

**SURVEYS FOR BLUE-GREY TAILDROPPER AND OTHER  
GASTROPODS AT RISK IN THE CAPITAL REGIONAL DISTRICT,  
AUTUMN 2011**



*Prepared for*  
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Cover photograph: Blue-grey Tailedropper found in Thetis Lake Regional Park, 2 November 2011.

## EXECUTIVE SUMMARY

The Blue-grey Tailedropper (*Prophysaon coeruleum*) is a small forest-dwelling slug native to Western North America. In Canada, it is known only from scattered sites on southern Vancouver Island, where it occurs in remnant forest patches within a largely urbanized landscape. Here we report on surveys for terrestrial gastropods (land snails and slugs), focusing on the Blue-grey Tailedropper, carried out in autumn 2011 within the Capital Regional District (CRD). This project is part of Habitat Acquisition Trust's (HAT) stewardship program for species at risk (the Blue-grey Tailedropper was added as a focal species in 2010) and continues previous efforts conducted in CRD Regional Parks since 2006. The goal of this study is to clarify the distribution and habitat use of the Blue-grey Tailedropper within CRD and to engage landowners and managers in stewardship.

In 2011, we placed survey transects in seven CRD Regional Parks (from northeast to southwest: Horth Hill, Coles Bay, Mount Work, Thetis Lake, Matheson Lake, Roche Cove, East Sooke), one Saanich Municipal Park (Calvert Park), and two residential properties in Saanich, one of which was contiguous with Calvert Park. Previous records for the Blue-grey Tailedropper existed from two of the above parks (Mount Work and Thetis Lake), but many areas of these large parks have not been surveyed for gastropods. The other sites contained potentially suitable habitat but had no records of the species. As previously, we used cardboard cover-objects placed along transects at stations set 10 m apart to sample gastropods. At one site (Calvert Park/Trevlac Pond) there were a small number of additional wooden boards used to monitor salamanders, which we also examined for gastropods. In 2011, there was a total of 353 cover-objects on 17 transects, which were checked for gastropods repeatedly in October – November for a total of 1083 cover-object flips.

A total of 26 species of terrestrial gastropods were found during the surveys. The species included 7 native and 5 introduced slugs, and 14 native snails. The Blue-grey Tailedropper was found at two sites: near Prior Lake in Thetis Lake Regional Park (1 adult on 2 November) and near Trevlac Pond immediately adjacent to Calvert Park (1 adult on 5 November). The Prior Lake site is 0.2 km from a previous observation in the park in 2010. The Trevlac Pond site is approximately 0.86 km from a previous observation in another Saanich municipal park. The habitat between these two sites is relatively continuous through wooded rural residential properties. Two other new occurrences of the Blue-grey Tailedropper were documented in 2011 as part of other surveys: Matheson Lake Regional Park (3 juveniles found on mushrooms during the Metchosin BioBlitz on 30 April, and identified by one of us) and Observatory Hill, Saanich (1 adult found during Sharp-tailed Snake surveys on 1 November). The new observations add to the growing data base on the distribution of this species, providing an essential first step towards conservation.

Three provincially Blue-listed species of gastropods were found: Warty Jumping-slug (*Hemphillia glandulosa*; nationally Special Concern) in East Sooke Regional Park; Scarletback Tailedropper (*Prophysaon vanattaë*) at Trevlac Pond; and the Pacific Sideband snail (*Monadenia fidelis*) in Thetis Lake Regional Park. In Canada, the Warty

Jumping-slug is known only from southern Vancouver Island, where its distribution is patchy. There are two previous records of the species from East Sooke Park, about 2 km from the new observation. Both the Scarletback Taildropper and Pacific Sideband are more widely distributed in western B.C., and there are several previous records from CRD, including regional parks.

The main threats to habitats at known Blue-grey Taildropper sites in CRD and Saanich parks include a various combination of the following: excessive trail networks, off-trail mountain bike and ATV use, invasive plants and animals, vegetation management activities, and forest encroachment of openings (forest gaps) and Garry Oak ecosystems. Residential development and land clearing activities are a threat to sites located outside of parks.

Within park boundaries, additional trail signage, barricading of unofficial trails, invasive plant control, and habitat restoration of trampled areas are recommended to mitigate threats. Further surveys on public and private lands are required to understand the distribution and habitat needs of the Blue-grey Taildropper, and to guide future stewardship work.

