



Identification of chimney swift breeding sites in southwestern Nova Scotia forest, barns, and chimneys

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A Report on 2018 Activities and Progress by Joseph J. Nocera (PI) & Courtney le Roux (MSc)

Executive Summary

We proposed to track radio-tagged chimney swifts (*Chaetura pelagica*) to nesting sites in forest, barns, and chimneys throughout Queens County, Nova Scotia. This was with the aim to address several knowledge gaps for a threatened species in Nova Scotia that could provide data to enhance our understanding of Chimney Swift habitat and better focus conservation actions of that habitat.

Despite extensive search effort, no tagged swifts led us to natural nesting sites (tree cavities) within the study area. However, we did discover important movement information that had never been documented, as radio-tagged chimney swifts were found to move great distances between roost sites with regularity. These data provide important insight into roost usage and connectivity that will be explored further. Without support from the NSSARCF these movement patterns would have remained unknown and a critical knowledge gap would have persisted.

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Introduction. Chimney swifts (*Chaetura pelagica*; hereafter “swifts”) are classified as a Threatened species in Nova Scotia (and across Canada). The use of urban nest sites by swifts is well known, and previous studies have described important nest site characteristics of chimneys (e.g., Fitzgerald et al. 2014). However, the use and relative importance of natural/alternate nest sites (e.g., in trees or barns) is poorly understood. This is a key knowledge gap, as the still draft Recovery Strategy for swifts has repeatedly flipped the definition of “critical habitat” between man-made chimneys and natural habitat.

Swifts historically nested in large-diameter hollow trees; however, land clearing and logging has eliminated much natural nesting/roosting habitat. Swifts are now considered primarily urban, and most research focuses on the identification of available habitat in human communities. However, breeding season observations of swifts in remote forested areas suggest they may be using natural sites more often than thought. It has long been assumed that the massive tree size thought to once be preferred by swifts has precluded modern use of such habitat, since very few, if any, of these remain in Nova Scotia (NS). However, observations of swifts sometimes using chimneys with small diameters indicate that smaller hollow trees could be an important natural resource. Further, recent observations of swifts using barns in NS suggests this too may be a more common phenomenon than is currently realized.

It is possible that swifts are making use of alternative structures for nesting, including trees and barns. This seems likely in remote areas with known roosts, where there are few suitable nesting chimneys, such as Algonquin Park in Ontario, Canada (Tozer 2012; Zanchetta et al. 2014). There are records of swifts using barns in Nova Scotia, Canada (Bird Studies Canada, unpublished data), woodpecker cavities (Zanchetta et al. 2014), and snags both with broken tops and branches (Hines 2013; Zanchetta et al. 2014). As the abundance of nesting chimneys diminish, it is likely that the swifts will adapt to using alternate nesting structures. If swifts are using these structures for nesting more often than previously believed, it is important to identify the potential population level impacts this change may have, and to identify opportunities for protection and management of future nesting habitat. As such, we sought to identify chimney swift breeding sites in southwestern Nova Scotia forest, barns, and chimneys. In the summer of 2018, we began our field research with the financial assistance of the Nova Scotia Species at Risk Conservation Fund (NSSARCF).

Methods & Study Area. The interior of southwestern NS is heavily forested and sparsely populated. An important roost site is situated at McGowan Lake, which hosts <200 swifts per night during the breeding season. Roosts at this time are comprised largely of non-breeders, however, some roosting swifts are members of a breeding pair who are not attending a nest that night (Nocera & Wheeler, unpub data). With support from the NSSARCF, we captured swifts at the McGowan Lake roost and affixed radio-transmitters to those showing signs of breeding (e.g., exhibit a brood patch). We then used radio

telemetry to attempt to track swifts from the roost site to nests within a 15 km radius (735.52 km²) of the McGowan Lake roost (Figure 1). We had a detectability radius of ~1 km, allowing a total of 634.99 km² of the study site (86.3%) to be monitored from roads and trails. We traveled the road (including tertiary roads) network while scanning signal continuously. Tracking by radio telemetry occurred daily from 1700 – 0200h on clear evenings, and during the day on poor-weather days. This allowed us to track swifts when they are least active, reducing the time required and difficulty in attempting to track swifts during their feeding hours.

