2021-2022

RESEARCH + MANAGEMENT REPORT

Bird Conservation & Management

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2021-22 RESEARCH & MANAGEMENT REPORT

Maine Department of Inland Fisheries and Wildlife protects and manages Maine's fish and wildlife and their habitats, promotes Maine's outdoor heritage, and safely connects people with nature through responsible recreation, sport, and science.

Bird Conservation & Management

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Compiled and edited by Lauren McPherson

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BIRD CONSERVATION & MANAGEMENT

Meet the Bird Group

Brad Allen, Wildlife Biologist and Bird Group Leader

Brad retired in August 2022 after a 41-year career with the Department, over half of which had been as the Bird Group Leader. He oversaw bird group activities and budgets, and was intimately involved in waterfowl and woodcock management, common eider research, and seabird monitoring and conservation. Brad's work often involved many collaborations with others, repeatedly bringing various groups together including state, federal, international, non-governmental organizations, and academic researchers to work towards common research and management goals. Brad's leadership and passion for the resource will be missed, but we wish him all the best in retirement!

Erynn Call, Ph.D.
Wildlife Biologist

Erynn focuses on the ecology and management of Maine's raptors. Her current research centers on rivers and river-associated birds, including bald eagles and ospreys. An ongoing, but recently modified, citizen science river bird monitoring program will offer a greater understanding of habitat relationships, presence and removal of dams, and the importance of sea-run fishes to raptors. Other work includes review and collaboration on various raptor research and monitoring efforts of industry, universities, federal agencies, and nonprofit organizations.

Danielle D'Auria
Wildlife Biologist

Danielle is the Department's species expert on secretive marsh birds, colonial wading birds, common loons, and black terns. Her work focuses on understanding statewide populations of these species as well as land management issues affecting the wetland habitats they depend on. Over the past 14 years, she has also devoted a great deal of effort to heron surveys and research, including coordination of a volunteer monitoring program called the Heron Observation Network of Maine and has used GPS transmitters to track great blue herons during breeding, migration, and wintering.

Adrienne Leppold, Ph.D.
Wildlife Biologist

Adrienne's responsibilities include the development and implementation of programs to assess the status of songbirds in Maine. Adrienne is also tasked with providing technical assistance and advice to the Wildlife Management Section regarding a wide range of bird conservation issues. Adrienne is currently directing the Maine Bird Atlas, a five-year effort partnering community scientists with professional biologists to document the abundance and distribution of all breeding and wintering birds across the entire state. She is also working on two research projects involving rusty blackbirds and Bicknell's thrush.

Kelsey Sullivan
Wildlife Biologist

Kelsey coordinates MDIFW's waterfowl banding programs, surveys, and research to assess the status of game bird populations in Maine. Game bird species that Kelsey is responsible for include ruffed grouse, American woodcock, wild turkeys, waterfowl, and Canada geese. He is Maine's representative on the Atlantic Flyway Council Technical Section.

See the Game Species Conservation & Management section of the report to learn about Game Bird Conservation & Management.

Brad Zitske
Wildlife Biologist

Brad specializes on shorebird conservation and management throughout Maine. Much of his work focuses on state-endangered piping plovers along the sandy beaches of southern Maine. This involves a robust network of volunteers and partners throughout coastal communities. He has been working on a collaborative research project on upland sandpipers for the past two years, aiming to fill an information gap on habitat use of this species and migratory movements. Other work includes environmental review and participation in Atlantic Flyway Shorebird Initiative efforts to conserve and protect shorebirds range-wide.

VOLUNTEERS AND PARTNERS

The Bird Group would like to thank the following dedicated individuals who have assisted us with our bird conservation and management tasks over the last year:

Evan Adams
Sara Beck
Adrianna Bessenaire
Louis Bevier
Erik Blomberg
David Brinker
Houston Cady
Bill Carll
Olivia Choi
Brittany Currier
Kelcy Deagle
Chris DeSorbo
Bob Duchesne
Chris Dwyer
Matt Gonnerman
Wing Goodale
Bill Hancock
Tracy Hart
Doug Hitchcox
Todd Jackson
Patrick Keenan
Cyndy Loftin
Allen Milton
Laura Minich Zitske
Glen Mittelhauser
Kate O'Brien
Brian Olsen
Logan Parker
Marek Plater
Mark Pokras
Kevin Regan
Deanne Richmond
Tony Roberts
Amber Roth
Kate Ruskin
Jeff Saucier
Lucas Savoy
Stephanie Shea
Bill Sheehan
Cole Teimann
Lindsay Tudor
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Coastal Bird volunteers
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John Brzorad and 1,000 Herons
Heron Observation Network volunteers
Maine Peregrine Falcon Program partners and volunteers
Maine River Bird Project volunteers
Island Heritage Trust
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Gordon Russell
College of the Atlantic Loon Necropsy Group
Center for Wildlife
Martha Bell
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Maine Department of Agriculture, Conservation, and Forestry
Private landowners who have granted us access to their property for surveys and monitoring

Expanding Tracking Technologies and Uncovering Migration Mysteries

Adrienne Leppold

Rusty blackbird, bobolink, northern saw-whet owl, salt-marsh sparrow, Bicknell's thrush, and monarch butterflies. These are just some of the species the **Northeast Motus Collaboration (Figure 1)** is now tracking throughout Maine thanks in large part to funding from a competitive U.S. Fish and Wildlife Service State Wildlife Grant which enabled the expansion of an automated telemetry receiver (i.e., antenna) network **(Figure 2)**. Part of the international **Motus Wildlife Tracking Network** developed and managed by Birds Canada, the northeast collaboration has been working for the last few years to dot our landscape with receivers, all with the goal of advancing our understanding of animal behavior and movement patterns.

