Upper Columbia Swallow Habitat Enhancement Project

Year 4 (2024-2025)

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Executive Summary

The Upper Columbia Swallow Habitat Enhancement Project (UCSHEP) is a multi-faceted, multi year project that has been supported by FWCP since its inception in 2021. The project's main objectives are: a) create and enhance breeding areas for swallows to increase habitat availability; b) complete effectiveness monitoring at all enhancement and restoration projects; c) build increased awareness for swallow species and their conservation status, including Indigenous perspectives on swallows; d) coordinate citizen-scientists to inventory/monitor swallow nests, and; e) use data from Motus Wildlife Tracking to learn about bank swallow post-breeding migration routes. In 2024, we built upon the successes of the previous three years of effort.

The UCSHEP located 128 active Bank Swallow colonies between Canal Flats and Donald, with an additional 58 colonies found without observed Bank Swallows activity. One hundred and fifty-seven active Barn Swallow nests were found and monitored on 130 structures in 2024, with 86 of those nests confirmed successful (produced chicks). In 2024, there were 585 Barn Swallow nest monitoring records made at 130 structures on 64 Barn Swallow nesting sites located between Fairmont and Kinbasket Reservoir. An additional 85 effectiveness monitoring records were made at artificial nesting structures that the UCSHEP built for barn swallows from 2021-2023.

There is limited Bank Swallow breeding habitat in the North Columbia. Based upon successes in eastern Canada, the UCSHEP built the first artificial nest structure (ANS) for Bank Swallows in Western Canada in November 2024, creating suitable habitat where it lacked. This expanded available breeding habitat in an area (Spike Elk Farm, Blaeberry) where other habitat requirements (food, roosting habitat) are present. A substrate pile in Athalmer (on District of Invermere land) was sloped in fall 2023 to create a vertical face, which is required by breeding Bank Swallows. This pile of substrate was used extensively by Bank Swallows in spring and summer of 2024; 13 monitoring visits in 2024 observed nearly 400 holes were dug by Bank Swallows, and nearly 200 of those became active nests. Bank Swallow breeding habitat was created at Birchlands Creek (20km south of Golden) in the Columbia Wetlands Wildlife Management Area in November 2024, adjacent to colony habitat that had been lost.

A pre-existing Barn Swallow nesting structure in Edgewater had deteriorated from significant wind and water damage. It provided roosting and breeding habitat for at-risk bats and swallows. Rather than having the structure torn down and replaced to compensate for lost habitat, in April 2024 it was restored and enhanced for swallows and bats. The structure was already being used by both roosting bats and breeding Barn Swallows shortly after restoration activities were completed.

From 2021-2023 we erected seven artificial nesting structures (ANS) for Barn Swallows (1=18'x24', 5=12'x18', 1 bat/swallow condo) and 94 nest cups for Barn Swallows. 10 more nest cups were installed in 2024 to entice breeding pairs to existing sites by making them more suitable for nesting (better nest attachment, head start on nest). Effectiveness monitoring occurred at all ANS and nest cups during all years of the project. One ANS in Invermere was used by one to two pairs of Barn Swallows in 2024. Two

broods were raised there, but at different times, one in a nest cup and the other in a naturally built mud nest.

Volunteer citizen-scientists continued to be trained to monitor Bank Swallow colonies and/or Barn Swallow nests, at ANS and natural colonies/nests. Seventy-eight volunteers participated in the UCSHEP in 2024, and 20 of those were new to the project in 2024. To date, there have been 154 volunteers that have participated, usually by monitoring Bank and/or Barn Swallow nesting sites. All data was submitted to the provincial data warehouse and to the federal government to assist with the identification of Critical Habitat for the recovery of Bank and Barn Swallows. Outreach was aimed towards conserving swallows and their habitats (e.g., promoting Best Management Practices for swallows) and on soliciting public information regarding the location of any new nest or roost sites. The UCSHEP Bank Swallow data was shared with Wildlife Conservation Society, the agency that administers the Key Biodiversity Area (KBA) program in Canada. Darvill has been working towards achieving KBA (formerly sites were Important Bird Areas) for the Columbia Wetlands since 2015, and by using data from the UCSHEP, she nominated the Upper Columbia as a KBA using Bank Swallow as the primary 'trigger species.'

This project most closely aligns with the Wetland and Riparian Action Plan, priority action 37, a habitat-based action working on enhancing wildlife habitat features (for swallows). Secondarily, the project most closely aligns with the Rivers and Riparian Action Plan, priority action 6. This is a habitat-based action working on the connectivity of habitat for both Bank and Barn Swallows. These two FWCP actions have the highest level of priority (number one) within the FWCP action plans.

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Cover photo: Substrate pile that was enhanced in Athalmer (Invermere) to create Bank Swallow breeding opportunities.

Table of Contents

Table of Figures

List of Tables

1.0 Introduction

Since 1970, roughly 2.9 billion birds have vanished from Canada and the United States, marking a 29% drop in bird populations (Rosenberg et al., 2019). According to Birdlife International's (2022) *State of the World's Birds* report, data from the IUCN Red List reveals that 49% of global bird species (5,412 species) are seeing population declines, while 38% (4,234 species) remain stable. Only 6% (659 species) are on the rise, and another 6% (693 species) have unknown population trends. Aerial insectivores—birds like swallows and flycatchers that hunt while flying—have suffered some of the most significant declines over the past several decades (Nebel et al., 2010). In Canada, they have experienced the steepest population drops among all bird groups (North American Bird Conservation Initiative Canada, 2019). This decline is driven by multiple factors, including the global reduction in insect populations (primary food source), habitat destruction, climate change, and adverse conditions at migratory stopover sites (Spiller & Dettmers, 2019). Birds demonstrate that with proper conservation efforts, species can be preserved and ecosystems can heal. A key step in conserving birds and other forms of biodiversity is to protect, secure, and manage the most vital areas required for their survival—these are Key Biodiversity Areas (KBAs), many of which have been specifically identified for bird conservation (Birdlife International, 2024).

The Bank Swallow (*Riparia riparia*) is facing one of the fastest population declines for a single species in Canada with an estimated 93%-98% population loss in Canada over a forty-year period (Smith et al., 2020; COSEWIC, 2013). In 2013, the Bank Swallow was listed as a Threatened species by COSEWIC and was listed as Threatened on Schedule 1 of the Species at Risk Act (SARA) in 2017. Reasons for their significant population decline are not well understood, but are thought to be cumulative and include the loss of breeding, foraging and winter habitat, collision with vehicles, widespread pesticide use, population decline of aerial insects, climate change and destruction of nest sites during mining excavation (Berzins et al., 2020; COSEWIC, 2013). Barn Swallows (*Hirundo rustica*) have had an overall population decline of 76% in Canada in a forty-year period (COSEWIC, 2011). They are blue-listed in B.C. and were listed as Threatened on Schedule 1 of SARA in 2017. Reasons for Barn Swallow decline are not well understood, but declines are attributed in part to losses of important types of artificial nests sites (e.g., open barns) and decline of prey items (insects) (COSEWIC, 2011).

To support the recovery of at-risk swallow populations, biologist Rachel Darvill (Goldeneye Ecological Services), developed and leads the 2021-2026 Upper Columbia Swallow Habitat Enhancement Project (UCSHEP), a program administered by Wildsight Golden. The UCSHEP represents a concerted effort to address the alarming decline of Bank Swallow (*Riparia riparia*) and Barn Swallow (*Hirundo rustica*) populations in Canada. Since its inception in 2021, the five-year project has built upon a rich history of conservation initiatives aimed at preserving and enhancing local bird habitats. For instance, between 2015 and 2019, the Columbia Wetlands Waterbird Survey (CWWS), administered by Wildsight Golden, engaged over 230 volunteers documenting more than 380,000 birds in the Columbia Wetlands (Darvill, 2020). These types of efforts are foundational to understanding regional biodiversity and informing conservation management and action.

