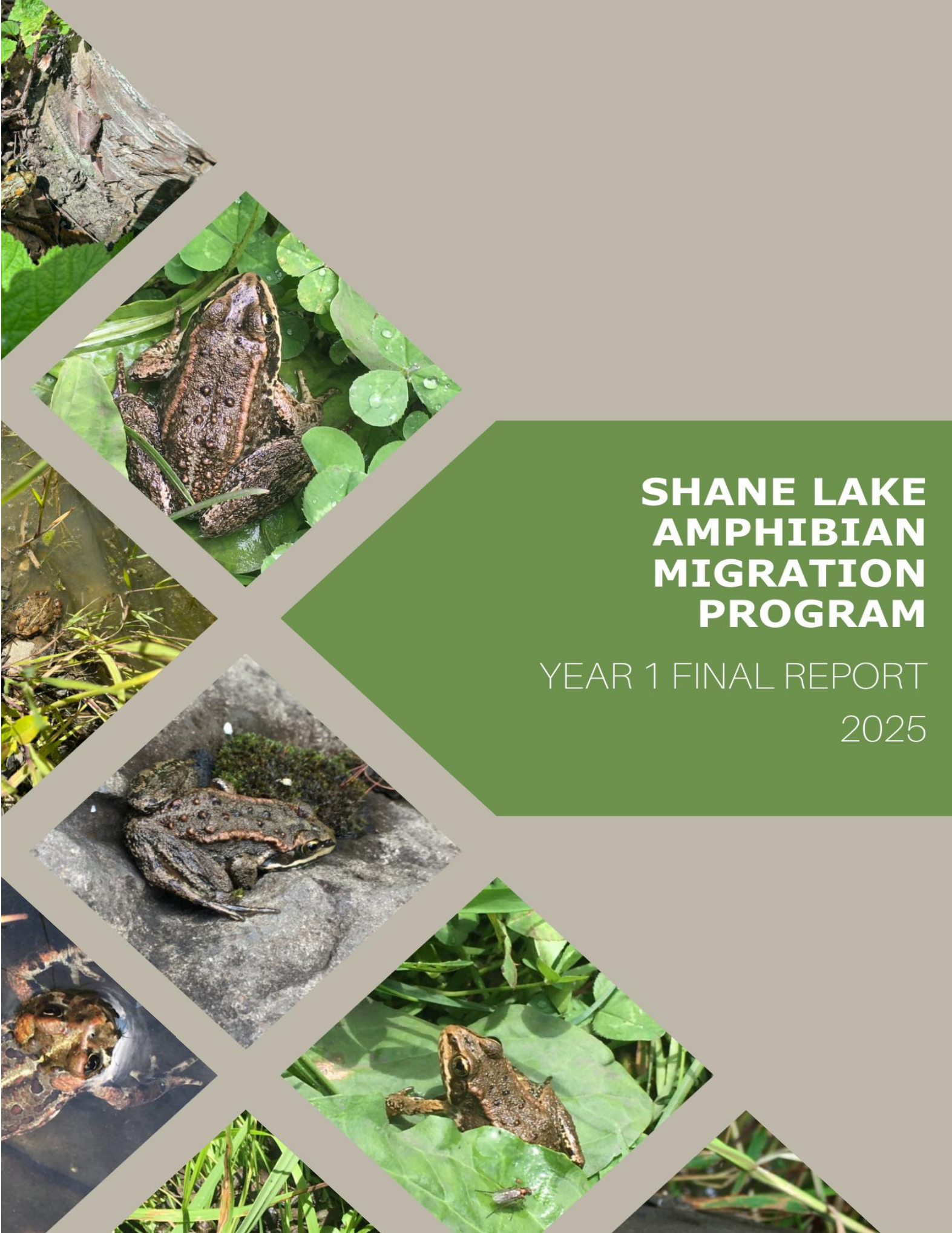




SHANE LAKE AMPHIBIAN MIGRATION PROGRAM

YEAR 1 FINAL REPORT
2025



Report prepared by Jane Markin, SERNbc Project Coordinator, SLAM Surveyor

Reviewed by Matt Robinson, RPBio

Finalized 20 February 2026

SUMMARY

Year 1 of the Shane Lake Amphibian Migration (SLAM) Program is a wrap. SLAM was developed to prevent mortality of amphibians on multi-use recreational trails and to enhance overall public awareness of amphibian populations at Shane Lake. Summer 2025 was the first season of the program and was aimed at public engagement and education, and on identification of core amphibian migration routes.

In summer 2025, data were collected by trained surveyors during the toadlet migration period to identify where and when toadlets intersected the main trail around Shane Lake. Toadlets were first observed on trails on 23 July, with the highest number of observations occurring in mid-August. An estimated 1,124 live amphibians were observed between 9 July and 10 September, with most observations being western toad toadlets. In addition, 165 dead toadlets were observed as a result of human trampling. Toads were observed on almost all sections of the Shane Lake trail with the highest concentrations at the north and south ends of the lake.

