

Morningside Park Salamander Monitoring Program

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Introduction

Morningside Park is a city park located on the east coast of Vancouver Island in the city of Nanaimo (Fig. 1). The small urban park has been the focus of restoration work by the Walley Creek Streamkeepers group—Walley Creek runs along the west edge of the park. Restoration work has included garbage removal, bank stabilization along Walley Creek, tree thinning, planting of native shrub species, and explorations into wetland habitat enhancement (e.g., examining water collection and drainage within the site). During the restoration work the Streamkeepers group discovered the presence of numerous Western Redback Salamanders (*Plethodon vehiculum*) in the area (Fig. 2). Members of the Streamkeepers group have engaged teachers and students at the adjacent Hammond Bay Elementary School regarding the restoration and monitoring program.

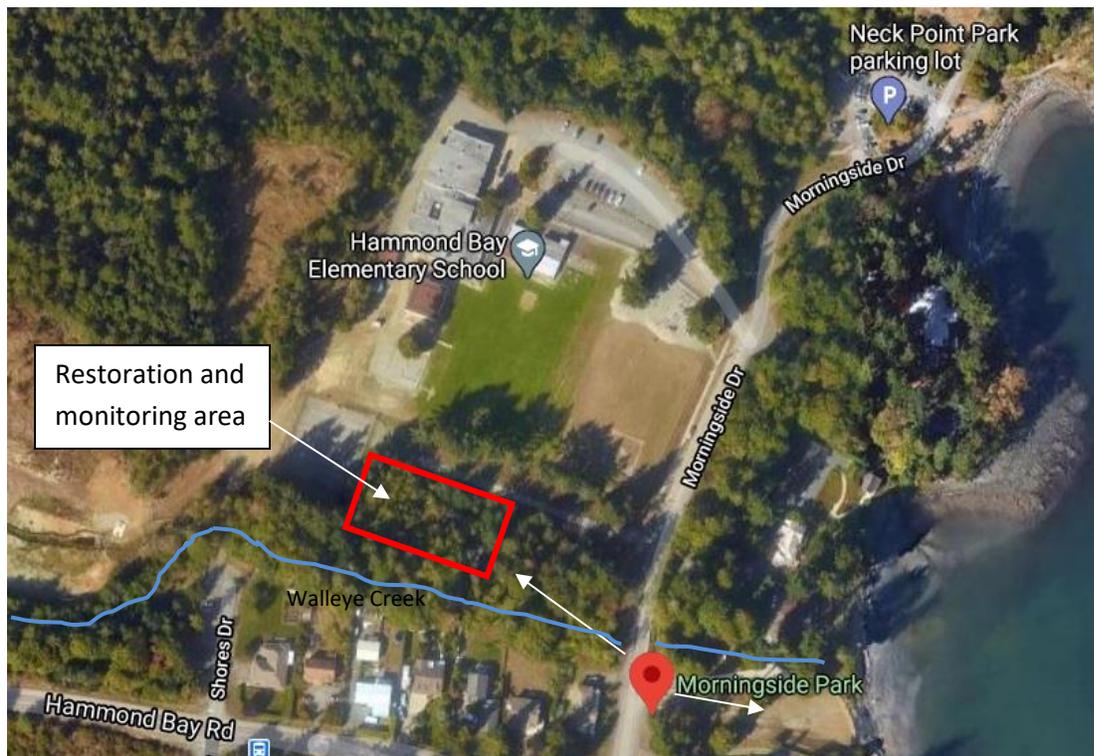


Figure 1. Morningside Park is located along Morningside Road in Nanaimo, BC. The park includes a seaside access area on the south side of Morningside Road and a patch of forest on the north side. The red box indicates the restoration and monitoring area.



Figure 2. Juvenile Western Redback Salamander found in Morningside Park.

Photo credit: Nina Evans-Locke

Western Redback Salamanders are a relatively common species occurring along coastal regions of the Pacific Northwest, including Vancouver Island. They are terrestrial salamanders that live their entire lives within upland forest areas, laying eggs under logs, rocks, and underground. Studies have found that juveniles and adults have relatively small home ranges ($< 3 \text{ m}^2$; Ovaska 1988). As such, the population that occurs within the Morningside park restoration site may have been present at that site for many generations. However, the park is now surrounded by roads, a trail, houses, and a school. Although we have observed Western Redback Salamanders attempting to cross roads (Wind, pers. obs.), it is unclear whether the Morningside Park population has become isolated from other nearby populations over time (e.g., Linley Valley to the west). We also don't know whether individuals occur throughout the park, or in other areas along Walley Creek or in nearby forest patches, if the local population is unique in some way (e.g., occurs at a relatively high density), and what habitat features they may be associating with (e.g., rocks or logs; near stream or farther away). Understanding these aspects of their life history will facilitate the restoration program.

