

POSSIBLE EFFECTS OF PLACEMENT TIMING ON THE USE OF REPLACEMENT HABITAT BY CHIMNEY SWIFTS IN MANITOBA

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Introduction

Loss of breeding and roosting habitat is one of the primary threats to the Chimney Swift (*Chaetura pelagica*) in Canada.¹ Prior to European settlement, this species nested and roosted in hollow trees in mature forests, only switching to chimneys during periods of urban expansion.² Since the Breeding Bird Survey was introduced in 1970, the Chimney Swift has declined significantly in Canada, culminating in it being listed as Threatened under the federal *Species at Risk Act* and in Manitoba, under *The Endangered Species and Ecosystems Act*.¹

Although breeding and roosting habitat loss is not considered a limiting factor in some regions, evidence from Manitoba and elsewhere suggests that annual loss of occupied habitat is still occurring on the Chimney Swift's nesting grounds.^{1,2,3,4} Consequently, replacing demolished, capped or lined chimneys has become a key focus for Chimney Swift conservation in Manitoba. The provincial legislation specifically protects the habitat on which listed species depend for breeding and other key parts of their lifecycle. The Manitoba Government has therefore required mitigation in two instances for the loss of breeding and roosting habitat on Crown lands. The structures supporting the habitat were deteriorating to the point that they endangered the public and were therefore in need of demolition. In each case, mitigation plans were prepared and, prior to demolition, a letter of exemption was issued under *The Endangered Species and Ecosystems Act* by the Government of Manitoba and a permit was issued under the federal *Species at Risk Act*, both permitting the destruction of Chimney Swift habitat.

Here I describe the process and the subsequent use by Chimney Swifts of these structures. These exemptions stipulated that habitat should be replaced at a ratio of one new structure for every structure destroyed at the first site and two new structures for every structure destroyed at the second site, both of which are described in more detail below. I also describe use of playback to draw Chimney Swifts to each structure in spring 2021.

Methods

Old Grace Hospital

A large brick chimney at the Old Grace Hospital in the Wolseley neighbourhood of Winnipeg, Manitoba, was demolished in the winter of 2014.⁵ Initially, a large timber tower was constructed on the site of the hospital, but was only completed

in July 2015, too late to support nesting that year. No Chimney Swifts were recorded roosting in the tower over the subsequent weeks. The tower was removed in the fall of 2015 to facilitate new buildings at the Old Grace location and it was moved to the Assiniboine Park in Winnipeg in 2018.⁵ Construction of a multipurpose housing complex, the Old Grace Housing Cooperative, began on the original site in 2016 and was formally opened in 2019. A false chimney was constructed within the new building development as long-term mitigation for the loss of Chimney Swift habitat. The chimney (Figure 1) was constructed of concrete blocks and the internal dimensions of the chimney are 0.46 m x 2.80 m x 11.00 m, with the top two metres above the eaves. A 38 mm overhang was constructed over the entrance to provide



FIGURE 1: False chimney at the Old Grace Housing Cooperative. Note that the chimney is the large red rectangular structure in the centre of the photograph. Photo credit: Ken De Smet, Manitoba Government.

a rain shield. These dimensions were equivalent to, or exceeded, minimum dimensions of chimneys that are used successfully by Chimney Swifts in Manitoba.⁶ The chimney was designed specifically to occupy an area of wall as part of the overall site development plan (Figure 1).

The false chimney was completed in 2018, but upon closer inspection it was found that horizontal metal support bars remained inside the chimney during the breeding season. These were removed by spring 2019 and the chimney is now considered to be suitable for Chimney Swifts. There was, however a four-year gap in habitat availability at this site. Prior to 2021, no Chimney Swifts were observed using the Old Grace Housing Cooperative site during nest and roost monitoring, which covered a period 60 minutes before and 30 minutes after sundown.⁷

Selkirk Mental Health Centre

Three chimneys have either been demolished or capped, or are to be demolished in the near future, at the provincially owned Selkirk Mental Health Centre in Selkirk, Manitoba. Four artificial towers were constructed at this location in spring and summer 2021, which were part of a mitigation plan in lieu of the destruction of three buildings with chimneys used by Chimney Swifts on the site (Figure 2).⁸