The next steps of the SLAM Program include additional monitoring for amphibian activity for a minimum of one additional season in summer 2026. The program will also explore the feasibility of incorporating trail enhancements to reduce amphibian mortality and consider implementation of signage during the peak of migration season, so the public is aware and proceeds with caution. The long-term goal for this program will consider more permanent solutions for mitigating amphibian mortality resulting from human traffic on trails. Permanent solutions may include the installation of trail bridging structures such as boardwalks and subsurface structures such as culverts to help facilitate amphibian migration and mitigate future mortality.

INTRODUCTION

Forests for the World Park and most of the Cranbrook Hill Greenway are located within the city limits of Prince George, BC and on the unceded ancestral lands of the Lheidli T'enneh. The park is one of the few natural greenspace corridors managed for both nature and recreation within city limits. Forests for the World is 157 hectares in area and has over 15 kilometres of trails that take visitors through a variety of ecosystems. Many people, both residents and visitors, recreate in these areas. The park has something for everyone including fishing at Shane Lake, picnicking in one of the shelters or visiting the traditional Aboriginal pit-house¹. The close proximity of this greenspace to Prince George, combined with its high use

¹ Greenway Trail to Shane Lake Loop (2025)



by the public, make it an ideal area to investigate human-wildlife interactions and to provide nature-focused education.

One of the focal points for park visitors is Shane Lake (Figure 1), a 4.4 hectare lake with a maximum and average depth of 5.7 m and 1.8 m, respectively². The lake has a viewing platform, dock, and picnic area at the north end. A human-made dam is located at the south end that regulates water levels. A trail loop encircles the lake and closely follows the lake's perimeter. The lake provides quick and easy access to nature for the residents of Prince George to enjoy.

Shane Lake also provides important habitat for wildlife, including large mammals, waterfowl, and amphibians. All four amphibian species that occur in the Prince George area can be found at Shane Lake and the surrounding park. These species include western toad (*Anaxyrus boreas*), wood frog (*Lithobates sylvaticus*), Columbia spotted frog (*Rana luteiventris*) and long-toed salamander (*Ambystoma macrodactylum*). While the accessibility of Shane Lake provides an excellent opportunity for the public to observe amphibians, the presence of amphibians on the trails is currently putting them at risk.

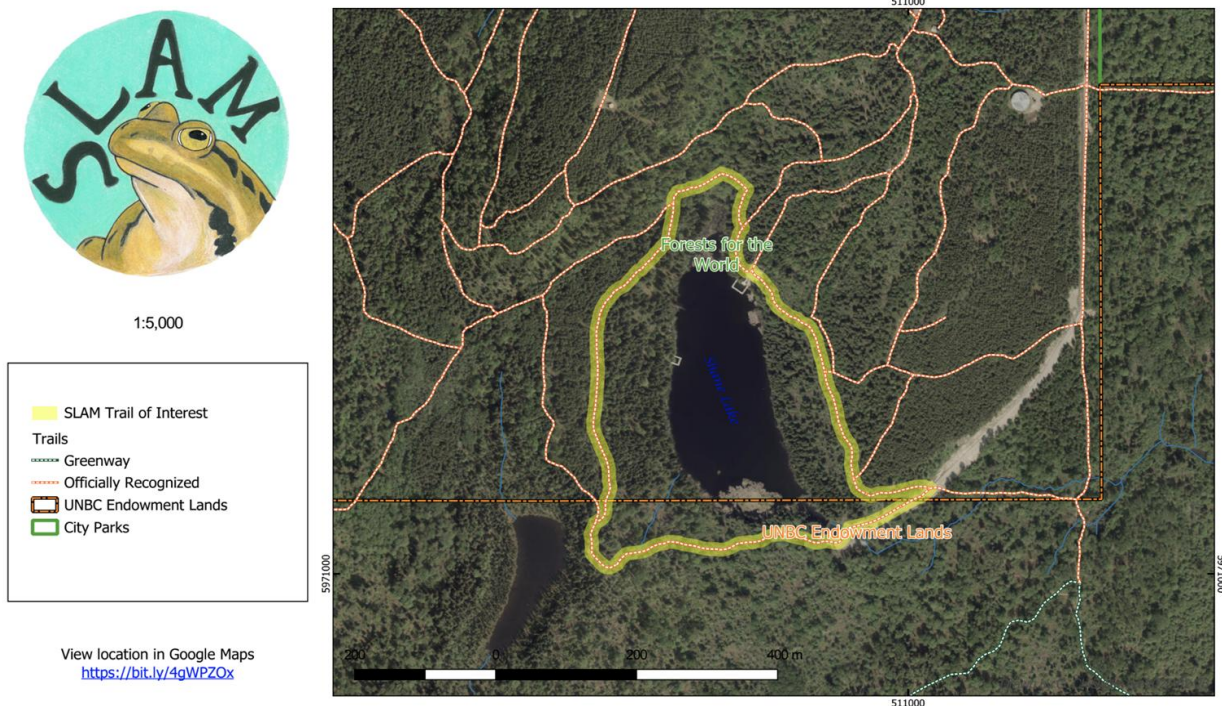


Figure 1. Map of Shane Lake and trails, highlighting the project area.

