REPTILE INVENTORY
FRENCH CREEK ESTUARY NATURE PRESERVE

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(Photo credit: E. Wind)

1.0 Introduction

The BC Parks Foundation led a fundraising campaign to conserve 9.22 hectares of ecologically sensitive land beside the French Creek estuary which was protected in 2022 as the *French Creek Estuary Nature Preserve* (FCENP; Fig. 1). The development of a Management Plan for this new Regional District of Nanaimo (RDN) managed preserve is ongoing, and ecological restoration efforts are underway. Funding was received through the Mount Arrowsmith Biosphere Region Research Institute (MABRRI) to conduct reptile surveys in 2025. There are five native reptile species that may occur in and around the FCENP: three snake, one lizard, and one turtle species, of which the latter is the species listed as being “at risk” (Table 1); two non-native reptile species may also occur in the area. Native reptile species utilize a variety of habitats, both terrestrial and aquatic, and require secure overwintering sites to survive.

The ***objectives*** of the reptile inventory in 2025 were to determine:

- Which reptile species occur within the FCENP
- Their distribution across broad habitat types within the FCENP
- The location of potential overwintering den sites

Based on the results of the inventory, the final objective was to provide habitat management recommendations that support local reptile populations while limiting the impacts of ongoing and future restoration work within the FCENP.

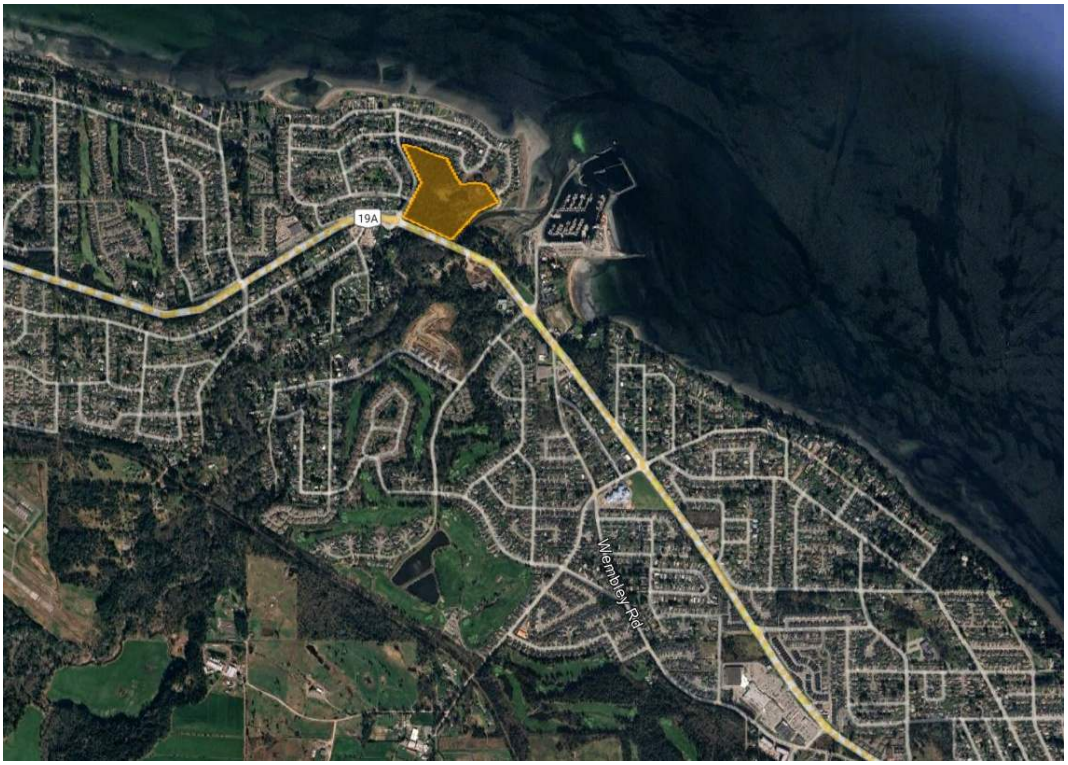

Figure 1. Location of the 9.22 ha French Creek Estuary Nature Preserve (orange polygon) north of Parksville on Vancouver Island.

Table 1. Reptile species that may occur within the FCENP, their provincial status, and general habitat associations.