A known nesting chimney on the Unit B building was capped in fall 2015 as there was a possibility of imminent demolition. A second chimney, the 36.6 m (120 foot) tall Powerhouse stack chimney, was demolished in April 2021. Since monitoring began in 2007, this chimney was a significant roost site, supporting up to 61 Chimney Swifts on a single night (Manitoba Chimney Swift Initiative, unpublished data). The Tankhouse and its chimney is to be demolished, but was still standing in April 2022. There are no plans to demolish the Red River College building that also supports a nesting chimney. The letter of exemption and federal permit allows for the destruction of all three buildings and the subsequent construction of six replacement artificial towers.⁸ Three replacements, two free-standing towers (T1 and T2 in Figure 2), and one tower attached to an existing

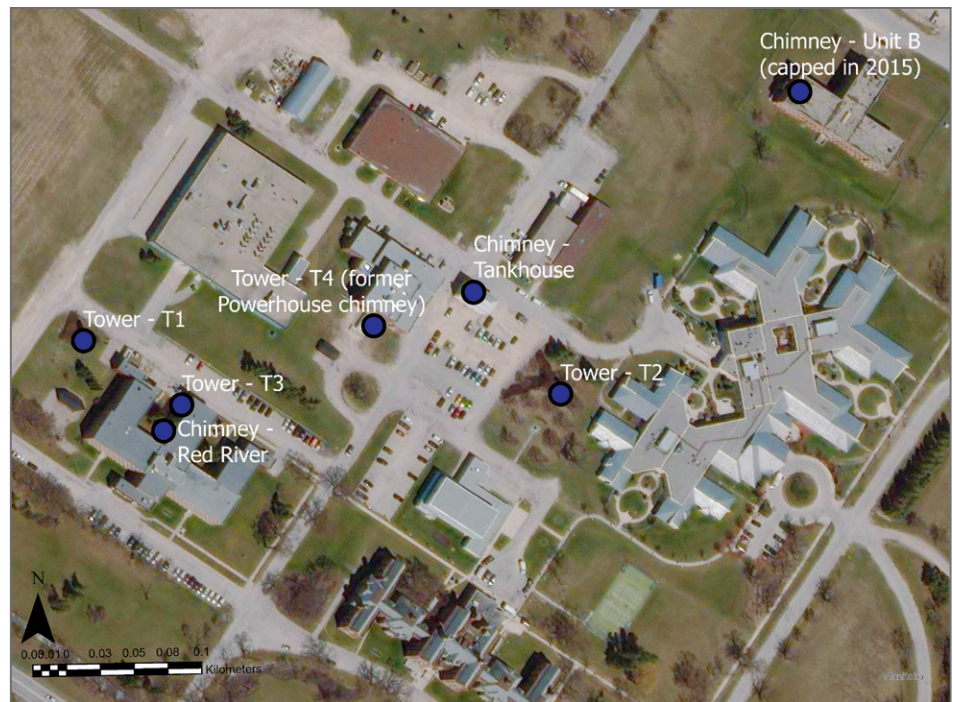


FIGURE 2: Plan of all chimneys at the Selkirk Mental Health Centre. Map created on ArcGIS Professional and property of the Government of Manitoba.

building (T3 in Figure 2) were constructed before 1 May 2021. The fourth tower (T4 in Figure 2; Figure 3) was completed in mid-June 2021 and built on the site of the Powerhouse chimney. All tower designs and construction were based on the successful tower at the Assiniboine Park (former Old Grace tower), the design of which followed guidelines from the Manitoba Chimney Swift Initiative.^{5,6} Internal dimensions of T2, T3 and T4 are 0.762 m x 0.762 m x 10.36 m; T1 is 0.76 m x 0.76 m x 13.82 m. The inside of each tower is lined with rough sawn cedar and the outside is clad with steel sheeting.

Playback protocols

Given the lack of occupancy at the Old Grace Housing Co-op and the urgency of attracting Chimney Swifts to the Selkirk towers, I established a playback protocol to try to draw Chimney Swifts to these sites in the summer of 2021. Playback has been used successfully to attract Chimney Swifts to artificial towers in Minnesota and Ontario, although in the Ontario case, no Chimney Swifts settled to breed in the towers following playback.^{9,10} The Ontario playback also employed the use of artificial Chimney Swift decoys over the tower and employed a two hour protocol with an initial period of 30 minutes of passive observations followed by 60 minutes of

playback and decoy-use, followed by a final 30 minutes of passive observations.¹⁰

Pre-recorded generic Chimney Swift calls were downloaded from a CD purchased from the Chimney Conservation Association onto an MP3 player and broadcast from a wireless Bluetooth speaker placed near the base of each structure.¹¹ Towers T1 and T3 were close enough to consider a simultaneous response by Chimney Swifts and therefore the speaker was placed between these towers. Playback commenced once it was confirmed that Chimney Swifts had returned to Manitoba in the spring, based on volunteer reports to the Manitoba Chimney Swift Initiative (MCSI) and submissions on eBird.¹² I designed a 70-minute protocol