² Wind, E (2009)



Program Overview

The Shane Lake Amphibian Migration (SLAM) Program was initiated by Ashley Sutherland, a nature enthusiast who felt compelled to help the amphibian populations of Shane Lake after observing mortality of western toad tadpoles resulting from foot traffic on the trails surrounding Shane Lake. These observations were made during the juvenile migration period when thousands of western toad tadpoles transform (metamorphose) into juvenile toadlets and disperse to nearby terrestrial habitats. Unfortunately, migration routes often intersect with busy recreation trails, which put the toadlets at risk of being trampled.

Program Importance

Prior to summer 2025, there was no formal data on amphibian use of the trail systems and associated mortality due to human trampling (aside from anecdotal accounts) as far as the SLAM team is aware. Baseline information on the number of amphibians using trails is essential to determining the areas and times of year when they are most at risk of being trampled. This data will help inform future protective measures, such as temporary trail closures during the peak migration period.

Similar programs exist in other BC communities, including Summit Lake in the Kootenays, Ryder Lake in the Fraser Valley, and Lost Lake in Whistler. The programs implemented in these communities involved systematic surveys and monitoring to document amphibian mortality and inform mitigation strategies. These programs have provided a fundamental template for which the SLAM Program is based. The SLAM Program aspires to inspire change and recognition for all creatures that share this planet.

A significant opportunity associated with SLAM is the overlap of the project area with the University of Northern BC (UNBC) Endowment Lands. Should UNBC desire to develop the Endowment Lands in the future, SLAM organizers may work alongside UNBC to implement amphibian passages and other conflict mitigating measures right from the planning and development phases. There may also be the opportunity for student involvement.

The program is founded on the belief that public education and awareness are key to implementing change. A priority of SLAM is to increase public awareness regarding the presence and vulnerabilities of amphibians, with the intent that education and outreach will assist the program in gaining momentum, resulting in a public desire for change. The hope is that as education spreads and momentum builds, community members, local organizations, and governments will gain a desire to increase protective measures towards amphibians and not just limited to the program area.

Program Objectives (Years 1 & 2)

The SLAM Program was created with the overall goal to protect amphibian populations and their habitat surrounding Shane Lake with a focus on western toad migration. The project includes two primary short-term objectives: 1) research, and 2) public education and outreach.





Research

This involved regular surveys around Shane Lake to identify where and when amphibians were migrating. This data will be used to inform future mitigation strategies such as temporary trail closures and/or construction of infrastructure to accommodate safe passage for amphibians between Shane Lake and the surrounding forest.

Public Education & Outreach

Education and outreach are critical to improving the public's understanding and awareness of amphibians in the area. This included informational signage, development of an iNaturalist project, and information sharing through local media and social media.

Western Toad Life History

Western toads have three different habitat types they frequent at different times of the year. These include aquatic breeding habitats, terrestrial summer ranges, and winter hibernation sites. The preferred breeding habitat for toads are shallow bodies of water with sandy bottoms. Adult toads migrate to communal breeding sites in the spring where females lay their eggs. On average a single female can lay 12,000 eggs during a single year, but clutch size can be as high as 16,000 eggs. Of the average 12,000 eggs laid, less than 1% of individuals survive to become sexually mature adults³.

The eggs of aquatic breeding amphibians have a similar physical structure – typically one or more jelly layers surrounding a dark ovum (the egg cell that develops into an embryo when fertilized). Western toad eggs are laid in paired strings - one string from each of the female's two oviducts. Individual eggs resemble black dots surrounded by a gelatinous layer. As the embryo develops, the black dot starts to look more like a comma. Depending on species and water temperature, eggs may hatch in a few days or several weeks.

Newly emerged tadpoles do not have limbs but do have a mouth, gills, and a tail for swimming. Over the following weeks, tadpoles will develop back legs, then front limbs, and lungs. During metamorphosis, their body will change shape, their skin will start to grow over their gills, and tails will shrink as they are absorbed by the body. At this stage they will transition into tiny adults known as toadlets or young-of-the-year⁴. Western toad tadpoles develop over a period of 6 to 8 weeks before undergoing metamorphosis. The rate at which eggs hatch and tadpoles develop is largely dependent on temperature.

Newly metamorphosed toadlets will often stay close to the water's edge for 1 to 2 weeks before dispersing terrestrially. The period when toadlets begin migrating overland is called the juvenile dispersal or migration period and occurs approximately mid-July to mid-August at Shane Lake. Timing of these key life history events, including juvenile migration, can vary from year to year, and among populations.

