Investigating the Feasibility of Obtaining Information on Nesting Success of Chimney Swifts in London, Ontario 2019, Primarily through Daytime Monitoring:

Summary and Assessment of Pilot Project

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Executive Summary

For more than a decade, the Chimney Swift has been designated as Threatened in Ontario and Canada, yet very little is known about how successful swifts are at raising young in this country. Recognizing this significant gap in knowledge, in 2019 Nature London created a pilot project to test the feasibility of using volunteer naturalists to attempt to learn about the success of local swift nests.

Because Chimney Swifts place their nests deep down inside chimneys where they cannot be easily observed, indirect means must be employed to assess happenings within nest chimneys. Nature London generally followed a model pioneered by Barb Stewart for Chimney Swifts in Manitoba. This is built around becoming skilled in interpreting changes in swift behaviours at nest chimneys, accurately identifying expected timing of key stages and transitions in the nesting cycle, and observing the chimney for extended periods at such times.

Using this approach, swift nesting activity might be determined at one of three levels.

1. Confirmation of a viable nesting attempt (as opposed to intermittent attendance at a chimney by a pair)
   - Daytime swift behaviours around a nest chimney over many weeks can indicate whether successive stages of nesting activity are being successfully achieved.

2. Determination of nest success (i.e., at least one youngster fledged)
   - Information obtained in level 1 can help identify the approximate date when fledging is likely to occur (28 to 30 days after hatching), so the chimney can be intensively monitored in anticipation of seeing at least one fledgling emerge.

3. Determination of productivity (i.e., actual number of young swifts that successfully fledged from a nest)
   - Information obtained in levels 1 and 2 can be helpful, but accurate productivity information can be more difficult to attain, even with marathon hours of observation. Young swifts in a nest may fledge over a two-day period, and attempts at a precise count may be confounded by the practice of recently fledged swifts sometimes entering and exiting chimneys other than the one in which they hatched.

Nest failure (may occur at any time during the nesting cycle and is not always easy to detect)
   - Although some failed nest chimneys are quickly abandoned, some bereft parents continue to visit the natal chimney during the day until neighbouring chimneys have completed their nesting activities for the season.

In the late winter of 2019, after consultation with potential volunteers to ascertain the level of involvement they might find acceptable, Nature London developed a pilot protocol for daytime monitoring of nest chimneys. It called for daytime visits of at least one hour per week from May to August at a sampling of chimneys (initially 14) that had been used by swifts during previous nesting seasons. Eight core volunteers participated, covering five sites (there was more than one chimney at some sites). Ten of the chimneys were occupied by nesting swifts in 2019. At six of these chimneys, evening monitoring was carried out on a weekly basis for one hour, beginning 30 minutes before sunset. Additional monitoring, especially during the daytime, was strongly encouraged.

The cold wet spring of 2019 in London made it challenging to identify when serious nesting efforts got underway. Throughout the nesting season, swifts often exhibited inconsistent patterns of behaviour around nest chimneys (possibly in part due to food availability). The ambiguity of some of the data collected made it difficult to pinpoint the timing of nest stages and predict expected fledging dates.

Of the 10 active swift chimneys monitored, nests were considered probably or possibly successful at five locations, probably or definitely failures at four, and the outcome was unknown in one chimney where insufficient information was available. At two additional chimneys, swifts visited intermittently but did not nest.

In later reviewing the effectiveness and feasibility of the pilot, it was concluded that two main factors contributed to the inability of the protocol to determine more than tentative assessments of nest outcomes.

- Difficult-to-interpret behaviour by swifts, perhaps related to weather and food supply, made it tough to accurately pinpoint the dates of nesting stages.
- Even more important, however, were time and timing. Many more hours per week of monitoring would have been useful. The real challenge, however, was to zero in on when monitoring visits were most critical and to have volunteer availability to carry out extended monitoring at those times. Though extremely dedicated and hard-working, our volunteers simply did not have unlimited free time and flexibility.

Administration of the daytime monitoring program proved to be very labour intensive. Also, for both coordinator and monitors to get even partly up to speed on interpreting subtle changes in swift behaviours, the learning curve was long and steep. Still, participants would likely agree the experience of being involved in this pilot was both fascinating and rewarding. As the season progressed, the monitors' vested interest in nest outcomes grew steadily. Even though the determination of success or failure proved somewhat elusive, everyone came away with a heightened appreciation for swift parents, which work very hard to try to keep their species going.

It appears the 2019 protocol, even if modified to include a substantial increase of monitoring effort at appropriately targeted times, is unlikely to be an efficient way of garnering significant amounts of data on swift productivity (total number of fledglings per nest) on a broad scale.

With modifications, there is some likelihood, however, of attaining a degree of success with the more modest goal of identifying general success or failure of a nest (zero versus one or more young fledged).

The 2019 protocol is generally well suited to confirming the presence of a viable nesting attempt.

Based on 2019 learnings and keeping in mind that it is important to be sensitive to the availability and wishes of potential volunteers, here are a few suggestions re implementation of daytime monitoring:

- For basic daytime monitoring, the following protocol is suggested:
    - Monitor for a two-hour session twice a week (or every four days) from early May to early August.
    - Based on behavioural cues observed during above sessions, make additional visits to document key transitions and nesting stages.
    - Determine expected time of fledging and plan to monitor for long hours over several days in the hope of observing the fledging of one or more young swifts.
- For delivery of the above protocol, here are two suggestions:
    - A group might focus on a single chimney. A coordinator would need to keep on top of interpreting behavioural indicators of the progressing stages of the nest effort and make scheduling decisions, often on short notice. It would have to be ensured that someone was present at strategic times for appropriate durations to optimize what could be learned regarding nest outcome.
    - A dedicated individual, with a high degree of commitment to learning swift cues, and unlimited time and flexibility might take on the monitoring of a single chimney.
- Monitoring as described above could be supplemented with weekly evening monitoring.
- Investigating chimney cleanouts at the end of the season could yield valuable supplementary information.

Precise and accurate information on the productivity of swift nests continues to be urgently needed. It is hoped that those with professional and academic affiliations will pursue avenues other than daytime monitoring by volunteers to achieve this end.

- Where accessible chimney cleanouts are present, pre- and post-nesting-season visits to swift-occupied chimneys can yield evidence related to nesting. Fallen debris from nests may provide information on number of eggs hatched, number of eggs lost in falling nests, number and developmental stage of young that died in the chimney, etc. Be mindful of health and safety hazards in investigating such sites.
- The tool with the most potential for obtaining data on swift productivity may be video cameras placed inside or above nest chimneys. Besides revealing the number of young fledged, cameras have the potential to provide information on habits of swift attendance at the chimney, rates of food delivery (possibly correlated with weather), causes of nest loss and much else. A camera might shed light on the activities of non-breeding swifts that roost for the night in some chimneys where nesting occurs. In London, the sometimes late-morning departures of such birds from the chimney during a daytime monitoring session made it hard to distinguish which entries and exits were associated with the nesting effort.
- The deployment of video cameras (and associated digital assessment of data) is beyond the scope of Nature London volunteers.

As a means of obtaining data on nest productivity, chimney monitoring by volunteers requires large inputs of time and skill, with no assurance of quality results. Video cameras, chimney cleanout investigations and possibly other approaches appear to offer greater potential. But, to assist anyone who is interested in trying their hand at daytime monitoring (with modest expectations for what might be learned regarding nest success), the following pages detail the 2019 Nature London experience and also provide information on interpreting swift behaviours.

1. Introduction

In the fall of 2018, under the auspices of Nature London, it was decided to undertake a 2019 daytime pilot project for monitoring nesting Chimney Swifts. The goal was to develop a protocol and test its feasibility for determining nesting success of local swifts. See **Appendix A** for background information relating to the decision to embark on this venture. Primary considerations were the at-risk status of the Chimney Swift (threatened), a continuing decline in the species' numbers, and a paucity of information on swift productivity.

Nature London has considerable depth of past experience in developing and delivering swift monitoring programs. Beginning in the fall of 2004, members of the club (then known as McIlwraith Field Naturalists of London) pioneered protocols for monitoring numbers of non-breeding swifts roosting overnight at local chimneys. The goal of that initiative was to help create tools that might provide information on swift populations, and insight into population trends. An additional goal, added somewhat later, was to document movements of non-breeding swifts among local roosts from spring through to fall. Nature London members continue to carry out evening swift-monitoring counts at selected chimneys and to make the results available to Ontario SwiftWatch, a program of Bird Studies Canada (which has recently adopted the public name of Birds Canada).

In addition to its interest in monitoring the use of roost chimneys by non-breeding swifts, Nature London has long been concerned by the almost total absence of information on the success rate of swifts nesting in Ontario. We believe that knowledge of swift productivity is fundamental to an understanding of population dynamics.

Prior to the 2019 season, Nature London swift volunteers made the decision to separate their data collection from that of Bird Studies Canada. The development of the club's own online data-entry system for evening monitoring facilitated the creation of a separate, but generally parallel, system for daytime monitoring. With local data-handling processes coming on stream, it became possible to launch a pilot program to test the feasibility of using volunteers to monitor the activities of nesting swifts in London during both daytime and evening sessions.

The material in the following pages describes the approaches used in the pilot project to monitor nest chimneys in London, presents information obtained relating to nesting success, and discusses the feasibility of using ground-based volunteers (mostly working in the daytime but supplemented by evening data where available) to gain some knowledge of the reproductive success of local swifts. The first third or so of the document may be considered as an overview. Substantial additional material is contained in the appendices that follow.

2. Development of a Pilot Protocol for Assessing Nesting Success of London Swifts

In the winter of 2019, a pilot protocol was developed to test the feasibility of using monitoring at active nesting chimneys to determine the success of swift nests in London. It was decided that data would come primarily from two sources:

- A new daytime monitoring program would document entries and exits and other behaviours of swifts using chimneys for nesting purposes.
- Data obtained through the new daytime program would be supplemented by data from the existing Nature London evening-monitoring program. The evening program carries out weekly monitoring from early May to late September at 13 active swift chimneys (most years, more than half of these chimneys harbour a communal roost during at least a portion of the swift season). The evening-monitoring protocol would be modified so that volunteers collected additional and more precise information relating to the times, numbers and behaviours of swifts entering and exiting chimneys (in the case of chimneys also serving as communal roosts, this mainly applied to the half hour or so before sunset).

The design of the actual pilot daytime protocol relied heavily on four sources:

- The existing evening monitoring protocol used by Nature London.
- A casual polling of potential participants that indicated little or no support for making the duration of a daytime or evening monitoring session greater than one hour or for making the frequency of monitoring visits greater than once a week. Some monitors were happy to work with a partner while others preferred to work alone. Some wished to be given responsibility for specific locations of their choosing (usually in their own neighbourhood).
- Research by Bird Studies Canada indicating that, on a clear day during June and July (between 9:00 am and one hour before sunset), a single visit of 60 minutes was generally adequate to confirm occupancy of a chimney by nesting swifts (Purves *et a*l. 2019).

- Documents from Manitoba, especially publications, reports and e-mails from Barb Stewart, plus blogs and other materials from the Manitoba Chimney Swift Initiative (MCSI) (e.g., publications by the Stewarts, 2011, 2013 and 2018). Among many other things, these documents provided information on behaviours indicative of various stages of the nesting cycle and highlighted the importance of having, by times, monitoring sessions that lasted much longer than one hour and that took place more frequently than once a week (especially zeroing in on times when certain key nest stage events were likely to occur).

Informed by the sources listed above, especially regarding what might be acceptable to potential volunteers, an updated protocol was developed for Nature London's evening monitoring program and a new protocol was created for daytime monitoring**.** A reference manual was written for each program.

Separate field data forms were developed for evening and daytime monitoring, and an online data entry portal was opened for each stream (through Wufoo, a program of Survey Monkey). See **Appendix B** for the daytime monitoring field data form and a screen view of the online portal.

Separate communications systems were established for the evening and daytime monitoring programs. Each included weekly e-mailed reports and summary tables. In the weekly daytime reports, for each monitored chimney, an effort was made to identify the stage of the nest inside the chimney, based on interpretations of the timing and frequency of entries and exits and other behaviours by the adults outside the chimney.

For a detailed account of the process of developing the daytime monitoring protocol, see **Appendix C**.

3. Daytime Protocol for Monitoring Nesting Success

See below for an abbreviated version of the daytime monitoring protocol used by the Nature London swift program in 2019. It includes some modifications that were incorporated as the season progressed. See **Appendix D** for a much more detailed version. The daytime monitoring manual contains the originals of both the short and long versions of the protocol.

The ultimate goal was to use both daytime and evening (where available) monitoring data to try to determine whether or not a nest had been successful in fledging any young. It was understood that, in order to do this, it was important well in advance to be able to pinpoint within a day or two the expected date of fledging. The hope was to estimate the approximate date by documenting, to the extent possible, key transitions during the nesting period. Differences in the behaviours of the adults (e.g., regarding frequency of visits to the chimney, duration inside, and number of adult swifts inside at once) would help identify the stage of the nesting cycle (e.g., nest building, incubation, hatching, presence of brooded young, presence of non-brooded young). Such information could be used to help predict the expected date of fledging.

It was acknowledged that, even if the approximate date of expected fledging were known, there was considerable chance that, given the monitoring protocol in place (once a week for one hour), an observer would not be present for the actual first departures of youngsters from a chimney (which may take place over more than one day). The possibility of determining an accurate figure for the total number of youngsters that fledged from a nest was even less likely, even if an observer was very lucky or spent exceedingly long stretches of time watching the chimney for the few days during which fledging was expected.

We were well aware that, in this pilot project, we might need to be content with a general picture of how long a nest had remained active before swifts abandoned the chimney. From such information, the likelihood of success or failure might, in some instances, be tentatively deduced (accepting that nest failure is always a possibility right up to the day of fledging, about 28 to 30 days after hatching).

In implementing the protocol, it was considered desirable for the same person or team to visit the same chimney each week. This allowed monitors to become familiar with the habits of the swifts using a particular chimney, which increased the chances of noticing significant changes in the patterns of comings and goings at that chimney.

<u>Abridged Version of Daytime Monitoring Protocol Used in London in 2019 Pilot Project</u>

<u>Goals</u>

- Determine when returning swifts first occupy chimneys for nesting purposes.
- Learn more about daytime activities and nesting success of London swifts.
    - Record times and numbers of all swifts entering and exiting chimney.

    - Determine max numbers inside chimney at any given time.
    - Identify key indicators of nesting stages and transitions to help predict when fledging is likely to occur.
    - If possible, document actual departure of one or more fledglings from chimney and/or later fledgling activity outside natal chimney.
- Determine when nesting swifts end daytime occupancy of nest chimneys for the season.

When

- Once weekly from early May to August (or when nest chimney is abandoned for daytime use).
- Preferably in clear weather (>90% clear), 60 mins (minimum), anytime between 9:00 am and one hour before sunset (i.e., in long days of spring and early summer, daytime monitoring can be done in early evening).
- Especially in May and early June, delay start of morning monitoring until temperature has risen to at least 13 ^{o}C (or, preferably 15 ^{o}C).
- In hot and/or humid weather, avoid monitoring mid-day and early afternoon.
- If count must be done under cloudy conditions, watch at least 90 mins.
- If you can stay more than 60 (or 90) mins or visit on extra days, please do so and submit data.

Where

- Priority: three of the locations where evening monitoring is carried out: 1) First-St. Andrew's, 2) Smith Fruit, and 3) Phoenix.
- Possible additional sites if sufficient manpower (Dundas/Adelaide area, Dundas St. Centre United Church).
- A chimney will be assigned only if it is expected there will be enough volunteer availability to cover it for entire nesting season (as much as possible, same person or team will monitor same chimney each week throughout season).

What to Bring

- Daytime field notes form (one for each chimney to be monitored), clipboard, pencil, timepiece, cellphone, swift "postcards".
- Suggested or optional: lawn chair, seasonal clothing, water, insect repellent, sunscreen, phone, buddy, binoculars.

Getting Set Up

- Try to station yourself in a shady spot with chimney silhouetted against sky (not foliage or buildings); avoid looking directly at sun.
- If possible, view from public property.
- Have as much as possible of chimney's height visible above roofline (but not so far away that view of small birds entering chimney will be impaired).
- Try to view from a location that allows good visibility of two sides of chimney at same time.
- Note: if you feel unsafe at any time during watch, depart immediately.
- Fill in preliminary data on form (date, location, observer[s], weather [use codes], start time).

Recording Data

- During watch, keep eyes on top of chimney at all times (if two people, can take turns).
- On table on field notes form, record times and numbers of all swifts entering or leaving chimney.
- Watch very carefully, as swifts are very secretive around nest chimneys in daytime, especially during incubation.
- Note any interesting behaviours or other observations (e.g., courtship, two swifts approaching and/or entering chimney together, presence of predators, etc.).
- Record max number of swifts in air at one time. Even if few or no swifts are coming and going from chimney, there may be a number of swifts flying in area.

Finalizing Field Notes Form

- Insert finish time, plus total number of entries and exits.
- To calculate max number of swifts inside chimney at once, consider entries and exits in order of listing on table (tips given in manual on page 5 and on field notes form).

Submit Data ASAP

- Enter data online: **https://dwbirds19.wufoo.com/forms/zlry23s077fatv/** [see **Appendix B** to preview 2019 screen; note this link is not active in 2020].
- Note that link to online data portal is different from one used for evening monitoring.
- Data from all daytime monitoring will be compiled and a weekly report sent to participants.
- Data should be submitted by Sat evening; late data will be included the following week.

Questions or Problems

- Contact **Winnie Wake (dwake@odyssey.on.ca)**.
- Daytime monitoring is a pilot project in London in 2019, so please provide lots of feedback on your experiences as we sort out best ways to monitor nesting swifts in order to maximize likelihood of determining nesting success.

4. Chimneys Included in Daytime Monitoring Program

See **Appendix E** for criteria and details of the selection process by which the following list of daytime-monitored chimneys was decided upon. See **Appendix F** for photographs of the chimneys. Use this link to find map locations and see aerial views of the chimneys: https://maps.london.ca/CityMap/.

- **Smith Fruit, 22 Maitland** (at Thames River) [also a communal roost]
- **Phoenix, 300 Wellington** (just east of Horton) [also a communal roost]

First-St. Andrew's Church, 350 Queens (at Waterloo) (4 chimneys)

- **FSA-SE** (round slim chimney near SE corner of sanctuary)
- **FSA-NE** (round slim chimney near NE corner of sanctuary)
- **FSA-N** (large square two-tiled chimney, above N driveway, where sanctuary joins office annex)
- **FSA-S** (rectangular three-flued chimney on office building by S driveway, behind cross)

Lilley's Corner area (SE of Adelaide and Dundas, plus Marshall)

Baker's Dozen Building, 611 to 619 Dundas (S side, E of Adelaide)

- **613-N Dundas** (N flue has aluminum, mushroom-shaped topknot)
  [**613-S Dundas** (two open flues); monitored Jul 1 on, not active before or after that; not part of list of formally monitored chimneys]
- **619-SW Dundas** (mesh-covered tile top plus open flue, appears suitable)
- **619-NW Dundas** (two chimney pots; monitored till Jun 25, not active before or after)

- **Flat-roofed warehouse at rear of Root Cellar, 623 Dundas** (tall slim chimney with tile, at S end of building)
- **Old Crown Livery Stable, 620 Marshall** (chimney with tile, at N end of building)

Dundas and Maitland (NE corner)

Dundas Street Centre Church, 482 Dundas (NE corner of Maitland)

- **DSCUC-NE large square** chimney
- **DSCUC-NE small slim** chimney

- **Thames Valley Midwives office in old house, 434 Maitland,** S chimney

For daytime monitoring, some chimneys were observed from the property on which the chimney was located. In others cases, observers were stationed at nearby parking lots, sidewalks or parkland. Smith Fruit, Phoenix, the Midwives building and the cluster of chimneys at Lilley's Corner were all best observed from off these properties. For both churches, chimneys were usually monitored from the grounds of the church.

Contact was made with the owners, occupants, managers or other representatives of First-St. Andrew's Church, Dundas Street Centre Church, the Midwives agency, 613 to 619 Dundas, 623 Dundas and 620 Marshall, all

of whom expressed an interest in and were supportive of the Nature London daytime monitoring program. Contact was made with the owner of Smith Fruit during evening monitoring. Unfortunately, by the time contact was made with the Root Cellar in early December, its chimney had been taken down.

At the end of the season, an update on the outcome of nesting efforts was provided to most of the owners where daytime monitoring had taken place.

5. Obtaining Volunteers and Implementing Monitoring

5.1. Recruiting, Training and Supporting Volunteers for Daytime Monitoring

Nature London hosted a training workshop for monitors (attendance 37) on April 27/19, at which both evening and daytime protocols were presented and volunteers were invited to specifically participate in daytime monitoring. A number signed up.

- During the next few weeks a list of eight core daytime volunteers was firmed up; four others served as assistants or substitutes or carried out occasional spot checks at other chimneys.
- Of the eight monitors, three had previous experience as evening swift monitors; three of the additional helpers were experienced.

Daytime monitors received training in the following ways:

- Overview of proposed daytime program presented at April 27 workshop.
- Twenty-page manual that set out the goals of the program, outlined the protocol; provided an overview of what swift behaviours to expect at each stage of the nesting cycle; gave tips for optimal viewing strategies; explained how to record data and submit via the Nature London daytime online portal; and included photos, descriptions, directions and tips for each chimney targeted for monitoring.
- In most cases, coordinator accompanied each volunteer to that person's first one or two monitoring sessions.
- E-mails in response to questions or to convey time-sensitive info, especially early season modifications to protocol as some aspects were found to need refinement on an ongoing basis.
- Weekly e-mailed reports that included tables of results plus text accounts for all daytime-monitored chimneys. Assessments of nesting activity were based on both daytime and evening results (though not all daytime-monitored chimneys were also on the evening monitoring roster). These reports included interpretations of what had been observed in the previous week and tips on what behaviours to be watching for in the following week.

Participants take part in daytime monitoring for various reasons: most like birds and find swifts fascinating, some relish the quiet and solitude of monitoring, others enjoy the company and friendship of buddies, some like the convenience of being involved in an activity very close to home, some seek prompt and detailed interpretations of swift doings at "their" chimney, others prefer less communication, some have low tolerance for heat and humidity or bright sunshine, some need to know how their monitoring effort is making a difference for swifts, most are keen to help but have limited time. Whatever their motivations and constraints, to keep volunteers happily engaged so they continue to participate, the monitoring experience must be meaningful for each volunteer on an ongoing basis.

5.2. Implementation of the Protocol

It was hoped that daytime monitoring would commence in early May, but poor weather settled in, causing repeated delays.

- It was also soon discovered that swifts were not necessarily occupying chimneys that had been used during the nesting season in previous years and that they were tending to visit likely nest chimneys less frequently than had been expected.
- Especially in May and early June, a one-hour watch did not necessarily pick up daytime swift use of a chimney even though
    - 1) The same chimney might have already become occupied by birds apparently intending to nest, as indicated by evening monitoring, or
    - 2) Daytime monitoring had shown that chimney to be in use by swifts the previous week.

- Modifications to the protocol and monitoring approach were introduced throughout May and early June (and even later in the season).
    - The original recommendation of Wednesday as the preferred monitoring day was soon changed to either Monday or Tuesday.
    - These two days became the most frequently used, though Friday or Saturday or Sunday worked best for some volunteers, and some monitors changed dates from week to week, according to the weather and busy schedules.

In general, finding a monitoring time each week that fit among other personal commitments was not always easy.

- Finding a suitable time was a sufficient challenge that the recommendation of going on a clear day (>90% clear) was generally not followed, nor was the directive to monitor for at least 90 mins under cloudy conditions.
- When the two members of a monitoring team came from different households, it was even more complicated to settle on a suitable time that worked for both individuals.
- For varying reasons (including personal preference and availability of potential partners), some individual monitors frequently monitored alone.
- Despite ongoing encouragement to do so, in general, most monitors did not have the time or flexibility to substantially increase monitoring effort above one hour per week.
- Inclement weather (especially in May and early June) and busy schedules meant that it was not unusual for more than seven days to pass between monitoring visits to a particular chimney.
- Some monitors had plans to be away for up to a couple of weeks on summer holidays. Quite often, other experienced daytime monitors were able to substitute.
- Unfortunately, in late July, a crucial stage in the swift-nesting cycle, several volunteers were away at one time and coverage at some chimneys was not as frequent, appropriately spaced or of as long duration as desirable during this period.
- Monitors are busy people and we are very grateful for whatever time they were able to give to the daytime monitoring project.
- Amazingly, some monitors managed to fit in extra visits or remained far more than an hour when they sensed they needed to be present to try to follow-up on unusual behaviours or unexplained changes in swift presence during a previous watch. Special kudos to these dedicated people!

The question of accuracy in recording swift entries and exits was of concern. In order to interpret nesting stage accurately, it is important that as many as possible actual entries and exits are noted.

- As swifts got down to the business of incubation and then of feeding young, the presence of chasing, chattering swifts in the airspace above the chimney(s) steadily declined.
    - On a warm and humid day it can be very, very hard to hold focus, especially at times when there is little swift presence in the area during a monitoring session.
    - Literally, a blink of an eye at the wrong instant can cause an exit or entry to be missed.
    - Also, when a monitor is working alone, a brief (but necessary) downward glance to record data may result in an entry or exit being missed.
- Seeing swift entries generally proved to be easier than seeing exits. This was because arriving swifts sometimes came in horizontally in a way that could be observed quite readily, or else dropped from above, also fairly easy to observe.
- By contrast, many departing swifts, seemingly quite often, chose to fly directly away from the opposite side of the chimney.
    - Because exits usually just barely cleared the chimney rim, such departures were not always visible.
    - This was especially the case for chimneys on which rims were high above ground level and/or the chimney was relatively wide and did not have great height above the roof.

Most of the chimneys in the pilot were clustered so that several active swift chimneys were located in close proximity and were visible in the same field of view.

- This usually made it very difficult, and often impossible, to determine to which chimney or partner the individuals in the group of up to 10 courting, chasing, chattering swifts overhead belonged.

- For example, swifts were sometimes observed flying through dead branches of nearby trees to collect twigs for nesting material.
    - Because the twigs were tiny and not readily visible to the naked human eye, and because the swifts were darting about among other flock members, it was often impossible to determine whether a swift was carrying a twig and/or to which chimney the twig was being taken.

As the weeks of May and June passed by, some apparently inactive chimneys were given less priority by watchers. In early June, an extra chimney was added when an active swift chimney was discovered that could be observed at the same time as another nearby active swift chimney.

- Sometimes monitoring was continued at chimneys that exhibited little or no swift activity because this could be done at the same time as monitoring at a close neighbouring chimney that was active.
    - This allowed the documentation of sporadic daytime swift use at some little-used chimneys.

With often just one, one-hour visit per week, an ongoing challenge was interpreting ambiguous behaviours at nesting chimneys.

- In order to determine nesting stage inside the chimney, it was important to document key indicator behaviours through the observation of often-subtle changes in the activities of the adults outside the chimney.
    - Yet, expected cues were frequently not clear cut or did not present themselves at anticipated times and sequences.
        - It is speculated that, for chimneys in the daytime pilot, in determining frequency and pattern of entries and exits at nest chimneys, often swifts may have been less influenced by expected behaviours for a given nesting stage and more influenced by weather conditions and by availability of food.
        - These two factors may have been interacting. Periods of extreme heat and humidity and/or heavy rain may have reduced the availability of airborne insects. When insects were scarce, swifts may have taken longer to accumulate a load and return to the nest than might have been the case if they had encountered a dense patch of insects that allowed them to make frequent food deliveries.
    - The difficulty in detecting patterns of food delivery that indicated particular stages of the nesting cycle made it challenging to pinpoint when hatching occurred, when the transition from feeding brooded young to feeding non-brooded young was made, and to then calculate when fledging of youngsters was likely to take place.
        - Without such knowledge, determining whether a nest was successful or not was problematic.

For more details of some of the challenges encountered in getting daytime monitoring underway and running on an even keel, see **Appendix G**. Fortunately, as June rolled along into July and early August, encouragement and welcome tips kept coming from Barb Stewart in Manitoba, who is the Canadian expert in daytime monitoring of nesting swifts.

5.3. Interpreting Nesting Stages through Observations of Swift Activity outside the Chimney

Both adults participate in nest building, incubation, feeding of young and mentoring of recently fledged juveniles. **Appendix H** contains detailed information and tips related to swift behaviours that can be useful in interpreting nesting stages. Much of this material is derived from Barb Stewart's wealth of knowledge, accumulated during more than a decade of careful observations of swifts at nest chimneys in Manitoba. Here follows a short summary.

<u>Courtship, Socializing, Pair Establishment, etc.</u>
(from first arrival to mid-June, but may be much shorter)

- Typically by groups of swifts (up to a dozen) spending time above area where several nest chimneys are located, foraging together, wildly chasing and chattering, V-flights, etc.
- One member of a swift pair may arrive back at its chimney earlier in the spring than the other.

Investigating Nest Site
(length of stage varies and may overlap with above stage)

- Daytime visits by one or two swifts, chattering or silent, circling first or directly dropping inside.
- May visit occasionally over several days before deciding to stay.
- Daytime visits by a pair over three consecutive days, with lengthy times spent inside, plus overnight occupancy confirm pair has settled in.

Nest Building
(usually about one to two weeks, plus overlap with egg-laying and incubation)

- May begin a few days after arrival, or some weeks later, especially if a cold, late spring.
- Pair flying close together, displaying, vocalizing; sometimes both approach and enter chimney at same time, sometimes one peels off.
- Late morning (10:00 am to noon) is good time to observe nest building.
- Frequency of visits to chimney varies, as well as length of time inside chimney.
- Swifts may be observed flying through fine dead branch tips of nearby trees to gather twigs for nesting material (items usually too small for the ground-based naked human eye to see).
- If swifts arrive back late in the spring or an early nest is lost, nest-building may be observed in late June or early July.

Egg Laying
(seven to nine days but depends on clutch size)

- Twig collecting and nest-building continue during egg-laying.
- Usually four or five eggs per clutch; one egg laid every second day; incubation begins after second last egg is laid.
- During egg-laying, often long stretches of time spent inside chimney (up to 30 or 40 mins) and long stretches when no swifts are inside chimney.
- Can be very difficult to detect transition from egg-laying to incubation.
    - During egg-laying there is a much longer time gap between an entry and subsequent exit than for incubation, when an exit usually occurs a min or two after an entry.

Incubation
(18 to 21 days)

- Compared to other stages of the nesting cycle, incubation is characterized by fewer, more secretive visits to a chimney.
- There is less chasing and chattering, and long gaps when no swifts are visible or audible overhead.
- During incubation, there is on average one paired entry/exit event per hour, with short turnaround time (i.e., an entry followed by an exit within 30 sec to two mins).
- Entries and exits are usually quick, silent and direct (no advance circling, and immediate departure from the area).

Hatching
(one to two days)

- When hatching is underway, there is an increased presence of swifts in the general area of the chimney.
- Neighbouring swifts will often make repeated low flyovers above the chimney opening (peer ‘n’ veer) to look down to catch a glimpse of the new babies inside.
- The rate of entry/exit events (with 30 sec to two mins between entry and exit) will increase from one entry/exit event per hour to two entry/exit events per hour, on average.

Brooded Young
(for approx. one week after hatching)

- During their first week or so of life, young swifts are featherless and must be brooded at all times (i.e., one parent is always present to sit on nestlings to keep them warm).

- On average, there are two entry/exit events per hour (about twice as frequently as for incubation).
- There is a very short time between an entry and a subsequent exit (same as during incubation).
- When one parent arrives with food, the parent that has been brooding the nestlings leaves immediately (within two mins) to find more food. The arriving bird distributes food to the nestlings, then settles down to brood them.

Non-brooded Young
(approx. three weeks, i.e., from approx. one week of age until ready to leave chimney)

- When juvenile swifts are six or seven days old, they are well-enough feathered to regulate their own temperature and can be left in the nest alone.
- This allows both adults to be out foraging at the same time.
- Feeding rates of non-brooded young average three or four entry/exit events per hour, but can be more frequent if a locally abundant food patch is present.
- Rate of feeding should increase as young get bigger and need more food.
- When an adult returns to the nest, it delivers food to each of the youngsters before it departs. This takes time, which means there may be five mins or more between the entry and the exit.
- Since the two adults are bringing in and distributing food independently of each other, both parents are sometimes inside at the same time. Intervals between visits are usually shorter than for brooded young.

Fledging
(approx. one week or more)

- Young swifts first leave their home chimney at age 28 to 30 days.
- For the first few days (maybe up to a week) juveniles will be noticeably weaker fliers than adults; watch for rapidly beating wings and slow straight-line flight mostly on the same plane and with few broad turns.
- Young will have smooth trailing wing edges, whereas adults will have jagged trailing wing edges due to missing, recently moulted feathers (binoculars often needed to detect such differences).
- After fledging, families may linger in the area of the home chimney for up to a week, sometimes entering in the daytime to rest or give youngsters a supplementary feeding.
- After fledging, some families leave the area within a few days, which means fledging and departure from the area are unlikely to be detected by monitoring visits one week apart.

6. Data Collected at Individual Chimneys

See **Appendix I** for a complete set of data collected at individual chimneys during daytime monitoring (and during evening monitoring up to mid-August or later for all daytime-monitored chimneys where evening monitoring was also carried out). This illustrates the kind of data generated by the protocol used in the pilot. The material in **Appendix I** is available to anyone who might like to try their hand at interpreting nest stage based on actual data collected in the field.

7. Determining When Returning Swifts First Occupy Chimneys for Nesting Purposes

The first 2019 swifts reported in London were two birds seen on April 30. A warm front moved in on May 1. That evening, monitoring was carried out at the 13 London chimneys visited approximately weekly (May 1 to late September) under Nature London's long-established evening monitoring program (60 mins beginning 30 mins before sunset). Six of the chimneys in the daytime monitoring pilot were also part of the evening monitoring program. Compared to other chimneys in the study, this gave the six chimneys two advantages. Evening monitoring commenced earlier in the season than daytime monitoring did, and chimneys monitored during both evenings and daytimes had two weekly sessions from which data could be drawn to help interpret happenings within the chimneys (though evening data are much less useful for such interpretations than are daytime data).

Initially, the group of six chimneys consisted of Smith Fruit, Labatt's and four chimneys at First-St. Andrew's United Church (FSA). During evening monitoring on seven dates from May 1 to 21, no evidence was detected at Labatt's of early-in-the-watch entries that might suggest occupancy by nesting swifts (though this chimney has hosted nesting swifts in past years and hosted a large communal roost in May 2019 – max of 595 on

May 8). Labatt's was therefore dropped from the daytime monitoring program and replaced by Phoenix, where daytime swift activity had been observed on May 18.

It had been planned to commence daytime monitoring at at least some of the chimneys on the proposed list during the first week of May. When daytime high temperatures proved to be generally low that week and the next, the hoped-for start date was delayed until May 15 and then until May 19, also for weather-related reasons. Prior to that, practice sessions for monitors often had to be cancelled because it was so cold, though limited daytime monitoring did take place during the first half of May at a few locations.

As monitoring gradually got underway, monitors were advised to select days and times when it was not cloudy or raining and during which the temperature would be at least 13 ^{o}C (or, better yet, 15 ^{o}C). This often meant delaying morning visits by a few hours or finding a different day. Such adjustments were often not easy or practical for volunteers with busy schedules.

Because conditions were variably rainy and there were many chilly nights and cool days among the relatively fewer milder, sunnier days of May and early June, it is possible that insect production was delayed and reduced. After temperatures warmed up for the day and insects started flying, swifts likely needed a few hours to feed before focusing on nest-related activities. If weather had been poor in the previous few days, swifts may have found food to be scarce, even on warm days, and needed to spend more time foraging. If a particular day had a limited number of hours of higher temperatures when insects might have been active, if these were the same hours during which monitors were watching for swift activity around chimneys, swifts might have been missed if they were off feeding elsewhere during this time.

For swifts intending to nest in London, in the days (and perhaps weeks) immediately after their arrival in the city, many of them may have been focussing on addressing their own nutritional needs after a long and possibly arduous migration trip, rather than moving forward with nesting activity. If the food supply did not become consistent or reliable as May progressed, swifts may have continued to give priority to feeding and to wait until much later than we expected to become attentive around nesting chimneys.

Appendix J presents summaries of early season swift activity at chimneys in the pilot. See **Table 1** for earliest dates on which chimneys are believed to have been occupied for nesting purposes. Note that these are first-detection dates, based on the schedule of visits (approx. once per week) by daytime monitors. Actual first-occupancy dates may have been earlier. For chimneys simultaneously harbouring communal overnight roosts of non-breeders, in **Table 1** the "Date First Occupied" for "Overnight Use" pertains to the date on which birds whose behaviours were suggestive of a possible interest in nesting in the chimney were first detected.

Table 1. For chimneys used by nesting swifts in 2019, first known spring occupancy dates believed to be for nesting purposes (not for overnight communal roosting only).

Chimney Address	Evening / Overnight Use		Daytime Use	
	Dates of Prior Visits	Date First Occupied	Dates of Prior Visits	Date First Occupied
22 Maitland, Smith Fruit		My 1	My 14,23	My 31
300 Wellington, Phoenix	My 1,8	My 16		My 18
350 Queens, FSA-SE	My 1,8	My 16	My 2,15,21	My 27
350 Queens, FSA-NE	My 1	My 8	My 2,15,21,27	Jn 4
350 Queens, FSA-N	My 1,8	My 16?,22	My 2,15	My 21
350 Queens, FSA-S	My 1,8	My 16	My 2,15	My 21
613-N Dundas, Baker's Dozen	Jn 12	Jn 27		My 24
613-S Dundas, Baker's Dozen	Jn 12,27			
619-NW Dundas, Baker's Dozen	My 23, Jn 12,27		My 24, etc.	
619-SW Dundas, Baker's Dozen	My 23, Jn 12,27		My 24, etc.	
623 Dundas, behind Root Cellar	My 23, Jn 12,27			My 24
620 Marshall, old livery stable		My 23		My 24
482 Dundas-NE-big, Dundas St Centre church	My 2	My 22		Jn 7
482 Dundas-NE-slim, Dundas St Centre church		My 2,22	Jn 7,15,17,24	
434-S Maitland, Midwives office				Jn 7

In attempting to determine when returning swifts first occupy individual chimneys for nesting purposes, it is most useful to look at the first six locations listed in **Table 1**. Monitoring efforts commenced at these sites earlier than at others, which made it more likely that early season nesting activity would be detected. For the most part, what appeared to be nesting swifts seem to have occupied these six chimneys for overnight purposes by mid-May, but generally did not begin to come and go from the chimneys during daylight hours until approximately the fourth week of May (range: May 18 to June 4).

An examination of the material in **Appendix J** shows that, even after first daytime occupancy was detected, swifts were not necessarily observed using the chimney on every subsequent visit (e.g., FSA-S on May 27).

In monitoring for early season daytime use of chimneys at Smith Fruit, Phoenix and FSA, considerable variation was noted in the degree of presence of swifts in the general area. At FSA (where five chimneys were subsequently occupied during the 2019 nesting season), during every daytime visit in the month of May (starting on May 2) a social flock with a minimum of seven swifts was always reported. Perhaps this was not surprising given the number of nest chimneys in close proximity at FSA. There may also have been additional occupied swift chimneys less than one block away.