FIGURE 3: Tower T4 at the Selkirk Mental Health Centre. Photo credit: Robert Stewart.

for daytime monitoring (defined as periods that ended at least 30 minutes before sundown) and a 90-minute protocol during the roosting period (the 30-minute period either side of sundown). Playback was conducted by volunteers from MCSI, residents of the Old Grace Housing Cooperative and me. Most playback at Old Grace was conducted in the late afternoon, whereas playback at Selkirk was primarily conducted in the morning and during the roosting period. Monitoring began with 10 minutes of silent observation. Following this, playback was broadcast for five minutes interspersed with 10 minutes of silent observation. This 15-minute protocol was repeated four times during the observation period. The protocol was unchanged if used during the roosting period, with all playback ceasing for the final 30 minutes of the 90-minute period, providing for a 30-minute period of silent observation. If Chimney Swifts entered the tower, the playback protocol ceased for the remainder of the observation period and all monitoring switched to silent observation.

Playback ceased if sites were considered to be occupied by Chimney Swifts. Occupancy was defined as at least one bird entering the structure and remaining inside during the roosting hour on a minimum of two evenings between spring arrival and 7 June. Playback was stopped at both sites after 7 June as Chimney Swifts would be expected to be constructing nests by this date.¹³ Monitoring continued if volunteer resources allowed, on at least one day per week until the end of June at the Old Grace Housing Cooperative and until mid-September (fall migration) at the Selkirk Mental Health Centre (as defined by no Chimney Swifts present for two consecutive visits) using MCSI monitoring protocols.⁷

Stages of breeding were estimated in each structure from June through to September, using the daytime monitoring protocols established for Manitoba.¹⁴ A Reconyx Hyperfire 2 Trail Camera was also placed in the base of T2 at the beginning of May, propped up to face the west-facing wall. Photographs of Chimney Swifts taken by this camera

were used to supplement monitoring data, primarily by confirming the presence of Chimney Swifts in the tower.

All towers were accessed via cleanout doors at the base of the structure in fall and winter to check for evidence of Chimney Swifts, including droppings, nests, egg shells, feathers and carcasses.

Results

Chimney Swifts were first reported in Winnipeg on 6 May 2021, and in Selkirk on 12 May 2021 (Amanda Shave, pers. comm.).¹² Playback at Old Grace Housing Co-op began on 6 May 2021, and was broadcast six times (Table 1). Supplementary roost monitoring without playback was also conducted on other evenings during the spring (Table 1). No Chimney Swifts were observed using the chimney during any monitoring and no evidence was found of use during an inspection of the cleanout on 3 December 2021. Chimney Swifts were seen flying high above the property during the summer, including during roost monitoring, but no apparent direct interest was shown in the site.

Playback at Selkirk Mental Health Centre began on 18 May 2021 and was conducted on five occasions (Table 2). There was a resident Chimney Swift population on site, and birds responded vocally and behaviourally to playback.

Observed behaviours included turning to swoop over the rim of the towers and chasing, behaviours which are associated with breeding Chimney Swifts.^{2,14} A Chimney Swift was observed entering T3 on 3 June 2021, but no roosting observations were made in this tower before playback discontinued on 7 June 2021 (Table 2). Roosting by a single Chimney Swift was noted in tower T2 on 18 May 2021 and 24 May 2021, culminating in playback ceasing early at this tower.

All towers and chimneys at the Selkirk Mental Health Centre were monitored throughout the summer, at least once per week by volunteers, and each was occupied on several occasions. Summary use of all sites is described as follows:

T1: First monitored on 11 May 2021. First observed use by two roosting Chimney Swifts on 10 June 2021. Subsequent use during the day on 18 June 2021 and four entries and two exits noted during roost monitoring on 23 June 2021 (two birds roosted for the night) suggested breeding.¹³ Only subsequent use however was recorded on 14 July 2021 when a single bird roosted for the night. No evidence of a nesting attempt was found inside the tower when it was inspected on 10 September 2021, although droppings confirmed that birds



FIGURE 4: Motion capture image of a pair of Chimney Swifts inside T2 taken at 10:14:37 on 8 June 2021. Photo taken with Reconyx Hyperfire 2 camera and property of the Government of Manitoba.

had used it earlier in the season.