The UCSHEP took a multifaceted approach to swallow conservation in the first three years and focused on identification of important breeding areas, habitat enhancement, collaborations to identify Bank Swallow post-breeding movements using Motus, and community engagement. Key accomplishments included:

- Identified critical breeding habitats – 64 nest locations for Barn Swallows and 128 active Bank Swallow colonies with 58 additional Bank Swallow colonies that have not been observed as active in the last 5 years.
- Artificial nesting structures (ANS): Erection of six large "Swallow Condos" for Barn Swallows, expanding available nesting habitats. One structure had successfully hosted Barn Swallow nestlings.
- Multi-Species Habitat Creation: Collaborations with the Wildlife Conservation Society and Lake Windermere District Rod & Gun Club created a structure to accommodate both endangered bats and swallows in Parson.
- Habitat Restoration: Partnerships with BC Parks facilitated the restoration of a Bank Swallow colony, including habitat enhancements at Windermere Lake Provincial Park and the removal of vegetation obstructing flight paths at a Blaeberry colony.
- Monitoring and Research: Installation of Motus Wildlife Tracking Stations in collaboration with Environment and Climate Change Canada enabled the tagging of 100 Bank Swallows in June 2022 and 2023, providing valuable data on migration routes and post-breeding habitats.
- Community Engagement: Distribution of 102 nest cups, built by the Lake Windermere District Rod and Gun Club, to private landowners to enhance nesting opportunities. Presentations, bird walks and event tables.
- 154 volunteers participated in swallow inventory and monitoring.
- Habitat creation for Bank Swallows in Athalmer (Invermere) through collaboration with the District of Invermere.

The fourth year (2024-25) of the UCSHEP built upon previous years of effort aimed to enhance swallow habitats and strengthen community involvement. This included creating the first artificial nest structure (ANS) for Bank Swallows in western Canada, restoring an existing structure that provides habitat for Barn Swallows and endangered bat species, vertical sloping to create Bank Swallow habitat in an area where habitat was lost (Birchlands Creek), additional nest cup installation for Barn Swallows, effectiveness monitoring at all enhancements put up on the landscape in previous years, monitoring with citizen-scientists, data entry and submissions, Key Biodiversity Area application for the Upper Columbia, and follow-up on the Motus Wildlife Tracking work done in 2022-2023 with Environment and Climate Change Canada's Canadian Wildlife Service and Cambridge University. These efforts are described in detail in the pages to follow.

2.0 Goals and Objectives and Linkage of FWCP Action Plans and specific action(s)

The UCSHEP aligns closely with the FWCP Wetland and Riparian Action Plan, specifically habitat-based action #37 (COLWRA.SOI.HB.37.01 Enhancing wildlife habitat features-P1). The UCSHEP has improved available wetland and riparian areas with habitat enhancement at multiple sites in the North Columbia and East Kootenays which has led to large-scale habitat connectivity for two at-risk swallow species. This project includes collaborative development with partners (including Indigenous Nations). The UCSHEP installed seven artificial nesting structures and 94 nest cups for Barn Swallows prior to year 4 (2023-24); and 10 additional nest cups went up in 2024. Five Bank Swallow enhancement/restoration projects have been completed in the North Columbia and East Kootenays expanding available breeding habitat. These enhanced/restored sites included: sloping substrate piles at two locations to create suitable habitat for nesting, vegetation removal to open a flight path to a breeding colony, and building an innovative artificial nesting structure for Bank Swallows in an area lacking suitable habitat on Ducks Unlimited Canada land at Spike Elk Farm/Moberly Marsh. This has increased the number of habitat structures created for nesting Bank Swallows in priority valleys.

Secondarily, this project closely aligns with the Rivers and Riparian Action Plan, priority action #6 (COLRRA.CXP.HB.06.01 Connectivity habitat-P1). This is a habitat-based action working on the connectivity of habitat (for Bank and Barn Swallows). Some breeding sites are under threat or were destroyed, and there is a lack of suitable, natural breeding habitat north of Brisco. Creating/restoring Bank and Barn Swallow breeding habitat in the North Columbia is producing more contiguous breeding habitat patches which is helping facilitate connectivity networks for these species facing severe population declines with limited habitat. A combined approach where connectivity and habitats are enhanced across the landscape is necessary to meet long-term conservation objectives for at-risk swallows. This five-year project works on habitat enhancement at multiple sites in the East Kootenay and North Columbia leading to large-scale habitat connectivity for two at-risk swallow species.

3.0 Study Area

The UCSHEP study area is situated in the Columbia Valley, which spans the East Kootenay and North Columbia FWCP regions, between Canal Flats and Donald (50°51'37.31"N, 116°20'12.06"W) in southeastern British Columbia, Canada. The valley bottom is home to one of the largest continuous wetland complexes in the southern interior of BC, the Columbia Wetlands (Hammond, 2007). These wetlands are a critical refuge for species that depend on them during vital stages of their life cycle (Darvill, 2020a), and they are recognized with Ramsar status, highlighting their international significance and the risks they face (Darvill, 2020b). This region is part of the traditional and unceded territory of the Ktunaxa Nation (Akisqnuk First Nation), Secwepemc First Nation (Shuswap Band), and is the chosen home of the Métis Nation Columbia River Society.

Wetland ecosystems are essential for at-risk swallows, as they provide a rich food source, including mosquitoes, midges, and dragonflies. The Columbia Wetlands serve as a crucial stopover habitat for swallows and many other bird species during migration (Darvill, 2020a; Kaiser, McKelvey & Smith, 1977). These wetlands also offer birds a safe space to forage, feed, and rest during long migratory journeys,

which require significant energy. Additionally, the Columbia Wetlands support a wide variety of wildlife, including ungulates, mammals, amphibians, reptiles, invertebrates, fish, and plant species.

4.0 Methods

4.1 Project start-up

- Hired local contractor (Zimmerman Construction) in 2024 to build an artificial Bank Swallow nest structure at Spike Elk Farm/Moberly Marsh. Worked with Ducks Unlimited Canda (land owner) and BC Parks (adjacent land owner) to select best location that will fit with the re-naturalization plan for the area.
- Collaborated with The Nature Trust of BC and Wildlife Conservation Society on the restoration and enhancement plan for the swallow/bat Quonset structure in Edgewater; hired a contractor to do the restoration work.
- Continued dialogue and site visits with interested private landowners in the study area regarding artificial nest cup placement and coexistence strategies.
- Continued communication with Shuswap Band and Ktunaxa Nation regarding opportunities for their additional engagement in the UCSHEP in 2024. Shuswap expressed interest to continue with monitoring a Bank Swallow colony on their lands, but needed to find a willing/keen member, which we did not.
- Designed interpretive metal signage to accompany an enhancement project in Edgewater and one for educational signage put up at Kicking Horse Mountain Resort (second largest active Barn Swallow colony in study area).
- Created and distributed a poster and roll-up banner that works to promote swallow conservation. The poster requested volunteers and was distributed around Golden. Volunteers were requested to participate in nest and structure monitoring activities (effectiveness monitoring). Volunteer opportunities were also distributed through social media, Wildsight website updates, press release and eBlast communications to Wildsight members. One of the roll-up banners was used at local events to educate people about Barn Swallows and the other banner was provided to Bellstar at Kicking Horse Mountain Resort to put up in their hotel lobbies together with 3 large laminated posters for the 3 hotels they manage there.
- Coordinated to meet with president of the Lake Windermere District Rod and Gun Club to acquire 10 nest cups they built for the UCSHEP.
- Liaised with all partner groups to ensure effective communication and collaborations during the project, including ECCC CWS.

4.2 Field Work

- Met with building contractor (Zimmerman Construction) on site a few times at Moberly Marsh to determine the most suitable location for building the artificial nesting structure (ANS) for Bank Swallows. Biologist was on site in fall when construction started and a few times during the month-long construction of the structure.
- Met onsite at Moberly Marsh with DUC and BC Parks about the location of Bank Swallow ANS to ensure placement is in line with the larger re-naturalization project of Moberly Marsh and adjacent Burgess James Gadsden Provincial Park.

