

Environment and Climate Change Canada

Canada Nature Fund: Community Nominated Priority Places for Species at Risk



## Kootenay Connect: Bat Conservation in Kootenay Connect Focal Areas



Years 1 to 7 (2019-2026)

Kootenay Connect Priority Places is a project facilitated by Kootenay Conservation Program



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Project Kootenay Connect- BAT-YR7, Year 7 (Kootenay Centre for Forestry Alternatives)

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# Table of Contents

Executive Summary.....	3
Background and Overview .....	5
Details of Activities .....	5
<b>Section 1:</b> Summary of Northern Myotis.....	7
<b>Section 2:</b> Bat Capture Inventories .....	7
<b>Section 3:</b> Habitat Enhancement – Roost Creation through BrandenBark and Tree Modifications, and Condo Construction .....	9
Tree Modifications and Creation of “Tree-like” Roost Structures .....	9
Guano Monitoring .....	14
Acoustic and Microclimate Monitoring.....	20
Bat Condos and Building Roosts.....	24
<b>Section 4:</b> Acoustic Monitoring: North American Bat Monitoring (NABat) .....	25
<b>Section 5:</b> Migration Monitoring .....	29
Conclusions and Recommendations .....	33
Acknowledgements .....	34
Literature Cited .....	36

## Executive Summary

WCS Canada's Western Bat Conservation program addresses threats to bats by generating scientific evidence, informing conservation policy and land-use decisions, closing critical knowledge gaps, and protecting and restoring habitats that sustain bat populations. In the Columbia Basin, we lead critical research that supports the Kootenay Connect initiative, which focuses on protecting and enhancing key areas to establish linkage corridors, promote biodiversity, and ensure suitable habitat for multiple at-risk species.

During year seven, WCS Canada's bat conservation efforts again center on three main activities: monitoring, inventory, and roost habitat enhancement. We contribute to the North American Bat Monitoring Program (NABat; [nabatmonitoring.org](http://nabatmonitoring.org)) and Biodiversity Pathways NNW NABat Hub models tracking species diversity and relative abundance at continental and regional scales through annual acoustic monitoring of bat echolocation calls using bat detectors. NABat is a continental-scale, standardized monitoring program that assesses bat diversity and populations, reporting every five years on the state of bats with models that evaluate species-specific occupancy changes over time and enable long-term examination of habitats. Most recently the state of the bats report has highlighted declines of species across the continent. NABat partners collect monitoring data in 10 km x 10 km grid cells, surveying them for at least one week during the same period each year. We first implemented the NABat program in BC in 2016 with 22 grid cells and leveraged partnerships and in-kind efforts to expand our network to 63 grid cells and improve the power of our data analyses. Over the first nine years of monitoring, we collected approximately 1.75 million bat recordings across BC. As part of our monitoring within Kootenay Connect priority areas, we deployed bat detectors in seven NABat grid cells that span five focal regions: Creston Valley (1), Bonanza Biodiversity Corridor (2), Kimberley/Wycliffe (1), Columbia Valley (2), and Lardeau (1). We collected a total of 163,500 bat recordings from these grid cells between 2020 and 2026. We identified activity from all 13 resident bat species within Kootenay Connect priority areas and expanded the known ranges of several species across BC, including the first record of Yuma Myotis in the Columbia Valley. Our data have also informed updated BC Conservation Data Centre range maps, the Bats of British Columbia guide book (2nd ed., Royal BC Museum, Lausen et al. 2022), and predictive modeling for habitat and WNS spread.

Through our migration project, we recorded more than 300,000 bat passes in 2025 and confirmed 11 species, including all three migratory bat species assessed as Endangered by the Committee on the Status of Endangered Wildlife in Canada. We deployed long-term, solar-powered acoustic migration monitors at seven sites: three in the Creston Valley, one in the Slocan Valley, and three in the Columbia Wetlands. These stations operated continuously throughout the migration period and remained active over winter. This effort allowed us to successfully identify likely migration corridors for all three Endangered migratory bat species, as well as document evidence of overwintering habitats for non-migrating species. Over the seven-year project, we monitored 10 sites across four focal areas: Creston Valley (4 sites), Columbia Wetlands (4 sites), Lardeau (1 site) and Slocan Valley (1 site). Across these locations, we confirmed the presence of at least 11 bat species. Preliminary analyses suggest that six sites show patterns consistent with migratory movement.

We conducted five capture nights in 2025. This adds to the other 24 nights of capture that we conducted over the 7-year Kootenay Connect period. In 2025, we captured a total of 160 bats of

seven species, confirming reproduction 68% of adult bats. In 2025 we captured no Northern Myotis, despite capture efforts. However, we apply the information we learned from our capture and radiotracking of this species in 2022 to put forward recommendations for forest management to protect this sensitive forest-dependent species.

Providing human-constructed tree-roosting habitat in areas where bats remained, but reproductive habitat was limiting, was the main goal of our roost creation. Since 2020, we have created 157 tree and tree-like roosts in Kootenay Connect linkage areas, including 23 new structures in 2025. These roosts consist of wildlife trees (young trees modified with chainsaws to create bat-friendly crevices) and trees and poles wrapped with BrandenBark™, a polymer-based artificial bark. We monitored all roost-tree structures using guano traps, which collect bat droppings on mesh trays as bats enter and exit crevices. The presence of guano confirms bat use, and we submitted samples for genetic analysis to identify bat species. In spring 2026, we will install guano traps on the roosts created in 2025. Currently, we have guano traps on 137 roost structures. At the time of reporting, we have only received genetic identification results from Northern Arizona University's Species From Feces lab. Genetic analysis has confirmed nine, potentially ten, bat species using these roosts, with further species documentation possible after we receive the remainder of the 2025 genetic results from an additional lab. The Little Brown Myotis, a SARA-listed Endangered species, remains the most frequently detected species in these structures.

We continue to monitor the Parson and Kuskanook bat condos through guano collection, acoustic recording, and microclimate loggers. We submitted for DNA analysis in 2025. The Kuskanook Bat Chalet is used by Yuma and Little Brown Myotis; the Parson condo results are pending. Additionally, we collected and submitted guano from the recently renovated Edgewater Quonset. Results confirm Little Brown Myotis continue to use the Quonset structure.

The scarcity of mature and old-growth trees, which provide critical roosting habitat for reproductive bats, remains a concern in the Columbia Basin region. With little protection for these remnant old-growth patches, we will continue advocating for their preservation. Once British Columbia updates its Identified Wildlife list under the Forest and Range Practices Act (under review since 2023), several at-risk bat species may be eligible for some level of habitat protection (e.g. proposed Wildlife Habitat Areas (WHA)).

## Background and Overview

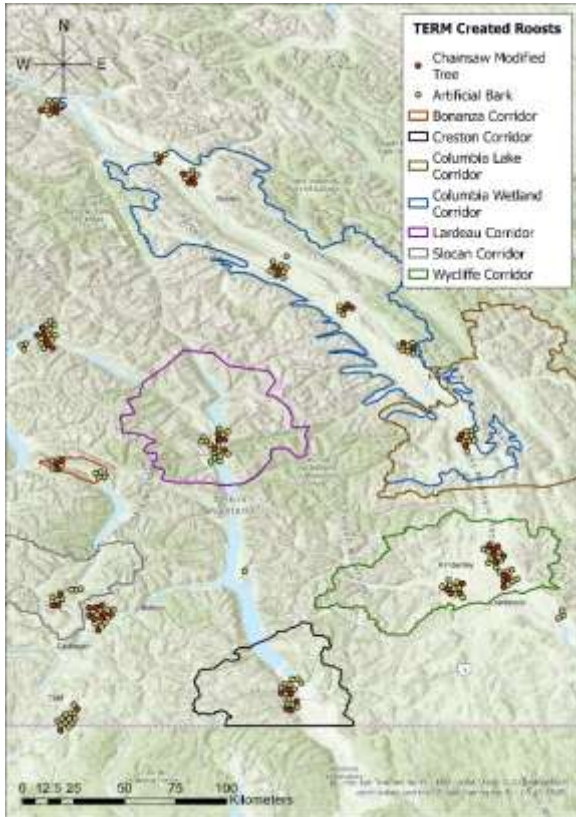
Bats face unprecedented threats. Wildlife Conservation Society Canada's Western Bat Conservation program addresses threats to bats by generating the scientific evidence needed to assess impacts, mitigation effectiveness, informing conservation policy and management decisions, closing key knowledge gaps, and restoring and enhancing habitats that sustain bat populations. The Columbia Basin contains critical habitat for multiple at-risk species, making it a focal point for conservation. Kootenay Connect aims to protect and enhance these areas by establishing linkage corridors, promoting biodiversity, and securing suitable habitat for at-risk species.

Within Kootenay Connect, we focus on three core activities: monitoring, inventory, and roost habitat enhancement. We conduct annual acoustic monitoring by recording echolocation calls with bat detectors to facilitate tracking of changes in species diversity and relative abundance over time. These long-term datasets facilitate assessments of how habitat changes and other threats influence bat populations over time to guide conservation and management decisions across the continent. Our work contributes to the North American Bat Monitoring Program (NABat), a large-scale, standardized initiative that uses a 10 km × 10 km grid system. During the course of this project we developed a robust network of partners to annually survey 63 grid cells across British Columbia, including 15 in the Columbia Basin and seven in Kootenay Connect areas: Creston Valley (1), Bonanza Biodiversity Corridor (2), Wycliffe (1), Lardeau (1), and Columbia Valley (2).

