gaps in survey coverage. In the CRD Regional Park system, we selected four parks (Roche Cove, Mill Hill, Elk/Beaver Lake and Francis King) that had received little survey coverage and where the Blue-grey Taildropper had not been found. We also selected two parks (Thetis Lake and Matheson Lake), where the species has been found in the past, to obtain information on persistence of populations. Thetis Lake was selected for intensive sampling to obtain information on relative abundance of the slugs. On residential properties, we selected sites where landowners either showed interest in participating in the surveys or allowed us access to larger tracts of land, preferably in the vicinity of known sites. Detailed locations of the survey sites were selected upon ground inspection.

An overview of the sites surveyed in 2012, together with sites surveyed previously for gastropods with cover-objects in CRD Regional Parks, is shown in Figure 1. The study sites were located within six CRD parks: Elk/Beaver Lake, Francis-King, Matheson Lake, Mill Hill, Roche Cove, and Thetis Lake regional parks. One Saanich park, Calvert Municipal Park, was surveyed. Additionally, there were ten sites on private residential lands in Highlands, Langford, Prospect Lake, and Saanich (Table 1).

Sampling with artificial cover-objects

As previously, we used artificial cover-objects (ACOs) constructed of corrugated cardboard to survey for gastropods (Hawkins *et al.* 1998, Ovaska and Sopuck 2001, 2008). The cover-objects consisted of layered 30 cm x 30 cm pieces of cardboard, which are effective in detecting the Blue-grey Taildropper and other gastropods. This method allows repeated surveys of the same sites with minimal disturbance to the habitat and the animals.

In CRD regional parks, the ACOs were placed along either 100 m-long or 50 m-long transects at sampling stations that were 10 m apart (5 parks) or within a 30 x 30 m grid with stations 5 m apart (Thetis Lake Regional Park). Each transect station had two ACOs, about 1 m apart, while each grid station had one ACO. There were 10 transects with a total of 160 ACOs within CRD regional parks; the grid contained 49 ACOs (Table 1). Thus, there were a total of 209 ACOs in CRD regional parks. On the residential properties the number of ACOs per site varied from 4 – 20, depending on the habitat, size of the property, and interest of the landowner. In total, there were 11 sites and 141 ACOs on municipal and residential properties (Table 1). Overall, including parks and private properties, there were 201 sampling stations and 350 cover-objects at 22 sites (transects or plots) in 2012 (Table 1).

Two sites (Calvert Park and Prospect Lake, Site 1) had been established in 2010 as part of a salamander monitoring project. The study plot at each of these sites consisted of two parallel 50 m lines, each with 5 sampling stations 10 m apart. At each station, there was an existing salamander ACO made from 3 ft long wooden boards arranged in layers and two cardboard ACOs, which were added in 2011 as part of this project; hence, each plot consisted of 20 cardboard ACOs and 10 wooden ACOs. A Blue-grey Taildropper was found under one of the salamander boards in 2011, and the boards, along with the cardboard ACOs, were checked in 2012.

The cover-objects were set on the forest floor in late September - early October 2012 in CRD parks and either in March or October 2012 on the residential properties. The cover-objects in Calvert Park and one residential property were set in autumn 2011 and were still intact in 2012; usually the cover-objects need to be replaced yearly as they deteriorate. At another residential property, the cover-objects were set in November 2011 and replaced in November 2012.

Figure 1. Overview of sites surveyed for gastropods using cover-objects within CRD Parks and residential properties in 2012 and in previous years.

Note: Two sites north of the mapped area that have been surveyed on Saanich Peninsula, Horth Hill and Coles Bay, and are not shown.
Each symbol represents an array of cardboard cover-objects.