- Site visit with building contractor about structural enhancements/restoration at the Edgewater Quonset.
- Ensured the Birchlands Creek restoration project for Bank Swallows was completed. It had faced lengthy delays due to CPKC/DFO permitting and Ministry of Water, Land and Resource Stewardship (MWLRS) permitting. The final permit and requirement (Section 11 water act permit) was received in October 2024. Excavator work was done in November 2024 to slope banks to 70–90-degree slopes, transforming them into suitable breeding habitat for Bank Swallows.
- Monitored subset of Bank and Barn Swallow colonies and nests in the region; coordinated volunteers to assist.
- Provided nest cups for private landowners with private landowner visits.
- Worked with Lake Windermere Ambassadors and Columbia Lake Stewardship Society to determine activity level (high, medium, low, none) of Bank Swallow colonies at Lake Windermere and Columbia Lake.
- Built on collaborations with co-existence strategies and site visits to Golden Mill (Pacific Woodtech) and Kicking Horse Mountain Resort (KHMR); they were interested in swallow enhancements and educational signage. Developed permanent signs for KHMR.
- Effectiveness monitoring at all completed enhancement and restoration projects, including all 102 nest cups.

4.3 Data collection

4.3.1 Bank Swallow inventory and monitoring protocol

To provide information on the number of active Bank Swallow colonies in 2024, the UCSHEP aimed to visit each natural colony at least once. Some volunteers were assigned to monitor specific colonies to determine the number of available and active burrows. Three surveys occurred during the following survey windows and were evenly spaced apart: first visit occurred second week of June, second visit was fourth week of June to the first week in July, and third visit was the second to third week in July. It was easier to get information on nest occupancy when the birds were feeding young (about 20 days after clutch initiation), which was the second to third week of July. All enhanced and restored breeding colonies were also monitored at least three times during the breeding season.

Monitoring methods and standard field data sheets were provided to volunteers in digital format, hard copies were given when requested. Volunteers were required to sign a waiver form, and review monitoring protocols and data forms prior to conducting surveys. A Bank Swallow colony record form was completed at each Bank Swallow colony with the following information recorded: date, time, photo documentation (yes/no), breeding evidence, number of pairs and active nests, and total burrows observed. Comments included any useful information about the colony, site, or habitat, as well as other burrow-nesting species seen at the colony [e.g., Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), Belted Kingfisher (*Megaceryle alcyon*)] and the habitats being used by foraging Bank Swallows. Colonies were viewed from a distance, to reduce colony disturbance, but close enough to be able to view burrows and get accurate bird ID.

When counting burrows, every attempt was made to count only those that appeared to be recently constructed or were still usable. Partially slumped and deteriorated burrows were not counted as usable holes/burrows. At colonies that were monitored more than once, a photograph of the colony was taken

during the first site visit, subsequently printed, and taken into the field for the second and third monitoring periods. These photographs were used in the field to document active burrows/nests: a burrow was circled on the colony photograph when a Bank Swallow was seen flying in or out of it or if chicks were seen at the burrow entrance. An active nest was defined as a burrow from which an adult was seen to enter or exit from or as a burrow that had nestlings visible at the entrance. On the colony photo 'map,' it was also indicated where other bird species were seen entering or exiting a burrow. Volunteers spent a minimum of 30 minutes at each colony. All field data collected related to colony monitoring and site descriptions were transcribed into digital databases and submitted to the provincial SharePoint data warehouse.

4.3.2 Barn Swallow monitoring protocols

Barn Swallow nest site monitoring took place during the breeding season from early May until late August, early September in rare cases. This captures the majority of nesting activities between the start (i.e., nest building) and end (i.e., fledging of juveniles) of the nesting season. Weekly nest monitoring was completed at each active nest and nest descriptions were also completed. The activity (e.g., alarm calls, nest building, adult flushed from nest, nest with young seen or heard) at each nest was recorded as best as possible. For each monitored nest, volunteers were asked to record the actual or estimated arrival and departure date of Barn Swallows to that nest site. A minimum of half an hour was spent monitoring nests at each site. Volunteers were requested to visit nest sites on a weekly basis to obtain continuous data, but the frequency of monitoring varied based on volunteer availability and capacity. They received a monitoring protocol and standard field data sheet provided in digital format; hard copies were also available upon request. Volunteers were required to review monitoring protocols and data forms prior to conducting surveys in the field.

On private land, the UCSHEP biologist ensured nest monitoring activities were undertaken with the landowner's permission and necessary authorizations were obtained. Barn Swallow nest monitoring followed protocols developed by the British Columbia Swallow Conservation Project (n.d.). Volunteers signed waiver forms ahead of participating. Volunteers were asked to survey nests from a distance to avoid any negative effects associated with disturbance and review a 'Code of Conduct for swallow monitoring' ahead of monitoring activities.

5.0 Results and Outcomes

5.1 Bank Swallow – natural colony locations and monitoring

The UCSHEP (2021-2024) and 2020 pilot project (Columbia Valley Swallow Project), located 128 active Bank Swallow colonies between Canal Flats and Donald (figure 1). The majority of colonies are clustered between Canal Flats and Edgewater, with some scattered colonies north to Golden (figure 1). An additional 58 old colonies were found and continue to provide potential habitat for Bank Swallows. Old colonies were identified by unique habitat characteristics, including the presence of old, inactive burrows/clustered holes on a vertical slope. Some old burrows were active with Northern Rough-winged Swallow (NRWS). There are very few reports of NRWS digging their own burrows (Ramírez-Garofalo, 2024) and use of burrows vacated by other species (e.g., Bank Swallows) is common.

One hundred and twenty-two of 128 colonies were visited and monitored by 31 people (2 contractors and 29 volunteers) in 2024, with 254 monitoring visits to Bank Swallow colonies. Of the 122 colonies visited,

81 colonies had active Bank Swallows, 33 did not, and 8 colonies had breeding Northern-rough Winged or Bank Swallows, but species ID was unconfirmed due to their similar appearance. All monitoring data was submitted to the provincial government SharePoint site.

5.2 Key Biodiversity Area nomination using Bank Swallow data

Key Biodiversity Areas (KBAs) are sites of global importance for biodiversity conservation, identified based on their role in supporting threatened species or unique ecosystems. They are crucial for maintaining ecological balance and protecting species at risk of extinction. Effective management of KBAs helps ensure the survival of biodiversity and the ecosystem services that benefit both nature and humans.

The UCSHEP Bank Swallow data was shared with Wildlife Conservation Society, the agency administering the KBA program in Canada. Darvill has been working towards KBA (formerly KBA sites were Important Bird Areas) for the Columbia Wetlands since 2015, and nominated the Upper Columbia as a KBA using Bank Swallows as a 'trigger species'. The Upper Columbia KBA is at the technical review stage at time of writing with trigger species being Bank Swallow, American Badger jeffersonii East population (*Taxidea taxus* population 2), Lewis's Woodpecker (*Melanerpes lewis*) (Darvill, 2025) and Southern Maidenhair Fern (*Adiantum capillus-veneris*). The rationale for site nomination with Bank Swallows is as follows:

Bank Swallows (Riparia riparia; COSEWIC Threatened) form large colonies throughout this KBA. There are 117 colonies identified with an estimated 5,000 to over 10,000 Bank Swallows nesting in the KBA most years. Over 16,000 burrows have been documented by survey efforts from 2020 through 2024 (R. Darvill unpubl. data). Occupancy rates elsewhere are estimated to be between 43 and 74% (COSEWIC 2013). If just one quarter of all burrows are active, that is 8,000 mature Bank Swallows (16,000 x 0.25 burrows, x 2 adults per burrow), this is well above the national A1 KBA threshold of 4,800 swallows.

