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ACROBATS OF THE AIR

WHAT IS CAUSING THE DECLINE AND DEMISE OF OUR GRACEFUL AND BELOVED BARN SWALLOWS?

By Kerry Banks

THERE IS AN OPEN FIELD NEAR MY HOME IN VANCOUVER WHERE I OFTEN GO WALKING. In the spring and summer as I make the crossing, barn swallows whirl around me in tight circles, rolling and banking and cleaving the air like miniature jet fighters. Easily recognizable by their steel-blue feathers, tawny underparts, cinnamon-coloured throats and deeply forked tails, they fly low to the ground and at high speed. These aerial acrobatics are spectacular, and I sometimes stop to watch them cavort in the sunshine. There seems to be a joyfulness to their movements, and I find that they instantly boost my spirits.

"Barn swallows are high-energy birds, and they have exquisite flying abilities," says Keith Hobson, a biologist at Western University in London, Ontario, who professes to admiring the birds for their beauty and aerial mastery. (The fastest of all swallow species, they have been tracked at a remarkable 74 kilometres per hour.) "They feed almost exclusively while flying, and if you stop to think of the neurological coordination needed to intercept prey in mid-air at top speed, that is pretty damn remarkable."

Unfortunately, this stellar flying ability has not helped barn swallows (*Hirundo rustica*) evade the forces that have sharply reduced their numbers in recent years. In Canada, they have declined by 76 per cent since 1970 and are classified as a threatened species under the federal Species at Risk Act.

The notion that barn swallows are under threat may seem far-fetched considering that they are the most common and widespread swallow species in the world. But there is no doubt they are struggling in North America. Canadian scientists are now

INCREDIBLY, 99.8 PER CENT OF A BARN SWALLOW'S DIET DURING THE BREEDING SEASON IS COMPOSED OF FLYING INSECTS. THEY EAT A VARIETY OF FLIES, BEETLES, MOSQUITOES, DRAGONFLIES AND MORE... SO THEY FEED ALMOST EXCLUSIVELY WHILE FLYING AT AMAZING VELOCITY. SAYS ONE EXPERT, "IF YOU STOP TO THINK OF THE NEUROLOGICAL COORDINATION NEEDED TO INTERCEPT PREY IN MID-AIR AT TOP SPEED, THAT IS PRETTY DAMN REMARKABLE"

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trying to determine why. They cite several likely contributing factors, including the loss of nesting and foraging habitats due to conversion from conventional to modern farming techniques, large-scale declines in insect populations, exposure to pesticides and the effects of climate change. There are two leading theories. The first suggests the decline is driven by a related drop in insect abundance or perhaps a growing mismatch in the timing of when insect abundance is highest and swallows are breeding. The second theory contends that their decline is linked to changing conditions at their wintering locations or hazards encountered during their annual southerly migration.

It is well documented that both the number and diversity of insects are declining globally due to habitat loss, pollution, climate change and insecticides. It is also true that aerial insectivores (birds that feed almost exclusively on insects while in flight) are suffering particularly. It is logical to assume then that the two phenomena are related, but no one has yet been able to prove a direct cause and effect with the swallows in Canada.

Like many other species of birds, barn swallows travel south for the winter, generally to areas across Central America, the Caribbean and South America. They migrate in large flocks that sometimes number in the thousands, foraging as they fly, and covering up to 400 km per day. When breeding, however, they spend their time in North America, where they build cup-shaped mud nests lined with grass, hair and feathers that are hidden in barns and other buildings. They lay three to seven small, creamy white eggs with reddish brown spots and raise one or sometimes two broods of young per season.

In a recent study, Trent University biologists monitored barn swallow reproduction behaviour and prey availability through two breeding seasons at 10 sites near Peterborough, Ontario. Their paper, published in the *Canadian Journal of Zoology* in 2019, found no relationship between food availability and the number of eggs laid or the number of young fledged. Nor did the researchers observe higher rates of second brooding or more pairs nesting at breeding sites with more food.