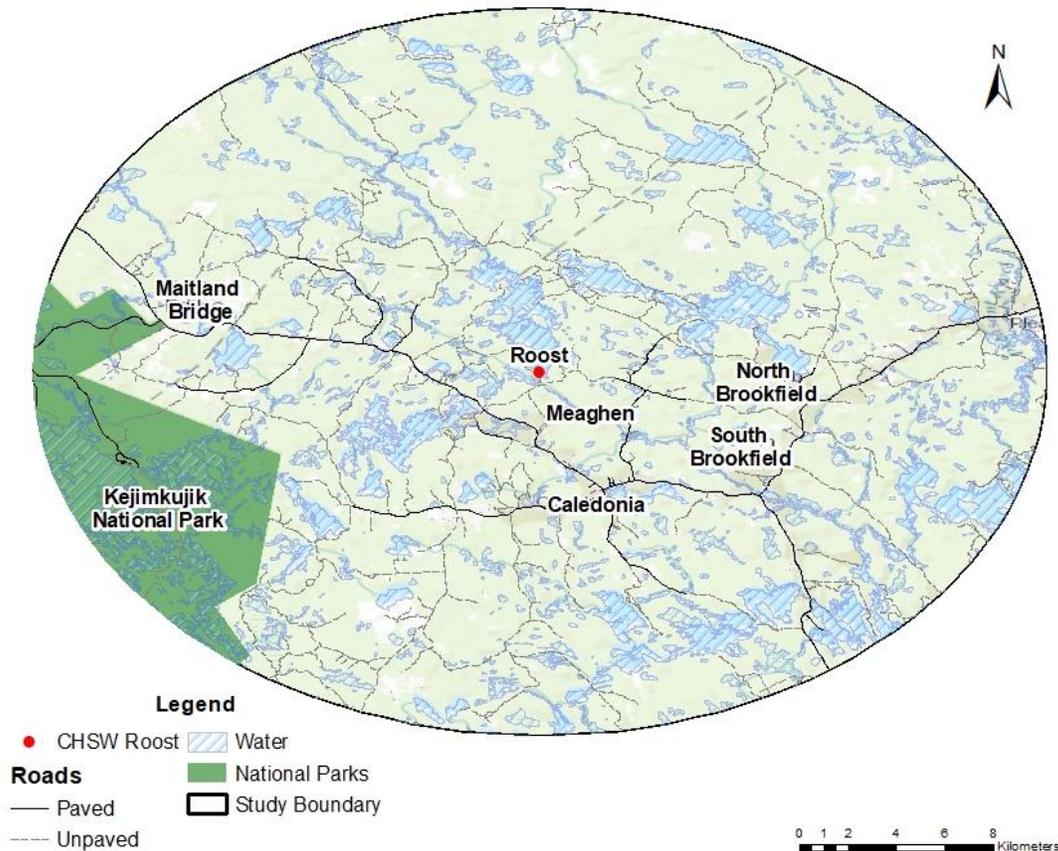


Figure 1: Study area of 15 km radius around McGowan Lake, Kent County, Nova Scotia chimney swift (*Chaetura pelagica*) roost.

We planned to then assess the availability of natural nesting sites for swifts in NS, whether current mechanisms (e.g., forest management legislation) appear to be effective for protecting suitable natural nesting sites in NS, and if natural nest sites appear to be limiting swift populations in the province. We attempted to achieve this by comparing measurable characteristics from the natural/barn nesting sites to those in the literature, and characteristics of wildlife trees protected by provincial forestry guidelines.

Project Objectives and Outcomes.

- To inform the policy-level definition of 'critical habitat' for chimney swifts by determining the rate at which swifts in Nova Scotia nest in natural tree cavities, barns, and man-made structures.

Though unsuccessful in identifying nesting sites of radio tagged swifts, we did record movement of swifts between roosting sites. This type of movement had never been documented and provides important insight into the role and connectivity of roosts. These data can be used to inform the policy-level definition of 'critical habitat' for chimney swifts in the form of roost sites, rather than nesting sites.

- Capture and radio-tag 20 chimney swifts at the McGowan Lake roost site.

We were successful in capturing swifts at a roost site, which had never been attempted prior to this project. This project confirms the proof of concept of capturing swifts at a roost site. It also provided important developments in methodology of tagging swifts, while we developed tagging methods that accommodate both the unique physical characteristics of swifts and their high metabolic demands.

- Measure the characteristics of nest sites to which tagged swifts have returned.

As we were unable to track radio tagged swifts to nesting sites, we could not fulfill this project goal.

- Determine the return rates of swifts to the roost.

We monitored radio-tagged swifts who returned daily to the initial capture roost throughout the breeding season. We also expanded our search area to include all of southern Nova Scotia and were able to document the movement of swifts between roosts across a large spatial scale.

Project Evaluation and Highlights. Data collected on radio marked swifts (n = 20), collected over the summer of 2018, showed movement between roosts that had never been documented (Figure 2). These data suggest a connectedness between roosts that has yet to be explored and has major implications for the conservation of critical roosting habitat.

