RESEARCH • INNOVATION • ENTERPRISE

ORNITHOLOGY

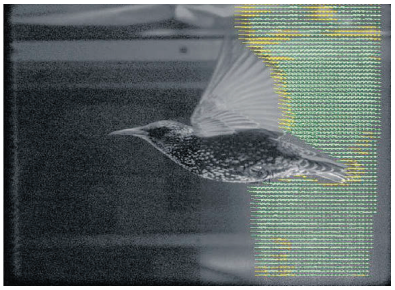
Taking flight, bird studies offer far-reaching insights

Even for a Canadian, the northern wheatear is well travelled. As the songbird with the longest migration in the world, the tiny species flies some 30,000 kilometres twice a year between its breeding grounds in Canada's Arctic and its wintering territory in sub-Saharan Africa.

Soon we may know the exact route it takes, as well as the effects of the changing climate, development and pollution on its flight. Fitted with radio transmitters on tiny harnesses, such birds will be tracked from space as part of a "transformative" effort to learn more about declining bird populations, says Christopher Guglielmo, a biology professor and co-director of the Advanced Facility for Avian Research (AFAR) at Western University in London, Ont.

AFAR, a $9.2-million facility opened in 2009, jointly financed by the Canada Foundation for Innovation (CFI) and the Ontario Research Fund, is used by the university's biology, psychology and engineering faculties to study subjects like bird behaviour, biomechanics, physiology and aerodynamics. It includes the world's first hypobaric climatic wind tunnel, where researchers study birds in flight in different wind, temperature, light, pressure and humidity conditions.

Next year, a new $3.4-million project will allow scientists to move into the natural environment, tracking even the smallest birds, such as thrushes, using digital telemetry arrays in Ontario and Atlantic Canada.



Birds in flight are the objects of study in the hypobaric climatic wind tunnel at Western University. SUPPLIED

Next year, AFAR Takes Flight, a new $3.4-million project supported by the CFI in partnership with the University of Guelph and Acadia University, will allow scientists to move into the natural environment, tracking even the smallest birds, such as thrushes, using digital telemetry arrays in Ontario and Atlantic Canada. On a global scale, the birds will be followed by a network of low-orbit satellites and the International Space Station, when AFAR teams up in 2015 with the Max Planck Institute for Ornithology in Germany in its International Cooperation for Animal Research Using Space (ICARUS) initiative.

Dr. Guglielmo notes that ICARUS could help explain the sharp drop in the numbers of grassland birds such as bobolinks, aerial insectivores such as swallows and shorebirds like the red knot, which breeds in the high Arctic and winters in Patagonia.

Some 80 per cent of bird deaths can occur during such migrations, he notes. "It's not enough to document the trends, we have to go into the field to try to understand the mechanisms."

Birds have long been harbingers of compromised ecosystems, from canaries once used to test the air in coal mines to peregrine falcons that taught us the dangers of DDT. But they have also proven valuable in studying other areas, such as brain networks, Dr. Guglielmo says, where they act as useful models for memory and language learning in humans.

FOOD SECURITY

Diagnosing bees in search for answers to collapsing colonies

Honey bee colonies are dying around the planet, with bees from one-third of all colonies disappearing each year since the Colony Collapse Disorder appeared in 2006. "Annual colony losses of 30 per cent to 40 per cent are now routine globally, and can go as high as 100 per cent," says bee biologist Mark Winston, author of *Biology of the Honey Bee*.

The loss of these essential pollinators is potentially devastating to the world's food supply, so accurately mapping and analyzing bee health is critical. The National Bee Diagnostic Centre (NBDC) in northern Alberta, launched by the Grande Prairie Regional College Centre for Research and Innovation in September 2012, aims to do just that.

While much research has been aimed at identifying a single cause, the most recent and comprehensive research points to systemic harm: "1,000 little cuts" such as mono-crop agriculture, which reduces nutrient diversity and pesticides that, while thought to be harmless in minute exposures, make bees more vulnerable to viruses and mites, says Dr. Winston.

"As a national centre, we've started to get a larger picture of the disease presence in Canada, which will enable industry to make informed decisions and help beekeepers better manage their colonies."

Dr. Bruce Rutley
National Bee Diagnostic Centre

Researchers at the National Bee Diagnostic Centre at Grande Prairie Regional College are trying to find out what is harming bee colonies. SUPPLIED

"There are three different categories of suspect causes: biological, chemical and nutritional," says Bruce Rutley, director of the NBDC. "We're focusing on identifying the biological causes – we have the only laboratory in Canada specializing in bee diagnoses."

Beekeepers across the country send samples of their stock to the lab, which detects the presence or absence of numerous pest pathogens or parasites.

"As a national centre, we've started to get a larger picture of the disease presence in Canada, which will enable industry to make informed decisions and help beekeepers better manage their colonies," says Dr. Rutley.