Species Name	Common Name	Provincial Status	General Habitat Associations
SNAKES			
Thamnophis elegans	Western (Terrestrial) Garter Snake	Yellow	A variety of habitats (forested and open) near water
Thamnophis sirtalis	Common Garter Snake	Yellow	Aquatic habitats and riparian areas
Thamnophis ordinoides	Northwestern Garter Snake	Yellow	Damp, heavily vegetated habitats with edges and openings
LIZARDS			
Elgaria coerulea	Northern Alligator Lizard	Yellow	Coniferous forests with some edges and openings
TURTLES			
Chrysemys picta (pop. 1)	Painted Turtle	Red	Permanent freshwater habitats
NON-NATIVE / INVASIVE			
Podarcis moralis	Common Wall Lizard	Exotic	Open habitats with cover; avoids heavily forested areas
Trachemys scripta	Pond Slider Turtle	Exotic	Permanent freshwater habitats

2.0 Methods

2.1 Rationale for Visual Surveys

The technique that was used to conduct an inventory for reptiles in 2025 was visual encounter surveys (VES). VES are recommended as a rapid inventory technique for all reptile species that likely occur within the area of the FCENP (Graeter et al. 2013), and they do not require a wildlife handling permit from the province. Visual surveys are utilized in a variety of ways to survey for reptiles, with the approach being adapted for the local species and / or habitats. For example, turtles are surveyed at aquatic habitats at times when they may be basking (seasonally and daily). Visual surveys conducted along transects are used in terrestrial habitats to search for snakes and lizards, sometimes along environmental or habitat gradients (e.g., from open habitats into forest, or from forest edges into interior forest). The FCENP has a variety of habitat types that may influence species occurrence their location, including wetlands, forests, and relatively open areas occupied by shrubs (Fig. 2). Reptiles select for different habitats at different times of the day and year in order to thermoregulate during the active season (open, warm areas in spring / morning, and more shaded areas in the peak of the day / summer), and to overwinter. An aspect of the inventory included surveys along rocky outcrops to locate potential den sites where reptiles may spend the winter; reptiles cannot survive freezing temperatures and dens are a critical component contributing to the ongoing survival of local populations. Volunteers were given training by an experienced herpetologist on the survey design and data collection on June 13th and species identification handouts were provided.