Keith Hobson doesn't discount that insect decline may be contributing to the demise of barn swallows, but he does note that "their population started to decline in the 1970s before the introduction of the really nasty pesticides, the neonicotinoids, into the market, which didn't occur until the 1990s."

Based on recent studies, Hobson believes climate change may be the most significant factor in their decline. He suspects the birds are being adversely affected by climate change events at both ends of their migratory cycle.

In a 2015 study done for Environment Canada, Hobson investigated where exactly barn swallows were escaping to in winter. He used a combination of two methods: an isotope analysis of chemical elements in the swallows' feathers, which provides clues about where the birds were when those feathers grew, and the fitting of birds with tiny geolocators to track their travel. Geolocators are a great tool, says Hobson, with the drawback that the tagged birds must return to their nests so researchers can retrieve the devices and collect information from them.

In total, they collected feathers from 208 barn swallows and were able to recapture 14 swallows fitted with geolocators. The assembled data revealed a distinct divide in the migratory patterns of barn swallows in eastern and western Canada. Those in the west migrated about 6,000 kilometres to Central America and the Caribbean, while those in the east made a much longer journey, flying to south of the Amazon basin and into Argentina, a distance of 9,000 km.

Scientists have established that unseasonably cold temperatures, heavy precipitation and other severe weather events can result in massive numbers of deaths for migratory birds, so it makes sense that longer migration routes increase risk. The evidence suggests that barn swallows in eastern Canada are faring worse than those in the west.

Graham Sorensen, a biologist with Birds Canada in Atlantic Canada, where swallows are declining at an alarming rate, notes that swallows are especially vulnerable to extreme weather because they depend on flying insects for sustenance. "A sudden cold snap that lasts five or six days in spring

A SWALLOW TATTOO WAS CONSIDERED LUCKY FOR OLD-TIME SEAFARERS, FROM A BELIEF THAT IF THEY WERE TO DROWN, THE SWALLOW WOULD CARRY THEIR SOULS AWAY SAFELY. IN THE EARLY DAYS OF THE BRITISH NAVY, SWALLOWS WERE OFTEN IMPRINTED ON THE CHEST, HANDS OR NECK. TO THIS DAY IT CONNOTES THAT ITS WEARER HAS TRAVELLED MORE THAN 5,000 NAUTICAL MILES. SWALLOWS ALSO WERE LINKED WITH WORKING-CLASS PRIDE, AND PRIZE FIGHTERS HAD THE TATTOOS ON THEIR FISTS TO SYMBOLIZE STRENGTH AND SWIFTNESS

could stop insects from taking to the air and result in the death of an entire colony of barn swallows," he says.

A third factor in the decline of barn swallows relates to the disappearance of their nesting sites. It's something that scientists are paying increasing attention to because it is one that people can directly affect. Historically, barn swallows nested on rocky surfaces protected from the rain in caves or on cliff walls, but after the arrival of Europeans in North America, the birds switched to constructing their nests on human structures, such as barns, sheds, bridges, culverts and houses. Today, they are totally reliant on them.

But the numbers and composition of those structures are now changing. For example, wooden barns are either being torn down or replaced by buildings made of aluminum and sheet metal. "The birds can't attach their nests to the smooth surfaces, and these barns are often sealed. The swallows prefer barns that have open doors or holes in them for easy access," explains Hobson.

Besides needing a regular access point and surfaces they can attach their nests to, barn swallows require a nearby source of mud. To build a new nest, a pair of swallows may make more than 1,000 trips, bringing back a mouthful of mud on each trip. Because this is hard work, they often reuse a nest built in a prior year. When reused, new mud can be added and the nest's lining changed.