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## COLOUR PLATES

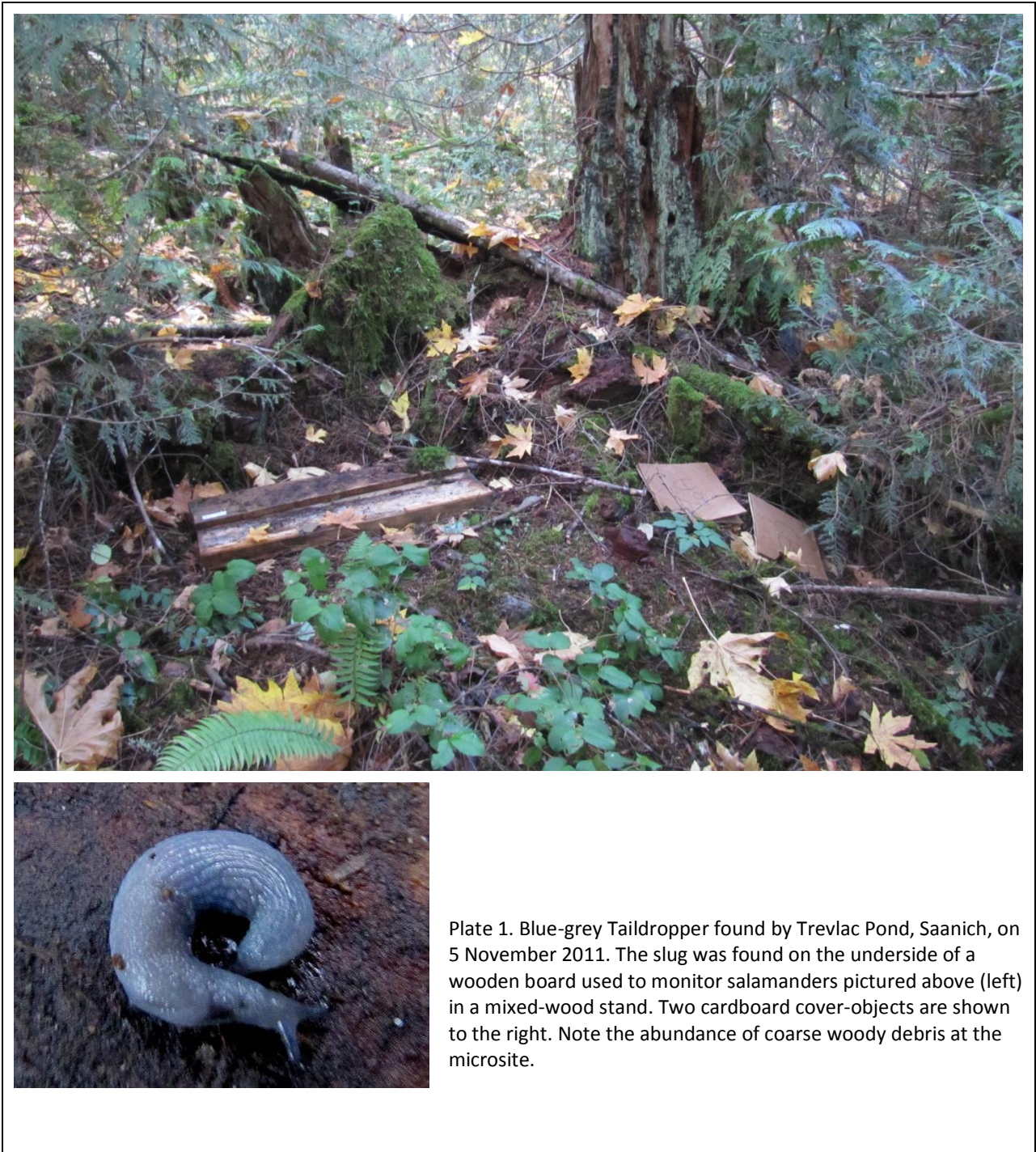




Plate 2. Blue-grey Taildropper on the underside of a cardboard cover object used to survey for gastropods, Thetis Lake Regional Park, 2 November 2011. The site was in older Douglas-fir dominated forest below a Garry oak – arbutus knoll. Note the deep moss cover that might be an important microhabitat feature for the slugs.





Plate 3. Two juvenile Blue-grey Taildropper found on a mushroom by K. Trim at Matheson Lake Regional Park, 30 April 2011 during Metchosin BioBlitz. Identified and photographed by L. Sopuck.



Plate 4. Warty Jumping-slug found in East Sooke Regional Park, 17 November 2011.

## 1.0 INTRODUCTION

The Blue-grey Taildropper (*Prophysaon coeruleum*) is a small forest slug that is patchily distributed from southern British Columbia to northern California. It is listed as endangered in Canada (COSEWIC 2006) and is on the provincial red-list of species at risk. In Canada, prior to 2011, the species was known from only 10 localities, all within the Capital Regional District (CRD) on southern Vancouver Island. The Blue-grey Taildropper is the rarest 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 and continues previous efforts aimed towards conservation of species at risk and their habitats throughout CRD. The Blue-grey Taildropper was added to HAT's Species at Risk program as a focal species with the initiation of surveys and landowner contacts in 2010 (Ovaska and Sopuck 2010). This project expands on previous studies that were conducted for the Blue-grey Taildropper and other terrestrial gastropods (slugs and land snails) in CRD Regional Parks and Trails System on behalf of CRD Parks (Ovaska and Sopuck 2006, 2007, 2008, 2009). CRD regional parks provide relatively large areas of forest habitat within a highly modified, residential landscape and hence form important refuges for the Blue-grey Taildropper and other species at risk. Although protected from development, management for species at risk is important to ensure that potentially conflicting activities are directed away from important habitats in these multi-use areas.

The goal of this study is to clarify the distribution and habitat use of the Blue-grey Taildropper within CRD and to engage landowners and managers in stewardship. Adequate knowledge of distribution patterns is an essential first step towards appropriate management of populations and habitats; hence the current emphasis of the study is on increasing survey coverage and locating the species. Concurrently, HAT is raising awareness of the species as an emblem of forest floor invertebrates and ecosystem processes by engaging landowners in habitat stewardship in target neighbourhoods through public outreach events and HAT's "Good Neighbours" Program.

This report presents the results of surveys conducted for the Blue-grey Taildropper in seven CRD Parks and one Saanich municipal park in autumn 2011. We have also initiated surveys for the species on private residential lands that contain suitable habitat.

## 2.0 OBJECTIVES

The objectives for 2011 were as follows:

- Survey suitable habitats for the Blue-grey Taildropper within the CRD Regional Parks and Trails System in an effort to better delineate its distribution.
- Initiate surveys at municipal and private residential properties with potentially suitable habitat.

- Describe habitats and threats at sites where the Blue-grey Taildropper is found, and provide management recommendations.
- Record all gastropods found during the surveys, with emphasis on species at risk.

### 3.0 STUDY SITES

We used orthophotos from CRD Natural Areas Atlas (2011), coupled with an inspection of habitats on the ground, to select survey sites. We selected sites where there were gaps in survey coverage and where blocks of potentially suitable habitat existed. The study sites were located within seven CRD parks (listed from northeast to southwest): Horth Hill (36 ha), Coles Bay (3.6 ha), Mount Work (575 ha), Thetis Lake (831 ha), Matheson Lake (157 ha), Roche Cove (163 ha), and East Sooke (1434 ha) regional parks and one Saanich park and adjacent private land: Calvert Municipal Park (10 ha)/ Trevlac Pond (Figure 1). Previous records for the Blue-grey Taildropper existed from Mount Work (Durrance Lake portion) and Thetis Lake Regional Parks (Ovaska and Sopuck 2010). However, these parks are large, and many areas have not been surveyed for gastropods. The other sites contain potentially suitable habitat for the species but have no previous records. Additionally, a landowner with a 10 acre residential property with Garry oak/arbutus woodland in Saanich allowed us to place gastropod cover-objects on the property.

Within the selected sites, we placed survey transects in moist areas within mixed-wood forests, containing Douglas-fir, Arbutus, Bigleaf Maple, and/or Garry Oak. We circumvented Garry Oak meadows to avoid disturbance to these sensitive habitats, and sampled only along fringes of Garry Oak ecosystems.

### 4.0 METHODS

#### 4.1 Survey methods and effort

As previously, we used small artificial cover-objects (ACOs) constructed of 30 cm x 30 cm layered sheets of corrugated cardboard to survey for gastropods (Hawkins *et al.* 1998, Ovaska and Sopuck 2001, 2008). Based on previous studies, these ACOs are effective in detecting the Blue-grey Taildropper and other gastropods. The slugs are attracted to the moist refuges under and between the cardboard layers. The ACOs allow repeated surveys of sensitive ecosystems with minimal disturbance to the habitat and without harming gastropods or other animals, which can move freely in and out of the cover-objects.

