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The Common Nighthawk’s Decline: a Multifaceted Problem

The common nighthawk (*Chordeiles minor*) was recently listed on the 2014 State of the Birds Report as “Common Bird in Steep Decline” and has been consistently declining according to data collected by the North American Breeding Bird Survey since 1966 (NACBI 2014). The issue of why this widespread bird is declining is a multifaceted one that heavily ties into the life history of the species. In this paper the question of why this species is declining so rapidly will be addressed by looking at various aspects thought to be contributing to their decline and potential solutions. When applicable, some other aerial insectivores will be referred to because of similarities in general natural history that may help shed additional light on the common nighthawk’s plight. Habitat loss, agricultural shifts, urbanization, insect declines, and climate change all in tandem with the common nighthawk’s life history makes their decline a multifaceted problem with aspects of each topic further antagonizing the other.\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 The common nighthawk is a nocturnal aerial insectivore that collects prey by hawking prey on wing—they have a highly specialized mouth, rictal bristles, and other adaptations that make them excel in the niche they fill (Brigham et al. 2011). This species is a long-distance migrant and leaves North America during the fall and winter months due to lack of suitable prey to sustain themselves (Brigham et al. 2011). Common nighthawks migrate over the Gulf of Mexico to get to their wintering grounds in South America (Ng et al. 2018). This species eats a wide range of prey but particularly likes Lepidoptera, Trichoptera, Coleoptera, and Hymenoptera species (Brigham 1990, Brigham et al. 1998, and Knight et al. 2018). Based on limited data available it appears that their migration route is a relatively narrow in range over the Gulf of Mexico and males have high site fidelity to their breeding grounds (Ng et al. 2018). During the breeding season when this species occupies North America it occupies early successional habitats and nests on the ground (Brigham et al. 2011). Some populations of common nighthawks have adapted to breeding and roosting in urban environments on gravel rooftops outside of their traditional habitat but it is not their preferred habitat for nesting (Brigham 1989). This species has previously been difficult to study. Their nocturnal nature, cryptic plumage and behavior, and difficulty in reliably monitoring them both in their breeding and wintering grounds has resulted to a relative lack of information about this species despite being one of the best studied Caprimulgiform species in the world (Brigham et al. 2011). Habitat loss is a major reason for the declines of avifauna across the board and the common nighthawk is no exception (Spiller and Dettmers 2019). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 While urbanization is partially to blame for habitat loss for the common nighthawk the species has some success in urban areas: it still prefers natural early successional areas over urbanized areas if given the choice but the species can both feed and reproduce in urban areas (Brigham 1989). However, the species faces novel problems in this new urban habitat especially in regards to new sources of mortality and nesting success. Wind turbines are a measurable source of mortality for nighthawks as they fly 37% of the time in the rotor zone (Wulff et al. 2016). Another nightjar species, the red-necked nightjar (*Caprimulgus ruficollis*), has been shown to use roads for thermoregulation in Spain and is known to be commonly admitted to wildlife rehabilitation centers in Spain because of road collisions (Camacho 2012). In North America the species is typically admitted into wildlife rehabilitation centers because of vehicle collisions as well which suggests that common nighthawks also utilize roads and roadside environments in much the same way as red-necked nightjars (WILD-ONe 2019). While the use of roadsides to aide in thermoregulation may help nighthawks survive on cool nights there is some evidence that in urban areas where nighthawks nest on gravel rooves that urban heat (generated in similar ways that results in warm roads) increases nestling stress (Newberry et al. 2018). Latta and Latta (2015) conducted a study by using quail eggs as a stand-in for nighthawk eggs and simulated nighthawk nests in both urban and natural environments to observe nest predation rates of the American crow (*Corvus brachyrhynchos*). They found that the rate of predation at urban nest sites was higher than the rate at natural locations which could suggest that urban nighthawks experience higher rates of nest predation than their rural counterparts. Research also found evidence that nighthawks living in urban areas are subjected to a population bottlenecks in these settings due to habitation fragmentation in these areas (Mays et al. 2019).