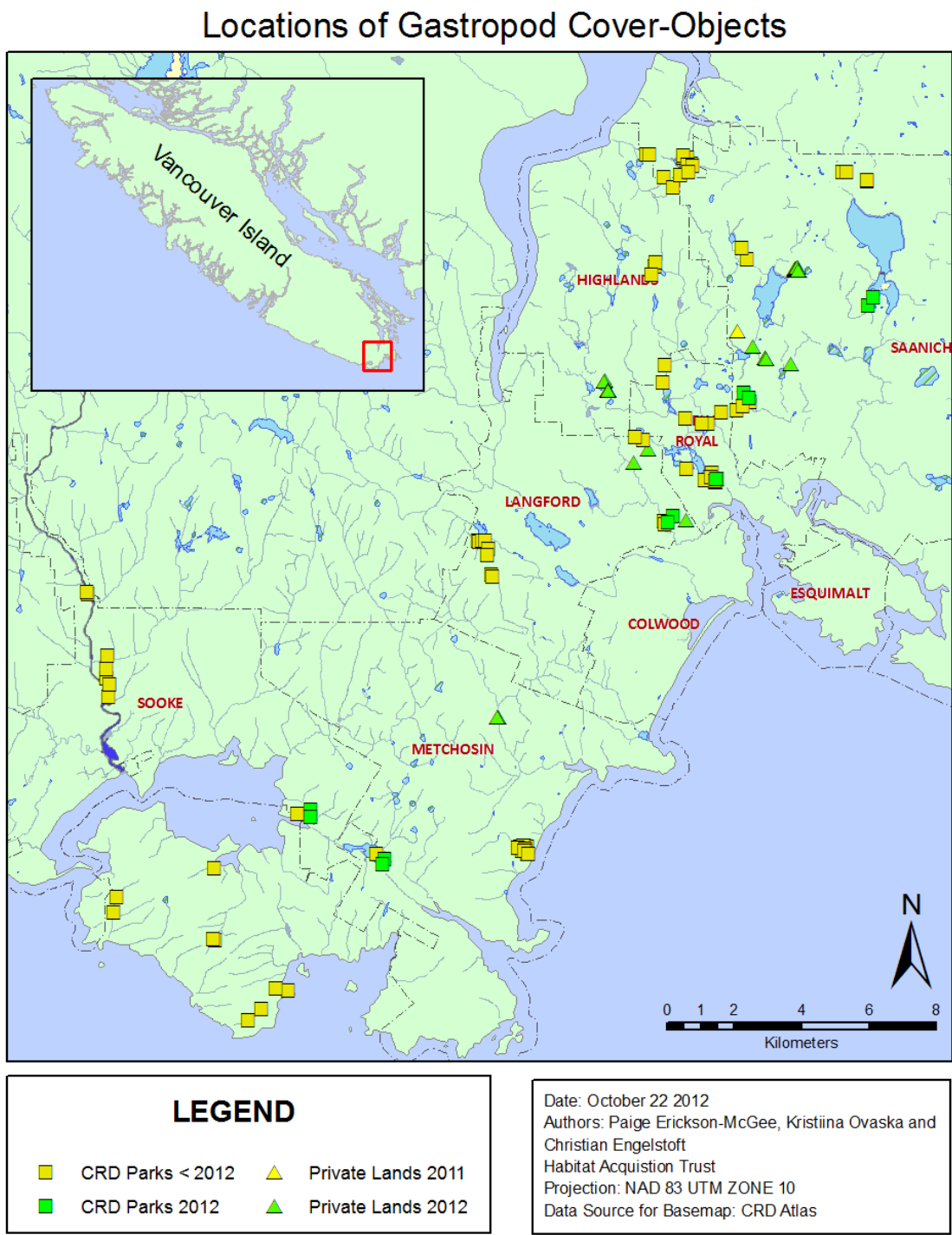


Table 1. Summary of search effort using artificial cover-objects (ACOs) to survey terrestrial gastropods in CRD in 2012.

See Appendix 1 for detailed locations of transects in CRD Regional Parks.

A. CRD Parks:					
Site Name	Transect or plot ID	# stations	# ACOs	# surveys	# of ACO flips
Elk-Beaver Lake Regional Park	T1	5	10	5	50
Elk-Beaver Lake Regional Park	T2	5	10	5	50
Francis-King Regional Park	T1	10	20	5	100
Francis-King Regional Park	T2	10	20	5	100
Matheson Lake Regional Park	T1	10	20	6	120
Matheson Lake Regional Park	T2	10	20	6	120
Mill Hill Regional Park	T1	5	10	5	50
Mill Hill Regional Park	T2	5	10	5	50
Roche Cove Regional Park	T1	10	20	6	120
Roche Cove Regional Park	T2	10	20	6	120
Thetis Lake Regional Park	Grid	49	49	4	196
A. SUB-TOTAL	11	129	209	58	1076
B. Municipal or private residential properties searched regularly by us:					
Site Name	Transect or plot ID	# stations	# ACOs	# surveys	# of ACO flips
Prospect Lake (Philippa Lake)	T1	10	20	5	100
Trevlac (Prospect Lake, Site 1)	T1	10	30	5	150
Trevlac (Calvert Municipal Park)	T2	10	30	5	150
B. SUB-TOTAL	3	30	80	15	400
TOTAL (A+B)	14	159	289	NA	1476
C. Private residential properties searched primarily by landowners:					
Site Name	Transect or plot ID	# stations	# ACOs	Search effort	
Highlands (Site 1)	1	3	6	Few checks in spring; 23 Oct 18 Nov checked irregularly ca. twice/week	
Highlands (Site 2)	1	2	4	Checked on 8 Nov	
Langford (Site 1)	1	2	4	Checked numerous times in Oct-Nov	
Langford (Site 2)	1	4	8	Unknown	
Metchosin (Site 1)	1	3	6	Checked 4-5 times from spring to fall; a few times in fall.	
Mill Hill (Site 1)	1	5	10	21 Oct; 19 Nov	
West Saanich (Site 1)	1	13	13	23 Nov (with KO)	
West Saanich (Site 2)	1	10	10	Numerous checks (30 Oct with KO)	
C. SUB-TOTAL	8	42	61		
GRAND TOTAL	22	201	350		

We checked the cover-objects in CRD parks, Calvert Park, and one of the residential properties 4 times from mid-October to late November 2012 (Table 2). Landowners checked the cover-objects on the remaining residential properties and reported the results to us.