Both Smith Fruit and Phoenix, which are about 1.3 km apart, on the other hand, had no other known active swift chimneys close by (though it is possible such existed), but the size and degree of presence of a social flock at each of these two sites were often quite different from each other. For example, at about the same time during the warm afternoon of May 23, no entries or exits were seen at either chimney. Yet Smith Fruit had a flock of up to 10 swifts socializing/foraging in the area, while no swifts at all were observed at Phoenix.

It might be argued that Smith Fruit, being close to the well-vegetated Thames River corridor, may have offered more desirable conditions for local foraging than did Phoenix (about 500 m from the river). In London the very earliest returning swifts of the season are often seen over the Thames, where early spring hatches of aquatic insects emerge from the water as flying adults. On the other hand, FSA, which is farther still from the river (about 1.2 km) though in an area of greater general tree canopy than Phoenix, hosted flocks of socializing/foraging swifts on all May visits.

It appears that, based on 2019 observations and weather conditions, though good numbers of swifts may be present in London by very early May, swifts that intend to nest locally do not necessarily consistently get down to business at their nest chimneys until up to three or more weeks later, even if they are spending time in the neighbourhood. We have no information on when the last-arriving swifts that mean to nest in London reach the city.

We were unable to determine with any degree of accuracy when chimneys could be considered to be occupied by particular pairs for nesting purposes. This is because early season monitoring visits were not frequent enough and because daytime swift activity was somewhat intermittent at chimneys during the early weeks of the season when cold, damp conditions predominated.

There are many unknowns regarding factors that influence when returning swifts settle into chimneys in the spring, what range of time lag is usual before they initiate nesting activity, and what times and conditions offer best prospects for detecting such activity. Perhaps temperature and/or insect availability are important.

8. Observations of Nesting-season Activities during June and July

Swifts were observed gathering nesting material at only one location – FSA. A number of times on June 4 and 11, swifts were seen flying through areas of fine dead twigs in a deciduous tree to the north of the church. Because of the number of active nest chimneys in the area (at least five) and the number of swifts in the flock of socializing/foraging birds (six to eight), it was not possible to tie such behaviour to a particular chimney.

Appendix I presents the record of entries and exits and other observations for each chimney during each monitoring visit (including observations made in the evening, where available). Early in the season and continuing thereafter, monitors began to find that, based on the pattern of entries and exits observed during a watch, it was often difficult to interpret the stage of the nesting cycle (see **Appendix H**), even after several successive weekly visits and even when the lens of hindsight was applied.

After nesting activity was believed to have been established in a chimney, volunteers sometimes observed no entries or exits during a monitoring session (e.g., FSA-NE on Jun 17, 60 mins).

8.1 Possible Reasons for not Detecting Swift Activity during One Hour of Observations

A number of the factors suggested below may be in operation at the same time, compounding effects.

Length of Monitoring Session too Short

In some cases, failure to detect swift activity at a chimney may have been related to the duration of the watch. A one-hour session would not be expected to always pick up occupancy of a chimney while incubation was underway (and, in a number of instances during this study, it did not), but sometimes a significantly longer watch did not detect activity during what was presumed to be the incubation stage (e.g., FSA-N and FSA-S, 105 mins on June 25). Similarly, at a chimney where feeding of young was believed to be underway, when entries and exits should have been more frequent, a monitoring session did not always detect chimney occupancy (e.g., FSA-N on Jul 22, 74 mins).

In some cases, lack of swift activity during an hour or more of observations might simply have been attributable to a "poor day", even though the weather seemed decent. Occupancy would also not necessarily be detected if a nest had recently failed and the parents had abandoned the shaft or were frequenting it less often than formerly. Similarly, if a second nesting attempt were to commence soon but was not yet underway, swift ownership of a chimney might not be picked up during a monitoring session.

Besides the need for longer-than-one-hour sessions to ensure detection of occupancy, there are other possible reasons for failure to observe activity at a chimney that was known to be active.

Difficulty in Detecting Exits from a Nesting Chimney

Nesting swifts are normally very secretive in their comings and goings at a nest chimney, usually entering and leaving directly, with no circling or vocalizing. Arriving swifts often approach horizontally or at a steep angle and are usually relatively easy to see. Departing swifts, on the other hand, tend to just clear the chimney rim before flying off more or less horizontally. When such departures head off in a direction away from a ground-based observer (as they often do), they can be very difficult to detect. This is especially so when departures are made from a chimney that is relatively wide, or both tall and wide and/or has a wide opening. If exits are missed, then incorrect conclusions may be drawn as to frequency and pattern of parental visits to the chimney, number of swifts inside at once, presence of any helper birds, etc., which may lead to inaccurate interpretations of nesting stage.

Food Scarcity May Cause Swifts to Spend Longer Foraging

At any stage of the nesting cycle, food scarcity may have caused prolonged absences by parents, if they required extended amounts of time to collect food, either for themselves (early in the season) or for both themselves and their nestlings (later on). Any such shortages of airborne insects might have been related to the cold, wet spring of 2019. This may have suppressed and delayed insect production and perhaps caused mismatched timing of peak insect abundance so the peak did not come at the time when the demand for feeding nestlings was highest. Heavy rain events might have washed insects from the sky, requiring time for the stock of insects in the aerial soup to be replenished.

The significant declines in general insect abundance that scientists have been increasingly reporting in recent years may indicate an overall reduction of available food for swifts. Any broad-scale scarcity of airborne insects would be expected to be exacerbated by the late spring, and interact negatively with other factors such as mismatched timing of peak insect abundance and possible increases in severe or extreme weather.

As nestlings grew and needed increasing quantities of food, the pressure on parents to deliver presumably increased. If insects in the aerial soup in which adult swifts were foraging were very small or very thinly dispersed, adults may have had to spend longer periods of time seeking food, resulting in less frequent deliveries. During the pilot, observations at some active nesting chimneys suggested a declining rate of food deliveries in the week or two before expected fledging, a time period when food needs of growing youngsters would be greatest.

Extreme Weather May Cause Swifts to Avoid Foraging for a Time

Unusual short-term weather might have caused swifts to be less active or less visible on particular days or times of days (e.g., significant temperature fluctuations; excessive cold, heat or humidity; heavy rain or electrical storms). In general, in recent years, London seems to be experiencing such extreme weather events with increasing frequency. Torrential downpours also have the potential to wash out swift nests, resulting in an immediate or gradual abandonment of the home chimney for daytime use.

Other Species May Interfere with Swift Attendance at Nest Chimneys

Swift comings and goings at nest chimneys may, at times, have been less frequent than expected due to the presence of other species sitting on the chimney rim, deterring swifts from entering the shaft.

European Starlings and Rock Pigeons were the main species observed perching on the rims of active swift chimneys in London. In general, such perching usually did not last much longer than 10 minutes (but sometimes up to 30 mins), and probably did not have too much of a negative effect on swifts wishing to enter a chimney, especially in the case of Rock Pigeons. An exception may have been the occasion when starlings were using the top of a swift chimney as a launching place for flying lessons for their youngsters (Jul 16). Also, starlings perched on a chimney top when young swifts are about to fledge or have recently done so would likely be highly stressful to the swift parents and a definite predatory threat to inexperienced fliers. Several years ago a London swift monitor observed starlings harassing a swift fledgling that was clinging to the outside of a chimney (while adult swifts circled close by).

Raptors hanging around or perched on or near swift chimneys may have posed an entirely different level of threat. Over the nesting season, raptors, mostly birds flying through, but not lingering in, an area where an active nest chimney was located, were reported from the vicinity of several swift chimneys. Of greatest concern to swifts were Merlin (perhaps the main predator of swifts in London) and, to a lesser extent, American Kestrel. At FSA these two species lingered for extended periods of time, sometimes even perching on chimney rims and peering down the shaft when nestlings were present inside. For several weeks from the latter part of June into early July, Merlin were reported at FSA. Kestrels were frequently present during both daytime and evening watches for much of July into early August. Swifts sometimes responded to the presence of these small falcons by mobbing them but often the swifts seemed to be undeterred in going about their business of entering and exiting chimneys, even when the falcons were perched nearby for lengthy periods. Swifts, however, did not attempt to enter a chimney if one of these small falcons was actually perched on it. During monitoring sessions no chases were observed, except by swifts chasing the falcons out of the area.

The sudden abandonment of FSA-SE shortly after July 10 (after young are thought to have hatched) may have been related to a Merlin. One Merlin tended to perch on the steeple directly above this nest chimney and, when swooping down among the four monitored FSA nest chimneys, usually first appeared by coming around a corner closest to FSA-SE. Though there is no actual evidence, it is possible a Merlin was able to grab an adult swift trying to enter or exit this nest. Whatever the case, the significant close-range presence of predatory falcons for extended periods of time at FSA must have caused substantial stress to the adult swifts at all church swift nests and would have been a significant predatory threat to newly flying youngsters.

A very limited amount of evening monitoring was carried out at the cluster of swift chimneys at Lilley's Corner. During an evening watch on June 12 no swifts approached, entered or exited any of the chimneys in the cluster, including 613-N Dundas and 620 Marshall, which are relatively short chimneys. During the watch, a Gray Squirrel was seen running around the roofs of both buildings but was not observed to climb either chimney. That evening a Raccoon was also seen on the roof of 613-N Dundas, though it was not seen to ascend the chimney. Both chimneys had been active during the daytime the day before (June 11) but were not active in the daytime on June 18 (78 mins), though both were active again on June 25 during the daytime.

It is possible that the generally less-than-expected frequencies of visits by adult swifts to the chimneys at Lilley's Corner during the daytime may have been somewhat depressed by Gray Squirrels or Raccoons in the vicinity. The nest chimney at 620 Marshall was last occupied on July 1, but the chimney at 613-N Dundas is thought to have possibly been successful in fledging a family.

8.2 Variation in Size and Behaviour of Socializing/Foraging Swift Flocks

There was noticeable variation among chimneys and chimney clusters regarding the presence and general activity level of the social flock in each area during June and July, during which time most nesting attempts were underway. It is possible this is related to local availability of food.

The Dundas Street Centre United Church chimney cluster (two active chimneys in area) was notable for the amount of swift presence overhead. Except for the coolish day (16 ^{o}C) of June 15 when there was no activity at either chimney and only one swift was seen, from June 7 to Aug 6, the max overhead flock size observed during a monitoring session ranged from 7 to 15. In general this site had the highest level of overhead swift presence compared to the four other sites in the daytime monitoring pilot. The DSCUC cluster was located at the edge of a

commercial district and a neighbourhood that included a number of mature trees. Given the number of swifts socializing in the area during the nesting season, it seems likely there are additional chimneys used by swifts in the immediate neighbourhood that we are not aware of.

By comparison, the max overhead flock size at First-St. Andrew's United Church (five active chimneys and likely others in near neighbourhood) ranged from three to 10 during June and July, with the amount of time the flock spent in the area decreasing as the season progressed. Possibly, as the summer went on, there was less food availability above the tree canopy in the neighbourhood. It is thought swifts at FSA may have done quite a bit of their foraging to the north and east (where they were often seen heading and where there are many mature deciduous trees).

At Lilley's Corner, a commercial area, the max size of the socializing/foraging flock ranged from one to eight during June and July (two active chimneys plus a third close by but not in the pilot). Most of the time there was minimal swift presence in the area, suggesting these nesting swifts tended to forage and socialize elsewhere.

At Smith Fruit (one known active swift chimney), during June and July the max size of the overhead flock ranged from three to eight. Phoenix (one active chimney, though there may have been others in the neighbourhood) had a max flock size of zero to five. Compared to Phoenix, Smith Fruit generally had more presence of overhead foraging and socializing swifts.

8.3 Hourly Rates of Entry/Exit Events at Chimneys

According to observations made in Manitoba over many years, in general, the lowest number of entry/exit events (one per hour, on average) should occur during incubation. This rate will approx. double (two entry/exit events per hour on average) during the first week after hatching, and approx. double again (three-to-four entry/exit events per hour on average) for the last three weeks the youngsters are inside the chimney. Barb Stewart (pers. com.), who developed the above rule of thumb, indicates, however, that, in the past few years, rates of food deliveries for non-brooded young in Manitoba are often less than expected.

Swift activity observed at monitored chimneys in London in 2019 only occasionally achieved the rates suggested by the Manitoba rule of thumb and was often quite variable from week to week, even at times when it would have been expected to be relatively high and fairly steady (i.e., during the last three weeks before fledging)

Some distinctive patterns showed up in London. In June and July, the hourly rate of entries and exits at Smith Fruit was consistently higher than expected by the rule of thumb, though it tended to taper off after mid-July, when feeding demand by maturing youngsters should have been highest. By comparison, during the same June-and-July time period, the hourly rate of entries and exits at Phoenix was generally about half that of Smith Fruit.

In the latter half of July, non-breeding swifts that had overnighted at Phoenix tended to emerge at unexpected times during daytime monitoring sessions. It was not always possible to distinguish adults associated with the nesting effort from late-rising non-breeders, unless good numbers of swifts emerged at once. It was thus often difficult to interpret what was happening with the nesting effort inside the chimney. For whatever reason, evidence of late-rising non-breeders did not become obvious at Smith Fruit.

Aside from concerns over the presence of non-breeders, it is possible the differential rate of food deliveries between Smith Fruit and Phoenix was related to local foraging quality. Insect production in the vegetated river corridor adjacent to Smith Fruit was likely higher than in the immediate vicinity of Phoenix, centred as it was in a commercial/industrial area. Even so, the swifts at Phoenix needed to fly only about half a km to reach the river.

Additionally, it has been suggested that swifts may preferentially feed above industrial/commercial areas where there is little vegetation cover. Such areas warm up more than the surrounding vegetated areas and generate rising thermals of hot air that suck in insects and carry them upwards.

Expected hourly rates of activity were rarely, if ever, achieved at London chimneys other than Smith Fruit. A notable exception occurred at 613-N Dundas on the hot and humid afternoon of July 21. During more than two hours of observations, an entry/exit event took place on average every 11 or 12 minutes. It was speculated that the parent swifts associated with this nest (no helpers were detected) must have encountered an unusually dense patch of insects and were ferrying the bonanza home to the youngsters as fast as they could. Wherever the concentrated insect swarm was located, it was not in the immediate area, as the adults disappeared between deliveries. It is thought they may have been foraging very high up, too far away for the naked human eye to detect since, when returning to the chimney, they first seemed to materialize as tiny, faintly twittering specks high overhead.

It has been suggested one hour of daytime observation at a chimney is sufficient for determining whether or not swifts are occupying the chimney. Based on our 2019 daytime monitoring experience, we found that one hour during June and July was not always adequate for detecting swift occupancy. We documented several instances when monitoring of >1.5 hours failed to detect swift activity, even though such activity was detected on previous and following days.

A one-hour monitoring session during June risks missing nesting efforts when the secretive incubation stage is underway and swifts make few visits to the chimney. One-hour monitoring sessions during July risk missing swifts whose nests have failed and who have abandoned their chimneys for the season. Furthermore, we found that, for no obvious reasons, swift attendance at nest sites can be inconsistent and unpredictable at any time throughout the nesting season. Some days simply appear to be "poor" days, with minimal swift presence around a swift neighbourhood that is normally busy with swift activity.

Many confounding factors can make hour to hour, day to day, and season to season use of any swift chimney highly variable. Monitoring at dusk provides information on overnight occupancy but not daytime use or state of the breeding effort (parents of failed nests can sometimes spend nights in their home chimney many weeks after the loss of their nest).

One or two hours of observations per week at a swift chimney provide only a very tiny window into swift life. In any June or July week, swifts spend more than 100 other daylight hours going about their business unobserved by human monitors.

8.4 Identifying Helper Birds

Sometimes an unmated swift or two joins up with a mated pair and provides assistance in raising the young. This can provide a significant advantage to the family, as it means more adults are present to bring food to the growing youngsters. Presence of helper birds can be determined during daytime monitoring by noting that at least three adult swifts are inside the chimney at once. Presence of helper birds makes it much more difficult to interpret nesting stage. While helper birds were occasionally noted at monitored chimneys in London, they did not seem to be regularly or consistently associated with any particular chimneys, except perhaps Smith Fruit.

8.5 Influence of Overnight Roosts on Nesting Efforts in Monitored Chimneys

Two chimneys in the pilot hosted overnight roosts of non-breeding swifts throughout June and July. During these two months, roost sizes varied from 17 to 78 at Smith Fruit and from 16 to 50 at Phoenix. Daytime monitoring at Smith Fruit detected somewhat higher rates of swift comings and goings at this chimney than at most other monitored chimneys. Based on the behaviours observed, there is no clear reason to believe that the higher rate of activity was caused by the non-breeding, overnight-only, cohort of swifts. On the other hand, beginning in mid-July some of the roosting swifts at Phoenix sometimes emerged from the chimney during a morning monitoring session and long after sunrise. Such behaviour made it difficult to be sure which swifts were associated with the nest and which were not.

We have no evidence to suggest that the presence of a roost either increased or decreased the chances of a successful nest. The Phoenix nest is believed to have probably fledged young. The Smith Fruit nest is thought to have probably been unsuccessful, though young likely reached the age of two weeks or more before the nest failed.

Of seven monitored London chimneys that hosted communal roosts during the 2019 nesting season, Smith Fruit and Phoenix were the only two where the presence of an active nest was confirmed. Why some chimneys simultaneously harbour both nesting and communally roosting swifts is not known.

In general, a nest is placed lower down the shaft than the area occupied by roosting swifts, and nesting swifts are thought to enter for the night before the main group of roosting birds settles in. Still, the presence of extra swifts in the upper part of a chimney might cause some disturbance for a nesting pair, which has to tolerate the noise and commotion of the flock, and may have to adjust the times of their comings and goings to avoid collisions. When young swifts are practising flying inside the chimney, the presence of additional swifts in the daytime may be inconvenient.

On the other hand, it is possible that roosting swifts might provide a degree of protection for nesting swifts, possibly buffering or diverting the flow of heavy rain or serving as a distraction to marauding Raccoons or Gray Squirrels.

During the height of the nesting season (mid-June to mid-July), Nature London's weekly evening monitoring program usually documented a combined tally of 300 or more non-breeding swifts roosting communally for the night. There is great scope for research to learn more about the make-up of this group, daily activity patterns of individuals, and number of hours per day spent inside roost chimneys as the season progresses. There is some evidence to suggest that, especially from mid-July onward, such birds may not necessarily emerge from their roost chimneys until late morning.

8.6. Comparison of Swift Usage of Nesting Chimneys in 2018 and 2019

- The five chimneys at FSA are all believed to have been occupied to some extent during the nesting season in 2018. In 2018, very limited monitoring was carried out at the same four chimneys as were monitored in 2019. In 2018, FSA-NE, FSA-N and FSA-S are believed to have been unsuccessful, while there is a slight possibility that FSA-SE may have fledged some young.
- In 2018, Smith Fruit hosted a swift nest, which is believed to have been successful in fledging young.
- In 2018 there seemed to have been a resident pair of swifts at Phoenix though there is no information to indicate whether or not the nest was successful.
- No observations were made in 2018 at any of the three chimneys in the Dundas and Maitland cluster, though both chimneys at Dundas Centre Church were on record for hosting swifts in previous years.
- Evening visits in late July and early August of 2018 showed five chimneys occupied by swifts at Lilley's Corner. In 2019, daytime monitoring was undertaken at all five. At two of these, no swift activity was detected. Two others hosted nests and a third had intermittent use by swifts but no evidence of a nesting attempt. (An additional chimney a few buildings to the east was not checked in 2018 but held nesting swifts in 2019.) Compared to 2018, why there was less swift presence at the cluster of five monitored chimneys at Lilley's Corner in 2019 is a mystery. Perhaps starlings, coons and squirrels observed on top of chimneys or on roofs may have been deterrents.

8.7. Outreach Opportunities during Daytime Monitoring

- Daytime monitors were supplied with information "postcards" (courtesy of Bird Studies Canada) to which Nature London contact info and a link to swift info on the club's website had been attached.
    - Postcards were given out in response to inquiries from passers-by and others.
- Some building owners or neighbours became quite interested in the welfare of "their" swifts and regularly checked in with monitors to inquire about the progress of the swift babies.
- Dundas Street Centre Church arranged to have W Wake give a PowerPoint presentation on swifts to church members on Nov 17/19 (attendance 40), at which time additional information on swifts was made available and a "Swift Friendly Building" sign from Bird Studies Canada was presented to the church.
- After the season ended, owners of 13 of the 15 chimneys were contacted and provided with information on the outcome of the nesting effort in their chimney.

9. Likely Outcomes of Nesting Attempts

Appendix K contains analyses by Barb Stewart (supplemented to a limited extent by WW) of outcome or likely outcome for each chimney in the daytime monitoring pilot (i.e., likelihood of success or failure, and very occasionally speculation related to possible number of young that might have fledged). An examination of the assessments in the appendix illustrates the very considered effort that goes into making interpretations based on field observations (see **Appendix I**). A careful perusal of **Appendices K** and **I** together may serve as an introductory exercise for anyone wishing to develop skill in interpreting nest outcomes from field data.

Likely outcomes for all chimneys are summarized in **Table 2**. **Table 2** also includes info on the number and dates of visits for both daytime and evening monitoring, as well as total number of hours of observations for daytime monitoring (evening monitoring sessions were usually one hour or slightly longer).

Outcomes for the 15 sites listed in **Table 2** can be broken down in the following manner:
Ten of the 15 monitored chimneys produced nests.

- Five of these 10 chimneys may have been successful in fledging young.
    - Two were deemed probably successful (FSA-NE and FSA-S).
    - Three were deemed possibly successful (Phoenix, 513-N Dundas and 434-S Maitland).

- Outcome for one chimney could not be determined due to insufficient data (482 Dundas-NE big square).
- Four of the 10 chimneys probably or definitely failed.
    - Two chimneys probably failed (Smith Fruit and FSA-N).
    - Two chimneys definitely failed (FSA-SE and 620 Marshall).

Five of the 15 monitored chimneys had no nesting attempt.

- Four of the five had no daytime swift activity (613-S, 619-NW, 619-SW and 482-NE slim Dundas).
    - At one of the four chimneys (482-NE slim) a pair of swifts overnighted on at least two dates in May, and in early August two swifts were seen emerging from this chimney around mid-day, possibly investigating the site for occupation another year.
- One of the five had occasional daytime swift activity but no nesting attempt was made (623 Dundas).

The monitoring protocol was able to come up with definite outcomes only in the seven cases where either no nest was attempted at all (five locations) or where the nest failed early and the adults immediately abandoned the site (two locations). The remaining eight chimneys held nests in which young may have survived until about the age of two weeks or more. After that, some nests probably failed and some probably succeeded.

Unfortunately, the one-hour once-a-week visits called for in the monitoring protocol were often insufficient to pick up enough cues to determine nest stage, which would have allowed an estimated fledging date to be calculated. Even when additional visits of longer duration were made, often it was still not possible to detect certain key indicators of nesting stage. In addition, swift behaviours during many of the monitoring sessions often did not fit well with expected frequencies and patterns of entries and exits at nest chimneys.

Ideally, the tracking of entries and exits over several weeks should have indicated the stage of youngsters inside chimneys. Instead, patterns were often somewhat ambiguous. Shifting behaviours, such as reduced attendance at a nest chimney, may possibly have been due to various factors, including excessively hot weather, shortage of insect food, or presence of potential predators (such as falcons or squirrels). Reduced frequency of visits may also have been early warning signs of potential nest failure.

The lack of precision in predicting expected hatching dates, coupled with the many competing commitments of volunteers, meant that rarely was anyone present at or close to the time when fledging might have occurred. In reviewing monitoring data for young swifts advancing from the brooded through the non-brooded stage, it was sometimes noticed that, as likely fledging time approached and nutritional requirements of growing young increased, the rate of food deliveries actually decreased. Such evidence hinted at possible trouble in the nest.

It is always possible that monitors were missing some exits, as parents dashed over chimney rims in great haste to gather more food. If, however, aerial insects were in short supply (or low in quality), the parents may have been overwhelmed by the demand and were simply unable to bring home enough good food fast enough to meet the need.

A dwindling rate of food deliveries may have indicated parents were still tending the nest but taking significantly longer to collect a load before returning. This pattern made it difficult to determine whether good-sized young had failed to make it out of the chimney or if they had managed to leave when no one was watching.

For some chimneys, daytime monitoring commenced more than a month earlier in the spring than at others. Number of visits to chimneys that held nests ranged from 9 to 16, while total number of hours spent monitoring these chimneys ranged from 10 to 26 (see **Table 2**). More frequent and longer visits provided more opportunities to try to follow and interpret what was happening with each nest, but did not lead to improved accuracy in learning the outcome of a nest. In theory, more and longer monitoring sessions throughout the nesting season should enable better pinpointing of expected fledging dates. This, in turn, would allow scheduling of intense, prolonged monitoring sessions over several days around the time of expected fledging. If we had been able to do better at identifying approximate fledging dates, we might have been able, in a few cases at least, to come up with a better handle on nest outcomes.

In general, it was found that, in 2019, the last two weeks of July and the first week of August were the crucial time period when London swifts were most likely to fledge. Unfortunately, a number of monitors were away on holiday around that time and it was not possible to deliver the intense level of monitoring that might have made determination of nest outcome more accurate.

In the case of nests that failed as fledging time approached, more intense monitoring could not have changed the outcome, but it might have provided greater insight into the changing patterns of adult attendance at nest chimneys that were failing.

Table 2. For Chimney Swifts, monitoring effort and tentative designations of success or failure for nest chimneys in pilot project to assess nesting outcomes.

Chimney Address	Evening Monitoring		Daytime Monitoring		Likely Outcome
	Dates of Visits (to Au 21)	Total Visits	Dates of Visits (to Au 14)	Total Visits, Total Time	
22 Maitland, Smith Fruit	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 17, 24, 31, Au 7, 14, 21	18 visits	My 14, 23, 31, Jn 8, 14, 22, 28, Jl 6, 14, 19, 20, 26, Au 3	13 visits, 15.3 hr	Probable failure (last active daytime Jl 26)
300 Wellington, Phoenix	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 17, 24, 31, Au 7, 14, 21	18 visits	My 18, 23, 31, Jn 6, 11, 18, 27, Jl 2, 9, 16, 19, 21, 23, Au 2, 15	15 visits, 23.3 hr	Possible success (last active daytime Au 2)
350 Queens, FSA-SE	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 17, 20, 24, 31, Au 7, 14, 21	19 visits	My 2, 15, 21, 27, Jn 4, 11, 17, 25, Jl 2, 9, 16, 22	12 visits (to Jul 22) 14.5 hr	Nest failure (last active: daytime Jl 9, evening Jl 10)
350 Queens, FSA-NE	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 11, 17, 20, 24, 31, Au 7, 14, 21	20 visits	My 2, 15, 21, 27, Jn 4, 11, 17, 25, Jl 2, 9, 16, 22, Au 1, 6, 9, 12	16 visits, 24.6 hr	Likely success (last active daytime Au 9, evening Au 21
350 Queens, FSA-N	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 11, 17, 20, 24, 31, Au 7, 14, 21	20 visits	My 2, 15, 21 ,27, Jn 4, 11, 17, 25, Jl 2, 9, 16, 22, Au 1, 6, 9, 12	16 visits, 26.2 hr	Likely failure (last active: daytime Au 6, evening Au 21)
350 Queens, FSA-S	My 1, 8, 16, 22, 26, 30, Jn 3, 12, 19, 26, Jl 3, 10, 17, 20, 24, 31, Au 7, 14, 21	19 visits	My 2, 15, 21, 27, Jn 4, 11, 17, 25, Jl 2, 9, 16, 22, Au 1, 6, 9, 12	16 visits, 26.2 hr	Probable success (last active daytime Au 9, evening Au 14
613-N Dundas, Baker's Dozen (metal topknot)	Jn 12, 27	2 visits	My 24, 27, Jn 3, 11, 18, 25, Jl 1, 8, 15, 21, 29, Au 5	12 visits, 20.5 hr	Possible fledging (last active daytime Jl 29)
613-S Dundas, Baker's Dozen (plain top)	Jn 27	1 visit	Jl 1, 8, 15, 21, Au 5	5 visits, 9.5 hr	Inactive, no nest attempt
619-NW Dundas, Baker's Dozen (chimney pots)	My 23, Jn 12, 27	3 visits	My 24, 27, Jn 3, 11, 18, 25, Jl 21, Au 5	8 visits, 14.1 hr	Inactive, no nest attempt
619-SW Dundas, Baker's Dozen (tile with mesh + open flue)	Jn 12, 27	2 visits	My 24 ,27, Jn 3, 11, 18, 25, Jl 1, 8, 15, 21, 29	12 visits, 20.5 hr	Inactive, no nest attempt
623 Dundas, warehouse behind Root Cellar	My 23, Jn 12, 27	3 visits	My 24, 27, Jn 3, 11, 18, 25, Jl 1, 8, 15, 21, 29, Au 5	12 visits, 20.2 hr	Some activity, no nest (last active daytime Jl 1)
620 Marshall, old livery stable	My 23, Jn 12, 27	3 visits	My 24, 27, Jn 3, 11, 18, 25, Jl 1, 8, 15, 21, 29, Au 5	12 visits, 20.2 hr	Nest failure (last active: daytime Jl 1)
482 Dundas-NE-big, Dundas St Centre church	My 2, 22	2 visits	Jn 7 ,15, 17, 24, Jl 1, 7, 9, 15, 27	9 visits, 10.1 hr	Active, insufficient data (last active daytime Jl 15)
482 Dundas-NE-slim, Dundas St Centre church	My 2, 22	2 visits	Jn 7, 15, 17, 24, Jl 1, 7, 9, Au 6	7 visits, 7.9 hr	Some activity, no nest (last active daytime Au 6)
434-S Maitland, Midwives office		0 visits	Jn 7, 15, 17, 24, Jl 1, 7, 9, 15, 27, Au 6	10 visits, 10.3 hr	Possible fledging (last active daytime Jl 27)

It should be pointed out that, regardless of the difficulties in determining a tentative outcome re success or failure of the nest, our methodology had little expectation of determining actual number of young fledged per nest (productivity). Improving the likelihood of gaining such information would have required very long periods of dedicated observation, perhaps dawn to dusk, over several days. Even then, because of the time delay between fledging of oldest and youngest siblings, and the propensity of some recent fledglings to move around among chimneys, determining which and how many youngsters had been hatched in a particular chimney would be challenging.

By mid-to-late July several monitors were increasing the frequency of sessions and staying longer each time. Still, there are more than 16 hours of daylight in London at this time of year and monitors cannot be present at all times in anticipation of fledging, even if expected dates could have been pinned down to within a day or two.

In the wild (based on work done in Manitoba), only about 40-50% of swift nests are successful in fledging at least one youngster, so the tentative assessments of nest outcomes obtained in the Nature London pilot may not be out of line with the norm. If all of the London nests rated as "possibly" and "probably" successful, were actually successful, then five out of ten nests might have fledged at least some young. An additional nest whose outcome was unknown, but which was thought to be progressing normally when last monitored, may have been another success. On the other hand, there is also the prospect that some or all of the "probables" and "possibles" were actually unsuccessful. Just because youngsters in a nest successfully reach the age of two or three weeks (approx. 28 to 30 days are needed from hatching to fledging), this is no guarantee of a successful outcome. A nest can fail at any stage right up till fledging day.

10. Determining When Nesting Swifts Abandon their Chimneys for Daytime Use and Overnight Use

Table 2 shows that 10 chimneys held active swift nests.

Two nests experienced early failure. The nest at 620 Marshall St was abandoned for daytime use in early July when the stage of the nesting effort was unclear (perhaps shortly before or after hatching). The chimney was not subsequently checked for nighttime use. FSA-SE failed when the young may have been about a week old and was soon after abandoned for both daytime use and for overnight use. There is a possibility that adults from this nest may have moved to another chimney at FSA to become helper birds.

When an active roost is present as the nesting season wanes (e.g., at Smith Fruit and Phoenix), it is not possible to determine when nesting swifts abandon the chimney for the night, since one or more swifts associated with the nesting attempt may join the roosting flock at that site. At Smith Fruit, where the nest is believed to have likely failed, swifts were using the chimney in the daytime on Jul 26 but not on Aug 3. At Phoenix, where the nest was possibly successful, on Jul 21 and 23, at least some daytime activity seems to have been due to roosting birds. On Aug 2, young swifts were practising diving into the chimney during the daytime, though it was not known whether these were swifts that had hatched in the Phoenix chimney or a different chimney. Regular daytime monitoring was not carried out at Phoenix again.

At FSA-NE (believed to have probably been a successful nest), daytime use was noted on Aug 9 but not on Aug 12. At FSA-N (believed to have likely been unsuccessful), the chimney was used during the daytime on Aug 6 but not Aug 9 or 12. At FSA-S (believed to have probably been successful), swifts were using the chimney during the daytime on Aug 9 but not Aug 12. Regarding overnight use, FSA-NE and FSA-N were last occupied on Aug 21 and FSA-S on Aug 14.

The chimney at 613-N Dundas was being used by swifts during the daytime on Jul 29 and possibly also on Aug 5. At the big square chimney at 482 Dundas (where outcome was not determined, even tentatively), entries and an exit plus multiple peer 'n' veers were observed on July 15, but there was no daytime activity on Jul 27. On July 27, the 434-S Maitland chimney was in use during the daytime, including an entry by a possible recent fledgling, but there was no activity on Aug 6. None of these three chimneys was visited at night in July or August.

11. Using Chimney Cleanouts as a Means of Learning More about Nest Outcomes

On Oct 10, 2019, a visit was paid to First-St. Andrew's Church, where Tim Medeima, the church's facilities manager assisted in gaining access to two chimney cleanouts in the basement. The FSA-NE chimney is believed to date from the church's construction in 1868, while the FSA-N chimney was likely built about 1938. The NE chimney has not been used in a very long time, but the N chimney currently vents the church's oil-burning furnace during the winter months. A third chimney, FSA-S, is located in a part of the church complex built in

1905. It has an unused fireplace at its base. It was possible to peer up the shaft of the fireplace chimney, but we did not disturb the closed damper. Photos of these three chimneys and their cleanouts are presented in **Appendix F**. Cleanouts for FSA-NW and FSA-SE (both identical to the FSA-NE chimney) could not be found, having been buried inside church walls during renovations over the years.

The FSA-NE cleanout door was located about 5 feet above the basement floor. It opened directly into a small-diameter (perhaps 1 foot), square, metal(?)-lined shaft. Contents of the chimney were firmly packed against the lower half of the door and slanted backwards and upwards towards the rear wall of the shaft. Fragments of old nests, feathers and curled up pieces of egg shells were visible among greyish-coloured detritus.

The FSA-N cleanout door was located about 4 feet above the basement floor and opened into a space somewhat less than 2 feet in diameter, which extended horizontally back a foot and a half or more to a larger-diameter vertical shaft that formed the chimney. Walls seemed to be made of some sort of concrete. Loose greyish debris sloped backward and upward from the door opening. Identifiable materials found close to the door included two small well-dried skeletons of young swifts, various feathers, eggshells, nest fragments and two dead beetles (identified by Hugh Casbourn as scarab beetles of the genus *Osmoderma*, most likely *O. eremicola*). Material in the cleanout appeared to have rolled down the slope from the vertical shaft to lie against the lower part of the door.

Both chimney cleanouts appeared to have been undisturbed for a very long time. It was therefore deemed prudent not to probe or rearrange the debris visible when the doors were opened, in case swift researchers might wish to "mine" these accumulations of swift "guano" someday. There may also have been health concerns related to breathing in any dust that was disturbed. A few items were handled minimally but things were essentially left in their original configuration. In both cleanouts, relatively few egg shell fragments were discernable among the uneven-surfaced detritus on the slope.

Because of the masses of material in both chimney cleanouts and the impossibility of distinguishing nest-associated materials from 2019 from those of previous years, it was not possible to learn anything about 2019 nest outcomes by peering into the contents of the cleanouts for the FSA-N and FSA-NE chimneys.

12. Consideration of the Effectiveness/Feasibility of the Protocol for Determining Nest Outcomes

<u>A major goal of the pilot was to obtain information about success rates of swift nests in London</u>.

- We were successful in learning much general information about swift activities associated with the nesting cycle, but swifts showed such variability in their behaviours that it was often very difficult to interpret nesting stage and predict possible fledging date.
    - Inability to predict approximate fledging dates and lack of large amounts of last-minute monitoring availability meant that definite (rather than tentative) determinations of nest outcomes (success or failure) were not possible.
    - Of 15 nest chimneys in the study, five were deemed to be possibly or probably successful.
        - For no nests could it be said they were definitely successful (i.e., fledged at least one young).
        - At no "probably" or "possibly" successful nests could the number of actual young fledged (productivity) be even tentatively determined (though in one case it was thought that at least one or two young might have fledged).
    - Of the 15 nest chimneys in the study, two probably and two definitely failed.
    - At five chimneys there was no actual nesting attempt, and at one there was insufficient data to make an assessment.
    - Determination of definite outcome was possible only in the cases of nests that failed early and where parent swifts abandoned the chimney soon after (two cases).

<u>A second goal of the pilot was to assess how practicable the protocol was to implement and how likely it was to achieve the goal of determining nesting success or failure.</u>

- As indicated above, the protocol was generally adequate for assessing "possible" or "probable" nest outcomes but inadequate for providing more definite information on nest outcomes.
    - A protocol that involved a level of monitoring commitment acceptable to potential volunteers meant that a single weekly monitoring session of one hour was specified (with more encouraged).

        - This level of effort proved insufficient to allow key cues to be picked up from nesting swifts, especially when they often did not exhibit expected behaviours.
        - As shown in **Table 2**, increasing the numbers of hours of monitoring at a chimney did not necessarily improve the likelihood of a better determination of nest outcome.
        - The critical element was deciding when the extra hours needed to happen, and it was an ongoing challenge to figure that out and to then have a volunteer available.
    - Even if many more hours of monitoring had been carried out per week, the vagaries of weather and of the swifts themselves do not necessarily fit well with pre-scheduled monitoring slots.
    - In order to detect the often very subtle aspects of swift behaviour that are indicative of transitions from one nesting stage to another, monitors need highly developed and focussed observational and interpretation skills.
        - The honing of such specialized skills happens slowly over time and is probably best achieved with much coaching and frequent communication. In 2019, the local coordinator was new to daytime monitoring and, though under the expert mentorship of Barb Stewart, was not always able to interpret and pass on relevant information as quickly as desirable to other monitors.
    - Perhaps the most serious drawback to the effective implementation of the monitoring protocol is the absolute necessity that monitors be available, often at very short notice, to put in long hours of intense monitoring effort when it is deemed fledging is likely to soon occur (if, indeed, such a date can be accurately predicted). Our volunteers were very generous with their time, but they do have private lives and other commitments and do not have unlimited time and flexibility.
        - Unfortunately, several volunteers were away on holidays in late July, which resulted in much reduced coverage of chimneys at the crucial time when extra monitoring was most needed.