In CRD regional parks, the ACOs were placed along 100 m-long transects at sampling stations 10 m apart. Each station had two ACOs, about 1 m apart, to increase the coverage of available microhabitats. There were 13 transects within CRD regional parks, each with 10 sampling stations (Table 1). There were two sampling plots near Trevlac Pond, one in Calvert Municipal Park and another one on residential land just north of the park. These plots had been established in 2010 as part a salamander

monitoring project and were monitored by students from the Camosun College Environmental Technology Program. Each plot consisted of two parallel 50 m lines, each with 5 sampling stations. At each station, there was an existing salamander board made from 3 ft long wooden boards arranged in layers. We added two cardboard ACOs to each station; hence, each plot consisted of 20 cardboard ACOs and 10 wooden ACOs. The salamander boards also attract gastropods and were checked as part of the Blue-grey Taildropper surveys.

Additionally, ACOs were placed on a residential property in Saanich in microhabitats deemed suitable for the Blue-grey Taildropper on and along the fringes of a Garry Oak-*Arbutus* knoll. There were 13 stations, each with one cardboard ACO, as well as existing cardboard pieces placed there previously by the landowner. One of us (KO) inspected the existing cover-objects on the property with the landowner on 10 November 2011 while installing new ACOs. The Blue-grey Taildropper was not found. The landowner continues to inspect the cover-objects but has reported no findings of the target species to date.

The cover-objects were placed on the forest floor from 19 – 22 September in CRD parks and 4 October at Trevlac Pond/Calvert Park. They were allowed to weather for at least two weeks before the first survey. Each transect within CRD Parks and Trevlac Pond/Calvert Park was surveyed at least 3 times from 13 October to 23 November (2 transects were surveyed 4 times) (Table 2). The surveys were timed for late fall just before the onset of cold, frosty weather. This is the period when Blue-grey Taildroppers are most active and appear to be easiest to detect (Ovaska and Sopuck 2008, 2009). In total, 353 ACOs were placed along 17 transects or plots in 2011, and there were 1083 cover-object flips (i.e., inspections of all ACOs) (Table 1).

#### **4.2 Identification and data recording**

Identification of gastropods was done in the field using external characteristics; all animals were released after examination. We took photographs of the Blue-grey Taildroppers found as vouchers. Nomenclature for gastropods follows Forsyth (2004). We described the habitat at the center of each transect and at the site of each Blue-grey Taildropper observation by visually estimating canopy closure and percentage coverage by shrubs, ferns, herbaceous plants, moss and coarse woody debris. We also recorded the dominant overstorey and understorey plants at the center of each transect and noted any habitat disturbance to the site (Appendix 1).

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

Figure 1. Overview of survey site locations in 2011 (indicated by red stars and transect ID numbers).



**Table 1. Summary of search effort using artificial cover-objects (ACOs) to survey terrestrial gastropods in CRD in 2011.**

Site Name	# transects or plots <sup>1</sup>	# stations <sup>2</sup>	# ACOs <sup>3</sup>	# surveys	# of ACO flips
Coles Bay Regional Park	1	10	20	3	60
East Sooke Regional Park	4	40	80	3	240
Horth Hill Regional Park	2	20	40	3.5	140
Matheson Lake Regional Park	1	10	20	3	60
Mount Work Regional Park	2	20	40	3	120
Roche Cove Regional Park	1	10	20	3	60
Saanich Residential Property <sup>4</sup>	1	13	13	1	13
Trevlac Pond/Calvert Municipal Park	2	20	60	3.5	210
Thetis Lake Regional Park	3	30	60	3	180
Total	17	173	353	10	1083

<sup>1</sup> 100 m-long transects, except at 2 parallel 50 m transects/plot at Trevlac Pond/Calvert Park

<sup>2</sup> 10 sampling stations per transect or plot, 10 m apart.

<sup>3</sup> 2 cardboard cover-objects per sampling station, except at Trevlac Pond/Calvert Park, where there was an additional, existing salamander board at each station.

<sup>4</sup> Additional cardboard cover-objects were installed previously by the landowner

**Table 2. Survey dates of artificial cover-object transects in 2011.**

Site name	Trans. ID	Check 1	Check 2	Check 3	Check 4
Coles Bay Regional Park	1	26-Oct	3-Nov	23-Nov	NA
East Sooke Regional Park	1,2,3,4	25-Oct	08-Nov	17-Nov	NA
Horth Hill Regional Park	1, 2	14-Oct (T2 only)	26-Oct	3-Nov	23-Nov
Matheson Lake Regional Park	1	25-Oct	08-Nov	17-Nov	NA
Mt Work Regional Park	1, 2	24-Oct	4-Nov	22-Nov	NA
Roche Cove Regional Park	1	25-Oct	08-Nov	17-Nov	NA
Saanich Residential property	1	10-Nov	NA	NA	NA
Trevlac Pond/Calvert Municipal Park	1, 2	13-Oct (T1 only)	27-Oct	5-Nov	16-Nov
Thetis Lake Regional Park	1, 2, 3	16-18-Oct	2-Nov	10-13-Nov	NA

## 5.0 RESULTS

### 5.1 Overview of gastropods found

During surveys in 2011, we found 26 species of terrestrial gastropods, including 7 native and 5 introduced species of slugs, and 14 species of snails, all native (Table 3). The Pacific Banana Slug and the snails Robust Lancetooth, Northwest Hesperian, Pygmy Oregonian, and Tightcoils were widespread and found at more than 40% of the transects. The Northwest Hesperian dominated the samples (35.7% of all gastropod observations), followed by the Pacific Banana Slug (13.8%) and Pygmy Oregonian (10.4%; Table 4).

Introduced slugs were most commonly found at Coles Bay and Trevlac Pond/Calvert Park, reflecting the proximity of these sites to residential areas.