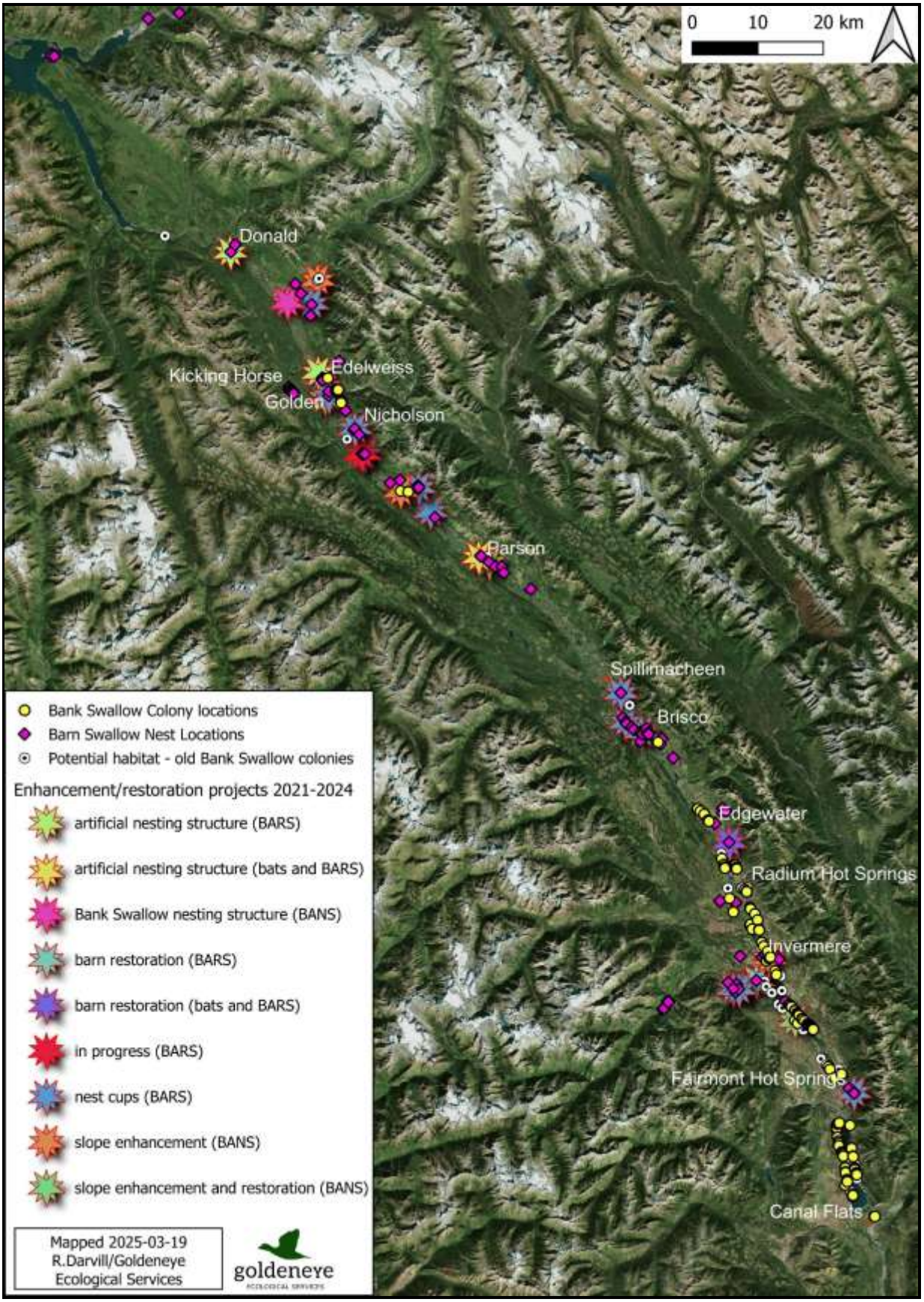

Figure 1. Map showing locations of Bank Swallow colonies, Barn Swallow nest sites, enhancement and restoration locations.

5.3 Bank Swallow enhancement activities and results

From 2021-2024, the UCSHEP enhanced and restored Bank Swallow breeding habitat at five sites. Two of those projects (Birchlands and Moberly Marsh) were competed in 2024. Previously completed enhancement sites were monitored for their effectiveness.

5.3.1 Blaeberry

Tall vegetation encroached a colony on private land, limiting openness and a clear flight path needed by Bank Swallows for accessing a breeding area. Vegetation was removed (using chainsaw) in 2022. Monitoring took place at this site in 2023 and 2024. In 2024, one active NRSW nest was detected, with another 3-4 active NRSW pairs adjacent to the sloped area with tree removal. They were likely nesting close by or in that bank.

5.3.2 Windermere Lake Provincial Park

In October 2021, in collaboration with BC Parks we re-sloped slumped sandy banks, using hand shovels, to make them vertical for breeding at Windermere Lake Provincial Park (Darvill, 2023). The re-sloping was done in the area that had been degraded by human activity and unauthorised trail creation. We placed ropes around the colony intended to keep people at a safe distance from the colony, with interpretive signage and monitoring from 2020-2024 (figure 2). Little change was observed in the number of active Bank Swallows burrows since restoration activities, with six active Bank Swallow burrows and 148 usable holes in 2024 (table 1). Colony-site selection by Bank Swallows is likely influenced by colony size and the breeding success of the previous year, and larger colonies with successful breeding are more likely to be recolonized (Freer, 1979). Recreationists have been respecting rope lines. Occupancy at this colony can increase, but this could take more time.

Figure 2. Bank Swallow restoration area at Windermere Lake Provincial Park. The swallow colony is located at the upper most portion of the slope. Ropes placed around the colony, together with interpretive signage, is intended to educate and keep people at a safe distance from the colony.

Table 1. Number of active and useable Bank Swallow burrows present at Windermere Lake Provincial Park between 2020-2024.

Colony ID	2024 BANS present	2024 Total # Useable Holes Observed	2024 # active BANS burrows	2023 BANS present	2023 Total # Useable Holes Observed	2023 # active BANS burrows	2022 BANS present	2022 Total # Useable Holes Observed	2022 # active BANS burrows	2021 BANS present	2021 Total # Useable Holes Observed	2021 # active BANS burrows	2020 BANS present	2020 Total # Useable Holes Observed	2020 # active BANS burrows
Wind LK PP	Y	148	5	Y	164	3	Y	164	4	Y	164	4	Y	164	5

5.3.3 Athalmer Neighborhood Restoration Site

In October 2023, UCSHEP worked with the District of Invermere (DOI) on Bank Swallow colony conservation and habitat expansion through enhancing (re-sloping with heavy machinery) a large pile of substrate on their private land (Darvill, 2024). The substrate pile had been sitting in an abandoned lot for at least two decades, a leftover remnant from a development that never proceeded (figure 3). This lot, owned by the DOI, is located in the Athalmer Neighbourhood Area, close to the main public boat launch in Invermere. As part of the DOI's Athalmer Neighbourhood Park plan, the substrate pile was slated to be removed. In 2021, a volunteer of the UCSHEP noticed several Bank Swallows nesting on part of the pile. The volunteer alerted UCSHEP biologist (Rachel Darvill) of that and she contacted the DOI about this active Bank Swallow colony, protected under federal law during the breeding season. Darvill requested the pile be maintained and enhanced for Bank Swallow habitat expansion and in a partnership the DOI agreed to stop demolition plans and work on enhancing the substrate pile, creating suitable breeding habitat.

On October 4, 2023 heavy equipment was used to slope the substrate pile to have an 80–90-degree slope on one face (Darvill, 2024). The substrate is ideal for Bank Swallow nesting, a mixture consisting of clay and sand. Bank Swallows make their nests by digging burrows into vertical faces of friable substrate using their feet, wing tips and bills. They create a nesting chamber and build a nest at the end of a burrow. The only part visible to humans is the hole dug and used by swallows to access their burrow and nest. Bank Swallows are sensitive to disturbance, so fencing and additional interpretive signage went up in spring 2024 (Darvill, 2024), aimed at keeping pets and people at a safe distance for the swallows, and signs provide information to people who would like to learn more about these birds. This enhancement project will be monitored for its effectiveness by the UCSHEP until 2025.

Shortly after returning to the valley from their wintering grounds, Bank Swallows started to occupy this site in the hundreds and rapidly dug approximately 400 burrows, with several additional shallow holes dug. Unpaired males dig only a shallow hole during early stages of selection phase (Petersen, 1955). Monitoring efforts took place 15 times between May 22, 2024 – July 18, 2024 with the data presented in Table 2. Photographs of the colony were used to document what holes were being used by adults to feed chicks; 198 of the 400 burrows were seen to be active with chicks. A video was also created and used for social media.

Table 2. Monitoring data from Athalmer Neighborhood Restoration site.