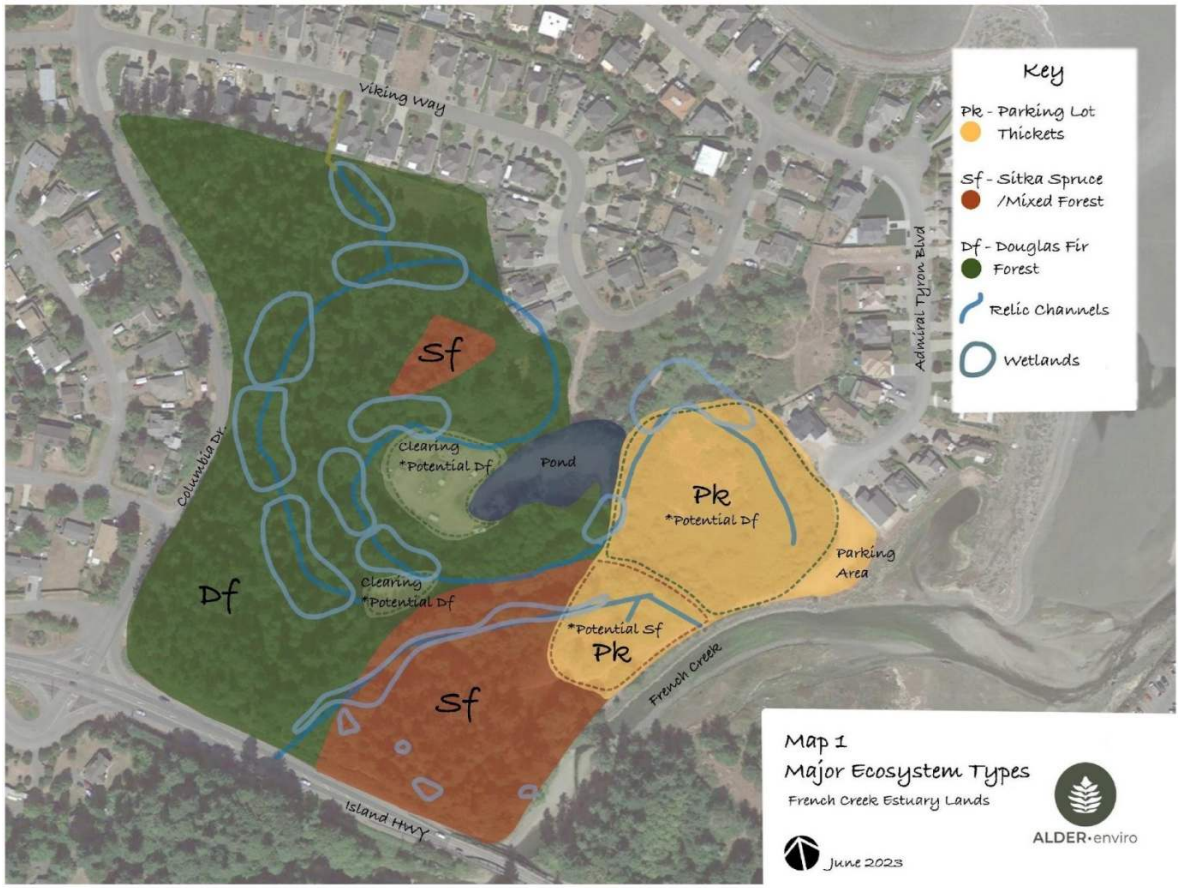

Figure 2. Habitats within the FCENP that could influence reptile presence and location.

2.2 VES Survey Design

VES for snakes, lizards, and turtles occurred along numbered survey trail routes within the FCENP that traversed through different habitat types (see Figs. 2 and 3). The VES occurred once per week with the start time varying across surveys between morning, mid day, or evening. Surveyors slowly walked each trail scanning for reptiles during this designated time (i.e., all trails were surveyed simultaneously) to avoid double counting. A transect was included along the largest pond in the FCENP where turtles have been observed in the past. Surveyors walked this perimeter transect scanning shoreline areas and logs for turtles.

The survey date, time, weather conditions (air temperature, cloud cover), and species observed was recorded for each survey and entered onto a VES datasheet (Appendix A). The location of any reptiles observed was recorded using a cell phone. Where possible, a photograph was taken of each individual observed for species identification purposes. All survey data results were entered into an Excel database (Appendix B) and observation GPS information was entered into Google Earth for location mapping.

In addition to VES, incidental reptile observations were also submitted and entered into the database.

