

The House Sparrow *Passer domesticus* decline: Conservation tools emerge from a contrasting North American perspective

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The House Sparrow *Passer domesticus*, a native of Eurasia, enjoys a nearly cosmopolitan distribution due to its exploitation of human-altered environments, and its 19th Century introduction into North America. In recent decades, however, the species (which is also known as English Sparrow) has undergone significant declines across Eurasian portions of its range. Numerous lines of evidence have been explored to explain the decline in both rural and urban House Sparrow populations, each with unique contributing factors.

Beginning around 1979, rural House Sparrow populations in Britain declined by as much as 60%, but then stabilised at reduced levels in the 1990s (Summers-Smith 2005). Chamberlain *et al.* (2000) implicated agricultural intensification in the decline of many farmland bird species due in part to a change from spring sowing of grain crops to autumn sowing, which eliminated important winter foraging grounds. Improved grain storage also reduced rural food availability, and widespread pesticide use reduced availability of invertebrate prey that are important for rearing nestlings in both rural and urban environments.

The collapse of British urban House Sparrow populations began in the 1990s and has not stabilised as rural populations did. Reduced invertebrate food supplies and a shortage of suitable nesting sites in urban centers were identified as key components of the urban decline (Summers-Smith 2005; Vincent 2005). In addition, nitrogen-dioxide air pollution in urban environments was shown to be associated with reduced body mass of House Sparrow chicks, which likely reduced their survival (Vincent 2005).

Other factors that have been linked to the Eurasian decline of House Sparrows include increased predation from domestic/feral cats and Sparrowhawks *Accipiter nisus*, and even electromagnetic radiation from phone antennae (Balmori & Hallberg 2007). It has also been suggested that Methyl Tertiary Butyl Ether (MTBE), an additive of unleaded gasoline, may contribute to the house sparrow decline due to its insecticidal properties (Summers-Smith 2005; Vasudha 2005). A double-edged sword, MTBE is an octane enhancer that reduces harmful emissions by promoting more complete combustion of gasoline. It is used to reduce smog-forming nitrogen oxides that were shown to reduce body mass of House Sparrow chicks (US EPA 2008; Vincent 2005).

Vincent (2005) showed that native-European deciduous shrubbery, grassy areas, and concrete were the main foraging areas for rural and suburban House Sparrows while ornamental and evergreen shrubs were avoided. These preferred foraging habitats were hypothesized to harbour important invertebrate prey items and were identified as a conservation priority. Working

from an opposite perspective in North America where introduced House Sparrows disrupt nesting of native birds, I identified deciduous shrubbery as an important factor attracting house sparrows to Cliff Swallow *Petrochelidon pyrrhonota* colonies and advocated for the removal of shrubs to discourage sparrows (Leasure *et al.* 2010). In a further twist, the shrubs used by House Sparrows in North America are often ornamentals and non-native species (from a North American perspective).

The conservation status of House Sparrows in North America stands in stark contrast to the species' status in Eurasia. House Sparrows were introduced into North America in the mid-1800s by homesick immigrants fond of this familiar bird. It easily expanded its range across North America as the continent was settled by Europeans. As early as 1889, North American naturalists described its negative impact on local grain crops and native bird populations (Barrows 1889; Estabrook 1901). Although annual North American breeding bird surveys show a general decline in House Sparrow populations across the continent from 1966 to 1987 (Lowther & Cink 1992), it still exists in great numbers. Average densities reached 200/km² in rural areas, and as high as 1,300/km² around livestock dwellings (Pinowski & Kendeigh 1977). The North American House Sparrow population was estimated at 150 million birds in 1943 (Wing 1943). House Sparrows are widely known to interfere with nesting of Purple Martins *Progne subis* and Eastern Bluebirds *Sialia sialis* to the chagrin of bird enthusiasts trying to attract these birds to backyard bird houses. Barrows (1889) listed 70 species of native birds attacked by House Sparrows, mostly at nest sites. Among these were Cliff Swallows.