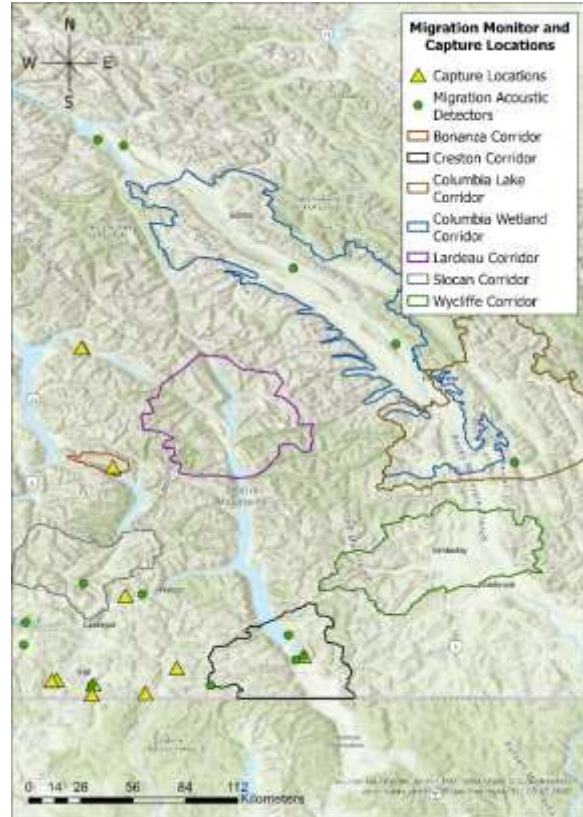
British Columbia is home to two federally endangered *Myotis* bat species: the Little Brown *Myotis*, which is widespread across the Columbia Basin, and the Northern *Myotis*, which occurs only in the Basin's northern reaches. These two endangered species differ markedly in ecology and habitat use, and we tailor our methods accordingly. Little Brown *Myotis* form large maternity colonies, often with hundreds of females, in buildings or bat boxes and forage primarily over standing water, although they also hunt in other habitats. In contrast, Northern *Myotis* roost and forage within forest interiors and strongly associate with old-growth and mature forests. They rarely cross open areas, typically following forest edges or remaining within 100 metres of cover. Reproductive females roost alone or in small colonies of fewer than 60 individuals and forage beneath the canopy, frequently gleaning insects from leaves and other vegetation. To support both species, we identify high-quality habitat patches and actively create tree roosts as interim solutions while natural recruitment of suitable roost trees recovers over time. To this end, we apply and refine practical mitigation strategies. Building on efforts of others (e.g., Griffiths et al. 2018), in partnership with Todd Manning (Strategic Resource Solutions) and Loki Tree Service, we create artificial roost structures, including crevice roosts cut directly into trees using chainsaws. We deploy these techniques strategically in areas where at-risk bat species are most likely to benefit.

## Details of Activities

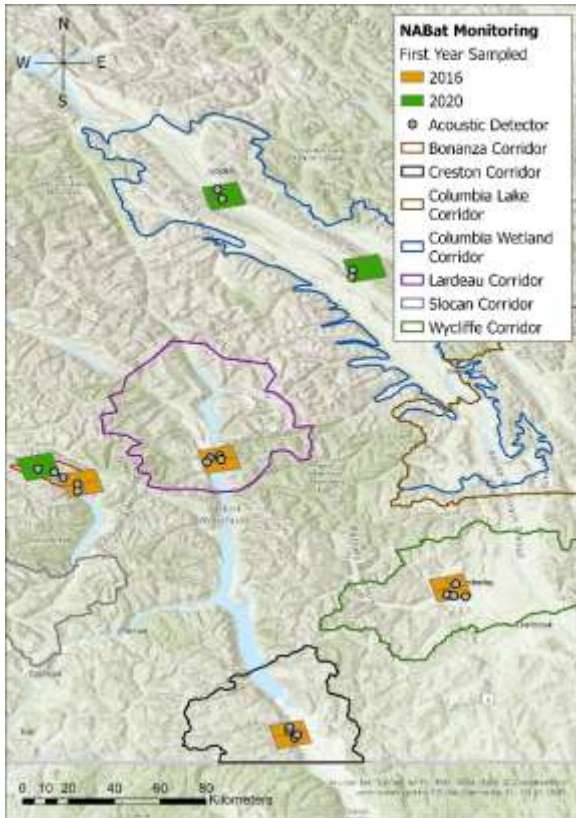
Locations of our Basin-wide activities that include and/or inform our Kootenay Connect project are summarized in Figure 1 (maps).



A.



B.



C.

**Figure 1.** Kootenay Connect bat enhancement, monitoring, sampling, and inventory sites. **A.** All Basin-wide tree and tree-like roosts created to date. **B.** 2025 inventory sites (capture and acoustics, including migration monitoring sites). **C.** 2025 Kootenay Connect NABat grid cells monitored in BC. Maps by Jason Rae. Note that for tree roost structures, the dots on the map have been offset, making the enhanced area look larger than it is.

## Section 1: Northern Myotis

The goal of our roost enhancement work is to create habitat for Little Brown and Northern Myotis, both of which are listed as endangered in Canada (ECCC 2018). This on-the-ground work is replacing lost habitat in an effort to ensure the long-term survival of these, and other, bat species. Northern Myotis has highly limited range in southern BC as this is a species typically associated with mature and old growth trees (CDC 2022), which have been decreasing on the landscape over recent times.

In 2021, we did not detect Northern Myotis in the sampled areas of the Columbia Valley during our initial inventory. In 2022, we expanded our search and, through mist-netting and radiotracking, located a remnant source population in the southern part of the Kinbasket Reservoir. Here we found bats roosting in small remnant patches of old-growth cedar, suggesting that this species may be keeping a foothold in this system through only small patches of remaining habitat. In 2023, we focused on the Duncan Reservoir/Meadow Creek region and conducted three nights of capture in remnant old-growth habitats but did not acoustically detect or capture Northern Myotis. Wildfires in 2024 prevented our planned follow-up work in this area. In 2024, instead, we returned to the Kinbasket Reservoir and shifted to acoustic monitoring, deploying detectors at 17 sites near remnant old-growth patches, with Northern Myotis detected at six of the sites. We do not know what minimum patch sizes and connectivity are needed to sustain this species and we recommend further study in this area to assess whether bats here are successfully reproducing, and what timber harvest regime facilitates the persistence of this species.

In 2025 we returned to Staubert Lake, a location that is to the west of the Lardeau corridor. This is an important location, because to date, we have been unable to find Northern Myotis anywhere in West Kootenay other than location. The Allan Marlow Old Growth at Staubert Lake is a tiny (approximately 0.1 square kilometre) remnant patch of old growth cedar where we had captured Northern Myotis in the past. Two nights of capture yielded 60 individual bats (one recapture), but we captured no Northern Myotis (Table 1, below). Notable is the fact that this site is within 4 km of roost enhancements that we did in 2022 (Armstrong Lake), where we confirmed Northern Myotis at one of the BrandenBark trees. Although these locations are not located in the Lardeau corridor, we include this information as context for our efforts to locate Northern Myotis within the Lardeau corridor that has suitable habitat, where we have conducted bat capture inventories in previous years as part of the Kootenay Connect project, and despite some remnant old growth patches in this corridor, we were unable to locate Northern Myotis.

## Section 2: Bat Capture Inventories

We use capture inventories to confirm the presence or absence of species in an area, and the occupancy by reproductive females. This provides valuable baseline data ahead of potential changes to habitat, including habitat loss or roost enhancement, and helps assess whether this area is supporting sustainable populations of these long-lived mammals. In addition to the attempted Northern Myotis capture and radiotracking (see section 1), in 2025 we focussed most of our capture efforts at sites of previous (Frog Bear, Fort Shepherd) and future (Hunter Siding) roost enhancements (Table 1).

**Table 1.** Capture inventory results. Species codes: MYLU, Little Brown Myotis; MYYU, Yuma Myotis; MYCA, Californian Myotis; MYEV, Long-eared Myotis; COTO, Townsend’s Big-eared bat; LACI, Hoary bat; EPFU, Big Brown bat; LANO, Silver-haired bat. These results summarize all relevant captures, including a night of capture at non-Kootenay Connect funded roost enhancements as these inform our Columbia Valley Kootenay Connect activities and results.

<b>Date</b>	<b>Associated Project (funding source)</b>	<b>Capture Site Name</b>	<b># Bats Captured</b>	<b># Species Captured</b>	<b>Species List</b>
15 Jul 25	Kootenay Connect	Alan Marlow’s Old Growth	45	2	MYLU, MYYU
17 Jul 25	Kootenay Connect	Alan Marlow’s Old Growth West	16*	3	MYLU, MYYU, COTO
28 Jul 25	Kootenay Connect	Hunter Siding	16	4	MYLU, MYYU, MYCA, LACI
30 Jul 25	Columbia Basin Trust	Fort Shepherd Riparian	17	6	MYLU, MYYU, MYCA, MYEV, EPFU, LANO
31 Jul 25	Kootenay Connect	Frog Bear	66	2	MYLU, MYYU

\*One recapture from previous night.

## Section 3: Habitat Enhancement – Roost Creation through BrandenBark and Tree Modifications, and Condo Construction

One of the many threats bats face is habitat loss. Our roost creations are mitigating habitat loss creating roosts that mimic old trees. These are designed to appeal to a large suite of bat species, including endangered Little Brown Myotis and Northern Myotis (Table 2).

### Tree Modifications and Creation of “Tree-like” Roost Structures

Specific to year 7 of the Kootenay Connect project, in 2025 we created a total of 23 new tree and tree-like roosts (Table 3). We created three types of roosts : BrandenBark™ trees, where we mounted BrandenBark™ on trees that we made into snags through limbing, topping and girdling (Figure 2); BrandenBark™ poles, where we mounted BrandenBark™ on poles (Figure 3); and wildlife tree snags where we limbed, topped, and girdled live trees and then created crevices specific for bats (Figure 4). Each tree received at least 3 chainsaw cuts consisting of a simulated lightning strike and 2 or more plunge cuts. For pole installs, we partnered with Kenpesq't Territorial Operations, the economic development arm of the Shuswap Band.

In 2025, partnering with Selkirk College and Okanagan Nation Alliance, we designed and produced locally made alternatives to BrandenBark™. There were two main drivers for this work: First, BrandenBark™ is effective, but it's expensive and not locally-sourced; second, we wanted to build local capacity and explore new designs that could serve as alternatives to traditional bat boxes. Out of that collaboration, we have developed two products: Canadian BatBark, a similar product to BrandenBark™; and MiniBarks which are smaller, self-contained units which we designed to install on live trees (Figure 5).