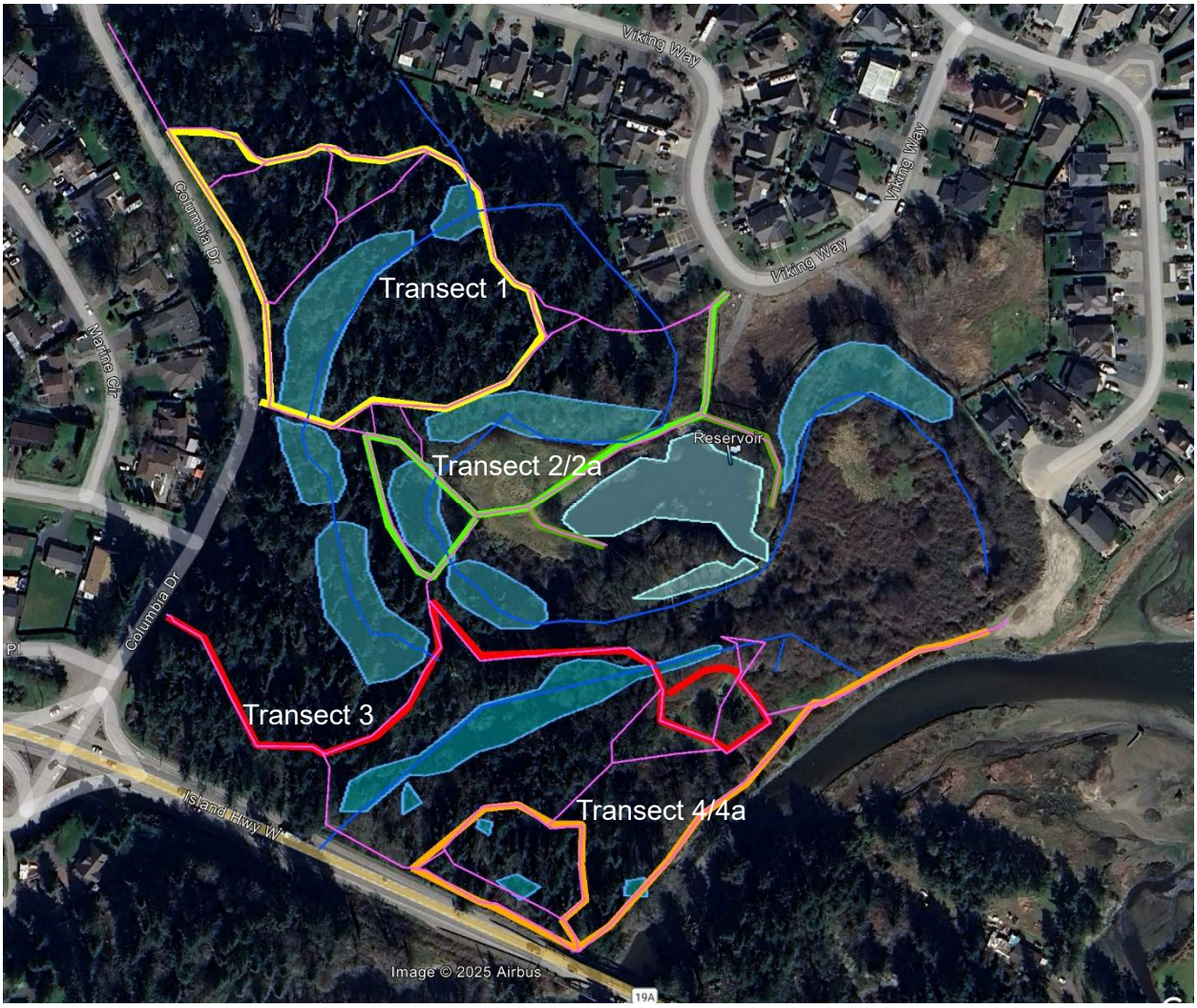

Figure 3. Location of the reservoir where basking turtle surveys took place [olive green perimeter transect line], and the four transect trail routes [yellow, light green, red, and orange lines] where surveys for lizards and snakes occurred in 2025.

3.0 Results & Discussion

A total of 15 volunteers conducted 20 surveys for reptiles between June 20 and Nov. 1, 2025 (Table 1; Appendix B). In total, reptiles were observed on 12 of the 20 survey days (60%); no reptiles were observed after Sept. 12th despite temperatures still remaining between 11-14°C on survey days. The average air temperature at the time of day when snakes were observed was warmer than when they were not (19.4°C versus 14.8°C respectively). Although the number of snakes observed was relatively equal across the three survey periods, more snakes were observed later in the day than earlier, especially when incidental observations were included (71% of evening surveys; Table 2). On most survey days that had reptile observations, only one individual of a snake, lizard, or turtle was observed; the maximum number of observations of a

snake or turtle observed on a given survey day across all survey routes was 2, suggesting that reptile densities within the FCENP may be relatively low.

Volunteers were unable to capture photographs of about half of the snakes observed, and none of the lizards, so species identification was somewhat limited. One of the lizard observations was described as being "green", which is indicative of the invasive Common Wall Lizard (*Podarcis muralis*). When turtle observations were recorded, they were confirmed to be the invasive Pond Slider (*Trachemys scripta*; Fig. 4). Of the 7 snake observations recorded during official trail surveys, 4 had associated photos (e.g., Fig. 5). An additional 15 snake observations were incidental, of which one had a photo and one had an identification from a volunteer that is familiar with snakes. Based on the photos and volunteer's identification, it appears that all three the species of gartersnake found on Vancouver Island occur within the FCENP, with *T. ordinoides* (3x) and *T. elegans* (2x) observed more than *T. sirtalis* (1x).

Snakes were observed on all survey routes except for Transect 3, which traverses from forested habitat in the west to relatively open habitat in the east (Fig. 6; Table 3). Transect 4 had snake observations on 4 survey days, followed by Transects 1 and 2 (observations on 2 survey days each). Transect 4 is mostly relatively open, it is south- and east-facing, and it runs along French Creek. Lizards were observed on Transect routes 2 and 3. As expected, because reptiles need to bask in sunlight in order to warm their body and digest their food, the majority of reptile observations captured during surveys and incidentally were of snakes in relatively open areas or close to forest edges within the FCENP (see Table 1 and Fig. 6).