Figure 1. Northeast Motus Collaboration signage affixed to automated telemetry tower.

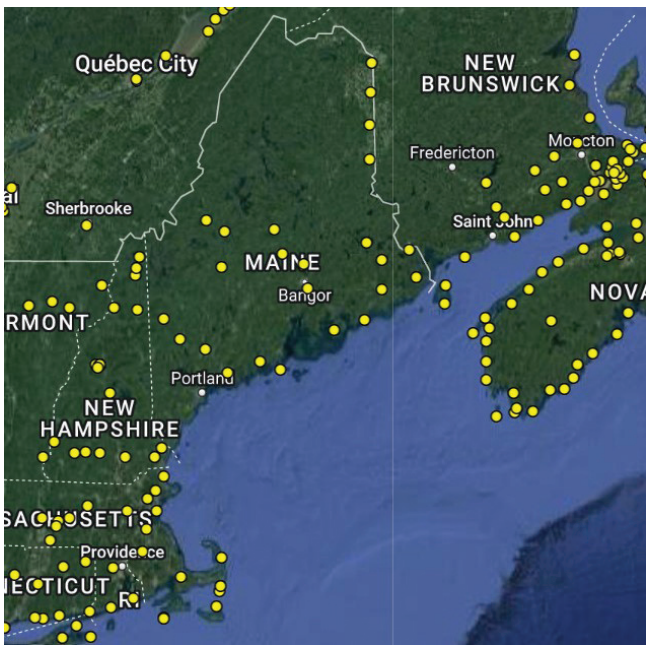


Figure 2. Map depicting receiver locations throughout the Northeast. More than ten towers have been erected or maintained through State Wildlife Grant funding over the last three years.

What are automated telemetry receivers?

Telemetry receivers are solar-powered antenna/receiving towers **(Figure 3)** that automatically record signals when animals carrying corresponding radio transmission tags pass within the tower's range. This technology allows biologists to gather information on organisms previously difficult or impossible to track over any distance due to the size limitations of cellular or satellite tracking technologies.

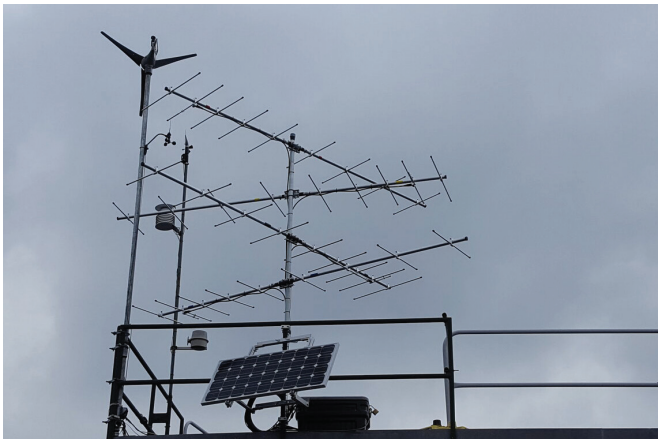


Figure 3a. A rooftop receiving array with two sets of quad-directional antennae and solar-powered receiving station.

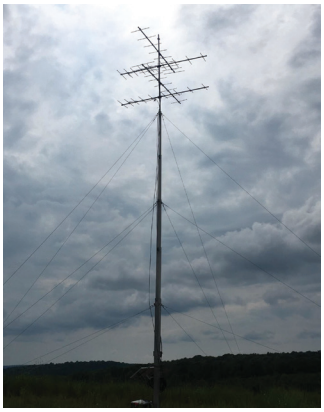


Figure 3b. A guyed, stand-alone tower array with two sets of quad-directional antennae.

Figure 3c. Ideal open view for optimizing antenna tag detection as seen from the top of an array fixed to an old fire tower.

The magic with Motus, which means *movement* or *motion* in Latin, is in the collaborations. Any tower in the network can register any specifically programmed tag such that infrastructure and data can be shared across projects. So, the more antennas there are across the landscape, the more potential there is to detect a tagged animal and learn about its movement and even habitat use. That said, the network's success also depends upon researchers capturing and deploying radio tags (e.g., nanotags) on animals.

One such effort has focused on bobolinks, a grassland bird species in steep decline **(Figure 4)**. One of the longest-migrating songbirds, bobolinks travel 12,500 miles round trip annually between breeding grounds in Maine and wintering grounds in central and southern South America. During migration, they face numerous threats, chief of which is the disappearance of grassland habitat throughout North America. In partnership with Amber Roth from the University of Maine and Maine Audubon, we have tagged 20 bobolinks over the past two years.

Figure 4. Male bobolink after capture and with a properly fitted Nanotag transmitter, just before release. Photo by Joanne Alex, UMaine Witter Farm.

What have we learned?