³ BC Frog Watch

⁴ The Nature Conservancy



Figure 2. Various western toad life stages.

Threats

Western toads are relatively common throughout BC but there are some population declines being observed in the southwestern region of the province. One of the biggest negative impacts on amphibian populations is the loss or alteration of their habitat. For example, human development in and around



wetlands can isolate or destroy toad populations⁵. Since amphibians use both aquatic and terrestrial habitats and rely on movement between each, human development can fragment these habitats and force toads to move through and interact with various human-created hazards, such as roads. In these situations, amphibians risk injury or mortality from vehicle or foot traffic, especially during seasonal migration periods. Other threats include pollution, introduced aquatic predators, and disease. Large scale impacts such as climate change, fluctuating water levels and increased ultraviolet radiation are also factors negatively affecting amphibian populations⁶.

METHODS

Surveys

In 2025, data were collected by trained surveyors during the toadlet migration period to identify where and when toadlets intersected the main trail loop around Shane Lake. Surveys occurred from 9 July to 10 September; a preliminary survey was also conducted on 27 June to train surveyors. The survey period started several weeks before toadlet migration began and continued for several weeks after migration ended. This was done to identify when the number of toadlets on the trail was highest and to capture amphibian observation data outside the toadlet migration period.

Surveyors walked the full loop around Shane Lake (approximately 1.6 kilometres) and recorded any sightings of amphibians at any life stage. Surveys occurred three times a week, targeting Monday, Wednesday, and Friday during the warmest part of the day, typically around 1:00 pm. A GPS waypoint was collected each time an amphibian was observed, and the individual(s) observed were assigned to species and age class (adult, juvenile, or young-of-the-year (YOY)). Age classes were defined by total body length: adults = > 55 mm, juveniles = 20 to 55 mm, YOY = ≤20 mm. YOY are toadlets that have metamorphosed in the current year, whereas juveniles are toads that have survived at least one winter but are not sexually mature.

Two different abundance classes were also assigned to each amphibian observation to estimate the number of live and dead amphibians present. The primary abundance class (Table 1) estimated the total number of live individuals on the trail by way of a range (for example, 0 to 20, 21 to 100). The secondary abundance class estimated the number of dead individuals (Table 2). Abundance classes were determined by how many amphibians of each species were within one observation zone. For example, 18 live and two deceased western toads observed within one metre of each other would be assigned an abundance class of 1A.

A numerical count was also estimated for the total number of individuals for each observation, which was separated into live and dead individuals. Amphibian counts were collected in these two ways (abundance

⁵ BC Frog Watch

⁶ COSEWIC (2003)



classes and numerical count) as it was not known which estimation method would work best, particularly when enumerating large numbers of individuals.

While observations did capture data on all amphibian species, the large number of western toads and high risk of mortality from human foot traffic during migration made the western toad the focal species.

Table 1. Primary abundance classes (PAC) used to estimate the number of live amphibians on trail.

Primary Abundance Class	Estimated Number of Individuals
1	1 to 20
2	21 to 100
3	101 to 500
4	501 to 1000
5	1001+

Table 2. Secondary abundance classes (SAC) used to estimate the number of deceased amphibians on trail.

Secondary Abundance Class	Estimated Number of Individuals
Z	0
A	1 to 5
B	6 to 15
C	16 to 30
D	31 to 50
E	51+

Signage

Four information signs were designed and installed by the SLAM team (Figure 3). These signs are intended to educate park users about the amphibian species present in the park and raise awareness of the seasonal presence of amphibians on trails. Signs also encourage public engagement and participation with the SLAM Program through via the iNaturalist app. Signs were placed at the Cranbrook Hill parking lot, the UNBC Greenway Trail parking lot and at each end of the lake (north and south) where the main trail enters the project area.

iNaturalist Project

The public were encouraged to participate in the SLAM Program by accessing the “Shane Lake Amphibian Migration Project” via the iNaturalist app and uploading amphibian observations. iNaturalist Canada is led by the Canadian Wildlife Federation along with the Royal Ontario Museum, Parks Canada, and NatureServe Canada. It allows users to record observations in nature and share them online among a larger community of naturalists.



Figure 3. SLAM signage around Shane Lake.

RESULTS

Surveys

Preliminary surveys and training started in late June 2025. At this time, there were no young-of-the-year (YOY) sightings as they had not yet hatched. However, western toad tadpoles were observed in high abundance at the north end of the lake during this period.

Most amphibians observed in 2025 were western toads. Some Columbia spotted frogs were also observed, but these were predominantly seen in two water-filled ditches along the survey route (not directly on the trails). Although surveys were focused on western toads, Columbia spotted frog observations were also recorded even though they represented a very small proportion of total amphibian observations relative to western toads.