Colony ID	Easting	Northing	Visit Number	Date (dd-mm-yyyy)	Start Time (24 hr)	End Time	Total Observation Time (in mins)	Breeding Evidence of BANS (Y/N, U)	Number of Pairs/Active Nests BANS	Total # Useable Holes Observed	Comments
Athalmer Neighbourhood Restoration Site	569427	5596264	1	22-05-2024	9:30	NA	30	Y	3-4 pairs	3	Brand new holes created since May 18, 2024, when no holes were seen. One of the holes had a BANS in it and sand was seen flying out of the hole due to the swallow digging.
Athalmer Neighbourhood Restoration Site	569427	5596264	2	22-05-2024	11:00	NA	30	Y	0	U	There were several BANS seen flying around but none entered the holes. There were 5 holes counted.
Athalmer Neighbourhood Restoration Site	569427	5596264	3	23-05-2024	14:25	14:55	30	Y	8	U	Some holes were still actively being dug. An additional five holes were partially dug. All the holes were located on the newly sloped face. There were at least five BANS seen at same time, but there were likely more in the area. A small falcon (likely a Merlin) caught a BANS while in the air and took it away. Two NRSW were perched on the fence around the structure, but they were not seen entering a hole.
Athalmer Neighbourhood Restoration Site	569427	5596264	4	29-05-2024	10:20	10:40	20	Y	20	U	There was a flock of Bank Swallows numbering about 40 flying just above the hill and a few perched on the side of the S facing excavated surface. There were entries and exits at 6 or more nests. There were 52 holes counted.
Athalmer Neighbourhood Restoration Site	569427	5596264	5	29-05-2024	13:00	13:30	30	Y	U	U	There were more partially dug holes with 87 holes counted.
Athalmer Neighbourhood Restoration Site	569427	5596264	6	04-06-2024	11:19	11:56	37	Y	U	142	There were at least 23 active BANS holes observed. This site was extremely active with BANS.
Athalmer Neighbourhood Restoration Site	569427	5596264	7	06-06-2024	11:20	NA	U	Y	U	U	There were many BANS flying in the hole area.
Athalmer Neighbourhood Restoration Site	569427	5596264	8	07-06-2024	U	U	U	Y	U	239	NA
Athalmer Neighbourhood Restoration Site	569427	5596264	9	17-06-2024	U	U	U	Y	U	290	A kestrel was at the colony, picked something off of ground in front of colony and flew away with it but could not tell what it was. It might have been a rodent that was at the bottom of the colony bluff. BANS were very active at colony flying in and out of holes.
Athalmer Neighbourhood Restoration Site	569427	5596264	10	21-06-2024	12:49	13:25	36	Y	U	290	There were at least 26 active BANS holes observed with much intense activity.
Athalmer Neighbourhood Restoration Site	569427	5596264	11	24-06-2024	U	U	U	Y	U	299	NA
Athalmer Neighbourhood Restoration Site	569427	5596264	12	02-07-2024	12:13	12:43	40	Y	U	299	There were at least 28 active BANS holes observed. An AMKE was seen above the colony pursued by two or more BANS.
Athalmer Neighbourhood Restoration Site	569427	5596264	13	11-07-2024	U	U	U	Y	198	400	NA
Athalmer Neighbourhood Restoration Site	569427	5596264	14	15-07-2024	8:43	9:15	32	Y	U	400	There were at least 30 active BANS holes observed.
Athalmer Neighbourhood Restoration Site	569427	5596264	15	18-07-2024	NA	NA	NA	Y	U	400	The site was still very active. This was an informal survey.

5.3.4 Birchlands Creek

From 2016-2019, Darvill documented a Bank Swallow colony on the north side of a natural bank at Birchlands Creek (20kms south of Golden), but the colony and its suitable habitat was no longer present as of 2019. Bank Swallows require a vertical or near-vertical face for nesting habitat. Substrate piles on riparian banks were created from excavator removal of bedrock in the creek, done by CPKC for several years to protect their bridge infrastructure that spans over the creek. The UCSHEP aimed to reshape those piles into near-vertical banks to make them more suitable for nesting and attract swallows back to this area.

The Birchlands site is in the Columbia Wetlands Wildlife Management Area. Several permits were required prior to the excavator work. An archeological report was requested by the MWLRS and one was prepared by Pathways Archeological Consulting, and was submitted to MWLRS. We obtained private landowner consent for accessing the site, developed a project design with mapping, had necessary agreements with CPKC and MWLRS to proceed. We made a water permit application and the permit was received October 2024. The enhancement work was scheduled to be completed in November 2023, but there were delays with the water permit. The excavator work was done in October 2024. The excavator modified the anthropogenically created substrate piles already present at Birchlands Creek (figure 3), and created 70–90-degree slopes that were compacted with the machine to transform substrate piles into suitable Bank Swallow breeding habitat (figure 4). Effectiveness monitoring will begin in spring 2025.

Figure 3. South slope of Birchlands Creek before sloping work.

Figure 4. South slope of Birchlands Creek after sloping work.

5.3.5 Spike Elk Farm/Moberly Marsh

The south end of UCSHEP's focal area has abundant deposits of glacial lacustrine (ideal substrate for breeding Bank Swallows), and an abundant prey source (aerial insects) throughout. Breeding habitat conditions between Canal Flats and Brisco are ideal for Bank Swallows, but there are significant gaps in available habitat north of Brisco with only ten known active Bank Swallow breeding sites. Artificial nest structures (ANS) for Bank Swallows have been created using cement walls mixed with suitable nesting substrate in Europe and in Quebec to mimic natural nesting habitat. An ANS was built by the Port of Montreal in Contrecoeu, Quebec, which was quickly occupied by Bank Swallows after construction in 2015 (Leberge & Houde, 2015). In 2022, the Kahnawa Environmental Protection Office (Mohawk Council) in Quebec modeled what the Port of Montreal had done and shortly after installation almost all available nest sites were used by Bank Swallows (Berube & White, 2024).

In October 2024, the UCSHEP built the first ANS for Bank Swallows in western Canada at Spike Elk Farm /Moberly Marsh (figures 5 & 6), creating habitat relatively close (~20km south) to where habitat was lost through the creation of the Mica Dam and Kinbasket Reservoir. The structure is located adjacent to the confluence of the Blaeberry/Columbia Rivers, and on private property recently purchased by Ducks Unlimited Canada (DUC). Bank Swallows have been reported there on several occasions and breeding colonies are located to the north and south in pockets of suitable habitat. Building an ANS at Moberly Marsh helps to compensate for loss of habitat at the Kinbasket, and expands available breeding habitat where it is lacking.

5.3.5.1 Artificial nesting structure design

The design was based on models that were proven effective at attracting Bank Swallows in Quebec. It is comprised of two concrete panels 2.4 m high x 2.1 m long with 28 holes in each (56 total nesting holes). Concrete panels are ~10 cm thick with concrete footing below the frost line. The holes in the concrete wall have a 50 mm diameter, space between holes 400 mm vertically, 300 mm horizontally. Holes start 1 m off the ground. On each side of the wall, as well as behind the wall, embankments of suitable friable substrate for nesting was placed to recreate Bank Swallow habitat. Substrate was moved from a sand pit where swallows already nest. A sturdy geogrid (material used to reinforce soils) was placed on top of the sand banks to prevent predators such as skunks, dogs, or coyotes from digging in the pile of sand. It will also help with slope stabilization. Low native vegetation was placed on top for slope stabilization and predator avoidance.

Bank Swallows prefer breeding habitats to have southwest orientations (Rohrer et al., 2019); this structure has a southern orientation. The presence of a nearby body of water provides an open, insect-rich habitat, and is a very important asset. Moberly Marsh is close to the Columbia River and the marsh habitat will likely have more open water in the near future through Ducks Unlimited and BC Parks "re-naturalization" project. Effectiveness monitoring will occur for 3 years, enabling us to learn more about what type of maintenance might be required (if any), in addition to how many swallows are using the site over time. This is a cutting-edge project that could be used as a prototype for other projects in BC and around the world. Educational signage will be placed at the structure in 2025.

"Occupancy of new nesting habitat may not be immediate, but often remains high once colonized, especially for permanent structures" (Ruiz de Azua et al., 2012). Artificial nest walls can sustain large

colonies over an extended period. For example, a 140 m long nest wall in Bunschoten, Netherlands supported an average of 150-300 pairs over its first decade of existence (Smeets, 2013). Success has been said to be more likely if there is suitable roosting and foraging habitat, but little or no suitable habitat already available nearby (Ontario Ministry of Natural Resources and Forestry, 2017).

Figure 5. Side profile of the Bank Swallow structure built at Spike Elk Farm/Moberly Marsh.