While additional years of tracking data will add important information to confirm these observed patterns, valuable discoveries are already being made from this small sample. By combining our data with that of tagged birds from other New England states, we have determined the Delmarva Peninsula is a critical migration stopover/staging area for our birds, at least during fall migration **(Figure 5)**. Additionally, individual track data is starting to elucidate at least two different bobolink migration strategies: 1) departing from the Delmarva Peninsula on a trans-oceanic journey to South America; and 2) continuing south by land from the Delmarva to the southeastern U.S. before departing out over the Atlantic (**Figure 6**), male #34246.

Despite South America not yet having as big of a receiving tower network **(Figure 7)**, male #34246 **(Figure 6)** also became the first of its species to be detected outside of North America. It flew 3,035 miles from Maine to Colombia in 32 days, with its final winter destination being somewhere in southwestern Brazil, Paraguay, northern Argentina, or central Bolivia.

This is all critical knowledge to inform conservation management actions, such as promoting grassland habitat along bobolinks' migration route (which would also benefit other species by association). All of this is made possible through the power of partnerships and this network. With so much potential, the Northeast Motus Collaboration is just getting started.

Animated maps of tagged animals' movements are publicly available on motus.org. Just click on 'Explore Data' to view tracks of selected species.

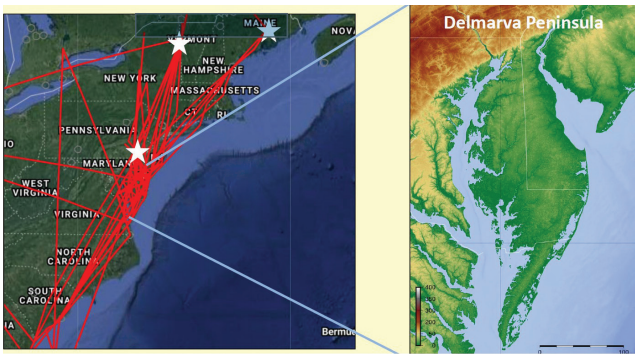


Figure 5. Map showing convergence of individual Bobolink migration tracks from nanotag detection on the Delmarva Peninsula (inset). Stars represent departure points of tagged birds and also the convergent point on the Delmarva. Graphic credit: Amber Roth.

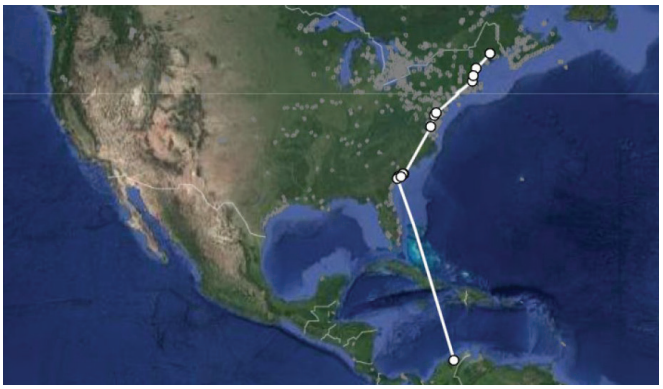


Figure 6. Male bobolink #34246 fall migratory track over land to southeastern U.S. and subsequent detection on the north coast of South America.

Figure 7. Map depicting receiver locations along the Gulf Coast of U.S., and in Mexico, Central and South America.