Table 1. Survey effort and reptile species observed during VES.

Date	Survey Period	# Of Transects Surveyed	Air T. (*C)	Precip.	Snake	Lizard	Unk. Reptile	Turtle	Notes
20-Jun-25	18:46-19:30	4	18	No	1 (+ 2 incid.)				
27-Jun-25	8:20-9:00	4	13	No	1				7 American Bullfrogs
04-Jul-25	12:08-13:32	5	18	No	(1 incid.)	1 (Common Wall Lizard)		1 (Pond Slider)	2a route separated out
11-Jul-25	18:13-19:10	5	23	No	1				
18-Jul-25	8:09-8:48	5	15	No	1				
25-Jul-25	12:15-13:45	5	18	No	1			2 (Pond Sliders)	
01-Aug-25	18:10-18:35	5	26	No	(1 incid.)	1			
08-Aug-25	8:05-9:15	5	14	No			1 (snake or lizard?)		
18-Aug-25	12:00-12:50	5	18	No	1 (+1 inc)				
22-Aug-25	18:00-18:26	5	25	No	1				
29-Aug-25	8:00-8:40	5	18	No					Heard Treefrogs; 5 Bullfrogs
05-Sep-25	12:02-12:50	5	21	No				1 (Pond Slider)	Treefrog
12-Sep-25	17:10-18:01	5	20	No	(1 incid.)				
19-Sep-25	9:00-9:32	5	13	No					
26-Sep-25	12:00-12:40	5	14	No					Heard Treefrog
03-Oct-25	17:00-17:50	5	14	No					Heard Treefrog
10-Oct-25	9:10-10:11	6	11	Yes					Added route 4a along river
17-Oct-25	12:11-12:31	6	12	No					
24-Oct-25	13:45-14:26	6	13	No					Heard Treefrog
01-Nov-25	15:10-16:30	6	11	No					

Table 2. Number of snakes observed across survey periods.

Survey Period	Number of Surveys	Number of Snake Observations		
		During Survey	Incidentally (immediately before or after survey)	Survey + Incid. Combined
Morning	6	2 (33%)	0	2 (33%)
Mid day	7	2 (43%)	2	3 (43%)
Evening	7	3 (43%)	4	5 (71%)

Figure 4. Invasive Pond Sliders were observed in the reservoir at the FCENP.
(photo credit: D. Erickson)

(photo credit: D. Erickson)

a) June 20, route 2; *T. elegans* (8 upper labial scales and “zig zag” yellow dorsal stripe)

(photo credit: S. Bingham)

b) July 11, route 1; *T. elegans* (“zig zag” yellow dorsal stripe)

(photo credit: B. Riordan)

c) July 25, route 4; *T. ordinoides* (pale yellow dorsal stripe)

(photo credit: D. Erickson)

d) July 21 incidental observation; *T. ordinoides* (small head; pale yellow dorsal stripe)

Figure 5. Images of some of the snakes observed in the FCENP in 2025.