13. Comments re Possible Modifications to the Protocol for Daytime Monitoring

- Monitoring for one hour per week per chimney allowed us to learn much interesting general info about swift nesting behaviour, including whether or not a viable nesting attempt was made. Unfortunately, the protocol, as implemented, was inadequate for achieving the goal of determining with certainty the actual outcome (success or failure) of a nest (let alone number of young fledged).
    - To achieve even the modest goal of determining nest success or failure, a much more intensive regimen of daytime monitoring is recommended – as a basic start, possibly twice a week (or once every four days) for two hours at a time. Then, additional monitoring visits of varying duration and frequency should be undertaken in response to observations made at just-completed monitoring sessions so that key stages and transitions, particularly fledging, can be observed.
    - Evening monitoring once a week (beginning 60 mins before and continuing to 30 mins after sunset) would be desirable to supplement info learned during daytime monitoring, such as a sudden change in numbers of swifts spending the night in the chimney. (But evening monitoring yields info only on site occupancy, not on breeding success.)
    - Pre- and post-season visits to chimney cleanouts could facilitate collection of info on actual number of eggs laid and hatched and number of young that died in the chimney.
- Much personal observation time and coaching/mentoring are necessary to develop the skills needed to interpret subtle changes in swift behaviour, especially when behaviours do not always fit with the expected.
    - An ability to identify transitions among nesting stages is essential for predicting fledging date and for planning for long periods of continuous monitoring that might allow the observation of one or more fledglings emerging from the chimney on its first flight.
    - Based on experiences in London in 2019, it takes more than one nesting season to develop a high level of skill in interpreting swift behaviours as indicators of nesting stage.
- It required a great deal of time to set up and administer the 2019 protocol that helped eight dedicated volunteers make useful input to the pilot project.

- Modifications that might improve the quality of data obtained would require an even greater time commitment from a local coordinator and monitors who have the flexibility to carry out extra monitoring visits at short notice.
    - This is a large time investment for returns that may not determine more than a general designation of nest success or failure.
    - It would not be wise to implement a daytime monitoring program unless it is can be ensured well in advance that there will be a very high degree of volunteer availability to conduct intense monitoring whenever needed during the last half of July and early August.
    - Here are two possible models for undertaking daytime monitoring:
        - A dedicated individual with a very high commitment to learning swift behavioural cues and unlimited free time works alone to monitor one chimney.
        - A group of individuals working under a coordinator focuses on just one chimney.

14. Possible Alternative Means of Obtaining Information on Nesting Success / Swift Productivity

Because of the many challenges associated with obtaining quality data on swift productivity via daytime monitoring, other avenues of more efficiently obtaining such information should be investigated. Here are two possibilities.

<u>Information on nest productivity can be obtained by examining cleanout traps in the spring and fall.</u>

- An inspection of basement chimney cleanouts can provide counts of numbers of eggs as well as numbers of young that died in the chimney. Assuming that no predators (e.g., squirrels or raccoons) caused mortality within the chimney and that all nest-related material made it to the bottom (i.e., did not get hung up on a ledge or caught in spider webbing), such information allows the determination of the number of eggs laid and the number of young that fledged. Eggs that hatched naturally (jagged eggshell edges) can be distinguished from eggs that smashed during a fall. Stage of feather development indicates age of youngsters at time of death.
    - A visit in the fall could pick up eggs, skeletons/carcasses, nest fragments, etc. from the nesting season just passed.
    - A second visit in the early spring (before swifts return) is important. It would identify any additional nest fragments that might have fallen during the winter (if a re-nesting attempt was made the previous year, the second nest might not fall until later). An early spring visit would also allow the floor of the cleanout to be thoroughly cleared of debris so that any materials collected at the end of the new season would be known to be from that year.
    - During an early spring visit, a sheet or cardboard could be placed on the cleanout floor or on top of existing debris in the bottom of the chimney if it were considered desirable not to clear away such deposits (they might contain valuable historic information on swifts).
    - Disturbance of dusty materials in long-undisturbed chimney cleanouts might pose a health and safety hazard and such investigations are probably best undertaken by qualified individuals exercising appropriate precautions.

<u>A video camera installed inside the chimney(or just above it) may be a very effective and efficient means of obtaining data on nest productivity, especially if footage can be assessed digitally</u>.

- A camera should be able to provide dates of nest initiation, egg-laying, hatching and fledging, as well as the number of young that left the chimney. It could also document all visits to the chimney, determine dates and causes of nest or nestling loss, facilitate the correlation of swift activities with weather, etc.
    - Visits by an observer on the ground for an hour or two every few days can never hope to gain more than a tiny window into swift activity inside a nest chimney.

<u>Tracking devices may provide supplementary information related to nest success or productivity.</u>

- While unlikely to yield direct information on nest success, fitting some nesting swifts with tracking devices (the more lightweight the better) could provide info on factors that are relevant to nesting success. These might include feeding locations and amount of time spent foraging.

15. Summary of Findings re Feasibility of Study

- Due to limitations related to frequency, duration and timing, daytime monitoring sessions carried out in 2019 proved to be inadequate to determine more than tentative assessments of nest outcomes, let alone actual numbers of young swifts that fledged from monitored chimneys.
- Many times volunteers were left scratching their heads by often ambiguous behaviour patterns noted during monitoring sessions.
    - The data collected each week often did poorly at identifying key indicators of nest stage transitions or seemed to support interpretations that subsequently were contradicted.
- To obtain the kind and level of data needed, much more frequent monitoring sessions of longer duration and at key times would be required. Even then, they might not necessarily be sufficient to detect the timing of the crucial transitions between nest stages that allow calculation of expected fledging date.
    - In order to be sure of witnessing first flights of at least some youngsters leaving a chimney, volunteers might need to spend several very long days watching a chimney.
        - Even with such long days, because recently fledged young swifts sometimes move to neighbouring chimneys, it could not necessarily be concluded that poorly flying swifts emerging from a chimney had hatched there.
    - Daytime monitoring carried out regularly throughout the nesting season seems to be a useful tool for confirming whether or not a nest is advancing through expected nesting stages.
    - Daytime monitoring, with a modified protocol that calls for longer and more targeted behaviour-based observation time, seems to be a reasonable tool for determining nest outcome (success or failure), though data obtained might be only tentative.
    - Due to considerations outlined earlier, daytime monitoring may not be an entirely reliable or consistent way to determine the actual total number of swifts fledged from an individual nest.

16. Suggestions for Follow-up to Learn More about Outcomes of Swift Nesting Efforts

Consider some of the following options:

- Develop plans to determine current productivity rates (i.e., number of young fledged per nest) for Ontario Chimney Swifts.
- Pursue use of video cameras placed inside chimneys (or possibly outside, just above chimney tops) as a means of documenting swift productivity.
- Investigate the inspection of chimney cleanouts as a means of determining productivity.
- Think outside the box to develop other means to gain information on swift productivity.
- Encourage professional biologists or academics to undertake the suggestions above.
- Recognize that daytime monitoring by ground-based volunteers is very labour intensive and, without proficiency in the interpretation of swift behaviours around nest chimneys to inform strategically targeted timing of monitoring sessions, is unlikely to obtain quality information on nest success or productivity.
- Without heavily promoting daytime monitoring, consider making information available at two levels:
    - For those interested in serious monitoring to gain insight re nest productivity:
        - Commence when swifts return in spring, continue 10-12 weeks; include the following:
        - daytime monitoring – twice a week (or every 4 days), minimum of two hours per session.
        - evening monitoring – weekly, start one hour before sunset and continue 30 mins after.
        - targeted monitoring – times and durations dictated by observed swift behaviours.
        - long-duration monitoring – over one to three days, around time of expected fledging date.
    - For those wishing to undertake limited daytime monitoring with modest expectations for what might be learned:
        - Consider weekly daytime visits (e.g., two hours) to obtain basic info such as when a chimney is first occupied in the spring for nesting, how many weeks it continues to be occupied, whether a nest is attempted, if and when early nest failure occurs.
- Create Ontario daytime monitoring protocols and online data portal to facilitate data collection and submission by anyone interested in undertaking some level of daytime monitoring.
- Develop guidelines for confirming swift nesting status for the upcoming Ontario Breeding Bird Atlas.

17. Discussion and Conclusions

The year 2019, due to its cold wet spring, may have been an atypical one for swift activity in the London area and hence a poor choice for running a pilot project on daytime monitoring. Although most swifts apparently returned to London about the usual time, their energy reserves may have been depleted on arrival. Cold wet weather through May and early June may have reduced insect production and created poor feeding conditions. This may have caused swifts to spend extra days feeding to improve their own fitness levels. Whatever the case, there seemed to be a delay in the initiation of nesting.

During this time period, the somewhat inconsistent attendance and ambiguous behaviours by swifts around chimneys made it difficult to detect clear indications of nest establishment. This had the ripple effect of adding to the problem of determining key dates for subsequent stages of nesting activity. As July advanced and the general time of fledging neared, swifts continued to deliver somewhat confusing messages as to the progress of their nesting efforts. Unfortunately, just at this time, several volunteers were away on holidays and it was not possible to implement the intense monitoring schedule needed to determine actual nest outcomes (failure, or success – as indicated by the fledging of at least one youngster), even if we had had a good handle on expected dates of fledging at the various chimneys. More frequent monitoring throughout the season would have been helpful but still no guarantee of the development of a clear understanding of what was happening inside chimneys.

In 2019, nesting attempts were made in 10 monitored chimneys, of which five were probably or possibly successful in fledging at least some young. At two additional sites, swifts spent some time investigating chimneys but did not nest. Because there is no baseline data available for Ontario, the usual success rate for the province's swifts in a normal year is not known (in Manitoba 40 to 50% of nests are usually successful).

Data collected at London roosts in August and September of 2019 showed peak numbers of fall migrants occurring about two weeks earlier and at significantly lower levels than in 2018. For the first time ever, the peak combined tally for four London roosts that have been monitored for more than a decade was lower during fall migration than in the spring. This suggests that productivity for the swifts that migrated southward through London in the fall of 2019 may have been considerably lower than usual. Perhaps as a result, swifts may have been free to leave the province sooner.

For background understanding of swift behaviours around nesting chimneys, we referred to what has been learned in Manitoba in the previous 13 or so years. It may well be, however, that swifts in southwestern Ontario follow somewhat different patterns. Rules of thumb that are more relevant to the London area would be very helpful. We suspect, however, that it would require a number of years of careful documentation to gather sufficient data to attempt to formulate such. Based on our observations in 2019, local swift behaviours may be too unpredictable to allow these to be easily developed.

Changing patterns of weather and ongoing declines in insects over wide geographic areas are of concern. Equally troubling is the decline in both the quantity and quality of insect prey available to swifts. In future years, it may prove that frequency of food deliveries to nests is governed as much or more by weather and food availability than the stage of development of the young.

Two London nests that are thought to have failed well after their likely hatching times introduce the possibility that food shortage may have been a factor.

Implementing an on-the ground daytime monitoring program with the intention of determining swift nest outcomes presents many challenges. The biggest is spending enough time watching the chimney at the right times and with appropriate spacing between visits, to tease out an understanding of how the nesting stages are progressing inside the shaft. It is desirable for monitoring to result in the identification of initial occupancy date, date of onset of nesting activity, how many helpers are present, and whether a nest fails and a second is attempted. Such details, as well as behaviours indicative of nest building, egg laying, incubation, hatching, the presence of brooded young and later non-brooded young, are learned only by having a strong grasp of indicator behaviours and spending large amounts of time observing the chimney. By following the succession of nesting stages, the approximate date of fledging can be anticipated. Then long days of monitoring can be planned in the hope of seeing at least some young swifts as they emerge from the chimney. That's the theory.

But, even with weeks of substantial monitoring effort, observers are present for only a tiny fraction of a swift's day. Between visits, and unbeknownst to volunteer monitors, many things can happen in swift lives to throw off the advance of the nesting cycle (e.g., predators, extreme weather, and insufficient food). Swifts may

have a poor day and unexpectedly disappear for hours. At such times, inclement weather (e.g., too hot, too cold, too wet) and food availability may be more important than nesting stage in determining swift attendance at nest chimneys. It is possible for a swift nest to fail right up until the time of expected fledging. But, the more frequent the monitoring sessions through the nesting season, the greater the likelihood such happenings can be tracked.

Despite pitfalls and complexities, undertaking the 2019 pilot project was definitely worthwhile, as much valuable information was gleaned from the exercise.

An important learning from the pilot is that expectations of volunteers have to be kept to reasonable levels. We were privileged to have tremendously dedicated people who sometimes stayed for very long monitoring sessions and returned on extra days. No matter how committed, most volunteers, however, simply do not have the time or flexibility to respond to cues that suggest that additional monitoring needs to be done on short notice at non-scheduled times. People do have private lives and commitments and do take holidays. Swifts don't take holidays.

Although monitors put in as many hours as they could manage, on an ongoing basis swift behaviours were challenging to interpret in regard to identifying the stage of a nest. This made it hard to develop an understanding of swift behaviours and to try to figure out exactly when extra observation hours were most needed. Thus, we did not always have monitors in place at the most crucial times. When we did, it was usually by chance. For none of our London nests did we have a good sense of just when hatching might be expected. Even if we had, such an event might take place over a couple of days, and it is not reasonable to expect such a level of volunteer presence at a site.

Our pilot project demonstrated that the protocol used (and even a modification that would require considerably more time and effort on an unpredictable and ever-evolving schedule) is not a very viable tool for learning about nest outcome (simple success or failure), let alone actual fledging rate. The logistics of trying to roll out such a program on a large scale and organizing and supporting volunteers on an ongoing basis would require very significant administrative input.

The kind of ground-based daytime monitoring conducted in the pilot did, however, teach us much about the habits of swifts. It also provided general information confirming whether or not a nesting attempt was underway and for how many weeks of the nesting season the chimney was occupied in the daytime. In a small way we spent some time "walking in the shoes" of swifts. We glimpsed aspects of their experiences in trying to raise a family in the face of many challenges – delayed spring, erratic weather, brutally hot days, possible food shortages, and potential predators hanging out nearby. These fascinating little birds and their indomitable spirits won our hearts, garnered our respect and piqued our imaginations.

Even in the absence of an organized monitoring program of this sort in the future, some individuals might wish to take on such monitoring on their own or as a small group focussed on a single nest chimney. It offers a tremendous opportunity to peer in a small way into the amazing lives of an urban species that needs our help. Even if monitors are not able to determine nest outcome, they can learn much along the way about the daily routines of local swifts.

To facilitate personal or small group monitoring for those who might be interested in pursuing this, we are making available much of the information we gathered in London this past summer. This appears in the appendices that accompany this document. Included is an array of background material outlining how our program was organized, the results obtained, and a listing of swift behaviours to watch for and explanations of how these might be interpreted. We hope the contents of the appendices might add to the enjoyment and possibly increase the potential for successful determination of nest outcome for anyone wishing to try out daytime monitoring.

As a result of this year's pilot, we have concluded that daytime monitoring by volunteers on the ground is not a feasible or time-effective means for obtaining significant quantities of quality information on simple outcome or fledging rates at London swift nests. Instead, it is probably far more useful to encourage other approaches. Much might be learned by investigating the contents of chimney cleanouts at the beginning and end of a nesting season. The installation of some sort of video monitoring system at selected chimneys has great potential. With cameras, activity inside Ontario nest chimneys could be known for 24 hours every day throughout the breeding season. Much could also be learned regarding the activity budgets of the non-breeders who use some of the same chimneys. The use of digital software would facilitate the processing of the resulting video.

The logistics of systematic investigation of chimney cleanouts and the technicalities of video monitoring and interpretation are beyond the ambitions, capabilities, budget and volunteer availability of Nature London. We hope that our experiences with the 2019 pilot will nudge academics and others to explore new approaches to determining fledging rates for Ontario swifts. Projects of this type would be perfect for grad students.

Acknowledgements

The biggest vote of thanks goes to Barb Stewart in Manitoba, who served as the London project's mentor and coach. Without her pioneering work and insights gained over many years, our pilot would never have gone anywhere. As the protocol was being developed and as the season unfolded, we pored over her written documents, observations and interpretations and then compared them to the data that were coming in in London. Her background material, wise advice, constant encouragement and end-of-season interpretations were essential to the success of our project. We are truly indebted to Barb's endless generosity in the sharing of time and expertise. Her bubbly enthusiasm also bolstered our spirits during the low times when we despaired of ever figuring out what the London swifts were up to. Information she provided also forms an important part of the appendices that accompany this document. Thank you Barb!

An equally large thank you goes to our amazing crew of Nature London volunteers. The bulk of the daytime monitoring was carried out by eight core monitors – a thousand thank-you's to Leslie Baker, Alison Greenhill, Steve Jarrett, Kathy McCoy, Theresa Morrissey, Joe Stephenson and Lori Ykema. These dedicated people cheerfully sat through blazing sun, dripping humidity and boring stretches when swifts were no shows, all the time carefully documenting what they observed. Some even sat through double- or triple-length monitoring sessions or went back for extra visits when swifts had left them perplexed the previous time. Another tip of the hat goes out to the monitors for being such excellent ambassadors – engaging and educating passers-by and building owners and making new friends for swifts. Thank you, all!

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Special thanks are sent to Sandy Symmes for so capably organizing the massive Nature London evening swift monitoring program, data from which supported the daytime monitoring pilot. Additional thanks go to Ric Symmes for handling the technical side of things.

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Last but not least we thank the property owners who provided accommodations to the swifts in this study, even if they didn't originally know it. And, of course, we thank the swifts themselves (who certainly didn't know it) for providing us with an amazing opportunity to learn a little more about their world. We salute them for their unwavering perseverance as they do their very best to bring a new generation of young swifts to life each year.

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APPENDIX A

Background Information Related to Chimney Swift Monitoring in London, Ontario

Early field work for the second Atlas of Breeding Birds of Ontario, 2001-2005 (Cadman *et al.* 2007) identified an apparent decline in Chimney Swift abundance and distribution in the province. In response to this information, in the fall of 2004, after preliminary work the previous year, members of Nature London launched an initiative they named SwiftWatch. At first, the main focus was development and implementation of a protocol to document numbers of swifts roosting overnight in London during fall migration. In subsequent years, educational, outreach, landowner contact and advocacy initiatives were added, and evening monitoring was expanded to cover the May-to-October swift season. Efforts were also made to identify chimneys used by swifts for nesting and to document the rate at which chimneys used by swifts were being lost. Conceived as a five-year project, the London program ran from 2004 to 2008.

Beginning in mid-August of 2008, swift activity in London came under the direct auspices of a program that was being developed by Bird Studies Canada (BSC, now Birds Canada). Subsequently BSC officially launched its Ontario SwiftWatch (OSW) evening-monitoring program in 2010. London naturalists adopted the BSC protocol and submitted data to BSC via mail, e-mail or online portal. This system primarily collects specific information relating to numbers of swifts entering chimneys at dusk, especially on several designated dates during spring migration (in collaboration with the National Roost Monitoring Program).

In 2017, members of Nature London began expanding the number of chimneys monitored and the number of nights per year these were covered. When further expansion took place in 2018, it became increasingly clear that the data collection system used by BSC was making it difficult for the London group to effectively engage volunteers. The BSC system was not set up to permit local monitors to receive timely information on what was happening at other London swift chimneys.

Hence, in the spring of 2019, the NL swift initiative separated itself from the BSC program and created its own evening-monitoring protocol, manual, field data form, data entry portal, communication system, etc. Nature London continued to collect all data required under the BSC protocol and to share data with BSC by forwarding spreadsheets on a weekly basis. The new, London-based data-handling system increased the administrative workload for local organizers but has been positively received by volunteer monitors.

Based on Breeding Bird Surveys, Chimney Swift numbers are believed to have declined by approximately 88 % in Canada from 1970 to 2017 (ECCC 2017). In the intervening half century, the climate has been changing; pesticide use, urban footprint, and industrial agriculture have expanded; and the habitat that produces insects on which swifts feed has decreased in both quantity and quality. Such changes are thought to be having a negative impact on swifts.

Locally, since 2003, Nature London has been keeping a list of chimneys used by swifts during the nesting season, although many additional London chimneys have never been checked for swift occupancy. By 2018, approximately 175 chimneys were on record for harbouring swifts during the nesting season, although almost one-third of these have been capped or demolished since initial discovery.

Nature London has long been concerned that little seems to be known about nesting success and distribution patterns of swifts locally and regionally and how these may have changed over time. In contemplating the establishment of a program to learn more about current swift-nesting success, it was decided to delve into old records to see what might be learned on these topics.

In 2018–2019, a cursory examination was made of available information related to swift population changes in the London region (both urban and rural) (Wake 2019). This effort discovered a major withdrawal by nesting swifts from agricultural landscapes but little or no data to indicate how successful London and area swifts are in producing young, neither now nor in earlier times.

Indeed, there is a general lack of information on the rate of reproductive success of Chimney Swifts across Canada. A small ongoing study is underway in Manitoba (e.g., Stewart 2018, Stewart and Stewart 2013). Unfortunately, no information, past or present, seems to be available for other parts of the country, including Ontario (COSEWIC 2018). Yet, rate of annual recruitment of young swifts into the population may be a crucial element in the ongoing decline in swift numbers.

For many years Nature London has been hoping that some academic or institutional entity in Ontario, backed by professional expertise and resources, would instigate a study into swift nest success/productivity. Alas,

this has never happened (though we continue to hope). In late 2018, members of the swift community within Nature London decided to wait no longer and instead try to make their own modest contribution to the swift cause in an area where information is sorely needed. The plan was to pilot the development of a protocol aimed at gaining insight into nesting success at a sampling of London swift chimneys, mainly using observations made by volunteers on the ground. In early 2019, the separation of Nature London's swift monitoring activities from those of Bird Studies Canada and the creation of the club's own data reporting system facilitated such an undertaking.

Although Nature London has more than 15 years of experience in creating and implementing swift-monitoring programs, most involved dusk-time counts of non-breeding swifts entering large communal roosts. Developing a viable protocol to monitor the affairs of nesting swifts presented a whole new set of challenges. Swifts build nests well out of sight, deep down inside old brick chimneys. In tending their nests, they enter and exit chimneys in ways that can make them difficult to detect. It is not easy to ascertain what is going on inside an active swift nesting chimney!

In early 2019, when the pilot project was being designed, no financial support was in sight. Thus, a means of obtaining and handling the desired information was devised that kept costs affordable for the organizers. Later in the year, the Nature London Board very generously decided to reimburse expenses, which was most appreciated.

APPENDIX B

1. **Daytime Monitoring Field Data Form**

See page 34. This form was used to record data in the field during Nature London's 2019 pilot project to investigate the feasibility of using daytime Chimney Swift monitoring as a means of obtaining information on nesting success.

2. **Screen View of the Online Portal for Data Entry for Daytime Monitoring**

See page 35. This page shows the screen on which volunteers entered daytime monitoring data. The actual screen included drop-down boxes.

NATURE LONDON CHIMNEY SWIFT DAYTIME MONITORING—FIELD NOTES 2019

DAYTIME MONITORING: Pilot project 2019

DATE _____

CHIMNEY/ADDRESS (specify chim if >1) _____

OBSERVER(S) _____

START TIME _____ FINISH TIME _____

START TEMP (°C) _____ WIND SPEED (0-7) _____ PRECIPITATION _____ CLOUD (0-11) _____

MAX NUMBER SEEN IN AIR AT ONCE _____

TOTAL ENTRIES _____ TOTAL EXITS _____ MAX NUMBER INSIDE CHIMNEY AT ONCE _____

TIPS FOR DAYTIME SWIFT MONITORING

Choose a clear day if possible & watch for a minimum of 60 mins (90 mins if cloudy).

- Watch from a safe location; avoid trespassing. View chimney silhouetted against sky.
- Watch any time between 9 am and 60 mins before sunset (but best to avoid heat of midday).
- On chart below, record time & number of swifts for each in or out (entry or exit).
- Determine max number inside chimney at one time (additional details in Manual).

Example: 1 in, 3 in, [so 4 now in], 2 out [so 2 now in], 1 in [so 3 now in] = 4 is max number inside at once.

Time	No of Swifts	In or Out	Comments: e.g., unusual behaviour, predators, etc.

	Wind (Beaufort Scale)
0	Calm, smoke rises vertically
1	Light air, smoke drifts
2	Light breeze, wind felt on face
3	Gentle breeze, small twigs move
4	Moderate breeze, small branches move
5	Fresh breeze, small trees sway
6	Strong breeze, large branches in motion
7	Near gale, whole trees moving

Precipitation
None
Rain
Hail
Trace/Occasional Rain
Thunderstorms

Cloud Cover			
0	Clear	6	60%
1	10%	7	70%
2	20%	8	80%
3	30%	9	90%
4	40%	10	Overcast
5	50%	11	Fog

QUESTIONS OR PROBLEMS?

Contact Winnie at dwake@odyssey.on.ca

SUBMIT DATA ASAP:

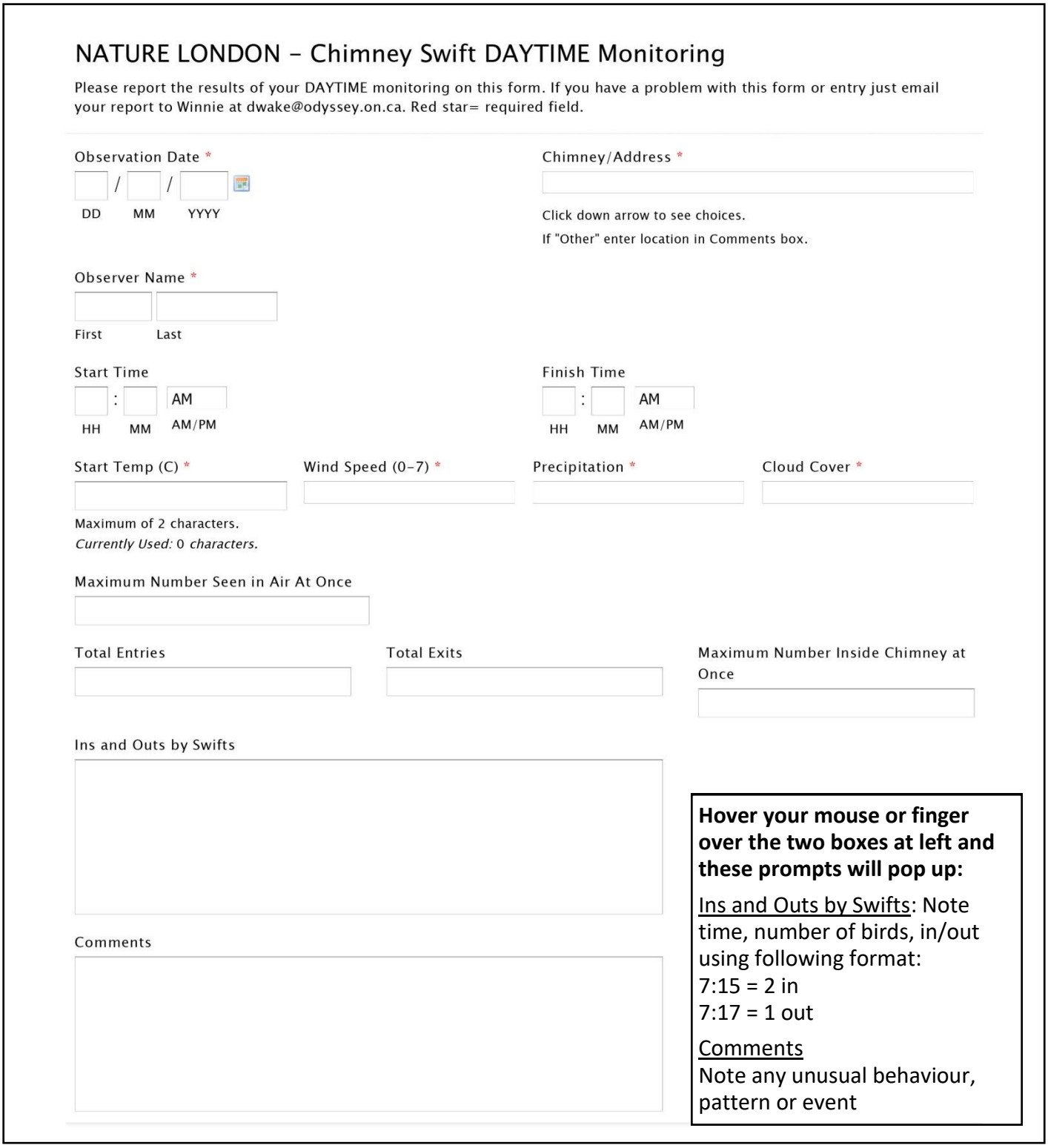
ENTER ONLINE: https://dwbirds19.wufoo.com/forms/zlry23s077fatv/

Daytime monitoring: enter data at **https://dwbirds19.wufoo.com/forms/zlry23s077fatv/**

Box below shows what input screen for daytime monitoring will look like when you click the link.

Enter data using your phone, tablet or computer. When complete, click "submit" at the bottom. Save your field notes (in case something goes wrong). If you have problems, contact Winnie at **dwake@odyssey.on.ca**.

To go to this data input screen, click the following link, or copy and paste it into the "search bar" at the top of your web browser (Internet Explorer, Firefox, Safari): **https://dwbirds19.wufoo.com/forms/zlry23s077fatv/**



NATURE LONDON – Chimney Swift DAYTIME Monitoring

Please report the results of your DAYTIME monitoring on this form. If you have a problem with this form or entry just email your report to Winnie at dwake@odyssey.on.ca. Red star= required field.

Observation Date *
/ /
DD MM YYYY

Chimney/Address *
Click down arrow to see choices.
If "Other" enter location in Comments box.

Observer Name *
First Last

Start Time
: AM
HH MM AM/PM

Finish Time
: AM
HH MM AM/PM

Start Temp (C) *
Maximum of 2 characters.
Currently Used: 0 *characters.*

Wind Speed (0-7) *

Precipitation *

Cloud Cover *

Maximum Number Seen in Air At Once

Total Entries

Total Exits

Maximum Number Inside Chimney at Once

Ins and Outs by Swifts

Comments

Hover your mouse or finger over the two boxes at left and these prompts will pop up:

Ins and Outs by Swifts: Note time, number of birds, in/out using following format:
7:15 = 2 in
7:17 = 1 out

Comments
Note any unusual behaviour, pattern or event

APPENDIX C

Detailed Account of Process of Developing Protocol for Monitoring Nesting Activity and Success

Data from two sources were to be used to attempt to learn more about swift behaviour around nest chimneys and how successful the nests were:

Existing weekly (May 1 to October) **evening monitoring program** at 13 London chimneys

- In early 2019, Nature London separated itself from Bird Studies Canada's Ontario SwiftWatch program, and developed its own evening monitoring protocol, manual, communication system, field data form and data entry portal.
- Under Nature London's new approach, data continued to be collected for 60 minutes beginning one-half hour before sunset, and all BSC-required data fields were included (data later shared with BSC).
- Entries and exits early in the watch were thought to be possibly indicative of the comings and goings of a resident pair of nesting swifts (only one pair of swifts nests in a chimney at one time, though the chimney may also simultaneously host numbers of non-breeding swifts for the night).
- In order to collect information specific to nesting activity, the field data form for evening monitoring was modified. Space was provided for recording details such as relevant behaviours, time and number of swifts involved for all entries and exits at the chimney during the 30 minutes before sunset, or until large numbers of non-breeding swifts began entering for the night or, until the end of the watch if no flock materialized.
- Data entered into the Nature London evening monitoring portal were converted to two forms: spreadsheet and table. This information, along with a text report/assessment, was e-mailed weekly to all participants in the evening-monitoring program (table) and to Bird Studies Canada (spreadsheet) for inclusion in its provincial swift database.
- A reference manual for evening monitoring was developed (50 pages, Apr 29/19). It included the following topics: detailed protocol and guidelines for evening monitoring, summary of daytime monitoring protocol, history of swift monitoring in London, daytime and evening field notes forms, daytime and evening online data input screens, photo catalogue (plus directions and tips) of chimneys targeted for monitoring in 2019, sunset table, typical behaviours of nesting swifts and non-breeding roosting swifts, descriptions of species that might prey on or be confused with swifts, releases of hand-reared swifts.

A new **daytime monitoring program** (weekly May 1 to approx. mid-August):

- In developing a daytime monitoring program, the general approach for data collection used during evening monitoring of communal swift roosts was followed. This saw volunteers on the ground documenting entries and exits at chimneys, as well as making notes on interesting/relevant swift behaviours.
- In early 2019 a number of experienced and potential evening and daytime monitors were consulted regarding the possibility of increasing the length of a monitoring session from one hour to 1.5 hours but the proposal encountered strong disapproval and was dropped. Similarly, the suggestion of carrying out monitoring more frequently than once a week was not well received.
- The initial design of the daytime protocol relied heavily on three resources:
    - The existing evening monitoring protocol used by Nature London in previous years which, even before 2019 modifications were introduced, differed slightly from the official one used by BSC (re how number of swifts inside a chimney for the night was calculated and how long monitors remained on duty after sunset).
    - A publication by Purves *et al*. (2019) out of Bird Studies Canada that indicated that, on a clear day during June and July (but especially late July), a single visit of 60 minutes at some time between 9:00 am and one hour before sunset was usually sufficient to determine occupancy of a chimney by swifts for nesting purposes.
    - A publication by Stewart and Stewart (2013) plus other documents by the Stewarts, especially Barb Stewart (including numerous e-mails) and blogs and other materials from the Manitoba Chimney Swift Initiative (www.mbchimneyswift.ca) that provided invaluable information on practical considerations for daytime monitoring, including swift behaviours that help interpret various stages of the nesting cycle unfolding inside the chimney.

- In the late winter of 2019, Nature London developed a daytime monitoring protocol, manual, communication system, field data form and online data entry portal. These paralleled those used for evening monitoring but were separate and distinct. See **Appendix B** to view field data form and online portal for daytime monitoring.
- In addition to collecting the usual data relating to weather and other housekeeping items, space was provided on the daytime field form for recording information pertinent to nesting activity, such as the time and number of swifts involved for all entries and exits at the chimney, maximum number of swifts inside the chimney at once, and maximum number of swifts seen in the air at once. Monitors were also encouraged to include noteworthy details of relevant swift behaviours.
- Data entered into the Nature London daytime monitoring portal were converted to two forms: spreadsheet and table. These were sent weekly (via e-mail) to all participants in the daytime monitoring program (table) and to Bird Studies Canada (spreadsheet) for inclusion in its provincial swift database.
- In addition, daytime monitors received a weekly report and tentative assessment of what was happening regarding the stage of nesting activity for each of the chimneys in the daytime program. This was also forwarded to Birds Studies Canada.
- The weekly assessment was based on results from daytime monitoring as well as from relevant data from all or portions of evening monitoring sessions. It should be noted, however, that not all daytime-monitored chimneys were also monitored in the evening.
- A reference manual for daytime monitoring was developed (20 pages, May 11/19). It covered the following topics: overview, detailed protocol, sample field notes form and online data input screen, info related to expected swift behaviours around a nesting chimney, photo catalogue giving directions and viewing tips for the 12 chimneys initially targeted for daytime monitoring.

APPENDIX D

Detailed Protocol and Tips for Daytime Chimney Swift Monitoring

(incorporating changes made as season progressed and since then; see daytime manual for original version)

Goal: Learn More about Activities and Nesting Success of London Swifts, e.g.,

- How soon swifts establish themselves in nesting chimneys in the spring.
- How weather might affect swift activity around nesting chimneys in the early spring.
- Times and numbers of swifts involved at all entries and exits at chimneys.
- Maximum number of swifts inside chimneys at once (more than two indicates presence of a helper bird).
- Behaviours associated with various stages of the nesting cycle such as courtship, nest building, incubation, hatching, feeding of brooded young (under one week old), feeding of non-brooded young (more than one week, up to four weeks old), fledging, perfecting flight skills, etc.
- Level of success of local swift nests (if, and how many, young are produced).
- When nest chimneys are abandoned for the season (for both daytime and evening use).

When to Monitor

- At least once weekly, early May to mid-August or until a swift family permanently abandons its nest chimney for the season for daytime use.
- Start no earlier than 9:00 am and end no later than one hour before sunset, any day of the week (i.e., in the long days of spring and early summer, daytime monitoring can be done in the early evening).
- At least one hour per session, but longer is encouraged, if possible.
- During clear weather (>90% clear), stay a minimum of 60 mins.
- If monitoring must be done under cloudy conditions (>10% cloud cover), stay at least 90 mins.
- Especially in spring (May and early June) and if weather has been cool and/or wet, delay starting until morning temperatures have risen above about 13 ^{o}C (15 ^{o}C is even better), to allow insects to become active.
- Especially during hot and/or humid weather, choose a start time that avoids counting during the hottest part of the day (i.e., mid-day and early afternoon).

- If you can visit on extra days, please do so and submit data (ideally there should be no more than four days between monitoring visits, with additional visits at times when key nest-stage transitions are expected).

Where to Monitor

- Observe at assigned chimney (usually a business, office, institution, etc.).
- Priority is given to three of the locations where evening monitoring is carried out (First-St. Andrew's, Smith Fruit, and Phoenix) as these sites will have a richer combined data set due to the evening sessions.
- If it is deemed there will be enough volunteer availability to cover additional sites through the full swift-nesting season (desirable to have same person or team monitor the same chimney each week throughout the season), daytime monitoring will also be undertaken at the clusters of chimneys located in the Dundas/Adelaide/Marshall area and the Maitland/Dundas area (especially Dundas Street Centre Church).
- One-off daytime observations at additional chimneys are also welcome.

Preparing for a Daytime Monitoring Session at a Designated Chimney

Before the first session, review pertinent material in manual, especially

- Daytime monitoring protocol and example of completed data form.
- Info on assigned chimney, i.e., photo, directions, parking advice, recommended place from which to view, and other tips regarding that site.
- Behaviours that swifts might be expected to exhibit at various stages of the nesting cycle.

What to Bring

- Printed daytime field notes forms (one for each chimney being monitored), clipboard, pencil and eraser (or tablet), watch or clock, cellphone (for safety), swift "postcards" (for handing out to interested passersby). [Daytime field notes form is printed in manual and in **Appendix B**.]
- Buddy (for safety, to share observation and data recording duties, to interact with curious passersby, and to help pass the time when there is little or no swift action).
- Lawn chair (though observations can sometimes be done from a parked car and some monitors prefer to stand or lean against a wall or utility pole).
- Seasonal clothing (e.g., jacket, hat), water, insect repellent, sunscreen, binoculars (if using, be discrete, but generally keep them out of sight if concerned their use might upset neighbours).
- Umbrella or lawn chair with canopy (optional; can be useful if no shady viewing location is available).

Getting Set Up

Choosing where to set oneself up for a daytime monitoring session will likely involve some compromises. Check through the following list and decide on the optimal site for the conditions and time of day.

- Try to arrive at least 10 minutes before the planned official start time, especially for the first visit to a site.
- Park in a safe, legal parking space that, if possible, is not too far away from where you will be stationed.
- Observe from a location where the chimney is silhouetted against the sky (not foliage or another building).
- Have as much as possible of the chimney's height visible above the roofline and a clear view to the left and right of the chimney. This improves chances of detecting swifts that might depart from the far side of the chimney rim but then become visible as they veer slightly to the left or right of the chimney while flying away. But avoid being so far away from the chimney as to impair the view of swifts entering or leaving.
- If possible, view from an angle that allows two side surfaces of the chimney rim (not just one) to be seen. Usually this means seeing one side well and the other somewhat less well. Such a viewing angle provides some depth perception and is sometimes helpful in picking up swift departures that just clear the rim and then race off fast and low on the far side of the chimney.
- View from a safe public spot (e.g., parking lot, edge of a sidewalk) or first obtain permission from property owner; avoid trespassing.
- Many monitors prefer a lawn chair; others stand or lean and, if an appropriate parking space is available, viewing from a car is acceptable, but please note

    - A lawn chair is better than a car for detecting approaching swifts, as more of sky can be seen in peripheral vision and any swift chatter can be more readily heard than from within an enclosed or semi-enclosed space in a car.
    - Car is best for safety concerns (open the car windows and sunroof if feasible); park to expedite quick departure.
- Station yourself in a shady spot if available; try to avoid looking in direction of sun.
- If you feel unsafe at any time during the monitoring session, leave immediately.
- If two or more monitors are present, determine in advance who will have primary responsibility for recording data and later submitting them online. Also determine how turns will be taken so at least one person will always have eyes fully on the chimney rim.
- Fill in preliminary data on daytime monitoring form, i.e., date, location, observer(s), weather (use codes at bottom of page), start time.