Over the past seven years we have been working to enhance and restore bat habitat for tree-roosting species across the Columbia Basin as part of a larger project which includes all seven Kootenay Connect areas. Thanks to multiple partners and funders, in 2025 in the Basin we constructed 33 new tree or tree-like roosts for bats: 14 wildlife trees created using chainsaws with crevices of strategic depth, size and aspect for bats; 12 BrandenBark™ wrapped trees; three BrandenBark™ wrapped poles; and ten prototypes of the locally produced Canadian BatBark (2 trees) and MiniBarks (2 trees, with 4 MiniBark/tree). This synthetic bark will likely last several decades, as a stop-gap measure, to provide immediate habitat to bats in forests where trees are not yet mature enough to provide the sloughing bark, hollows, and cavities that bats need for raising young.

**Table 2.** Type and number of structures in Kootenay Connect focal areas, and endangered species which they benefit. Structure code descriptions: BB, BrandenBark™ installed on tree or pole; WT, chainsaw modified wildlife tree. Species codes: MYLU, Little Brown Myotis; MYSE, Northern Myotis; BARS, Barn Swallow.

Species Managed	Structure	Type of Structure	Quantity (cumulative to date)	Quantity (2025 only)	2025 Breakdown by Kootenay Connect Focal Corridor
MYLU, BARS	Added	Artificial Structure (condo)	3*	0	
MYLU, MYSE**	Modified	Natural Structure (WT)	17	4	N/A (to west of Lardeau Corridor in MYSE confirmed area)***
MYLU, MYSE**	Added	Artificial Structure (BB)	30	4	N/A (to west of Lardeau Corridor in MYSE confirmed area)***
MYLU	Modified	Natural Structure (WT)	37	6	<b>Columbia Wetlands (3) Bonanza (3)</b>
MYLU	Added	Artificial Structure (BB)	73	9	<b>Columbia Wetlands (6) Bonanza (3)</b>

\* Previously built condo (Kuskanook Bat Chalet) only targets MYLU. Number includes Edgewater Quonset

\*\*Only structures in Meadow Creek, Lardeau, Duncan, and Donald could possibly have MYSE (within species' range), so only these are included in these rows.

\*\*\*Kootenay Connect funds not used on these structures, but included in report for context only

**Table 3.** Tree roost structures created. A. Tree roosts created in Year 7 (2025) by site. Roost type descriptions: BBT, BrandenBark™ installed on trees; BBP, BrandenBark™ installed on poles; WT, chainsaw modified wildlife tree. B. Summary of all tree-roost structures created in the Columbia Basin, including those in the Kootenay Connect Corridors over the past 7 years. Species codes: MYCA = California Myotis; MYLU = Little Brown Myotis; MYEV = Long-eared Myotis (*Myotis evotis*); MYTH = Fringed Myotis (*M. thysanodes*); MYVO = Long-legged Myotis (*M. volans*); MYYU = Yuma Myotis; LANO = Silver-haired bat (*Lasiorycteris noctivagans*); LACI = Hoary bat (*Lasiurus cinereus*); MYSE = Northern Myotis; EPFU = Big Brown bat (*Eptesicus fuscus*). Question marks indicate genetic ambiguity among some bat species/sub-species.

**A.**

Location	BBT	BBP	WT	Total
Wilbur Lake (Columbia Valley Corridor)		3		3
Cleland Lake (Columbia Valley Corridor)	3		3	6
Summit Lake Provincial Park (Bonanza Biodiversity Corridor)	3		3	6
Armstrong Lake (outside Kootenay Connect area – west of Lardeau Corridor)*	4		4	8
<b>TOTALS</b>	<b>10</b>	<b>3</b>	<b>10</b>	<b>23</b>

\*Kootenay Connect funds not used on these structures; results included in report for context only

**B.**

SITE	K. Connect Focal Corridor	Install month	Install year	Type of Structure	modification/ installation	SPECIES OF BATS DETECTED
Snk'mip Marsh (Bonanza)	Bonanza	Sept.	2023	4 trees	BBARK	LANO, MYJU (and flying squirrel)
Summit Lake P Park	Bonanza	Sept.	2025	3 trees 3 trees	BBARK chainsaw	monitoring underway monitoring underway
Lot 48	Columbia Lake	Sept. - Oct.	2022, 2023	6 poles	BBARK	MYLU, MYEV/MYTH?
		Sept.	2024	3 trees	BBARK	MYLU, MYEV?
		Sept.	2024	3 trees	chainsaw	LANO, MYLU, MYEV?
Cleland Lake	Columbia Wetlands	Sept.	2025	3 trees 3 trees	BBARK chainsaw	monitoring underway monitoring underway
Marl Creek Prov. Park	Columbia Wetlands	Oct.	2021	2 trees 2 trees	BBARK chainsaw	MYLU, MYEV, MYEV?, LANO MYLU, MYCA, MYEV?, LANO
NTBC Edgewater Property	Columbia Wetlands	Sept., Oct.	2021, 2023	6 trees	BBARK	EPFU, MYLU, MYEV/MYTH? EPFU, MYLU, MYEV/MYTH? (and flying squirrel)
		Oct.	2021	4 trees	chainsaw	----
Parson Bat/Swallow condo	Columbia Wetlands	May	2023	pole	BBARK	MYLU
Spike Elk Ranch	Columbia Wetlands	Oct.	2020	pole pole	BBARK Doug Fir Bark	MYJU, MYLU, MYEV? MYLU, MYVO
Burges James Gadsden Prov. Park	Columbia Wetlands	Oct.	2021	2 trees 4 trees	BBARK chainsaw	MYLU, MYEV? MYLU, MYJU
Wilbur Lake	Columbia Wetlands	Sept.	2024	3 trees	BBARK	results pending
		July	2025	3 poles	BBARK	monitoring underway
		Sept.	2024	3 trees	chainsaw	results pending

SITE	K. Connect Focal Corridor	Install month	Install year	Type of Structure	modification/ installation	SPECIES OF BATS DETECTED
Creston CVWMA	Creston	Sept., Oct.	2022	6 trees	BBARK	EPFU, MYCA, MYYU, MYEV/MYTH?, LANO
				3 poles	BBARK	EPFU, MYYU, MYLU, MYEV/MYTH?
				6 trees	chainsaw	MYYU, MYLU, MYEV?, LANO
Creston NCC (Frog Bear)	Creston	Sept.	2022	3 poles	BBARK	EPFU, MYCA, MYYU, MYLU, MYEV/MYTH?, LACI (or adjacent tree?)
Duncan Lake	Lardeau	Sept.	2022	3 trees	BBARK	MYCA, MYYU, MYLU, MYEV?, LANO
Duncan-Lardeau Flats	Lardeau	Sept.	2022	3 trees	chainsaw	----
				2 trees	BBARK	MYYU, MYLU, LANO
Hill Creek Spawning Channel	Lardeau	Nov.	2023	1 pole	BBARK	MYLU
				3 poles	BBARK	MYCA, MYLU
Lardeau River	Lardeau	Sept.	2022	4 trees	BBARK	MYCA, MYYU
Lardeau River- NTBC-GS	Lardeau	Sept.	2022	2 trees	chainsaw	guano samples failed to provide genetic results
				3 poles	BBARK	MYCA, MYYU, MYLU
Meadow Creek Spawning Channel	Lardeau	Sept.	2022	2 trees	BBARK	----
		July	2023	1 pole	BBARK	MYYU, MYLU, MYEV?
Vallican (Elk Root Farm)	Slocan	Sept.	2024	3 trees	BBARK	----
				3 trees	chainsaw	----
Winlaw (Crooked Horn Farm)	Slocan	Mar.	2025	3 poles	BBARK	monitoring underway
Bummers Mid	Wycliffe	Sept.	2023	3 trees	BBARK	MYLU, MYEV?, LANO
Bummers North	Wycliffe	Oct.	2023	3 poles	BBARK	LANO, MYLU/MYEV?, MYEV/MYTH?
Bummers South	Wycliffe	Sept.	2023	3 trees	BBARK	MYLU, MYEV, MYTH?
				3 trees	chainsaw	failed
NTBC Wasa Slough	Wycliffe	Sept.	2024	6 trees	BBARK	LANO, MYLU/MYEV?
				6 trees	chainsaw	LANO, MYLU/MYEV?

SITE	K. Connect Focal Corridor	Install month	Install year	Type of Structure	modification/ installation	SPECIES OF BATS DETECTED
Wycliffe	Wycliffe	Sept.	2023	8 trees 4 trees	BBARK chainsaw	MYLU, MYEV, MYTH? ----
Armstrong Lake	n/a	Sept.	2022, 2025	6 trees	BBARK	MYSE, MYYU, MYLU
		Sept.	2025	6 trees	chainsaw	monitoring underway
Arrow Reservoir	n/a	Sept.	2022	2 trees	BBARK	MYLU
Incomappleaux	n/a	Nov.	2023	3 poles	BBARK	MYCA, MYLU
Beasley - Smallwood	n/a	June	2020	9 trees 9 trees	chainsaw BBARK	MYCA, MYEV, MYLU, LANO MYCA, MYYU, MYLU, MYEV?, LANO
Crawford Bay	n/a	May	2023	1 pole	BBARK	MYYU, MYLU
Gold River	n/a	Sept.	2025	4 trees 3 trees 2 trees	2 BBARK; 2CB-Bark chainsaw MBARK	monitoring underway monitoring underway monitoring underway
Bull River	n/a	Sept.	2023	3 trees	BBARK	----
Newgate	n/a	Sept.	2023	3 trees 3 trees	BBARK chainsaw	MYYU, MYLU, MYEV/MYTH? ----
Trail Ft Shepherd	n/a	Sept., Oct.	2022	6 trees 6 poles 2 trees	BBARK BBARK chainsaw	EPFU, MYCA, MYYU, MYLU, MYEV/MYTH?, LANO EPFU, MYCA, MYYU, MYLU, MYEV/MYTH?, LANO EPFU, MYCA, MYYU, MYLU, MYEV/MYTH?, LANO



**Figure 2.** An arborist installs a BrandenBark™ sheet on a tree at Wasa Slough (top). Looking up a BrandenBark™ tree installation (bottom) at Cleland Lake, showing the large-volume pocket created by the artificial bark. Photos by Heather Gates.



**Figure 3.** BrandenBark™ on poles at Wilbur Lake. Photos by Heather Gates.





**Figure 4.** An arborist prepares the young tree by limbing, girdling, and topping (above). A completed chainsaw modified wildlife tree (right). Photos by Heather Gates.