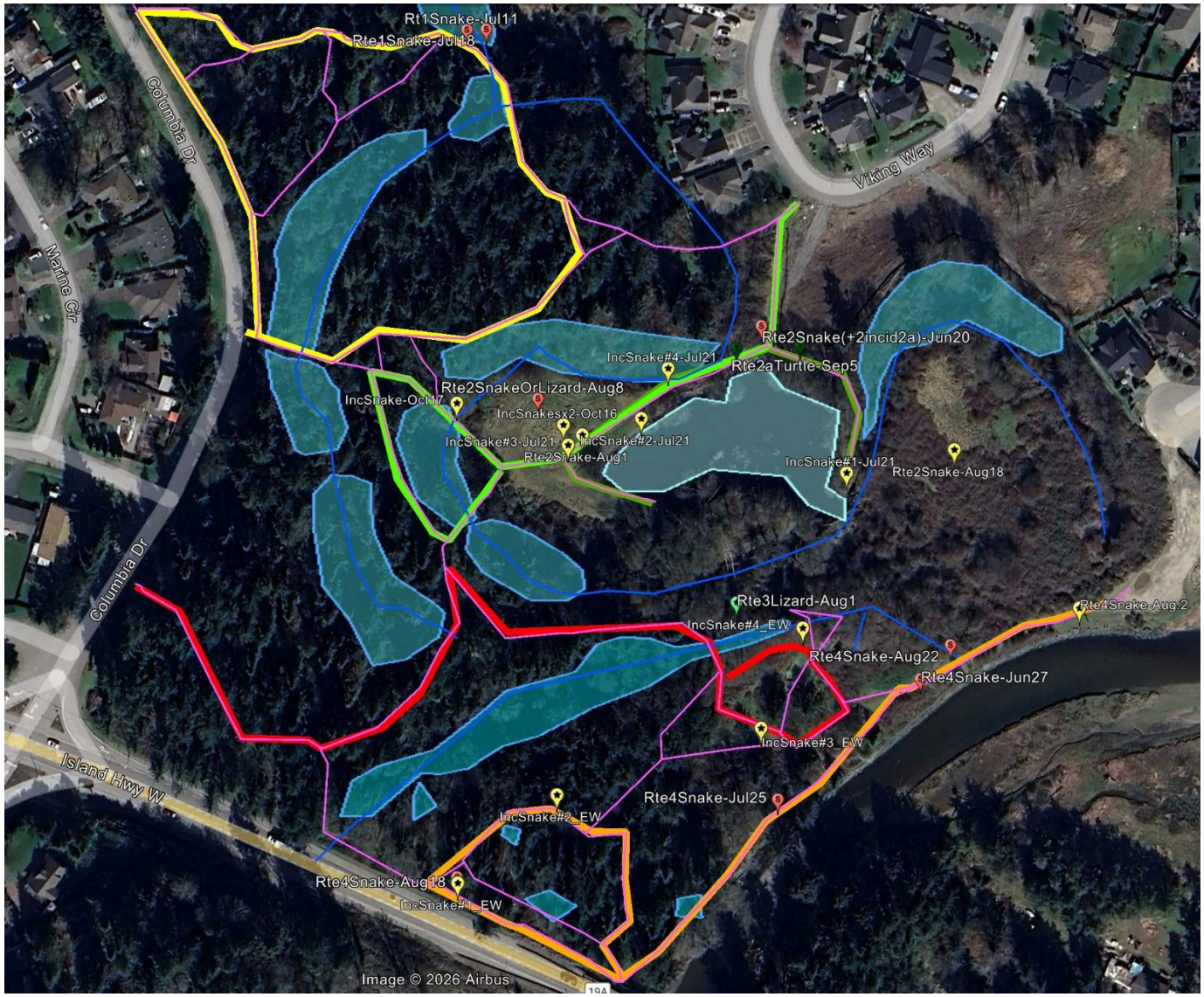

Figure 6. Location where reptiles (snakes, lizards, and turtles) were observed during targeted surveys along four transect routes (Rte; red and green symbols), and incidentally (Inc; yellow stars), within the FCENP in 2025. *Note:* Some location coordinates were not recorded during surveys, so some observations in Table 1 and Appendix B are not mapped here.

Table 3. Transect routes where reptiles were observed during surveys.

Survey Route	Number of Observations			
	Snakes	**Lizards**	**Unkn. species** (Snake or Lizard)	**Turtles**
1	**2** (*T. elegans* & *T. ordinoides*)	0	0	*NA*
2	**1** (*T. elegans*) (+1 incid; possibly *T. ordinoides*)	0 (1 incid; Common Wall Lizard)	**1**	*NA*
2a *(turtles only)*	*NA* (3 incid; 1 *T. ordinoides*)	*NA*	*NA*	**4** (Pond sliders)
3	0	**1**	0	*NA*
4	**4** (2 were *T. ordinoides*) (+1 incid; *T. sirtalis*)	0	0	*NA*
4a *(added in Oct)*	0	0	0	*NA*
# Routes With Observations	3 of 4	2 of 4	1 of 4	1 of 1

4.0 Recommendations

The following recommendations would ensure the ongoing occurrence of reptiles within the FCENP and improve future inventory projects where volunteers are engaged in capturing observations.