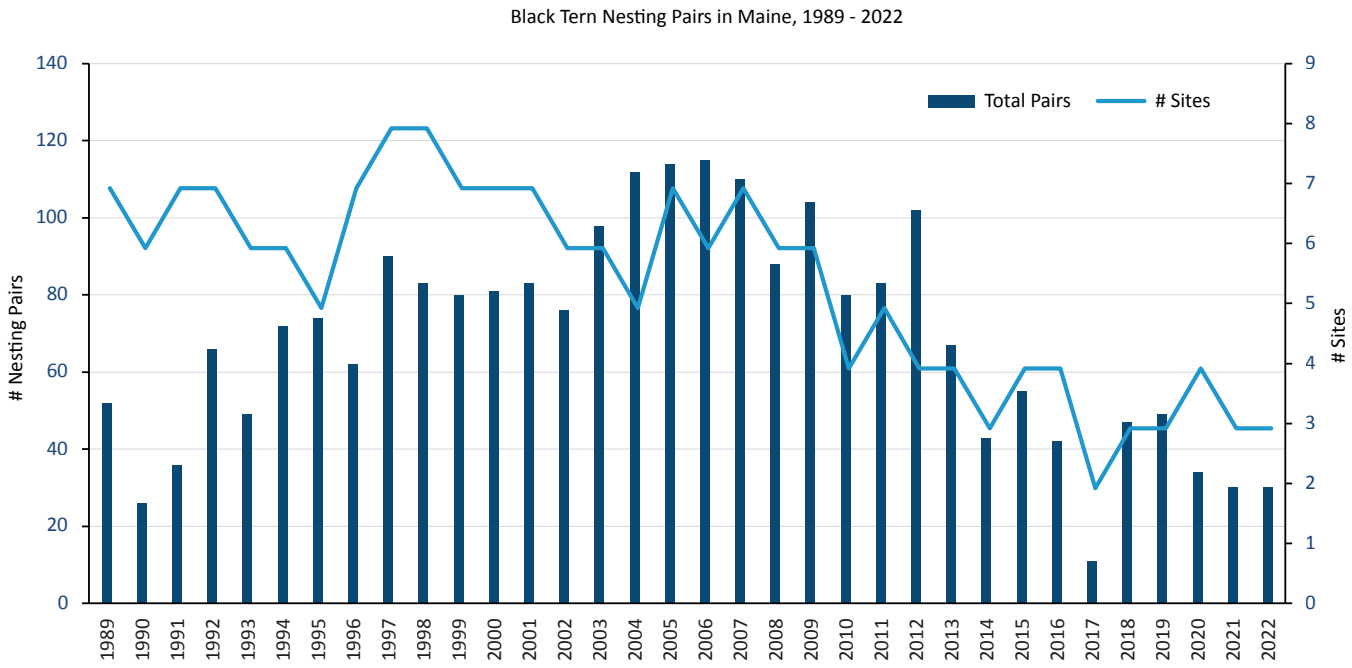
Research on Maine's Rarest Tern

Danielle D'Auria

The black tern (*Chlidonias niger*) is the rarest tern in Maine, nesting in just a handful of the state's freshwater marshes. Since 1989, the Maine Department of Inland Fisheries and Wildlife (MDIFW) has been monitoring the number of nesting pairs, which peaked in 2006 at 115 before declining to a low of 30 pairs (at three sites) in 2022.

This decline is not just occurring in Maine, which is on the periphery of the black tern's North American range. The black tern has experienced a long-term decline throughout its range, even at its core in the Prairie Pothole Region of the U.S. and Canada. The cause is unclear. While habitat loss and degradation have occurred, breeding habitat availability does not appear to be a primary limiting factor. In areas where survival and productivity have been studied, estimated vital rates fall far below those required to maintain a stable population.

Black tern on exposed mud, a typical site for a nest.



To better understand the return rates of Maine's black terns to their breeding wetlands year after year, MDIFW began color-banding adults in 2021. Each adult has a unique color band combination on one of its legs and a silver metal USGS band on the other. Biologists spend time watching the birds with binoculars and spotting scopes with the hope of "re-sighting" a color-banded bird.

MDIFW has also contributed to a larger migratory connectivity project in partnership with the University of Saskatchewan by equipping 10 adults (five in 2021, and five in 2022) with geolocators attached to a plastic leg band. Support for this work is also being provided by the Smithsonian Migratory Bird Center's Migratory Connectivity Project. Each geolocator has a light sensor that uses changes in ambient light levels to estimate sunrise and sunset times, from which latitude and longitude can be calculated. The derived locations will tell us where the birds go during migration, including important stopover and overwintering locations and areas where different sub-populations mix, so that we can potentially discover priority conservation issues at these sites.

Black tern with metal leg band on its right leg and two color bands (orange over yellow) on its left leg. MDIFW photo.

Black tern with geolocator attached to yellow plastic band. Photo by Don Lyons.

To obtain the data collected by the geolocators, the birds need to be recaptured and the geolocators removed and analyzed. This summer we recaptured three black terns with geolocators that had been deployed in 2021 and are looking forward to discovering where they traveled after the nesting season.

Over the next few years, we will continue to color-band adults and re-sight them to look at return rates, and hope to deploy more geolocators. We will also need to recapture birds with geolocators. If you spot a black tern with color bands or a geolocator (see photos for what to look for), please be sure to report your observation to the Bird Banding Laboratory and email **danielle.dauria@maine.gov** with the color band combination, location, and date.