Habitat fragmentation in their typical natural habitats is also a major problem for the common nighthawk. Common nighthawks historically were relatively abundant in and around areas where farming occurred (Jones and Bock 2002). Recent major shifts in agriculture has negatively impacted the number of species that are able to thrive on many modern farms and reduced biodiversity (Chamberlain et al. 2000). The use of neonicotinoids has raised red flags for aerial insectivores and migratory birds. Since the introduction of neonicotinoids in the Netherlands there has been an annual decline of 3.5% of aerial insectivore birds (Hallmann et al. 2014). Likewise, a recent study found that neonicotinoids delay migration and are correlated with weight loss in white-crowned sparrows (*Zonotrichia leucophrys*) (Eng et al. 2019). Other research found that a single seed coated in a regulation dose of neonicotinoid can be enough to poison and kill a songbird (Mineau and Palmer 2013). While the common nighthawk is not a seed-eating bird like the white-crowned sparrow there is another problem with neonicotinoids—their link to insect declines.  
 Less publicized than the decline of birds is the decline of insects worldwide with a recent study finding that 40% of insect species may go extinct over the next few decades (Sánchez-Bayo and Wychkuys 2019). It was found that insects as a whole have a 10% percent rate of extinction in comparison to birds with 0.8% currently (Sánchez-Bayo and Wychkuys 2019). This does not bode well for species that rely on insects. Many of the insect groups that the nighthawk predominately eats are also some of the groups of insects showing big declines worldwide (Sánchez-Bayo and Wychkuys 2019). As ratios of nitrogen isotopes tend to increase with trophic level a study looked for the presence of different nitrogen isotopes in the eastern whip-poor-will and prey species (both historically and presently) and compared them to try to determine if there has been a diet shift for the species (English et al. 2018). The study found that over the past century shifts in isotopes suggested that there has been a diet shift due to higher trophic level prey being less abundant in modern times (English et al. 2018). As for many birds habitat loss is the main driving factor for a wide range of insect species and fears about shifts in agricultural and urbanization are echoed with insects (Sánchez-Bayo and Wychkuys 2019). Neonicotinoids were developed to address invertebrate pests and their worldwide use has been due to the effectiveness of the pesticide. This causes two potential problems for aerial insectivores. First, their food source is being diminished and killed by the pesticide (Wood and Gouldson 2017). Second, much like the use of DDT, neonicotinoids can accumulate up the food chain and has the potential to cause problems in larger organisms as the toxin accumulates (Wood and Gouldson 2017). Another concern regarding the decline of insects that is also causing concerns for many bird species is climate change.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 Climate change is a concern for a number of bird species including many kinds of aerial insectivores like the eastern whip-poor-will (*Caprimulgus vociferous*) with The Audubon Society listing many as “climate vulnerable” (The Audubon Society 2019). While their models predict that the common nighthawk will still have suitable habitat and is not considered a high-risk species for loss there are other climate-related changes that could affect the common nighthawk in the future. Mayor et al. (2017) found that shifts in climate are causing asynchrony with migration patterns of birds and the development of vegetation and thus potentially could create problems with food availability. While the main focus and the bulk of conservation efforts have been towards at-risk and declining species North America has seen the extinction of numerous, common, and widespread species before in the passenger pigeon (*Ectopistes migratorius)* and Rocky Mountain locust (*Melanoplus spretus*) due to human influences. Just because the common nighthawk is common does not mean that it is invulnerable to such changes. It is known that the species is less common than it has historically been with a 61% population loss since 1966 (NACBI 2014). \_\_\_

So what can be done to conserve the common nighthawk? Like many at-risk species the problems this bird faces are multifaceted, interconnected, and it is a combination these things that are causing declines. Further research of this enigmatic bird is a top priority to better understand aspects of its life history and needs to make more informed decisions. Conserving land where common nighthawks are doing well is not only beneficial for nighthawks but has been found to be beneficial for also conserving closely related species such as the eastern whip-poor-will creating a win-win situation for both nightjar species (Farrell et al. 2017). Working with farmers through programs like the Farm Bill to create habitat buffers and early successional habitat has been beneficial for a wide number of species such as the Golden-winged Warbler and continuation these practices could also be beneficial for conserving nighthawk habitat as well (USDA 2019). Banning or reducing the use of neonicotinoids could have positive effects on insect populations. In wide-scale farming creating habitat buffers and other shifts to allow some species to come back to those areas may be beneficial. Migratory species’ conservation of stopover sites and wintering grounds are importance for their survival (La Sorte et al. 2017). For nighthawks that now reside in urban areas management decisions could be made to make these urban areas bird-friendly such as creating rooftop habitat ideal for nesting and roosting. In reality a combination of solutions would be needed to conserve this species.

Some may argue the validity of trying to save the common nighthawk when so many species are imperiled. The species is not a particularly charismatic, it is not a large source of economic revenue for people, it is a relatively unknown in the public eye, and is not a keystone species giving it major ecological importance. When there are so many conservation battles to fight there are only so many that conservationists can realistically win. However many of the same problems that plague the charismatic, well-known, ecologically beneficial, and monetarily important species are also ones that the common nighthawk currently faces. The landscape is a puzzle and there are many pieces to it that interlock together. So why care about one missing, bland-colored piece? You begin to lose the entire picture when you are missing pieces. Soon another is lost, then another, and over time the puzzle is structurally weakened and the beauty that was once there is no longer. The common nighthawk may be just one piece of this greater picture but without all those the individual parts the picture would no longer exist.

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