- *Retain Open Habitats* - It is essential that restoration work within the FCENP includes the retention of open (unforested) habitats for species that prefer edges and open meadows (e.g., reptiles, some birds, pollinators and their associated flowering plants, etc.). This objective would increase biodiversity and reflect the habitats that likely occurred at the site historically. The Coastal Douglas-fir (CDF) ecosystem occurs along the southeast coast of Vancouver Island including where the FCENP is located (Fig. 7). The CDF includes Garry Oak, Arbutus, and a variety of rare plants in drier sites, rock outcrops, and meadows.

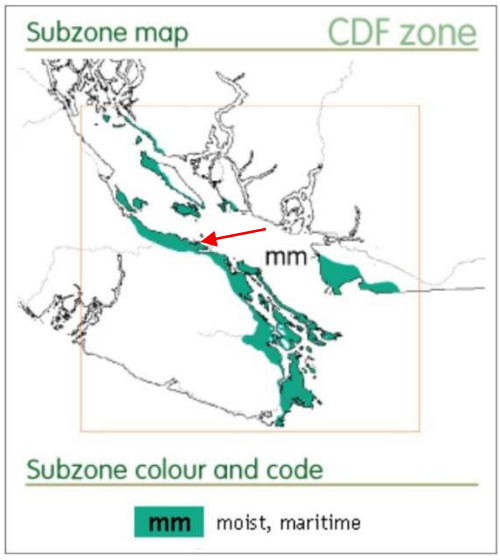

Figure 7. Location of the FCENP (red arrow) within the Coastal Douglas-fir ecosystem (green) along eastern Vancouver Island. (source: https://cfcg.forestry.ubc.ca/resources/cataloguing-in-situ-genetic-resources/cdf-zone/)

- *Improve Location Information* – The Arrowsmith Naturalists should consider purchasing a handheld GPS to capture and map accurate location information during their inventory and restoration work. Volunteers should be trained in its use, how to download and map waypoints and tracks, and a long-term data management scheme should be followed for computer entry and storage.

- *Reptile Hibernacula*
    - The location of a potential hibernacula for reptiles was not identified during the surveys in 2025. A survey route (4a) was added to the surveys in late Sept. in order to assess the large rock piles located along the French Creek that may be suitable as a hibernaculum (e.g., they provide access to underground refugia, and they are on a south-facing bank). No reptiles were observed along that route, but the timing and / or conditions at the time may not have been ideal as no reptiles were observed anywhere within the FCENP during surveys after that date. Continued survey work, targeting potential hibernacula, would be useful information for the protection of local reptile species (e.g., conduct visual surveys in early spring when reptiles often bask near hibernacula post emergence during any available sunny periods).
    - The construction of an artificial hibernacula within open areas of the FCENP could benefit and protect local reptiles. To improve the chance of success, work with a qualified herpetologist when designing features such as this.

5.0 References

Graeter, G.J., K.A. Buhlmann, L.R. Wilkinson, and J.W. Gibbons. (*Eds*). 2013. Inventory and Monitoring: Recommended Techniques for Reptiles and Amphibians. Partners in Amphibian and Reptile Conservation Technical Report IM-1, Birmingham, Alabama.

Appendix A. Datasheet used by volunteers during VES reptile surveys.

Reptile Trail Transect Route Datasheet

General Survey Information (to be completed for all surveys)

Date (dd-mm-yy):		**Surveyor(s)**:			
1st route start time (24-hour):		**1st route end time** (24-hour):		**1st completed?**	Yes / No
2nd route start time (24-hour):		**2nd route end time** (24-hour):		**2nd completed?**	Yes / No
		Cloud cover (*circle one*):	<25%; 26-50%; 51-75%; >75%		
Transect route number(s):		**Air temper.** (°C):		**Precipitation**:	Yes / No

Reptile Observation Data

Observ. Number	**Lizard, snake, or turtle**	**Route #** (1, 2, 2a, 3, 4)	**Time of obs.** (24-hour)	**Activity** (basking, moving, consuming prey, swimming, other)	**General Habitat** (forest, grass, shrub, water)	**Photos taken** (surveyor's camera and photo numbers)	**Location Coordinates**	**Notes**

Appendix B. Results from VES for reptiles in 2025.