Overall, total amphibian observations were low from mid to late-July. YOY western toad toadlets were first observed on trails on 23 July. In early August, observations of toadlets increased notably with the peak occurring during the week of 4 August (Figure 4). Another smaller peak of toadlet observations occurred the week of 18 August with observations steadily declining after that.

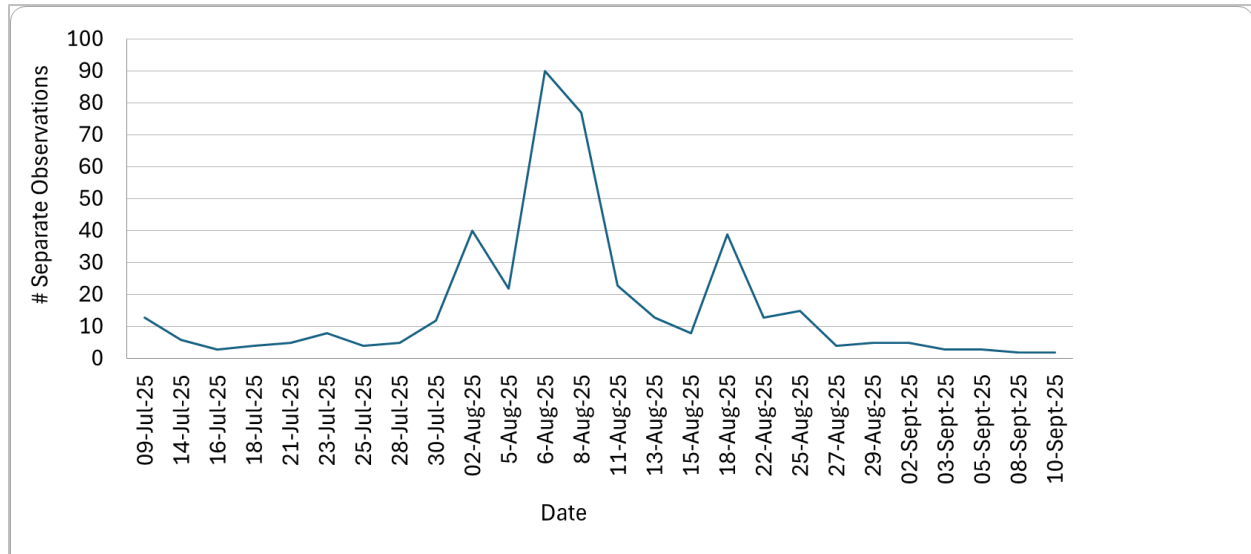


Figure 4. Total number of amphibians observed from 9 July to 10 September 2025

At the beginning of the survey period, most observations were juvenile and adult western toads, with juveniles being the more prominent life stage observed. From mid to late-July, the number of adult and juvenile toads began to decrease while the number of YOY toadlet observations increased (Figure 5). As August progressed, observations of all life stages decreased as they migrated into the surrounding forest.

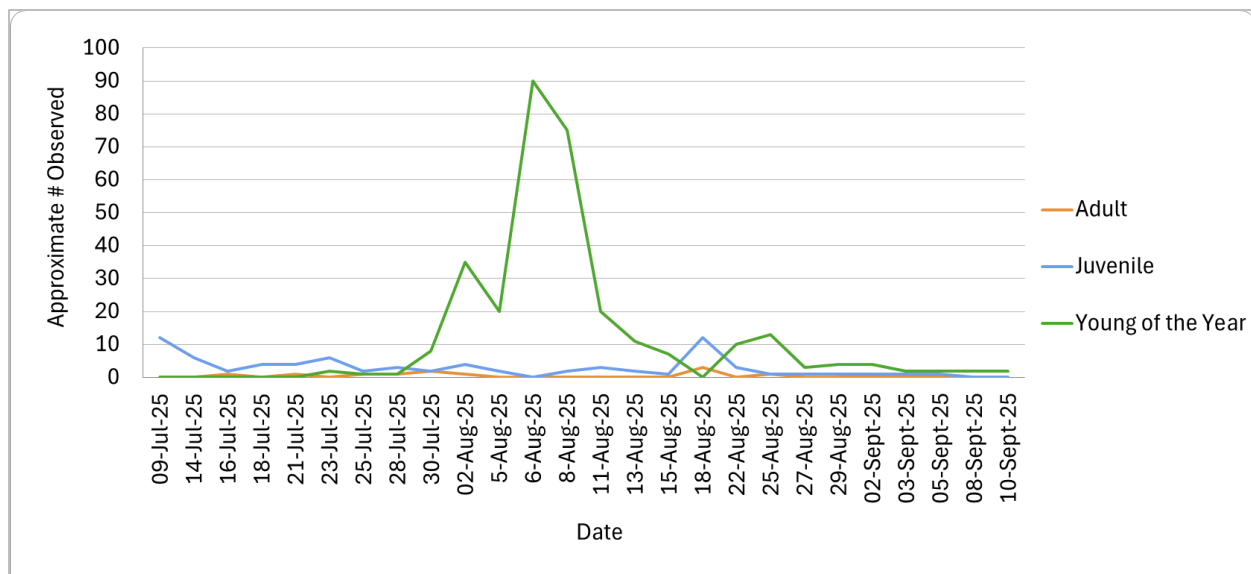


Figure 5. Timeline of western toad observations by life stage from 9 July to 10 September 2025.

