Spring 2018 Volume 19 Issue 1

Tracker News

Microwave Telemetry, Inc.

Data Protection & Species Protection

Dear Customers and Friends,

With the passing May 25th 2018 deadline for compliance with the European Union's (EU's) General Data Protection Regulation (GDPR), the world took note of the importance of protecting stored personally identifiable information. While this monumental legislation only protects people in the EU and European Economic Area, new privacy laws for other countries are certain to follow. We are reminded of a time (not long ago) when birds and marine animals moved about in near secrecy, their whereabouts only revealed during point observations. Technology has enabled us to connect these points in near-real time — doing so is as easy as opening an email. Interestingly, at a time when privacy is regarded as an inherent human right, the scientific community increasingly moves towards a climate supportive of transparency in reporting and open-accessibility of data. As recent events have made clear, data ownership is a powerful tool to be used responsibly. Since no policy exists to protect animals' privacy rights, let's agree to put the information we acquire to good use. Humans owe them that, at least.

In this issue, Autumn-Lynn Harrison, Pete Marra, Amy Scarpignato, Katrina Phillips, Kelly Nesvacil, Don Lyons, and Susan Oehlers graciously share their data with us. Thank you to these impressive biologists who demonstrate their deep appreciation of scientific responsibility.

Sincerely,
Lucy and the Team at MTI

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Discovering Unknown Migrations with the Migratory Connectivity Project

Autumn-Lynn Harrison is a Research Ecologist at the Smithsonian Migratory Bird Center and Program Manager of the Migratory Connectivity Project. Pete Marra is Head of the Smithsonian Migratory Bird Center. Amy Scarpignato is a GIS Technician at the Smithsonian Migratory Bird Center.

The Migratory Connectivity Project

Migration is one of the most engaging phenomena of the animal world and is epitomized by birds. Over 75% of the birds in North America migrate. Migratory birds are also the quintessential canaries in the coal mine and more than 35% of migratory birds in North America are declining — some as much as 95% in the last 40 years. And like a canary in a coal mine, many migratory birds are indicators of an ecosystem's health — ecosystems that we as humans also depend on. Understanding and tracking bird migration is crucial for understanding causes and locations of population declines, and for conserving habitats that are essential to species and ecosystem survival. And yet, knowledge about why, how, when, and where bird species migrate during their lives is still missing for many species.

Male Black-bellied Plover
Photo by Ryan Askren, USGS

Migratory connectivity is the geographic and temporal linking of individuals and populations between one life cycle stage and another, for example, between breeding and wintering locations for a migratory songbird. Without an understanding of migratory connectivity, conservation investments can be ineffective because they are implemented at the wrong place or time, or for the wrong purpose.

Through the Migratory Connectivity Project (MCP), an initiative of the Smithsonian Migratory Bird Center, partners across North America are working to solve migration mysteries. Current initiatives of the Migratory Connectivity Project include discovering unknown migrations and testing new tracking technologies, catalyzing scientific collaborations around the migratory connectivity of birds, and building an atlas of migratory connectivity incorporating the 100-year North American bird banding dataset.

Discovering Unknown Migrations and Conducting Research on Species of Concern

In 2014 we initiated bird tracking projects throughout North America, focusing on Alaska, Alberta, Colorado, and Texas. We have since expanded our research to field sites in South Carolina, Georgia, Washington D.C., Maryland, Montana, Wyoming, Saskatchewan, and Argentina. Populations and species were selected for study based on either a lack of available migratory connectivity information, or a conservation need. We are working with species from many different biomes and taxonomic groups, including seabirds, shorebirds, songbirds, nightjars, raptors, and waterbirds, and we use and test many different types of electronic tracking technologies, including archival and satellite-linked tags.

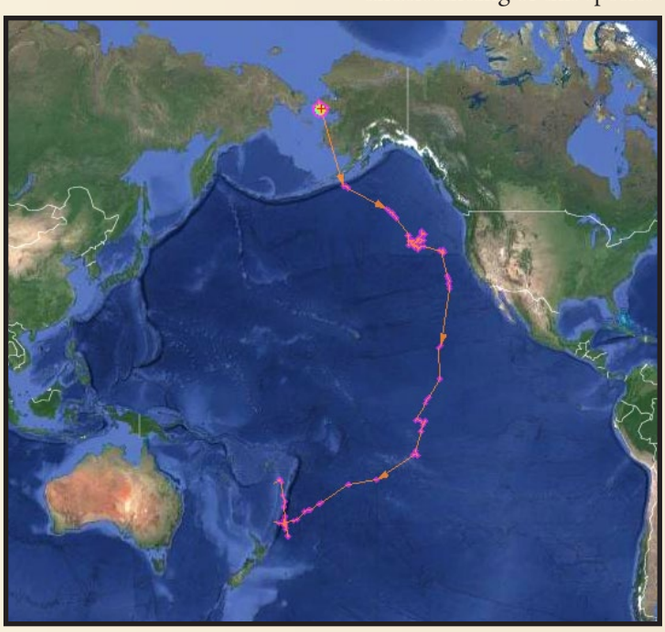
Microwave Telemetry is a main supplier of satellite tags for our research. Below we provide examples of exciting results from MCP studies using Microwave Telemetry tags.