Beginning in the late 19th Century, Cliff Swallows expanded their range from western North American mountain ranges to include most of North America (Brown & Brown 1995). These expansions were made possible by the construction of bridges and buildings that provided ideal nesting habitat for this colonial bird. Colonies may contain a few or several thousand gourd-shaped mud nests that adhere to cliff faces, bridges, and building ledges. The concurrent range expansions of Cliff Swallows and House Sparrows resulted in significant overlap and frequent interactions between these two species.

As an undergraduate student at the University of Arkansas-Fort Smith, I studied the impact of House Sparrows on the reproductive success of Cliff Swallows in Arkansas (United States) with renowned ornithologists Dr. Ragupathy Kannan and Dr. Douglas James. We provided evidence that House Sparrows were associated with a 30% reduction in the number of Cliff Swallow nests that produced at least one nestling, and a 54%

reduction in the number of Cliff Swallow eggs that successfully hatched nestlings (Leasure *et al.* 2010). We also reported that House Sparrows maintained a “demilitarised zone” around their commandeered Cliff Swallow nests so that one nesting pair of House Sparrows could prevent the use of a multitude of nearby Cliff Swallow nests.

After observing many Cliff Swallow colonies in western Arkansas, we noticed that House Sparrows seemed to prefer colonies in close proximity to shrubby vegetation, which they used as pre-roosts. At dusk, House Sparrows could be seen gathering on nearby shrubs, enjoying social interactions, and courting potential mates before they retired to their roosts in empty Cliff Swallow nests. While Cliff Swallows spend their winters in South America, House Sparrows enjoy the colonies vacated by the swallows and have often produced a clutch of eggs or even a brood of nestlings by the time the swallows return in April.

The passive nature of Cliff Swallows allows the more aggressive House Sparrows to easily usurp nesting space and perhaps even cause mortality of Cliff Swallow eggs, and nestlings. We observed House Sparrows entering active Cliff Swallow nests at will, while the resident swallow parents only circled the nest giving alarm calls, but not intervening. While the activities inside the nest were obscured from view, we suspected that the House Sparrows pecked eggs and nestlings, which may have caused the 54% reduction in successful hatchings that we observed at our study sites. We also observed incubating Cliff Swallow parents that abandoned their eggs under harassment from their House Sparrow neighbours.

House Sparrows have been managed at Cliff Swallow colonies by removing empty Cliff Swallow nests in the winter to discourage sparrow roosts and by trapping or shooting sparrows (Brown & Brown 1995). Efforts at culling North American House Sparrow populations are regularly undertaken in efforts to protect native North American cavity nesters in marked contrast with Eurasian House Sparrow conservation. Although the endgame of House Sparrow management efforts differ between North America and Eurasia, the lessons learned can often be applied interchangeably.

I am eager to share this perspective with conservationists halfway around the globe who are facing declining House Sparrow populations. Inter-hemispheric sharing of information holds great potential for benefiting House Sparrow related avian conservation in both hemispheres. Compare, for example, our findings (Leasure *et al.* 2010) to those of Vincent (2005) who

identified deciduous shrubs as important conservation tools. We advocated *removing* shrubs to reduce House Sparrows and the European author advocated *increasing* shrubs to benefit House Sparrows. Increasing deciduous shrubs to benefit Eurasian House Sparrows would likely be most effective in close proximity to suitable cavity nesting sites as we found to be preferred by House Sparrows utilising North American Cliff Swallow colonies. North American House Sparrows heavily utilise backyard nest boxes designed for Eastern Bluebirds and Purple Martins. These nest boxes could be deployed by bird enthusiasts in Eurasian urban centers where reduced nest site availability has been identified as a House Sparrow conservation priority (Summers-Smith 2005). Similarly, an understanding of the Eurasian decline may provide valuable conservation tools to North American House Sparrow control efforts.

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