Objectives

The objectives of the monitoring program include:

1. Increase our knowledge of the distribution and relative density of Western Redback Salamanders within Morningside Park.
2. Identify habitat attributes that the salamanders are associated with.
3. Engage teachers and students in scientific studies and monitoring so that they have a greater awareness of what science is, why it is important, and how it can be used to conserve wildlife.

Methods

Objective 1: Increase our knowledge of the distribution and relative density of Western Redback Salamanders within Morningside Park.

We will monitor Western Redback Salamanders using cover boards, a technique recommended by the provincial government for surveying terrestrial salamanders (Resources Inventory Committee 1999). The use of cover boards is advantageous for a long-term monitoring program because it prevents the

disturbance and destruction of natural habitat features (e.g., logs), it provides a standard, repeatable measure of salamander abundance and distribution, and it does not involve the capture and handling of the salamanders.

Cover boards consist of a series of boards stacked together and placed flush onto the forest floor (Fig. 3). As salamanders forage across the ground at night they encounter the boards, which they may choose to use as cover during the day. They may also seek to forage under the boards as they also attract insect prey. The cover boards are checked / lifted on a regular basis and the species and size of salamanders under each are recorded. The boards are placed into the study area 4 to 6 months prior to the initiation of the monitoring program in order to give the salamanders enough time to discover them, and to allow the cover boards time to weather.

The cover boards will be placed into a grid pattern throughout the study area (Fig. 4). This design will allow for a comparison of the salamander distribution and density throughout the study area, from near stream (riparian) to upland area, and from within the core of the restoration area to adjacent forest habitat and edges.

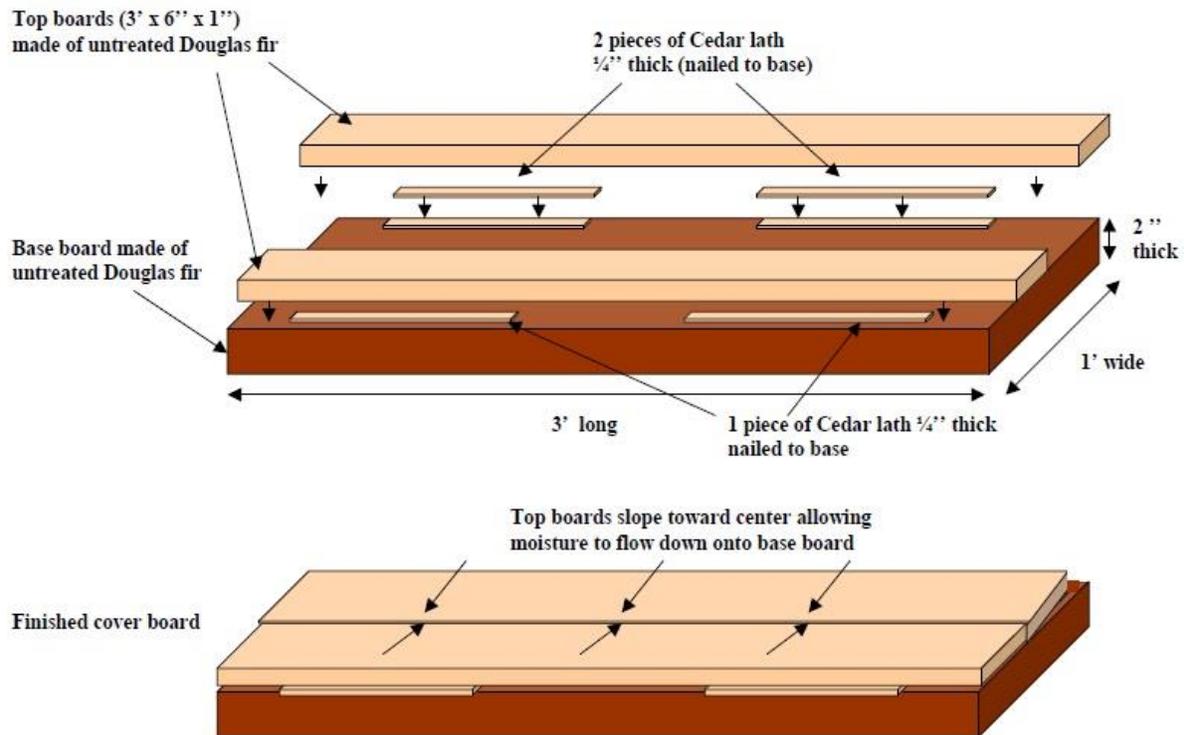


Figure 3. Design of cover boards to survey for terrestrial salamanders. Native species of untreated wood are used for the main cover boards. (Prepared by Biolinx Environmental Research Ltd.; Ovaska pers. comm.).