Keeping Up with the Uppies and their Changing Habitats

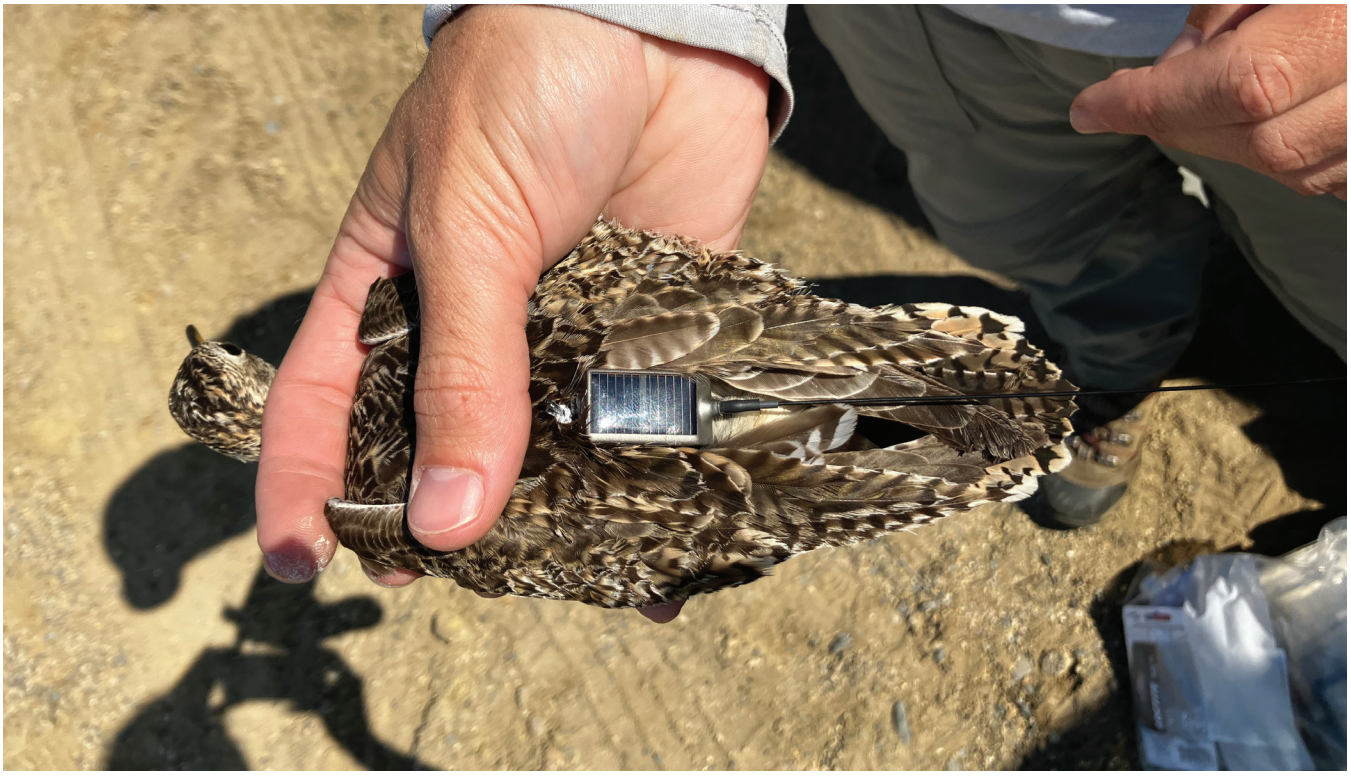
Brad Zitske

Upland sandpipers, also affectionately known as "uppies", are an unusual member of the shorebird family in that they don't spend much time on the shore. In Maine, their habitat is mostly open-field grassland and barrens. They occur in low densities and are area-sensitive, meaning they require a minimum amount of open space to settle and breed (typically 70-100 acres, with a preference for expanses over 150 acres). Sometimes that includes managed grassland like Kennebunk Plains Wildlife Management Area in southern Maine, the fields surrounding airports, and expansive agricultural operations in Aroostook County. But most often, you'll find them nesting in Downeast Maine's heavily managed blueberry barrens.

Over the past 100 years, their preferred field habitats throughout the state have diminished considerably, having been left to grow, developed, or turned into other uses. With that habitat change, upland sandpiper numbers have decreased and are declining statewide by almost all accounts, and they are currently listed as threatened in the state.

To date, minimal efforts have been made to document how upland sandpipers use breeding habitat in Maine or what their habitat needs are throughout the year. Research is also needed to understand how upland sandpipers could be impacted by, or will respond to, grasslands, blueberry fields, and other open space habitats being developed for various uses including solar energy facilities. The lack of information about upland sandpiper habitat use in Maine limits our ability to properly develop conservation strategies for this species and to find compatibility between upland sandpipers and the industries putting pressure on their habitats.

The summer of 2022 marked the second year MDIFW collaborated with the Biodiversity Research Institute (BRI) on a study of upland sandpiper habitat use and movement, generously aided by an award from the Maine Outdoor Heritage Fund (MOHF) with additional support from The Nature Conservancy in Maine. This is a much-needed and valuable opportunity to start addressing notable data gaps that limit our ability to conserve and manage for upland sandpipers.



Biodiversity Research Institute biologist Kevin Regan holds a satellite-tagged upland sandpiper before releasing. Photo by K. Regan.

This summer, biologists from BRI captured five upland sandpipers and tagged them with satellite transmitters to study their movement patterns and habitat associations during the nesting season, as well as to establish migratory connectivity between breeding grounds in Maine and wintering areas in South America. Early movement data is being collected on the four remaining transmitting birds (one stopped reporting on July 31, either due to a failed or lost transmitter or possibly a mortality).

Some movement highlights include one individual leaving its breeding grounds and flying approximately 118 miles to New Brunswick, Canada, on July 26. It spent the next two days in fields in and around Norton, NB, and on July 28 began working its way back down the Maine coast to its original banded location, where it arrived on July 29 (see photo on the first map! **Figure 1)**.

Between August 26 and September 1, all four tagged uppies departed North America, flying over the Atlantic Ocean to the southeast along roughly similar paths. Over five days, they each flew an estimated 3,500 miles! As of this writing (November 2022), the birds were in South America, spread from Venezuela to Brazil.

Results are still preliminary, but we receive exciting new information each day and look forward to observing their movements this winter. Each new transmittal we receive informs us of where these birds spend the winter and what areas on the wintering grounds are being used. It will be interesting to observe if some survive the winter and return to our area next spring; and if so, what routes they take and if they return to the same breeding grounds. All of this information is new for Maine – truly an exciting time to learn more about this fascinating species!

Figure 1. Movement of one individual upland sandpiper moving from its breeding territory to New Brunswick, Canada, and returning just three days later.

Satellite-tagged upland sandpiper with color bands perches after release. Photo by K. Regan.

Southbound migratory flight paths of four satellite-tagged upland sandpipers from 8/26/22 to 9/1/22.

Bald Eagles Made a Spectacular Recovery – What Now?