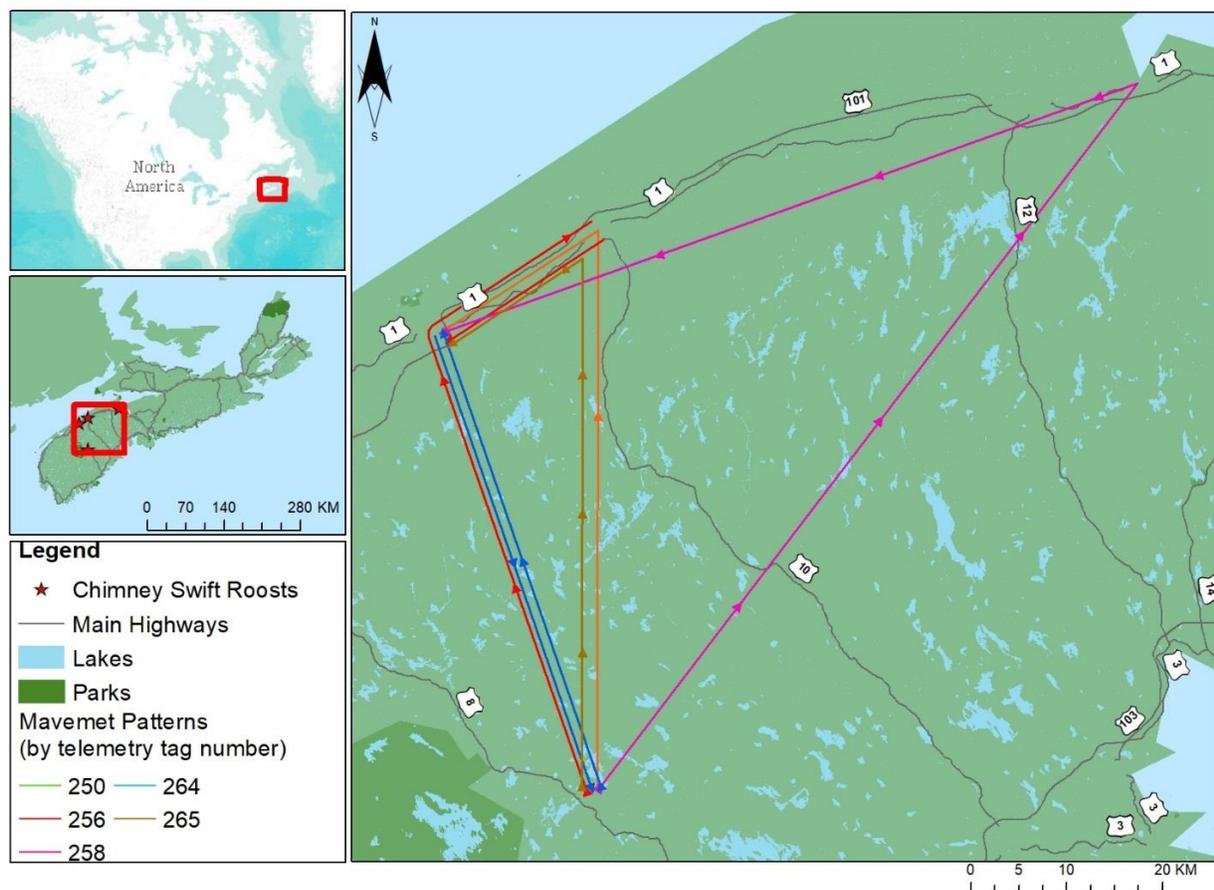


Figure 2: Movement between roosts by five radio tagged chimney swifts (*Chaetura pelagica*) during the summer of 2018. All individuals were initially tagged at the McGowan lake roost near Caledonia, Nova Scotia, Canada.

Due to their small size and high metabolic demands, chimney swifts have rarely been fitted with radio tags. This project allowed for the development of a revised methodology for tagging swifts that will allow future work to have the least possible impact on the swifts' metabolic demands. Swifts will now be tagged using customizable harness constructed of absorbable suture that will disintegrate when exposed to the environment, ensuring swifts are not burdened with the additional weight of tags beyond the study period.

Revised Project Description.

We will expand on the work done in 2018 and use the Motus Wildlife Tracking System (Taylor et al. 2017) (hereafter: Motus) to explore connectivity among roosts and local movement patterns throughout the breeding season. We will focus on how an individual's sex, breeding status, and foraging method influence roost usage.

In June 2019, we will again capture chimney swifts (n = 40) at the McGowan Lake roost in Kempt County, Nova Scotia. Swifts will be fitted with nanotags (®Lotek Wireless) coded for the Motus network. Motus is a system of automated receivers that record location of tagged individuals in five-

minute intervals (Taylor et al. 2017). Each Motus receiver uses the same single scanning frequency, allowing for a high detectability rate in comparison to cycling through frequencies (Taylor et al. 2017). The typical detection range for receivers is ca. 15 km, and there are Motus receivers located near most known chimney swift roost sites in Nova Scotia (Figure 3). The network of Motus receivers will provide us with near real-time location data on all tagged individuals that are within range of the towers. Using these data, we can determine fine-scale movement of individual swifts between roosts, roost site fidelity, and foraging range.