SNAKE DATA				Surveyors Coordinates Provided		Google Earth Mapped Coordinates	
Survey Date	**Trans#**	**# Snakes**	**Notes**	**Lat / Northing**	**Long / Easting**	**Lat / Northing**	**Long / Easting**
20-Jun-25	2	1	Recently dead (photo; *T. elegans*)	49.35064	124.34615	49.350535	-124.364001
27-Jun-25	4	1	Red stripe (*T. ordinoides* ?); disappeared under rock; incorrect location recorded (manually moved it to an approximate location on Trans#4)	*49*20'53.91"*	*124*21'37.18"*	49.349342	-124.363176
11-Jul-25	1	1	Surveyors i.d. = (photo; *T. elegans*)	5467432	400828	49.351533	-124.365528
18-Jul-25	1	1	(photo - *T. ordinoides)*	49.351535	-124.365428	49.351535	-124.365428
25-Jul-25	4	1	(photo; *T. ordinoides*)	49.3489360	-124.3639154	49.348936	-124.363915
8-Aug-25	2	1?	Snake or lizard (tail observed)	49.35029	-124.36516	49.350290	-124.365160
18-Aug-25	4	1	Moved into thick blackberry	49.348674	-124.36558	49.348674	-124.365580
22-Aug-25	4	1		49.3498114	-124.3634235	49.349811	-124.363424
Inc. Obs Date	**Map Loc.**	**# Snakes**	**Notes**	**Lat / Northing**	**Long / Easting**	**Easting**	**Northing**
20-Jun-25	2a	2	Moving; brief glimpse of tail			49.350535	124.364001
4-Jul-25	2a	1	Snake (12")	*not recorded*			
21-Jul-25	Obs#1	1	Obs by E. Wind during wtld trap check			49.350320	-124.363559
21-Jul-25	Obs#2	1	Obs by E. Wind during wtld trap check			49.350215	-124.364624
21-Jul-25	Obs#3	1	Obs by E. Wind during wtld trap check			49.350126	-124.365004
21-Jul-25	Obs#4	1	Obs by EW wtld trap check (photo: *T. ordinoides*)			49.350384	-124.364485
NR	GS#1	1	Obs by E. Wind when on site			49.348646	-124.365576
NR	GS#2	1	Obs by E. Wind when on site			49.348943	-124.365062
NR	GS#3	1	Obs by E. Wind when on site			49.349168	-124.364003
NR	GS#4	1	Obs by E. Wind when on site			49.349506	-124.363786
1-Aug-25	2	1	Obs. from public for 8am that day	45.35016	-124.36493	45.350160	-124.364930
02-Aug-25	4	1	*Not assoc. with a survey*	49.3495731	-124.3623513	49.349573	-124.362351
12-Aug-25		1	*Not assoc. with a survey*	49.35	-124.366	49.350000	-124.366000
18-Aug-25	2a	1	All dark, 8" (*T. ordinoides* ?)	49.35011	-124.36300	49.350110	-124.363000
12-Sep-25	4	1	(photo; surveyor / Stu i.d. = *T. sirtalis* ?)	*not recorded*			
16-Oct-25	2	2	*Not assoc. with a survey* (≈ 1.5 meters apart)	49.350194	-124.365028	49.350194	-124.365028
17-Oct-25	2	1	*Not assoc. with a survey*	49.350267	-124.365581	49.350267	-124.365581

LIZARD DATA				Surveyors Coordinates Provided		Google Earth Mapped UTM Coordinates	
Survey Date	**Trans#**	**# Lizards**	**Notes**	**Lat / Northing**	**Long / Easting**	**Easting**	**Northing**
1-Aug-25	3	1	Moving, in forest (species unkn)	49.34960	-124.36413	49.349600	-124.364130
Inc. Obs Date	**Map Loc.**	**# Lizards**	**Notes**	**Lat / Northing**	**Long / Easting**	**Easting**	**Northing**
4-Jul-25	2	(1 inc)	Green (*P. muralis*)	*not recorded*			

TURTLE DATA				Surveyors Coordinates Provided		Google Earth Mapped UTM Coordinates	
Survey Date	**Trans#**	**# Turtles**	**Notes**	**Lat / Northing**	**Long / Easting**	**Easting**	**Northing**
4-Jul-25	2a	1	Water, basking on log	49.35046	-124.36413	49.35046	-124.36413
25-Jul-25	2a	2	Edge of water on log (photo; Pond Slider)	49.35046	-124.36413	49.35046	-124.36413
05-Sep-25	2a	1	Basking on log (photo; Pond Slider)	49.35047	-124.3638	49.35047	-124.3638