How to Observe Swifts and Record Data

- If you arrive early, begin monitoring as soon as you are ready.
- During watch, keep eyes on rim of chimney at all times (if two observers, can take turns).
- Keep field notes form and pencil in hand for jotting down observations, avoiding looking down as much as possible and, when necessary, be very, very quick.
- If a second person is present, have one be the recorder (or take turns).
- Be alert that especially during incubation and nestling stages, adults are likely to arrive and depart quickly and silently – dropping directly into the chimney (no advance circling or chattering) and leaving by just clearing the rim (often on the far side) and immediately flying off in a more-or-less horizontal direction.
- On table in field notes form, record times and numbers of all swifts entering or leaving the chimney; use a separate line for each entry or exit event. If an entry is noted, be alert for an exit soon after.
- Briefly note interesting behaviours, such as courtship (V-flights, flying in pairs or threesomes, etc.), vocalizations, presence of a circling flock, approx. height of flock above ground, presence of predators and swift reactions to them, presence of other species perched on the chimney rim that might deter swift entry, where swifts may be foraging (e.g., overhead or in a particular direction), if swifts are flying through dead branches of a tree to break off twigs for nesting material, whether swifts are approaching and/or entering the chimney singly or as a pair, direction of arrival and departure. If additional space is needed, use back of field noted form. But, unless a second person is present to keep eyes on the chimney rim while the other person writes, it's best to wait till the end of the watch before writing down too much detail.
- Record max number of swifts in the air at one time (easier to do if a second observer is present). (Even if few or no swifts are coming and going from the chimney, there may be a number of swifts flying in the area.)
- At end of watch, insert finish time and total number of entries and exits; calculate max number inside chimney at once (by adding and subtracting ins and outs in sequence; see tips on field notes form and in manual page 5).
- After watch, enter data ASAP online via daytime monitoring portal using phone, tablet or computer: https://dwbirds19.wufoo.com/forms/zlry23s077fatv/. [Note: this link is not active in 2020.]
- See manual for instructions and advice on filling out the online form, which is reproduced in **Appendix B.**
- For questions or problems, contact Winnie Wake (dwake@odyssey.on.ca).
- Daytime monitoring is a pilot project in London in 2019, so please provide lots of feedback on your experiences. This may help us improve approaches to monitoring nesting swifts and increase the likelihood of determining nesting success.

APPENDIX E

Chimneys Included in the Daytime Monitoring Program

Considerations for Selecting Chimneys for the Pilot Program of Daytime Nest-chimney Monitoring

- Preferably only chimneys known to have been occupied by swifts during the nesting season prior to 2019.
- Chimneys in relatively close proximity to one or more other known nest chimneys, to optimize volunteer time (and reduce boredom) by observing more than one chimney at once.
- In addition to nest-only chimneys, a few chimneys known in past years to have simultaneously harboured both a nest and a communal roost of non-breeders.
- Availability of one or more volunteers willing to commit to doing daytime monitoring at a particular location for the whole of the nesting season.

The Selection Process

- Initially, Labatt's (183 Simcoe St) was selected as one of the nest-plus-roost sites but, when no evidence of nesting swifts had been observed at the Labatt's chimney by the third week of May, it was replaced by Phoenix (where daytime activity had been detected).
- At First-St. Andrew's Church, five chimneys were used by nesting swifts in both 2018 and 2019; one (FSA-NW) was not visible from the same location as the other four, so was not included in daytime monitoring.
- At Lilley's Corner (southeast of Adelaide and Dundas, north of Marshall), a cluster of five chimneys in close proximity had been occupied by swifts in 2018. In the middle of this grouping was a sixth chimney for which there was no record of prior swift occupancy but which appeared suitable. Of the five chimneys active in 2018, only four could be directly viewed at one time from a single location. Therefore four of the five chimneys plus the "appears-suitable" one were formally monitored. On July 1, construction at the viewing site forced monitors to move to a new viewing location, from which one of the four monitored "active-in-2018" chimneys could no longer be directly seen, and formal monitoring was discontinued there. At this time, the fifth "active-in-2018" chimney became visible to monitors and it was monitored for the remainder of the season. Unfortunately, from the new viewing location, the chimneys on the 613-619 Dundas building (especially 613-N) could be seen less well. (Neither the chimney that was dropped nor the one that was added had any swift activity in 2019; during the time that each was just out of sight from the monitors' viewing location, it was clear that no swifts were coming and going from either of these two shafts. The "appears suitable" chimney could be seen well the entire season but had no signs of any swift use in 2019.)
- Based on knowledge from previous years, Dundas Street Centre United Church harboured two known swift chimneys. During May, one was found to be occupied by swifts only at night and was dropped from further formal daytime monitoring (though informal monitoring continued, as this shaft could be seen at the same time as another monitored church chimney being used by swifts). Daytime monitoring was ongoing at the second (active) church chimney. In early June, a chimney on the building immediately to the north of the church was discovered to have swifts in residence, so it was added to the daytime monitoring list.
- By the first week of June, after a few substitutions, the list had more or less settled at 14 chimneys including the "appears-suitable one" that was not occupied in 2018.
- Additional info also came in irregularly from a few other active chimneys.
- The regularly monitored chimneys consisted of two "isolated" chimneys (known to be used for both nesting and communal roosts) and three clusters. Each cluster consisted of two or more nest chimneys in close proximity. In one cluster, chimneys were all on one building; in a second cluster, chimneys were on two buildings; and in the third cluster chimneys were on three different buildings.
- At the three locations where clusters of chimneys were monitored simultaneously (usually by two monitors working together), monitors often had difficulty in keeping track of the names/designations to be applied to each of the shafts for data-reporting purposes. In all three locations, one building had multiple active swift chimneys plus sometimes additional inactive chimneys. In one case, a building that had eight chimneys (some used by swifts, some not) had multiple street addresses. Confusion was most pronounced at Lilley's Corner and to a lesser extent at First-St. Andrew's Church.

List of 14 (+1) Monitored Chimneys

Asterisk indicates chimney was one of 14 formally monitored and includes 619-SW Dundas, the only chimney on the initial roster that did not have a history of swift use in a previous year; it was not active in 2019.
Italics indicate a chimney (613-S Dundas) monitored only after Jul 1/19, though earlier peripheral watching showed it to be inactive in 2019; it had been active in 2018.

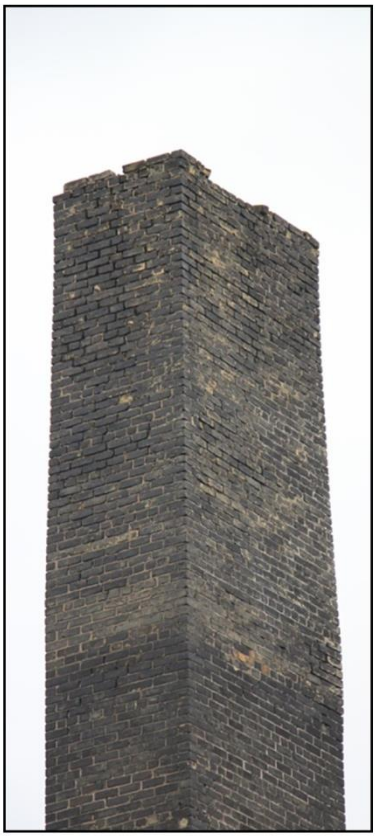
- Single nest/roost chimneys
  - **Smith Fruit*, 22 Maitland** (east side, south end of street, at Thames River)
  - **Phoenix*, 300 Wellington** (east side, just north of Horton)
- Cluster of chimneys at **First-St. Andrew's United Church, 350 Queens** (NE corner of Waterloo)
  - **FSA-SE*** (round slim chimney located near SE corner of sanctuary part of building)
  - **FSA-NE*** (round slim chimney located near NE corner of sanctuary part of building)
  - **FSA-N*** (large square two-tiled chimney located near N driveway at junction of sanctuary and office building)
  - **FSA-S*** (rectangular three-flued chimney on office building overlooking S driveway, behind cross motif)
- Cluster of chimneys at **Lilley's Corner** (S side of Dundas, just E of Adelaide, N of Marshall)
  - **Baker's Dozen / Arts Incubator Building**, 611 to 619 Dundas (S side, E of Adelaide)
    - **613-N Dundas*** (S flue open, N flue has metal mushroom-shaped topknot, active in 2018)
    - ***613-S Dundas*** *(two open flues, no top-of-chimney superstructure visible from ground, active in 2018); monitored from Jul 1/19 on, but peripheral viewing indicated chimney not active before that*
    - **619-SW Dundas*** (one flue has protruding tile topped by wire mesh, second flue is open, appears suitable, not active 2018)
    - **619-NW Dundas*** (chimney topped by two tapered concrete chimney pots, active in 2018); monitored until Jun 25/19 and irregularly after but no activity in 2019
  - **Flat-roofed warehouse, 623 Dundas*** (tall slim chimney with protruding tile at S end of warehouse in centre of block to S of Root Cellar Restaurant, active in 2018)
  - **Old Crown Livery Stable, 620 Marshall*** (chimney with protruding tile at N end of building, active in 2018)
- Cluster of chimneys at **Dundas and Maitland** (NE corner; one [NE slim] of two church chimneys active in previous years failed to host a nest by early June 2019; an active swift chimney on the building immediately to the north was added in early June)
  - **Dundas Street Centre United Church, 482 Dundas** (NE corner of Maitland)
    - **DSCUC-NE large square*** monitored during Jun and Jul
    - **DSCUC-NE small slim*** monitored sporadically, but inactive
  - **Thames Valley Midwives office in old house, 434 Maitland*,** S chimney, monitored Jun and Jul

APPENDIX F

Photographs of Monitored Chimneys

The following pages contain photos and other relevant information regarding the chimneys monitored during the 2019 daytime monitoring program.

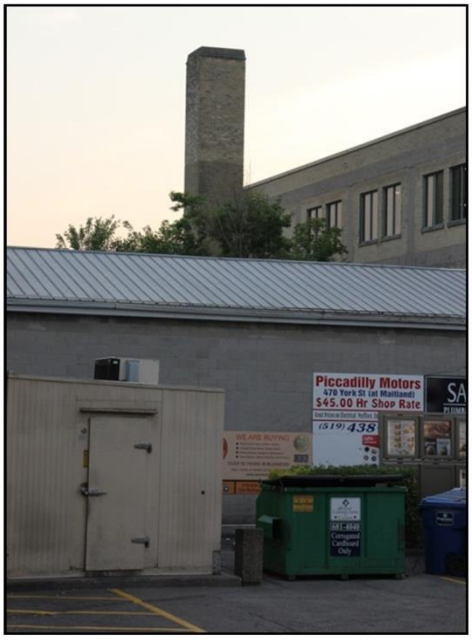
Smith Fruit, 22 Maitland St



The Smith Fruit building is 100 years old or more. Left: Years ago, the upper portion of the chimney was taken down and its bricks dropped inside the chimney shaft (they are visible via the cleanout door in the basement). Subsequently, the upper part of the chimney was partially rebuilt (bricks in the older, lower portion appear more darkly coloured). Today the top edge of the chimney is deteriorating. Over the years, including in 2019, the owner has indicated the company plans to take the chimney down "someday". When swift monitors have the opportunity, they encourage the owner to retain the chimney for continued use by swifts. In addition to its annual use as a communal roost for migrating swifts (especially in the fall but sometimes also in the spring and summer), this chimney has consistently harboured a pair of nesting swifts. (photo by WW, Mar 10/19)

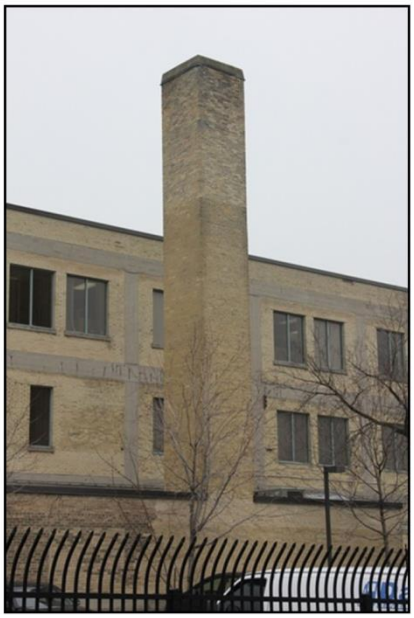
Left: Preferred viewing location for evening monitoring. (photo by DW, Aug 9/16) Above: Preferred viewing location for daytime monitoring. (photo by WW, Mar 27/19) Monitors look north/northeast.

Phoenix Building, 300 Wellington St

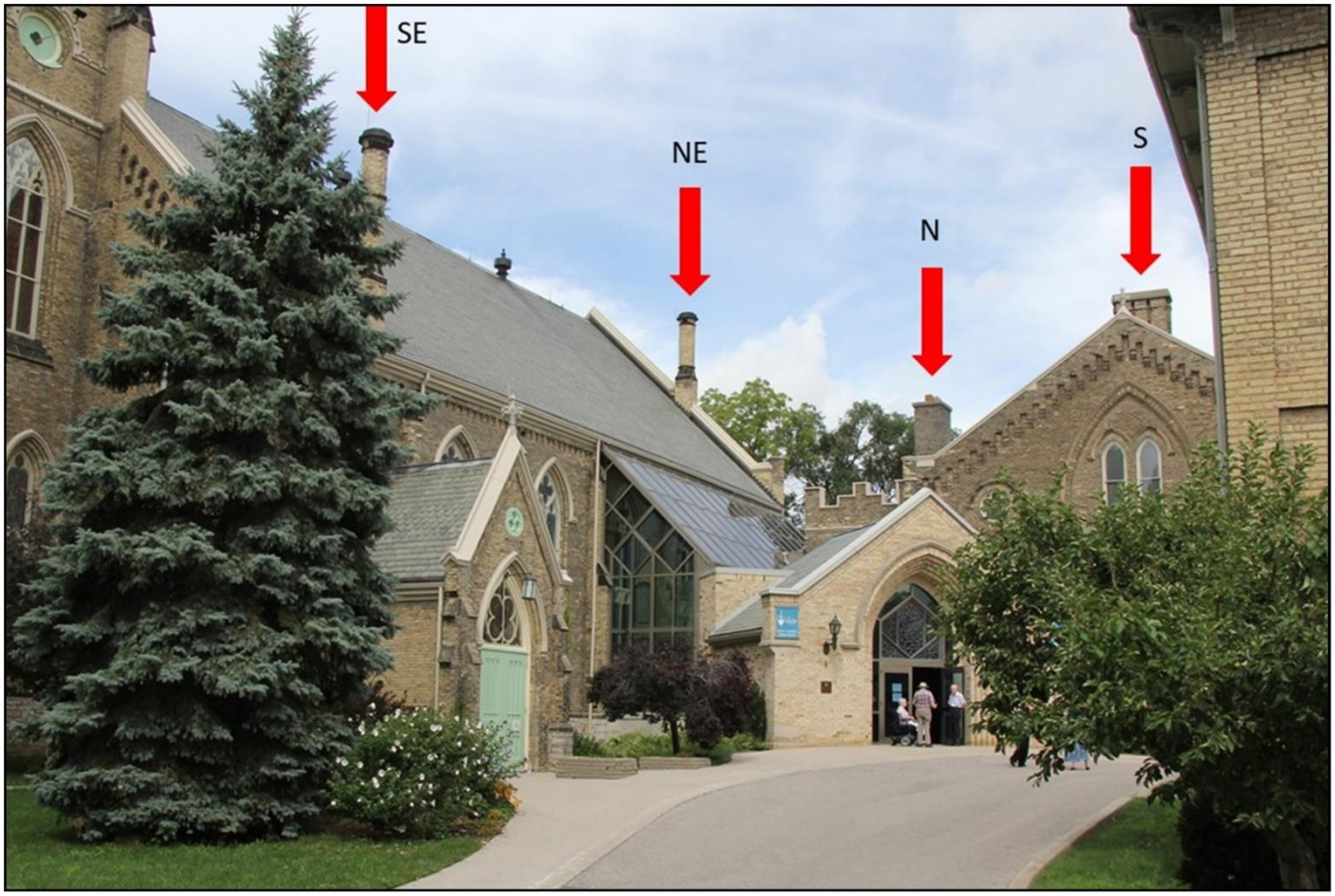


Above: Preferred viewing location for the Phoenix chimney (both daytime and evening) at the rear of the Tim Horton's parking lot. This allows the chimney to be viewed against the northwest sky from the safety of a parked car. (photo by WW, Jun 17/18)

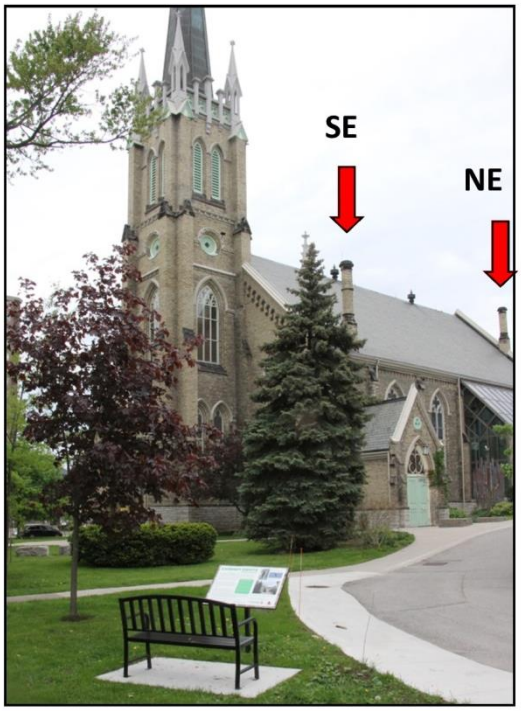
The Phoenix building was built in the late 1940s, after the end of World War II. The chimney is located immediately to the south but separate from the main structure. At some point in the past the upper portion of the chimney was rebuilt (note differing colours of brick in the photos). The rim of the rebuilt chimney is topped by a crown that protects the bricks below from adverse effects due to exposure to the elements. Below left: A view of the chimney from the east shows that it is connected to the main building near its base. Below right: A view from the south/southwest across the fence of a car rental operation. (photos by WW, Dec 13/15)

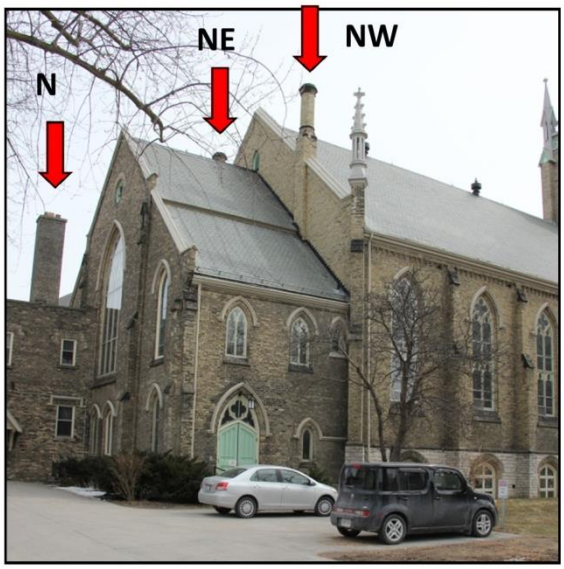


First-St. Andrew's United Church, 350 Queens Ave



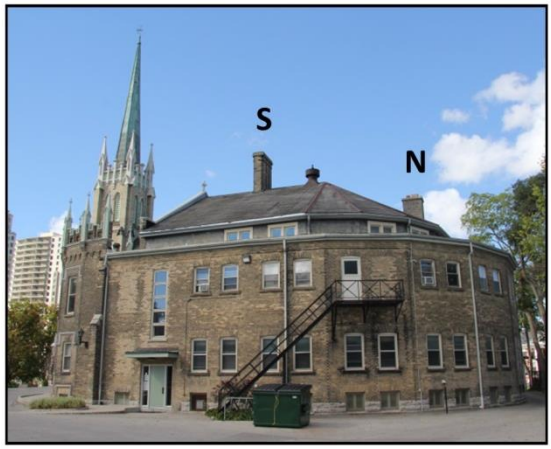
Five chimneys at First-St. Andrew's United Church are used by swifts during the nesting season. In some years the big N chimney serves as a communal roost during spring or fall migration. Other chimneys sometimes harbour very small migratory roosts for brief periods. Four chimneys (SE, NE, N and S) can be seen from beneath the crab apple tree and along the west side of the old manse (right side of above photo, Aug 14/16 by DW). A viewing bench (lower left photo, May 26/19 by DW) allows three chimneys (NE, N and S) to be viewed at once. At all these locations, viewing is generally towards the north or northwest. Because individual chimneys are best seen from slightly different spots, when sufficient monitors are present, they often watch from different locations (for both evening and daytime monitoring). A fifth chimney, FSA-NW (lower right photo, taken from the northwest, Mar 21/18 by WW) is identical to FSA-SE and FSA-NE. FSA-NW was not regularly monitored in 2019, but swifts using this chimney formed part of the social group often observed overhead during monitoring sessions. For more info and photos of FSA chimneys, see next page.



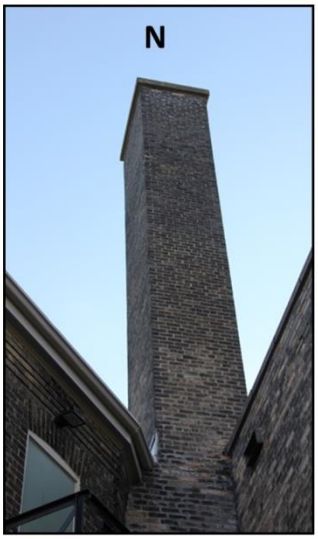


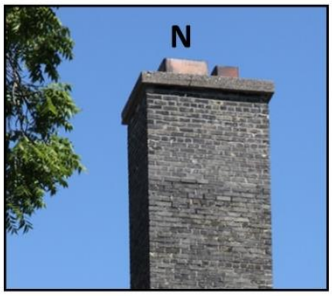
The original St. Andrew's Presbyterian Church was built in 1868. Three identical chimneys (NW, SE and NE) date from that time. The NE chimney, viewed from the southeast is pictured at left (Dec 11/15 by WW). Basement cleanouts for the NW and SE chimneys could not be located. The two photos at right (Oct 10/19 by DW) show the contents of the cleanout for the NE chimney.

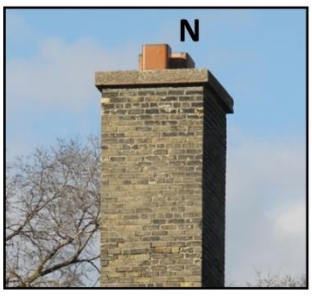
In 1905, a large Christian education building was constructed immediately to the east of the church, which, in the photo at right (Sep 15/12 by DW), hides the entire church, except for the steeple. The S chimney is located in this part of the church complex and ends in a currently unused fireplace in the basement. Photos below right show the exterior of the fireplace and an upward view towards the closed damper inside the fireplace chimney (Oct 10/19 by DW). The photo at left shows the S chimney from the northeast. (Dec 11/15 by WW). Especially during evening monitoring, FSA-S and FSA-N are often viewed from the general location shown on the previous page, which allows both chimneys to be silhouetted against the north/northwest sky. In the daytime, optimal viewing for both chimneys is to be had from the large parking lot to the east of the Christian education annex. Unfortunately this area offers little shade to protect monitors from the heat of the blazing daytime sun.



The large N chimney (two "tile" openings on top) was built about 1938 during construction that joined the church proper with the Christian education building to the east. The N chimney, which vents an oil furnace, is the only chimney currently in use. Three bottom photos, left to right, show the N chimney from the north/northeast (Dec 11/15 by WW), from the west (Aug 18/15 by WW), and from the south (Dec 11/15 by WW). Swifts usually enter via the larger of the two openings. Some deterioration of upper bricks is visible, as is evidence of past repair work. Two photos on the right (Oct 10/19 by DW) show the basement cleanout door (lower) and the view inside (upper). A short horizontal shaft runs from the door to a large-diameter, vertical chimney shaft. It is believed the chimney contains just one shaft.





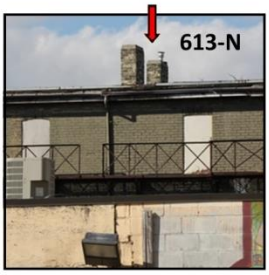


620 Marshall St (old Crown Livery Stable), 613 (2 chimneys) and 619 (2 chimneys) Dundas St (Baker's Dozen Arts Incubator / old Chapman's Bakery) and 623 Dundas St (behind Root Cellar Restaurant).

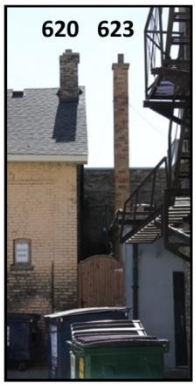
The old livery stable at 620 Marshall opened in 1886, and nearby buildings and their chimneys likely date from the same general time period (1870s or 1880s). See photo at right (Jun 3/19 by WW). A viewing location behind a graphic design business at 629 Dundas allowed six chimneys to be seen, although no more than five could be monitored at one time (photo below, Jun 11/19 by WW).

As the monitoring season progressed, swift activity was found only at 620 Marshall, 613-N and 623 Dundas (though 613-S and 619-NW had also been active in 2018). Starting on July 1, due to construction of a high board fence behind 629 Dundas, the viewing location was moved to the parking lot behind the St Regis Tavern at 625 Dundas. Though closer to the chimneys, the new location provided a much poorer view of the active chimney at 613-N Dundas (the one with the metal topknot). See photos at right and left, taken on Dec 30/19 by WW. By this date, renovations were underway on the roofs of 611 to 619 and 623 Dundas, the chimney at 623 Dundas had been removed and the chimney at 620 Marshall was in need of major repairs.

The photo below (Oct 14/18 by WW) shows an alternative viewing location for the chimney at 613-N Dundas. Unfortunately the chimney at 620 Marshall cannot be seen from this location.

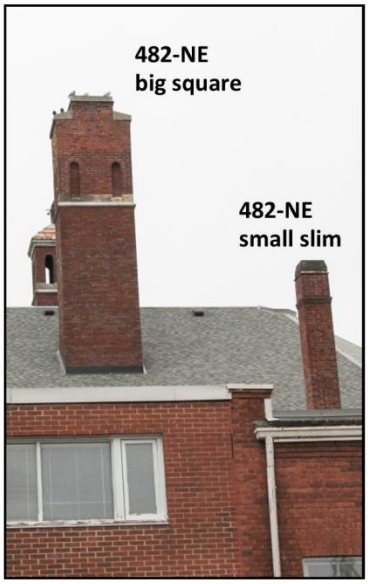


The photos below (Jun 3/19 left and Dec 30/19 right by WW) show 620 Marshall and 623 Dundas before and after the 623 Dundas chimney was taken down.



Left : store fronts of 611 to 623 Dundas, including Baker's Dozen and Root Cellar Restaurant. Left: old livery stable at 620 Marshall St (both photos taken Oct 14/18 by WW).

Dundas Street Centre United Church, 482 Dundas St



Dundas Street Centre United Church was built in 1895. It has at least five chimneys. Two are known to be capped (C). In 2019, swift occupancy was detected in two other chimneys though, in one case, activity at the chimney was very limited. The two photos above show the church from the east. For evening monitoring (not regularly carried out in 2019), viewing is best from the parking lot next door to the east (in foreground of photo above left), from a location to the left of the photo, so that, as much as possible, the chimneys are silhouetted against the northwest sky. The photo at right was taken from a viewing location in the church parking lot to the north/ northeast of the building, which is the preferred spot for daytime monitoring. (all photos Nov 10/19 by WW)

Thames Valley Midwives, 434 Maitland St

The old house occupied by the Thames Valley Midwives and other offices is located immediately to the north of Dundas Street Centre Church (left photo below, taken Oct 11/19 by WW). The chimney used by swifts is on the south side of the house overlooking the church parking lot. Daytime monitoring is usually carried out from the church parking lot or the sidewalk along Maitland St. A view of the chimney (right) taken from the church parking lot, looking to the northwest, shows some deterioration of the brick-work in the flared decorative upper portion of the chimney (photo taken Jun 9/19 by Joe Stephenson).

APPENDIX G

Additional Information Related to the Implementation of a Daytime Protocol

When the daytime monitoring protocol was ready, the reference manual well in hand, the field data forms prepared, the online data entry portal up and running and a tentative list of targeted chimneys identified, it was time to enlist participants. At the Apr 27/19 swift monitors' orientation session, primarily aimed at evening monitoring, volunteers were recruited to participate in the pilot daytime monitoring program.

Over the next few weeks, after people clarified schedules and plans, eight core volunteers committed to monitor an assigned chimney(s) at least weekly until early August (or whenever a particular nesting attempt ended for the season). A few additional people served as substitutes or did spot checks at various chimneys. Most of the daytime monitors also participated in evening monitoring at different locations.

In general, daytime monitors were assigned in work in pairs. This improved safety, helped alleviate boredom, reduced the chances of drowsiness developing on a warm day, and made it less likely that a swift could sneak in or out of a chimney undetected. Some monitors preferred to work alone or to find their own partners.

The need to find a monitoring time that worked for two people sometimes made it more difficult to fit in a monitoring session during the small windows of opportunity when weather was good in May and early June.

It was considered beneficial for a monitor to become very familiar with the same assigned chimney(s), getting to know the habits and idiosyncrasies of swifts using that chimney. Daytime monitors were therefore not rotated among sites on a weekly basis, as is the case for evening swift monitoring in London. If, however, a monitor was planning to be away on holidays, efforts were made to find someone to substitute.

During May and early June, some chimneys that were expected to host nesting swifts proved to be inactive while other, unexpected chimneys were discovered to be occupied. This resulted in some adjustments to the original list of chimneys to be monitored in the daytime and the reassignment of some monitors.

Prolonged stretches of cold, wet weather during May and early June sometimes made it difficult to find a time when weather was suitable for monitoring. Thus, during this time period, some chimneys went for considerably longer than desirable between monitoring sessions.

Just because weather seemed appropriate, it did not always follow that monitors would detect significant swift activity at chimneys during their shifts. It may be that previous days of poor weather had suppressed the insect supply and reduced opportunities for swifts to adequately nourish themselves. The few nice days may have served as a time for insect activity to gradually increase and for hungry swifts to focus on feeding rather than nest-related chores.

The list of 14 core chimneys included two that were considered likely to host overnight roosts of non-breeders during the nesting season (both did). These two chimneys were not close to any other monitored chimneys. The other 12 chimneys were located in three clusters of four, three and five chimneys in close proximity. The clustered chimneys allowed two monitors assigned to one cluster to simultaneously monitor more than one chimney.

As the season progressed, it was found that refinements to the protocol were needed on an ongoing basis. For example, frequent inclement weather necessitated more flexibility in the timing of monitoring sessions. In order to fit sessions in around people's busy lives, the directive to try to monitor during clear weather was usually overlooked. Also, over time, as it became increasingly clear that an hour was often insufficient to detect swift activity at a chimney, monitors were encouraged to spend much longer during a monitoring session and to visit more than once a week, if possible.

Appendix H

Indicators of and Tips for Determining Stage of Nesting Cycle

Much of the information that follows comes courtesy of Barb Stewart of Manitoba, Canada's pioneer and expert on interpreting swift nesting stages through observations by ground-based observers. This information is supplemented by observations of swifts in London.

Overview

The following material is intended for the reference of an observer on the ground. Tips and indicators are provided to help interpret the various stages of the nesting cycle. These include nest-building, egg-laying, incubation, feeding of brooded young, feeding of non-brooded young, and fledging.

Given the ultimate goal of determining whether a nest has successfully fledged young, or at what stage the nesting attempt failed, it is important to know the timing of the transition from one stage to the next. For example, if the date of the transition from egg-laying to incubation can be identified, then the approximate date of hatching (18 to 21 days later) can be anticipated and extra effort made to carry out additional monitoring around that time. Similarly, if the date of hatching can be established, then it is known that 28 to 30 days are needed before fledging takes place, and extra time can be planned for watching the chimney then. In actual fact, key dates in the nesting cycle are often difficult to pinpoint. Hindsight can often be very useful in establishing such dates after the fact.

Despite the general information provided on what swift behaviours to expect at different stages of the nesting cycle, many variations can occur. Here are some considerations:

- When adult swifts are feeding young inside the chimney, their first foraging efforts of the day are usually to feed themselves. After their own nutritional needs have been met, they switch to bringing food to the nestlings. Generally after 9:00 am and especially mid-to-late morning is a good time to observe activity at nest chimneys (especially food deliveries).
- The location from which a chimney is observed can influence interpretations and conclusions; being able to see two sides of the chimney at once is better than one.
- Nesting swifts departing from a chimney usually just barely clear the rim and then fly away in a more-or-less direct horizontal line (first often slightly dropping height). If the departing swift heads off on the side of the rim opposite the observer, the departure can easily be missed altogether.
- Individual swifts often have particular patterns of behaviour: e.g., some always approach from specific directions or angles; some may have short turnarounds inside the chimney while others take longer inside.
- Intense heat (increasing as the day progresses) can lower insect abundance and influence how long it takes a swift to accumulate a load of food to take back to the nest.
- Heavy air pollution (e.g., smog or smoke from a forest fire) may reduce the frequency of visits to a nest site for the purposes of incubation exchange or food delivery.
- Easy foraging (e.g., the discovery of a dense patch of insects) may mean more frequent food deliveries and/or that more time is available to spend at the chimney.
- Weather factors, such as intense rain or extremely high winds can influence swift behaviour. Aerial insects may get blown away or washed downward from the sky, limiting foraging by adult swifts (they will readily feed during rain showers but don't like to venture into electrical storms with high winds).
- Sheets of rain washing down the inside of a chimney can loosen a nest from the wall and send it and its contents crashing to the bottom of the shaft. If a nest containing eggs or small youngsters is lost, the nesting attempt will fail. If the youngsters are older (a minimum of two weeks, but older is better), they may be able to cling to the chimney wall where the parents will continue to feed them until they fledge. The older they are at the time the nest is lost, the better their chances of survival.
- If a nest containing eggs or small nestlings is dislodged from the wall, the nesting attempt will fail. The pattern of daytime parental comings and goings will likely decline or the shaft may be abandoned altogether. Watch for indications of the construction of a new nest.
- At all stages of the nesting cycle, adult swifts must feed themselves in addition to carrying out their breeding activities.
    - Some swifts may have experienced arduous overwintering and migration conditions and need time in the spring to build up fitness levels before commencing nesting activities.

    - A cold wet spring may delay insect production. Reduced food availability means swifts need to spend longer foraging to meet their own nutritional requirements, and may result in a delay in initiating nesting activities. Later in the season, heavy rains may wash insects from the sky, depleting insects for a few days (or longer) and increasing the time needed for foraging.
    - When incubation begins, with one member of a pair sitting tight on eggs at all times, each parent now has only half as many daylight hours for finding food for itself.
    - When eggs hatch, for the first week, young must be brooded at all times. The off-duty bird must find enough food for itself plus the youngsters.
    - When young are a week old, they can be left alone in the nest. This allows both parents to spend daylight hours foraging for themselves as well as their offspring. More food needs to be captured as the young get larger.
- Factors related to food availability, weather, fitness and the changing energetic requirements of parents and young are intertwined. These influence the behaviours exhibited at chimneys and may make expected behaviours and their timing less predictable. Individual swifts may also have their own idiosyncrasies, such as differing skill levels for capturing insects.
- An observation period of two hours or more is much superior for interpreting nesting stages compared to a watch of just one hour. If, on a particular visit, however, little or no action is observed or what is seen is ambiguous, it is important to be flexible in adjusting monitoring plans as appropriate to include sooner and more frequent viewing sessions, perhaps at different times of the day, under different weather conditions and/or of different durations.

Courtship, Mating, Establishment of Pairs

(from arrival in early May to mid-June, but may be much less, depending on weather, when individuals occupy a particular nest chimney, their fitness level on arrival, availability of insect food in early spring, etc.)

- Only one mated pair/nest will be present in a chimney at a time; if other swifts occupy the chimney simultaneously, they will be non-breeding birds using the chimney as an overnight communal roost.
- When a swift has once nested in a chimney, it is highly likely to return to that chimney to nest the following year, but this does not necessarily mean that the two members of last year's pair will return on the same day.
- When the first swifts arrive in the spring, courtship is already underway.
- Courtship can be observed at any time of the day that swifts are active.
- V-display: two swifts fly around close together, often circling rapidly, one swift close behind the other (but sometimes almost beside); then one or both raises its wings in a shallow V and the two swifts glide together momentarily. V-displays may also be done by a single swift; if so, there are usually other swifts in the general area.
- Rapid chases with two or three or more swifts in close proximity careening or zigzagging around the sky while rapidly vocalizing.
- Mating: two bodies very briefly come together in mid-air; the swift following closely behind briefly mounts the one ahead (but most mating occurs inside the nest chimney).
- Courtship (e.g., V-flights, wild chases, etc.) is most often seen prior to the beginning of incubation, after which it tapers off, but such behaviour (e.g., V-flights) may be observed at any time of the swift season, including late summer.
- If several chimneys in close proximity are occupied by nesting swifts, it may not be possible to match courtship and mating behaviours with the occupants of a particular chimney.
- Early in the season, to confirm the establishment of a pair for nesting purposes, it is necessary to detect two swifts inside the chimney at one time. This can be observed during the daytime or when swifts are entering the chimney to spend the night.

Early Season Social Activities and Foraging

- Several swift pairs often nest in chimneys in the same general area (one pair per chimney).
- Such neighbourhood clusters allow for much social interaction.

- Early in the season, swifts often spend considerable time above the general area of a neighbourhood of nest chimneys, coming and going foraging and socializing – chasing, courting, circling, chattering, racing about in pairs or threesomes or larger combinations.
- Social groupings are constantly changing in size as pairs and other lesser-sized groupings come together or split apart and drift in and out of the area.

Investigating Nest-site Suitability and Settling In
(duration of this stage may vary depending on weather and amount of time swifts need to spend foraging to meet their nutritional needs, especially in the days and weeks after their arrival)

- Mostly takes place early in the season.
- Swifts may be chattering or silent as they approach the chimney before entry.
- Swifts may not necessarily circle first, but just drop directly into the chimney.
- Swifts may visit chimneys in the daytime and/or overnight before deciding to stay to nest.
- Chimney exits seen early in the season around dusk may involve swifts claiming a territory but could also be by swifts visiting more than one chimney to sort out where they prefer to roost for the night.
- Observing one or two swifts investigating a chimney does not always result in a breeding pair settling in.
- Occupancy of a chimney by nesting swifts is often first noticed when one or two swifts are observed entering and/or exiting the chimney during the hour bracketing sunset (or, during the 30 mins before sunset if a communal roost of non-breeders is also present in the chimney).
- After nighttime occupancy is first detected, sometimes a number of days or even weeks will pass before entries and exits are seen during the day; this is especially the case during a prolonged period of cold wet weather when swifts are giving priority to foraging to meet their nutritional needs during the day rather than to nest establishment.
- Numerous entries and exits by a single swift or a pair, with varying amounts of time spent inside the chimney and between visits, suggest strong interest in the chimney.
- An observation of two swifts inside one chimney at the same time indicates that a breeding pair may be settling in (can be in the daytime or when retiring for the night).
- Two adults using a chimney during the daytime, especially a pair entering and leaving together, strongly indicate a nest site is being established, confirmed when two swifts spend the night inside.
- Three consecutive days of use/occupancy by a pair of swifts is a very strong indicator the chimney has been adopted as a nest site.
- Daytime visits, not just evening/overnight visits, on three consecutive days are needed to fully confirm occupancy for nesting purposes.
- Whether during the daytime or evening, a careful tracking of entries and exits can be used to determine max number of swifts inside the chimney at once. This may provide information on when a swift first occupies the chimney, when the mate arrives and when (or if) a helper bird becomes part of the unit.
- Often a pair socializes together in the air, flying close to each other, sometimes with V-displays, rapid vocalizations, and perhaps flying broad circles in their territory around the chimney. If other swifts are nesting nearby, there may be additional swifts present and engaged in such behaviours (sometimes groups of three, four, five or more may be flying close together while wildly chattering).
- Sometimes, newly arrived pairs appear in an area as late as mid-June and move into a previously unoccupied chimney. It is not known if these are late-arriving migrants or if they are relocating local swifts.