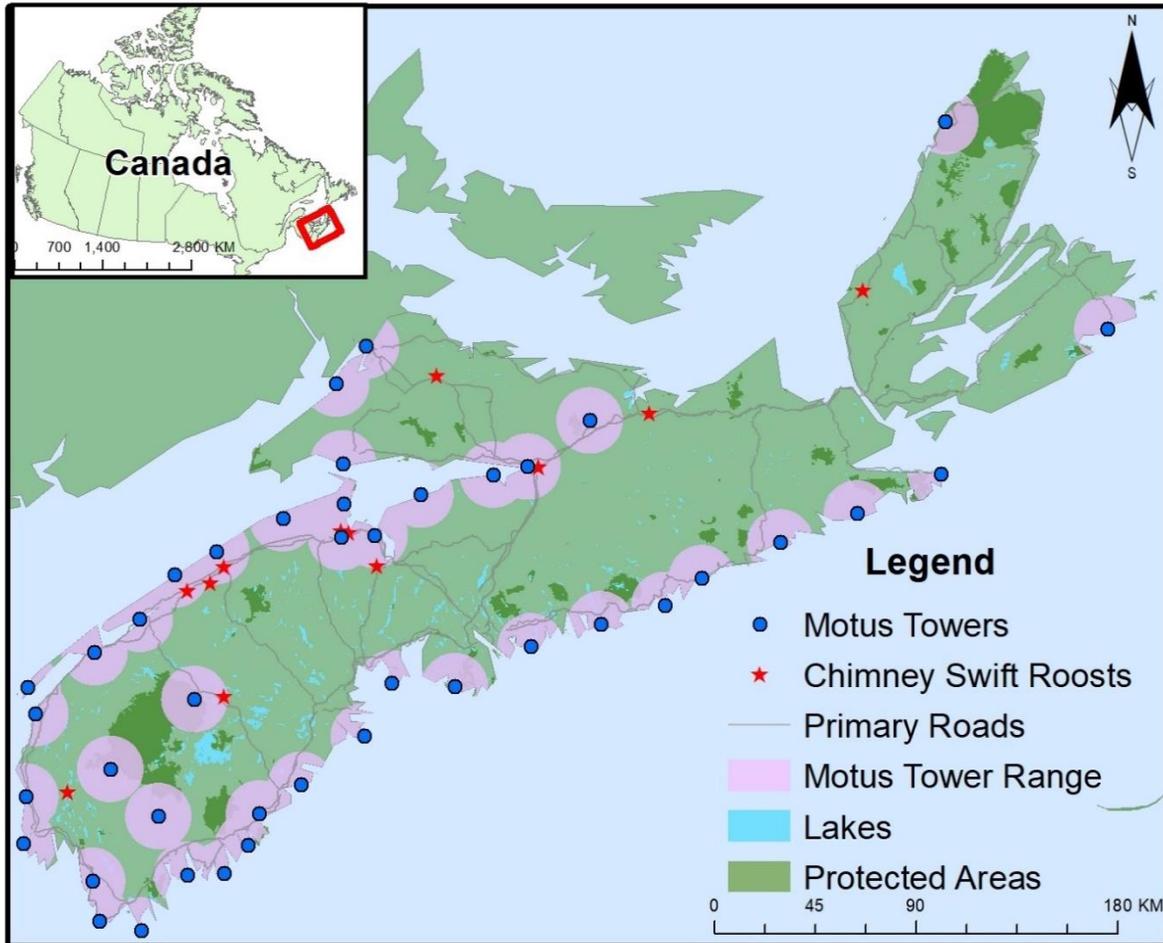


Figure 3: Location of Motus Wildlife Network (Taylor et al. 2017) locations (including detection range) in relation to known chimney swift (*Chaetura pelagica*) roost locations.

Conclusions.

Funding from the Nova Scotia Species at Risk Conservation Fund allowed us to collect new information on movement patterns and roost usage of chimney swifts. The results from the 2018 field season will lead to further investigation into these patterns and connectivity, which will inform policy-level identification of critical roosting habitat.

Data on radio marked swifts, collected over the summer of 2018, showed a great deal of movement between roosts. These data suggest a connectedness between roosts that has yet to be explored and has major implications for the conservation of critical roosting habitat. By using the Motus Wildlife Network to obtain close to real-time location data on swifts, we will be able to explore how the network of roosts interact and to what degree they are connected. This network connectivity of roosts has never been explored and will be fundamental information needed for conserving swift roosting habitat as roosts continue to be decommissioned.

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