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**BIOLOGISTS INTEGRATE UNMANNED AIRCRAFT TECHNOLOGY IN LONG-
STANDING CANADIAN WILDLIFE STUDY****FIRST TESTS SUGGEST UNMANNED AERIAL SYSTEMS AS SAFE AND NON-INVASIVE MEANS OF
MONITORING ECOLOGICAL SYSTEMS IN THE ARCTIC**

In a portion of Manitoba, Canada, so remote you have to fly in by helicopter, a research team led by the University of North Dakota and the American Museum of Natural History spent the summer deploying the latest tool in a nearly five-decade-old ecological study: unmanned aerial systems (UAS). As part of the Hudson Bay Project, a collaborative research program that includes partners from the U.S. and Canada, the group conducted nearly 90 test flights from Wapusk National Park to learn whether UAS can be used to non-invasively study the overabundant geese in the region and their impact on the tundra landscape. Their work suggests that in addition to being effective and efficient – the single unmanned aircraft used by the team generated more than 80,000 detailed images during just two months – UAS studies are also safer than foot surveys that put researchers at risk of encounters with bears.

“This technology has propelled us well into the 21st century,” said Robert Rockwell, a research associate in the Museum’s Department of Ornithology and a senior scientist of the Hudson Bay Project. Rockwell, who has been counting geese in the area since the late 1960s, teamed up last year with University of North Dakota biologists Susan Ellis-Felege, Robert Newman, Chris Felege, UAS expert Michael Corcoran, and students Andrew Barnas and Sam Hervey to explore the use of UAS at the remote Canadian camp.

“We have been able to enhance and extend our geographical coverage, and to do it

in a way that precludes potential disturbances of the very ecosystem we are studying,” Rockwell said. “It also helps us avoid confrontation with the ever-present bears, the region’s top predators. The first year’s operations were a grand success by any measure, and I look forward to expanding our efforts in 2016 and beyond.”

The team is the first to be given permits to develop UAS technology in a national park in Canada. The new tool grants researchers the freedom to monitor the ecosystem from the air and greatly extends their range of monitoring activity, providing the kind of view and access previously afforded only by helicopters, but with much less noise and expense.

The researchers’ UAS vehicle of choice is a 5.5-pound Styrofoam flyer that launches via catapult and is programmed to follow transects while taking photos at one-second intervals. The imagery is then stitched together to form a picture of the ground below. From about 250 feet up, the aircraft’s belly camera clearly captures snow geese (blue and white varieties) and their goslings, different types of vegetation and damaged areas, and other bird species like sandhill cranes, tundra swans, bald eagles, and herring gulls.

To gauge how the local wildlife responds as the aircraft flies nearby, the researchers placed video cameras near goose and eider duck nests. They found that the animals generally ignored the aircraft, even when in close proximity to the launch sites.

“Once we’re set up, the birds didn’t seem to pay attention to the aircraft,” said Ellis-Felege. “But to confirm nesting bird responses, we are now reviewing camera footage and sound recordings from the nests to determine if they show any responses to this small aircraft flying above them.”

That is important not only to the nature of the work, but also to the park managers and the indigenous people who have a “don’t touch and don’t disturb” philosophy, said Rockwell. “Using UAS allows us to respect those wishes and cultural considerations,” he said.

Before starting the study, the team underwent extensive training to receive a Special Flight Operations Certificate. The flights are conducted through the approval of both Parks Canada and Transport Canada.

“Flight crews, including the biologists, initially received factory training that instructed them how to professionally operate the air vehicle, and they continue to build

their science and aviation skills as the project moves forward,” Corcoran said.

The technology does have limitations: the vehicle must be in sight at all times during flight, so helicopters are still necessary to transport people and equipment to areas of interest that are far away from the electric-fence-protected camp. But based on their initial tests, the researchers expect that UAS will be extremely beneficial in learning more about nesting and nest failure in the region – an increasingly important topic as the changing Arctic climate is [causing bears to consume alternative food sources like geese and their eggs](#).

Unmanned aircrafts also could be used to study the area’s predators by identifying “day beds,” flattened grass areas that mark where polar and grizzly bears rested on land. Researchers can then go on targeted field trips to collect hair left in the beds for genetic testing that provides details about the local population.

Funding for the study was provided by the North Dakota EPSCoR program, UND College of Arts and Sciences, UND Office of the Provost, Parks Canada and Wapusk National Park, the Central and Mississippi Flyway Councils, the Arctic Goose Joint Venture, and Anne Via.

UNIVERSITY OF NORTH DAKOTA

With nearly 15,000 students, the University of North Dakota is a classic university that offers more than 220 fields of study from the bachelor’s to the Ph.D., along with degrees in law and medicine. The University’s mission is to provide students a liberal arts foundation with a particular focus on business, education, law, medicine, engineering and mines. UND sustains its strong core in the liberal arts and sciences, and has developed special missions in the life sciences, fine arts, aerospace, engineering and energy disciplines. It is focused on creating world-class academic programs responsive to the needs of the residents of North Dakota, the nation and the world.

AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)

The American Museum of Natural History, founded in 1869, is one of the world’s preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including the Rose Center for Earth and Space and the Hayden

Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200 scientists, whose work draws on a world-class permanent collection of more than 33 million specimens and artifacts, as well as specialized collections for frozen tissue and genomic and astrophysical data, and one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree and, beginning in 2015, the Master of Arts in Teaching degree, which began as a pilot in 2012 and is the only non-university affiliated such program in the United States. Annual attendance has grown to approximately 5 million, and the Museum's exhibitions and Space Shows can be seen in venues on five continents. The Museum's website and collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions more beyond its walls. Visit amnh.org for more information.

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