All cover-objects were inspected repeatedly for gastropods in October – November (Table 2). The surveys were timed for the autumn because past experience indicated that the Blue-grey Taildropper is detected most readily at this time (Ovaska and Sopuck 2008, 2009, 2011, 2012). In CRD parks, there were 4 – 6 checks per site for a total of 1076 cover-object flips. There were 400 cover-object flips at three additional sites on municipal or residential properties that were inspected 5 times by us. In addition, landowners checked cover-objects on their lands multiple times.

3.3 Volunteer involvement

Landowners interested in participating in the surveys were identified through HAT's habitat stewardship and landowner contact programs. Landowners in target areas were visited, and if suitable habitat for the Blue-grey Taildropper was deemed to be present, cardboard cover-objects were installed. Landowners were trained to check the cover-objects, collect data, and identify the Blue-grey Taildropper. Outreach materials, including Blue-grey Taildropper Identification Guide (HAT 2011), were provided. CRD Parks volunteers also helped with the surveys and received training in the field. HAT provided follow-up support by identifying gastropods from photographs sent to us, and by accompanying landowners on cover-object checks.

3.4 Identification and data recording

We identified and recorded all gastropods found with the cover-objects. Nomenclature for gastropods follows Forsyth (2004). As in previous years, identification was done in the field using external characteristics, and all animals were released after examination. We also recorded the dominant overstorey and understorey vegetation at the center of each transect and noted any habitat disturbance to the site.

The data were entered into Microsoft Excel 2007 spreadsheets. Raw data are submitted together with this report as an Excel file.

Table 2. Survey dates of artificial cover-objects in 2012.

Site Name	Transect or plot IDs	Check 1	Check 2	Check 3	Check 4	Check 5	Check 6
A. CRD Regional Parks; regular checks by us and park volunteers:							
Elk-Beaver Lake Regional Park	T1, T2	16-Oct	24-Oct	02-Nov	10-Nov	16-Nov	
Francis-King Regional Park	T1, T2	17-Oct	24-Oct	30-Oct	07-Nov	15-Nov	

Site Name	Transect or plot IDs	Check 1	Check 2	Check 3	Check 4	Check 5	Check 6
Matheson Lake Regional Park	T1, T2	18-Oct	25-Oct	01-Nov	04-Nov	08-Nov	14-Nov
Mill Hill Regional Park	T1, T2	18-Oct	25-Oct	01-Nov	08-Nov	16-Nov	
Roche Cove Regional Park	T1, T2	18-Oct	25-Oct	01-Nov	08-Nov	13-Nov	20-Nov
Thetis Lake Regional Park	Grid	25-Oct	01-Nov	08-Nov	16-Nov		
B. Municipal or private residential properties inspected regularly by us:							
Prospect Lake (Philippa Lake)	T1	17-Oct	25-Oct	01-Nov	09-Nov	14-Nov	
Trevlac (Prospect Lake, Site 1)	T1	17-Oct	25-Oct	01-Nov	09-Nov	14-Nov	
Trevlac (Calvert Municipal Park)	T2	17-Oct	25-Oct	01-Nov	09-Nov	14-Nov	
<i>See Table 1 for the remaining sites that were inspected primarily by landowners.</i>							