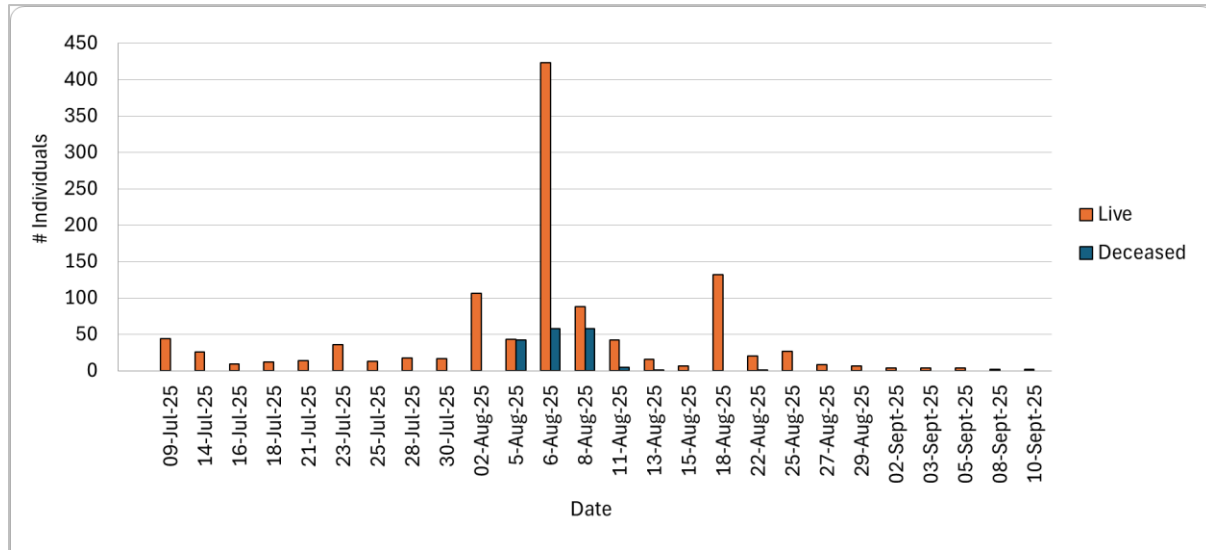


Figure 6. Total number of live versus deceased western toad observations.

Most observations fell into the 1Z abundance class (Table 3), indicating that most sightings were 1 to 20 live individuals, no mortality observed. The next most frequent abundance class was 1A with 1 to 20 live and 1 to 5 deceased individuals observed.

Over the course of the survey period an estimated 1,124 live western toads were observed and 165 deceased; all deceased individuals were young-of-the-year toadlets (Figure 6). The total percentage of deceased toadlets observed was 12.8%.

The intent of surveying was to identify specific locations where amphibians were most concentrated on the trail to inform future mitigation strategies aimed at reducing negative effects (i.e., trampling) of human trail use on migrating amphibians.

Overall toads were observed on almost all sections of the Shane Lake trail, with the highest concentrations at the north and south ends of the lake. There was also a high concentration of observations at the southeast end of the lake where the walking trail merges with an access-restricted road.

This location was identified as a perennial puddle where numerous Columbia spotted frogs were consistently observed (Figures 7 and 8).

Table 3. Summary of abundance classes observed.

Abundance Classes (PAC/SAC)	# Observations
1A	81
1B	3
1Z	301
2A	15
2B	1
2C	1
2Z	17
3A	3
3B	2
3Z	3

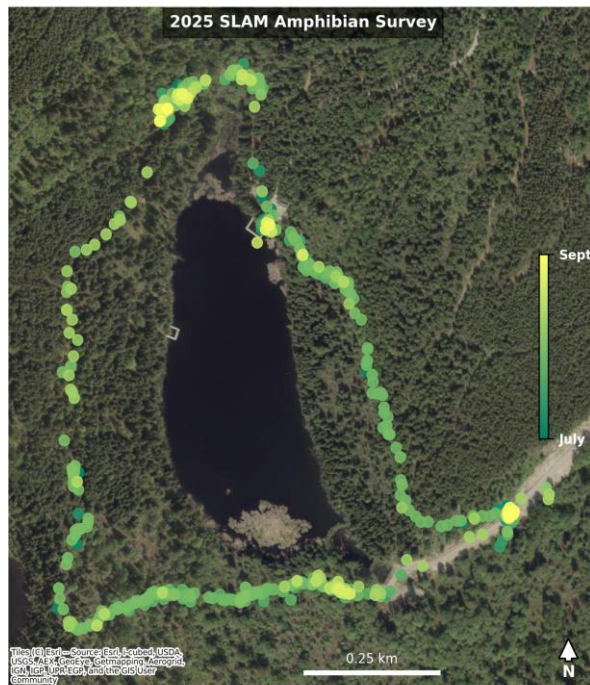


Figure 7. Amphibian observation locations through the entirety of the survey period (9 July to 10 September); each dot is a GPS waypoint.