T2: First monitored on 11 May 2021. First use by a single roosting Chimney Swift during playback on 18 May 2021 and subsequently on 24 May 2021. No Chimney Swifts roosted on 26 May and 3 June 2021, but two roosted on 7 June 2021. Images from the Reconyx Hyperfire 2 camera indicated that a pair was present together in the tower during the day on 8 June 2021 from 10:14 to 10:16 (Figure 4). An entry/exit cycle observed from outside the tower during the day on 10 June 2021 suggested possible nest

building.¹⁴ A presumed pair, based on two individuals in the tower together, roosted on the same evening and on 15 June 2021. Further use of the tower was recorded by the Reconyx camera between 19 and 21 June 2021, but no further use was recorded after this either by volunteers or the camera. Contrary to observations on 8 June 2021, no evidence of a nesting attempt was found inside the tower when it was inspected on 10 September 2021, although droppings confirmed that birds had used it earlier in the season.

T3: First monitored on 11 May 2021. First use during the day by a single Chimney Swift during playback on 3 June 2021. No subsequent use was detected until a single bird roosted on 27 June 2021. Subsequent roost monitoring sessions suggested occasional roosting by single birds throughout July, but not into August. No evidence of a nesting attempt was found inside the tower when it was inspected on 10 September 2021, although feathers at the base of the tower suggested that at least one non-breeding adult had used it for moulting.

DATE	METHOD	OBSERVATIONS
6 May 2021	Playback – Daytime (defined as anytime between 30 minutes after sunrise and 30 minutes before sunset)	No Chimney Swifts observed
13 May 2021	Playback – Daytime	Possible Chimney Swift observed flying high above the roof
17 May 2021	Playback – Daytime	No Chimney Swifts observed, Merlin (<i>Falco columbarius</i>) in area
20 May 2021	Playback – Daytime	No Chimney Swifts observed
25 May 2021	Playback – Daytime	No Chimney Swifts observed
26 May 2021	No playback – Roost (defined as the period starting 30 minutes before sunset and ending 30 minutes after sunset)	No Chimney Swifts observed, Two Merlins in area
27 May 2021	No playback – Roost	No Chimney Swifts observed
30 May 2021	No playback – Roost	No Chimney Swifts observed, Merlin in area
31 May 2021	Playback – Daytime	No Chimney Swifts observed. Note: Five Chimney Swifts observed for 30 minutes in the evening at 21:15 DST, circling high over building but did not roost
3 June 2021	No playback – Roost	No Chimney Swifts observed
7 June 2021	No playback – Roost	Chimney Swifts spotted in area on two occasions but did not investigate chimney

TABLE 1: Summary of monitoring at the Old Grace Housing Co-op, Winnipeg, Manitoba in May and early June 2021.

DATE	PLAYBACK PERIOD	TOWER	OBSERVATIONS
18 May 2021	Roost	T1 and T3	Immediate response by pair above rim of T1, chasing behaviour consistent with pair bonding ² . Responded to every playback period
		T2	Regular flights by area. Single Chimney Swift roosted at 21:32 DST
24 May 2021	Roost	T1 and T3	Up to seven birds observed above T1, including obvious pairing behaviour. No entries in either tower
		T2	Up to seven Chimney Swifts in immediate area. Single Chimney Swift entered tower to roost at 21:20 DST
28 May 2021	Daytime (defined as anytime between 30 minutes after sunrise and 30 minutes before sunset)	T1 and T3	Gusty winds. Up to four Chimney Swifts observed dipping and circling over T1
1 June 2021	Daytime	T1 and T3	Up to 10 Chimney Swifts around T1, several sharp dips towards tower
3 June 2021	Daytime	T1 and T3	Single Chimney Swift entered T3 and did not leave within 30 minutes

TABLE 2: Summary of playback monitoring at the Selkirk Mental Health Centre. Note that tower T4 was not completed until after the protocol had ended.