5.0 RESULTS

5.1 Habitat mapping

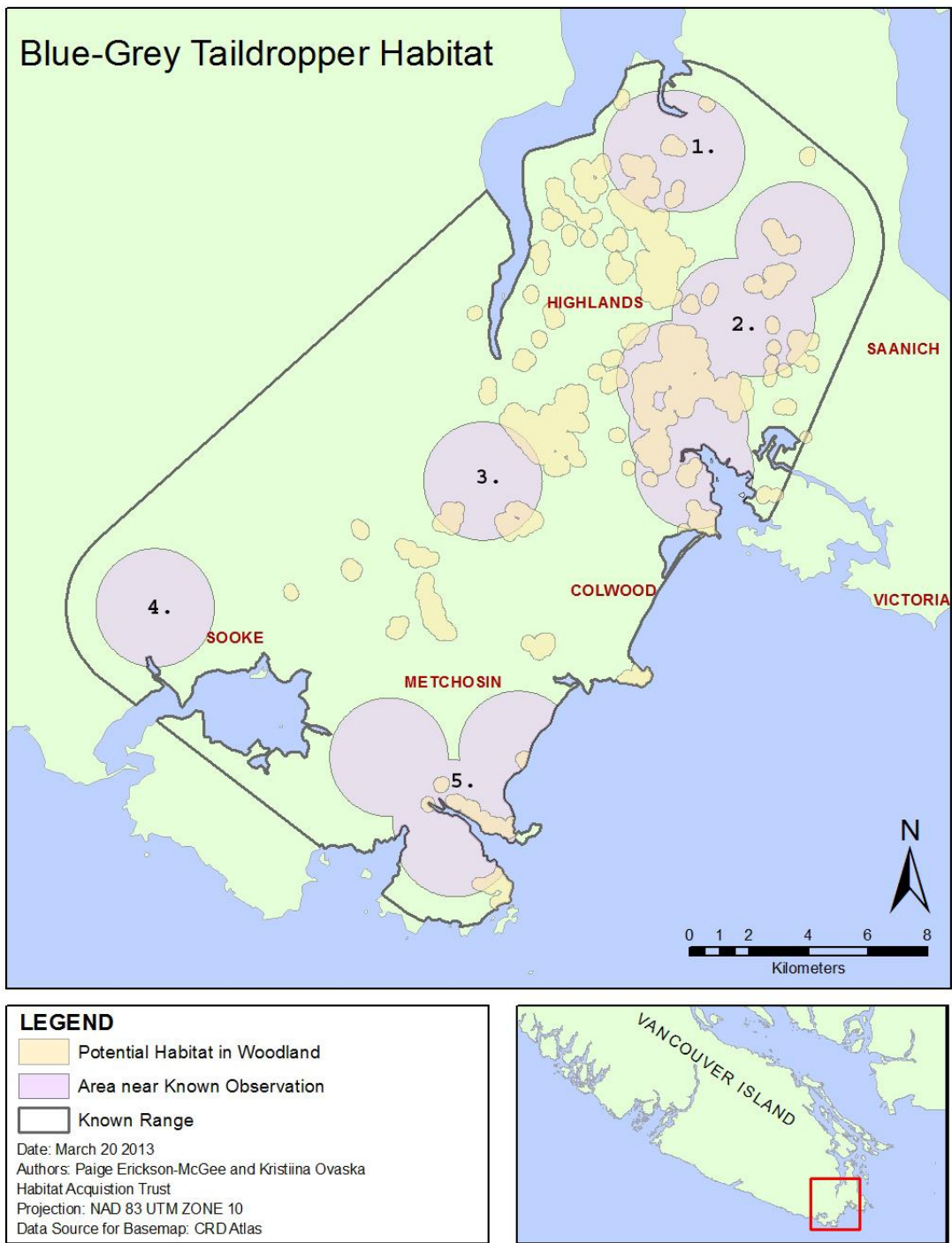
The Blue-grey Tailedropper is known from various localities within an area of approximately 221 km² in CRD (referred to as the known range; Figure 2). Within this larger area, five occupied polygons with records of the Blue-grey Tailedropper were delineated (Figure 2). The species is most likely to be found in suitable habitats within these polygons. The largest polygon (46.6 km²) is in View Royal and Saanich. Another large polygon (30.9 km²) is in Metchosin. The total amount of woodland habitat, which is deemed optimal for the species, within the occupied polygons is 23.4 km², which comprises 44% of all mapped woodlands within the known range.

Table 3. Size and characteristics of areas delineated around Blue-grey Tailedropper occurrences.

Polygon number*	Polygon location	Area (km ²)	Road length (km)	Road density (length/ km ²)	Mapped Woodland area (km ²)
1	Highlands/ Saanich	15.607	53.556	3.43	3.031
2	View Royal/ Saanich	46.623	248.243	5.32	15.862
3	Langford	12.566	51.337	4.09	2.122
4	Sooke	12.506	31.673	2.53	0
5	Metchosin	30.8	102.665	3.33	2.352

*Polygon numbers as per Figure 2.

Figure 2. Habitat suitability map for the Blue-grey Tailedropper.



Road densities (length of road/km² of land) can be used as an index of habitat fragmentation. Road densities are high within all occupied polygons, ranging from a low of 2.53/km in the Sooke polygon to a high of 4.94/km in the View Royal – Saanich polygon.

The habitat map shows that much potentially suitable habitat within the known range exists outside the occupied polygons. Potentially suitable woodlands are mostly located in the northern portion of the known range. Additional smaller woodland habitat patches occur throughout this area but have not been mapped and hence are not shown in Figure 2.

5.2 Survey results

On the 14 transects or plots surveyed regularly by us in 2012, 21 species of terrestrial gastropods were found. They included four species of native and four species of introduced slugs, and 13 species of native snails (Table 4). The Northwest Hesperian, a large, widespread snail, dominated the samples and comprised 45% of the 401 individuals found. The Pacific Banana Slug was also frequently encountered and comprised nearly 15% of the observations. Relatively few individuals of other species were found (Table 4). Landowners checked cover-objects on an additional 8 sites, but few gastropods were found. Species identified by us on the ground at these sites or from photographs provided by landowners included Northwest Hesperian, Robust Lancetooth, Glossy Pillar, Banana Slug, and introduced Arion slugs.

The Blue-grey Taildropper was not found at any of the sites, including the study plot in Thetis Lake Regional Park, where the species has been located in previous years (Figure 3). Several species of introduced slugs were found at this study plot (Table 4), but even their numbers were relatively low when compared to numbers in previous years, when sampling was less intensive. There is a record of a juvenile Blue-grey Taildropper from Devonian Regional Park, found in May 2012 by Melissa Frey and documented with photographs (M. Frey pers. comm. 2012).

The provincially blue-listed Scarletback Taildropper (*Prophysaon vanatta*) was found at two sites (1 juvenile at each site): Francis-King Regional Park and near Prospect Lake (Trevlac site).