Erynn Call

It's a species recovery success story: Maine's bald eagle population has increased from just 21 pairs in 1967 to an estimated 800+ pairs today, making it by far the largest bald eagle population in New England and among the top 10 in all the lower 48 states.

In 1978, when the bald eagle was listed as an endangered species, there were approximately 600 known nests in the lower 48 states. In 1995, bald eagles were downlisted from endangered to threatened at both the state and federal levels; and in 2007, they were removed from the federal threatened and endangered species list. In 2009, they were removed from Maine's state list; and in 2018, MDIFW discontinued statewide aerial surveys (Todd et al. 2019).

This tremendous comeback was due to the collaboration of MDIFW, USFWS, and many private landowners. Protecting nesting birds from habitat loss and disturbance was key to helping this species recover from its exposure to DDT, a pesticide that caused eggs to thin and then crack during incubation.

More recent efforts to bolster and protect sea-run fisheries have further benefited bald eagles. Large numbers of non-breeding adult and subadult eagles congregate in places like the Sebasticook River in central Maine, where 2.8 million river herring were documented passing through the Benton Falls Dam in 2022 (DeSorbo et al. 2015, Maine Department of Marine Resources). These seasonal food sources boost the survival of eagles and ultimately stabilize the population.

Federal Eagle Act

Even though bald eagles were removed from both federal and state endangered and threatened species lists and their populations are increasing, they still are protected under the Federal Bald and Golden Eagle Protection Act (Eagle Act), which prohibits the take and disturbance of eagles. The Eagle Act is currently undergoing an **update** given the positive trajectory of the population, with the intent to improve the conservation benefit for eagles.

MDIFW continues to work closely with USFWS to collect and manage bald eagle productivity data, apply the **Management Guidelines**, and update the Eagle Act. The Department provides funding, participates in grant applications, reviews permits, and offers expertise and technical support on field research and reporting.

Subadult bald eagle. Photo by Laura Zamfirescu.

Movement Studies

In recent years, MDIFW supported and participated in multiple research efforts focused on eagle movements. Documenting the movement patterns of Maine's bald eagles helps us to understand and limit risks to eagles. To date, several studies identified areas of notable importance to eagles (e.g., aggregation areas). Such information is critical to informing broader conservation and management decisions and promoting responsible land management practices.

Using tools such as field-readable colored leg bands **(Figure 1)** and tracking devices, wildlife managers can learn a lot about Maine bald eagles' longevity and habits. Observations of eagles with leg bands are reported to MDIFW and partners regularly. The color bands uniquely identify individuals with an alphanumeric code and can be read from a distance with a spotting scope or digital camera. Silver USGS leg bands are also placed on the bird and contain a unique ID; however, this ID can typically only be read if the eagle is in hand.

Figure 1. A red alphanumeric band (left) and USGS band (right) from an adult bald eagle recaptured during a research study in Maine. Photo by Blake Massey.

"Over 950 Maine bald eagles – mostly nestlings – have been banded since 2001 as a part of research and wildlife rehabilitation efforts. Of those, nearly 300 have been re-observed – some up to 15 times!" [C. DeSorbo, personal communication, November 2, 2022]

We have gained some fascinating insights thanks to several collaborative research projects wherein transmitters were placed on fledgling and resident adult bald eagles (DeSorbo et al. 2015, DeSorbo et al. 2020, DeSorbo et al. 2021, Massey in prep). Specifically, we've learned that certain areas are especially important to eagles during different times of the year. We've characterized various movement patterns and home ranges (where the eagle spends its time) of both adult and subadult (< 5 years of age) bald eagles during breeding and non-breeding seasons, and have learned, for example, that subadult eagles are likely to wander widely throughout Maine and New England throughout their first few years of life until they eventually establish their territories. Meanwhile, adult eagles may remain in the vicinity of their nesting territory year-round depending on a variety of factors (for example, they're likely to stay throughout the winter months unless food scarcity forces them to relocate or migrate).

Studies tracking bald eagle fledglings reveal that nestlings raised in Maine predominantly use habitats throughout Maine, New Hampshire, and New Brunswick; however, individuals can travel as far west as Lake Erie, as far south as the upper reaches of Chesapeake Bay, as far north as central Quebec east of Hudson Bay, and as far east as the Churchill River region of Newfoundland and Labrador (DeSorbo et al. 2020). This research shows that the range of these young Maine eagles contracts and shifts southward during the winter, but that many areas are important year-round, particularly portions of major rivers such as the Penobscot, Androscoggin, and Kennebec Rivers in Maine and the Connecticut River between New Hampshire and Vermont.

One research project, initiated in 2015, revealed which factors drive habitat use around nest sites at the landscape scale (Massey in prep). This study involves capturing resident adult eagles and monitoring their movements using GPS transmitters. Using the tracking data, the researchers built computer models that predict eagle habitat preferences at different scales **(Figure 2)**. The GPS location data is matched with remote-sensed GIS data to identify important environment variables and flight paths around nests. Results are incorporated into an individual-based movement model that represents individual eagles in a realistic environment.