**Table 3. Terrestrial gastropod species and transects where found in CRD in 2011.**

Numbers in cells denote transect identification numbers.  
n = total # of transects per site

SPECIES	Coles Bay (n=1)	East Sooke (n=4)	Horth Hill (n=2)	Matheson Lake (n=1)	Mount Work (n=2)	Roche Cove (n=1)	Thetis Lake (n=3)	Trevlac/Calvert (n=2)	# of transects (n=16)	% of transects
<b>Slugs:</b>										
Pacific Banana-slug, <i>Ariolimax columbianus</i>	1	1, 2, 3, 4	1, 2			1	1, 2, 3	1, 2	13	81.3
Brown-banded Arion, <i>Arion circumscriptus</i> *	1								1	6.3
Hedgehog Arion, <i>Arion intermedius</i> *	1								1	6.3
Chocolate Arion, <i>Arion rufus</i> *		1, 3	1					1, 2	5	31.3
Meadow Slug, <i>Deroceras laeve</i>								1	1	6.3
Grey Fieldslug, <i>Deroceras reticulatum</i> *	1								1	6.3
Warty Jumping-slug, <i>Hemphillia glandulosa</i>		1							1	6.3
Giant Gardenslug, <i>Limax maximus</i> *	1							1	2	12.5
Reticulate Taildropper, <i>Prophysaon andersonii</i> <sup>^</sup>	1	2, 4						1	4	25.0
Blue-grey Taildropper, <i>Prophysaon coeruleum</i>							3	1	2	12.5

SPECIES	Coles Bay (n=1)	East Sooke (n=4)	Horth Hill (n=2)	Matheson Lake (n=1)	Mount Work (n=2)	Roche Cove (n=1)	Thetis Lake (n=3)	Trevlac/Calvert (n=2)	# of transects (n=16)	% of transects
Yellow-bordered Taildropper, <i>Prophysaon foliolatum</i>							1, 2, 3		3	18.8
Scarletbacked Taildropper, <i>Prophysaon vanatta</i>								1	1	6.3
<b>Snails (large; adult shell width <math>\geq</math> 8 mm):</b>										
Pygmy Oregonian, <i>Cryptomastix germana</i>	1	1, 2, 3, 4	1, 2		1	1			9	56.3
Robust Lancetooth, <i>Haplotrema vancouverense</i>	1	2, 3, 4	1, 2		1		1	1	9	56.3
Pacific Sideband, <i>Monadenia fidelis</i>							3		1	6.3
Northwest Hesperian, <i>Vespericola columbianus</i>	1	1, 2, 4	1, 2	1	1, 2	1	1, 2, 3	1, 2	15	93.8
<b>Snails (small with adult shell width &lt; 8 mm):</b>										
Toothless Column, <i>Columella edentula</i>		3		1	2				3	18.8
Glossy Pillar, <i>Cochlicopa lubrica</i>							1		1	6.3
Brown Hive, <i>Euconulus fulvus</i>		2			1, 2				3	18.8
Vancouver Snail, <i>Microphysula cookei</i>					1				1	6.3
Blue Glass, <i>Nesovitrea binneyana</i>					1, 2		2		3	18.8
Tightcoil species, <i>Pristiloma</i> sp. ( <i>P. stearnsii</i> and/or <i>P. lansingii</i> )	1	1, 2, 4	1	1				2	7	43.8
Conical Spot, <i>Punctum randolphii</i>				1					1	6.3
<i>Vertigo</i> species		1, 4			1, 2		2	2	6	37.5
Western Glass-snail, <i>Vitrina pellucida</i>					1			1	2	12.5
Quick Gloss, <i>Zonitoides arboreus</i>		2						1	2	12.5

\* denotes introduced species

^ Identified by colour pattern only; positive identification to distinguish from *P. foliolatum* requires dissection.



**Table 4. Terrestrial gastropod species and numbers found in CRD in 2011.**

Numbers in cells denote the total number of individuals found.

n = total # of transects per site

SPECIES	Coles Bay (n=1)	East Sooke (n=4)	Horth Hill (n=2)	Matheson Lake (n=1)	Mount Work (n=2)	Roche Cove (n=1)	Thetis Lake (n=3)	Trevlac/ Calvert (n=2)	# of animals (269)	% of all animals
<b>Slugs:</b>										
Pacific Banana-slug, <i>Ariolimax columbianus</i>	2	14	7			4	6	4	37	13.8
Brown-banded Arion, <i>Arion circumscriptus</i> *	1								1	0.4
Hedgehog Arion, <i>Arion intermedius</i> *	1								1	0.4
Chocolate Arion, <i>Arion rufus</i> *		2	1					4	7	2.6
Meadow Slug, <i>Deroceras laeve</i>								4	4	1.5
Grey Fieldslug, <i>Deroceras reticulatum</i> *	6								6	2.2
Warty Jumping-slug, <i>Hemphillia glandulosa</i>		1							1	0.4
Giant Gardenslug, <i>Limax maximus</i> *	2							3	5	1.9
Reticulate Taildropper, <i>Prophysaon andersonii</i> <sup>^</sup>	1						4	5	10	3.7
Blue-grey Taildropper, <i>Prophysaon coeruleum</i>							1	1	2	0.7
Yellow-bordered Taildropper, <i>Prophysaon foliolatum</i>		5							5	1.9
Scarletbacked Taildropper, <i>Prophysaon vanatta</i> e								2	2	0.7
<b>Snails (large; adult shell width <math>\geq 8</math> mm):</b>										
Pygmy Oregonian, <i>Cryptomastix germana</i>	5	17	3		1	2			28	10.4
Robust Lancetooth, <i>Haplotrema vancouverense</i>	3	5	4		1		2	1	16	5.9
Pacific Sideband, <i>Monadenia fidelis</i>							1		1	0.4
Northwest Hesperian, <i>Vespericola columbianus</i>	5	15	3	4	11	5	9	44	96	35.7

SPECIES	Coles Bay (n=1)	East Sooke (n=4)	Horth Hill (n=2)	Matheson Lake (n=1)	Mount Work (n=2)	Roche Cove (n=1)	Thetis Lake (n=3)	Trevlac/ Calvert (n=2)	# of animals (269)	% of all animals
<b>Snails (small with adult shell width &lt; 8 mm):</b>										
Toothless Column, <i>Columella edentula</i>		1		1	2				4	1.5
Glossy Pillar, <i>Cochlicopa lubrica</i>							1		1	0.4
Brown Hive, <i>Euconulus fulvus</i>		1			2				3	1.1
Vancouver Snail, <i>Microphysula cookei</i>					1				1	0.4
Blue Glass, <i>Nesovitrea binneyana</i>					2		1		3	1.1
Tightcoil species, <i>Pristiloma</i> sp. ( <i>P. stearnsii</i> and/or <i>P. lansingii</i> )	2	17	1	1				1	22	8.2
Conical Spot, <i>Punctum randolphii</i>				1					1	0.4
<i>Vertigo</i> species		2			3		1	1	9	2.6
Western Glass-snail, <i>Vitrina pellucida</i>					2			1	3	1.1
Quick Gloss, <i>Zonitoides arboreus</i>		1						1	2	0.7

\* denotes introduced species

^ Identified by colour pattern only; positive identification to distinguish from *P. foliolatum* requires dissection.

