

Bank Swallow colonies along the Saugeen River, 2009-2013

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Bank Swallows have declined considerably in Ontario, but their colonies, like this one in a pit near Guelph, are still hives of activity. *Photo: Zoé Lebrun-Southcott*



Introduction

Aerial insectivores, birds that eat flying insects on the wing, are in decline in Canada, showing the largest decline of any bird group (North American Bird Conservation Initiative Canada 2012). According to the Breeding Bird Survey (BBS), the Bank Swallow (*Riparia riparia*) is experiencing the largest long-term decline of any aerial insectivore in Canada: an annual loss of 6.95% since 1970 (Figure 1), and an annual decline of 4.33% south of the Canadian Shield in Ontario from 2001 to 2011 (Environment Canada 2013). The reason for the aerial insectivore decline is unknown, although several possible causes have been postulated. Given that the common denominator is their insect prey, a decline or change in insect populations may be involved (Nebel *et al.* 2010).

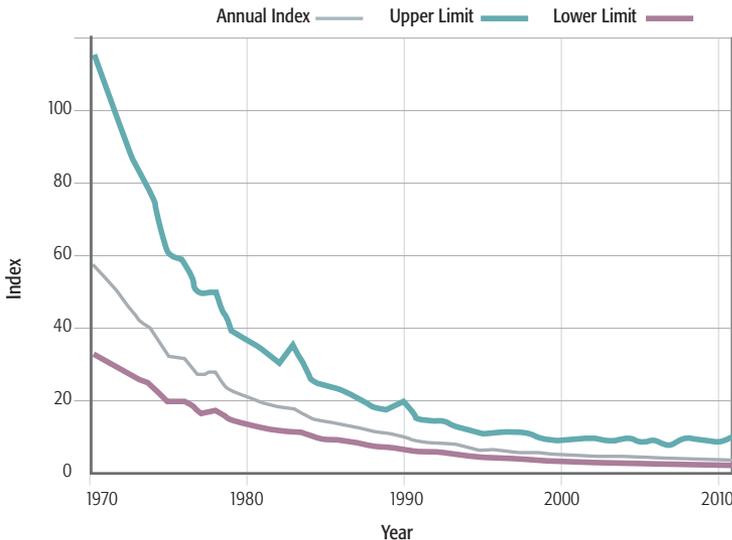
Although Bank Swallows are well-known for nesting on river banks, little has been published on Bank Swallows nesting along rivers in Canada. This paper provides a summary of the results of a project that monitored the number of Bank Swallow burrows along a stretch of the Saugeen River in southern Bruce County, Ontario (Figure 2) from 2009 through 2013. The paper provides information on the number and size of colonies each year and establishes a baseline for future population surveys. It also examines whether the population trend along this stretch of river is consistent with that of the general Bank Swallow population as measured by the BBS.

Due to erosion, almost all of the burrows along this stretch of river disappear between years, so the number of burrows counted each year provides one measure of annual population size. The actual occupancy rate for Bank Swallow burrows

is surprisingly difficult to obtain and changes considerably during the breeding season. Early in the season, males build a partial burrow and then try to attract a mate (Garrison 1999), but are sometimes unsuccessful, so some burrows remain incomplete and are not used for nesting. Later in the season, some burrows are abandoned, due, for example, to nest depredation or the death of one of the adults, while others are abandoned after young are raised successfully.

Occupancy can be assessed by counting, either visually in the field or by using video recordings, the proportion of a sample of burrows seen to be used by Bank Swallows, and some preliminary assessment of the Saugeen colonies has been done. However, the best approach, when burrows are accessible, is to inspect burrow contents to determine what proportion has a nest chamber, nest material, eggs, or young. Unfortunately, few of

Figure 1. Annual indices for Bank Swallow in Canada, 1970-2011, based on the Breeding Bird Survey (Environment Canada 2013).