**Figure 5.** Locally produced Canadian BatBark prototype installed on the left-hand tree and BrandenBark™ on the right-hand tree (above) and MiniBark installed on a live tree (right). Photos by Heather Gates.

## Monitoring Using Guano

We actively monitor use of our created roosts by installing guano traps (Figure 6) at the bases of trees and poles and collecting droppings from the mesh to confirm bat occupancy. These traps allow us to evaluate the effectiveness of both bark-mimic (BrandenBark™) roosts and chainsaw-modified wildlife trees. Samples that we collected from guano trays installed beneath our roost creations to date confirmed presence of nine species: Little Brown Myotis, Northern Myotis, Long-legged Myotis, California Myotis, Long-eared Myotis, Yuma Myotis, Silver-haired Bat, Hoary Bat, and Big Brown Bat. We may also have detected Fringed Myotis; however, mitochondrial DNA sequences for Long-eared Myotis are identical to those of Fringed Myotis, and both species occur in parts of the West (Fort Shepherd, Creston) and East (Kootenay Trench) Kootenays. While Long-eared Myotis are well documented throughout the Columbia Valley and Kootenay Trench, we have only recently documented Fringed Myotis (capture and acoustics) in the latter area.

We submitted guano collected in 2025 for all roost creations to either Northern Arizona University (37 pooled samples from 106 roosts) or Wildlife Genetics International (92 individual samples from 25 roosts). We have received genetic results from Northern Arizona University, with no new species detected. Results from Wildlife Genetics International are still pending at the time of reporting. Genetic results across all years and occupancy rates based on guano presence are found in Table 4.



**Figure 6.** A wood-framed mesh guano trap at the base of tree roost at Wilbur Lake (left) and bat guano on a trap (right). Photos by Heather Gates.

**Table 4.** Guano sampling by roost type (all Columbia Basin locations), % of occupied roosts, and genetic results to date. Roost type description: BBT, BrandenBark™ tree; BBP, BrandenBark™ pole; NBP, natural (Douglas fir) bark pole; WT, chainsaw modified wildlife tree. Species codes: MYLU, Little Brown Myotis; MYSE, Northern Myotis; MYYU, Yuma Myotis; MYEV, Long-eared Myotis; MYVO, Long-legged Myotis; MYCA, California Myotis; EPFU, Big Brown; LANO, Silver-haired bat; LACI, Hoary bat. MYEV/MYTH, either long-eared Myotis or Fringed Myotis.

		<b>Number of Monitored Installations by year and type</b> <i>(% of monitored roosts with guano collected in 2025)</i>			
		BBT	BBP	NBP	WT
<b>Year of Install</b>	2020	9	1	1	9
	2021	6	0	0	6
	2022	24	19	0	12
	2023	31	15	0	16
	2024	15 (94 %)	3 (100%)	0	15 (61%)
<b>Species confirmed (2020 – 2024 results combined)</b>		MYLU, MYSE, MYYU, MYEV, MYCA, LANO, EPFU, MYEV/MYTH*	MYLU, MYYU, MYCA, MYEV, EPFU, LACI, MYEV/MYTH*	MYLU, MYVO	MYLU, MYYU, MYEV, MYCA, MYEV/MYTH*

\* mtDNA sequences of MYEV are identical to that of MYTH. Both species are potentially present as they are both known from East Kootenay. MYEV is known from throughout the Columbia Valley and Kootenay Trench, but MYTH has only recently been discovered in the latter area.

## Monitoring Using Acoustics and Microclimate Loggers

In 2025, we monitored a representative subsample of roosts in both the East and West Kootenays using acoustic Roostloggers (Titley Scientific, Missouri) (Figure 7). While guano collection and genetic analysis confirm which species occupy each roost, acoustic monitoring allows us to determine precisely when bats first occupy roosts in spring and when they cease using them in autumn (Table 5). We also calculate the percentage of days each roost remains active within that seasonal window, which provides a quantitative measure of roost fidelity and intensity of use (Figure 8). In 2025, we deployed Roostloggers in 31 tree roosts, increasing our cumulative total of acoustically monitored roosts to 66.

We also installed HOBO microclimate monitors in a subset of roosts to measure internal temperature and relative humidity (Figure 9). These data allow us to characterize thermal profiles within each structure, evaluate how roost design influences microclimate, and assess whether conditions fall within ranges known to support reproductive females and developing pups. In 2025, we installed HOBO units in 14 additional roosts, bringing the total number of roosts monitored for microclimate conditions to 45. Together, acoustic and microclimate monitoring provide a comprehensive evaluation of roost occupancy, seasonal use, and habitat quality. We are currently analyzing these data and will use the results to inform recommendations in a forthcoming scientific publication describing our tree-roost enhancement tools.



**Figure 7.** An acoustic Roostlogger (left) and a HOBO temperature/Rh logger installed in a chainsaw modified wildlife tree (below). Photos by Heather Gates.

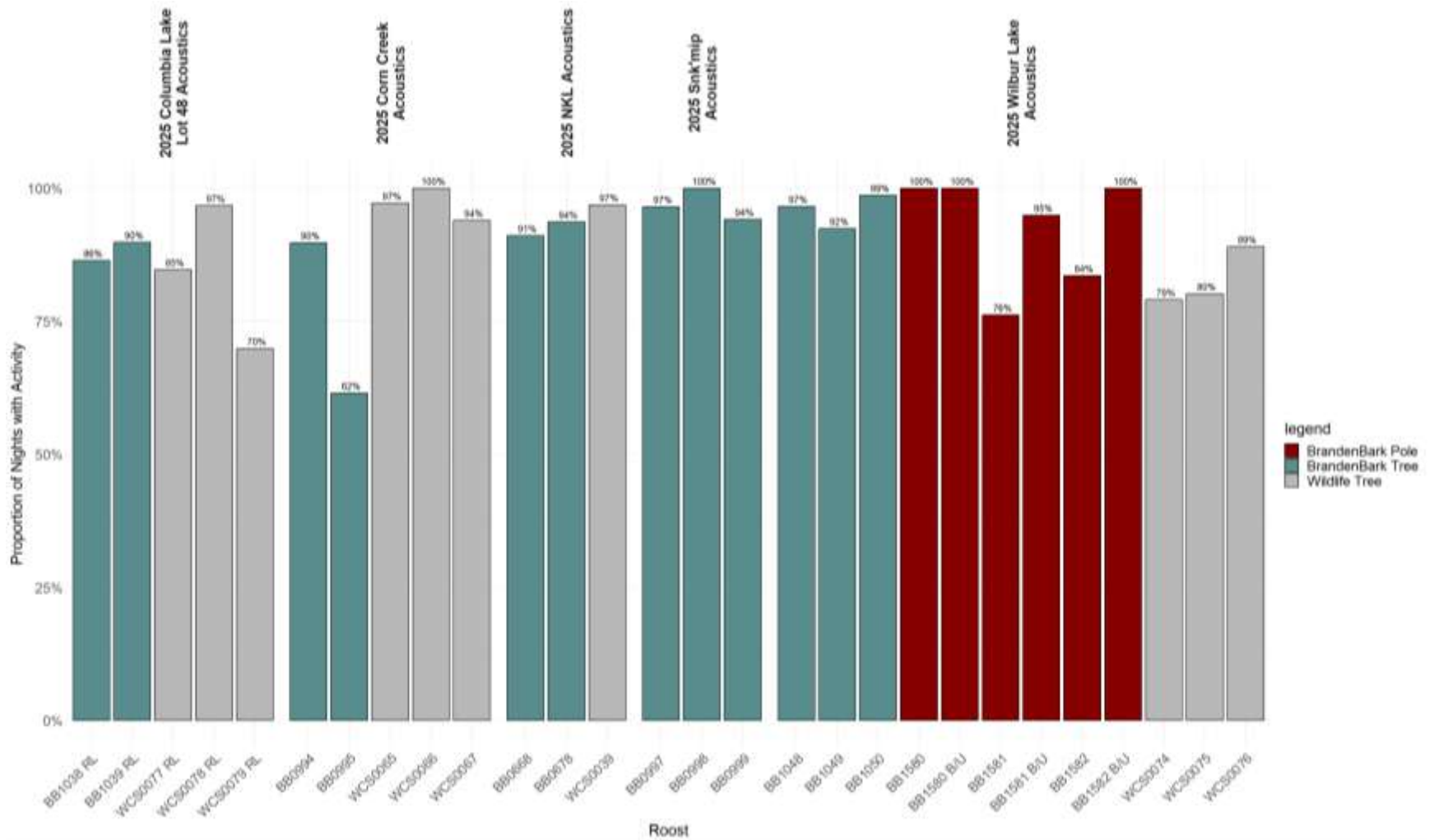


**Table 5.** Date span of roost use, showing first and last detection dates during 2025. BBT, BrandenBark™ tree; BBP, BrandenBark™ pole; WT, Wildlife tree; B/U, backup Roostlogger in case of failure. \*No detections of bats, but Roostlogger was functioning.