Figure 6. Bank Swallow structure at Spike Elk Farm/Moberly Marsh showing front view with perforated holes in cement slabs and nesting substrate banks on the sides.

5.4 Motus Wildlife Tracking of Bank Swallows

The UCSHEP participated in a Canada-wide initiative led by Environment and Climate Change Canada (ECCC) from 2021-2024. The project used the Motus Wildlife Tracking System to describe migration routes and timing for Bank Swallows from breeding sites across Canada and in Alaska. Understanding Bank Swallow migration ecology is an important first step for their conservation because it provides the necessary foundation to understand when and where drivers of population decline are acting, which can help determine the most appropriate conservation actions. Tagging took place in the Invermere area in 2022 and 2023 and UCSHEP worked with partners to install seven Motus Wildlife Tracking Stations in the region from Columbia Lake to Brisco (Darvill, 2023; Darvill, 2024).

ECCC enlisted a Master's student from Carleton University (Ottawa, ON) who worked on the Motus data analysis for Bank Swallows. There were 100 tags deployed at our two banding colonies (near Wilmer), with an additional 790 tags deployed across Canada. Nearly two million detections came through at various Motus stations. The masters student (Sarah Endenburg) sifted through the enormous amount of data generated from this project and her thesis research and her findings are now available.

Some of Endenberg's most interesting findings relevant to the UCSHEP are that two of the BC birds tagged in Wilmer ended up in Costa Rica and it is possible they overwintered there. Also, there appear to be three different migratory routes for the Bank Swallows that were tagged across Canada. Birds tagged in Wilmer headed directly south post breeding, and possibly followed the Rocky Mountains southward. In contrast, swallows from northern BC, Yukon Territories, Alaska and Saskatchewan headed east into the Canadian prairies and then down into central USA.

As for likely wintering areas, deployed tags had a limited battery life to reduce their weight, and since there are few Motus stations in Central and South America, we cannot rely on them for determining the end points for migration routes. Feathers were also removed during the banding/tagging process. Feather stable isotopes will be used to determine likely winter locations for each individual (Sarah Endenberg, personal communication, November 2024). Bank Swallows undergo most of their molt during the winter; therefore, the isotopic signature in their feathers is representative of their winter areas and can be used to estimate likely winter locations. Migratory connectivity profiles are being used by Endenberg and other researchers, to evaluate temporal and spatial connectivity from the migration route (radio-telemetry) and probable winter location (stable isotope) findings. Results will inform whether connectivity throughout the year could explain differential population trends (Sarah Endenberg, personal communication, November 2024).

5.5 Barn Swallow – natural nest site monitoring

Forty-six volunteers and two contractors monitored Barn Swallow nests in 2024. One hundred and fifty-seven active Barn Swallow nests were found and monitored on 130 structures in 2024, with 86 of those nests confirmed successful. Successful meant chicks were seen/heard in the nest although we were not always certain if nests produced viable fledglings. In 2024, there were 585 Barn Swallow nest monitoring records made at 130 structures at 64 nesting sites located between Fairmont and Kinbasket Reservoir. An additional 85 effectiveness monitoring records were made at artificial nesting structures that the UCSHEP built for barn swallows from 2021-2023. There were seven reports of dead Barn Swallows in 2024; 19 dead BARS chicks at six sites, and one adult at a site. Causes of death included overheating in one of the

nests and window strike for the adult, it was unclear why the other chicks died. All monitoring data has been submitted to the provincial government SharePoint site.

5.6 Barn Swallow - habitat enhancements and monitoring in 2024

Several Barn Swallow habitat enhancement projects were completed in previous years of the UCSHEP: six artificial nesting structures (ANS) were created for Barn Swallows between Invermere and Donald; one ANS for Barn Swallows and endangered bats in Edgewater; 92 nest cups up on 13 previously erected structures between Invermere and Blaeberry; one restored structure for Barn Swallows and bats in Invermere (Darvill, 2022; Darvill, 2023, Darvill, 2024) (figure 1).

In 2024 an additional ten nest cups were installed on previously erected structures in the region. In a collaboration with The Nature Trust of BC (TNTBC) and Wildlife Conservation Society, a deteriorated building that housed breeding bats and Barn Swallow was restored on TNTBC property in Edgewater (figures 7 & 8). Rotten beams were replaced and roofing was put on the west side of the structure to keep weather from going in, and enhancements for swallows (nest cups) and bats (roosting chambers) were installed.

There are 86 effectiveness monitoring records from 2024 at 22 Barn Swallow enhancements, with three active (and successful) nests reported. Two were at the ANS at the Zehnder Ranch in Invermere; the first was a nest built in a nest cup, the same nest cup that was used in the previous year. Three fledglings were produced. After the first brood of the season fledged from the ANS (last seen on July 5, 2024 perched beside the nest inside the ANS), a mud nest was observed in the ANS on July 10, 2024 (figure 9). This nest produced five chicks; mites were seen on chicks in the nest. Four fledglings survived; it is unknown what happened to the fifth chick. Interestingly, mud nests have been built in this ANS without nest cups but with available nest cups close by (figure 10). Nest cups were used in this same structure in 2022, 2023 and 2024.

Other activity noted at the Barn Swallow enhancements in 2024 were: a few Barn Swallows observed flying around (potentially prospecting) the Wharton structure in Golden; Pine Martin destroyed robin nests built in the Golden ANS; a squirrel was seen in the Soles ANS; two nest cups in different structures were used by American Robins. There was one successful Barn Swallow nest in the Edgewater structure (not in a nest cup), in addition to many roosting bats using the bat habitat enhancements.

Figure 7. Edgewater Quonset structure providing habitat for bats and Barn Swallows, but in disrepair.

Figure 8. Edgewater Quonset structure repaired and enhanced to increase habitat availability for bats and Barn Swallows.

Figure 9. Barn Swallow mud nest built inside of artificial nesting structure that was completed in July 2021.

Figure 10. Mud nest (as shown in figure 9) built in an artificial nest structure, adjacent to 'block' with unused nest cup.

5.7 UCSHEP Outreach and Education

- Four presentations were given by the program biologist including one at the Columbia Wetlands Stewardship Partners AGM, one at the CBT EPP Project Ideas Workshop, KCPs Community Action Forum and Wildsight Golden's AGM.
- UCSHEP's program biologist led two field trips: one Wings Over the Rockies event at a local wetland with 20 participants, and one for the Kootenay Conservation Program's (KCP) Columbia Valley Local Conservation Fund with 16 participants (regional and municipal leaders).
- Two press releases in newspapers (appendices 2 & 3), 12 eBlasts to Wildsight Golden membership, five emails to UCSHEP volunteer base, nine posters (including information on the importance of a dark sky to birds during peak migration), 19 training sessions with volunteer monitors, one video was created for social media and used as website material.
- Event booths about the UCSHEP and swallow conservation were set up at the Columbia Wetlands Stewardship Partners AGM, two Golden Farmer's Markets and at a summer festival at Kicking Horse Mountain Resort.
- Two freestanding banners were created (appendix 4). One was for events; the other was for permanent display to be rotated between three different hotel lobbies at Kicking Horse Mountain Resort.
- Permanent metal signs went up at The Nature Trust of BC's Edgewater land parcel, and at the base area of Kicking Horse Mountain Resort (KHMR). KHMR has the second largest Barn Swallow colony in the Columbia Valley.
- Visits were conducted with 16 private landowners on their land. Swallow nest inventories on private land took place after a landowner contacted us to say that they thought they have Barn or Bank Swallows nesting on their land. Some landowners became involved with monitoring swallow nests on their land, and several wanted to put up nest cups to encourage Barn Swallows to nest in appropriate places for peaceful co-existence with humans. Nest cups were provided.
- 78 volunteers participated in the UCSHEP in 2024, 20 of those volunteers were new to the project in 2024. To date, there have been 154 volunteers that have participated, usually by monitoring Bank and/or Barn Swallow nesting sites.
- Led a field trip for 30 kids on Akisqnuk land for their Little Badgers summer camp at their Lakeshore Resort campground. Discussed all birds and their values, swallows, conservation values, and walked down to the shoreline to observe Bank Swallows at a colony.