Nest-building
(usually about one to two weeks)

- Nest building is carried out for at least seven days before the first egg is laid. Nest-building continues until the eggs hatch.
- Classic nest building behaviour: pair socializing together in air, flying close to each other, sometimes with V-displays, vocalizing, perhaps flying broad circles in their territory around the chimney. Sometimes pair enters together; sometimes both swifts approach and one enters while other peels off.

- After insects have become active in the morning, swifts leave the chimney to forage, then return later to focus on breeding chores. Late morning (say 10:00 am to noon) is a good time to observe nest-building activity.
- On very hot days, the heat causes insects to move high into the sky and, by early afternoon, the frequency of activity by swifts at nest chimneys declines (say, from about 2:00 to 5:00 pm).
- Some swifts commence nest building within a few days of arrival while others may delay for weeks.
- During very cold wet springs, some swifts may delay the onset of nest-building and/or egg-laying to focus on their own energy requirements. They may be run down after a long migratory journey and need to replenish their reserves. They may need to build up condition to be fit enough to lay eggs and/or to carry themselves through the incubation and nestling period when they will have many fewer hours per day in which to forage for their own needs.
- Another possible angle behind delaying nest-building is that it is important that eggs do not hatch until there are sufficient flying insects in the air to feed both of the parents and the young. A changing climate may be causing timing of peak insect abundance to be less well matched to swift needs at various stages of the nesting cycle.
- A quick, direct entry into the chimney from a high angle indicates a confident bird that is experienced using that chimney.
- Exits can be harder to detect, as the departing swift may just clear the rim and head off in a more-or-less horizontal direction away from the observer. Especially for a high and/or wide chimney, such departures can be difficult to see. Always be alert for a swift that becomes visible to the left or right of the chimney heading away from it.
- After a swift (or the pair) enters the chimney it (they) may remain inside for a few minutes, or quite a bit longer, before exiting. One or both may re-enter a few minutes later, or may not for some time. Exits can be by one swift at a time or the two swifts together.
- Frequency of visits to the chimney can vary greatly during nest-building; there can be up to a dozen entries (and exits) per hour, or there may be none detected in an hour.
- Swifts may be observed flying through fine dead branches of nearby trees. Though the twigs they snap off with their feet are usually too small to see (binoculars are helpful), the swifts will be carrying these in their bills into the chimney for use in nest construction.
- Swift nests are usually placed well down inside a chimney (as much as 6 m from the top), often below the level of the roof. About 200 to 300 tiny twigs are glued by saliva to each other and to a flat side of the interior chimney wall. Each nest is about 6 cm by 10 cm and about 3 cm high.
- Nest-building continues until incubation starts and, even after that, more twigs may occasionally be added right up until the time the eggs hatch. (During incubation, each member of the pair has only half as many hours per day for foraging to meet its own needs, so less time is available to devote to nest-building than before incubation commenced.)
- Though most nest-building behaviour is observed earlier in the spring (say late May and early June), sometimes a pair arrives late (say, mid-to-late June) or a nest is lost (perhaps washed out during a torrential downpour). If the loss happens early enough in the season, the swifts may make a second nesting attempt, perhaps as late as early July.
    - An observation of two swifts approaching a chimney together, then either both entering at once or one entering and the other peeling off, may indicate a late nest is under construction.
    - Observations of a swift flying through dead branches of a nearby tree would confirm a late nesting attempt is underway.
    - Though limited data are available, late nests may have a reduced chance of success; there are reports of such parents sometimes abandoning their half-grown youngsters as the summer wanes.

Egg-laying

(takes seven to nine days, but may be shorter or longer depending on clutch size)

- Swifts produce about four or five eggs on average (range: two to seven eggs). Each egg is pure white, about 1.3 cm by 2 cm and weighs about 1.85 g.

- Twig collecting and nest-building continue during egg-laying (watch for a swift flying through the dead branches of a tree, snapping off fine twigs and then flying to the chimney).
- Egg-laying is often characterized by very long intervals of time spent inside the chimney (i.e., the time between an entry and an exit). Whether a single bird or a pair enters, it is often 30 or 40 minutes before there is an exit from the chimney.
- During the egg-laying stage, there may be long stretches (more than an hour) when there are no swifts inside the chimney. At other times, one or two swifts may be inside.
- When outside the chimney, the pair may be flying independently or together.
- Eggs are laid every second day until the clutch is complete.
- Incubation usually starts after the second-last egg is laid.
- It can be very difficult to detect the transition from egg-laying to incubation. Watch for signs of change in the frequency of entries and exits.
    - During egg-laying there is a much longer time gap between entries and exits than for incubation, when an exit usually occurs within a minute or two after an entry.
    - Spring arrival dates at a chimney (if known) may offer clues as to when incubation is likely to commence.
    - Cessation of twig-collection may be a clue that incubation has begun (though twigs are sometimes added to the nest during the incubation period).

Incubation
(lasts up to three weeks, usually 18 to 21 days, but can be as short as 16 days)

- It is difficult to determine the precise onset of incubation, as development of embryos can commence and progress without an adult sitting on the eggs full time. Often an after-the-fact rear-view mirror analysis may be needed.
- During the incubation stage, one adult will be inside the chimney incubating the eggs (sitting on them to keep them warm) while the off-duty parent is away feeding. Periodically, the parents will exchange duties.
- During incubation, it is generally very quiet in the area of the nest chimney, with little swift presence and usually much reduced chasing and chattering.
- Swifts may be entirely absent from the airspace for extended periods (no swifts audible or visible overhead), sometimes for more than an hour at a time.
- But, where several active nesting chimneys are located in close proximity, they may not all be at the same stage of the nesting cycle at the same time. Thus, if swifts continue to be actively chasing and chattering in an area, it can be difficult to detect reduced swift presence related to one particular chimney, though there may be fewer swifts in the overhead chasing/chattering group than previously. To pick up on such a change (i.e., that incubation may have started in at least one of the chimneys), it can be helpful to keep track of the usual and maximum numbers of swifts "normally" overhead prior to that time.
- During incubation, entries and exits are characteristically less frequent and more secretive than during nest building.
- On average, during incubation, there is one visit (an entry quickly followed by an exit) per hour.
- Sometimes considerably more than one hour may lapse between entry/exit events at an active nest chimney. Sometimes the absence of activity at the chimney may run to two hours or more (possibly due to intense heat and humidity or perhaps a shortage of airborne insects).
- A one-hour monitoring session is therefore often too short to detect incubation exchanges. In such situations, the length of a monitoring visit can influence the interpretation of the nesting stage. For example, during incubation, if an entry/exit exchange occurs in the middle of a one-hour watch, the length of the interval between two such exchanges would not be known. An exchange that took place just before or after the monitoring session would not be detected at all. The longer the session, the greater the amount of information that can be picked up to help figure out the stage of the nesting cycle.
- A classic incubation exchange involves one entry (usually silent, direct and fast), followed by an exit within 30 seconds to 2 minutes (silent, fast, swift flies directly away from area). This represents a parent returning from feeding to take over incubation duties, while its mate goes off to feed.

- An incubation exchange involves a much shorter interval of time (2 mins or less) spent inside the chimney than is typical of visits to the chimney during egg-laying.
- Partner exchanges of incubating swifts may be best observed during earlier daytime hours (but after 9:00 am).
- During incubation, entries will usually be by single birds (no advance circling or chattering) when coming in to relieve a mate of incubation duties.
- Swifts may make fewer entries and exits in the heat of mid-day.
- Even when incubation is underway, both adults like to feed and drink before roosting for the night. This means that, in the evening, the eggs are sometimes left unattended, usually for short periods, but sometimes for as long as half an hour or more.
- During incubation, heavy rains have the potential to wash out nests.
- Twig collecting and nest-building often continue until the eggs hatch. After that, the adults are too busy gathering food to have time to bring in more twigs to add to the nest.

Helper Birds

- Though relatively uncommon, sometimes extra swifts become associated with a nest chimney, either temporarily or longer term. Such helper birds can appear at any time during the nesting cycle, and assist the parents with various tasks.
- The most important contribution made by helper birds is likely in helping to bring food to the youngsters. Feeding of young usually begins in the latter part of June and continues into August, depending on how early the eggs hatch in a particular nest (it takes from 28 to 30 days from hatching to fledging).
- It is thought helper birds are most likely to show up after about mid-June; these may be late-arriving migrants or local swifts, possibly birds whose own nesting attempts have experienced early failure.
- Helper birds may arrive as single birds or two together.
- The presence of helper birds is usually detected by carefully tracking entries and exits at a chimney to determine the maximum number inside at once. During the daytime, three or more swifts inside a chimney at one time indicate a helper(s) is present.
- Having helper birds on site at a chimney can make it much more difficult to figure out the stage of the nesting cycle based on the frequency and timing of entries and exits.

Hatching

- Newly hatched young are blind and naked and have large feet that function like grappling hooks to help secure them in the nest.
- Each hatchling is the size of a jellybean and weighs about as much as three paperclips.
- Because the last egg is laid after incubation starts for the rest, that egg may require more time to hatch; thus eggs may hatch over a period of a day or two.
- Swifts like to stay connected with their social group and often repeatedly fly low over a neighbouring chimney to look down and see things of interest, especially key nesting cycle transitions such as hatching.
- Repeated approaches low to the chimney rim before flying off, often with head movements indicating the bird is looking down inside the chimney, are referred to as "peer 'n' veer" flyovers.
- Many dips at a chimney by one swift or groups of swifts passing low overhead, possibly pausing ever so briefly above the opening to peer down for a view, may indicate hatching is occurring or that there are newly hatched babies in the nest.
- There is very little information available on when nests first hatch in London – one known date was Jun 28/18. Probably the last week of June marks the onset of hatching in London, but this will vary with the return dates of adults and the start date of nesting for individual nests.
- When the transition from incubation to hatching occurs, there should be a subtle shift in behaviour at a nest site: the frequency of visits to the chimney will double from one entry/exit event per hour on average for incubation, to two entry/exit events per hour on average for newly hatched young.
- During hatching, sometimes the returning swift will remain in the nest much longer than the usual turnaround time of two minutes or less (perhaps staying 30 minutes or more).
- Hatching day marks the first day of feeding.

Brooded Young
(lasts approx. one week, from hatching to age six or seven days)

- Brooding is the warming of young birds in a nest by a parent sitting on them (i.e., brooded young).
- Feeding of brooded young begins with hatching and continues approx. six or seven days. Young are fed insects mixed with the parents' saliva.
- As soon as hatching takes place, parents entering the nest chimney will be carrying food. This is indicated by bulging throats (not visible to the naked eye but might be detected through binoculars, though swifts are usually moving too fast for this to be seen).
- During approximately their first week after hatching, young swifts have too few feathers to thermo-regulate, so one parent is always inside the chimney brooding the nestlings.
- On average, there are two entry/exit events per hour (twice as frequently as for incubation).
- One parent brings food and distributes it to nestlings, while the other leaves immediately to find more food.
- While young are being brooded, there is a very short time between an entry and an exit (less than two mins).

Non-brooded Young
(lasts about three weeks, from age six or seven days to age 28 to 30 days)

- When swift nestlings are sufficiently feathered to regulate their own temperature they no longer need to be constantly brooded by a parent.
- After they are about one week old, young are left unattended in the chimney while both parents forage for food.
- Neighbours may fly low over the chimney and peer down (peer 'n' veer) to note the transition from brooded young to non-brooded (unattended) young.
- Wing feathers begin to unfurl at about 10 days. Eyes open at about two weeks.
- On average there are three or four entry/exit events per hour (but may be much higher).
- As the young get older and their nutritional requirements increase, feeding rates may be expected to increase.
- Time between entry and exit varies but is longer for feeding non-brooded young than brooded young.
- Frequency and sequencing of entries and exits can be variable and confusing, especially when helper birds are present.
- Frequency of entries (food deliveries) may be greatly influenced by availability of food – infrequent if flying insects are scarce, more often if parents find a good concentration of insects (up to six or seven times per hour).
- Time spent inside the chimney (i.e., turnaround time) is longer during the non-brooded-young stage because the same swift enters and leaves and needs time to deliver the food while inside. The adult may spend 5 minutes or even more inside while distributing food to the nestlings.
- The length of time between visits is shorter for non-brooded young than during the stage when young are brooded because there are now two adults bringing home food.
- At any stage of the nesting cycle, swifts may visit their chimney less frequently if the weather if unduly hot or wet or dry. Such conditions may result in a scarcity of insects; if this happens, there can be worrisomely long intervals between visits to the chimney.
- Carefully tracking the sequence and timing of entries and exits helps determine how many adults are inside the chimney at once (none, one, two, or possibly three if there is a helper on site). Spells during which no adults at all are inside for various lengths of time identify that young are no longer being brooded.
- As more adults in a neighbourhood reach the stage of having non-brooded young (i.e., both parents out of the chimney at the same time), the social interactions among them increase. Groups of perhaps four or five or more swifts may be visible foraging and chattering. Some pairs may fly close together and do V-displays. Occasionally, between feeding bouts, there may be peer 'n' veer flyovers to check out young ones inside the various neighbouring chimneys.

- As juveniles approach 20 to 21 days of age, they transfer out of the nest and cling to the rough interior wall of the chimney. They flap their wings hard and exercise their flight muscles. Then they undertake practice flights up and down inside the shaft.
- Once swifts are "on the wall", heavy rain may dislodge the empty nest, but will not harm the youngsters.

Indications of Nest Failure
(at any stage of the nesting cycle)

- Watch for indications of possible nest failure but don't jump to conclusions too quickly. Key indicators are abandonment (no entries or exits), or significant decline in frequency of visits to the chimney, or much reduced swift activity in area of chimney.
- A nest containing eggs or nestlings can be dislodged by heavy rain from the interior chimney wall, causing nest failure. After such events, watch for diminished swift presence at the nest chimney. As youngsters approach the age of three weeks, they are less prone to such loss, as they may have already left the nest to spend the next week or two clinging to the brick wall. There their parents will continue to feed them and they have more space to strengthen wing muscles by hard flapping and taking short practice flights up and down inside the chimney.
- If parents are unable to deliver enough food to sustain their youngsters, frequency of visits to the chimney may taper off. For example, if there have been unduly long stretches of heat and drought or of heavy rain, insects may become limiting. This may be reflected by increasingly long intervals between feeding visits.
- Although little documented, other causes of nest failure may possibly include raccoons or squirrels raiding a nest chimney, the killing of an adult swift by a raptor, stress effects from raptors or other species hanging out near the chimney or using the top of the chimney or a spot close by as a perching place.
- After a nest has failed, parents may return to spend substantial periods inside the chimney, but the timing and duration of spells inside do not fit the pattern of expected feeding visits for the suspected nest stage.
- If the nesting attempt is unsuccessful, some parents may discontinue daytime visits, but continue to spend nights in the chimney until neighbouring swifts have completed their nesting efforts and departed.
- Other swift parents that have experienced nest failure may abandon their chimneys (both during the day and overnight) soon after and spend nights at a communal roost.
- Some adults that have experienced nest failure may move on to become helpers at a neighbouring nest. By doing so, they increase the feeding rate and improve the chances of successful fledging at the other nest.
- After a nest failure (indicated by it being too early for young to have fledged), watch for a sudden increase in the number of swifts at a nearby chimney (two swifts, then up to three or four).
- If weather is unduly hot or humid or wet, swifts may drastically reduce the frequency of feedings; be careful not to misinterpret this as nest failure/abandonment.
- Nest failure can be confused with successful fledging so it's important to know whether the period of feeding lasted four weeks (28 to 30 days from hatching to leaving the chimney) or for a somewhat shorter period.
- Keep in mind that any abnormal condition (e.g., excessively hot or wet weather) may cause swifts to visit their nests much less frequently at any stage of the nesting cycle.
- As long as entries and exits are happening during the daytime, nesting activity is likely still ongoing.
- Even if regular feeding visits have been observed for three or more weeks after hatching, it is still possible for the nest to fail. As youngsters grow, they need increasing amounts of food and, if food availability happens to be dropping off during that last crucial week or two, the parents simply may not be able to deliver enough for the youngsters to survive.

First Week (or so) of Flight

- The most frequent number of young swifts in a family is four or five.
- At age 28 to 30 days, juveniles take their first flights outside the chimney as fledglings.
- Young in the same family may not all leave the chimney for their first flight at the same time or even on the same day. One nestling is usually a day or two younger than the rest (because incubation starts after the second last egg is laid).
- As fledging day approaches, watch for changes in activity patterns at nesting sites:

    - Adults may cut back a bit on the frequency of food deliveries as a means of encouraging young to come outside and try foraging for themselves.
    - There may be an increase in activity by adults around the top of the chimney.
    - Adults may begin to try to lure the juveniles up to the top of the chimney and entice them to follow them outside:
        - There may be a sudden increase of low flyovers, with stalls above the rim.
        - There may be an increase in quick entry/exit activity, as adults repeatedly barely fly into the chimney, immediately turn around just inside the rim, and then head back out again.
    - Since young will be weak fliers for the first few days
        - Significant, prolonged wind activity may delay fledging.
        - Juveniles may be buffeted and blown around by strong winds.
- Swifts don't hover about the fledglings like helicopter parents.
    - In the first couple of days post-fledging, it is common to see an adult leading the kids around showing them the neighbourhood routes.
    - Later in their first post-fledging week, youngsters increasingly get to explore independently.
- After juveniles first leave the chimney, activity patterns become very unpredictable.
    - Look for an increase in activity by groups of swifts flying around the area.
    - There may be fledging day "parades", or unescorted forays by youngsters.
    - After its first flight, a juvenile may take a recovery day to rest inside the chimney.
- An increased head count at a chimney may indicate fledging has taken place. Especially, watch for extra birds going into a chimney at dusk.
    - But, the absence of increased head counts at a site does not necessarily mean fledging has not happened!
- Just because youngsters are seen emerging from a chimney doesn't always mean they fledged from it.
    - Fledglings sometimes practice entries and exits at chimneys other than the one in which their nest was located; similarly they may choose to enter a different chimney to take a rest.
    - The family group (or fledglings alone) sometimes moves to a different chimney.
    - To conclude that fledging occurred from a particular nest, documentation of activity at that chimney needs to show a consistent record of appropriate behaviours occurring at appropriate times over the precious weeks.
        - These must indicate that successive nest stages and transitions were successfully achieved in the chimney.
- For the first few days after emerging from the chimney, the young are likely to be noticeably poorer fliers than the adults.
    - There are usually adults around to coach and give encouragement.
    - Technique will gradually improve, and the differences in abilities between adults and young will become less noticeable as the days go by.
    - One fledgling, the youngest of the brood, may be a day or two behind its siblings in gaining proficiency.
- As fledglings develop their skills, watch for the following:
    - Youngsters may not be flying as fast as the adults, but their wings will be beating faster.
    - Young are not as proficient at steering, so tend to fly in straight lines and stay on one horizontal plane for longer. Their tail feathers may be fanned out.
    - Turns tend to be very broad (compared to ones executed by adults).
    - Young may be flying low by times till they become proficient at gaining height.
    - Young swifts practice diving into the chimney.
        - An adult might go first, flying low towards the rim, then demonstrate an entry, which the youngster following will try to emulate. But youngsters often practise diving into a chimney without an adult nearby.
        - Making multiple attempts to enter a chimney is very typical of an inexperienced bird. Developing skill in entering the chimney can involve a number of approaches, tentative or almost entries and repeated last-minute swerving away.

        - Botched or failed entries and repeated clumsy attempts to enter a chimney indicate recently fledged young. There may be several circles and low sweeps, followed by a halting entry. Or a juvenile may spend many minutes making wide circles and low sweeps above a chimney and then leave without entering. Sometimes two juveniles will engage in such circling behaviour together.
        - In contrast, an entry by an adult is usually quick and direct. The adult may appear out of nowhere and dive in like a bullet. Or it may swoop low over a chimney, hover momentarily to align itself, then drop in.
        - Individual fledglings may have a characteristic entry style, such as always approaching or leaving the chimney from a particular direction.
        - Sometimes a youngster may tumble down the outside of the chimney for a bit if it misses the opening.
- Fledglings must put in many hours of practice in order to develop flight proficiency.
    - They begin with simple straight-ahead flying, with no major changes in speed, direction, altitude etc.
    - As they improve, they move on to more complicated feats.
    - Fledglings must learn to navigate their neighbourhood, find and safely enter a chimney, cope with wind, and learn how to forage independently.
- Very occasionally young swifts may be observed clinging to the outside of a chimney; this is most likely if the youngster has grown tired and needs a rest but is not able to successfully execute a dive into the chimney (adults swifts will likely remain nearby to protect the youngster from predation or being harassed by other species).
- Once fledging takes place, daytime use of the chimney declines markedly over the next week (sometimes up to 10 days), as the youngsters gain flight proficiency and become independent feeders.
    - How quickly use of the home chimney diminishes can vary greatly among sites. At one chimney youngsters may be going in and out of the chimney often during the daytime for over a week, while at another they may have stopped visiting the natal chimney within two days of fledging.
    - During the first few days (or sometimes longer), in between daytime outings to hone flying skills, the family may return to the home chimney (or another close by) to allow the fledglings to rest and be fed. Or, maybe only the fledglings return to the chimney.
- Nighttime roosting by the family group at the home chimney continues until pre-migratory groups come together in August.
    - But, sometimes parents and young move to a different chimney for a few days, both for daytime and overnight use, and then later move back to the original chimney.
    - In the evening, fledglings often practise repeated quick entries and exits, with a short duration inside the chimney (touch ‘n’ go entries/exits). They may continue to be busy with such activity at a different chimney from the one where their parents have earlier gone in to roost for the night.
    - Sometimes fledglings decide to relocate to an unoccupied chimney to spend the night.
- Adult swifts moult during the breeding period.
    - Missing wing feathers may first become evident in the time period when they are feeding young inside the home chimney, with gaps indicating where feathers have been lost.
        - A careful look through binoculars will often reveal notches or discontinuities in the trailing wing margins. This will be most readily seen during low flyovers.
    - Uneven trailing wing edges are a good way to distinguish adults from young, as fledglings do not moult and have clean, intact-looking wing margins.

<u>Quick Tips for Distinguishing a Recent Fledgling from an Adult Swift</u>
(especially during first week after leaving chimney)

- The flight characteristics of new fledglings are very different from those of experienced adult fliers. Juveniles fly much less strongly, though proficiency develops in a matter of days. The biggest gains are made in the first two days, though improvements continue for about a week or 10 days.
    - Youngsters have slow air speed despite lots of wing flapping.
    - They make big broad turns and do no fancy acrobatics.

    - Flying is usually in a straight line and all on one plane.
    - Tentative, slow approaches to a chimney are made before dropping in close to the rim.
    - Recent fledglings enter a chimney feet-first or may seem to flop or float in (adults experienced with a chimney usually fly in directly with no hesitation, sometimes diving in head-first).
    - Sometimes repeated approaches are made before an actual entry is attempted or made.
    - Sometimes fledglings miss the opening altogether and tumble down the outside face of the chimney.
- The most reliable way to tell fledglings apart from adults is by the wings (watch for birds that are flying low; binoculars are useful).
    - Fledglings have intact trailing wing margins (i.e., smooth edges), though these are not always easily seen.
    - Adults have jagged wing edges or even a gap in the wing due to missing feathers, again not always easily seen.
    - While the most noticeable differences in the flying skills of adults and fledglings diminish in about two days to a week, differences in the appearance of the wing edges remain for a longer time.

<u>Pre-migratory Behaviour</u>
(starting a week or more after young first emerge from nest chimney)

- Initially juveniles may still be actively engaged in flight training in the neighbourhood of the nest chimney.
- A couple of weeks after fledging there may be signs of pre-migratory movements.
- Daytime aerial swift presence in the area of nest chimneys may be much reduced or absent.
- As summer wanes, swifts often forage too high to be seen or heard by observers on the ground, descending only as dusk approaches.
- Swifts may be seen actively feeding or flocking with other aerial insectivores such as swallows.
- Seven to 10 days after fledging the young may have left the nest chimney area altogether.
- Several family groups may roost together in a neighbourhood chimney for a few days or a few weeks, before moving on to a larger roost of migrating swifts.

APPENDIX I

Data (both Daytime and Evening) Collected at Each Monitored Chimney

The following pages contain compilations of the data collected at each of 12 chimneys monitored during the 2019 daytime monitoring program. Chimneys at which no swift presence was detected are not included. At the six chimneys where regular evening monitoring was also carried out, evening data are presented immediately following daytime data.

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precip-itation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-14	14:37:00	16:05:00	88	15	3	None	7	2	0	0	0	none	Sky mostly clear by end of watch, temp 17°C. 3:17 = 2 swifts briefly flew over area, bit of chatter. 3:30 = 2 swifts briefly flew over chimney, bit of chatter. No other swifts seen or heard
2019-05-23	15:59:00	17:00:00	61	26	6	None	3	10	0	0	0	No swifts seen entering or exiting chimney.	Groups of 1-10 swifts seen and heard intermittently from 4:08 until 4:55 flying and circling in area, some coming close to chimney. At 4:50 pm, a group of 8-10 with 2 couples flying closely. About a minute later, a group of 5 observed, with 1 couple flying in tandem. Uncertain if this group of 5 was part of group seen a minute or so earlier. A grackle was seen to land on the chimney top a couple of times during the observation period, perching there for a few minutes each time.
2019-05-31	16:40:00	17:40:00	60	24	4	None	0	7	7	7	2	4:41=2 in, 4:42=2 out, 4:55=2 in, 5:03=2 out, 5:05=2 in, 5:15=2 out, 5:29=1 in, 5:34=1 out	
2019-06-08	11:35:00	12:37:00	62	23	4	None	3	6	11	12	5	11:37 = 1 in, 11:47 = 2 in, 11:49 = 2 in, 11:51 = 1 out, 11:53 = 1 out, 11:54 = 2 out??, 12:08 = 1 out??, 12:14 = 1 in, 12:20 = 1 out, 12:21 = 2 in, 12:21 = 1 out, 12:22 = 2 in, 12:23 = 2 out, 12:24 = 1 in, 12:24 = 1 out, 12:26 = 1 out, 12:28 = 1 out	Not sure that the 12:08 exit actually occurred--it could have been a swift that had flown up behind the chimney that I hadn't noticed coming or it could have been a swift that had exited on the other side of the chimney from the side that I was facing. I think it may have been the former as it appearered a bit smaller than all the other swifts I saw exiting the chimney, suggesting that it came from farther away.
2019-06-14	15:25:00	16:30:00	65	20	5	None	9	8	5	5-7	4	?1 out = 3:27?, 1 in = 3:47, 1 in = 3:50, 2 in = 3:55, 1 out = 3:56, 1 out = 4:02, 1 or 2 out = 4:11, 1 out = 4:12, 1 in = 4:24, 1 out = 4:26	Uncertain of first exit at 3:27 if this was a flyby low around the chimney or an actual exit. Also uncertain if 1 or 2 came out at 4:11 -- seemed as if one came out and then another but only saw the second one fly up and away; might have been helpful to be using binoculars. Lots of flying around and by the area in groups of 1-8 with chittering. Sometimes 2 or 3 or 4 flying close together, once all 8 flying in a group.
2019-06-22	10:11:00	11:09:00	58	18	3	None	1	5	4	4	2	10:30 = 1 out, 10:36 = 1 in, 10:37 = 1 out, 10:45 = 1 in, 10:49 = 1 in, 10:50 = 1 out, 10:59 = 1 in, 11:08 = 1 out	Groups of 1-5 swifts seen flying in area with much less chittering than usual. Group of 4 swifts seen at one point, with 3 flying closely together. Ins and outs were quick and fairly direct.
2019-06-28	10:15:00	11:45:00	90	27	1	None	1	6	5	1	4	10:31=2 in together, 10:41= 1 in & 1 flew off, 10:44=1 out; 10:59=1 in fr flock of 6; 11:18=1 in	During watch, much swift presence often in a loose flock flying high, lots of chatter & many dips at chimney usually by groups of several swifts together.
2019-07-06	17:05:00	18:05:00	60	28	4	None	3	5	8	4-6	4	5:09 = ?1 out, 5:11 = 2 in, 5:15 = 1 out, 5:20 = 1 in, 5:20 = 1 out, 5:50 = 1 out, 5:53 = ?1 out, 6:00 = 1 in, 6:01 = 1 out	The two question marks for exits were birds that I didn't see pop out of the chimney--they either exited on the other side or they were birds that my peripheral vision didn't pick up flying in towards the chimney. Groups of 1-5 swifts flying intermittently in area. Some chittering but much less than on previous observation visits. The swifts that entered or exited did not do any chittering on approach.
2019-07-14	11:02:00	12:05:00	63	20	3	None	0	6	6	6	3	11:03 = 1 in, 11:11 = 2 in, 11:17 = 1 out, 11:18 = 1 out, 11:30 = 1 out, 11:43 = 1 in, 11:48 = 1 in, 11:50 = 1 in, 11:52 = 2 out, 11:58= 1 out	Groups of 1-6 seen flying overhead frequently. Quite a bit of peer and veer behaviour noted with one group of 5 doing this together over the chimney at 11:33. The entrance at 11:43 involved a pair that appeared to peer and veer and then come around again with one of the pair going in and the other hovering for a bit to peer after the entrance before veering off, circling, then flying away. Some chittering, again not by any of the entering or exiting swifts.
2019-07-19	10:47:00	11:47:00	60	28	6	None	9	5	0	2	2	11:03 = 1 out, 11:38 = 1 out	Groups from 1-5 swifts seen flying overhead with occasional chittering.
2019-07-20	09:21:00	10:21:00	60	23	0	None	9	2	1	0	1	9:23 = 1 in	1-2 flying swifts seen 2-3 times and no chittering. Quieter in general.
2019-07-26	17:20:00	18:30:00	70	27	5	None	0	3	3	4	2	5:38 = 1 in, 5:40 = 1 out, 5:42 = 1 out, 6:11 = 1 in, 6:24 = 1 in, 6:27 = 1 out, 6:29 = 1 out	All entries and exits very sudden. Swifts seen flying singly. The one group of 3 was spread out. Almost no chittering.
2019-08-03	09:00:00	11:00:00	120	20	3	None	2	4	0	0	0	No entries or exits or dips.	Hazy. 9:00-9:50= 4 times, 1 to 4 swifts silently & briefly flew low or high over chimney & building; 9:50-11:00= occas brief chatter heard; 5 times, 1 to 3 swifts flew briefly over area, mostly silent & high but once low over chim.

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:50:00	20:58:00	20:26:00	15	2	None	8	20:28:00	20:44:00	11	8.28 - 1 in, 8.33 - 1 in, 8.35 - 10+1 in, 8.37 - 1 + 1 in, 8.39 - 1+1+1 out, 8.43 - 2 out, 8.44 - 1 in	
2019-05-08	19:54:00	21:05:00	20:34:00	12	5	None	9	20:13:00	20:14:00	3	8:13=1 in, 8:14=2 in	7 total swifts, 3 in. Quiet entries from the side.
2019-05-16	20:12:00	21:10:00	20:42:00	18	4	None	5	20:40:00	20:57:00	22	8:40 1 in, 8:42 2 in, 8:48 2 in, 8:55 8 in, 8:56 1 out, 8:57 10 in	9 swifts flying about on arrival, 3 in constant formation - courtship behavior? 8:45 more chimney swifts came from somewhere.
2019-05-22	20:06:00	21:18:00	20:48:00	17	1	None	2	20:27:00	21:07:00	8	No outs	Sparrow sat on the side of the chimney intermittently during middle 1/2 hr.
2019-05-26	20:15:00	21:20:00	20:52:00	18.5	3	None	0	20:34:00	21:05:00	4	8.34 = 1 in, 8.41 =1 out, 8.59 = 1 in, 9.04= 2 in, 9.05 =1 in	Maximum of 6 seen and heard overhead
2019-05-27	20:22:00	21:22:00	20:52:00	17.5	3	None	0	20:34:00	21:05:00	4	8:34=1 in, 8:42=1 out, 8:59=1 in, 9:04=2 in, 9:05=1 in	Moderate urban noise (hum of distant traffic, sirens) Saw up to 10 birds at once, but many flew north before sunset.
2019-05-30	20:15:00	21:26:00	20:56:00	18	1	None	5	20:44:00	21:11:00	104	8:23=1 out; 8:25=1 out; 8:44=1 in; 8:56=2 in; 9:03=3 in+10 in; 9:04=10 in; 9:05=9 in; 9:06=42 in; 9:07=13 in; 9:08=10 in; 9:09=1 in; 9:11=2 in+1 in.	We observed swifts flying overhead from 8:17 onwards. We heard chittering and observed some courtship behaviour. Before 9:00 the maximum number observed flying overhead at once was 13. We also saw and heard barn swallows.
2019-06-03	20:25:00	21:31:00	20:59:00	14	3	None	0	20:40:00	21:18:00	78	8.40 - 1 in, 8.45 - 1 in, 8.59 - 5 in, 9.03 - 1 out, 9.04 - 3 in, 9.07 - 2 in, 9.15 - 53 in, 9.16 - 2 in, 9.18 - 12 in	first sighting at 8.33, a group of 7; 8.42 another 5; 8.44 additional 8; 9.01 - 5. The largest group at any one time was at 9.15 when 53 entered the chimney.
2019-06-12	20:30:00	21:30:00	21:04:00	20	1	None	2	20:31:00	21:25:00	41	8:31= 1 in, 8:35=1 out, 8:42=1 in, 8:48= 1out, 8:50= 2 out, 8:58= 1 in, 9:02= 1 in, 1 out, 9:04=2 out, 9:06 1 in, 9:10=1 in, 9:11= 1 in, 1 out, 9:13= 4 in, 9:15= 5 in, 9:16= 13 in, 9:17= 3 in, 9:18= 4 in, 9:19=1 in, 9:20 1 in, 9:24= 1 in, 9:25= 2 in	9 aloft @ 8:42
2019-06-19	20:30:00	21:30:00	21:07:00	24	2	None	9	20:35:00	21:19:00	17	8:35=1 in, 8:35=1 out, 9:02=2 in, 9:10=4 in, 9:11=2 in, 9:14=1 in, 9:15=1 in, 9:15=1 out, 9:16=1 in, 9:17=5 in, 9:19=2 in	6 swifts aloft on arrival
2019-06-26	20:11:00	21:40:00	21:08:00	27	1	None	1	20:15:00	21:39:00	27	8:15=1+1 in; 8:22=1 in; 8:24=1 out, 1 in, 1+1 out; 8:35=1 in, 1 out; 8:37=1 in; 8:42=1 in; 8:52=2 in; 8:54=1 out; 8:55=1+1 in; 8:57=1 out; 9:03=3 in; 9:04=1 out; 9:05=1+1 out; 9:06=1 out; 9:16=1 in; 9:22=1 in; 9:23=1+1 in; 9:24=1+1+4+1 in; 9:25=1+1 in; 9:26=1 in; 9:28=1+1+2+1+1 in; 9:30=1 in; 9:32=1+1 in; 9:39=1 out, 1 in	Throughout almost entire watch there was almost continuous swift presence in the area, with much chatter (often rapid), chasing, flying in tight formation by 2, 3, 4 or more swifts, a few V-displays, occasional body contact in the air, frequent low flyovers and dips at chimney. Max seen at once = 11.
2019-07-03	20:40:00	21:50:00	21:08:00	28	0	None	2	21:19:00	21:27:00	20	9:19 - 2+2, 9:29 - 1 in, 9:21 - 1 in, +1, 9:24 - 1 in. 9:25 - 8 in,+2; 9:27 2+2=20 in total.	Late arrivals. Mostly single ins.
2019-07-10	20:25:00	21:35:00	21:05:00	23	0	None	7	20:30:00	21:19:00	63	8:30=1 in, 8:33=1 in, 8:45=1 in, 8:46=1 out 9:09=4 in, 9:11=1 out	
2019-07-17	20:03:00	21:35:00	21:01:00	26	4	None	1	20:50:00	21:24:00	50	8:50 1 in, 8:51 1 out, 8:58 1 in, 8:59 1 in, 9:06 1 in, 9:07 1 in, 9:08 4 in, 9:09 2 in, 9:10 1 in, 9:11 2 in, 9:12 2 in, 9:13 3 in, 9:15 10 in, 9:16 7 in, 9:17 2 in, 9:18 8 in, 9:19 1 in, 9:20 2 in, 9:21 1 in, 9:24 1 in	Maximum number in sky:~20 swifts.
2019-07-24	19:57:00	21:30:00	20:55:00	26	5	None	1	20:47:00	21:17:00	74	8:47=1; 8:50=1; 8:59=1; 9:00=1; 9:01=1; 9:01=1; 9:02=1; 9:02=4; 9:03=3+3+3; 9:05=5; 9:06=17+1; 9:07=9+2+3+1; 9:08=1+1+1+1; 9:10=1 out; 9:10=3+3+1; 9:11=4; 9:14=1; 9:17=1 Total 75 in, 1 out	Max seen at once 30. Swifts were heard but not seen throughout most of the watch. Large numbers seemed to be foraging above the river and green space behind us, to the south, however we had to keep an eye on the chimney. The birds went in over an extended period of time, just a few at a time.
2019-07-31	20:18:00	21:18:00	20:47:00	23	4	None	0	20:39:00	21:14:00	75	8:19=1 out, 8:39=1 in, 8:50=1 in, 8:54-8:55=2 in, 8:56-8:57=8 in, 8:58-9:00=2 in, 9:01-9:04=24 in, 9:05-9:07=37 in, 9:07=1 out, 9:08=1 in, 9:14=1 in	Maximum no. seen in sky at one time: between 15 and 20.
2019-08-07	20:05:00	21:15:00	20:39:00	27	1	None	2	20:14:00	21:06:00	81	8:14=1 in, 8:19=2 in, 8:39=2 in, 8:40=9 in, 8:40=2 in, 8:41=2 in, 8:42=1 in, 8:44=5 in, 8:45=1 in, 8:45=6 in, 8:46=3 in, 8:48=5 in, 8:49=5 in, 8:51=6 in, 8:52=16 in, 8:53=4 in, 8:54=2 in, 8:56=5 in, 8:58=1 in, 8:59=2 in, 9:06=1 in	Maximum number of swifts observed in the sky was 20.
2019-08-14	19:55:00	20:59:00	20:29:00	28	3	None	2	20:05:00	20:47:00	227	8:05=1 in; 8:10=1 out; The rest are ins. 8:17=1; 8:18=10; 8:20=1+5+8+12; 8:22=5; 8:29=1; 8:32=4; 8:34=7; 8:35=4+4+8+10; 8:39=33+1+1; 8:40=7; 8:41=18+2+26+46+7; 8:43=1+1; 8:45=1; 8:46=1; 8:47=1+1	The swifts were very noisy behind us, apparently over the river, and tended to come in relatively small groups to enter the chimney, maybe 30 or 40 at a time.
2019-08-21	19:20:00	20:50:00	20:18:00	23	0	None	1	19:55:00	20:35:00	305	7:55-8:05=first group of swifts entered quickly, skillfully. 8:10-8:15=second and much larger group entered, not as organized or as fast as the first bunch, much more milling about above the chimney, seeming to bump into one another, 8:25-8:30=last group, fewer birds (maybe 30 in this bunch) entered after milling about, a few stragglers (2-3) at the very end.	Sky cleared from west to east halfway through the evening; very light drizzle at start of watch, nothing after that. Rainbow seen. Sunshine broke through just around sunset.
2019-08-28	19:30:00	20:40:00	20:07:00	24	4	None	10	19:31:00	20:14:00	202	7:31=1 in, 7:35=5 in, 7:36=1 in, 7:38=1 in, 7:40=1 in, 7:41=1 out, 8:01=14 in, 8:02= 50 in, 8:07=79 in, 8:08=14 in, 8:09=17 in, 8:10= 4 in, 8:11=10 in, 8:12= 6 in, 8:14=1 in, 8:29= 1 out	