SPECIES	Elk-Beaver L. (n=20)	Francis-King (n=40)	Matheson L. (n=40)	Mill Hill (n=20)	Roche Cove^ (n=40)	Thetis Lake (n=49)	Trevlac (Calvert Park) (n=30)	Trevlac (Site 1) (n=30)	Prospect L. (Philippa Lake) (n=20)	# found	% of all obs.
mm):											
Glossy Pillar, <i>Cochlicopa lubrica</i>	0	2	6	0	2	0	0	0	0	10	2.5
Blue Glass, <i>Nesovitrea binneyana</i>	0	0	1	0	3	0	7	1	0	12	3.0
Pinhead Spot, <i>Paralaeoma servilis</i>	0	0	3	0	0	1	0	0	0	4	1.0
Western Flatwhorl, <i>Planigyra clappi</i>	0	0	5	0	0	2	0	0	0	7	1.7
Tightcoil species, <i>Pristiloma</i> sp. (<i>P. stearnsii</i> and <i>P. lansingii</i>)	0	0	9	5	1	0	4	0	3	22	5.5
Conical Spot, <i>Punctum randolphii</i>	1	0	9	0	2	0	0	1	0	13	3.2
Northwest Striate, <i>Striatura pugetensis</i>	0	0	0	0	0	0	1	0	0	1	0.2
<i>Vertigo</i> species	0	0	2	0	0	0	0	0	1	3	0.7
Quick Gloss, <i>Zonitoides arboreus</i>	0	0	0	0	1	0	1	5	0	7	1.7
Black Gloss, <i>Zonitoides nitidus</i>	0	0	0	1	0	0	0	0	0	1	0.2

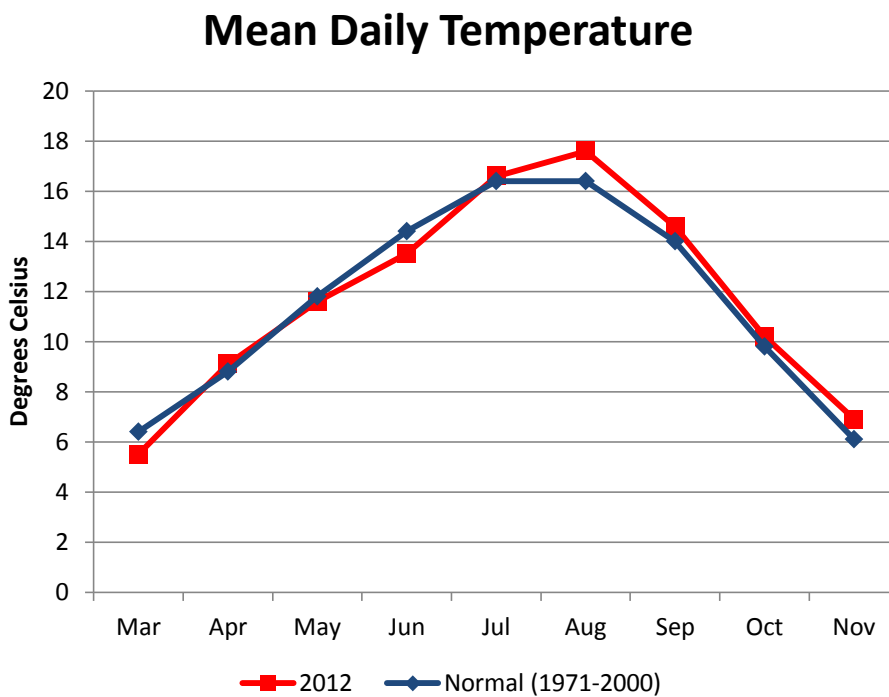
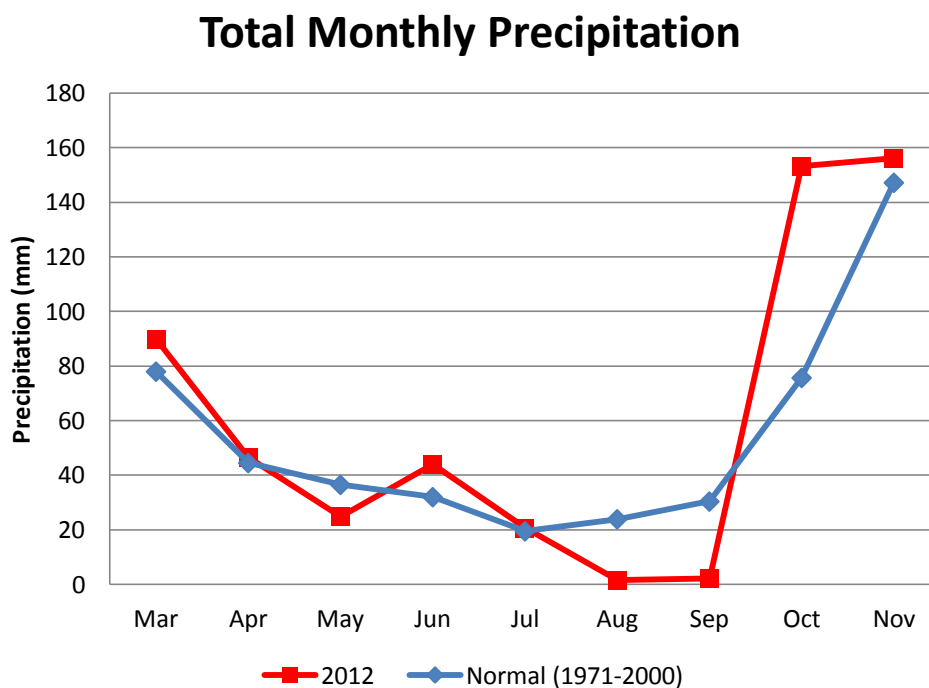
^Additional 34 snails (unidentified) were recorded by a volunteer