T4: Observations first made on 18 June 2021, while construction workers were still working on the side of the tower, noted three Chimney Swifts regularly flying over the rim during the daytime. A single Chimney Swift roosted inside the tower on 23 June 2021, the first monitoring night post construction. Two birds roosted on 27 June and 7 July 2021, but no birds were noted roosting inside the tower on 15 July 2021. A single Chimney Swift was observed entering the tower on 15 July 2021 at the culmination of a 90-minute daytime monitoring session. Monitoring was not conducted consistently at this site again until 11 August 2021 when six entries and four exits were noted during monitoring and two Chimney Swifts roosted for the night. A similar level of activity was detected during roost monitoring on 16 August 2021. On 19 August 2021, a probable nesting attempt at the non-brooded juvenile stage was confirmed during a 90-minute daytime observation period.¹³ Further monitoring indicated nesting was being attempted, culminating in two fledged juveniles entering the tower on 9 September 2021. Observations continued until no Chimney Swifts were observed using the tower, with the final monitoring session occurring on 15 September 2021. Evidence of nesting Chimney Swifts was found upon inspection of the cleanout trap on 23 September 2021, including a nest on the wall of the tower (Figure 5), eggshells, twigs and droppings. No carcasses were present on the floor of the tower. The mass of eggshells suggested that three or four chicks hatched in this tower but confirmation of total productivity cannot occur until the nest contents can be examined for dead chicks.

Initially, the monitoring data suggested that fledging at T4 occurred between 30 August and 9 September 2021. The behaviour of the fledged birds on 9 September, requiring several attempts to enter the tower, including tumbles along the external wall, suggested inexperience, supporting the conclusion that the birds had only fledged between one to four days previous (Barbara Stewart, pers. comm.). The single daytime entry on 15



FIGURE 5: Nest on the wall of tower T4 at the Selkirk Mental Health Centre taken from underneath on 23 September 2021. Photo credit: Timothy Poole, Manitoba Government.

July 2021 was likely an adult carrying nesting material. Assuming it takes a minimum of seven days to build a nest and lay the first egg, incubation may have started on 21 July 2021 and hatching may have occurred between seven and 10 August 2021. No birds were detected using the tower during monitoring of the adjacent Tankhouse chimney on 8 August 2021. Assuming that the lack of activity was indicative of there being no chicks hatched, this potentially places hatching between 9 and 11 August 2021. This suggests a nominal fledging date of 6 to 8 September 2021 (28-30 days post-hatch), with the latest date being 9 September 2021 (Barbara Stewart, pers. comm.).

Discussion

These results demonstrate the importance of constructing replacement towers for Chimney Swifts to mitigate for habitat that has been destroyed. Significantly, the timing of erecting replacement habitat varied between the two sites. In the case of the Selkirk

Mental Health Centre, three alternative sites were completed before the Chimney Swifts returned from their wintering grounds, and a fourth was available early enough in the season for a pair to successfully raise their chicks. By contrast, there was a gap of four breeding seasons between the demolition of the Old Grace Hospital site and the completion of the Old Grace Housing Cooperative, with an artificial tower placed too late for Chimney Swifts to use in the first of those years. Chimney Swifts are known to possess a strong bond to their nest site, and if one adult does not return to the site in spring, the other continues to use the same site with a new mate.¹⁵ Furthermore, young birds often return to the immediate area around their natal site.¹⁵ In two cases, Chimney Swifts have occupied unscreened chimneys in Winnipeg following the capping of previously occupied chimneys on the same buildings (pers. obs.).¹⁶ The four years with no available nesting habitat may have broken the bond that juvenile

or adult Chimney Swifts had with the site. Furthermore, I cannot eliminate the possibility that the Old Grace site lacks certain unknown structural cues which are critical for Chimney Swift occupation.¹⁰

The effect of time might have been amplified by issues relating to location. The tower at Assiniboine Park Zoo was occupied by a breeding pair of Chimney Swifts in its second full season in place.⁵ The success of this tower was potentially a consequence of proximity to a large hub of at least 11 nesting and roosting chimneys north of the Assiniboine River, with the closest chimney being approximately 300 m from the tower.⁵ Two regular nesting chimneys were still left standing at the Selkirk Mental Health Centre in 2021, and each tower was no more than 70 m from the closest occupied nesting chimney. By contrast, the closest known occupied nest chimney to the Old Grace Housing Co-op is an apartment block 185 m away in a dense urban neighbourhood. The MCSI database lists 11 sites in that neighbourhood, including the Old Grace Housing Cooperative, the original Old Grace Hospital chimney and a site watched in 2019 but which was not occupied by Chimney Swifts.¹⁷ Of the eight remaining sites, four chimneys have been capped, lined or demolished, a rate of decline similar to that identified previously in Manitoba.^{4,17} Only four known active chimneys remain in this neighbourhood. While the small number of known sites may be influenced by low volunteer recruitment in the area, low recruitment may reflect a low population of Chimney Swifts. What is clear is that 25% of the known sites were lost in the intervening years before the Cooperative was finished, which likely served to amplify the impacts of the four-year period with no habitat. Furthermore, it has been suggested elsewhere that artificial towers constructed for Chimney Swifts at the northern edge of their range, were placed out of logistical convenience rather than in areas with large numbers of Chimney Swifts or where habitat is limiting.¹⁸