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precip-itation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-18	15:50:00	15:51:00	<1	17	3	None	10	1	1	0	1	15:50=1 in	Incidental observation.
2019-05-23	14:30:00	15:59:00	89	25	5	None	3	0	0	0	0	0	Occasional chattering was heard to the east of the site, but no swifts were observed.
2019-05-31	10:03:00	11:05:00	62	11	2	None	0	3	2	2	1	10:07 = 1 in; 10:25 = 1 out; 10:35 = 1 in; 10:51 = 1 out.	10:28: 2 swifts circling overhead: observed some courting behaviour (V-shaped wings); 10:35: 3 swifts overhead; 10:50: 1 swift flying near chimney.
2019-06-06	11:26:00	12:28:00	62	19	2	None	3	3	3	2	2	11:27 = 1 in; 11:28 = 1 in; 11:36 = 1 out; 11:58 = 1 in; 12:10 = 1 out.	At 11:35 we saw one overhead. We likely missed a swift leaving the chimney shortly after the first one left at 11:36. At 11:45 we saw 2 overhead. At 11:50 we saw 2 swifts overhead exhibiting courtship activity (V shaped wings). At 12:24 we saw 3 swifts overhead, two exhibiting courtship activity. At 12:26 there were two overhead.
2019-06-11	11:35:00	12:40:00	65	17	3	None	0	3	1	2	2	11:43 = 1 in; 11:44 = 2 out.	Throughout our watch 2 or 3 swifts would appear from time to time, flying above the chimney.
2019-06-18	10:36:00	11:40:00	64	20	2	None	9	5	3	4	3	10:45=1 in; 10:46=1 in; 10:48=1 out; 10:56=1 out; 10:57=1 out; 11:05=1 in; 11:41=1 out.	At 10:36 observed 4 overhead. 11:20 to 11:32: observed from 2 to 4 overhead. 11:37 to 11:40: observed 4 overhead. 11:43: observed 5 overhead.
2019-06-27	16:55:00	17:55:00	60	28	0	None	1	4	1	1	1	5:25 = 1 in; 5:28 = 1 out.	At 5:35: observed 4 swifts overhead briefly. 5:50: observed 1 swift overhead. 5:55: observed 2 swifts overhead.
2019-07-02	10:25:00	11:34:00	69	25	3	None	10	5	2	2	2	10:37 = (1+1) 2 out; 11:10 = 1 in; 11:30 = 1 in.	At 10:30: 2 swifts observed overhead; 10:38: 5 swifts observed overhead; 10:55: 1 swift observed overhead; 10:58: 4 swifts observed flying around overhead; 11:12: 3 swifts observed circling over the chimney; 11:25: 4 swifts observed circling low directly over the chimney.
2019-07-09	09:40:00	11:14:00	94	18	1	None	0	3	5	3	2	9:41 = 1 in; 9:43 = 1 out; 10:07 = 1 in; 10:08 = 1 in; 10:14 = 1 out; 10:45 = 1 out; 10:53 = 1 in; 11:12 = 1 in.	At 9:45 observed 2 swifts overhead. 10:02 to 10:03 observed from 2 to 3 swifts overhead. 10:09 observed 1 swift overhead. 10:27 observed 2 swifts overhead. 10:38 to 10:39 observed 2 swifts circling low over the chimney (peer and veer) - at least 4 passes observed. 10:43 observed 3 swifts far overhead.
2019-07-16	09:40:00	11:00:00	80	26	3	None	10	2	0	6	6	10:47 = (1+1+1) 3 out; 10:50 = (1+1) 2 out; 10:51 = 1 out.	There is a possibility that a fourth swift left the chimney at 10:47, but we were not certain, so we just recorded 3 swifts leaving at that time. - At 9:40 there were about 10 starlings sitting on top of the chimney (4 adults and 6 young starlings). They seemed to be using it as a launch pad for their young to learn how to fly. By 9:50 the last young starling flew off the chimney. - At 9:55 we observed a swift fly close to chimney. - At 10:07 a young starling flew back to the chimney and was joined by a second young starling at 10:09. They hopped around the chimney and from our vantage point they seemed to look down the chimney from time to time. At 10:10 one starling flew away and at 10:14 the second starling left. - At 10:16 we observed 1 swift above chimney. - At 10:19 we observed a swift fly low across the top of the chimney. - At 10:21 we observed 2 swifts over the chimney. - At 10:43 we observed 4 swifts high over chimney and then 1 circling the chimney. - Then at 10:47 the swifts who were in the chimney started leaving. We thought that one of the swifts seemed to be making more of an effort as it came out of the chimney than we usually observe (i.e. perhaps flapping a little differently.) We could not tell from our vantage point if some swifts were smaller.
2019-07-19	08:55:00	11:55:00	180	28	3	None	8	0	1	3	1	8:58 = 3 out; 9:55 = 1 in.	
2019-07-21	09:11:00	12:15:00	184	22	3	None	10		6	10	4	9:16 = 2 out; 9:17 = 1 out; 9:20 = 1 out; 9:32 = 1 in; 9:39 = 1 out; 10:06 = 1 in; 10:13 = 1 out; 11:07 = 1 in; 11:13 = 1 out; 11:37 = 1 in; 11:42 = 1 in; 11:47 = 1 out; 11:53 = 1 out; 12:11 = 1 in; 12:14 = 1 out.	
2019-07-23	09:42:00	10:57:00	75	18	4	None	0	0	3	18	17	9:58 = 1 in; 10:02 = 1 out; 10:04 = 1 out; 10:06 = (1+1)2 out; 10:07 = 2 out; 10:14 = 3 out; 10:15 = (3 + 4)7 out; 10:24 = 1 in; 10:26 = 1 out; 10:50 = 1 in; 10:52 = 1 out.	Between 9:58 and 10:02 there seemed to be a maximum of 17 adult swifts in chimney, before they started leaving at 10:02. Feeding seemed to occur at 9:58, 10:24 and 10:50 a.m.
2019-08-02	09:31:00	10:55:00	84	22	1	None	0	16	5	3 at least	4	9:56=1 out, flew SE; 10:41= 3 in; 10:43=1 in; 10:44 = may have been some exits; 10:47=1 out; 10:48=1 in; 10:52=1 out.	Hazy. 9:53= brief chatter, 3 flew over chim high. 9:55-10:10=ev few mins 2 to 10 swifts circling very high to W at limits of visual detection. 11:13-15=chatter & up to 12 swifts circling above & milling around chim, many dips & aborted direct dives at chim, then flock moved higher & drifted S. 11:15-30= up to 9 high over chim or in far W sky, sometimes loosely circling & occas ~6 flying tightly or 2 together, some chatter; 10:37=3 flew low over chim; 10:38-10:39=up to 8 overhead, loosely circling, some dips at chim, some chatter; 10:41=7 circling, sev dips (3 in); 10:43=12 circling & dipping over chim (1 in); 10:44=16 milling high & low above & around chim; 10:49=no further swifts seen or heard.
2019-08-15	06:14:00	10:05:00	231	17	2	None	7	28	19	33	300+	6:25=28 out; 6:26=1 in; 6:34=4 in; 6:38=1 in; 6:39=1+1 in; 6:42=1 in; 6:52=1 in; 6:53= 1 in; 6:56=1+1 in; 6:59=1 in; 7:08=1 in; 7:11=1 in; 7:13=1 in; 7:41= 1 in; 9:46=1 in; 9:38=1+1+1 out; 9:49=1+1 out.	312 swifts inside chim previous night. Sunrise=6:30 am. Bright morning as cloud not against E horizon. ~4 hrs of watching. 5 mins before sunrise, 28 swifts exited chim by 2s & 1s, barely clearing rim, dropping slightly, then flying off horizontally; all immediately left area, mostly heading SW. One min later 1 swift entered chim, then others gradually returned & re-entered after much circling [up to 10 mins] & dipping & occasional V-displays. Circling at times was around chim, well below top. By 7:41, 18 had re-entered. Then no swifts seen till 9:46 when 1 entered; within 2 or 3 mins 5 out, heading SW. End of watch: cloud 9, wind 2, 20°C.

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:38:00	20:57:00	20:26:00	17	4	None	9	20:32:00	20:39:00	3	8:32=1 in, 8:35=1 in, 8:39=1 in	Maximum number seen: 35, first swift of night spotted at a distance at 8:00, last group of 14 seen flying away at 8:42. 8:12, two swifts swooped in close to the chimney, but did not enter. 8:33, two swifts were observed in "V" flight, flying very close to one another.
2019-05-08	19:52:00	21:04:00	20:34:00	14	6	None	10	-	-	0	0	5 Swifts were spotted flying overhead.
2019-05-16	20:10:00	21:08:00	20:42:00	16	4	None	1	20:42:00	20:42:00	2	8:42=2 in	Total of 14 swifts flying fairly high over the Phoenix chimney and heading towards the Labatts chimney, between 8:13 and 8:52 pm. Didn't hear any of their chittering until the last three at 8:52. The two swifts who did enter the chimney seemed to appear from nowhere and just zoom down in. The maximum number seen in the air at once was 5, at 8:38.
2019-05-22	20:08:00	21:18:00	20:48:00	16	0	None	2	20:13:00	21:18:00	193	8:13 = 1 in, 8:19 = 2 out, 8:21 = 1 in, 8:24 = 1 out, 9:05 = 7 in, 9:13 = 180 in, 9:14 = 4 in, 9:17 = 1 in, 9:18 = 1 in.	8:12: 5 overhead; 8:23: 2 flitting around over chimney; 8:33: 2 flitting around over chimney; 8:35 to 8:45: between 3 and 5 observed overhead; 8:49: at least 12 overhead. Then from 8:59 onwards numerous waves of birds, chittering loudly, appear overhead, and fly over chimney, disappear and then come back again. Seven swifts entered chimney at 9:05 and then there was a lull, with the waves of birds continuing to circle overhead and over chimney, chittering loudly. Then at 9:13 at least 180 dropped into chimney. We consider this estimate to be conservative. The final few entered shortly after.
2019-05-26	20:20:00	21:25:00	20:52:00	19	0	None	0	20:45:00	21:16:00	139	8:45 =1 in, 8:53 =1 in, 9:09 =20 in, 9:10 =11 in, 9:11 =65 in, 9:13 =33 in, 9:14 =2 in, got really quiet!! 9:16 =3 in, 9:16 =1 in	8:32 4 flew by; 8:33 4 flew by; 8:39 1 flew by; 8:45 4 flew by; 8:53 2 flew by; 8:57 3 flew by; 8:58 8 circling; 8:59 5 circling; 9:02 8 flew by; 9:09 10 circling; 9:15 2 circling
2019-05-30	20:22:00	21:25:00	20:55:00	19	1	None	3	20:34:00	21:14:00	66	8:34=1 in, 8:53=2 in, 9:10=1 in, 9:10=53 in, 9:10=3 in, 9:14=5 in, 9:14=1 in	At 8:41 three swifts first seen foraging on the south side of Horton St. No swifts overhead. At 8:45 4 swifts flying low overhead. At 9:00 14 swifts observed flying north At 9:05 22 swifts observed circling above chimney. Plenty of airborne insects at least at ground level.
2019-06-03	20:05:00	21:30:00	20:59:00	14	2	None	1	20:12:00	21:24:00	44	8:12=1 in; 8:25=1 in; 8;27=1 out; 8:49=1 in; 8:59=1 in; 9:03=1 out; 9:10=3 in; 9:17=4 in; 9:18=1 in; 9:19=29 in; 9:22=3 in; 9:23=1 in; 9:24=1 in.	No swifts were observed until the first one came out of nowhere and went down the chimney. Maximum circling at any one time: 12.
2019-06-12	20:18:00	21:35:00	21:04:00	22	1	None	3	20:46:00	21:22:00	16	8:46 1 in, 9:12 5 in, 9:14 4 in, 9:17 2 in, 9:20 3 in, 9:22 1 in, none out	1 pair of swifts circled close by for the first half hour , max 6 seen circling overhead. Actual descents into the chimney were few and well spaced.
2019-06-19	20:37:00	21:38:00	21:07:00	23	2	None	10	20:58:00	21:25:00	16		Person passing by reported that he has noticed 2-4 swifts entering chimneys at 2 nearby houses on the north side of Horton
2019-06-26	20:29:00	21:40:00	21:08:00	27	1	None	4	20:41:00	21:35:00	18	8:41 = 1 in, 9:02 = 1 in, 9:10 = 1 in, 9:19 = 6 in, 9:20 = 1 in, 9:29 = 2 in, 9:30 = 1 in, 9:31 = 1 in, 9:32 = 1 in, 9:34 = 2 in, 9:35 = 1 in	Lots flying by then on to another chimney
2019-07-03	20:38:00	21:38:00	21:08:00	27	2	None	2	20:57:00	21:27:00	16	8:57=1 in, 9:14=1 in, 9:15=1 in, 9:15=1 in, 9:16=1 in, 9:17=1 in, 9:19=1 in, 9:19=1 in, 9:21=1 in, 9:22=1 in, 9:23=1 in, 9:23=1 in, 9:23=1 in, 9:26=2 in, 9:27=1 in	Saw two swifts fighting in mid-air and drop several feet before releasing? Did not look like courtship behaviour, seemed more aggressive. Swifts were overly chatty today. Many flying together in tight clusters of 3-7.
2019-07-10	20:15:00	21:35:00	21:05:00	27	1	None	8	20:20:00	21:25:00	23	8:20 - 1 in, 8:34- 1 in, 8:45 - 1 in, 8:46 - 2 in then 2 more, 8:48 - 1 in, 8:55-1 in, 8:58 - 1 out, 9:05- 1 out, 9:06 - 1 in, 9:09- 1 in, 9:10- 2 in, 9:12- 1 in, 9:14 to 9:15 - 4 in, 9:15-9:16- 3, 9:16 to 9:17 - 3 in, 9:25- 1 in.	The pattern of individual separate entries persisted from sunset to the last bird at 9:25 Maximum number seen overhead was 9
2019-07-17	20:24:00	21:31:00	21:01:00	28	1	None	2	21:03:00	21:23:00	24	9:03=1, 9:05=2, 9:09=1, 9:11=1, 9:12=2, 9:13=1, 9:16=7, 9:17=3, 9:18=1, 9:19=1, 9:21=1, 9:22=2, 9:23=1	At 8:24 there were 6 flying around and again at 9:05 there were 8 flying around.
2019-07-24	20:15:00	21:35:00	20:55:00	23	4	None	0	20:56:00	21:16:00	36	all birds in. 8:56=1, 8:59=2, 9:00=3, 9:01=7, 9:02=4, 9:03=2, 9:05=2, 9:07=6, 9:08=2, 9:09=1, 9:10=3, 9:14=2, 9:16=1.	
2019-07-31	20:00:00	21:19:00	20:47:00	23	4	None	0	20:35:00	21:14:00	50	8:35=1 in; 8:51=1 in; 8:54=1 in; 8:55=1 in; 8:56=2+1 in; 8:57=2+3 in; 8:58=1+1 in; 8:59=1 in; 9:01=1 in; 9:03=3+10+1 in; 9:04=1 out, 1+1+1 in; 9:06=13 in; 9:07=1+1 in; 9:08=1 in; 9:10=1 out; 9:11=1 in; 9:12=1 in; 9:14=1 in.	At 8:16 2 swifts circled and left. At 8:35, 2 approached: 1 entered & 1 left. After 8:25, every few mins short bursts of chatter were heard. Less frequently a swift or two flew over. From 8:50 on, every min or two, 1 or 2 swifts appeared & dropped into chimney (no advance circling). Most approaches came from SW. Only twice did a small group of swifts materialize, then enter at once (9:03 & 9:06). From 9:12 to 9:14, 2 swifts repeatedly circled chimney & area, well below chimney top before both finally entered.
2019-08-07	20:05:00	21:12:00	20:39:00	26	2	None	2	20:43:00	21:08:00	226	843=10 in, 844=5 in, 845=15 in, 846=9 in, 847=8 in, 848=5 in, 849=15 in, 850= 30 in, 852=8 in, 853=31 in, 854=38 in, 855=33 in, 856=8 in, 856=1 out, 857=5 in, 858=1 in, 900=1 in, 901=1 in, 905=1 in, 907=1 in, 908=1 in	Up to 20 seen flying about starting at 8:17. Count may be out by up to 20 because of the high number of entries.
2019-08-14	19:59:00	20:59:00	20:29:00	25	2	None	5	20:01:00	20:53:00	312	8:01= 3 in; 8:13=3 out; 8:14=3 in; 8:16=1 in; 8:32=1 in; 8:33-8:34=12 in; 8:35=4 in; 8:37=12 in; 8:38-8:42=135 in; 8:43=55+45+36; 8:44 = 1+1+1+1+1+1; 8:52=1 in; 8:53=1 in	Upon arrival, ~15 swifts circling & dipping; thereafter, flock gradually increased in size, alternately rising high & out of sight, then dropping down again to circle & dip at chimney, sometimes twittering, sometimes not. Three early entries, then 3 early exits, then 3 entries makes one wonder whether these birds might be part of the family that nested here earlier in the season. There was no waterfall type of entry tonight in which large numbers of swifts poured down the chimney together. Instead, for all entries, there were approx equal numbers of swifts dropping behind the chimney at the same time. This made it very difficult to distinguish actual entries. Our estimate could be somewhat off, but we did the best we could.
2019-08-21	19:25:00	20:57:00	20:18:00	22	4	Rain	10	20:20:00	20:57:00	45	7:45=1 exit. The remaining are entries. 8:20=3+2+5+1+1+1; 8:21=1+1+4; 8:22=1; 8:23=1; 8:28=2; 8:29=1+1+1+2+1; 8:31=1; 8:33=3+1; 8:34=1+2+1; 8:35=1+1+1; 8:38=1; 8:40=1; 8:42=1; 8:57=1	There had been a short but substantial downpour. The sun broke through the clouds at about 7:25 and there was a lovely double rainbow. The weather changed dramatically throughout the watch. All rain ceased. The wind died down. The clouds began disappearing. Apart from the sole exit at 7:45, no swifts were seen or heard until 8:17. Some headed down the chimney. Many flew off in a southwesterly direction.
2019-08-28	19:30:00	20:30:00	20:07:00	21	3	None	9	19:30:00	20:17:00	180	7:30=1 in, 7:42=2 in, 7:51=4 in, 8:00=2 out, 8:02=1 in, 8:03=2 in, 8:04=10 in, 8:05=50 in, 8:06=20 in, 8:07=20 in, 8:08=21 in, 8:09=19 in, 8:10=14 in, 8:11=7 in, 8:13=10 in, 8:17=1 in	20 was maximum number seen in sky around 7:35 pm. Flock started to circle and approach as if to go in, possibly due to dark clouds and earlier light drizzle, but then changed their mind and went to forage a bit longer.

Daytime Monitoring Table
May to July 2019

350 Queens Avenue, London ON
First-St. Andrew's United Church
SE Chimney

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-02	18:51:00	19:22:00	31	18	1	None	10	8				No entries or exits	Though there was regularly some swift presence overhead, it was often high up and not close to the chimneys. The only evidence of courtship was one chase by three swifts following in close proximity.
2019-05-15	12:08:00	13:08:00	60	18	3	None	2	10	0	0	0	none	No swifts closely approached or entered any of the 4 chims. Occas there were passovers of small groups of swifts. at 12:26 max no (10) chattered & circled in a tight flock, some dipping, some tight chases, then gone.
2019-05-21	14:00:00	15:10:00	70	15	5	None	3	9	0	0	0	0	swifts ignored this chimney
2019-05-27	11:10:00	12:10:00	60	20	1	None	0	7	2	2	1	11:13 = 1 in; 11:33 = 1 out; 11:52 = 1 in; 12:05 = 1 out	1 turkey vulture at 11:54.
2019-06-04	09:20:00	11:10:00	110	14	1	None	1	8	3	1	2	10:22=1 in; 10:30=1 out; 10:49=1 in; 10:56=1 in	Flying in group of 3's, possible courtship behavior
2019-06-11	13:30:00	15:00:00	90	22	5	None	0	6	1	3	3	1:45=1 in; 1:52=1 out; 2:01=1 out; 2:02=1 out; 2:59=1 in	at 2 pm swifts just "disappeared" for about 50 minutes
2019-06-17	09:30:00	10:30:00	60	18	4	None	4	6	1	1	1	9:48=1 in; 9:53=1 out	at 10:06 am swifts disappeared for about 15 minutes.
2019-06-25	09:00:00	10:30:00	90	20	5	None	4	2	0	1	1	10:02=1 out	other birds seen: 1 merlin, 1 turkey vulture; flock of rock pigeons
2019-07-02	09:30:00	10:30:00	60	25	2	None	7	9	0	0	0	0	
2019-07-09	09:34:00	11:41:00	127	20	1	None	0	5	3	3	1	9:48=1 dipped very close to chim & went E; 9:50=1 in; 9:52=1 out; 10:36=1 in; 10:40=1 out; 11:13=1 in; 11:15=1 out.	When arriving, bird usually came from S, when leaving usually headed E. Sky hazy. Generally, swifts were flying high and usually silently, often in 2s and 3s. Occasionally, there would be a bit of chasing and chattering and a few V-displays.
2019-07-16	09:30:00	10:30:00	60	25	2	None	0	4	0	0	0		
2019-07-22	09:00:00	10:00:00	60	19	3	None	8	3	0	0	0		

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:44:00	20:50:00	20:26:00	15	3	None	4	-	-	0	NONE	7:48-8:07 pm SMALL GROUPS OF SWIFTS CIRCLING OVERHEAD. MAX NUMBER AT ONE TIME = 10. 8:10 TO 8:25 pm, ONE OR TWO SWIFTS OCCASIONALLY CIRCLING OVERHEAD. FLEW OFF TO NORTH.
2019-05-08	19:50:00	20:55:00	20:34:00	13	5	None	8	-	-	0	none	Max swifts overhead 6. No interest in this chimney tonight
2019-05-16	19:58:00	21:12:00	20:42:00	16	2	None	1	20:56:00	20:56:00	2	8:56=2 in	From 5 to 7 swifts were observed circling overhead and chattering throughout the observation period. As late as 8:52 I observed 6 swifts swooping down around the chimneys, but I only observed 2 swifts enter the SE chimney at 8:56. Because I was trying to watch the four chimneys simultaneously I could very well have missed others slipping into any of these chimneys after 8:52. It was also getting quite dark and cloudy at that time.
2019-05-22	20:18:00	21:20:00	20:48:00	15	1	None	3	-	-	0		
2019-05-26	20:10:00	21:22:00	20:52:00	17	2	None	0	20:32:00	20:34:00	2	8:32=1 in, 8:34=1 in	Swift flying low, lots of chattering calls. Saw swifts possibly entering the chimney on the opposite side of the church (chimney closest to Waterloo Street, i.e. FSA-NW). Possible entry times: 8:58=2 in, 9:01=1 in, 9:02=2 in. Maximum number seen in the sky: 14
2019-05-30	20:27:00	21:30:00	20:56:00	19	1	None	2	21:02:00	09:04:00	2	9:02=1 in, 9:04=1 in	When we arrived at 8:27 there were about 10 swifts circling low and very noisy. This kept up until about 9:06 when only 4 were circling and then by 9:12 they were all gone and it was very quiet. We had 7 in total in the 4 chimneys for the night.
2019-06-03	20:24:00	21:36:00	20:59:00	17	1	None	0	20:25:00	21:15:00	3	8:25=1 in, 8:50=1 in, 9:03=1 out, 9:05=1 in, 9:15=1 in	There were 10 Chimney Swifts flying over the building when I arrived. All Chimney Swifts entered on their own about 5 to 10 minutes apart.
2019-06-12	20:31:00	21:30:00	21:04:00	21	1	None	2	-	-	0	none	8 swifts seen flying around at the beginning of watch, diminished to 2 or 3 by sunset
2019-06-19	20:28:00	21:37:00	21:07:00	23	0	None	10	20:36:00	20:36:00	1	1 in at 8:36pm	At 8:50pm a merlin flew toward the church and it was being chased by 2 swifts. The merlin landed on the weather vane, on the church, and stayed there until 9:03pm. Flew a short distance and returned at 9:04pm to the weather vane. At 9:05pm a second merlin landed on the weather vane and they were both there when we left at 9:37pm. Also, at 9:34pm a bat started circling around our heads and it was still flying in the area when we left. We saw a maximum of 7 swifts at one time.
2019-06-26	20:40:00	21:38:00	21:08:00	25	1	None	2	21:20:00	21:22:00	2		About 10 swifts seen.
2019-07-03	20:30:00	21:42:00	21:07:00	27	0	None	2	20:53:00	20:53:00	1	1 in at 8:53	There were 6 swifts overhead at times with much swirling and chittering. Two Kestrels were often perched at various points on the sanctuary roof, patrolled the area and actually perched on the NE round and N chimneys and peered down the tiles.
2019-07-10	20:31:00	21:37:00	21:05:00	26	1	None	6	20:47:00	21:35:00	2	8:47=1in, 8:49=1out, 9:08=1in, 9:35=1in	Another observer reported 8:13=1in, 8:15=1out. Maximum number seen in sky =6
2019-07-17	20:15:00	21:32:00	21:01:00	26	2	None	1	-	-	0	No activity seen.	No swifts were observed entering or leaving. 2 small birds of prey, possibly kestrels, were on the church roof near the chimney. When they arrived they were mobbed by swifts each time. Moderate urban noise due to vehicle traffic. Courtship behaviour mid-air observed twice.
2019-07-20	19:58:00	20:48:00	20:58:00	31	0	None	10	-	-	0	No ins or outs, no swifts came anywhere near chimney,	Clouds to N very black. By 8:02 wind = 6; thunder, lightning & rain (mostly light) ongoing during watch. At 8:12, temp dropped sharply. 24°C at end of watch. Watch ended 10 mins before sunset.
2019-07-24	20:25:00	21:25:00	20:55:00	24	1	None	0	-	-	0	0	
2019-07-31	20:16:00	21:25:00	20:47:00	23	3	None	0	-	-	0	none	Up to 10 swifts over head early in the evening. 2 Kestrels visted and 1 spent a lot of time perched on the centre ridge of the sanctuary building. Just after sunset, bats were busy flying low across the driveway.
2019-08-07	20:00:00	21:10:00	20:39:00	25	2	None	1	-	-	0	No entries or exits.	During watch, though there was considerable swift activity in area, there was no circling near or above area of SE chimney. Max in air at once = 13. 9:00 = first bat seen (max of 3 bats).
2019-08-14	20:00:00	20:53:00	20:29:00	27	0	None	8	-	-	0	None	No swifts.
2019-08-21	19:40:00	20:42:00	20:18:00	23	1	None	8	-	-	0		
2019-08-28	19:30:00	20:35:00	20:07:00	23	3	None	9	-	-	0	none	
2019-09-11	19:20:00	20:10:00	19:42:00	19	4	Trace/Occ Rain	10	-	-	0	Quiet night	

Daytime Monitoring Table
May to August 2019

350 Queens Avenue, London ON
First-St. Andrew's United Church
NE Chimney

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (C)	Wind Speed (0-7)	Precipitation	Cloud Cover 0-11	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-02	18:51:00	19:22:00	31	18	1	None	10	8				No entries or exits	Though there was regularly some swift presence overhead, it was often high up and not close to the chimneys. The only evidence of courtship was one chase by three swifts following in close proximity.
2019-05-15	12:08:00	13:08:00	60	18	3	None	2	10	0	0	0	none	No swifts closely approached or entered any of the 4 chims. Occas there were passovers of small groups of swifts. at 12:26 max no (10) chattered & circled in a tight flock, some dipping, some tight chases, then gone.
2019-05-21	14:00:00	15:10:00	70	15	5	None	3	9	0	0	0	0	swifts ignored this chimney
2019-05-27	11:10:00	12:11:00	61	20	1	None	0	7	0	0	0	0	1 turkey vulture @ 11:54 am
2019-06-04	09:20:00	11:10:00	110	14	1	None	1	8	4	2	3	10:16=1 out, 10:22=1 in, 10:23=1 in, 10:35=1 out, 10:55=1 in, 11:08=1 in	there was some courtship behavior - flying in group of 3's
2019-06-11	13:30:00	15:00:00	90	22	5	None	0	6	1	2	2	1:46=1 in, 1:51=1 out, 2:00=1 out	At 2 pm swifts just "disappeared" for about 50 minutes
2019-06-17	09:30:00	10:30:00	60	18	4	None	8	6	0	0	0	0	at 10:06 am swifts disappeared for about 15 minutes
2019-06-25	09:00:00	10:30:00	90	20	5	None	4	2	2	3	2	9:35=1 in, 9:35=1 out, 9:53=1 out, 10:26=1 in, 10:28=1 out	other birds seen: 1 merlin, 1 turkey vulture; flock of rock pigeons
2019-07-02	09:30:00	10:30:00	60	25	2	None	7	9	3	2	3	10:04=1 out, 10:14=1 in, 10:15=2 in, 10:15=1 out	
2019-07-09	09:34:00	11:41:00	127	20	1	None	0	5	4	4	1	9:40= 1 in; 9:42=1 out; 10:16=1 in; 10:17=1 out; 10:38=1 in; 10:39=1 out; 10:46=2 together flew a bit low over area of chimney; 11:12=1 in; 11:32=1 dipped & circled over chimney; 11:35=1 out.	Sky hazy. Generally, swifts were flying high and usually silently, often in 2s or 3s, but up to 5. Occasionally, there would be a bit of chasing and chattering and a few V-displays. A few times activity above the vicinity of the NW section of the sanctuary roof suggested there may have been comings and goings from the NW chimney, which was not being monitored.
2019-07-16	09:00:00	11:04:00	124	25	2	None	0	4	6	2	4	9:08= 1 in; 9:35= 1 in, 1 out; 9:48= 1 in; 10:04=1 in, 10:07=1 in, 1 out; 10:08= 1 in	
2019-07-22	08:46:00	10:00:00	74	19	3	None	8	3	4	3	2	8:57= 1 out; 8:58= 1 in; 9:00=1 in; 9:00=1 out; 9:28= 1 in; 9:42=1 out; 9:52= 1 in.	
2019-08-01	09:30:00	11:51:00	141	21	1	None	0	5	3	1	2	10:37=1 in; 10:51=1 out; 11:03=1 in; 11:34=1 in.	Up to about 11 am, few swifts were seen in area & those were usually circling silently high in the NW to NE sky. After 11 am or so, swifts were seen in the same general area, but more often & with occasional chatter; whenever they were near the church, they seemed to be more focused on N or S chimneys, especially S chimney.
2019-08-06	09:15:00	11:20:00	125	24	4	Trace/ Occ Rain	9	5	2	0	2	10:46=2 in.	Very occasionally during watch a few swifts could be seen circling high up, usually silently and far to the N. Occasionally brief bursts of chatter could be heard, usually to the E. Very little swift activity around the church. Entries silent and direct, by strong experienced fliers.
2019-08-09	09:38:00	11:45:00	127	20	3	None	0	1	0	1	1	11:17=1 out, went E, low behind church office section; a min later a swift seen in NW sky heading W was likely same bird.	No other swifts anywhere near this chimney during watch. No vocalizations heard throughout watch. No foraging or other activity visible in area during watch except for entries and exits at S chimney, from which swifts immediately left area. At end of watch cloud 7, wind 4.
2019-08-12	08:55:00	11:00:00	125	23	1	None	8	1?	0	0	0	No entries or exits.	No swifts seen or heard in area near or far, high or low, except a possible swift flying briefly high to NW at 10:37 and a possible swift flying briefly high to N at 10:39. A kestrel flew in high fr NE and landed on top of weather vane at 10 am and stayed about 12 mins.

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:44:00	20:50:00	20:26:00	15	3	None	4	-	-	0		
2019-05-08	19:50:00	20:55:00	20:34:00	13	5	None	8	20:25:00	20:25:00	1	one in	Cold and gusty tonight. Max number of swifts overhead 6
2019-05-16	19:58:00	21:12:00	20:42:00	16	2	None	1	20:44:00	20:54:00	2	8:44=1 in, 8:54=1 in.	From 5 to 7 swifts were observed circling overhead and chattering throughout the observation period. As late as 8:52 I observed 6 swifts swooping down around the chimneys, but I only observed 2 swifts enter the SE chimney at 8:56. Because I was trying to watch the four chimneys simultaneously I could very well have missed others slipping into any of these chimneys after 8:52. It was also getting quite dark and cloudy at that time.
2019-05-22	20:18:00	21:20:00	20:48:00	15	1	None	3	21:07:00	21:11:00	2	8:55=1 out 9:07=1 in 9:11=1 in	9 flying overhead at 8:21 p.m.
2019-05-26	20:10:00	21:22:00	20:52:00	17	2	None	0	21:03:00	21:03:00	2	9:03=2 in.	From 4 to 14 swifts observed flying over the FSA chimneys from 8:10 onwards. Lots of chattering.
2019-05-30	20:27:00	21:30:00	20:56:00	19	1	None	2	21:02:00	21:02:00	1	9:02= 1 in	When we arrived at 8:27 there were about 10 swifts circling low and very noisy. This kept up until about 9:06 when only 4 were circling and then by 9:12 they were all gone and it was very quiet. We had 7 swifts in total in the 4 chimneys for the night.
2019-06-03	20:25:00	21:29:00	20:59:00	16	1	None	1	20:30:00	21:15:00	12	12 in from 8:30pm to 9:15 pm lots of fly bys and activity.	
2019-06-12	20:31:00	21:30:00	21:04:00	21	1	None	2	20:42:00	20:49:00	2	8:42 =1 in, 8:49 =1 in	8 swifts seen and heard flying around at beginning of watch, diminished to 2 or 3 by sunset.
2019-06-19	20:33:00	21:36:00	21:06:00	23	0	None	10	21:17:00	21:17:00	1		At 8:50pm a merlin flew toward the church and it was being chased by 2 swifts. The merlin landed on the weather vane, on the church, and stayed there until 9:03pm. Flew a short distance and returned at 9:04pm to the weather vane. At 9:05pm a second merlin landed on the weather vane and they were both there when we left at 9:37pm. Also, at 9:34pm a bat started circling around our heads and it was still flying in the area when we left. We saw a maximum of 7 swifts at one time.
2019-06-26	20:32:00	21:38:00	21:08:00	26	3	None	3	21:09:00	21:09:00	1	9:09=1 in	Merlin seen around the church at 8:48pm, 9:03pm, 9:12pm and 9:18pm. Maximum Number seen in the Sky: 17
2019-07-03	20:30:00	21:42:00	21:07:00	27	0	None	2	20:48:00	21:12:00	1	1 in at 8:48, 1 out at 8:49, 1 in at 9:12	Maximum number of swifts in the air was 9 early on, then mainly 6 swifts overhead in 2 groups of 3 with much swirling and chittering. Two Kestrels were seen, often perched at various points on the sanctuary roof, patrolling the area--they actually perched on both the NE round and N chimneys and peered down the tiles to check out the activity inside.
2019-07-10	20:30:00	21:37:00	21:05:00	26	1	None	6	20:35:00	21:20:00	2	8:35 = 1 in, 8:45 = 1 in, 8:49 = 1 out, 9:03 = 1+ 1 in =2 in, 9:04 =1 out, 9:20 =1 in	Extra observations 8:01 - 8:30: 8:11 =1 in, 8:12 = 1 out, 1 Merlin perched on roof on arrival joined by another(?) at 9:07.
2019-07-11	20:04:00	21:35:00	21:04:00	23	4	None	0	20:18:00	21:23:00	1	8:18=1 in; 8:23=1 in (after 4 close dips about 1 min apart); 8:25=1 out; 8:40=1 in; 8:40+=1 out; 8:41=1 out; 8:56=1 in; 8:57=1 out; 9:00=1 in; 9:10=1 out; 9:23+=1 in (total ins = 6, total outs= 5)	Viewed from parking lot to N of church. Much less swift presence in area compared to evening of Jul 10. At various times brief bits of chatter could be heard to N, but there were rarely any swifts in view. A couple of times there were very short bouts of chasing and chattering by up to 4 swifts. One or 2 kestrels perched at various times on parts of steeple or decorative features on sanctuary roof ridge. At 8:42, when a kestrel landed on N peak of sanctuary roof ridge, 4 swifts materialized out of nowhere and silently twice circled over it. The departure of 2 swifts from this chimney about the time the kestrel landed (fairly close to this chimney) may be related to the kestrel's presence, though there was no mobbing or chasing of the kestrel during other times when it was perched on the church, though not as close to the NE chimney.
2019-07-17	20:20:00	21:40:00	21:01:00	25	2	None	0	20:24:00	21:18:00	4	8:24=1 in, 8:26=1 out, 8:29=1 in, 8:39=1 in, 9:05=1 in, 9:07=1 out, 9:09=1 in, 9:10=1 out, 9:18=1 in, 9:18=1 in	2 small birds of prey, possibly kestrels, were on the church roof near the chimney. When they arrived they were mobbed by swifts each time. Moderate urban noise due to vehicle traffic. Courtship behaviour mid-air observed twice.
2019-07-20	19:58:00	20:48:00	20:58:00	31	0	None	10	-	-	0	No ins or outs, no swifts anywhere near chimney, except at 7:58 when a swift flew over N & NE chimneys chattering.	Clouds to N very black. By 8:02 wind = 6; thunder, lightning & rain (mostly light) ongoing during watch after 8:12, when temp dropped sharply. 24°C at end of watch. Watch ended 10 mins before sunset. At 7:58 kestrel landed on peak at N end of sanctuary roof, & 3 mins later flew W.
2019-07-24	20:25:00	21:25:00	20:55:00	24	1	None	0	20:38:00	21:03:00	2	8:38 = 1 in; 8:40 = 1 out; 8:49 = 1 in; 9:03 = 1 in.	We observed 5 swifts flying around the chimneys early in our watch. At 9 p.m. we observed four swifts flying overhead.
2019-07-31	20:16:00	21:25:00	20:47:00	23	3	None	0	08:50:00	21:07:00	2	8:50- 1 in, 9:07 - 1 in	We noted up to 10 swifts over head early in the evening. 2 Kestrels visted and 1 spent a lot of time perched on the centre ridge of the sanctuary building. Just after sunset, bats were busy flying low across the driveway.
2019-08-07	20:00:00	21:10:00	20:39:00	25	2	None	1	20:47:00	20:55:00	3	8:47=2 in fast & direct. 8:48=1, then 2, swifts repeatedly circling around & above NE chim, diving & aborting entries at last possible moment. 8:54=2 swifts circling & dipping at NE chim, 8:55=1 in. No exits.	At 7:58, 13 swifts circling & chattering above parking lot, some beating wings harder than others. Periodically during watch, groups of up to 9 swifts circling over area, mainly over NE, N & S chimneys or to N & E of bldg. Some chatter. 8:49=swifts giving chip notes while chasing kestrel. 8:50=more chasing of kestrel, which landed on E edge of S chim. 8:52= 2nd kestrel flew through area SW to NE. 8:54=4 swifts dipping at kestrel on S chim. 8:55= Kestrel moves to perch on NE chim. No more swifts seen or heard. 9:56= kestrel lands on N peak of sanctuary, then soon after on alcove at base of steeple where it spent night. Presence of kestrel may have deterred 4th swift from entering NE chim & other swifts from entering S chim.
2019-08-14	20:00:00	20:53:00	20:29:00	27	0	None	8	20:42:00	20:46:00	3	8:42=1 in, 8:43=1 in, 8:46=1 in	saw 10 flying all at once at site before any entries.
2019-08-21	19:40:00	20:42:00	20:18:00	23	1	None	8	19:56:00	19:56:00	1		8:02 4 to 5 circling then quiet 8:08 about 12 circling and noisy then quiet 8:24 about 20 flew by to the south
2019-08-28	19:30:00	20:35:00	20:07:00	27	1	None	7	-	-	0	No ins--no outs	Kestrel was observed on roof vent. Maximum swifts in sky was 13.