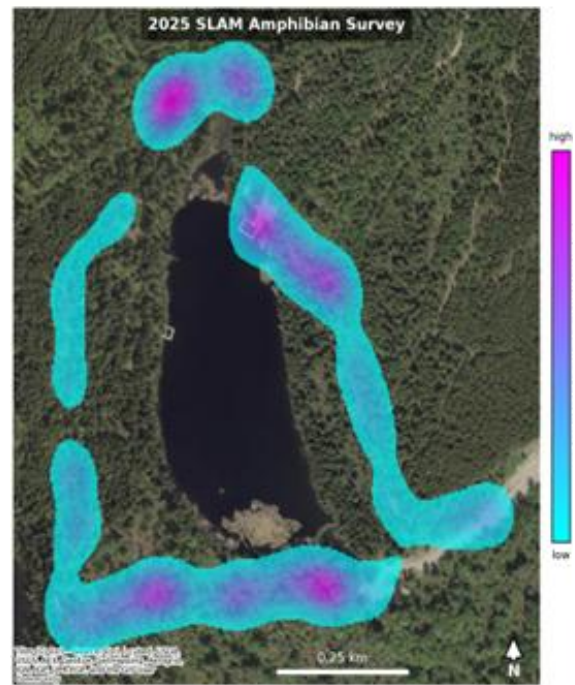


Figure 8. Collective amphibian observations through the survey period.

Education & Outreach

The SLAM Program garnered interest from other residents and professionals within Prince George. Michael Bryden, a UNBC Fish and Wildlife student, created several media materials which featured SLAM. These features include an [article](#) for the Canadian Herpetological Society, a mini-documentary [video](#) for the UNBC Outdoor Recreation and Tourism Management (ORTM) video contest of 2025, a CBC Radio interview segment, and a Wilder Insights [podcast](#) episode featuring Ashley Sutherland.

iNaturalist Project

By the end of 2025, the SLAM project on iNaturalist had accumulated 36 observers/members that had collectively submitted 117 amphibian observations.



CONCLUSION

The four amphibian species native to Forests for the World Park play a critical role in maintaining a healthy ecosystem, where preservation provides important habitat for amphibian species and other organisms in a world where habitat is lost every day⁷. This preservation can be achieved by increasing public awareness regarding amphibians, their importance, and their vulnerabilities. We are hopeful that as awareness spreads, mortality due to human interactions will decrease. Forests for the World Park and the Cranbrook Hill Greenway are enjoyed by many people and in valuing and caring for the natural inhabitants of this area we can help keep this ecosystem intact.

Long-term Goals

The long-term goals for this program will consider more permanent solutions. These may include the installation of trail bridging structures such as boardwalks or subsurface structures such as culverts, to help facilitate amphibian migration and mitigate future mortality.

The next steps of the SLAM Program will consider the continuation of monitoring amphibian activity for a minimum of one additional season in summer 2026, and the feasibility of incorporating trail enhancements that will protect critical amphibian habitat with a focus on amphibian migratory areas. The program will also consider the implementation of signage during peak migration season, so the public is aware, and proceeds with caution, or ideally, chooses a different route.

How the Public Can Help

Citizen science is a powerful tool and those who visit Forests for the World and Shane Lake can play a role in assisting with the SLAM Program. Recreators can help by being aware of the presence of amphibians and becoming engaged and educated about these important species and their vulnerabilities. This engagement influences others, encouraging park users to tread lightly.

Additionally, when amphibians are observed, people should be encouraged to observe only by sight and not through touch. If physical contact is required, observers should ensure their hands are clean and that individuals are handled gently. This is because amphibians breathe through their skin and will absorb any contaminants such as sunscreen and bug spray. These contaminants can enter the amphibian's body which negatively impacts their health⁸.

We can help amphibian populations by learning more about their distribution and ecology, identifying breeding sites, addressing terrestrial habitat needs and preventing habitat destruction. In learning about their ecology, we can share that knowledge and advocate for their wellbeing.