Figure 3. Garry Oak-Douglas Fir woodland habitat in Thetis Lake Regional Park, where the Blue-grey Taildropper was found in 2010 and 2011, but not in 2012.



A drought that lasted into mid-October delayed the start of fall gastropod surveys in 2012. With no rainfall, August and September were unusually dry when compared to climate normals for the area (Figure 4). There was virtually no rain for a 3-month period from 12 July to 12 October. In addition, mean daily temperatures in 2012 were slightly higher from July-November compared to climate normals (Figure 4).

Figure 4. Precipitation and temperature by month in 2012 in comparisons to normals (1970 - 2000) at Victoria international Airport (data from Environment Canada).



6.0 DISCUSSION

6.1 Habitat mapping

The habitat map that was produced takes into account what is currently known about the distribution and habitat use of the Blue-grey Taildropper and is expected to be updated as more information becomes available. The delineated polygons around known sites indicate areas where the species is most likely to be found and can be used in management and land use decisions. Within these polygons, woodland and forest habitats can be delineated on the ground, as needed, for example, if activities that require habitat alteration are considered. The map shows that suitable habitat for the species also exists outside of these polygons, and further survey efforts should target these habitats. Larger patches of woodland habitat are most abundant in the Langford, Highlands, Saanich, and Royal Oak districts, but smaller patches exist on and around rocky knolls throughout the area; these small patches are not mapped in the Saanich Sensitive Areas Inventory, which was used for the woodland layer in the map.

Analysis of road densities in the delineated polygons revealed that habitats are extremely fragmented, limiting natural dispersal of slugs and leading to increasing isolation of populations. The fragmentation is particularly prevalent in the northern polygons and less so in the south, in Metchosin and Sooke. Establishing connectivity between occupied areas at the landscape level, for example through riparian restoration, would be beneficial for the species.

6.2 Survey results and species at risk

No new occurrences of the endangered and red-listed Blue-grey Taildropper were found in autumn 2012. To date, the species is known from 12 sites (Figure 5). The sites include seven sites within the CDR Parks and Trails system: Galloping Goose Trail at Sooke River, Sooke Hills Wilderness Reserve, and Devonian, Matheson Lake, Mt. Work (Durrance Lake portion), and Thetis Lake Regional Parks (see Appendix 2 for history of gastropod surveys in CRD Regional Parks). The observation from Matheson Lake was of two juvenile slugs found during the Metchosin Bioblitz in May 2011. A juvenile slug was found in Devonian Regional Park by Melissa Frey in December 2011 and in May 2012 during the Metchosin Bioblitz (M. Frey pers. comm. 2012). There are numerous previous observations from this park since 2004.

The species also occurs in and near Saanich municipal parks: in Logan Park and immediately adjacent to Calvert Park. All the above parks form important refuges for the species within the developed and modified landscapes on southern Vancouver Island.