8.0 Discussion

The UCSHEP is important for conserving two at-risk bird species, Bank and Barn Swallows. This project has enhanced, restored or created habitat at five locations for Bank Swallows and 23 places for Barn Swallows. This has included six artificial nesting structures (ANSs) created for Barn Swallows, one ANS designed to meet habitat requirement for both Barn Swallows and endangered bats, one Bank Swallow structure using concrete walls, 102 nest cups up on 13 previously erected structures, two restored structures for Barn Swallows and bats. The habitat created at Athalmer for Bank Swallows was a huge success immediately after the swallows returned from their wintering grounds, whereas some structures require more time for swallow occupancy.

Human-made habitats are expected to contribute to supporting the breeding population and recovery of Bank Swallows, as long as appropriate stewardship measures are also in place, such as minimizing colony disturbance (COSEWIC 2013; Pelletier, Arndt, Darvill, and Cry, 2022). Greater connectivity and creating more breeding areas in the North Columbia is enhancing the area that colonists such as Bank Swallows can use, allowing for increased at-risk bird species abundance. Unlike the immediate success of Bank Swallows occupying the created habitat at Athalmer, the ANSs and nest cups built for Barn Swallows have thus far received limited use. Barn Swallows seem to be choosier and the exact preferences for certain habitat variables are unknown. They do select for old, large, open structures that are well protected from weather (wind and rain). While more of the ANSs may become occupied in time, retaining structures already in place that are used by breeding Barn Swallows is critical to their survival. The UCSHEP has been able to retain two structures on the landscape by restoring deteriorating buildings in Edgewater and Invermere. Outreach and collaborations to encourage and assist landowners to keep structures used by breeding Barn Swallows on the landscape should continue.

Active colonies in human-made habitats will make an important contribution to a resilient Bank Swallow population (Pelletier, Arndt, Darvill, and Cry, 2022). However, the rehabilitation and preservation of natural nesting habitats of Bank Swallows is also critical to their recovery and conservation in Canada (Pelletier, Arndt, Darvill, and Cry, 2022). Larger breeding habitat patches created for Bank Swallows through this project are improving habitat connectivity for this at-risk species with limited habitat in the North Columbia. Larger more continuous habitat patches with fewer gaps increases foraging efficiency and decreases breeding costs, and provides more overall available habitat.

Human interactions with birds have been identified as one of the most readily recognised wildlife interactions that most urban and rural residents experience regularly, and have been linked with benefits to psychological well-being and a sense of connectedness to nature (Cox & Gaston, 2018). Observing birds can lead to a greater conservation ethic, increasing sustainable behaviours.

Ample opportunities have been developed for volunteer citizen-scientists to be involved with this bird conservation project that provides landscape level benefits for swallows; with 154 volunteers to date. Private landowners with nesting swallows have continued to be visited regarding co-existence strategies, importance of swallow conservation, their at-risk status, and what individuals can do to help reverse their population declines. Educational events (e.g., training, Wings Over the Rockies Nature Festival, farmers markets, presentations) continued. Outreach increases the awareness of swallows' at-risk status and their nesting habits, co-existence, habitat connectivity, and the importance of birds. The UCSHEP has provided

information to communities regarding the Migratory Birds Convention Act (MBCA), including obligations under this Act (e.g., it is illegal to remove nests during the breeding season) by assisting private landowners with empowering education regarding their duties to protect nests. The MBCA and its regulations protect migratory birds and prohibit the disturbance or destruction of migratory bird nests and eggs in Canada. The UCSHEP regularly communicates with the federal government, including when we are made aware of any contravention of these acts for swallows in our focal area. The illegal removal of Barn Swallow nests on private lands is of great conservation concern in the North Columbia and East Kootenay regions.

9.0 Recommendations

The UCSHEP should continue to utilize citizen-scientists to monitor effectiveness at enhancement and restoration areas, and continue to monitor a subset of natural Bank and Barn Swallow colonies to learn about nest success over time, and to identify and address threats. Monitoring and evaluation are essential to any project and should be the main component of the 2025-26 UCSHEP. Effectiveness monitoring at all enhancements will enable us to learn more about what type of maintenance might be required (if any), in addition to how many swallows are using the sites over time. UCSHEP should monitor the structural stability of all enhancements, noting if any repairs are needed, substrate added, etc. It is possible that some structures may need maintenance and/or improvements to make the enhancement more suitable, but we will not know without monitoring. For instance, in 2023 we saw a squirrel in one of the structures and UCSHEP aims to make it 'squirrel-proof' in 2025. Also, one of the artificial nesting structures for Barn Swallows has a lack of perching habitat nearby, a required habitat feature. It is recommended to make those improvements in 2025.

It is important to catch problems early, ensure resources are used efficiently, learn from any mistakes so they do not get passed onto other groups interested in swallow conservation, and learn what types of enhancements work the best for Barn and Bank Swallows. Other organizations can learn from the UCSHEP and replicate the most effective swallow conservation actions around the country and beyond. The creation of Bank Swallow habitat at Athalmer was extremely successful at attracting Bank Swallows almost immediately upon their return from wintering grounds. This strategy should be replicated elsewhere to increase habitat availability for Bank Swallows.

The UCSHEP should continue to reduce the potential for future nest removals on private land through ongoing education to private landowners, politicians and colleagues using posters, website, videos with Kootenay Conservation Program, Wings Over the Rockies Nature Festival, press releases, social media, presentations, field trips, events (farmers markets), and landowner outreach visits. Continuation of promoting Best Management Practices (BMPs) for swallows should continue, such as nest platforms under Barn Swallow nests to minimize poop and disturbance, maintaining food and breeding material sources, and no pesticide use. The UCSHEP should continue to share data and expertise on swallows with the Ministry of Water, Lands and Resource Stewardship, BC Parks, ECCC CWS, the Kootenay Conservation Program's Kootenay Connect, land conservancies and other interested groups. Additionally, the growing threat of recreational disturbance at Bank Swallow colonies, especially at Lake Windermere, should be addressed. This could involve replicating the enhancement and restoration work done at Lake

Windermere Provincial Park where interpretive signs were installed with the colony roped off to keep humans at a safe distance.

10.0 Acknowledgements

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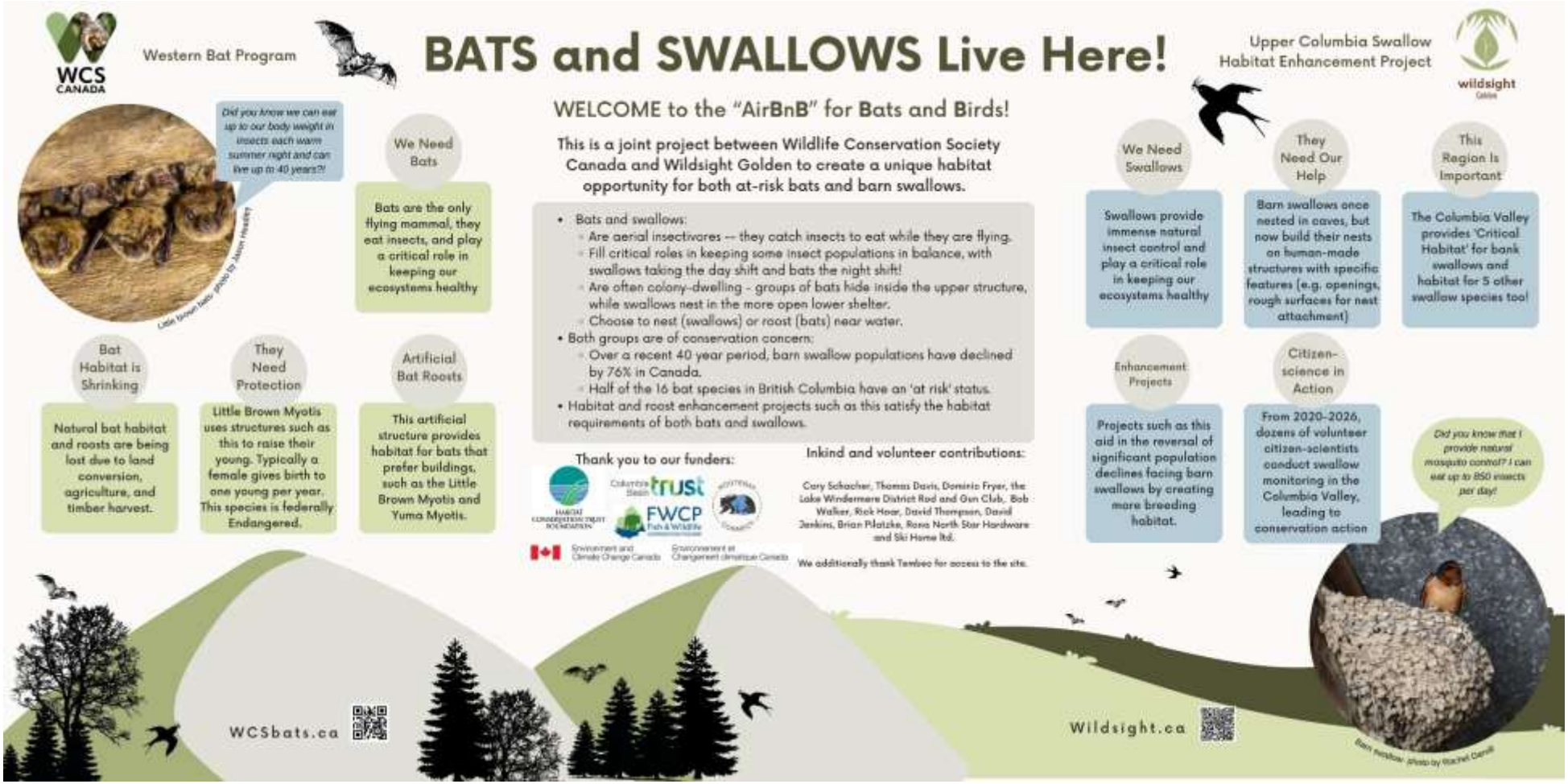
12.0 Appendices