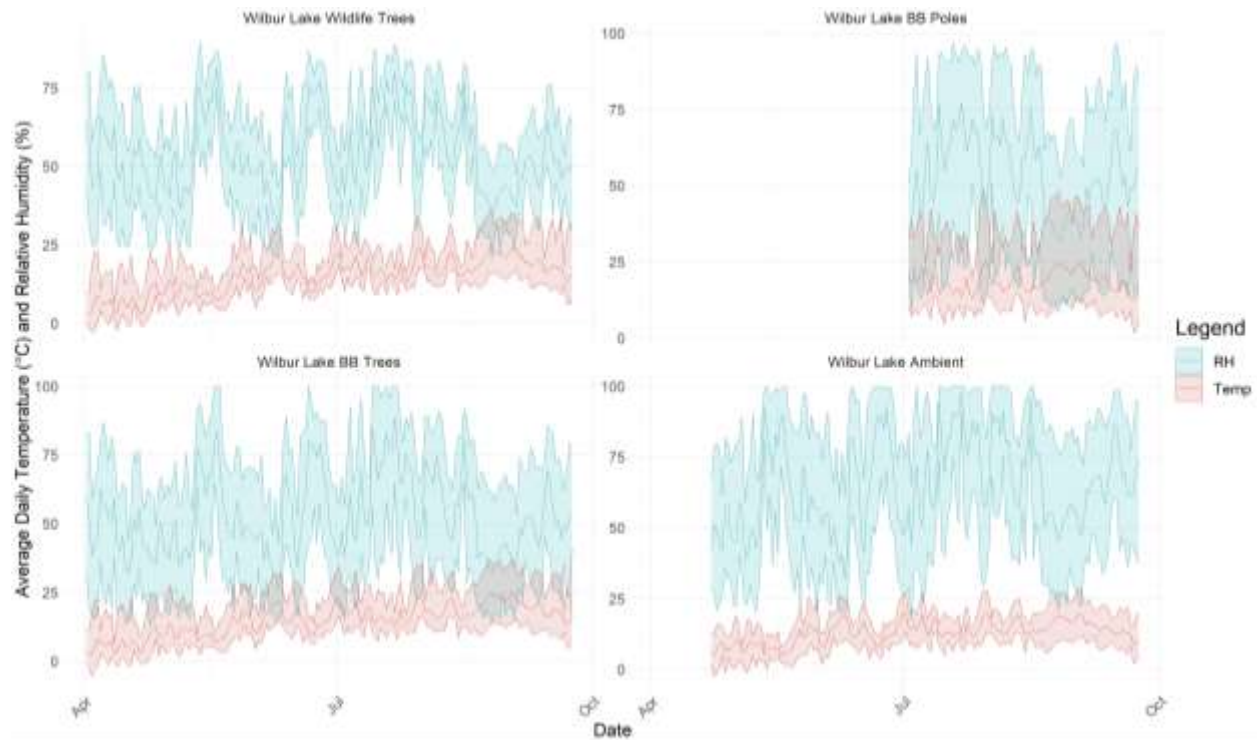
Area	Roost ID	Roost Type	First Bat Detection	Last Bat Detection	Detector Log Start	Detector Log End	Percentage of Days Roosts Were Used
<b>Lot 48</b> (Columbia Lake Corridor)	BB1038 RL	BBT	2025-05-28	2025-10-21	2025-05-28	2025-11-15	86
	BB1039 RL	BBT	2025-05-28	2025-10-21	2025-05-28	2025-11-15	90
	WCS0077 RL	WT	2025-05-28	2025-10-24	2025-05-28	2025-11-15	85
	WCS0078 RL	WT	2025-05-28	2025-10-25	2025-05-28	2025-11-15	97
	WCS0079 RL	WT	2025-05-30	2025-10-21	2025-05-28	2025-11-15	70
<b>Corn Creek, CVWMA</b> (Creston Valley Corridor)	BB0995	BBT	2025-05-14	2025-05-26	2025-05-13	2025-05-26	62
	BB0994	BBT	2025-05-17	2025-10-18	2025-05-14	2025-11-14	90
	BB0996	BBT	_*	_*	2025-05-13	2025-11-14	-
	WCS0065	WT	2025-05-14	2025-11-07	2025-05-14	2025-11-14	97
	WCS0067	WT	2025-05-14	2025-11-15	2025-05-13	2025-11-15	94
WCS0066	WT	2025-05-14	2025-05-17	2025-05-13	2025-05-17	100	
<b>North Kootenay Lake</b> (Lardeau Corridor)	BB0678	BBT	2025-05-27	2025-11-01	2025-05-27	2025-11-03	94
	BB0668	BBT	2025-07-02	2025-09-05	2025-07-01	2025-11-03	91
	WCS0039	WT	2025-05-27	2025-11-02	2025-05-27	2025-11-03	97
<b>Snk'mip Marsh</b> (Bonanza Biodiversity Corridor)	BB0998	BBT	2025-05-09	2025-10-10	2025-05-09	2025-10-10	100
	BB0999	BBT	2025-05-10	2025-10-10	2025-05-08	2025-10-09	94
	BB1000	BBT	_*	_*	2025-05-08	2025-10-09	-
	BB0997	BBT	2025-05-09	2025-08-02***	2025-05-08	2025-09-24	97
<b>Wilbur Lake</b> (Columbia Valley Corridor)	BB1049	BBT	2025-05-01	2025-09-23	2025-04-30	2025-09-23	92
	BB1050	BBT	2025-05-01	2025-09-23	2025-05-01	2025-09-24	99
	BB1048	BBT	2025-05-01	2025-09-24	2025-05-01	2025-09-24	97
	WCS0076	WT	2025-05-01	2025-09-22	2025-04-30	2025-09-23	89
	WCS0075	WT	2025-05-02	2025-09-14	2025-05-01	2025-09-23	80
	WCS0074	WT	2025-05-01	2025-09-20	2025-05-01	2025-09-23	79
	BB1580	BBP	2025-07-03**	2025-09-23	2025-07-03	2025-09-23	100
	BB1580 B/U	BBP	2025-07-03**	2025-09-23	2025-07-02	2025-09-23	100
	BB1581	BBP	2025-07-03**	2025-09-04	2025-07-03	2025-09-23	76
	BB1581 B/U	BBP	2025-07-03**	2025-09-18	2025-07-02	2025-09-23	95
	BB1582	BBP	2025-07-03**	2025-09-19	2025-07-03	2025-09-23	84
BB1582 B/U	BBP	2025-07-03**	2025-09-19	2025-07-03	2025-09-23	100	

\*\*BrandenBark™ poles were installed 2025-07-03, Roostlogger data indicates bats found and used them the day of installation.

\*\*\*Roostlogger mic likely failed 2025-08-02



**Figure 8.** Percentage of days roosts were used during the occupied period (first day bats were detected to last day bats detected – see rightmost columns in Table 5).



**Figure 9.** Average daily internal minimum and maximum temperature ( $^{\circ}\text{C}$ ) and relative humidity (%) with mean represented by the central line, by roost type. (Wilbur Lake BrandenBark™ [BB] trees n=3, BrandenBark™ poles n=3, and Wildlife Trees n=3). Ambient station was a single HOBO deployed in a solar shield.

## Bat Condos and Building Roosts

In 2025, we continued monitoring the Kuskanook Bat Chalet, completed in May 2022, by collecting guano and recording internal microclimate conditions. We gathered sufficient guano to create a pooled sample and submitted it for genetic analysis, which confirmed use by both Little Brown Myotis and Yuma Myotis.

Leading up to this occupancy, we had monitored the inside temperatures of this new design, and in 2024, in response to observing cooler than expected internal roost temperatures, we stained the exterior with a darker colour to enhance solar gain and constructed additional internal chambers to reduce airflow and drafts. We also installed a shade plate on the adjacent marina light to prevent artificial light from shining onto the structure and potentially deterring bats from entering the structure.

We constructed the Parson Condo in spring 2023 within the Columbia Valley Wildlife Management Area to provide habitat for endangered Little Brown Myotis and at-risk swallows. We partnered with the BC Ministry of Water Land and Resource Stewardship as part of a project to replace lost maternity roosting habitat: a local citizen in Parson was excluding a colony of Little Brown Myotis from his house, and we built this replacement structure as alternative roost habitat. This project was also in collaboration with Wildsight Golden and Goldeneye Ecological Services, designing the structure to also support nesting swallows: we thus dubbed the structure the “Bat-Swallow AirBnB.” We also

consulted local First Nations during planning and construction and conducted an archaeological assessment to ensure the sonotubes of the structure would not represent a potentially sensitive disturbance. We received a special access permit from Canfor, and a permit from the BC Min. of WLRS to build on the provincial wildlife management area.

To expand microclimate options and attract additional bat species, we installed a pole wrapped in BrandenBark™ adjacent to the condo. In spring 2024, we outfitted the building with a solar-powered PIT tag reader system, renovated internal roosting features to reduce drafts and improve thermal conditions for reproductive females, and installed educational and memorial signage. In 2025, we confirmed first-time use by Barn Swallow and collected small amounts of bat guano from inside the structure, indicating exploratory or low-level bat use. We submitted the sample for genetic analysis, and results are pending. We also deployed acoustic Roostloggers and HOBO microclimate monitors inside the condo to quantify occupancy patterns and internal conditions.

In 2024, in partnership with Wildsight Golden, we reinforced a collapsing Quonset structure at Edgewater that was known to house reproductive Barn Swallows and Little Brown Myotis. Our modifications enhanced this roosting/nesting habitat by replacing/securing beams and posts and modifying rafters to improve roosting/nesting opportunities and microclimates. As Nature Trust BC conservation land, this property is accessed by the public. As such, we capitalized on this outreach opportunity by installing an educational sign between the Quonset and our nearby tree-roost structures (BrandenBark™ and Wildlife trees) to highlight our habitat enhancement work completed at the site.

In 2025, we collected guano from the Quonset and submitted it for genetic analysis, which confirmed continued use by Little Brown Myotis. This genetic analysis was conducted because we have genetically detected a very similar species, Yuma Myotis, in the vicinity. Yuma Myotis commonly roost with Little Brown Myotis in West Kootenay, but there had been no detections of Yuma Myotis in the Columbia Valley when we started our Kootenay Connect project in 2019. Over the 7-year period, we had five genetic detections of Yuma Myotis in the Columbia Valley (from three sites at Nicholson, Brisco, and Blaeberry).

## **Section 4: Acoustic Monitoring: North American Bat Monitoring (NABat)**

Standardized long-term monitoring remains essential for understanding patterns in bat species diversity and relative abundance over time. Consistent acoustic data collection enables population trend analyses and highlights changes in species distributions, helping to detect emerging threats. This information also enables evaluation of the effectiveness of habitat enhancement and restoration initiatives.

Since we first implemented the NABat program in BC in 2016, we have strategically leveraged many partnerships and in-kind efforts to develop our network and improve the power of our data analyses. Over the first nine years of monitoring, we collected approximately 1.75 million bat recordings across BC. This substantial dataset enables regional and provincial trend analyses of relative activity and abundance across habitat types and restoration contexts. Our data have

already informed updated BC Conservation Data Centre range maps, the Bats of British Columbia guide book (Lausen et al. 2022), and predictive modeling for habitat and WNS spread.