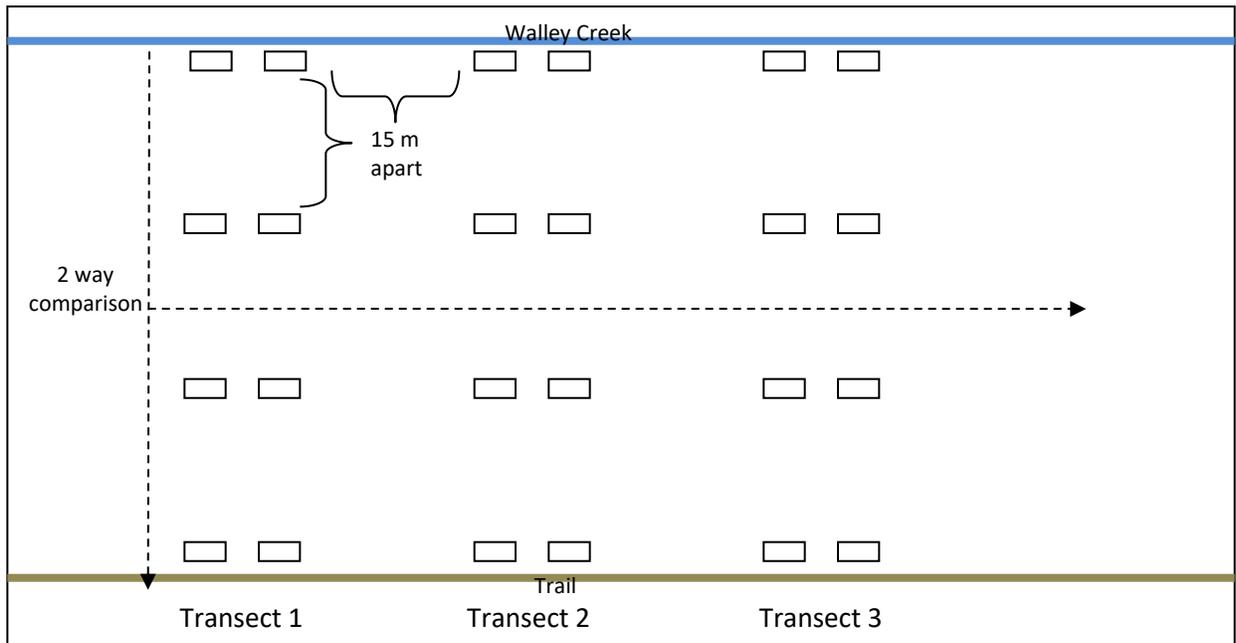


Figure 4. Example study design where cover boards are laid out into transects to allow for a comparison across the study area in two directions—e.g., up and downstream along Walley Creek, from the centre of the study area to the edge, and from Walley Creek (riparian area) towards the trail (upland / edge habitat).

Objective 2: Identify habitat attributes that the salamanders are associated with.

Prior to initiating the cover board monitoring program a survey will be conducted throughout the study area to determine what microhabitat features the salamanders are naturally associating with in order to provide information that will inform the restoration work at the site (e.g., do salamanders use wood cover more than rocks as you move farther from the stream?). The three transect lines for Objective 1 will be laid out and a random number of habitat features within different categories along each transect line will be searched for salamanders (e.g., 30 leaf litter, 30 logs, and 30 rocks). The species and size of salamanders detected will be recorded within each microhabitat category. To avoid injuring salamanders, all individuals detected under solid cover objects (e.g., logs and rocks) will be captured and temporarily placed into clean, wet buckets, then the cover will be returned to its original position, and the salamander released at the edge of the cover object to avoid crushing.

This aspect of the monitoring program will be overseen and conducted by an experienced herpetologist (E. Wind) to minimize impacts to the habitat and salamander population. Ms. Wind will train adult partners involved in the project (NALT staff, Streamkeepers) in the survey technique, proper handling of the salamanders, disinfection of gear, and data collection.