Appendix 1. Interpretive sign designed for the Edgewater Quonset structure restored and enhanced for Barn Swallows and bats.



Appendix 2. Press release in The Golden Star on August 25, 2024.

Upper Columbia swallow habitat enhancement project

Submitted by Wildsight Golden

Accomplishments from 2023 and looking ahead!

Populations of two species at risk, Bank and Barn Swallows, have unfortunately significantly declined in the last few decades. The Upper Columbia Swallow Habitat Enhancement Project (UCSHEP), administered by Wildsight Golden, is working to help halt and reverse these population declines. In 2023, the UCSHEP team was involved in the following conservation actions: coordinating 82 volunteers who helped monitor Bank Swallow colonies and Barn Swallow nests in the Upper Columbia Valley between Donald and Canal Flats; private landowner visits for swallow inventories and education about swallows; construction of Artificial Nesting Structure (ANS) for Barn Swallows and a multi-species use structure for endangered bats and swallows. Eight ANSs have been constructed since the program's inception in 2021. 29 nest cups were installed on various pre-existing buildings, which were made by volunteers from the Lake Windermere Rod and Gun Club. A Bank Swallow colony in Invermere was prevented from being destroyed during a development and instead was resloped for increased nesting opportunities. In partnership with Environment and Climate Change Canada, six Motus Wildlife Tracking Stations were installed and 50 Bank Swallows tagged at two colonies near Invermere to provide information on post-breeding habitat and migration routes. At swallow enhancement sites interpretive signs were installed and included Indigenous information about the swallows, perspectives were provided by the Secwépemc and Ktunaxa Nations.

The UCSHEP has some exciting things coming up in 2024! We will continue to have volunteers monitor Bank Swallow colonies and Barn Swallow nests. We'll also continue to provide landowner outreach and education through farmer's markets, bird walks, presentations, and give nest cups for Barn Swallows to those people who qualify. We plan to work more with businesses in Golden to help them learn how to co-exist with at-risk Barn Swallows. There will be a Bank Swallow restoration initiative near Parson. In Edgewater we plan to make modifications to a pre-existing barn to make it structurally sound and more suitable for Barn Swallows and bats, partnering with The Nature Trust of BC and the Wildlife Conservation Society. And we will be building an artificial nesting structure at Moberly Marsh, collaborating with Ducks Unlimited Canada and BC Parks.

We cannot do this work without the help of volunteers and are once again looking for people with binoculars to help us between May and September. Volunteers will monitor swallow nests, or colonies, or possibly the effectiveness of conservation actions already on the ground. This is a great way to learn more about our local swallows and get outside at the same time. We provide training and support. To learn more please visit the Wildsight Golden website or contact us at swallows@wildsight.ca. Thank you to all of the volunteers that help make swallow conservation in the Columbia Valley a success!

This program is managed by local biologist Rachel Darvill and naturalist Verena Shaw. We look forward to hearing from you!

Appendix 3. Press release in The Golden Star in December 2024.

Golden Star www.thegoldenstar.net

Publisher: Megan Crandall
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Bank Swallow Habitat Enhancements Completed in Golden Area

Submitted by Wildsight Golden

Populations of avian aerial insectivores (e.g., swallows, swifts, nightjars) have been declining for decades and conservation actions must be put into place to help halt and reverse this alarming trend. Bank Swallows have faced one of the fastest population declines for a species in Canada with an estimated 98% population loss in Canada over a recent forty-year period.

"Bank Swallows have faced one of the fastest population declines for a species in Canada with an estimated 98% population loss in Canada over a recent forty-year period."

Reasons for the massive decline are cumulative and include the loss of breeding, foraging and winter habitat, collision with vehicles, widespread pesticide use, population decline of insects, climate change and destruction of nest sites.

With only 2% of their population remaining in Canada, Bank Swallows require urgent conservation action! They have very specific habitat requirements that we need to pay special attention to, especially sites with ideal breeding habitat, i.e. specific substrate (silty-fine sand), vertical banks, low-elevation (less than 900m) and near water. Bank Swallows dig burrows in vertical banks with the right type of conditions as mentioned.

In the Columbia Valley, ideal breeding conditions for Bank Swallows are found between Canal Flats and Edgewater. "We have discovered 126 Bank Swallow colonies through the Upper Columbia Swallow Habitat Enhancement Project [UCSHEP] and these critical breeding areas should be conserved, restored or enhanced where possible, especially given recent and significant population decline," states project biologist Rachel Darvill.

"There are considerable gaps in the amount of available breeding habitat north of Edgewater, with only scattered colonies located between Edgewater and Donald. We have been working to expand the amount of available breeding areas for this species at risk," says Rachel.

The Upper Columbia Swallow Habitat Enhancement Project (UCSHEP) just completed two enhancement projects for Bank Swallows in the Golden area. One was in the Donald area at Moberly Marsh on private land owned by Ducks Unlimited Canada.

"There are considerable gaps in the amount of available breeding habitat north of Edgewater, with only scattered colonies located between Edgewater and Donald. We have been working to expand the amount of available breeding areas for this species at risk."

There, a large artificial structure was constructed this past October and November. The structure is a combination of a concrete slab wall with perforated holes and suitable breeding substrate on each side of the wall. Structures like these have been successful at attracting breeding Bank Swallows in Quebec, but this is the first of its kind in Western Canada.

Additionally, the UCSHEP recently finished reshaping sandpiles at Washout Creek (or Birchlands Creek) located just south of Golden, which were left behind from CPKC's protection of their bridge infrastructure. These sandpiles contain the perfect type of nesting substrate for Bank Swallows, and by making them more vertical, we were able to create ideal conditions for the swallows to nest.

Barn Swallows are also at risk, as their Canadian population has also severely declined in a recent 40 year period. Between 2021-2024, the UCSHEP implemented enhancement projects at 34 locations in the region between Canal Flats and Donald for both Bank and Barn Swallows. Effectiveness monitoring at all 34 enhancement sites is critical to determine how well these actions, including the two described above, are working for swallow conservation.

The UCSHEP is administered by Wildsight Golden and was developed and managed by RPBio, Rachel Darvill of Goldeneye Ecological Services. This project would not be possible without the financial support of the CBT Ecosystem Enhancement Program, Fish and Wildlife Compensation Program, and the provincial Gaming Grant. Ducks Unlimited also contributed financially to the enhancement structure on their lands at Moberly Marsh.

Appendix 4. Stand up banners used at events, and one on permanent display at Kicking Horse Mountain Resort.