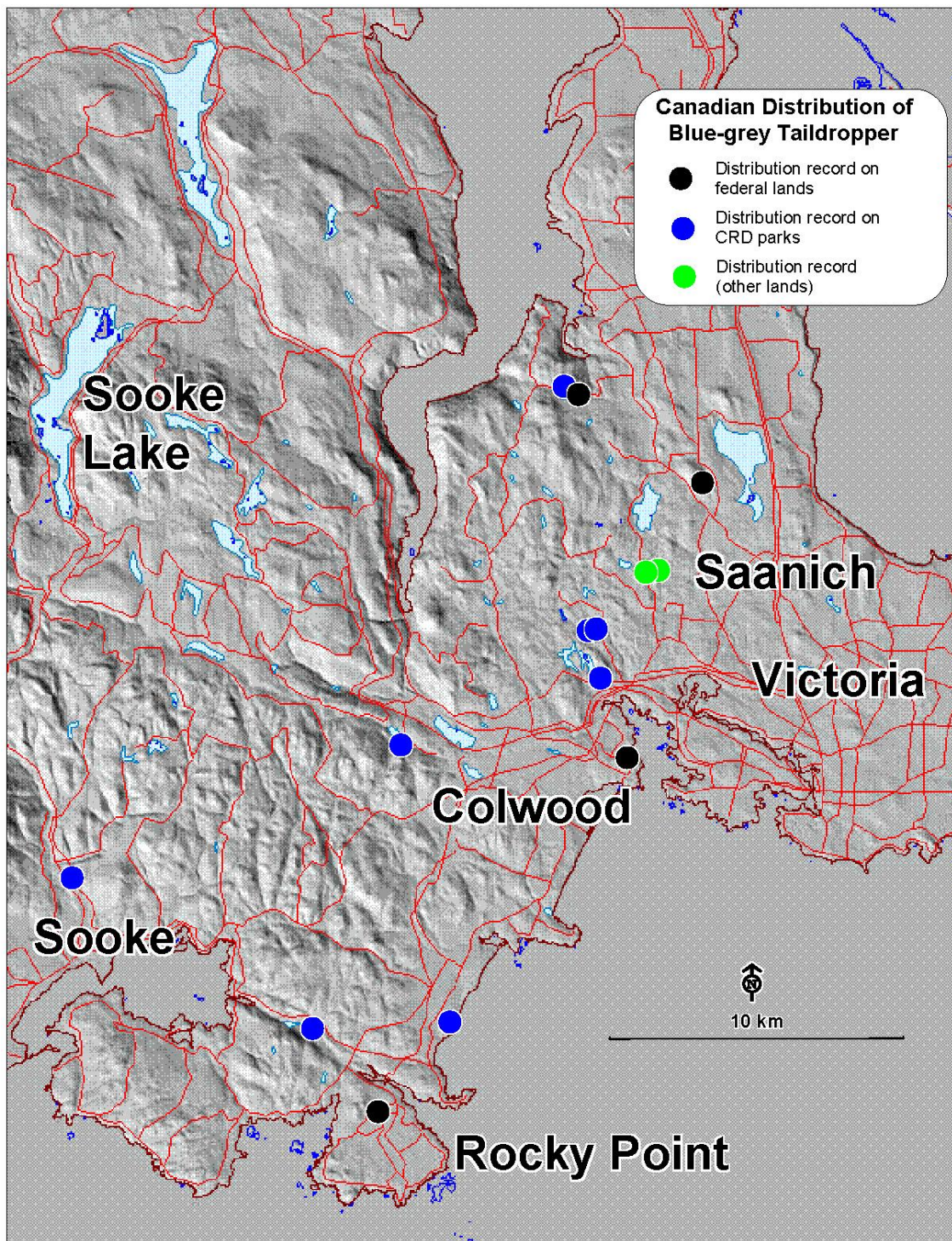
The blue-listed Scarletback Taildropper was found at two sites, in Francis-King Regional Park and near Prospect Lake; only one small juvenile was found at each site. This species is widely distributed on Vancouver Island and along the B.C. coast but is seldom encountered within CRD away from the wetter west coast.

Weather conditions during the surveys were mild and moist, but a 3-month drought from July to mid-October probably stressed gastropod populations, including the Blue-grey Taildropper and contributed to the lack of observations. While July and August are often dry months on southern Vancouver Island, droughts lasting well into fall are unusual and potentially detrimental. Each year since surveys for the Blue-grey Taildropper have been carried out since it was first documented from B.C. in 2002, the species has been found at new and/or previously known sites, and most observations have been from September to November. There were no observations in autumn 2012, although the survey effort was considerable and included intensive sampling with a grid of cardboard cover-objects in Thetis Lake Regional Park at a site where the species has been found in previous years. Another known site was also sampled with a similar grid on a federal property (Observatory Hill) as part of a separate project in fall 2012, and the species was not found (Ovaska, pers. notes). The numbers of individual slugs found in previous years have been small; hence the effects of drought on the species cannot be inferred with confidence. However, lack of observations following the drought even after the return of suitable moist conditions suggests that the populations may have been reduced. It is important to continue monitoring of known sites in 2013 to confirm continuing presence of the species at these sites.

6.3 Volunteer involvement

In 2012, contacts through HAT's stewardship program resulted in increased landowner participation in surveys for the Blue-grey Taildropper. Landowners and volunteers were trained to collect data and identify the species. Efforts by landowners and CRD Parks volunteers greatly increased survey coverage, but, unfortunately, drought in summer and early autumn resulted in less than optimal conditions for finding the Blue-grey Taildropper. It is hoped that landowners and volunteers will continue helping with surveys in the future.

Figure 5. Summary of known occurrences of the Blue-grey Taildropper on Vancouver Island.



7.0 THREATS AND RECOMMENDED MITIGATION

As previously identified (Ovaska and Sopuck 2012), the main threats to Blue-grey Taildropper populations in CRD and Saanich parks include various combinations of the following: excessive trail networks, off-trail mountain bike and ATV use, invasive plants and animals, and forest encroachment into Arbutus and Garry Oak ecosystems. Additional trail signage, barricading of unofficial trails, invasive plant control, and habitat restoration of trampled areas are recommended to mitigate these threats.

At Thetis Lake Regional Park, we carried out intensive surveys with a grid of cardboard cover-objects at a site where the Blue-grey Taildropper has been found in previous years. Habitat at this site is threatened by introduced Laurel-leaved Daphne (*Daphne laurealis*), which appears to have spread since our previous surveys. Numerous unofficial trails are also present in the vicinity of the site, and introduced slugs are prevalent. Removal of Daphne is recommended but should be carried out with care with minimal disturbance to the soils and avoiding compaction of the forest floor by trampling.