Objective 3: Engage teachers and students in scientific studies and monitoring so that they have a greater awareness of what science is, why it is important, and how it can be used to conserve wildlife.

Teachers and students from Hammond Bay Elementary School will be partners in the monitoring program. The students will assist in setting up the study design (laying out transects, building and installing cover boards), collecting the data (finding and recording salamander observations), and summarizing the data into tables and graphs. This program will directly engage the students in scientific data collection, and demonstrate how data can be used to inform conservation and management.

An experienced herpetologist (E. Wind) will train all of the partners involved in the project (NALT staff, Streamkeepers, and teachers and students) in the study layout, survey techniques, proper handling of the salamanders, disinfection of gear, and data collection.

Data Management

To ensure that the monitoring data is not lost as turnover occurs over time with staff and volunteers involved in the program, the data will be shared annually and held by multiple partners, including NALT, E. Wind, the teacher(s) involved from Hammond Bay Elementary School, and Streamkeepers volunteers.

Permit

A wildlife permit will be obtained from the province to allow some temporary handling of salamanders for safe practices (e.g., capturing salamanders where needed to allow for their safe return under moved cover objects).

Schedule

The schedule for the program initiation and implementation is summarized in Table 1. Cover boards will be set up 4 to 6 months before the initiation of data collection to allow them to weather. An application for a wildlife handling permit will be submitted to the province at least 2 months prior to the start of data collection to ensure that it is approved in time. Salamanders are generally most active at the surface during the spring and fall active seasons (which coincides with the school year), but data can be collected year round to compare their activity levels seasonally throughout the study area (e.g., active throughout the site in spring and fall, but only along the stream edge in summer).

Table 1. Schedule of monitoring program set-up and implementation.

Task	Description	Timeline / Dates
Build and layout cover boards (Obj. #1 & #3)	- Obtain cover board materials - Build 24 cover boards - Layout transects and install cover boards	Jan.-Feb. 2021
Obtain provincial permit	- Submit wildlife permit to province	April 2021
Microhabitat surveys (Obj. #2)	- Conduct microhabitat surveys along transects	May 2021
Initiate monitoring of cover boards (Obj. #1 & #3)	- Check cover boards for salamanders - Record data - Enter data into computer	June 2021
Ongoing monitoring (Obj. #1 & #3)	- Check cover boards for salamanders - Record data - Enter data into computer - At the end of every fall and spring survey period create summary tables and graphs of the data	Repeat every month (e.g., 3 coverboard checks are conducted mid month, at least 4 days apart, and ideally after rain events)

Materials and Budget

The materials that will be needed for this monitoring program are summarized in Table 2 and the wages for the amphibian expert in Table 3.

Table 2. Materials needed for a salamander coverboard monitoring program.

Task	Materials	In-Kind	Cost
Build 24 cover boards	- Wood and lathe (cut to size) - Nails and hammers - Metal numbering plates to i.d. each cover board	- Donated? - Donated?	
Layout cover boards	- Eslon tape - Flagging tape/pin flags - Sharpie marker - Rake / shovel - Wheel barrow	- E. Wind (all)	
Microhabitat surveys & cover board monitoring	- Random cover i.d. strategy / protocol - Data collection (tablet and/or waterproof datasheets) - Gloves - Buckets with lids - Ruler - Species i.d. sheets - Disinfection gear (bleach solution, spray bottle)	- E. Wind - NALT (all)	

Table 3. Wages for amphibian expert (E. Wind) for the first year of monitoring.

Task	Description	Timeline / Dates / Time (Hrs)	Cost
Build and layout cover boards (Obj. #1 & #3)	- Description of materials to purchase / obtain - Help build cover boards, layout transects, and install cover boards	Jan.-Feb. 2021 (4 hrs)	
Write and submit provincial permit application	- Write and submit wildlife permit to province	April 2021 (2 hrs)	
Microhabitat surveys (Obj. #2)	- Conduct microhabitat surveys along transects	May 2021 (4 hrs)	
Initiate monitoring of cover boards (Obj. #1 & #3)	- Check cover boards for salamanders - Record data - Enter data into computer	June 2021 (2 hrs)	
		TOTAL	(Removed for confidentiality)

References

Resources Inventory Committee 1999. Inventory Methods for Plethodontid Salamanders. Standards for Components of British Columbia's Biodiversity No.36. Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee. Victoria, BC. Version 2.0.