

RESEARCH FACTS



UNIVERSITY OF SASKATCHEWAN

Livestock and Forage
Centre of Excellence

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IN PROGRESS

Effects of environmental and pollution stressors on avian cognition and migratory behaviour

PROJECT TITLE

Effects of environmental and pollution stressors on avian cognition and migratory behaviour

In progress:

Long-term maintenance of nest-box population

RESEARCHERS

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Background:

Migration between wintering and breeding grounds is a critical event for many birds, and any delays or disruption of migration could negatively affect survival and future reproduction. Successful migration requires complex brain functions, such as orientation, navigation and spatial memory. Many migratory bird populations are exhibiting steep population declines. There is an urgent need to understand the causes of these declines and whether exposure to chemicals in the environment and disruption of cognitive function are playing a role.

European starlings are a widespread songbird species with a well-studied ecology. They readily use nest boxes, making it easy to monitor their reproductive success and nestling development. In Saskatchewan, starlings are migratory where they move further south in the winter and return in the spring to breed. This combination of traits makes them an excellent study species for investigating the effects of environmental stressors on migratory songbirds.

Objectives:

The objective of our research is to investigate how environmental conditions, including exposure to common environment contaminants, can affect the brain, behaviour and health of migratory songbirds, using the European starling as a model species.

What They Will Do:

We maintain a nest-box population of European starlings at the Livestock and Forage Centre of Excellence's Goodale Farm. We start checking nests after birds return in early spring and monitor for egg laying and hatch dates. In the 2020 breeding season, we conducted a project to assess how early exposure to common pesticides affect the development of brain regions that are associated with migration. After hatching, chicks were orally exposed either to known concentrations of a pesticide or to a control dose that did not contain pesticides. Subsets of chicks were collected at three time-points over the nest period. The rate of brain cell formation, the size of different brain regions and the cell density in different brain regions is currently being measured. We also caught adults using nest-box traps and collected nail clippings that will be analyzed for hydrogen stable isotope ratios, which will allow us to estimate migration distance of the parents. From this information, we will be able to compare how brain structure changes over the nestling period, how exposure to pesticides affects brain development and whether the migration distance of parents is related to the development of brain regions associated with migration in the nestlings.

Implications:

This research will increase our understanding of how environmental contaminants may be affecting migratory bird populations and will help identify conservation measures that could contribute to the protection of migratory birds. It will also help answer fundamental questions surrounding avian brain structure and function in relation to bird migration.

Proudly funded by:



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