8.0 SURVEY RECOMMENDATIONS FOR 2013

Recommendations for 2013 include the following:

- Refine the habitat suitability map for the Blue-grey Taildropper, including fine-scale delineation of suitable habitat within identified polygons.
- Continue surveys within CRD Regional Parks and Trails System in an effort to better delineate the distribution of this species.
 - Survey parks where suitable habitat exists but where the species has not been found.
 - Resurvey selected sites with known occurrences to obtain information on life history, densities, and persistence of populations.
- Continue working with municipalities and private landowners, targeting areas near known occurrences and other areas with suitable habitat, as identified from habitat mapping.

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APPENDICES

Appendix 1. Detailed locations of study sites in CRD Regional Parks in 2012.

Site name	Design type*	Transect ID	UTM Easting (start)	UTM Northing (start)	UTM Easting (end)	UTM Northing (end)	ACO set-up date	Bearing
Elk-Beaver Lake	Transect	T1	470333	5373075	470314	5373106	03-Oct-12	318
Elk-Beaver Lake	Transect	T2	470502	5373334	470528	5373299	03-Oct-12	313
Francis-King	Transect	T1	466672	5370491	466719	5370426	03-Oct-12	128
Francis-King	Transect	T2	466795	5370343	466838	5370269	03-Oct-12	135
Matheson Lake	Transect	T1	455976	5356638	455913	5356697	28-Sep-12	
Matheson Lake	Transect	T2	455919	5356486	455884	5356570	28-Sep-12	208
Mill Hill	Transect	T1	464552	5366826	464566	5366849	28-Sep-12	30
Mill Hill	Transect	T2	464415	5366649	464511	5366786	28-Sep-12	330
Roche Cove	Transect	T1	453798	5358118	453728	5358084	28-Sep-12	246
Roche Cove	Transect	T2	453781	5357914	453832	5357851	28-Sep-12	130
Thetis Lake	Grid		465835	5367939	465852	5367962	15-Oct-12	NA

*Transects consisted of 10 or 5 sampling stations, 10 m apart and each with cardboard cover-objects.

Grid consisted of a 7x7 grid with 1 cardboard cover-object every 5 m.

Appendix 2. History of terrestrial gastropod surveys in CRD Regional Parks and Trails System, 2003 – 2012.

Note: Additional surveys were conducted in Matheson Lake as part of Metchosin bioblitz in May 2011 and at Devonian in May 2012 during which the Blue-grey Taildropper was found.

Park or Trail	2003	2004	2006	2007	2008	2009	2010	2011	2012	Source
Bear Hill					Oct-Nov		Oct-Dec			Ovaska & Sopuck 2008, 2010
Coles Bay								Oct-Nov		Ovaska & Sopuck 2012
Devonian		Sep-Nov	Oct-Nov	Nov	Apr-June; Oct-Nov	Oct-Dec				Ovaska & Sopuck 2004, 2006, 2007, 2008, 2009
East Sooke	Oct	Sep-Nov				Oct-Nov		Oct-Nov		Ovaska & Sopuck 2004, 2009, 2012
ElkéBeaver Lake									Oct-Nov	Ovaska & Sopuck, this report
Francis/King		Sep-Nov				Oct-Nov			Oct-Nov	Ovaska & Sopuck 2004, 2009, this report
Galloping Goose Trail at Sooke		Nov	Oct-Nov	Nov	May-Jun; Oct-Nov					Ovaska & Sopuck 2004, 2006, 2007, 2008
Horth Hill								Oct-Nov		Ovaska & Sopuck 2012
Lone Tree Hill		Sep-Nov								Ovaska & Sopuck 2004
Matheson Lake		Sep-Nov						Oct-Nov	Oct-Nov	Ovaska & Sopuck 2004, 2012, this report
Mill Hill			Nov						Oct-Nov	Ovaska and Sopuck 2006, this report
Mount Wells					Oct-Nov	Oct-Nov	Oct-Dec			Ovaska & Sopuck 2008, 2009, 2010
Mount Work		Sep-Nov	Oct-Nov	Nov-Dec	Apr-Jun; Oct-Nov	Oct-Nov	Oct-Dec	Oct-Nov		Ovaska & Sopuck 2004, 2006, 2007, 2008, 2009, 2010, 2012
Roche Cove								Oct-Nov	Oct-Nov	Ovaska & Sopuck 2012, this report
Sooke Hills Wilderness			Oct-Nov			Oct-Nov	Oct-Dec			Ovaska & Sopuck 2006, 2010
Thetis Lake					Oct-Nov	Oct-Nov	Oct-Dec	Oct-Nov	Oct-Nov	Ovaska & Sopuck 2008, 2009, 2010, 2012, this report
Witty's Lagoon		Sep-Nov								Ovaska & Sopuck 2004
Survey effort (search of forest floor; person-minutes)	160	54*		160						
Survey effort (# ACO flips)		660	1390	260	2360	1620	1460	860	1076	

* At Galloping Goose Trail, where there were no artificial cover-objects (ACOs)