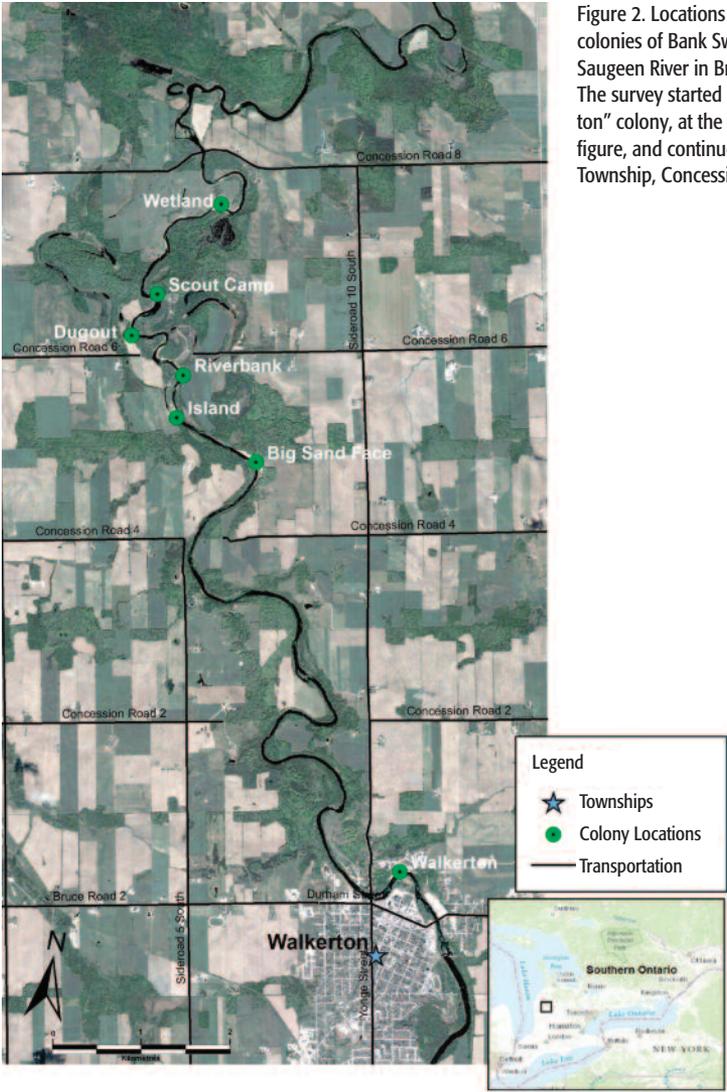


Figure 2. Locations of seven colonies of Bank Swallows on the Saugeen River in Bruce County. The survey started at the “Walkerton” colony, at the bottom of the figure, and continued until Brockton Township, Concession 8.

the burrows along this stretch of the Saugeen River are accessible. After reviewing several studies for the Sacramento River, California’s Bank Swallow Technical Advisory Committee (2013) adopted a rate of 50% as roughly the ratio between the number of burrows and the number of nesting pairs along that

river; a similar occupancy rate was obtained for Lake Erie colonies (M. Falconer, unpubl. data). Until further work is completed on Ontario river colonies, this estimate of occupancy is the best available and provides at least a general idea of what might be the situation along the Saugeen River.



Juvenile Bank Swallow

Photo: Zoé Lebrun-Southcott

Methods

In this paper, a colony is defined as a group of two or more burrows separated by more than 100 m from any other group of Bank Swallow burrows.

The study area extended from the “Walkerton” colony, within the city limits of Walkerton, downstream to the end of the surveyed section at Concession 8 (Brockton Township, Bruce County). This stretch of the river is 14.9 “river km” long, and 8.4 km as the crow flies (Figure 2).

From 2009 to 2013, this section of river was surveyed for Bank Swallow colonies at least once each year during the breeding season. The size of Bank Swallow colonies fluctuates greatly over the summer due in large part to the ephemeral nature of the banks in which they nest. Early in the season, colonies increase in size as birds return and burrows are established. Decreases occur due to erosion, bank collapse, and predation over the season, as well as slumping of burrows later

in the season. In some cases, colony size increases due to re-nesting after erosion has destroyed burrows. In 2009, a single survey was conducted, three surveys were conducted in 2010, seven in 2011, three in 2012 and one in 2013. Results from these surveys show that the peak number of total burrows observed along this section of the Saugeen River usually occurs in June, with the highest numbers in mid-late June, though individual colonies may peak in number at different times. This paper compares burrow counts from one visit conducted during the height of the breeding season in each of the 5 years: 2 July 2009; 25 June 2010; 20 June 2011; 24 June 2012 and 13 June 2013.

The “Walkerton” colony mentioned above is road-accessible; the remaining colonies (Figure 2) were accessed by canoe, from an access point in Walkerton. Each survey was conducted by 2 to 4 researchers, from roughly 08:00 to 15:00. Researchers traveled downstream by canoe, stopping to observe all colonies encountered. Burrow counts were conducted mostly in the field, through binoculars, at a distance of five to 80 m.

Figure 3. Number of Bank Swallow burrows at colonies along the Saugeen River, from south to north, 2009-2013.

