

## **NH Swallow Colony Registry (Swallow CORE)**



### ***Background***

Birds that capture insects on the wing such as swallows and flycatchers are declining across northeastern North America. This group, called aerial insectivores, includes a variety of birds with different habitat needs and foraging styles. Swifts, swallows, and nighthawks feed almost entirely by catching insects in flight (called hawking), while Whip-poor-wills and flycatchers tend to catch insects by sallying out from a perch. Many of the latter are forest or edge birds, while the hawking insectivores are more typical of open areas such as wetlands, agricultural lands, or barrens.

The magnitudes of some declines have been so severe that three species (Common Nighthawk, Chimney Swift, and Olive-sided Flycatcher) were recently listed as “threatened” in Canada. Several additional species, including Whip-poor-will and Bank Swallow, are being considered for similar designation. In the northeastern United States, these declines have only recently come to the attention of the broader conservation community, and while few species have been listed as threatened or endangered in individual states (Common Nighthawk is an exception), several are listed as “special concern” or otherwise considered “species of greatest conservation need.” In New Hampshire, Common Nighthawk is listed as state-endangered and five others are on the list of species of conservation concern. For the most part, biologists have no clear understanding of why these species are in clear and persistent decline. Hypotheses proposed to date include pesticides (at any point in the bird’s life), climate change, and habitat loss or alteration (during breeding, wintering, and migration). See below for more on the causes of the decline as they pertain to swallows.

Some declining species of aerial insectivores have recently become the subjects of targeted conservation programs. “Chimney Watch” seeks to investigate the role of nest site availability for Chimney Swifts in Connecticut, North Carolina, and other states. NH Audubon’s “Project Nighthawk” is studying artificial rooftop “nest patches” in urban areas, and similar efforts are underway in Pennsylvania. The Northeast Nightjar Survey developed monitoring protocols for Whip-poor-wills, and has also expanded to study habitat use on the breeding grounds. In addition, there are intensive and wide-ranging research and monitoring efforts directed at two species of swallows – Purple Martin and Tree Swallow – which have the potential to provide insight into the factors that may influence population dynamics.

NH Audubon, with funding from NH Fish & Game, is piloting “Swallow CORE” as a means of collecting data on the distribution and abundance of swallows in New Hampshire, focussing on the colonial species that are showing the steepest declines. Although we have data on statewide population trends, we lack current information on the statewide distribution of breeding colonies in the state. The last statewide survey for these species was the Breeding Bird Atlas in the early 1980s. We suspect that the number of breeding sites and the number of nests at each site has declined since then, but we have no hard data. There is no mechanism in place to track the size and productivity of swallow colonies over time. It is hoped that volunteer “citizen scientists” can help us gain a better understanding of the statewide distribution and abundance of

the four highly colonial swallow species: Barn Swallow, Cliff Swallow, Bank Swallow, and Purple Martin. Specific objectives of Swallow CORE include:

- Develop a registry of known swallow colonies in New Hampshire. This will allow for site-specific monitoring of colony size, and refine our knowledge of swallow distributions in the state.
- Collect data on productivity at swallow colonies. This can help us better understand the population dynamics of these birds, and in turn inform future conservation activity.
- Engage citizens in efforts to collect data on species of conservation concern.

### ***Why are Swallows Declining?***

Bird populations are subject to multiple factors that can result in increases or decreases. These are what ecologists call “limiting factors,” in that they tend to keep a population within certain limits set by habitat, resources, predation, or even climate. Most such factors are a natural part of each species’ environment, so it is normal to see some variation between years. However, when a population consistently increases or decreases over a period of several years, this is a suggestion that something has changed, and that some limiting factors are having a greater or lesser effect than before. For example, if factors such as predation pressure or cold temperatures are relaxed, a population may be able to increase, while if food or habitat is lost the population may decline. Changes to limiting factors may be natural or the result of human activity, and it is the investigation of the latter that is often the focus of conservation biology.

So what limits populations of swallows? During the breeding season two things are particularly critical: nest sites and food. Studies of cavity-nesting species (e.g., Tree Swallow, Purple Martin) have shown that populations can be increased significantly simply by providing nest boxes within a study area. Other species have very specific nest site requirements. For example, Bank Swallows can only nest in areas where erosion or excavation have exposed banks for the birds to burrow into, while Barn and Cliff Swallows need stable vertical or horizontal surfaces. It is quite possible that the proliferation of human structures once benefited Barn and Cliff Swallows, as did the creation of extensive open areas over which they can feed. Declines in these species may occur if former farmland reverts to forest, or if barns and similar structures deteriorate or are torn down, although more permanent structures such as highway bridges still provide suitable nest sites.

As for food, since swallows feed almost exclusively on flying insects, they tend to occur in open areas and near water, since rivers, lakes, and wetlands provide excellent sources of mosquitoes, mayflies, and other insects. It is also important that prey be available throughout the breeding season, and particularly during the period when parents are feeding nestlings or fledglings. During this time – usually 4-5 weeks – adult swallows need to forage almost continuously to meet the energy demands of both themselves and their young. If food is unavailable during critical times – a late spring cold spell, for instance – swallows may not be able to keep up the pace. In such cases nests may be abandoned, and sometimes even the adults suffer high mortality.

While populations of swallows' insect prey fluctuate naturally, there are additional impacts related to human activity that may further reduce food availability or alter its timing. An obvious example is that of pesticides, which are specifically intended to kill large numbers of insects such as mosquitoes and agricultural pests. There are very few data on the effects of insecticides on birds such as swallows, but anything that makes insects harder to find is clearly not beneficial in the long run. And while most pesticides in use in the United States today are not toxic to the birds themselves, this is not necessarily the case elsewhere in the world (see below).

The interaction of climate change and food availability is a little more complicated. In the simplest sense, the time when insects emerge in spring is likely to shift earlier in the year. If migration timing of swallows fails to shift similarly, the birds may arrive after populations of certain insects have already peaked. This "phenological mismatch" could have its most severe consequences during the nestling feeding stage. If the insects that the swallows normally rely on to feed their young have already passed, it may be harder to successfully produce a clutch of young. Available data suggest that many swallows are actually arriving *later* in the season, thus compounding this problem. Even before swallows nest, long periods of cold, wet weather suppress insect activity, which can result in the adult birds not having enough food after returning from migration. Some climate models predict wetter springs, and in combination with the phenological shift, this may further impact local swallow populations. Changing weather patterns can also affect swallows during migration, either before or after their breeding season here in New Hampshire. Increased storm intensity in the fall may cause mortality and cold snaps at any time will influence food supplies.

The final threats to our swallow populations during the non-breeding season occur during the several months they spend on their winter grounds, mostly in Central and South America. These threats are largely unstudied, but include habitat loss and pesticides. The latter are of particular concern because it is already known that some agricultural chemicals used in South America are directly toxic to birds. And even if birds don't die on their winter grounds, reduced food availability, habitat loss, or other stresses can make it more difficult for migratory birds to successfully make their return migration to breeding sites in the spring.