The successful nesting attempt at T4 was significantly later than any other documented breeding attempt

in Manitoba, with the previous record being 24 August 2017 at a nest site in Brandon (Manitoba Chimney Swift Initiative, unpublished data).¹³ Previously documented late breeding attempts by Chimney Swifts in Manitoba have resulted in nest failures. A re-nesting attempt in the Club Amical in St Adolphe and an apparent primary attempt in St Avila School in Winnipeg were monitored concurrently in August 2016. In both cases, feeding continued until the third week of August and stopped suddenly, culminating in adult Chimney Swifts abandoning nest sites quickly, heading towards full migration (Barbara Stewart, pers. comm.). The mechanism for such rapid abandonment is unknown but is suspected to relate to sharp declines in aerial insect populations, possibly due to late season cool temperatures. Although there is little information regarding why Chimney Swift nests fail, studies of brood survival in another aerial insectivore, the Tree Swallow (*Tachycineta bicolor*), documented declines in insect flight activity following cold snaps.¹⁹ Warm and dry weather conditions in August and September 2021 may have produced higher than average insect flight activity, enabling these birds to continue to feed their young much later into the fall.

It is possible that the pair of Chimney Swifts that occupied T2 switched to T4 on its completion. No Chimney Swifts were detected using T2 after 21 June 2021, with first documented use of T4 on 23 June 2021. As T4 sits on the site of the former Powerhouse roost chimney, this suggests the Chimney Swifts may have been influenced by site location, a form of site fidelity, in their habitat selection. There is no previous evidence that Chimney Swifts bred in the Powerhouse roost chimney, although they have been documented nesting in large roosts in Manitoba and elsewhere across their range (MCSI, unpublished data).² Historically, volunteers were instructed to focus on counting roosting birds, and were not encouraged on this site to document daytime use consistent with breeding; therefore, we cannot rule out the possibility that Chimney Swifts had previously nested in the Powerhouse chimney.

The loss of the roost chimney led to

a drop in overall numbers at the Selkirk Mental Health Centre in 2021. A new smaller roost (nine birds) formed at an apartment building 1.5 km to the east of the hospital grounds in spring 2021. Although the roost was not replaced on site, a consistent total of six to 10 birds was observed during roost monitoring each evening prior to juveniles fledging. In addition, two successful breeding attempts were recorded in the two existing brick chimneys on the site, opening up the prospect of more recruits breeding in the other towers in future years.

Conclusions

The experience with artificial habitats in Manitoba for Chimney Swifts demonstrates the importance of completing habitat mitigation in a timely manner for migratory birds with evidence of site fidelity. Although late nesting was successful in T4, this was possibly due to unseasonably warm weather conditions increasing insect loads. Thus, completing construction before birds return in the spring should still be considered a priority for their conservation. Furthermore, replacing nest and roost sites quickly is more urgent in areas with low densities of alternate breeding sites than areas with high densities of alternate sites and larger local populations of Chimney Swifts.

Given playback elicited a response at the Selkirk Mental Health Centre in 2021, I would recommend its continued use at the Old Grace Housing Co-op in future years, possibly with some adaptation of the equipment to broadcast further in an enclosed urban area. Following initial difficulties attracting Chimney Swifts to towers that replicated the successful model used in Texas, our recent experience with taller, insulated artificial towers confirms that Chimney Swifts will accept these sites for roosting and nesting in Manitoba.^{6,15}

The successful nesting in T4 is the latest recorded in Manitoba. Fledging is likely to have occurred between 6 and 9 September 2021, around two weeks later than the previous record. The potential switching by Chimney Swifts to a tower on the site of the demolished chimney

not only suggests site fidelity in this species but also that future replacement structures should be situated as closely to the original chimney as possible.

The Manitoba Chimney Swift Initiative was founded on the assumption that building towers would reverse long-term negative population trends in this species in Manitoba. After years of effort, we can now say that the successful use of the second tower supports the old mantra, 'if you build it, they will come'. Nonetheless, beyond using a successful tower design for Manitoba conditions, the timing of new habitat placement is everything.

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POETRY

Ravens

What sounds do I hear,
that breaks the morning silence?
Is it the trickster?

With ebony coats,
glistening in the sunshine,
ravens call aloud.

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