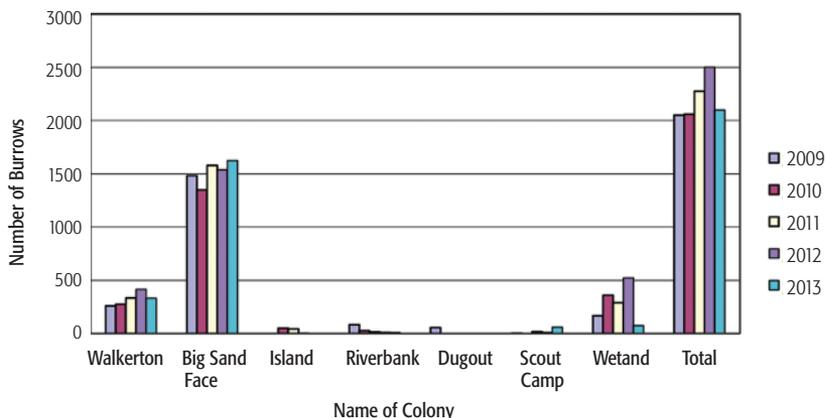




Figure 4. The central portion of the Big Sand Face colony. Most of the nests occur in the area shown, though the bank extends about 150 m further in each direction. *Photo: Zoé Lebrun-Southcott*

Counts were performed from land, except for one small colony where landing was difficult and counting could be done readily from a canoe. Burrows were counted individually and in most cases by two observers to ensure that counts were as accurate as possible. The largest colony, at “Big Sand Face”, was photographed and later counted from digital photographs that were printed and magnified on screen as required.

Results

The number of burrows counted at each colony each year from 2009 to 2013 is shown in Figure 3. Seven colonies were located, and colony size ranged from

three to 1624 burrows, although three colony sites had no burrows for at least one year when these banks appeared to be unsuitable for nesting. In each of the five years, the largest colony located was at “Big Sand Face” (Figure 4). The colonies were often at bends in the river and were on the outside of the bends in areas with large sand deposits.

The total number of burrows counted along the river peaked in 2012 at 2501 and averaged 2195. Numbers fluctuated considerably during the five year period, with changes of as much as 16% between subsequent years, but showed no evidence of decline over the five year study period.



Figure 5. A close up of part of the Big Sand Face colony. *Photo: Zoé Lebrun-Southcott*

Discussion

The number of burrows found indicates an exceptionally large population of Bank Swallows along this stretch of the Saugeen River, averaging 147 burrows per km over the entire stretch from the “Walkerton” colony to Concession 8, Brockton Township, and 397 per km over the 4.9 km from the “Big Sand Face” colony to the “Wetland” colony. A similar survey along the upstream section of the Saugeen River from Hanover to Walkerton in August 2013 found only 40 burrows in three small colonies, averaging 2.3 burrows per km. A downstream survey from Concession 8, Brockton Township to Bruce Road 17 east of Port Elgin tallied approximately 600 burrows along a 44 km

stretch of river in June 2012, or 13.6 burrows per km (burrow numbers extracted from photographs provided by V. Martin, pers. comm.). The numbers from this study are also large compared to a similar survey completed in 2013 along a 12 km stretch of the Nottawasaga River which counted 245 burrows over 12.1 km, or 20.2 per km (Canadian Wildlife Service, unpubl. data).

The large number of burrows in this section of the Saugeen River is in large part due to the “Big Sand Face” colony, which held an average of 69% of the burrows along this entire 14.9 km stretch over the five year period. This is clearly an unusual and significant breeding site. The sand bank is approximately 400 m

in length and 30 m high at its highest point. Within this large sand face, the location of “subcolonies” (Figure 5) changes annually, depending on the availability of near-vertical sand faces within the larger bank. It may be the largest colony on a river in Ontario. No other river bank colonies of this size have been reported to the Ontario Nest Records Scheme (ONRS), though larger colonies have been reported in aggregate pits (ONRS data, pers. obs.) and along the shores of Lake Erie (M. Falconer, unpubl. data).

Given the large decline in Bank Swallows in Ontario (93% since 1970 according to BBS data), one might expect large areas of unused nesting habitat along the river; however, this was generally not the case. All of the banks that appeared to be suitable were occupied by nesting Bank Swallows each year, though not all of the suitable bank was necessarily filled to capacity with burrows. At the “Big Sand Face” colony there seemed to be considerable room for more burrows, even in years with large numbers of burrows (see Figure 5). Along the river, banks seemingly too small for Bank Swallows were occupied frequently by Belted Kingfishers (*Ceryle alcyon*) or Northern Rough-winged Swallows (*Stelgidopteryx serripennis*), the latter of which often nest in abandoned burrows.