## 5.2 Blue-grey Taildropper

The Blue-grey Taildropper was found at two sites: Thetis Lake Regional Park (Transect 3) and Trevlac Pond (Transect 1). The site in Thetis Lake Regional Park, near Prior Lake, is 200 m to the east of a previous observation in 2010 (Ovaska and Sopuck 2010). The species has also been reported from another site in the park, located 1.7 km south of the Prior Lake site (Ovaska and Sopuck 2008, 2009). The observation at Trevlac Pond represents a new distribution record and is located 0.86 km west of the nearest previous observation in Logan Park (Ovaska and Sopuck 2010). The habitat is relatively continuous between Trevlac Pond and Logan Park and consists mainly of rural residential properties.

The Blue-grey Taildropper at Thetis Lake was found on 2 November 2011. Habitat consisted of a relatively open stand of old-growth Douglas-fir with a dense shrub understorey dominated by Salal (Table 5). A deep moss layer covered much of the forest floor and might provide important moist hiding places for the slugs. This site was

on a slope below a rocky knoll with Garry Oak and Arbutus. The vegetation of the area was relatively undisturbed except for several unofficial hiking trails. The rocky knolls receive some use by sunbathers in summer.

On 5 November 2011, a Blue-grey Taildropper was found by Trevlac Pond. The habitat consisted of relatively dense, second-growth forest dominated by Western Redcedar and Douglas-fir with a Bigleaf Maple component (Table 5). The understory was moderately dense with Salal, Oregon Grape, Ocean Spray, and a few scattered Sword Ferns. Coarse woody debris was extremely abundant at the sampling station where the species was found and probably provides moist refuges for the slugs. The property contains a network of lightly used trails and is surrounded by large residential lots and Calvert Municipal Park. We did not find the species on the survey plot in the park, but it is highly probable that it occurs there as well based on habitat continuity.

**Table 5. Habitat at sites of Blue-grey Taildropper records in 2011.**

Herbaceous plants could not be assessed due to time of year (November)

Habitat feature	Thetis Lake Regional Park: Transect 3 (ACO 1b*)	Trevlac Pond: Transect 1b (ACO 6c*)
Dominant tree species	Douglas-fir	Western Redcedar, Douglas-fir, Bigleaf Maple, Grand Fir
Estimated Stand Age	120+	60-70
Dominant shrub species	Salal, Oregon Grape, Ocean Spray	Salal, Oregon Grape, Rose, Ocean Spray
Fern species	Sword Fern	Sword Fern
% canopy closure	50	60
Shrubs: % coverage	80	30
Ferns: % coverage	5	5
Coarse Woody Debris: % coverage	0	10
Moss: % coverage	80	30
Substrate	moss	leaf/needle/moss
Comments	Old Douglas-fir forest; several unofficial trails in area used by hikers and sunbathers	Hillside with E-SE aspect by pond; 2nd growth forest; small paths, rarely used by park visitors (limited access); introduced slugs

\*ACO refers to identification of artificial cover-object where the slugs were found along the transects.

Other native species of gastropods found on the two transects with Blue-grey Taildroppers included the Pacific Banana Slug, Meadow Slug, Reticulate Taildropper, and Scarletback Taildropper, as well as a number of species of native snails (Table 6). Introduced slugs (Chocolate Arion and the Giant Gardenslug) were prevalent at the Trevlac Pond site (Table 6).

**Table 6. Species and numbers of gastropod species found on transects at Thetis Lake Regional Park and Trevlac Pond with records of the Blue-grey Taildropper in 2011.**

Numbers in cells denote total number of individuals found.

SPECIES	Thetis Lake: Transect 3	Trevlac Pond Transect 1
<b>Slugs:</b>		
Pacific Banana-slug, <i>Ariolimax columbianus</i>	4	4
Chocolate Arion, <i>Arion rufus</i> *	0	3
Meadow Slug, <i>Deroceras laeve</i>	0	4
Giant Gardenslug, <i>Limax maximus</i> *		3
Reticulate Taildropper, <i>Prophysaon andersonii</i>	2	5
Blue-grey Taildropper, <i>Prophysaon coeruleum</i>	1	1
Scarletbacked Taildropper, <i>Prophysaon vanatatae</i>	0	2
<b>Snails (large; adult shell width <math>\geq</math> 8 mm):</b>		
Robust Lancetooth, <i>Haplotrema vancouverense</i>	0	1
Pacific Sideband, <i>Monadenia fidelis</i>	1	
Northwest Hesperian, <i>Vespericola columbianus</i>	1	2
<b>Snails (small with adult shell width &lt; 8 mm):</b>		
Quick Gloss, <i>Zonitoides arboreus</i>	0	1
Western Glass-snail, <i>Vitrina pellucida</i>	0	1

\*denotes introduced species

### 5.3 Other gastropod species at risk

Three provincially blue-listed species were found during the 2011 surveys: Warty Jumping-slug (Special Concern by COSEWIC), Scarletback Taildropper, and Pacific Sideband (Tables 3 and 4). One adult Warty Jumping-slug was found on Transect 1 in East Sooke Park on 17 November. The slug was in a Western Redcedar/Red Alder grove with Sword Fern understorey. The site was very moist and contained massive amounts of coarse woody debris (large logs and stumps). The Scarletback Taildropper was found on Transect 1 at Trevlac Pond; two juveniles were found during searches of natural habitat (away from ACOs) on 13 October. One juvenile Pacific Sideband was found on Transect 3 in Thetis Lake Regional Park on 13 November.

## 6.0 DISCUSSION

### 6.1 Blue-grey Taildropper

In 2011, we found the Blue-grey Taildropper at one site in Thetis Lake Regional Park and at another site by Trevlac Pond. The Trevlac Pond observation represents a new location for the species (Figure 2). Although the habitat is relatively continuous from Trevlac Pond to the nearest sighting at Logan Park about 1 km away, the presence of