Daytime Monitoring Table
May to August 2019

350 Queens Ave, London ON
First-St. Andrew's United Church
North Chimney

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (C)	Wind Speed (0-7)	Precipitation	Cloud Cover 0-11	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-02	18:51:00	19:22:00	31	18	1	None	10	8	0	0	0	No entries or exits	Though there was regularly some swift presence overhead, it was often high up and not close to the chimneys. The only evidence of courtship was one chase by 3 swifts following in close proximity.
2019-05-15	12:08:00	13:08:00	60	18	3	None	2	10	0	0	0	none	No swifts closely approached or entered any of the 4 chims. Occas there were passovers of small groups of swifts. at 12:26 max no (10) chattered & circled in a tight flock, some dipping, some tight chases, then gone.
2019-05-21	14:00:00	15:10:00	70	15	5	None	3	9	2	2	2	2:58 = 2 in; 3:00 = 2 out	There were 2 groups of 3's that often would fly altogether in a group of 6. Most of the time when they weren't foraging they would swirl around the N & S chimneys. SE & NE chimneys were ignored. 6 turkey vultures flew by, and the swifts all disappeared until a few minutes after they were gone.
2019-05-27	11:13:00	12:48:00	95	20	1	None	0	8	2	0	2	12:12=1 in; 12:20=1 in	Every 5 or 10 mins swifts would appear overhead and remain in area a min or two, sometimes as 2 subgroups that would come together, then apart, come together again, etc., sometimes 2 or 3 flying in tight formation, sometimes rapid chatter, sometimes silent, a few V-displays.
2019-06-04	09:25:00	11:10:00	105	14	1	None	10	10	2	1	1	10:29=1 in; 10:53=1 out; 10:54=1 in.	End of watch: 18°C, cloud 5. At arrival 5 swifts overhead. During watch saw much chasing, rapid chattering, tight threesomes flying together, some V-flights, etc. Max of 8 seen at 9:48, 10 at 10:50. Over time, more swifts spent longer in area and less time out of area. After 10:50 several times noticed swifts passing through fine dead branches of a tree top visible behind N chimney, presumably collecting nesting material.
2019-06-11	13:28:00	15:10:00	102	21	4	None	2	7	0	0	0	no entries or exits	During the watch, swifts entered and/or exited 3 of the 4 chimneys being watched, but not this one. During 1st 40 mins or so, every few mins swifts present (up to 7) usually in groups of 2 or 3, chasing & chattering, often just over church and several times one or more passing through dead twig area of nearby tree. After 2:10, swifts occasionally visible briefly, often as singles and usually high and silent, but during last 10 mins or so, up to 6 over church chasing & chattering and passing through dead twigs.
2019-06-17	09:30:00	10:30:00	60	18	4	None	8	5	5	0	5	9:51=1; 10:00=1; 10:20=2; 10.20.5=1	The stats are deceptive. It was a chilly overcast day as I arrived. By the time I left it was sunny and warm. Most of the clouds had dissipated, leaving white cirrus streams against a blue sky. Two birds were seen and heard when I arrived. This gradually built to the maximum of 5 that I could see at once, but I think there were more. Around 10:05, the busyness ended and the few remaining birds arrived only to drop quickly and silently into the chimney. Just after 10:30, 7 swifts appeared slightly to the north, heading in a northerly direction.
2019-06-25	09:00:00	10:45:00	105	20	4	None	5	4	0	0	0	none	Swifts were much less present around FSA today and when occasionally a few drifted into sight they were usually silent, high overhead, in a loose flock (none flying closely together) and did not remain long in the area. A Merlin, occasionally screaming, perched on the east side of the base of the steeple from 10:15 to 10:25.
2019-07-02	09:28:00	11:10:00	102	25	3	None	9	8	4	4	2	9:44=1 out; 10:03=1 in; 10:06=1 in; 10:25=1+1 out; 10:26=1 in; 10:27=1 in; 10:40=1 out	Until about 11:45, no more than a min or so would pass without swift presence overhead - circling, chasing, rapid chattering, sometimes dipping at chimney, often 2 pairs (sometimes 3 or 5 birds together) flying tightly together, a few V-displays and some body contact. After 11:45, much less swift presence in area. At 11:59 screaming Merlin seen at base of steeple, soon flew to far side. At 11:00 a Merlin (likely a different bird) flew N to S over church. At 11:05 a Merlin flew from far side of steeple, went S. The few swifts in area took no notice & did not give chase.
2019-07-09	09:34:00	11:41:00	127	20	1	None	0	5	4	1	3	10:23=1 in (2 swifts approached, 1 entered, other veered off); 11:25= 1 in (after repeated circling by up to 4 birds, dipping by 1 swift and a few V-flights by 2); 11:31=1 out; 11:40= 1 in (after circling, chasing, chattering & V-display by 3 swifts); 11:40+=1 in.	May be that some exits were missed if a bird slipped away by just clearing the back of the rim. Sky hazy. Generally, swifts were flying high and usually silently, often in 2s or 3s, but up to 5. Occasionally, there would be a bit of chasing and chattering and a few V-displays. No Merlins seen.
2019-07-16	09:00:00	11:04:00	124	25	2	None	1	8	1	2	2	9:21=1 in; 10:04=1 out; 10:52=1 out.	Almost no swift presence in air during watch and, when present, swifts were almost always silent. Most entries were silent, direct, out of nowhere and usually with no advance circling. Exits were similarly discrete. The exception happened 10:56 to 58 when a loose flock that eventually numbered 8 assembled over the church. There was some circling in a tight knot, a pair could be distinguished, some lowish passes over N and S chimneys, one V-display, all silent.
2019-07-22	08:46:00	10:00:00	74	19	3	None	9	2	0	0	0	No entries or exits & no swifts approached or dipped at chimney.	9:02=1 Merlin flew over parking lot, S to N, 1 swift in pursuit. During watch, occasional entries & exits at S & NE chimneys, all silent and direct. About 9:35 a few times heard brief distant swift chatter to N. About 9:55 heard a few bouts of more prolonged, rapid chatter to N & E; once saw 2 swifts overhead. Otherwise no swift presence in area during watch.
2019-08-01	09:30:00	11:51:00	141	21	1	None	0	5	2	2	1	9:47=1 in; 9:49=1 out; 11:09= 1 in; 11:10=1 out.	Up to about 11 am, few swifts were seen in area & those were usually circling silently high in the NW to NE sky. After 11 am or so, swifts were seen in the same general area, but more often & with occasional chatter; whenever they were near the church, they seemed to be more focused on N or S chimneys, especially S chimney.
2019-08-06	09:15:00	11:20:00	125	24	4	Trace/ Occ Rain	9	5	1	0	1	10:24=1 in.	Very occasionally during watch a few swifts could be seen circling high up, usually silently and far to the N. Occasionally brief bursts of chatter could be heard, usually to the E. Very little swift activity around the church. Entry silent and direct, by strong experienced flier.
2019-08-09	09:38:00	11:45:00	127	20	3	None	0	1	0	0	0	No entries or exits.	No swifts anywhere near this chimney during watch. No vocalizations heard throughout watch. No foraging or other activity visible in area during watch except for entries and exits at NE and S chimneys, from which swifts immediately left area. At end of watch cloud 7, wind 4.
2019-08-12	08:55:00	11:00:00	125	23	1	None	8	1?	0	0	0	No entries or exits.	No swifts were audible or visible anywhere near chimneys and were not present foraging in the neighbourhood this morning. When a kestrel flew into area and landed on top of the steeple, robins on ground began giving alarm notes; they did the same when it departed.

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:44:00	20:56:00	20:26:00	14	3	None	6	-	-	0		7:46 - 7:50= 6 flying high above church; 7:52 - 7:59= 6 - 10 flying high above church; 8:07 - 8:11= 4 flying around the area; 8:24= 9 fly by; 8:36= 8 hover around church vicinity.
2019-05-08	19:45:00	21:00:00	20:34:00	13	5	None	9	-	-	0	0	8:04 = 2 swifts seen flying above, 8:17 = 6 swifts seen flying above (max. seen in sky)
2019-05-16	19:58:00	21:12:00	20:42:00	16	2	None	1	-	-	0	0	An onlooker thought she saw 1 swift enter this chimney.
2019-05-22	20:00:00	21:20:00	20:48:00	16	2	None	7	20:30:00	21:10:00	9	8:30 = 1 in, 8:38 = 1 out, 8:44 = 1 in, 9:01 = 1 in, 9:02 = 1 in, 9:06 = 3 in, 9:09 = 1 in, 9:10 = 2 in	7 swifts were seen on my arrival, then 2 more joined in 8:20.
2019-05-26	20:10:00	21:22:00	20:52:00	17	2	None	0	20:24:00	21:01:00	5	8:24=2 in, 8:55=1 in, 9:00=1 in, 9:01=1 in.	Swift flying low, lots of chattering calls. Saw swifts possibly entering the chimney on the opposite side of the church (chimney closest to Waterloo Street, i.e. FSA-NW). Possible entry times: 8:58=2 in, 9:01=1 in, 9:02=2 in. Maximum number seen in the sky: 14
2019-05-30	20:27:00	21:30:00	20:56:00	19	1	None	2	20:54:00	20:55:00	2	8:54= 1 in, 8:55= 1 in	When we arrived at 8:27 there were about 10 swifts circling low and very noisy. This kept up until about 9:06 when only 4 were circling and then by 9:12 they were all gone and it was very quiet. We had 7 swifts in total in the 4 chimneys for the night.
2019-06-03	20:30:00	21:40:00	20:59:00	17	1	None	0	21:07:00	21:12:00	5	none out	
2019-06-12	20:31:00	21:35:00	21:04:00	21	1	None	2	21:15:00	21:15:00	3	9:15=3 in	
2019-06-19	20:20:00	21:37:00	21:07:00	23	0	None	10	20:30:00	21:19:00	7	This chimney had only ins 8:30=2; 8:41=1; 8:58=1; 9:12=1; 9:14=1; 9:19=1	
2019-06-26	20:35:00	21:30:00	21:08:00	26	0	None	3	21:20:00	21:20:00	2	2 swifts went in at 9:20 p.m.	I think we have a nesting chimney here.
2019-07-03	20:33:00	21:39:00	21:07:00	27	0	None	2	21:24:00	21:24:00	3	9:24=2 in, 9:24= 1 in	Nine swifts total in the area.
2019-07-10	19:53:00	21:30:00	21:05:00	22	0	Rain	10	21:08:00	21:14:00	3	8:26=1+1 out; 9:08=2 in; 9:14=1 in	Rain stopped by about 10 mins after start of watch. During most of watch, much chasing & chattering, often by up to 6 or 8 swifts, in tight formation or loosely circling. Prob 2 prs. Mating observed. Swift presence was almost constant until 8:55, after which chatter gradually lessened and gaps between presence of swifts in area grew longer. No swifts seen or heard after 9:15.
2019-07-11	20:04:00	21:35:00	21:04:00	23	4	None	0	21:06:00	21:23:00	2	8:07=1 out, 9:06=1 in; 9:23=1 in	Viewed from parking lot to N of church. Much less swift presence in area compared to Jul 10. At various times brief bits of chatter could be heard to N, but there were rarely any swifts in view. A couple of times there were very short bouts of chasing and chattering by up to 4 swifts. One or 2 kestrels were perched at various times on parts of steeple or decorative features on sanctuary roof ridge.
2019-07-17	20:15:00	21:32:00	21:01:00	26	2	None	1	21:06:00	21:16:00	2	1 In = 9:06, 1 in 9:16	As many as 12 swifts were visible overhead but few chose to roost here. A Kestrel appeared twice escorted by 4 or 5 Swifts, and later a pair of Kestrels perched on the ornamental vent on the Sanctuary building, sharing a snack of something that looked substantial in size (a mouse perhaps?)
2019-07-20	19:58:00	20:48:00	20:58:00	31	0	None	10	20:09:00	20:12:00	2	8:09=1 in, 8:12+=1 in, 1 out; 8:12++=1 circled and in.	Clouds to N very black. By 8:02 wind = 6; thunder, lightning & rain (mostly light) ongoing during watch from 8:12, when temp dropped sharply. 24°C at end of watch. Watch ended 10 mins before sunset. 7:58 1 swift flew over N & NE chims, then went E. 8:01=6 swifts flying & chattering over parking lot. 8:07=1 swift came from E, dipped at chim & returned E. At 8:08, 2 dipped & circled at N&S chimneys, one went E, one went N.
2019-07-24	20:25:00	21:25:00	20:55:00	24	1	None	0	20:35:00	21:05:00	2	8:35 = 1 in; 9:05 = 1 in.	
2019-07-31	20:14:00	21:20:00	20:47:00	23	2	None	0	20:53:00	20:56:00	2	8:53=1 in, 8:56=1 in	8:17, two small groups of swifts flew around. 8:40, a kestrel flew into a nearby oak.
2019-08-07	20:00:00	21:10:00	20:37:00	25	2	None	1	20:18:00	20:18:00	1		At the beginning of the watch, a Kestrel was observed on the highest point of the red brick house at 360 Queens. After sunset, 2 Kestrels were observed, perching at various times on the South chimney, NE chimney and the steeple. One Kestrel was still visible when we left at 9:10 pm, apparently settled in for the night in a corner of the woodwork immediately above the brick portion of the steeple.
2019-08-14	20:00:00	20:54:00	20:29:00	27	0	None	8	20:35:00	20:46:00	3	8:35=1 in, 8:40=1 in, 8:46=1 in	
2019-08-21	19:40:00	20:42:00	20:18:00	23	1	None	8	20:27:00	20:28:00	2	8:27=1 in, 8:28=1 in	8:02 4 to 5 circling then quiet. 8:08 about 12 circling and noisy then quiet. 8:24 about 20 flew by to the south.
2019-08-28	19:30:00	20:35:00	20:07:00	27	1	None	7	-	-	0	No ins--no outs	Maximum number of swifts in sky=14

Daytime Monitoring Table
May to August 2019

350 Queens Avenue, London
First-St. Andrew's United Church
South Chimney

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (C)	Wind Speed (0-7)	Precipitation	Cloud Cover 0-11	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-02	18:51:00	19:22:00	31	18	1	None	10	8				No entries or exits	Though there was regularly some swift presence overhead, it was often high up and not close to the chimneys. The only evidence of courtship was one chase by 3 swifts following in close proximity.
2019-05-15	12:08:00	13:08:00	60	18	3	None	2	10	0	0	0	none	No swifts closely approached or entered any of the 4 chims. Occas there were passovers of small groups of swifts. at 12:26 max no (10) chattered & circled in a tight flock, some dipping, some tight chases, then
2019-05-21	14:00:00	15:10:00	70	15	5	None	3	9	2	2	1	2:35 = 1 in; 2:37 = 1 out; 2:39 = 1 in; 2:42 = 1 out	There were 2 groups of 3's that often would fly altogether in a group of 6. Most of the time when they weren't foraging they would swirl around the N & S chimneys. SE & NE chimneys were ignored. 6 turkey vultures flew by, and the swifts all disappeared until a few minutes after they were gone.
2019-05-27	11:13:00	12:48:00	95	20	1	None	0	8	0	0	0	no entries or exits	Every 5 or 10 mins swifts (max of 8) would appear overhead and remain in area a min or two, sometimes as 2 subgroups that would come together, then apart, come together again, etc., sometimes 2 or 3 flying in tight formation, sometimes rapid chatter, sometimes silent, a few V-displays.
2019-06-04	09:25:00	11:10:00	105	14	1	None	10	10	4	2	2	9:53=1 in; 9:57=1 out; 10:01=1 in; 10:03=1 out; 10:47=1 in; 10:50=1 in.	End of watch: 18°C, cloud 5. At arrival 5 swifts overhead. During watch saw much chasing, rapid chattering, tight threesomes flying together, some V-flights, etc. Max of 8 seen at 9:48, 10 at 10:50. Over time, more swifts spent longer in area and less time out of area. After 10:50 several times noticed swifts passing through fine dead branches of a tree top visible behind N chimney, presumably collecting nesting material
2019-06-11	13:28:00	15:10:00	102	21	4	None	2	7	5	3	3	1:28=1in; 1:30=1 out; 1:34=1 in & 1 flew off; 1:44=1 in; 1:45=1 in; 1:45+=1 out; 1:53=1 in, 2:05=1 out.	During the watch, swifts entered and/or exited 3 of the 4 chimneys being watched, During 1st 40 mins or so, every few mins swifts present (up to 7) usually in sub-groups of 2 or 3, chasing & chattering, often just over church. Several times one or more swifts passed through dead twig area of nearby tree. After 2:10, swifts occasionally visible briefly, often as singles and usually high and silent, but during last 10 mins or so, up to 6 over church chasing & chattering and passing through dead twigs.
2019-06-17	09:30:00	10:30:00	60	18	4	None	8	5	0	0	0		
2019-06-25	09:00:00	10:45:00	105	20	4	None	5	4	0	0	0	none	Swifts were much less present around FSA today and when occasionally a few drifted into sight they were usually silent, high overhead, in a loose flock (none flying closely together) and did not remain long in the area. A Merlin, occasionally screaming, perched on the east side of the base of the steeple from 10:15 to
2019-07-02	09:28:00	11:10:00	102	25	3	None	9	8	6	2	4	9:40=2 approached chim & 1 entered; 9:45=1 in; 9:48=1 out; 10:03=1 out; 10:10=1 in & 1 peeled off; 10:29=1 in & 1 flew off; 10:35=1 in &1 flew off; 10:36=1 in	Until about 11:45, no more than a min or so would pass without swift presence overhead - circling, chasing, rapid chattering, sometimes dipping at chimney, often 2 pairs (sometimes 3 or 5 birds together) flying tightly together, a few V-displays and some body contact. After 11:45, much less swift presence in area. At 11:59 screaming Merlin seen at base of steeple, soon flew to far side. At 11:00 a Merlin (likely a different bird) flew N to S over church. At 11:05 a Merlin flew from far side of steeple, went S. The few
2019-07-09	09:34:00	11:41:00	127	20	1	None	0	5	0	1 (or 2?)	1 (or 2?)	10:13 = 1 out?, or did the bird not come from the chimney at all?; 10:40=1 out.	Sky hazy. Generally, swifts were flying high and usually silently, often in 2s or 3s, but up to 5. Occasionally, there would be a bit of chasing and chattering and a few V-displays. It can be difficult for an observer on the ground to accurately detect ins and outs at this chimney.
2019-07-16	09:00:00	11:04:00	124	25	2	None	1	8	1	2	1	10:04=1 out; 11:02=1 in & 1 out	Almost no swift presence in air during watch and, when present, swifts were almost always silent. Most entries were silent, direct, out of nowhere and usually with no advance circling. Exits were similarly discrete. The exception happened 10:56 to 58 when a loose flock that eventually numbered 8 assembled over the church. There was some circling in a tight knot, a pair could be distinguished, some lowish passes
2019-07-21	15:00:00	15:05:00	5	27	2	None	6		1			1 swift entered chimney	Casual Observation
2019-07-22	08:46:00	10:00:00	74	19	3	None	9	2	2	3	2	9:20=1 out; 9:21=1 out; 9:40=1 in; 9:43=1 out; 9:43+=1in.	9:02=1 Merlin flew over parking lot, S to N, 1 swift in pursuit. All entries & exits at this & NE chimney silent and direct. Entries to S chim came fr SE & departures went NE. About 9:35 a few times heard brief distant swift chatter to N. About 9:55 heard a few bouts of more prolonged, rapid swift chatter to N & E; once saw 2 swifts overhead. Otherwise no swift presence in area during watch.
2019-08-01	09:30:00	11:51:00	141	21	1	None	0	5	7	8	2	9:38=1 out; 10:15=1 in; 10:18=1 out; 10:20=1 out; 10:26=1 in; 10:27=1 in; 10:27+=1 out; 10:28=1 out; 10:30=1 in; 10:30+=1 out; 10:30++=1 in; 11:12=1 in; 11:12+=1 out; 11:14=1 out; 11:51=1 in.	Up to 11 am, few swifts in area & those usually circling silently high in NW to NE sky. After 11 am, swifts seen in same general area more often & with occasional chatter; when near church, they seemed most focused on S chimney. Rapid chatter heard once during watch when 3 flew tightly together over steeple at 11:36. After watch was over, at 11:56, 9 swifts momentarily appeared from N&E over parking lot, silent,
2019-08-06	09:15:00	11:20:00	125	24	4	Trace/ Occ Rain	9	5	3	1	2	9:20=1 in; 9:39=1 out; 10:58=1 in; 11:00=1 in.	Very occasionally during watch a few swifts could be seen circling high up, usually silently and far to the N. Occasionally brief bursts of chatter could be heard, usually to the E. Very little swift activity around the church. Entries silent and direct, by strong experienced fliers.
2019-08-09	09:38:00	11:45:00	127	20	3	None	0	1	2	3	2	10:25=1 out, went SE. 11:18=1 out, went E. 11:37=1 in, came from E, direct drop from high up. 11:38=1 out, went E (swift seen a min later flying high above offices E to W, then circling back and heading SE was likely same	No other activity by swifts in area during entire watch (except an exit from NE chimney). No vocalizations heard during entire watch. All entries and exits into or out of central flue. All entries were quick and direct, from high up, clearly by experienced swifts. At end of watch cloud 7, wind 4.
2019-08-12	08:55:00	11:00:00	125	23	1	None	8	1?	0	0	0	No entries or exits.	No swifts audible or visible in area throughout watch though a couple of possible sightings high up in the distant sky.

Observation Date	Start Time	End Time	Sunset Time	Start Temp °C	Wind 0-7	Precipitation	Cloud Cover 0-11	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-01	19:30:00	20:58:00	20:26:00	16	3	None	6	-	-	0	N/A	Swifts first spotted at 7:48 pm. ~6 flew over. Birds foraged for awhile fairly high up; showed little interest in descending to the chimneys. Swifts last seen at 8:36 pm heading north. A maximum of 10 swifts were seen flying together.
2019-05-08	19:50:00	20:55:00	20:34:00	13	5	None	8	-	-	0	00	Very windy and cool, two sets of 3 seen flying in the general vicinity of the church, but high in the sky. No dips at the chimney but heard chittering from the group. No kestrels or Merlins in sight.
2019-05-16	19:58:00	21:12:00	20:42:00	16	2	None	1	20:34:00	20:51:00	3	8:34=1 in, 8:43=1 in, 8:51=1 in.	I am not positive that a swift entered at 8:34. It may have just swooped down behind the chimney. As the sky darkened and it clouded over towards 9 p.m., it became increasingly difficult to perceive activity at this particular chimney.
2019-05-22	20:00:00	21:20:00	20:48:00	16	2	None	7	20:06:00	21:15:00	6	8:06 = 2 in, 8:08 = 2 out, 8:16 = 1 in, 8:18 = 1 out, 9:03 = 1 in, 9:04 = 2 in, 9:05 = 2 in, 9:15 = 1 in	7 swifts were seen on my arrival, then 2 more joined in 8:20. As it got closer to sunset, more birds joined in.
2019-05-26	20:10:00	21:22:00	20:52:00	17	2	None	0	20:40:00	21:05:00	3	8:40=2 in, 8:43=1 out, 9:05=2 in.	
2019-05-30	20:27:00	21:30:00	20:56:00	19	1	None	2	20:58:00	21:11:00	2	8:58= 1 in, 9:11= 1 in	When we arrived at 8:27 there were about 10 swifts circling low and very noisy. This kept up until about 9:06 when only 4 were circling and then by 9:12 they were all gone and it was very quiet. We had 7 swifts in total in the 4 chimneys for the night.
2019-06-03	20:30:00	21:45:00	20:59:00	17	1	None	0	21:10:00	21:14:00	4	none out	
2019-06-12	20:31:00	21:35:00	21:04:00	21	1	None	2	20:44:00	20:44:00	2	8:44=2 in	8 birds flying around and chattering at 8:32
2019-06-19	20:33:00	21:36:00	21:06:00	23	0	None	10	20:36:00	21:30:00	6	8:36=2 in, 9:17=1 in, 9:27=1 out, 1 in, 1 out, 1 in, 9:28=1 out, 1 in, 9:29=1 in, 9:29=1 in, 1 out, 1 in, 9:30=1 in	At 8:50pm a merlin flew toward the church and it was being chased by 2 swifts. The merlin landed on the weather vane, on the church, and stayed there until 9:03pm. Flew a short distance and returned at 9:04pm to the weather vane. At 9:05pm a second merlin landed on the weather vane and they were both there when we left at 9:37pm. Also, at 9:34pm a bat started circling around our heads and it was still flying in the area when we left. We saw a maximum of 7 swifts at one time.
2019-06-26	20:30:00	21:30:00	21:08:00	26	0	None	3	20:56:00	21:10:00	2	1 in 8.56 p.m., 1 in 9.10 p.m.	8.33 p.m. First swifts seen flying - a group of 6. 8.58 p.m. A group of 7+ flying overhead. Observed 2 (Falcons??) perched on weather vane on church spire
2019-07-03	20:33:00	21:39:00	21:07:00	27	2	None	0	21:14:00	21:29:00	2	9:14= 1 in, 9:22= 1 in, 9:28= 1 out, 9:28= 1 in, 9:28= 1 out, 9:29= 1 in	Nine swifts total in the area.
2019-07-10	19:53:00	21:30:00	21:05:00	22	0	Rain	10	20:56:00	20:56:00	0	8:56 - 1 in; 8:59 - 1 out.	We arrived early because of the rainshower that ended around 8:00 pm. I watched the NE and SE chimneys for about 30 minutes. Maximum number of swifts circling this evening was 8. A Merlin flew in around 8:06 pm, and perched on the north peak of the sanctuary roof. It remained there until I changed vantage points around 8:30 pm and I could no longer see it. At 9:07, I observed the Merlin in flight, with several swifts in pursuit. A Kestrel flew in at 9:13 pm and landed on the steeple.
2019-07-17	20:15:00	21:32:00	21:01:00	26	2	None	1	20:53:00	21:15:00	4	8:53 - 3 in, 9:15 - 1 in	As many as 12 swifts were visible overhead but few chose to roost here. A Kestrel appeared twice escorted by 4 or 5 Swifts, and later a pair of Kestrels perched on the ornamental vent on the Sanctuary building, sharing a snack of something that looked substantial in size (a mouse perhaps?)
2019-07-20	19:58:00	20:48:00	20:58:00	31	0	None	10	20:12:00	20:12:00	0	8:12= 1in, 8:13=1 out. Total in = 0, but 1 in & 1 out.	Clouds to N very black. By 8:02 wind = 6; thunder, lightning & rain (mostly light) ongoing during watch. At 8:12, temp dropped sharply. 24°C at end of watch. Watch ended 10 mins before sunset. 8:01=6 swifts flying & chattering over parking lot. At 8:08, 2 dipped & circled at N&S chims, one went E, one went N.
2019-07-24	20:30:00	21:25:00	20:55:00	22	1	None	0	20:42:00	21:08:00	9	8:42 1, 8:51 2, 8:53 1, 8:55 2, 8:59 1, 9:03 1, 9:08 1.	Lots of fly overs starting at 8:40
2019-07-31	20:14:00	21:20:00	20:47:00	23	2	None	0	20:25:00	21:01:00	10	8:25=1 in, 8:48=1 in, 8:52=1 in, 8:53=1 in, 8:54=2 in, 8:59=1 in, 9:00=2 in, 9:01=1 in	several times during the watching period we saw and heard 6-8 swifts, usually flying fairly high
2019-08-07	20:12:00	21:09:00	20:39:00	24	0	None	6	20:12:00	21:01:00	6	8:12=1 in, 8:13= 1 out, 8:35= 1 in, 8:39=1 in, 8:40=1 in, 8:49=1 in, 8:56= 1 in, 9:01= 1 in	1 kestrel seen flying and perched on the chimney, then was chased by swifts.
2019-08-14	20:00:00	20:54:00	20:29:00	27	0	None	8	20:38:00	20:46:00	3	8:38=1 in, 8:40=1 in, 8:46=1 in	
2019-08-21	19:40:00	20:42:00	20:18:00	23	1	None	8	-	-	0		
2019-08-28	19:35:00	20:37:00	20:07:00	25	1	None	9	-	-	0	None.	Maximum Number Seen in the Sky: 13. 8:10pm kestrel arrived, departed at 8:11pm

Daytime Monitoring Table
May to August 2019

613 Dundas Street, London ON
N Chimney, Baker's Dozen
(Metal Topknot)

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-24	09:34:00	11:00:00	86	15	3	None	1	4	2	0	2	10:35=1 in, 10:39=1 in, no exits	Bit of occasional chatter high up during watch & 1 to 4 swifts occasionally seen. By end of watch cloud was 4.
2019-05-27	09:20:00	11:00:00	100	16	0	None	0	6	2	0	2	10:44=2 in; no exits	On arrival, 6 swifts chattering & circling above the 5 chimneys being watched. At infrequent intervals during watch up to 6 swifts were briefly present chattering and chasing above the area.
2019-06-03	14:30:00	16:05:00	95	14	5	None	0	1	0	0	0		Observed 5 chims from W side of fence on E side of property of grey concrete block bldg at 629 Dundas, whose rear door faces onto Marshall. 14:37 – heard very brief chatter & saw 1 swift flying high going SW. No other swifts seen or heard. Starlings sometimes perched on rim. Starlings, pigeons and House Sparrows present in area.
2019-06-11	11:28:00	13:08:00	100	20	4	None	0	3	2	0	2	12:03= 1 in; 1:05=1 in & 1 flew off. Because the view of this chimney is somewhat confined, it is possible that an exit might have been missed.	Relatively little swift presence in area during watch; on 7 occasions up to 3 swifts were briefly in area, sometimes singles and sometimes 2 together; twice there was a gap of a half hour during which no swifts were seen or heard. During watch, the chimney at 620 Marshall was also used by swifts, but not 3 other chimneys also being observed.
2019-06-18	12:59:00	14:17:00	78	22	0	None	9	3	0	0	0	0	
2019-06-25	11:15:00	13:20:00	125	24	4	None	9	4	0	1	1	12:22= 1 out	During watch, swifts very rarely came into area, and then usually in conjunction with 620 Marshall. Otherwise very occasionally during watch heard brief high chatter and saw a few swifts. Starlings, House Sparrows and pigeons were in the area plus 1 Monarch butterfly.
2019-07-01	09:27:00	11:12:00	105	20	2	None	1	4	2	2	1	10:17=1 in; 10:25=1 out; 11:08=1 in; 11:10=1 out	At regular intervals during watch, up to 4 swifts overhead, usually circling high, sometimes chattering, sometimes silent, once saw a V-display. Due to construction, viewing site had to be moved to east side of parking lot behind St. Regis Tavern at 625 Dundas. Chimney top is now barely visible above surrounding roofs.
2019-07-08	09:43:00	11:23:00	100	21	2	None	0	4	6	4	2	9:47=1 in; 10:09=1 out; 10:14=1 in & 2nd peeled off 10 secs later; 10:17=1 out; 10:26=1 in; 10:31=1 out; 10:47=1 in (after a dip & circling); 10:49=1 in; 10:49+=1 out; 11:22=1 in.	Hazy sky. Swifts were visible overhead every few minutes during the watch, usually high and silent but occasionally lower and chattering.
2019-07-15	09:20:00	11:02:00	102	20	2	None	1	3	11	7	4	9:23=1 in; 9:24=1 out; 9:31=1 in; 9:44=1 in (while a starling sat on the rim); 9:56=1 in; 9:57=1 out; 10:01=1 in; 10:02=1 out; 10:09=1 in; 10:22=1 in; 10:23=1 out; 10:29=1 in; 10:30=1 out; 10:34=1 out; 10:42=1 in; 10:43=1 out; 10:43+=1 in; 10:48=1 in.	Very little swift presence in area during watch, but very occasionally up to 3 swifts seen overhead, or bursts of chatter heard very briefly. At 9:55, 1 was high over 613-N and 1 cruised low over same chimney; 1 entered soon after. At 10:21/22, 2, then 3, swifts were flying together chattering, 1 made some dips at 613-N chim, then 1 entered & 2 continued to dip, chatter & circle. It is possible that some exits might have been missed, as the view of this chimney was very low to the roof.
2019-07-21	12:31:00	14:55:00	144	23	2	None	10	8	13	12	2	12:52=1 in; 12:54=1 out; 12:59=1 in; 1:00=1 out; 1:14=1 in; 1:15=1 in, 1 out; 1:37=1 in, 1 out; 1:39=1 in; 1:40=1 out; 1:54=1 in; 1:55=1 out, 1 in; 1:56=1 out; 2:10=1 in, 1 out; 2:15=1 in; 2:16=1 out; 2:21=1 in, 1 out; 2:30=1 in; 2:31=1 out; 2:47=1 in; 2:49=1 out.	For much of watch swifts rarely detected except every 5 mins or so, one (or 2) might be high overhead or a brief burst of chatter heard. Chatter was often followed by an entry within 1 min. Most entries were followed by an exit within 30 to 60 secs. From 2:24 to 2:37, from 4 to 8 swifts overhead, sometimes in a loose flock, by times chasing and chattering in a tight flock, some V-displays and 2 flying close together. For about 1 hr towards latter part of watch, cloud broke up somewhat; temp at end of watch = 27°C. An in/out event occurred every 11 or 12 mins on average.
2019-07-29	09:30:00	10:45:00	75	23	3	None	1	1	2	3	2	9:37 = 1 in, 9:40 = 1 out, 9:47 = 1 out, 9:58 = 1 in, 10:27 1 out	no chattering and no swifts flying around
2019-08-05	10:00:00	12:00:00	120	22	2	None	0	3	1?	0	1?	10:04=1 possible entry	During watch, occasional high chatter and circling by swifts high up & far to N & NW. Several times swifts circled directly above 613-N chimney, but did not come down close to it. End of watch= 27°C, cloud 6. No activity at 613-S, 619-NW, 619-SW and 623 Dundas & 620 Marshall.

EVENING

Date	Start Time	Finish Time	Sunset Time	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum in sky at once	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-06-12	20:34:00	21:31:00	21:04:00	22	4	None	4	3	-	-	0	No entries or exits	Nine times from 8:30 to 8:57, chatter high up well to east. (once saw 1 swift, once saw 3) but no swifts seen or heard above or near 613-619 Dundas or immediate neighbouring buildings. After 2 swifts entered 655 Dundas chimney for night (well to east in area where chatter was heard), no swifts seen or heard. About 8:50, squirrel ran along south/rear edge of roof of this building, but did not approach any chimney. At 9:21, raccoon wandered along south/rear edge of roof but did not approach any chimney.
2019-06-27	20:10:00	21:46:00	21:08:00	29	3	None	1	5	20:30:00	20:52:00	1	8:30=1 in; 8:52=1 in; 8:52+=1 out	From arrival and at frequent intervals of considerable duration throughout watch, lots of chasing, chattering, tight flying by 2 or 3 swifts over general area.

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-24	09:34:00	11:00:00	86	15	3	None	1	4	0	1	1	9.53 = 1 out	Courtship display seen. Increased cloud cover and wind during observation period.
2019-05-27	09:20:00	10:59:00	99	16	0	None	0	6	0	0	0	0	Occasional 2-6 birds seen overhead. Courting display noted
2019-06-03	14:30:00	16:05:00	95	14	5	None	0	1	0	0	0		Observed 5 chims from W side of fence on E side of property of grey concrete block bldg at 629 Dundas, whose rear door faces onto Marshall. 14:37 – heard very brief chatter & saw 1 swift flying high going SW. No other swifts seen or heard. Starlings sometimes perched on rim.
2019-06-11	11:27:00	12:50:00	83	18	4	None	0	2	0	0	0	none	
2019-06-18	12:59:00	14:17:00	78	22	0	None	9	3	0	1	1	1:15 = 1 0ut	
2019-06-25	11:15:00	13:20:00	125	24	4	None	9	1	0	0	0	0	
2019-07-01	09:28:00	11:12:00	104	20	2	None	1	2	1	1	1	9:28 = 1 in, 9:44 = 1 out	2 approached the chimney but only 1 went in. Observation site now on east side of parking lot behind St. Regis Tavern, 625 Dundas.
2019-07-08	09:43:00	11:23:00	100	21	2	None	0	4	0	0	0	None	First swifts (2) observed circling in the area at 9:51 and at intervals through the entire watch. Groups of 1, 2, 3 and at times 4 birds circling.
2019-07-15	09:20:00	11:02:00	102	20	2	None	1	3	0	0	0	0	
2019-07-21	12:31:00	14:55:00	144	23	2	None	10	8	0	0	0	No entries or exits; no swifts approached or dipped at chimney.	For much of watch swifts rarely detected in area except every 5 mins or so, one (or 2) might be high overhead or a brief burst of chatter heard. For 10 or 15 mins towards end of watch, 4 to 8 swifts were present in area. Towards latter part of watch, cloud broke up somewhat; temp at end of watch = 27°C.
2019-07-29	09:30:00	10:45:00	75	23	3	None	1	1	0	0	0		
2019-08-05	10:00:00	12:00:00	120	22	2	None	0	3	0	0	0		During watch, occasional high chatter and circling by swifts high up & far to N & NW, but no activity near this chimney.