As part of our monitoring within Kootenay Connect priority areas, we deployed bat detectors in seven NABat grid cells and conducted mobile acoustic surveys along driving transects in four of those cells. We collected a total of 163,500 bat recordings from these grid cells in Kootenay Connect priority areas between 2020 and 2026. Monitoring locations were strategically selected to align with areas where tree-roost enhancements were deployed or planned, including the Creston Valley Wildlife Management Area, Snk'mip Marsh, Summit Lake, Lardeau, and Wycliffe. We identified activity from all 13 resident bat species within Kootenay Connect priority areas and expanded the known ranges of several species, including Spotted Bat, Fringed Myotis, Yuma Myotis, California Myotis, and Northern Myotis. In 2022, we confirmed the first genetic record of Yuma Myotis in the Columbia Valley.

As of 2025, we have completed the transition of NABat Hub leadership to Biodiversity Pathways, ensuring long-term continuity and coordination of this large-scale monitoring effort. We recorded more than 50,000 bat passes this year within our seven grid cells in Kootenay Connect corridors and identified activity from 13 species (Table 6). Between 2019 and 2025, we detected Big Brown Bat, Hoary Bat, Silver-haired Bat, California Myotis, Long-eared Myotis, Little Brown Myotis, and Long-legged Myotis every year across all grid cells, while we detected Townsend's Big-eared Bat, Eastern Red Bat, Northern Myotis, and Fringed Myotis at varying frequencies within only specific grid cells (Table 7). The seven Kootenay Connect NABat grid cells comprise just over 40% of the 17 total grid cells in the Kootenay NABat Region, meaning regional trends are likely to closely reflect patterns within the Kootenay Connect focal areas. Results from the 2024 summary report by Hurtado (2026) found no significant trends in bat activity within the Kootenay Region, suggesting that regional activity levels in monitored areas remain relatively stable. The dataset we have collected will continue to provide a foundation for trend analyses, meta-analyses, and additional analyses to illuminate critical unknowns in bat ecology.

**Table 6.** Summary of species detected in stationary acoustic monitoring conducted as part of the North American Bat (NABat) monitoring efforts within 7 Kootenay Connect areas in Columbia Basin in 2025. ND = not detected. Species codes are as follows: ANPA, Pallid Bat; COTO, Townsend’s Big-eared Bat; EPFU, Big Brown Bat; EUMA, Spotted Bat; LABO, Eastern Red Bat; LACI, Hoary Bat; LANO, Silver-haired Bat; MYCA, California Myotis; MYME/MYCI, Western Small-footed Myotis; MYEV, Long-eared Myotis; MYLU, Little Brown Myotis; MYSE, Northern Myotis; MYTH, Fringed Myotis; MYVO, Long-legged Myotis; MYYU, Yuma Myotis.

Grid Cell Name Nearest City/General Area	Wycliffe/ Kimberley	Nicholson	Spillimacheen	CVWMA	Lardeau	Hills	Summit Lake
	Cranbrook	Golden	Radium	Creston	Kootenay Lake	New Denver	Nakusp
<b>NABat Cell ID</b>	<b>243562</b>	<b>70250</b>	<b>60586</b>	<b>147306</b>	<b>79018</b>	<b>1194</b>	<b>218282</b>
<b>ANPA</b>	ND	ND	ND	ND	ND	ND	ND
<b>COTO</b>	Y	ND	ND	Y	Y	ND	ND
<b>EPFU</b>	Y	Y	Y	Y	Y	Y	Y
<b>EUMA</b>	ND	ND	ND	ND	ND	ND	ND
<b>LABO</b>	Y	Y	Y	Y	ND	ND	ND
<b>LACI</b>	Y	Y	Y	Y	Y	Y	Y
<b>LANO</b>	Y	Y	Y	Y	Y	Y	Y
<b>MYCA</b>	Y	Y	Y	Y	Y	Y	Y
<b>MYME/MYCI</b>	Possibly	ND	ND	ND	ND	ND	ND
<b>MYEV</b>	Y	Y	Y	Y	Y	Y	Y
<b>MYLU</b>	Y	Y	Y	Y	Y	Y	Y
<b>MYSE</b>	ND	ND	ND	ND	Y	ND	Possibly
<b>MYTH</b>	ND	ND	ND	Y	ND	ND	ND
<b>MYVO</b>	Y	Y	Y	ND	Y	Y	Y
<b>MYYU</b>	Y	ND	Y	Y	Y	Y	Y
<b>TOTAL BAT PASSES</b>	<b>1975</b>	<b>1034</b>	<b>15522</b>	<b>21884</b>	<b>5559</b>	<b>1285</b>	<b>12362</b>
<b>Total bat passes in Current Kootenay Connect Areas in 2025 = 59,621</b>							

**Table 7.** Total percentage of years each species was detected during North American Bat Monitoring Program (NABat) acoustic monitoring within 7 Kootenay Connect areas in Columbia Basin -- cumulative for all 7 years of Kootenay Connect: 2019 to 2025. All lower confidence recordings labelled as “possible” were excluded from this total. ND = not detected. Species codes are as follows: ANPA, Pallid Bat; COTO, Townsend’s Big-eared Bat; EPFU, Big Brown Bat; EUMA, Spotted Bat; LABO, Eastern Red Bat; LACI, Hoary Bat; LANO, Silver-haired Bat; MYCA, California Myotis; MYME/MYCI, Western Small-footed Myotis; MYEV, Long-eared Myotis; MYLU, Little Brown Myotis; MYSE, Northern Myotis; MYTH, Fringed Myotis; MYVO, Long-legged Myotis; MYYU, Yuma Myotis.

Grid Cell Name Nearest City/General Area	Wycliffe/ Kimberley	Nicholson	Spillimacheen	CVWMA	Lardeau	Hills	Summit Lake
	Cranbrook	Golden	Radium	Creston	Kootenay Lake	New Denver	Nakusp
<b>NABat Cell ID</b>	<b>243562</b>	<b>70250</b>	<b>60586</b>	<b>147306</b>	<b>79018</b>	<b>1194</b>	<b>218282</b>
<b>ANPA</b>	ND	ND	ND	ND	ND	ND	ND
<b>COTO</b>	100%	17%	50%	100%	100%	14%	67%
<b>EPFU</b>	100%	100%	100%	100%	100%	100%	100%
<b>EUMA</b>	ND	ND	ND	ND	ND	ND	ND
<b>LABO</b>	86%	67%	100%	29%	ND	14%	ND
<b>LACI</b>	100%	100%	100%	100%	100%	100%	100%
<b>LANO</b>	100%	100%	100%	100%	100%	100%	100%
<b>MYCA</b>	100%	100%	100%	100%	100%	100%	100%
<b>MYME/MYCI</b>	ND	ND	ND	ND	ND	ND	ND
<b>MYEV</b>	100%	100%	100%	100%	100%	100%	100%
<b>MYLU</b>	100%	100%	100%	100%	100%	100%	100%
<b>MYSE</b>	ND	ND	ND	ND	57%	ND	ND
<b>MYTH</b>	57%	ND	ND	100%	ND	ND	ND
<b>MYVO</b>	100%	100%	100%	86%	100%	100%	100%
<b>MYYU</b>	71%	17%	67%	100%	100%	100%	100%
<b>Number of Years Monitored</b>	<b>7</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>6</b>

## Section 5: Acoustic Migration and Winter Activity Surveys

Because the three tree-roosting migratory bat species—Hoary Bat, Eastern Red Bat, and Silver-haired Bat—are currently under assessment by the Committee on the Status of Endangered Wildlife in Canada, we began to acoustically monitor likely migration corridors in the Columbia Basin in 2022. We deployed solar-powered detectors to support continuous, long-term monitoring and have operated most stations year-round since installation (with occasional interruptions for maintenance or temporary solar limitations). Through this monitoring, we can identify the main species present in an area during the maternity season, examine the timing of seasonal movements of migratory species through the area, and assess winter bat activity that may indicate the presence of nearby hibernacula.

In 2025, we deployed seven year-round acoustic monitors within the Kootenay Connect corridors: three in the Creston Valley, three in the Columbia Wetlands, and one in the Slocan Valley. Over the seven-year project, we monitored 10 sites within these corridors: Creston Valley (Leach Lake, Frog Bear, Stagleap [Figure 10], Kuskanook), Columbia Wetlands (Columbia Lake, Canal Flats, Edgewater, Parson Condo), Slocan Valley (Vallican [Figure 10]), and Lardeau (Duncan Island). Across the duration of the project, we confirmed at least 11 species (Table 8).



**Figure 10.** Servicing the year-round acoustic detectors at Stagleap Provincial Park (left; Creston Valley Corridor) and Vallican (right; Slocan Corridor).

**Table 8.** Summary of the species detected at each year-round monitoring site, during each year at the migration monitoring locations (based on automated bat call identification only). Species codes are as follows: COTO, Townsend’s Big-eared Bat; EPFU, Big Brown Bat; LABO, Eastern Red Bat; LACI, Hoary Bat; LANO, Silver-haired Bat; MYCA, California Myotis; MYEV, Long-eared Myotis; MYLU, Little Brown Myotis; MYTH, Fringed Myotis; MYVO, Long-legged Myotis; MYYU, Yuma Myotis.