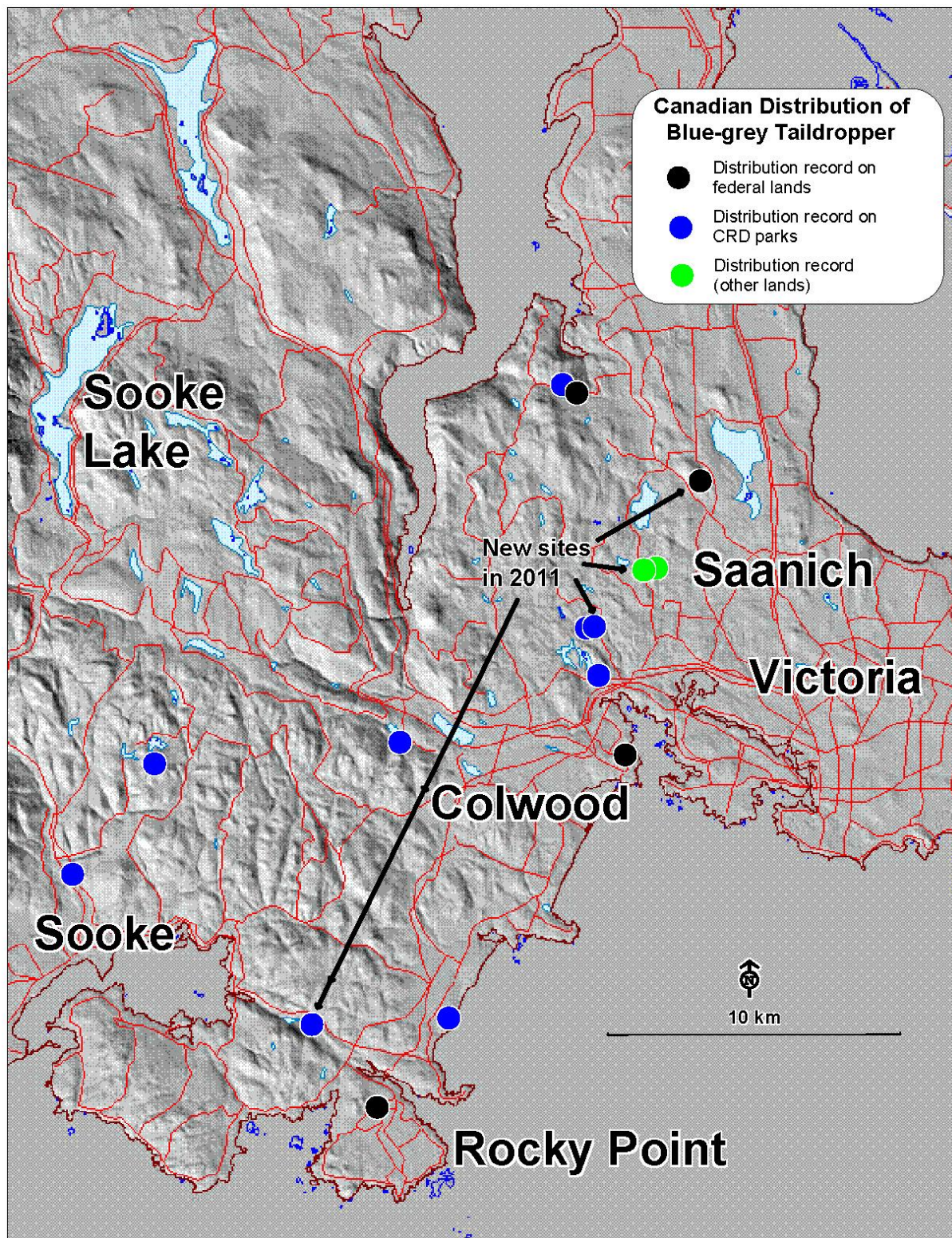
residential developments results in some isolation of these populations. The observation near Prior Lake in Thetis Lake Regional Park extends the known distribution of the species within the park only by about 200 m.

Two other new occurrences of the Blue-grey Taildropper were documented in 2011 as part of other surveys (Figure 2). On April 30, three small juveniles were found on mushrooms in Matheson Lake Regional Park (K. Trim and A. Ceska, pers. comm.; inspected live and from photographs, respectively, by L. Sopuck). On 1 November, an adult Blue-grey Taildropper was found under a cover-object used to survey Sharp-tailed Snakes (*Contia tenuis*) on Observatory Hill in Saanich (L. Sopuck, pers. notes). This slug was found in Garry Oak habitat.

The Blue-grey Taildropper is patchily distributed in the landscape and appears to prefer moist sites in relatively open forests containing a deciduous component with often a dense understorey (COSEWIC 2006, Ovaska and Sopuck 2010). All the observations in 2011 (Thetis Lake, Trevlac Pond, Matheson Lake, and Observatory Hill) were in relatively open-canopy woodlands with a dense understorey of either shrubs or herbs. Several previous observations, including one in 2011 (Observatory Hill), were within Garry Oak habitats, but the species is clearly not restricted to these ecosystems. Forest openings may provide suitable warm habitats for the species that exists at the northern extremity of its distribution on Vancouver Island. Suitable moist microhabitats for shelter appear to be an important habitat feature but may be variously provided by deep moss mats or coarse woody debris. In addition to the Thetis Lake site, the species has been found within moss mats at other sites, including Devonian, Mount Work, and Sooke Hills Wilderness regional parks. Habitat use of the slugs on Vancouver Island is poorly understood, reflecting the small number of sites identified to date. Additional information on the slugs' habitat use is required to help target survey efforts to most likely locations and to assist in developing habitat-based management.

As found previously (Ovaska and Sopuck 2010), the focus on late autumn surveys appears to be a good strategy to detect the Blue-grey Taildropper. Three of the 4 new sightings in 2011 occurred in early November just prior to the onset of frosty weather. The observation of juveniles on mushrooms in Matheson Lake Regional Park in 2011 suggests that additional survey effort in early spring may greatly improve the detection of juvenile slugs. In addition to checking cover-objects, these surveys should involve examination of mushrooms. Spring surveys would help identify sites where juvenile slugs have hatched and/or overwintered and would provide additional information on the habitats and life history of the species.

Figure 2. Summary of known occurrences of the Blue-grey Tailedropper on Vancouver Island, including sites of new records obtained in 2011.



Over the past 5 years, survey efforts have greatly expanded the database on the distribution of Blue-grey Taildroppers and other terrestrial gastropods at risk within CRD Parks (Appendix 2). This information is needed to develop appropriate management plans for gastropod species at risk. CRD Parks contain a large area of relatively undisturbed habitat suitable for the Blue-grey Taildropper within an urban/rural residential setting, and the protection of this habitat is very important in maintaining the viability of this species.

Potential habitat for the Blue-grey Taildropper and other gastropods at risk also exists in municipal parks and on private residential lands. In 2010, two Blue-grey Taildroppers were found in Logan Park, a Saanich municipal park, and in 2011 additional surveys were conducted in Calvert Park, close to where the species was found. In 2010 and 2011, landowner contacts were initiated in potentially suitable habitats. In 2011, a Blue-grey Taildropper was found on a residential property near Trevlac Pond and most likely also occurs in the adjacent Calvert Park, as the habitat is contiguous. We plan to involve more landowners in the program in 2012.

## **6.2 Other Gastropod Species At Risk**

In addition to the Blue-grey Taildropper, three other listed species were found: Warty Jumping-slug, Pacific Sideband, and Scarletback Taildropper.