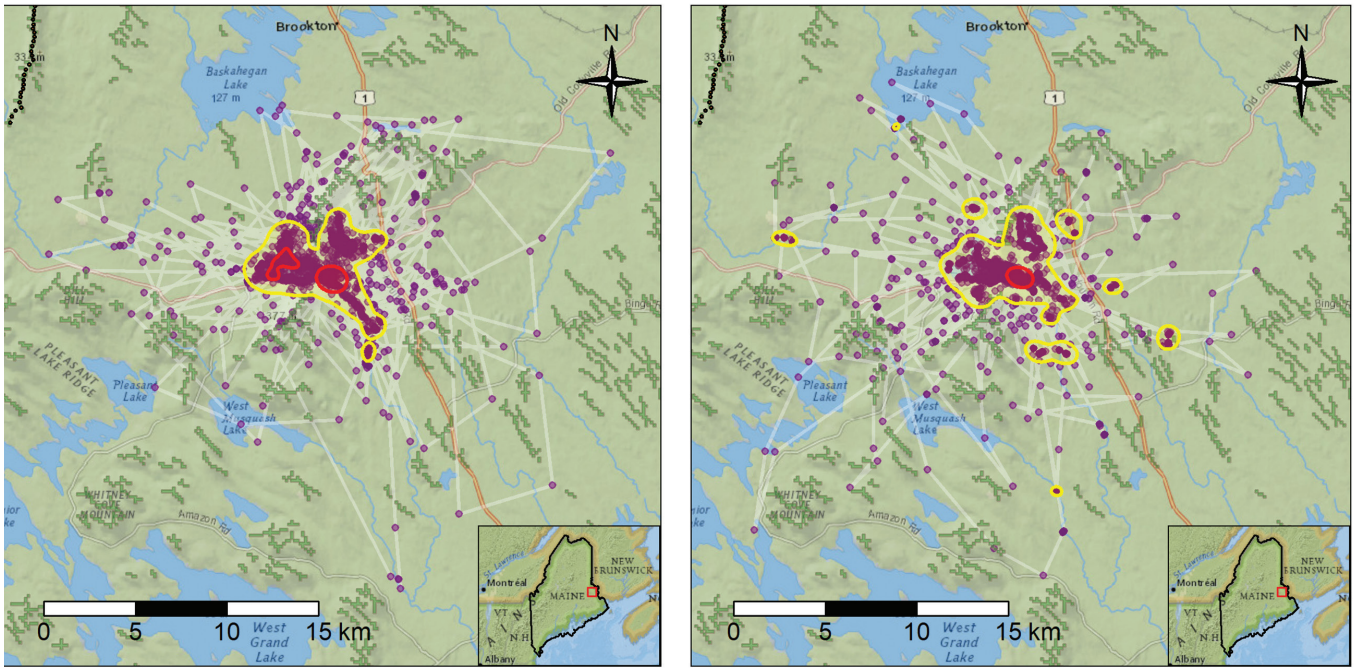


Figure 2. Example results from the individual-based model comparing actual movement data from GPS transmitters on a bald eagle at East Musquash Lake in 2016 (left map) to simulated eagle movements for the same location (right map). Purple dots represent point locations and white lines are interpolated movement paths. Yellow and red lines represent 95% and 50% habitat utilization areas, respectively (i.e., areas of high use).

Using behavioral, movement, and habitat-selection rules, the model can simulate each eagle moving around its territory. These simulations estimate habitat use, including important perching areas, flight corridors, and spatial distributions of territorial bald eagles.

The model can also simulate eagle movement patterns across existing landscapes and under various land use change scenarios. For example, eagle movements around a nest could be estimated and help guide landscape planning and minimize adverse effects on nesting bald eagles.

Sources of Mortality

Although Maine's bald eagle population is increasing, wildlife managers still monitor sources and incidences of mortality. Vehicle collisions and territorial fights are relatively common sources of mortality, while line collisions and electrocutions occur more sporadically. Another source of annual mortality for bald eagles in Maine and neighboring states is lead poisoning, which several recent studies have found leads to slower growth and lower resilience in U.S. bald eagle populations (Hanley et al. 2022, Slabe et al. 2022).

Bald eagles are exposed to lead when they inadvertently consume lead ammunition fragments in carcass remnants left on the landscape. When an animal is shot with a lead bullet, a third or more of the bullet's total weight is fragmented into hundreds of tiny pieces upon impact, dispersing internally as far as 18 inches from the pathway of the bullet. This happens even if the bullet passes through the intended target. Some of these lead fragments are so small that they are not visible to the naked eye but are detectable in x-rays. When eagles consume lead, it doesn't take much to make them sick. A piece the size of a grain of rice is toxic and often lethal. Because bald eagles are among the most valuable bioindicators of environmental contaminants, MDIFW is working with several research partners to measure concentrations of lead and other contaminants such as mercury in Maine's bald eagle population.

Another developing source of mortality for eagles as of January 2022 is the highly pathogenic form of avian influenza (HPAI), or bird flu. HPAI was last detected in wild birds in the U.S. in 2016. Migratory waterfowl can carry and spread this virus without any symptoms, but raptors and domestic birds such as chickens are severely affected and quickly die. Humans are very rarely susceptible to HPAI and only one human case was reported in the U.S. this year. Still, **MDIFW** is adjusting bird handling procedures associated with research and working closely with partners such as the **Maine Department of Agriculture, Conservation, and Forestry** and **U.S. Department of Agriculture Wildlife Services** to understand the status of the virus in Maine and educate the public.