Along with the disappearance of traditional barns in Canada, the number of farms with livestock has also dropped. European studies have indicated that barn swallows do best at sites where livestock is on hand, presumably because the animals attract insects and create mud. Consistent with this theory, one of the largest colonies of barn swallows in B.C. is found at Vancouver's Stanley Park in the rafters of the stables used by the city's mounted police unit.

Since monitoring began there in 2017, the number of chicks produced has varied between 80 in 2017 and 163 in 2019. However, in 2021 there were only 43 barn swallow chicks produced from 16 nests. "Because the population seems to fluctuate from year to year, we can't determine if this is a sign that their population is declining in general or if this was just a low year," says Olga Lansdorp, a conservation technician with the Stanley Park Ecology Society. Lansdorp also notes that the extreme heat in Vancouver in the early summer of 2021 may have hurt nesting success.

In Ontario, recent attempts have been made to build artificial nesting structures for barn swallows to help to make up for the loss of traditional barns. These efforts

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IT HAS BEEN SAID THAT THE ANCIENT ROMANS USED TO KIDNAP BREEDING SWALLOWS FROM THEIR NESTS AND TRANSPORT THEM TO GRAND SPORTING EVENTS. THERE THEY WOULD PAINT THE BIRDS WITH THE COLOURS OF THE VICTORS BEFORE RELEASING THEM. THEY'D QUICKLY RETURN TO THEIR ABANDONED EGGS OR HATCHLINGS, THEREBY INFORMING PEOPLE FAR AFIELD ABOUT WHO HAD WON THE GAMES

have met with mixed success. To evaluate the merits of artificial nesting structures, barn swallow breeding success was compared at 10 nesting structures and seven barns in the southwestern part of the province. According to Natasha Barlow, Ontario Projects Biologist with Birds Canada, "There did not appear to be a difference in success, failure and unknown fates of nests between barns and nest structures, nor did there appear to be a difference in average brood size."

Barlow notes that the study revealed there were more barn swallow nests in traditional barns than in artificial nesting frameworks, but because traditional barns are usually much larger, it's difficult to say whether this indicates that barns are a more attractive nest site.

Rachel Darvill, a biologist studying barn swallows in B.C.'s Columbia Valley, says many people today consider the birds to be pests because they nest so close to humans. "People don't like to see their droppings, so the nests get knocked down." In Canada, the barn swallow and its nests and eggs are protected under the Migratory Birds Convention Act. Financial penalties for destroying their nests can be severe. In 2018, a lodge in Banff National Park was fined $27,000 after maintenance staff removed and destroyed an egg and four barn swallow nests. But this law is difficult to enforce on private land.

Darvill is conducting a five-year habitat enhancement project at 67 sites in the Columbia Valley with the help of more than 60 volunteers. They're improving the nesting and breeding situation for barn swallows and bank swallows, a related species that has suffered even more severe population decline. The project involves locating nesting sites and monitoring swallow behaviour, building nesting structures where existing nests are being removed (if, for example, a building is being torn down), restoring suitable breeding habitat sites and providing artificial nest cups to private landowners to attract barn swallows.

"These nest cups can give barn swallows a good head start, as they mimic the size and shape of natural mud nests and allow for the swallow to establish a nest faster than constructing a new one out of mud," Darvill says.

Eight nesting frameworks will be built with different footprints and roof types and with openings ranging from small to a completely open side. The structures will be monitored for their effectiveness to further understand barn swallows' preferred nesting conditions.

The project will also track migratory routes and wintering ground locations to assess the opportunity for collaboration among regional and international partners to support habitat connectivity and consistent protection for both species.

In Atlantic Canada, similar efforts have been adopted to raise the profile of the threats facing barn swallows. "We have been working with landowners and farmers to encourage them to protect nesting structures," says Graham Sorensen. The reaction has been largely positive. He believes that raising public awareness is vital to helping stem barn swallows' decline.

"As more people become aware of the problem, I think there is a good chance that we can bring the swallows back," he says. "People are excited to have barn swallows on their property."

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