EVENING

Date	Start Time	Finish Time	Sunset Time	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum in sky at once	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-23	20:15:00	21:19:00	20:49:00	22	5	None	3	5	-	-	0	None	Bursts of chatter every few mins & occ dipping at 619 NW (chimney pots), 620 Marshall and 623 Dundas. 2 or 3 swifts seen together.
2019-06-12	20:30:00	21:34:00	21:04:00	22	4	None	4	3	-	-	0	no entries or exits	On 9 occasions from arrival to 8:57, heard chatter high overhead well to E (once saw 1 swift, once saw 3) but no swifts seen or heard above or near 623 Dundas or its immediate neighbouring bldgs. After 2 swifts entered 655 Dundas chim (well to E in area where chatter had been heard) no more swifts seen or heard. About 8:45 a squirrel ran over this bldg's flat roof but did not climb chimney.
2019-06-27	20:10:00	21:45:00	21:08:00	29	3	None	1	5	-	-	0	no entries or exits	Swifts were seen and heard in the area when we arrived and until after sunset. One swift flew down and took a good look into the chimney but flew away and did not return.

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-05-24	09:34:00	11:00:00	86	15	3	None	1	4	2	2	2	10:15 = 2 in, 10:54 = 2 out	10:14: observed 3 swifts overhead and chattering. 10:29: observed 2 swifts overhead. 10:31: observed 4 swifts overhead.
2019-05-27	09:20:00	10:59:00	99	16	0	None	0	6	1	0	1	10.53= 1 in	Occasional 2-6 seen overhead. Courting flight seen
2019-06-03	14:30:00	16:05:00	95	14	5	None	0	1	0	0	0		Observed 5 chims from W side of fence on E side of property of grey concrete block bldg, whose rear door faces onto Marshall. 14:37 – heard very brief chatter & saw 1 swift flying high going SW. No other swifts seen or heard. Starlings sometimes perched on rim. Starlings, pigeons and House Sparrows present in area.
2019-06-11	11:27:00	12:50:00	83	18	4	None	0	2	2	2	1	12:15 = 1 in & 1 flew off, 12:18 = 1 out, 12:24 = 1 in, 12:28 = 1 out	Few swifts seen overhead. One pair seen to fly down together to the chimney, but only 1 entered, the other swerved away at the last moment
2019-06-18	12:59:00	14:17:00	78	22	0	None	9	3	0	0	0	0	
2019-06-25	11:15:00	13:20:00	125	24	4	None	9	1	2	2	1	11:20 = 1 in, 11:42 = 1 out, 12:56 = 1 in, 1:08 = 1 out	11:17 1 swift circling and repeatedly dipping towards the 2 chimneys (this one plus 623 Dundas). Starling seen on the top rim of the chimney and squirrel seen on the roof top
2019-07-01	09:28:00	11:12:00	104	20	2	None	1	2	2	1	2	9:30 = 1 in, 10:03 = 1 in, 10:18 = 1 out	Observation site now on east side of parking lot behind St. Regis Tavern, 625 Dundas.
2019-07-08	09:43:00	11:23:00	100	21	2	None	0	4	0	0	0	None	First swifts (2) observed circling in the area at 9:51 and at intervals through the entire watch. Groups of 1, 2, 3 and at times 4 birds circling overhead. Rock pigeon perched on the edge of the chimney twice during the watch period. Other birds noted in the area include House Sparrow, European Starling, and one House Finch.
2019-07-15	09:20:00	11:02:00	102	20	2	None	1	3	0	0	0	0	
2019-07-21	12:31:00	14:55:00	144	23	2	None	10	8	0	0	0	No entries or exits; no swifts approached or dipped at chimney.	For much of watch swifts rarely detected in area except every 5 mins or so, one (or 2) might be high overhead or a brief burst of chatter heard. For 10 or 15 mins towards end of watch, 4 to 8 swifts were present in area. Towards latter part of watch, cloud broke up somewhat; temp at end of watch = 27°C.
2019-07-29	09:30:00	10:45:00	75	23	3	None	1	1	0	0	0		
2019-08-05	10:00:00	12:00:00	120	22	2	None	0	3	0	0	0		During watch, occasional high chatter and circling by swifts high up & far to N & NW, but no activity near this chimney.

EVENING

Date	Start Time	Finish Time	Sunset Time	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum in sky at once	First Swift Entry	Last Swift Entry	Swifts in for the night	Ins and Outs by Swifts	Comments
2019-05-23	20:15:00	21:19:00	20:49:00	22	5	None	3	3	20:48	20:55	3	8:48=1 in; 8:55= 2 in	Bursts of chatter every few mins & occ dipping at 619 NW (chimney pots), 620 Marshall and 623 Dundas. 2 or 3 swifts seen together.
2019-06-12	20:30:00	21:34:00	21:04:00	22	4	None	4	3	-	-	0	no entries or exits	On 9 occasions from arrival to 8:57, heard chatter high overhead well to E (once saw 1 swift, once saw 3) but no swifts seen or heard above or near 620 Marshall or its immediate neighbouring bldgs. After 2 swifts entered 655 Dundas chim (well to E in area where chatter had been heard) no more swifts seen or heard. About 8:45 a squirrel ran along roof ridge and around the base of chim at 620 Marshall but did not climb chim.
2019-06-27	20:10:00	21:45:00	21:08:00	29	3	None	1	2	21:04	21:04	2	09:04=2	There were swifts flying around and chittering when we arrived and until after sunset. This pair of swifts flew close together much of the time and entered the chimney one after the other.

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-06-07	12:00:00	13:02:00	62	22	3	None	1	10	3	3	2	12:14 = 2 in, 12:25 = 2 out, 12:53 = 1 in, 12:58 = 1 out	Of the two chimneys on the church, only the larger chimney appeared to be in use at this time.
2019-06-15	12:15:00	13:15:00	60	16	4	None	10	1	0	0	0	None at all	Poor day for sightings and zero in or out.
2019-06-17	17:56:00	18:56:00	60	23	2	None	4	10	0	0	0	Zero ins and zero outs.	Lots of Swifts in the air but none entered or exited either of the 2 church chimneys that we know are open (uncapped).
2019-06-24	11:35:00	13:06:00	91	24	4	None	10	7	1	2	2	12:08 pm =1 in, 12:28 pm =1 out, 12:29 pm =1 out	Saw one Redtail Hawk soaring overhead. Chased by 2 Crows.
2019-07-01	18:13:00	19:20:00	67	27	5	None	3	9	0	0	0	Zero in or out	
2019-07-07	11:37:00	12:39:00	62	22	2	None	1	10	2	2	2	11:40 = 1 in, 12:08 = 1 in, 12:15 = 1 out, 12:16 = 1 out	
2019-07-09	12:38:00	13:50:00	72	25	1	None	10	12	1	2	2	1:10 pm = 1 in, 1:15pm = 1 out, 1:16 pm = 1 out	Lots of action. Few entries/exits. Lots of peer and veer and leer at different times! Cloud cover may have been forest fire smoke.
2019-07-15	11:27:00	12:39:00	72	22	1	None	1	8	1	2	1	11:31 = 1 in, 11:32 = 1 out, 12:20 = 1 out	Many peer and veers: one at 11:48; 3 at 12:05; one at 12:31; one at 12:32; one at 12:34; one at 12:35; 3 at 12:38. One Red-tailed Hawk observed.
2019-07-27	11:10:00	12:10:00	60	24	2	None	2	15	0	0			Several peer and veers. No entry/exit observed.

EVENING

Date	Start Time	End Time	Sunset Time	Start Temp (°C)	Wind 0-7	Precipitation	Cloud Cover 0-11	Maximum in Sky at once	First Swift Entry	Last Swift Entry	Swifts in for Night	Ins and Outs by Swifts	Comments
2019-05-02	19:50:00	20:35:00	20:27:00	9	1	None	6	3	-	-	0		No Nighthawks.
2019-05-22	20:20:00	21:20:00	20:48:00	13	0	None	1	12	20:56:00	20:56:00	2	2 ins at 8:56; zero outs	No Nighthawks

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-06-07	12:00:00	13:02:00	62	22	3	None	1	10	0	0	0		
2019-06-15	12:15:00	13:15:00	60	16	4	None	10	1	0	0	0	None at all	Poor day for sightings and zero in or out.
2019-06-17	17:56:00	18:56:00	60	23	2	None	4	10	0	0	0	Zero ins and zero outs.	Lots of Swifts in the air but none entered or exited either of the 2 church chimneys that we know are open (uncapped).
2019-06-24	11:35:00	13:06:00	91	24	4	None	10	7	0	0	0	None	No activity at this chimney today. Saw one Redtail Hawk soaring overhead. Chased by 2 Crows.
2019-07-01	18:13:00	19:20:00	67	27	5	None	3	9	0	0	0	Zero in or out in this slim small chimney at DSCUC	
2019-07-07	11:37:00	12:39:00	62	22	2	None	1	10	0	0	0	Zero	
2019-07-09	12:38:00	13:50:00	72	25	1	None	10	12	0	0	0		No action at this chimney!
2019-08-06	11:29:00	11:29:00		24	4	None	10		0	2	2	11:29=2 out.	Incidental observation.

EVENING

Date	Start Time	End Time	Sunset Time	Start Temp (°C)	Wind 0-7	Precipitation	Cloud Cover 0-11	Maximum in Sky at once	First Swift Entry	Last Swift Entry	Swifts in for Night	Ins and Outs by Swifts	Comments
2019-05-02	19:50:00	20:35:00	20:27:00	9	1	None	6	3	20:26:00	20:27:00	2	No exits	No Nighthawks.
2019-05-22	20:20:00	21:20:00	20:48:00	13	0	None	1	12	20:55:00	20:55:00	2	8:55= 2 in; no exits	No Nighthawks

Observation Date	Start Time	Finish Time	Duration (min)	Start Temp (°C)	Wind Speed (0-7)	Precipitation	Cloud Cover (0-11)	Maximum Number Seen in Air At Once	Total Entries	Total Exits	Maximum Number Inside Chimney at Once	Ins and Outs by Swifts	Comments
2019-06-07	12:35:00	13:02:00	27	22	3	None	1	10	2	2	2	12:35 = 1 in, 12:42 = 1 in, 13:02 = 2 out	
2019-06-15	12:15:00	13:15:00	60	16	4	None	10	1	0	0	0	Zero ins and zero outs	Poor day for sightings
2019-06-17	17:56:00	18:56:00	60	23	2	None	4	10	2	1	2	6:22 = 1 in, 6:23 = 1 in, 6:33 = 1 out	
2019-06-24	11:35:00	13:06:00	91	24	4	None	10	7	3	2	2	11:54= 1 in, 11:55=1 out, 12:24=1 out, 12:36= 1 in, 12:40= 1 in	
2019-07-01	18:13:00	19:20:00	67	27	5	None	3	9	1	1	1	6:31 = 1 in 6:33 = 1 out	
2019-07-07	11:37:00	12:39:00	62	22	2	None	1	10	3	2	2	11:50 = 1 in, 11:51 = 1 out, 12:15 = 1 in, 12:21 = 1 in, 12:23 = 1 out	7 times during observation of this chimney today, a group of 5 Swifts chattering incessently - closely approached the chimney together and one would break off and come within inches of the entrance to chimney and then pull up and away and rejoin the group again. During one of these times the single swift approached as if "fluttering" in for the night roost- and then pulled up and rejoined the group. This may be "peer and veer" behaviour.
2019-07-09	12:38:00	13:50:00	72	25	1	None	10	12	2	0		12:53 pm = 1 in, 1:36 pm = 1 in	At 12:36 pm one other Swift fluttered by the chimney opening. At 1:36 pm several swooped by (peer & veer?). Did not observe exits from this chimney. Don't know max inside chimney at one time. Overall, seemed to be few entries and exits at this time.
2019-07-15	11:27:00	12:39:00	62	22	1	None	1	8	5	6	2	11:38 = 1 in, 11:39 = 1 out, 11:48 = 1 in, 11:49 = 1 out, 11:57 = 1 in, 11:58 = 1 out, 12:14 = 1 out, 12:28 = 1 in, 12:29 = 1 out, 12:31 = 1 in, 12:32 = 1 out	Peer & Veer by one swift at 11:15. One Red-tail Hawk observed.
2019-07-27	11:10:00	12:10:00	60	24	4	None	2	15	2	1	2	1 in at 11:24am, 1 in at 11:38, 1 out at 11:39	Swift at 11:24 "floated" into chimney as opposed to directly in. Swift at 11:38 was awkward and may have been a juvenile.
2019-08-06	11:32:00	12:31:00	59	24	4	None	10	7	0	0	0	No entries or exits.	At intervals during watch, small groups of swifts (up to 6 or 7) circled above area, occasionally with some chatter.

APPENDIX J

Details/Summary of Early Season (to Early June) Swift Activity at Monitored Chimneys

22 Maitland St, Smith Fruit

During the month of May, Smith Fruit hosted a communal overnight roost (range of 3 to 22, but rising to 104 on May 30). On each of the evening monitoring visits during May (1, 8, 16, 22, 26 and 30), at least 1 swift entered around or before the time of sunset, suggesting possible occupancy for nesting purposes.

Yet, daytime monitoring visits on May 14 (15 ^{o}C, mid-aft, ~1.5 hrs) and May 23 (26 ^{o}C, late aft, 1 hr) detected no entries or exits, though, on May 23, up to 10 swifts were actively foraging and socializing overhead. On May 31 (24 ^{o}C, late aft, 1 hr), a pair of swifts entered and exited the chimney together several times.

While Smith Fruit may have been occupied overnight by potential nesters as early as May 1, daytime occupancy was not detected until May 31, when a pair entered together (no daytime use of chimney seen on May 14 and 23).

300 Wellington St, Phoenix

During the first half of May, Phoenix hosted few birds overnight. The 3 entries on May 1 were of separate individuals; there were no entries on May 8; but, on May 16, 2 entered together with no circling, suggesting a possible mated pair. On May 22, when 193 swifts spent the night in the chimney, there were several ins and outs (including by 2 swifts together) long before sunset, again suggesting a possible mated pair. On May 26 there were a couple of single entries more than 15 mins earlier than the bulk of the 139 swifts entered for the night. On May 30, there were 3 early entries, including by a pair more than 15 mins before most of the 66 swifts entered.

On May 18 (17 ^{o}C, mid-aft), a casual observation noted a swift entering the chimney. Phoenix was first formally monitored in the daytime on May 23 (25 ^{o}C, mid-aft, 1.5 hrs), when no swifts were observed in the area at all. On May 31 (11 ^{o}C, mid-morn, 1 hr), there were 2 entries and 2 exits, spaced well apart, but with probably no more than 1 swift inside at once.

Evening results suggest a pair may have been using the Phoenix chimney at night at early as May 16. A single daytime entry was noted on May 18 but daytime activity was not formally detected until May 31 (inactive on May 23).

350 Queens Ave, First-St. Andrew's-SE (round slim chimney)

During evening monitoring there were no entries on May 1, 8 or 22, but 2 swifts entered together on May 16, and 2 swifts entered 2 mins apart on each of May 26 and 30.

During daytime monitoring, on May 2 (18 ^{o}C, early eve, .5 hr), May 15 (18 ^{o}C, noon, 1 hr), May 21 (15 ^{o}C, mid-aft, 1 hr) no swifts approached the chimney though there were 8 to 10 swifts in the air on each occasion. On May 27 (20 ^{o}C, late morn, 1 hr), several entries and exits were well-spaced apart; max inside at once was 1. On June 4 (14 ^{o}C, mid-morn, 2 hrs) entries and exits were well spaced out; there was a max of 2 inside at once. There was much courtship in the area and twig collecting was observed, though it was not possible to determine whether these activities involved the swifts of FSA-SE or only swifts associated with neighbouring chimneys.

A pair of swifts was likely occupying the chimney at night by May 16. Despite daytime visits on May 2, 15 and 21, daytime occupancy was first observed on May 27 but not until June 4 was a pair detected.

350 Queens Ave, First-St. Andrew's-NE (round slim chimney)

During evening monitoring, there were no entries or exits on May 1, but 1 swift entered on May 8. On May 16, 2 entered 10 mins apart; on May 22, there was an exit and 2 entries well spread apart; on May 26, 2 entered together; on May 30, 1 entered; 12 spent the night inside on June 3.

During the daytime, on May 2 (18 ^{o}C, early eve, .5 hr), May 15 (18 ^{o}C, noon, 1 hr), May 21 (15 ^{o}C, mid-aft, 1 hr) and May 27 (20 ^{o}C, late morn, 1 hr) no swifts approached the chimney though there were 7 to 10 swifts in the air on each occasion. On June 4 (14 ^{o}C, mid-morn, 2 hrs), there were some entries and exits including possibly a pair together; the max inside at once was 3. Courtship and collection of nesting material were observed, though it could not be discerned whether or not these activities were by swifts associated with FSA-NE.

No communal roost was present during May (though 12 swifts roosted on June 3). The first overnight occupancy was by 1 swift on May 8; thereafter there were 2 swifts per night for the rest of the month. Daytime

visits on May 2, 15, 21 and 27 detected no entries or exits. The first daytime occupancy was noted on June 4, when there were numerous entries and exits and a max of 3 swifts inside at once.

350 Queens Ave, First-St. Andrew's-N (big square, 2-tiled chimney)

In the spring of 2018, this chimney was used as a communal roost by a max of 79 swifts (May 23/18). In 2019, during evening monitoring, there were no entries or exits on May 1 and 8; on May 16 there was 1 possible entry; on May 22, 9 swifts spent the night inside, including an early entry, exit and entry, well spread apart; on May 26, 2 entered together early, well ahead of 3 others; on May 30, 2 entered 1 min apart.

During the daytime, on May 2 (18 ^{o}C, early eve, .5 hr) and May 15 (18 ^{o}C, noon, 1 hr), no swifts approached the chimney though there were 8 to 10 swifts in the air on both dates. On May 21 (15 ^{o}C, mid-aft, 1 hr), 2 entered and exited together. On May 27 (20 ^{o}C, late morn, 1.5 hr), there was a max of 2 inside at once, the entries being well spread out. On June 4, (14 ^{o}C, mid-morn, 1.5 hr), the max in at once was 1, though there was a paired in and out. Courtship and gathering of nest material was happening in the area.

The first confirmed overnight occupancy was on May 22, when there was early entry/exit activity and 9 swifts spent the night inside. Despite daytime visits on May 2 and 15, the first daytime activity was noted on May 21, when a pair was using the chimney.

350 Queens Ave, First-St. Andrew's-S (rectangular, 3-flued chimney)

On May 1 and 8 during evening monitoring, there were no entries or exits; on May 16, 3 entered well spread apart; on May 22, 6 spent the night, including an early entry and exit by 2 swifts together and an early entry and exit by a single bird; on May 26, 3 spent the night including 2 that entered together and an exit; on May 30, 2 entered, well apart.

In the daytime of May 2 (18 ^{o}C, early eve, .5 hr) and May 15 (18 ^{o}C, noon, 1 hr), no swifts approached the chimney though 8 to 10 were in the air on each occasion. On May 21 (15 ^{o}C, mid-aft, 1.5 hrs), max inside was 1, entries and exits being spaced apart. On May 27 (20 ^{o}C, late morn, 1.5 hrs), no ins or outs but some courtship in area. On June 4 (14 ^{o}C, mid-morn, 1.5 hrs), max of 2 in, one paired out and in, then several single ins and outs.

Evening occupancy was first detected on May 16 (3 swifts). Despite visits on May 2 and 15, daytime occupancy was first noted on May 21.

613-N Dundas (metal topknot), Baker's Dozen

This chimney was active during the nesting season in 2018. In 2019 it was not visited in the evening until June 12, when no activity was detected. The chimney was first visited in the daytime on May 24, when there was a single entry followed by a second entry 4 mins later. On the next daytime visit (May 27), a pair entered together.

613-S Dundas (flat top), Baker's Dozen

The chimney was active during the 2018 nesting season. No daytime or evening activity was seen in 2019.

619-NW Dundas (chimney pots), Baker's Dozen

This chimney was active during the nesting season in 2018. No daytime or evening activity was detected at this chimney in 2019.

619-SW Dundas (open flue plus mesh-covered tile), Baker's Dozen

This chimney was not known to be active during the nesting season in 2018. No daytime or evening activity was detected at this chimney in 2019.

623 Dundas (flat-roofed warehouse behind Root Cellar Restaurant)

This chimney was active during the nesting season in 2018. In 2019, there were no entries or exits during an evening visit on May 23. Daytime use was noted on May 24, but not on May 27 and June 3.

The chimney was occupied sporadically during the nesting season, too infrequently to indicate a nesting attempt.

620 Marshall St (old livery stable)

This chimney was active during the nesting season in 2018. During evening monitoring on May 23, a pair entered together plus a single swift. During daytime monitoring on May 24 there were entries and exits by a pair. There was activity at the chimney on May 27 and June 11 but not on June 3.

482 Dundas-big square NE chimney (Dundas St Centre Church)

This chimney has been used by swifts in past years. During evening visits in 2019, no swifts were present on May 2, but a pair entered the chimney on May 22. The chimney was first visited in the daytime on June 7, when a pair of swifts was using the shaft.

482 Dundas St-slim NE chimney (Dundas St Centre Church)

This chimney has been used by swifts in past years. During evening visits in 2019, a pair entered on both May 2 and May 22. The chimney was first visited in the daytime on June 7, but no swifts entered or exited then or on subsequent visits, except for 2 swifts that emerged around mid-day on Aug 6.

434 Maitland-S chimney (Thames Valley Midwives)

No evening visits were made to this chimney in 2019. It was first monitored in the daytime on June 7, when a pair of swifts was using the shaft.

APPENDIX K

Interpretations of Likely Outcomes of Monitored Chimneys

The following material largely consists of assessments made by Barb Stewart of Manitoba after examining all field data related to the 2019 London pilot (see Appendix I). Over the past 13 or so years, Barb pioneered the approach for monitoring daytime activity at nest chimneys that was generally used (though in a more limited way) in London in 2019. She identified and described myriad often-subtle swift behaviours that can be seen by an observer on the ground and that allow interpretations to be made regarding nesting stages and outcomes.

Comments by WW appear in italics in square brackets.

Smith Fruit, 22 Maitland St

- In 2019, Smith Fruit was a combined use site – it supported a small roosting population through May, then consistently through to the end of August. A nesting attempt at this site was indicated by daytime use (entry/exit events) seen in daytime monitoring sessions from May 31 to July 26.
- There were some evening exits between May 1 and May 26, but it is likely that spring arriving swifts were claiming a territory and/or sorting out their roosting preferences.
- The "arrival" peak of roosting swifts on May 30 is interesting in that numbers swelled up quite quickly = a big pulse of migrants arriving? *[WW: Other local chimneys had hosted larger numbers of migrants as early as May 1.]* The May 31 daytime session was interesting as that was the start of what could be interpreted to be nest-building activity. So when did the breeding pair get established? I am a bit surprised at the lack of daytime activity at Smith Fruit in mid-May.
- Helpers were onsite during the daytime over a stretch of time during the breeding season; the extra 2 to 3 swifts involved created an atypical nest site activity pattern (2 breeding birds and rarely 1 helper is usual).
- The evening June 26 entry/exit activity appears greater than what would be expected for "settling roost site squabbles" so I am inclined to think that breeding activity was still underway – possibly feeding brooded young by a pair plus helper(s).
- July 14 daytime data suggest that feeding non-brooded juveniles could be taking place. Two swifts seemed to track together and, of the 3 birds indicated being onsite, they were all out of the chimney at times = unattended young. The date is well within a window where a May 31 start of breeding could evolve to feeding non-brooded juveniles on July 14.
- Daytime activity on July 19 is low but it was a brutal hot 'n' humid day I suspect. The Phoenix site also had very low activity during 3 hours of morning observations that day. This indicates the swifts in London may have been struggling with overlaid conditions that were beyond their control.
- Daytime activity was higher on July 26, but I am suspicious about viable juveniles being onsite as the July 20th activity rate was also low.
- Also, the evening activity July 17 to 24 shows a drop in entry/exit activity that would indicate 2 to 5 adults feeding non-brooded young.

- Observers never mentioned flight descriptions that could indicate that fledglings, from this site or another, were overhead.
- An increasing head count during the roosting hour will never be the smoking gun for determining successful fledging at a combined use site.
- I am inclined to designate the breeding attempt at Smith Fruit 2019 unsuccessful.

[WW: The presence of an overnight roost of non-breeding swifts at Smith Fruit throughout the entire breeding season complicates interpretations at this chimney. We know nothing of the morning departure habits and daytime use of the chimney by the non-breeders, though there was nothing overt to flag any of the daytime entries or exits as possibly relating to individuals from this group. This makes it impossible to know whether or not some or all of the additional daytime entries/exits attributed to an unusually high number of helper birds might have been the comings and goings of members of the overnight roost of non-breeders.]

Phoenix, 300 Wellington

- Data from daytime and evening monitoring sessions support the designation of the Phoenix chimney as a combined-use site: there was a nesting attempt made in addition to housing roosting, non-breeding swifts throughout the season.
- A pair of breeding swifts was displaying in the vicinity on May 31 and by June 6 nest-building behaviour was evident.
- A helper appeared to be onsite June 18.
- For ease of counting, let's use June 1 as the nominal start of the breeding process, and use minimum values for transitions between stages of nesting. I count the transition days as Day 1 of the new stage, so it tightens up the elapsed time: e.g., end of hatching on Day 18 = Day 1 of feeding (i.e., feeding starts the day of, not the day after, hatching).
- So for Phoenix 2019: 7 days to nest build, egg lay and start incubation. With a VERY small clutch size, this takes us to June 7; use 18 days for minimal incubation to proceed to hatching = June 24; use 28 days for feeding of juveniles to fledging = July 21 as the earliest possible date of fledging.
- The July 16 consecutive exits by 6 swifts is challenging to explain! There was a confounding issue with a family of starlings using the rim for their own flight training purposes. Another confounding issue is the description of a tentative swift fledgling. But, based on the exercise above, the date is really too early for fledging. *[WW: Some or all of the 6 swifts might have been part of the group of non-breeding swifts that were overnighting in the Phoenix chimney around that time – 23 on Jul 10, 24 on Jul 17.]*
- Daytime activity is high July 21 to 23; large number of swifts using the site during the day of the 23rd; no fledglings noted. *[WW: Again, some of these birds – max of 17 inside at once on Jul 23 – may have been part of the non-breeding swift group that was spending nights here.]*
- Daytime activity on Aug 2 is ongoing with interesting circling/dipping/aborted dives behaviour noted; fledglings or near fledging indicated?
- For evening observations, there were 2 inflection points for changes in the number of roosting swifts: ~May 26 to 30 (decreasing) and ~July 31 to Aug 7 and 14 (increasing). This fits into a suggested pattern of use that says swifts aggregate at communal roosts in the spring before dispersing to nest sites and then reassemble after the breeding season, then proceed to migrate. Clearly, the number of roosting swifts at Phoenix is variable but nearly stable at 16 to 18 birds from mid-June to early July (then numbers went up slightly not down, so non-breeders were being added). Also, a breeding pair plus likely helper claimed the chimney for nesting purposes.
- The roosting data for Aug 14 followed by the morning data for Aug 15 is one for the record books! Truly a nugget of new behaviour to add to the variation of possibilities that can stymie us! What the heck were those swifts doing? *[WW: Anecdotal reports from past years in London and elsewhere show that, especially after mid-July, non-breeders may spend substantial amounts of time inside their roost chimneys during the day, especially in the morning, but large numbers of swifts have also been observed emerging from a roost chimney in the early evening, well before expected roosting time. There is much scope for future research to learn more about daytime roosting and its significance.]*
- The roosting maxima are different in the spring (peak = 193) vs the fall (peak = 312). Does the fall peak represent successful breeders repositioning themselves with juveniles, or is this the coalescence of local

birds, which were distributed more widely among other spring roost sites? We'll never know without tagging individuals. *[WW: Swifts in the fall peak might also come from out of town, as migrants from the north head southward.]*

- Bottom line for Phoenix = successful fledging is possible but it cannot be determined unequivocally. I try not to squeeze interpretations into what may be "hoped" for. And I always hope for success for these birds.

First-St. Andrew's SE, 350 Queens

- This site was used for nesting only (daytime activity plus ≤ 4 swifts roosting at night).
- A pair was onsite by the nominal cut-off date *[of June 4 in Manitoba]* for possible successful outcome of a breeding attempt.
- June 17 = an incubation exchange indicated.
- July 9 = 1/2 hour between visits and ~2 minute duration in the chimney suggests feeding brooded young (partner exchanges taking place; no indication of pair being out of chimney together).
- July 10 to 17 nest failed and site abandoned. This is unlike *[the more usual scenario]*, where the breeding adults typically continue to roost *[in the home chimney]* until the first set of fledglings *[in the neighbourhood*] are airborne.
- Consider a possible relocation between sites after a nest failure (i.e., swifts from FSA-SE moving to FSA-NE *[to become helper birds]*).

First-St. Andrew's NE, 350 Queens

- The site appears to have been an early spring *[mini-]*roost (n = 12 on June 6), after which the chimney became a dedicated nest site.
- On June 4th, 3 swifts (breeding pair plus helper) were using the site during the day = meets criteria for nest site (any entry/exit activity outside the *[hour bracketing sunset]*. *[June 4]* is the Manitoba cut-off date for possible successful breeding outcome.
- Continued daytime activity through to August 9 would suggest that possible successful fledging could have taken place: i.e., presence of swifts over the required cumulative time for nest building, egg laying, feeding brooded and non-brooded young has been met.
- Activity pattern holds fairly steady at 2 visits per hour from July 9 to Aug 1, so feeding seems to be ongoing (all the required stages of nesting preceding feeding are assumed to have taken place!).
- Based on the Manitoba condition – which may be very different to southern Ontario – the activity pattern is NOT classic however; there is no marked increase in daytime activity suggesting a higher rate of feeding non-brooded young; nor is there a flag to indicate fledging *[i.e., an increase in number of birds entering the chimney for the night]*.
- On Jul 16, 4 entries in 2 hours is good. I wonder if there is a helper here. There are 2 swifts for sure; the 10:07 entry indicates 2 swifts in the chimney. The 10:08 exit indicates 1 minute between visits, which is too short for the outgoing bird to feed and return.
- On Jul 22, if only 2 swifts are involved, the site was unoccupied from 8:57 to 8:58; however, the passage of time from the 16th to the 22nd is enough on its own to allow for the transition from brooded to non-brooded young.
- The evening data do offer some insights – the Aug 7th event *[of 2 inexperienced fliers trying to enter the chimney at dusk]* suggested some fledglings may have been present, but nothing like a good old confounding factor to be added by the hunting kestrel! It would make sense biologically for a predator to exploit less talented fliers!
- If fledging did take place, and if the fledglings roosted in their natal site (not always the case), then you may have had only 1 to 2 fledglings. There was a blip of 3 roosting swifts Aug 7 and Aug 14; I would think your sites are very dynamic and exchange could happen easily *[with several active nesting chimneys so close together]*.
- The absence of increased head counts at a site does not mean fledging has not happened!
- The entry/exit activity during evening sessions through early Aug has nudged me over to calling this breeding attempt a likely success with tentative fledging.
- *[WW: At least one kestrel (sometimes 2) was hanging around and/or perching on FSA roof features and chimney tops during successive evenings around the time of expected fledging at FSA chimneys. This*

raises the possibility that one or more poorly flying youngster may have been caught by a kestrel or that some youngsters, and possibly parents too, very soon after initial fledging, may have chosen to spend nights away from church chimneys to avoid risking exposure to kestrels (there are other suitable chimneys within a block or 2).]

- What interests me is the July 17 evening data pooled from many sites. FSA-NE had 4 roosting swifts this night = a relative peak. This increase in number takes place on the same date that a shift is seen at FSA-SE when a nest failure was indicated and the site was abandoned. There was also an increase in the number of roosting swifts at FSA-S on July 17th. So, I wonder if some movement by adults between chimneys was taking place.

First-St. Andrew's N, 350 Queens

- There was a spring *[mini-]*roost (n= 9, n=7 swifts) in May and June.
- Then a breeding pair plus helper(s) used the chimney during the daytime for nesting purposes.
- July 7 data yield really short between-visit interval(s), so that indicated a helper(s).
- By July 9, I wonder if there were non-brooded juveniles (Day 6-7 or beyond) in the nest – it seems peer 'n' veer activity was taking place.
- July 16 seems to have had continued feeding by at least 2 swifts that were both out of the chimney after 10:52 = another indication of non-brooded young.
- Things went south after that and I believe that no fledglings made it up and out of the chimney.
- The August 1st observations *could* have been interpreted as post-fledging touch 'n' go events by juveniles BUT there is no roosting hour activity, from July 17 and beyond, that suggest any increased pre/post fledging activity let alone an increased number of swifts.
- This was likely a failed breeding attempt.

First-St. Andrew's S, 350 Queens

- The site was an early spring *[mini-]*roost (n=6 on May 22).
- A breeding pair remained on site; approx. 1 to 2 helpers were indicated (evening data for May 26, 30, June 3, 12).
- June 19 evening was interesting – in Manitoba we often see changes in numbers in the last half of June = re-dispersing locals or late-arriving migrants, but the changes are usually a new occupation of a previously empty chimney. Having said that, helpers have been known to arrive and can move about between sites depending on the stage of nesting. And here is another case of a kestrel changing swift behaviour!
- July 17 – I've talked *[elsewhere]* about the increased roosting count in this chimney and at FSA-NE this evening. All very neat stuff!
- Shifting back to daytime observations: a pair was onsite and active June 4th = at the cut-off for a possible successful breeding attempt *[per the experience in Manitoba]*.
- June 17 and June 25 were no-show sessions but that darned merlin was about on the 25th!
- July 9 – rim blips *[hard-to-see exits from the chimney]* are SO frustrating. Swifts really don't care about abiding by our optimum playbook.
- July 16 – Activity rate low but the same was going on at FSA-N; possibly a bad bug day? It was brutally hot at 9:00 am!
- Now it's time to go back and forth between daytime and evening data ~ I wonder if fledging took place ~July 24; there is a really nice meshing of increased head counts on July 24 pm, and July 31 pm and Aug 1 daytime when you saw some swifts "flapping hard".
- If you use a baseline of 4 adults, and perhaps 6 to be conservative (see June 19th pm and July 2 daytime when 4 swifts entered but each showed up associated with another swift that peeled off/flew off – another really interesting behaviour!), then the maximum number of fledglings may be calculated using the July 24 head count of 9 swifts and the July 10 head count of 10 swifts. And yes, this is assuming that only the natal group is present! 9-4 = 6, 9-6 = 3; 10-4 = 6, 10-6 = 4 respectively. So the range of fledglings estimated by behaviour observations = 3 to 6 which is in the expected range.
- I would be inclined to call this a successful breeding attempt.
- Long sessions that stretch into the 2 hour mark give good data for duration-in/turnaround time and between-visit intervals! Plus the behaviour notes are so supportive for interpreting purposes.

Baker's Dozen (chimney with metal topknot), 613-N Dundas

- A pair was onsite May 24 and had a long duration inside the chimney together – the site seemed to be claimed.
- June 11 = egg laying/incubation could be taking place.
- June 25 = long intervals for both duration inside and between visits.
- July 1 = feeding brooded young.
- July 8 = IFF only 2 adults were involved, there was an unattended stretch of >14 minutes, possibly indicating non-brooded young.
- July 15 = 2 helpers present? – it is too early for fledging.
- The July 21 activity is crazy busy! Wow!
- Especially for mid-afternoon; it would have helped to have a couple more observation sessions between July 21st and 29th and Aug. 5, but I sure understand the stretch of limited resources.
- Possible fledging occurred based on activity over the breeding season, but it cannot be determined conclusively – maybe early fledging and relocation to another site?

Baker's Dozen (chimney with smooth top), 613-S Dundas

- *[No swift activity whatsoever and no nesting attempt in 2019 (though used by swifts in 2018).]*

Baker's Dozen (chimney with 2 chimney pots), 619-NW Dundas

- *[No swift activity whatsoever and no nesting attempt in 2019 (though used by swifts in 2018).]*

Baker's Dozen (chimney with mesh-topped tile and one open flue), 619-SW Dundas

- *[No swift activity whatsoever and no nesting attempt in 2019 (not known if used by swifts in 2018).]*

Flat-roofed warehouse behind Root Cellar, 623 Dundas

- Of 12 daytime and 2 evening monitoring visits, swifts were noted using the chimney on only 3 occasions – May 24 = 1 exit, June 18 = 1 exit, July 1 = 1 entry & 1 exit 16 minutes later.
- I think there was not sufficient activity to indicate a nesting attempt took place.
- Swifts were clearly investigating the site = young, non-breeders?
- Investigation of site but no nesting attempt.

Old livery stable, 620 Marshall

- *[May 23 evening – swifts dipping at chimney and 2 entered together (total of 3 in for night).]*
- *[May 24 – pair entered and exited together in daytime.]*
- *[May 27 – single entry; courtship observed in area.]*
- *[June 3 – no entries or exits, cool day (14 ^{o}C), during 95 mins just 1 swift seen (flying high); starlings sometimes perched on chimney rim.]*
- *[June 11 – 2 paired entry/exit events in 83 min; once pair approached chimney – 1 entered, other flew off, possible nest building?]*
- *[Jun 12 evening – no entries or exits or swift presence at or near any of 5 chimneys; a squirrel on roof ran around base of chimney at 620 Marshall (not a tall chimney); raccoon roamed on nearby roof.]*
- *[June 18 – no entries or exits, possible incubation?]*
- *[June 25 – during 125 mins, 2 entries and 2 exits, well spread apart; max of 1 inside at once; at 11:17 am 1 swift circled silently and repeatedly dipped at chimney, entered at 11:20; starlings occasionally perched on rim of chimney; squirrel seen on roof circling base of chimney; 2 entries and 1 exit well spaced apart.]*
- *[June 27 evening – pair spent extensive time flying around together and entered together for the night.]*
- *[Jul 1 = 2 swifts tending chimney; max of 2 inside at once.]*
- *[No swift activity seen at chimney on subsequent daytime visits.]*
- *[Unsuccessful nesting attempt. Were squirrels and starlings a deterrent?]*

Dundas St Centre Church, 482 Dundas – NE big square chimney

- June 7 = pair moving together during daytime – nest building likely.
- June 24 = long duration in.
- July 7 = periods of unattended chimney = non-brooded young?
- July 9 = non-brooded young being scoped out.
- July 15 = non-brooded young still drawing attention.
- Long interval between July 15 and July 27 makes it difficult to definitively establish if fledging took place.
- I think there is insufficient data to call it a nest failure or a successful fledging/relocation...tough to make a full picture out of snapshots, but here's a shout out of thanks to the volunteers for documenting a breeding attempt and establishing the chimney to be viable habitat!
- Breeding attempt but outcome undetermined.

Dundas Street Centre Church, 482 Dundas – NE small slim chimney

- *[Chimney occupied overnight by 2 swifts on May 2 and 22.]*
- *[No daytime activity during June and July.]*
- *[Two exits observed at 11:29 am on Aug 6 suggest swifts prospecting against future possibilities, perhaps next year.]*
- *[Some early spring overnight use plus post-season daytime investigations; no nesting attempt.]*

Thames Valley Midwives office, 434 Maitland Street – S chimney

- June 7 = a pair is onsite and moving together – nest building seemed underway.
- June 24 – IFF 2 adults are involved, there was a short, 2 minute unattended interval.
- July 1 = a nice classic incubation exchange.
- July 7 – 3 times per hr feeding rate with unattended period of 24 min suggests non-brooded juveniles (so hatching could have been later in the day on July 1 or July 2 (just like swifts to do the amazing things when you turn your back!).
- July 9 and 15 – nice to see those peer and veers with activity in the chimney, feeding continues.
- July 27 – could the floating entry be a juvenile?
- It would have been great to see a net increase in swifts using the chimney. So, fledging may have occurred but a successful nesting attempt cannot be established conclusively due to gaps in monitoring.