We are fortunate in Maine to avoid many eagle deaths thanks to the care and expertise of wildlife rehabilitators at places such as Avian Haven and the Center for Wildlife. Avian Haven has admitted 449 eagles since 2001 and released 170 (D. Winn, personal communication, 4 November 2022). Their efforts continue to make a positive difference for eagles.

WHAT CAN YOU DO TO HELP MAINE'S BALD EAGLES?

- Protect sea-run fisheries. Learn more about the Sebasticook River **here** and **here.**
- Share the benefits of using nonlead ammunition. Learn more **here** and **here.**
- Avoid leaving carcasses harvested with lead ammunition on the landscape.
- Report nest locations with date, photos, and # of eaglets to **erynn.call@maine.gov.**
- Report injured or sick eagles to a local **wildlife rehabilitator, MDIFW warden, or biologist** (dead eagles can be reported to MDIFW).
- **Support wildlife conservation in Maine** through your donations.
- Learn more about **Maine's bald eagles**.

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Maine Partners with other States and Canadian Provinces on Two Atlantic Flyway Duck Research Projects

Kelsey Sullivan, Game Bird Specialist and Brittany Currier, Satellite Unit Project Field Leader

Left to right, top: Callie Knudson (Unity College) and Connor White (MDIFW Assistant Regional Biologist, Enfield). Left to right, bottom - Ilsa Griebel (University of Saskatchewan) and Steve Dunham (Regional Biologist, Jonesboro) work on deploying units on mallards and American black ducks at a rocket net capture site in Bucksport, January 19, 2022.

Two large-scale Atlantic Flyway satellite transmitter studies were initiated in the last two years to study the migration ecology and demographics of mallards and American black ducks (black ducks). These studies will give us a better understanding of the two species' breeding effort and habitat use and will inform our population estimates and harvest strategies.

Studying a species' survival and the factors that influence its productivity allows for researchers to estimate population sizes. However, with migratory birds, it's challenging to understand which factors contribute to population dynamics (i.e., low productivity or survival) given that specific individuals are difficult to follow throughout the year. Global Positioning System (GPS) and tri-axial acceleration (ACC) tracking devices help to fill this gap. GPS information provides the location of individuals and ACC devices collect spatial data and record movement in three dimensions.

In the winter of 2022, biologists captured mallards and black ducks using walk-in traps and rocket nets, then fitted them with individually numbered metal leg bands with contact information for reporting future encounters. We also equipped some females with GPS-ACC backpack tracking devices. These lightweight, solar-rechargeable devices record 12 GPS fixes and 240 ACC fixes per day. Analyzing these data will give us a better understanding of nesting attempts and success, brood rearing, mortality, and habitat use (e.g., for breeding, roosting, or foraging).

In all, Atlantic Flyway states and Canadian provinces deployed 270 satellite units on female mallards (23 from Maine) and 150 on female black ducks (9 from Maine). All of the Maine mallards that were determined to have nested remained in Maine. Two of the Maine black ducks settled in Canada — one in New Brunswick and one in Quebec. When these two ducks return to areas of cell coverage, data from the breeding season will be uploaded to satellites and available for analysis.

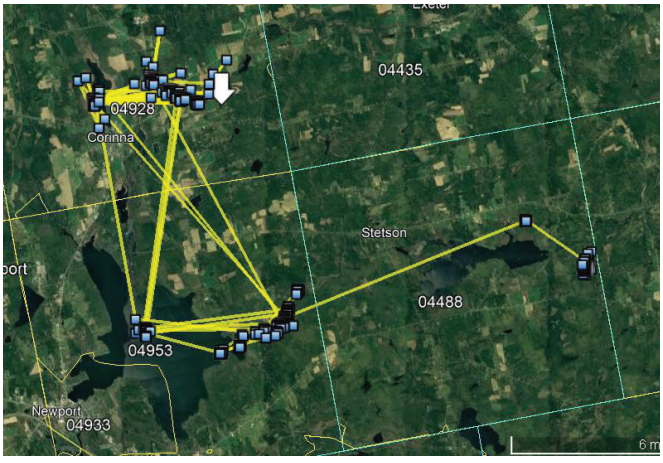
The mallard project was developed by New York and Pennsylvania out of a need to understand recent mallard population declines in the Northeastern U.S., contrasted with the stable mallard population trend in Eastern Canada. The black duck project is funded by the Black Duck Joint Venture and supported by state and provincial partners who deploy and monitor the transmitters. Coordination and data analysis for these projects are being led by graduate students at the State University of New York at Brockport and the University of Saskatchewan. This is a great opportunity for us to learn more about the breeding ecology, migration, and habitat use of these two species across their range as well as mallards and black ducks that winter in Maine. This winter, the Department plans to deploy 33 mallard transmitters and 30 black duck transmitters to contribute to the larger project.

Satellite transmitter deployed on an American black duck female - Verona Island capture site, January 16, 2022.

AMERICAN BLACK DUCK UNIT 215017 MIGRATORY ROUTE WINTER TO SPRING 2022

Unit 215017 – American black duck female captured in Newport, Maine on February 1, 2022; migrated to Pessamit, Quebec for the breeding season.

MALLARD UNIT 215488 FALL 2022 MOVEMENTS



Unit 215488 – Mallard female captured in Newport, Maine on February 1, 2022, remained in Maine for the breeding season and is now moving between Stetson, Newport, and Corinna.