In Canada, the Warty Jumping-slug (COSEWIC: Special Concern; B.C. blue-list) has been found only on the southern half of Vancouver Island and has a very patchy distribution. The slug's location is about 2.3 km from two other nearby sites in East Sooke Park near Anderson Cove in 2003 and 2009 (Ovaska and Sopuck 2004, 2009). The Warty Jumping-slug occurs in very moist habitats and is most frequently found along the west coast of Vancouver Island between Sooke and Port Renfrew.

The blue-listed Pacific Sideband is our largest land snail on the west coast. The species is relatively widespread in low-elevation mixed-wood stands forests on Vancouver Island and the mainland coast. In 2011, we found this species in Thetis Lake Regional Park (Transect 3). There are previous records of the species from many locations within CRD, including regional parks.

The blue-listed Scarletback Taildropper appears to be uncommon within CRD, but has a relatively wide distribution in coastal forests of south-western B.C. In 2011, two small juveniles were found on a tree at Trevlac Pond, close to where the Blue-grey Taildropper was found. This species is often arboreal and may be more common than surveys of the forest floor indicate. However, at other sites, such as Burns Bog on mainland B.C., the species is readily found using cardboard cover-objects (Ovaska *et al.* 2011).

## 7.0 SITE-SPECIFIC THREATS AND RECOMMENDED MITIGATION

Ovaska and Sopuck (2009, 2010) provided a comprehensive list of measures to mitigate the effects of human activities on the Blue-grey Taildropper. The main threats identified in CRD parks include excessive trail networks, off-trail mountain bike and ATV use, invasive plants and animals, vegetation management activities, and forest encroachment of openings (forest gaps) and Garry Oak ecosystems.

Unauthorized ATV use and introduced, invasive plants and slugs were identified as threats in Logan Park, a Saanich municipal park where the species found in 2010 (Ovaska and Sopuck 2010), and which is continuous through rural residential properties with Calvert Park. Residential development and land clearing activities are a threat to sites located outside of parks.

Habitat disturbance caused by hikers using unofficial trails was observed at the Thetis Lake, Matheson Lake, and Trevlac Pond/Calvert Park sites in 2011. Additional trail signs, barricading of unofficial trails, and habitat restoration of trampled areas are recommended to mitigate these threats.

At Trevlac Pond, the Blue-grey Taildropper site is effectively barricaded from visitors using the adjacent Calvert Park. Introduced slugs and invasive exotic plants were considered a potential threat at this site.

At all sites, removal of invasive plants is recommended but should be carried out with care with minimal disturbance to the soils and avoiding compaction of the forest floor by trampling. Sites that would particularly benefit from invasive plant removal include the Trevlac Pond area, both within and adjacent to Calvert Park, and Garry Oak – Arbutus habitat within Thetis Lake and Devonian regional parks where the Blue-grey Taildropper has been found in previous years (Ovaska and Sopuck 2008, 2009).

## 8.0 RECOMMENDATIONS FOR 2012

- Continue surveys focusing on new areas with potentially suitable habitat for the Blue-grey Taildropper. Continued surveys are an important action to conserve the Blue-grey Taildropper. Surveys to determine the range and habitat preferences of the Blue-grey Taildropper are needed to guide future land protection efforts and habitat restoration, and to determine critical habitat for the species.
- Collaborate with Saanich Municipality to expand surveys in Saanich municipal parks.
- Encourage landowners to participate in surveys and stewardship efforts within suitable habitats on private lands.
- Continue the strategy of late fall surveys using ACOs but also consider conducting spring surveys to detect juvenile slugs on mushrooms.



## 9.0 LITERATURE CITED

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## APPENDICES

### Appendix 1. Habitat characteristics for sites searched for terrestrial gastropods in 2011.

Assessment conducted from 3-8 November 2011.

Transect (Tr.) ID refers to individual transects of 10 artificial cover-object (ACO) stations, 10 m apart, each with 2 cardboard covers

Trees: Dominant species within 20 m radius at center of transect; Understorey vegetation (shrubs, ferns): Dominant species (total percentage of ground coverage by layer) within 10 m radius area near center of transect; note: herbaceous species could not be accurately assessed due to time of year (November). CWD: Coarse woody debris (logs, bark and other wood on the forest floor with diameter of 15 cm or more) within 10 m radius area near centre of transect.

Habitat rating: Assessed for Blue-grey Taildropper based on visual inspection of habitat on the ground: L –low, M-moderate, H–high.

Site name	Tr. ID	Dominant trees	Stand age	Dominant shrubs	Dominant ferns	Canopy (%)	Shrub (%)	Herb (%)	Fern (%)	CWD (%)	Moss (%)	Litter type (rel. depth)	Habitat rating	Habitat notes for entire transect	Habitat disturbance
Horth Hill	T2	Douglas-fir, Arbutus, Western Redcedar	50	Ocean Spray, Red Huckleberry, Saskatoon, Salal, Rose, Red Huckleberry, Honeysuckle, Tr. Blackberry	Licorice Fern, Sword Fern	50	30	TR	50	25	95	Moss, needles (deep)	M	Upper slope, east-facing, dense understorey	Old logging, excessive trails
Horth Hill	T1	Douglas-fir, Bigleaf Maple, Grand Fir, Western Redcedar, Arbutus, Cascara	60-120	Ocean Spray, Indian Plum, Snowberry, Rose, Tr, Blackberry, Holly	Licorice Fern, Sword Fern	40	85	TR	10	25	80	Moss, leaves, needles; Cobbles (moderate)	M	Lower slope, south-facing, a few older trees, dense understorey	Old logging, Ivy on east end, excessive trails
Coles Bay	T1	Douglas-fir, Bigleaf Maple, Grand Fir, Garry Oak	100	Snowberry, Ocean Spray, Laurel-leaved Daphne, Indian Plum, Oregon Grape, English Ivy, Rose, Tr. Blackberry	Nil	80	60	TR	Nil	4	40	Leaves, needles (moderate)	M	Old Douglas-fir stand with deciduous component	Invasive plants and nearby houses
Thetis Lake (SW end)	T1	Douglas-fir, Arbutus	50-60	Ocean Spray, Salal, Rose, Red Huckleberry	Licorice Fern	40	40	TR	TR	5	100	Moss (deep)	M	On ridge in open forest; deep moss layer & series of mossy rock-outcrops on undulating terrain	Unofficial trails & sign of mountain biking; appears to be free of introduced, invasive shrubs