Site and Year	COTO	EPFU	EPFULANO	LABO	LACI	LANO	MYCA	MYEV	MYLU	MYTH	MYVO	MYYU	Myotis spp.	High Freq. Bat	Low Freq. Bat	NoID	Total	
<b>Canal Flats</b>		<b>4</b>	<b>28</b>	<b>18</b>	<b>57</b>	<b>788</b>	<b>29</b>	<b>34</b>	<b>162</b>		<b>15</b>		5	<b>1569</b>	<b>691</b>	<b>466</b>	<b>3866</b>	
2025		4	28	18	57	788	29	34	162		15		5	1569	691	466	3866	
<b>Columbia Lake</b>		<b>120</b>	<b>9</b>	<b>169</b>	<b>75</b>	<b>482</b>	<b>20</b>	<b>47</b>	<b>1614</b>				2	<b>11823</b>	<b>1503</b>	<b>2788</b>	<b>18652</b>	
2022														1215	81	475	1771	
2023		55	4	93	21	102	3	9	329				1	3398	337	161	4513	
2024		65	5	76	54	380	17	38	1285				1	7210	1085	2152	12368	
<b>Duncan Island</b>		<b>44</b>	<b>12</b>	<b>3</b>	<b>116</b>	<b>474</b>	<b>109</b>	<b>32</b>	<b>174</b>		<b>1</b>	<b>102</b>	<b>4</b>	<b>4270</b>	<b>14115</b>	<b>3415</b>	<b>22871</b>	
2022														3202	13179	3129	19510	
2023		42	12	3	116	368	84	28	172		1	100	3	927	671	163	2690	
2024		2				106	25	4	2				2	141	265	123	671	
<b>Edgewater</b>		<b>11</b>	<b>56</b>	<b>32</b>	<b>316</b>	<b>339</b>	<b>205</b>	<b>61</b>	<b>2852</b>				<b>4</b>	<b>9349</b>	<b>1965</b>	<b>3197</b>	<b>18397</b>	
2025		11	56	32	316	339	205	61	2852				4	9349	1965	3197	18397	
<b>Frog Bear</b>	<b>1</b>	<b>15</b>	<b>2</b>	<b>12</b>	<b>2678</b>	<b>89</b>	<b>99</b>	<b>6</b>	<b>1281</b>	<b>18</b>			<b>1372</b>	<b>99</b>	<b>11116</b>	<b>2537</b>	<b>5071</b>	<b>24396</b>
2024	1	15	2	12	2678	89	99	6	1281	18			1372	99	11116	2537	5071	24396
<b>Kuskanook</b>		<b>1</b>	<b>2</b>	<b>39</b>	<b>31</b>	<b>167</b>	<b>227</b>		<b>494</b>	<b>2</b>			<b>2536</b>	<b>71</b>	<b>18936</b>	<b>217</b>	<b>2754</b>	<b>25477</b>
2025		1	2	39	31	167	227		494	2			2536	71	18936	217	2754	25477
<b>Leach Lake</b>	<b>30</b>	<b>124</b>	<b>115</b>	<b>123</b>	<b>1395</b>	<b>1668</b>	<b>500</b>	<b>58</b>	<b>947</b>	<b>98</b>			<b>6396</b>	<b>219</b>	<b>42584</b>	<b>17890</b>	<b>13495</b>	<b>85642</b>
2024	11	7	13	1	557	185	89	23	155	24			1371	62	7098	6002	5080	20678
2025	19	117	102	122	838	1483	411	35	792	74			5025	157	35486	11888	8415	64964
<b>Parson</b>		<b>10</b>	<b>29</b>	<b>51</b>	<b>1202</b>	<b>465</b>	<b>75</b>	<b>30</b>	<b>1446</b>		<b>18</b>		<b>114</b>	<b>17163</b>	<b>8434</b>	<b>9636</b>	<b>38673</b>	
2024		7	18	26	987	290	43	26	1075		12		65	11458	6942	5346	26295	
2025		3	11	25	215	175	32	4	371		6		49	5705	1492	4290	12378	
<b>Valiican</b>		<b>216</b>	<b>48</b>	<b>21</b>	<b>46</b>	<b>1861</b>	<b>777</b>	<b>263</b>	<b>318</b>	<b>5</b>		<b>1006</b>	<b>64</b>	<b>20722</b>	<b>2594</b>	<b>4683</b>	<b>32624</b>	
2024		7	13	1	46	288	323	27	162	2		508	43	14716	743	3563	20442	
2025		209	35	20	1573	454	236	156	3			498	21	6006	1851	1120	12182	
<b>Stagleap</b>		<b>2535</b>	<b>44</b>	<b>133</b>	<b>48</b>	<b>1662</b>	<b>193</b>	<b>50</b>	<b>236</b>		<b>4</b>	<b>6397</b>	<b>67</b>	<b>138892</b>	<b>6877</b>	<b>19400</b>	<b>176538</b>	
2024														9	5	116	130	
2025		2535	44	133	48	1662	193	50	236		4	6397	67	138883	6872	19284	176408	
<b>Total</b>	<b>31</b>	<b>3080</b>	<b>345</b>	<b>601</b>	<b>5964</b>	<b>7995</b>	<b>2234</b>	<b>581</b>	<b>9524</b>	<b>123</b>	<b>38</b>	<b>17813</b>	<b>655</b>	<b>276424</b>	<b>56823</b>	<b>64905</b>	<b>447136</b>	

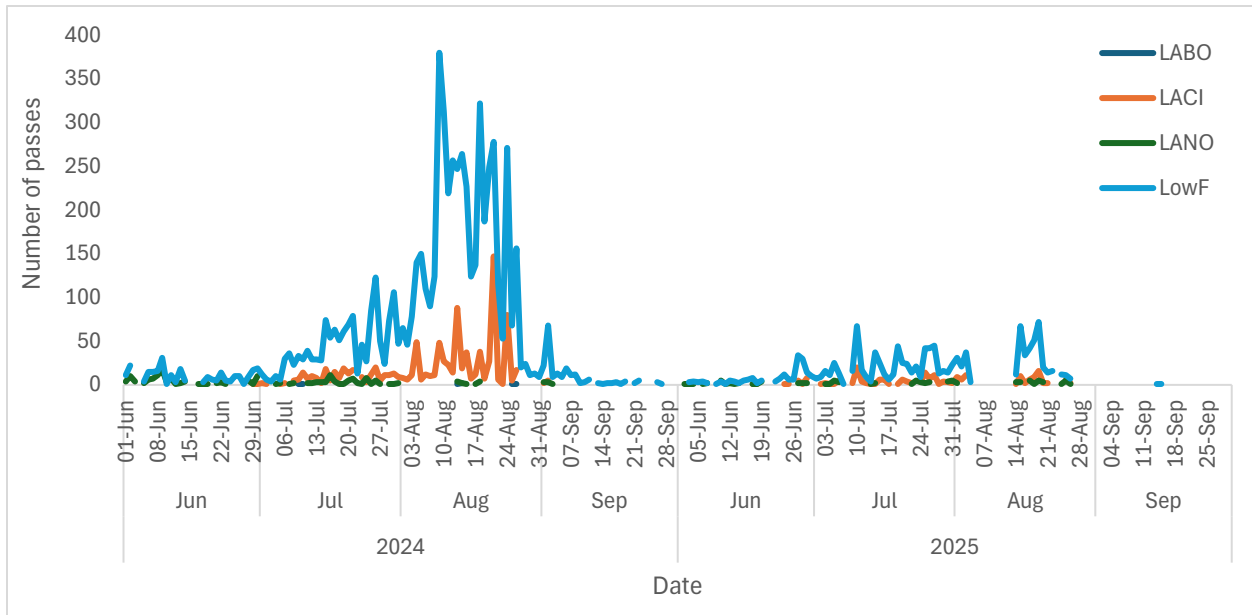
Due to the large volume of year-round monitoring data (~450,000 bat passes across 10 sites; Table 8), we rely on automated bat call identification software (i.e., Kaleidoscope and SonoBat) to efficiently process and screen recordings. We then plot activity across all sites and examine the resulting line graphs to evaluate seasonal patterns for different bat species. Although we expect activity to increase in late summer as young-of-year fledge and begin flying independently, pronounced activity spikes—particularly of migratory tree-roosting species—indicate elevated movement through the area rather than just local fledging of young. These peaks correspond with bat seasonal movement toward wintering habitats.

Results from the automated identification analyses suggest that six of the ten monitored sites show patterns consistent with seasonal migration of bats. In contrast, there is no clear evidence of significant peaks of movement at the Columbia Lake or Kuskanook sites. Patterns at Canal Flats and Edgewater remain inconclusive -- an additional year of monitoring is planned to help confirm whether migratory activity occurs at these locations. Among the sites showing potential migratory patterns, activity peaks of migratory species varied. Duncan Island showed a peak from early to late August, Frog Bear from early to mid-August, Parson Condo from mid-July to late August (Figure 11), Leach Lake from early to late August (Figure 11), Vallican from early to mid-July, and Stagleap from late July to early September. This suggests that migration of bats across the Kootenay region may start as early July and extend into the first part of September.

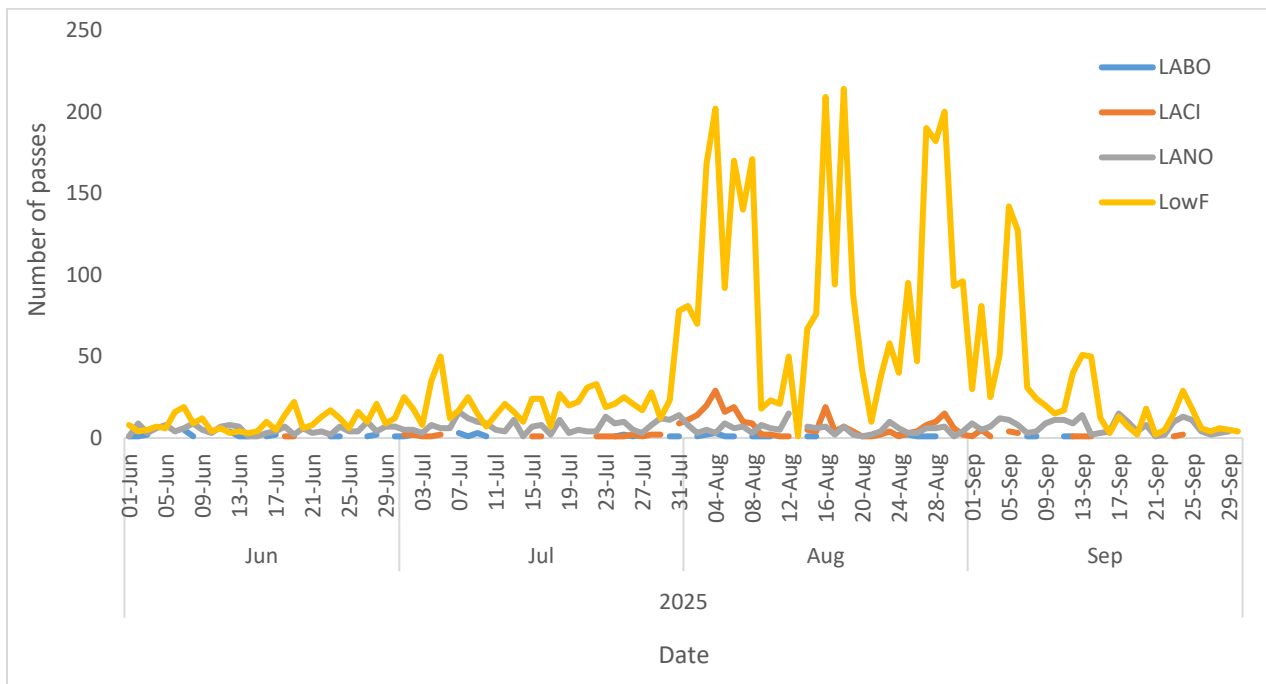
Among sites with past winter data (i.e., activity between the months of December and February), those in the west Kootenays (Duncan Island, Frog Bear, Leach Lake, Vallican, and Stagleap) appear to contain overwintering habitat, whereas the East Kootenay sites (Columbia Lake and Parson) do not show the same pattern. Canal Flats, Edgewater, and Kuskanook were newly deployed in summer 2025, and their first winter data will be collected from the field in April 2026. Overall low winter activity at the East Kootenay detectors suggests these sites are not located near significant hibernacula. However, detections of both high- and low-frequency bats in the West Kootenay sites indicate that *Myotis* species, as well as silver-haired and possibly big brown bats, are overwintering in that area, supporting previous winter monitoring in this area.