⁷ Keitch (2021 Jun 25)

⁸ Reptile & Amphibian Center (2022 Mar 30)



ACKNOWLEDGEMENTS

The SLAM Program would not be successful without its many supporters. Many thanks to the following organizations and individuals:

- ❖ Aleza Lake Research Forest Society
- ❖ Society for Ecosystem Restoration in Northern BC (SERNbc)
- ❖ University of Northern British Columbia
- ❖ College of New Caledonia Research Forest
- ❖ The Wildlife Society, UNBC Student Chapter
- ❖ Spruce City Wildlife Association
- ❖ Lheidli T'enneh First Nation
- ❖ Prince George Naturalists Club
- ❖ iNaturalist
- ❖ Matt Robinson RPBio (professional and technical training and expertise)
- ❖ Michael Bryden (communications and outreach)
- ❖ Katee Doyon (SLAM logo artist)
- ❖ Adam Hawkins (data visualization)
- ❖ Mark Thompson RPBio and Sara Sparks RPBio from EcoLogic Consultants Ltd., who accepted an initial meeting about SLAM as an idea and brainstormed a list of contacts and a starting point for this program.



RESOURCES & LINKS

Alberta Conservation Association. 2019. Amphibians on my Land: Habitat Stewardship in Agricultural Landscapes. https://www.ab-conservation.com/downloads/educational_materials/brochures/aca_amphibians_on_my_land.pdf.

Bryden M. 2025 Nov 24. Mind Your Step: An Effort to Protect Western Toads from Trail Mortalities. [accessed 2025 Dec 10]. https://canadianherpetology.ca/blog/blog_post.html?id=28.

Corkran, C.C. and Thoms, C. 2006. Amphibians of Oregon, Washington and British Columbia: A Field Identification Guide. 3rd ed. Lone Pine Publishing, Edmonton.

Fraser Valley Conservancy. 2021. Fraser Valley Conservancy. [accessed 2025 Nov 18]. <https://fraservalleyconservancy.ca/the-western-toad-migration/>.

Mike Bryden Wildlife - Mind Your Step (SLAM Program) - [Mind Your Step \(SLAM Program\)](#)

Resort Municipality of Whistler. 2025 Jan 3. Western Toads | Resort Municipality of Whistler. Resort Municipality of Whistler | Resort Municipality of Whistler. [accessed 2025 Nov 18]. <https://www.whistler.ca/parks-recreation-culture/wildlife-biodiversity-and-environment/living-alongside-wildlife/western-toads/>.

Stebbins, R.C. Peterson Field Guide to Western Reptiles and Amphibians. 2003. 3rd ed. Houghton Mifflin Co., Boston Massachusetts. xiii + 533 pp.

Thompson M, Lee A. 2022 May 22. Habitat Restoration and Priority Trials for Amphibians. chrome-extension://efaidnbmninnibpcapjpcglclefindmkaj/https://a100.gov.bc.ca/pub/acat/documents/r59893/PEA_F22_W_3413_1664382188555_8FCE11DCCD.pdf.

Toadfest. 2025. [accessed 2025 Nov 18]. <https://www.fwcp.ca/events/toadfest.html>.

Western Toads - Nakusp and Area Community Forest. 2025 Oct 17. Nakusp and Area Community Forest. [accessed 2025 Nov 18]. <https://www.nakuspcommunityforest.com/western-toads/>.

Wilder Insights podcast - Making Change and Western Toad Conservation with Ashley Sutherland | Ep - 02 (<https://www.youtube.com/watch?v=H0xm-lWIHaM>)



LITERATURE CITED

- BC Frog Watch, Habitat Conservation Trust Fund, Forest Renewal BC. Factsheet - Western Toad (*Bufo boreas*). British Columbia Ministry of Water, Land and Air Protection.
<https://www.env.gov.bc.ca/wld/documents/westerntoad.pdf>.
- COSEWIC. 2003. Assessment and Status Report on the Western Toad *Bufo boreas* in Canada. [accessed 2025 Dec 9]. <https://publications.gc.ca/collections/Collection/CW69-14-346-2003E.pdf>.
- Greenway Trail to Shane Lake Loop. 2025. AllTrails.com. [accessed 2025 Nov 18].
<https://www.alltrails.com/trail/canada/british-columbia/greenway-trail-to-shane-lake-loop>.
- Keitch L. 2021 Jun 25. The toad angels of Revelstoke. Wildsight. [accessed 2025 Nov 4].
<https://wildsight.ca/2021/06/25/the-toad-angels-of-revelstoke/>.
- Reptile & Amphibian Center. 2022 Mar 30. Reptile & Amphibian Center.
<https://www.reptilecenter.org/the-burrow/a-frog-in-the-hand>.
- The Nature Conservancy. Explanation: Frog & Toad Life Cycle. [accessed 2025 Nov 24].
<https://www.nature.org/content/dam/tnc/nature/en/documents/frog-toad-lifecycle-guide-FL-CCI.pdf>.
- Wind E, Triton Environmental Consultants Ltd. 2009. Shane Lake Resource Risk Assessment. [accessed 2025 Nov 18].
https://a100.gov.bc.ca/pub/acat/documents/r15933/ShaneLkfinal_1234457520666_11c838a028c91c914c4e91e88dab40c6ce573df30bfe8483ffb879e9e80ccb2b.pdf.