Although this five year study provides only a small snapshot of localized data in comparison to the more than 40 years of BBS data, it is difficult to reconcile the huge decline in Bank Swallow populations illustrated by the BBS with the stable population shown along the Saugeen River since 2009. Presumably

the removal of steep cut road-side banks due to changes in highway standards and an increased use of berms around aggregate pits make it harder to view Bank Swallows in roadside areas, so numbers from the roadside BBS might be expected to decline. The relatively stable numbers found along the Saugeen River, however, suggest that the river provides a comparatively stable environment for Bank Swallows, and that river banks in Ontario may be important for sustaining Bank Swallow numbers. Continued monitoring, and surveys along other rivers, should help clarify whether the pattern observed in this study is typical of the Saugeen River over the longer term and how it compares to other Ontario rivers.

At three of the colony sites, no burrows were found in some years. Small colonies appeared and disappeared depending on the state of the available bank at these locations. The banks changed considerably between years, due to erosion and bank collapse, and were sometimes obstructed by downed trees. On smaller banks, this meant that no suitable nesting habitat was available in some years. Similarly, along the Sacramento River in California, colony persistence was shown to be correlated with colony size (Garcia 2009).

Larger colonies were occupied during all five years of the study. Although the specific part of the large bank occupied may have varied from year to year, there was always some suitable bank for nesting in these locations. Nevertheless, some very large changes in burrow numbers occurred between years in large colonies. For example, the number of burrows



Figure 6. Dugout burrows at Dugout colony, 2 July 2009. The stones were dumped over the edge of the bank, presumably to help reduce erosion. They may have made it easier for mammalian predators to access the colony. Photo: M. Cadman

in the “Wetland” colony declined from 522 in 2012 to 74 in 2013, an 86% decline, due to a considerable reduction in the amount of vertical sand bank between years. This colony is on a very actively eroding cut bank on a curve of the river, and sometimes changed considerably even during one breeding season. For example, in 2010, we counted 360 burrows in this colony on 25 June, but on 29 July, only 31 burrows remained — the rest having been lost when most of the bank collapsed due to undercutting from the river. In 2011, the colony was back up to 289 burrows.

Although three of the small colonies had no burrows in one or more years, two of them re-established when the bank returned to a usable condition. The “Dugout” colony, however, was destroyed by mammalian predator(s) in 2009 and has not been re-established since. The talus beneath the vertical bank has a fairly shallow slope, making it accessible to predators (Figure 6). The nests were mostly close to the bottom of the vertical bank where they could be reached by predators. In our Bank Swallow work in aggregate pits, we have found signs that Coyote (*Canis latrans*), Red Fox (*Vulpes*



When the young begin to emerge from their burrows they are quite vulnerable to raptors.

Photo: Zoé Lebrun-Southcott

vulpes), Striped Skunk (*Mephites mephitis*) and Raccoon (*Procyon lotor*) have depredated burrows by excavating them, but we do not know which species was responsible for the predation in Figure 6. A colony might re-establish at this location when the bank returns to a suitable condition.

The “Riverbank” colony provides a special case in relation to occupancy rate. Although a small number of burrows were counted each year, none of these burrows were seen to be occupied by Bank Swallows in 2011, 2012 or 2013, and many of the same burrows persisted for several years in a row — as viewed from photographs. This is perhaps because the soil has higher clay content than most of the other colonies, so the bank is much less

susceptible to erosion and collapse, and burrows survive the winter. In other colonies along this stretch of the Saugeen River, which are mostly in banks of sand, almost all of the burrows disappeared between years due to erosion. For example, of the 2,060 burrows counted along the river on 25 June 2010, only 48 (2.3%) were still extant on 29 April 2011, and 19 of these were in the “Riverbank” colony. Although some burrows in this colony survived from one year to the next, they were not occupied because Bank Swallows generally avoid reusing old nests because of increased likelihood of infestation by fleas (*Ceratophyllus* spp., Haas *et al.* 1980). Northern Rough-winged Swallows were observed using some of the “Riverbank” colony burrows in 2011 and 2012.

In 2014, Canadian Wildlife Service and Ontario Ministry of Natural Resources will conduct a large scale survey for Bank Swallows on Ontario rivers. The results should help to elucidate the importance of rivers to Bank Swallows in Ontario relative to their numbers in pits (which were surveyed in 2013), and to the large population along Lake Erie (M. Falconer, unpubl. data) and Lake Ontario (Ontario Power Generation, unpubl. data) which have been surveyed since 2010 and 2007, respectively. If you have any information about Bank Swallow colonies on Ontario rivers, please contact the lead author.

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