We have also paired a high-elevation site (Stagleap) with a low-elevation site (Leach Lake) to assess bat movements not only along linear corridors such as major waterways but also examine elevational differences in bat activity and diversity, and relative movement of bats over mountain passes (Figure 12). Stagleap (1775 m) and Leach Lake (535 m) are separated by ~33 km and an elevation difference of ~1240 m. Preliminary comparisons between the sites highlight the importance of high-elevation passes for fall migration. Unexpectedly, the bat activity is higher at the high elevation bat detector relative to the low elevation detector. Further examination of species diversity, sex, and reproductive status will need to be done at these sites to understand this unusual result.

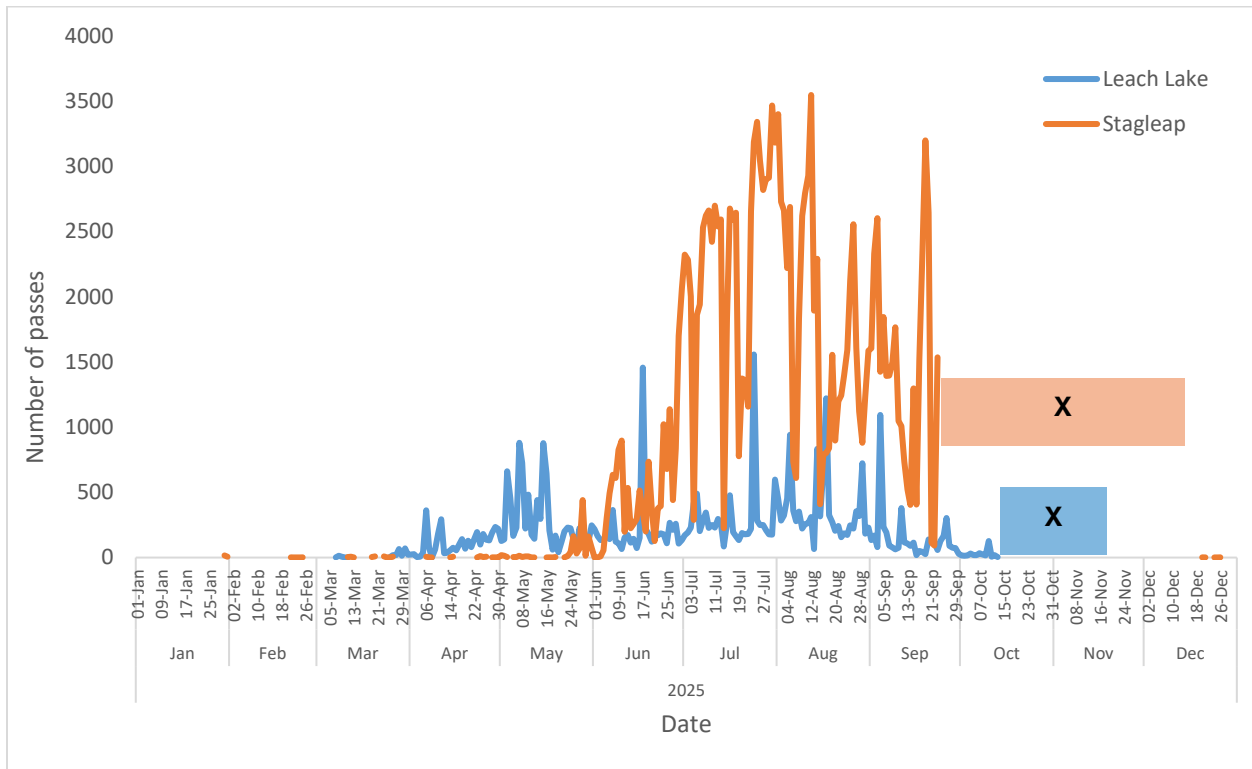
A.



B.



**Figure 11.** Activity patterns from June to September for Parson Condo in 2024 and 2025 (A) and Leach Lake in 2025 (B). Species codes are as follows: LABO, Eastern Red Bat; LACI, Hoary Bat; and LANO, Silver-haired Bat. Trends for LowF (low-frequency bats) are also shown. This category includes passes from Hoary Bats and Silver-haired Bats, as well as some non-migratory species such as Big Brown Bat, that the automated software was unable to assign to a specific species. It is included because it contains detections of the migratory species of interest; however, results should be interpreted with caution because the category also includes some non-migratory species.



**Figure 12.** Year-round bat activity at two monitoring stations in the Creston area. Stagleap is a high elevation site, 1240 metres above the Leach Lake detector, which is at valley bottom (535 m elevation) on the west side of the Creston Valley linkage corridor. Solid colour blocks (X) indicate periods of detector failure when no data were recorded.

Additional monitoring at sites between the existing bat detector stations may help clarify how bats are moving across the landscape within the Columbia Basin. This could help explain why migratory activity is detected at some sites but not others, and why the timing of activity peaks differs among locations, particularly if bats are following specific water corridors or different east–west versus north–south movement routes.

## Conclusions and Recommendations

Over the past seven years, our work through the Kootenay Connect project has filled important knowledge gaps and established critical baseline data upon which to gauge future changes in bat diversity and relative abundance. This will be increasingly important as threats continue to increase for bats with ongoing loss of old forests, wind energy development proposals, and the spread of white-nose syndrome.

In the strategic Kootenay Connect linkage corridors, we have not only enhanced habitat for bats and other biodiversity that use tree crevices, but developed and tested new designs for creating maternity habitat for bats. Most notably, we have developed and deployed new tools as stop-gap

measures for creating tree roosts for bats, replacing lost habitat needed to keep bats on the landscape in areas that have been heavily logged.

As bats continue to decline across the continent and BC's forests continue to degrade in their ability to provide old growth forests for bats to raise young, there is increased urgency to protect and enhance forests to ensure the persistence of these vital long-lived mammals. Forests and the forestry industry benefit from bats through their pest control services, and bats depend on appropriately managed forests for population sustainability. We recommend that our work on understanding the role of artificial bat bark structures in forest management be continued alongside research to specifically inform management of forests to sustain bat biodiversity. We also highly recommend that our created roost structures be revisited every few years for coming decades if possible, to determine the longevity and use of these structures over time.

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## Literature Cited

- Adams J, Roby P, Sewell P, Schwierjohann J, Gumbert M, Brandenburg M. 2015. Success of BrandenBark™, an artificial roost structure designed for use by Indiana bats (*Myotis sodalis*). *Journal of the American Society of Mining and Reclamation*, 4(1): 1–15.
- Caceres, M., 1998. The summer ecology of *Myotis* species bats in the interior wet-belt of British Columbia. University of Calgary, Masters Thesis.
- CDC (Conservation Data Center). 2022. B.C. Conservation Data Centre Conservation Status Report: *Myotis septentrionalis*. B.C. Ministry of Environment. Available: <https://a100.gov.bc.ca/pub/eswp/> (accessed Mar 11, 2023).
- COSEWIC. 2023. Hoary Bat (*Lasiurus cinereus*) Eastern Red Bat (*Lasiurus borealis*) Silver-haired Bat (*Lasionycteris noctivagans*): COSEWIC assessment and status report 2023. Available: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/hoary-bat-eastern-red-bat-silver-haired-bat-2023.html>
- ECCC (Environment and Climate Change Canada). 2018. Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat (*PeriMyotis subflavus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 172 pp.
- Lausen, C.L., D. Nagorsen, R.M. Brigham, J. Hobbs. 2022. Bats of British Columbia, 2nd Edition. Royal British Columbia Museum, Victoria, B.C. 375 pp.
- Foster, R. W., and A. Kurta. 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). *Journal of Mammalogy* 80:659-672.
- Griffiths, S.R., Lentini, P.E., Semmens, K., Watson, S.J., Lumsden, L.F. and Robert, K.A., 2018. Chainsaw-carved cavities better mimic the thermal properties of natural tree hollows than nest boxes and log hollows. *Forests*, 9(5), p.235.
- Henderson, L.E. and H.G. Broders. 2008. Movements and resource selection of the northern Long-eared Myotis (*Myotis septentrionalis*) in a forest-agriculture landscape. *Journal of Mammalogy* 89:952-963.
- Hurtado, C. 2026. North American Bat Monitoring Program in British Columbia Data Summary and Activity Trend Analyses: 2016 – 2024. Available: [https://biodiversitypathways.github.io/BCNABat/NABat-BC\\_2016-2024.pdf](https://biodiversitypathways.github.io/BCNABat/NABat-BC_2016-2024.pdf)
- Loeb, S.C., Rodhouse, T.J., Ellison, L.E., Lausen, C.L., Reichard, J.D., Irvine, K.M., Ingersoll, T.E., Coleman, J.T., Thogmartin, W.E., Sauer, J.R. and Francis, C.M. 2015. A plan for the North American bat monitoring program (NABat) (p. 112). United States Department of Agriculture, Forest Service, Research & Development, Southern Research Station.
- Mering E.D. and Chambers C.L. 2012. Artificial roosts for tree-roosting bats in northern Arizona. *Wild. Soc. Bull.* 36(4):765-772.