Advanced tech takes flight to track migratory birds

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What exactly happens when migratory birds travel from Point A to Point B, and all the stops and starts along the way? Those are questions a new $3.4 million project led by Western's Advanced Facility for Avian Research (AFAR) hopes to answer.

"Approximately 80 per cent of Canada's birds are migratory, and many species have been declining for decades, some by over 70 per cent," said Biology professor Chris Guglielmo, one of the principal investigators on the project. "We need to understand how Canadian bird populations are structured across the landscape, why they are changing and how they can be protected for future generations."

The project, titlted AFAR Takes Flight, will allow researchers to achieve their primary goal of understanding the connections between breeding, migrating and wintering locations for all of Canada's birds by 2030.

This multi-faculty, multi-institution project brings together Western's faculties of Science (Biology, Earth Sciences) and Social Science (Psychology), as well partnerships with the University of Guelph and Acadia University, each of whom contributed part of their Canada Foundation for Innovation (CFI) funding to the proposal.

On the global scale, AFAR will team with Vogelwarte Radolfzell, a principal investigator from the Max Planck Institute for Ornithology in Germany. Radolfzell leads the International Cooperation for Animal Research Using Space (ICARUS) initiative.

Just as it sounds, the new technology will be capable of tracking birds, as small as thrushes, from space by using satellite transmitters/receivers and should be operational next year.

"This new ICARUS project has money from the European Space Agency and can use low-orbit receivers that would be able to detect a 1.5-gram transmitter, as opposed to a 15-gram transmitter," Guglielmo said. "Now, I can take this individual bird, particularly if it's an endangered species, and I can exactly track it for a full year – where it goes and if it dies, is it on migration over the Gulf of Mexico, does it make it to the wintering area and then die there? It will answer so many questions.

"With a one-year lifespan, we will be able to continuously track birds as small as 20-40 gram over thousands of kilometres and between multiple continents."

AFAR will be the first group in North America to take advantage of this space technology.

Closer to home, Guglielmo will work with Geography professor Fred Longstaffe and his stable isotope facility. By measuring such elements as hydrogen, oxygen, carbon and nitrogen levels in the feathers and other tissues of birds, the team will be able to reconstruct movement and probability patterns for virtually every migratory bird breeding in Canada.

Digital telemetry arrays are ground-based systems used to directly measure movements of a large numbers of animals simultaneously and, using sophisticated computing, in real time.

Numerous receivers and radars will track marked birds in Ontario, Atlantic Canada and British Columbia, and communicate and analyze

data through new high-performance cloud computing at Western. Computer Science professor Mike Bauer will create the necessary software and algorithms to collect, filter and analyze the huge amount of data that will be generated by the telemetry array.

Guglielmo said many migrants are threatened and the data collected will give Canada the information it needs to conserve its natural heritage of migratory birds as its population and economy grow.

"Changes in climate and land use are threatening many migrants, and the goal of this project is to understand how Canadian bird populations are structured across the landscape, why they are changing, and how they can be protected for future generations," he said.

Provided by University of Western Ontario