Site name	Tr. ID	Dominant trees	Stand age	Dominant shrubs	Dominant ferns	Canopy (%)	Shrub (%)	Herb (%)	Fern (%)	CWD (%)	Moss (%)	Litter type (rel. depth)	Habitat rating	Habitat notes for entire transect	Habitat disturbance
Thetis Lake (SW end)	T2	Douglas-fir, Arbutus	50-60	Salal, Ocean Spray, Rose	Licorice Fern	50	40	5	TR	5	100	Moss (deep)	M	Forest and small Garry Oak opening on mossy cliff; a few larger (older) trees	Unofficial trails; appears to be free of introduced, invasive shrubs
Thetis Lake (Prior L.)	T3	Douglas-fir, Arbutus	120+	Salal, Oregon Grape, Ocean Spray, Red Huckleberry	NA	50	60	10	0	TR	80	Grass, moss (deep)	H	Old Douglas-fir forest fringing a rocky ridge with Garry Oak and Arbutus with mostly moss ground cover on SE slope	Unofficial trails; general area used by sunbathers and hikers
Thetis Lake (Prior L.)	T3	Douglas-fir	120+	Salal, Oregon Grape, Ocean Spray	Sword Fern	50	80	0	5	0	80	Moss (deep)	H	Site where PROCO found in old Douglas-fir forest	Unofficial trails; general area used by sunbathers and hikers
Mount Work	T1	Arbutus, Douglas-fir	40	Ocean Spray, Honeysuckle, Rose, Tr. Blackberry, Salal, Snowberry, Oregon Grape	Licorice Fern, Sword Fern	50	80	TR	2	5	75	Leaves, moss, cobbles (moderate)	M	Along ridge, young forest with dense understorey	Old logging/burning
Mount Work	T2	Arbutus, Douglas-fir, Western Redcedar	40	Ocean Spray, Rose	Sword Fern	40	90	TR	10	2	95	Moss (deep)	L-M	Higher elevation (311 m asl) ridge, young forest with very dense understorey, thick moss	Old logging/burning
East Sooke: Park Heights	T1	Douglas-fir, Western Hemlock, Western Redcedar, Alder,	70	Salal, Red Huckleberry, Ocean Spray, Willow	Sword Fern	60	75	NA	30	7	60	Needles, leaves, ferns (moderate)	M	Lower slope with dense salal and sword ferns	Old logging and some old skid roads
East Sooke: Park Heights	T2	Western Hemlock, Western Redcedar, Alder	80+	Salal	Sword Fern	60	5	NA	30	25	10	Leaf, needle (moderate)	L-M	Near bottom of ravine with stream at bottom; SW slope	Some old stumps

Site name	Tr. ID	Dominant trees	Stand age	Dominant shrubs	Dominant ferns	Canopy (%)	Shrub (%)	Herb (%)	Fern (%)	CWD (%)	Moss (%)	Litter type (rel. depth)	Habitat rating	Habitat notes for entire transect	Habitat disturbance
East Sooke: Aylard's Farm	T3	Western Redcedar, Western Hemlock, Alder	60	Salal, Ocean Spray, Oregon Grape	Sword Fern	50	20	NA	5	10	40	Needle (some moss)(thin)	L-M	Lower slope (toe) of hill above) with S-SE aspect (153 dgr)	Sign of old logging, compacted soil; recent brushpile; main trail downslope
East Sooke: Aylard's Farm	T4	Douglas-fir, Western Redcedar, Pine, Alder	50-60	Salal, Ocean Spray, Salmonberry, Alder	Sword Fern	40	50	NA	TR	15		Needle, moss (thin)	L-M	Ridge sloping steeply to trail on one side, creek on the other	Main trail to S-SW within 30 m; signs of old logging
Roche Cove	T1	Douglas-fir, Grand Fir, Alder	90	Salal, Ocean Spray, Trailing Blackberry	Sword Fern	30	50	NA	5	TR	90	Needle, leaf, moss (moderate)	M-H	Transect goes through rocky, moss-covered knoll (Stns 3 - 6)	Trails in the vicinity (official)
Matheson Lake	T1	Douglas-fir, Western Redcedar, Arbutus, Grand Fir	100+	Salal, Rose, Saskatoon	Bracken Fern	20	100	NA	1	5	20	Leaf, needle, moss (moderate)	M-H	Beginning of transect by previous PROCO site by moss-covered knoll; heavy salal cover	Unofficial small trails & trash (beer bottles), indicating recreational use of knolls
Trevlac Pond	T1	Western Redcedar, Douglas-fir, Bigleaf Maple, Grand Fir	50-60	Salal, Oregon Grape, Rose, Ocean Spray	Sword Fern	60	30	NA	5	10	30	Leaf, needle, moss	H (at PROCO site)	Hillside with E-SE aspect by pond	2nd growth forest; small paths, rarely used by park visitors (no access); introduced slugs
Trevlac Pond	T2	Douglas-fir, Grand Fir	60-70	Salal, Oregon Grape	None	40	60	NA	0	TR	80	Moss	M	Hillside with SW-W aspect by pond	2nd growth forest; small path used by park visitors
East Sooke: Park Heights	T1	Western Redcedar, Douglas-fir, Western Hemlock, Red Alder, B. Cherry	70	Salal, Red Huckleberry, O. Spray (small amount)	Sword Fern	80	10	NA	20	30	60	Needles, moss, leaves (moderate)	M	Lower slope, cedar stand upslope and alder/Sword Fern stand below, slug found under cedar trees with huge amount of CWD in area (large logs and stumps)	Old logging and skid road in area, plus park trail/road

**Appendix 2. History of terrestrial gastropod surveys in CRD Regional Parks and Trails System, 2003 – 2011.**

Park or Trail	2003	2004	2006	2007	2008	2009	2010	2011	Source
Bear Hill					Oct-Nov		Oct-Dec		Ovaska & Sopuck 2008, 2010
Coles Bay								Oct-Nov	Sopuck & Ovaska 2012 (this report)
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; Sopuck & Ovaska 2012 (this report)
Francis/King		Sep-Nov				Oct-Nov			Ovaska & Sopuck 2004, 2009
Galloping Goose Trail at Sooke		Nov	Oct-Nov	Nov	May-Jun; Oct-Nov				Ovaska & Sopuck 2004, 2006, 2007, 2008
Horth Hill								Oct-Nov	Sopuck & Ovaska 2012 (this report)
Lone Tree Hill		Sep-Nov							Ovaska & Sopuck 2004
Matheson Lake		Sep-Nov						Oct-Nov	Ovaska & Sopuck 2004; Sopuck & Ovaska 2012 (this report)
Mill Hill			Nov						Ovaska and Sopuck 2006
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; Sopuck & Ovaska 2012 (this report)
Roche Cove								Oct-Nov	Sopuck & Ovaska 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	Ovaska & Sopuck 2008, 2009, 2010; Sopuck & Ovaska 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	In 2011, sites outside CRD Parks were also surveyed for a total of 1083 ACO flips (Sopuck and Ovaska 2012)

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