Tracking shorebirds and small seabirds using a tag the weight of a nickel

Small tracking devices are revolutionizing the study of bird migration. They allow us to understand the migrations and habitats of birds like shorebirds and small seabirds that previously were too small to carry a tag, but that face great conservation risks.

In North America, shorebirds have declined by 50% though many Arctic breeders like Black-bellied Plovers, are little studied. In the 100-year history of bird banding in North America, only two band recoveries from breeding grounds to wintering areas have been reported for this species. Using Microwave Telemetry's 5g PTT (at the time, the smallest solar-powered satellite tag available), we tracked 15 Black-bellied Plovers from two breeding populations in Alaska (Nome and Colville River Delta). The Canadian Wildlife Service had the same idea, and has tracked over 30 individuals from the Canadian High Arctic. We are now combining our data to reveal the range-wide migratory connectivity of this species in the Americas, stop-over habitats, migratory behavior, and over-wintering locations.

The 5g PTT has also allowed us to reveal, for the first time, the migration of the Long-tailed Jaeger in the Pacific Ocean. In the Atlantic Ocean hundreds of individuals of this species have been tracked with geolocators, but there is very little understanding of this species' behavior in the Pacific. Long-tailed Jaegers spend most of their lives far away from land. In a pilot-study last summer, we tagged three individuals on their breeding grounds in Nome, Alaska. Before departing on their migration, one bird was confirmed shot, and its mate's tag also stopped transmitting the same day. Our third bird, however, gave us a show with an amazing migration path to the South Pacific, spending time over the Kermadec Trench north of New Zealand (see map).



Track of a Long-tailed Jaeger from Nome, Alaska to the South Pacific.

From the grasslands to the beaches, and the boreal forest to the tropics

The prairies and the boreal forest are two of North America's most iconic and threatened habitats. Using Microwave Telemetry 9.5g PTTs, we are studying the migratory connectivity of birds that breed in these special places. Three Broad-winged Hawks were tracked from Alberta's boreal forest, skirted the Gulf of Mexico, and over-wintered in South America.

continued on page 3

North America's largest shorebird, the Long-billed Curlew, breeds in prairie habitat. It is a species of conservation concern throughout its range, but some populations are thought to be more stable than others. We found that birds breeding in Nebraska, the Dakotas, eastern Montana, Alberta, and Saskatchewan all overwinter along the beaches of Texas, many in protected areas, but also in school yards and baseball fields.

Tokyo or Tijuana? The migratory divide of Alaska's Pacific Loons

We tracked 20 Pacific Loons with Microwave Telemetry implanted PTTs from two breeding populations in Alaska. Because we simultaneously tagged individuals from the two separate breeding populations — one above the Arctic circle, and one in western Alaska — we were able to record an exciting phenomenon, a migratory divide. Loons from Alaska's north slope flew west to Russia and Japan, and loons from western Alaska flew south to California and Mexico. The Arctic is changing rapidly and the information we uncovered is critical for determining how changes might affect the two populations differently.

Building an Atlas of Migratory Connectivity for the Birds of North America

To fill an enormous knowledge gap about migratory connectivity of the birds of North America, we are also working on an important and exciting book entitled "Discovering Unknown Migrations: The Atlas of Migratory Connectivity for the Birds of North America." The Atlas will be published by Princeton University Press. This book will be the first of its kind for North American birds. It is a mapping project using existing banding recovery data integrated with new sources of tracking data (e.g., stable isotopes, geolocators, satellite transmitters). Existing data come from the USGS Bird Banding Laboratory where band recovery data has been archived for close to 100 years. One hundred years later, after the recovery of millions of bands, there has yet to be a comprehensive and thoughtful analysis of these data.

Discovering Unknown Migrations will begin with introductory chapters ranging from why understanding migratory connectivity is critical to the state-of-the-art tools available to quantify and track birds. Most of the book will consist of individual species accounts that contain a connectivity map and a short narrative written by knowledgeable experts that include descriptions of the species' basic biology, conservation status, and an interpretation of the migratory connectivity patterns.

Conclusion

No one group can solve the conservation crisis we face with migratory birds. Several complex issues underlie population declines that require partnerships across multiple disciplines. The Migratory Connectivity Project is supported by ConocoPhillips Global Signature Program. Many collaborators contributed to the work we described here including David Newstead of Coastal Bend Bays and Estuaries Coastal Bird Program; Dan Ruthrauff, Joel Schmutz, Lee Tibbitts, and Brian Uher-Koch of USGS Alaska Science Center; Erin Bayne's lab of University of Alberta Edmonton; Phil Bruner of Brigham Young University — Hawaii, and Jennie Rausch, Environment and Climate Change Canada. And at the heart of most modern studies of bird migration, indeed the cause of a revolution in migration science, is technology. We continue to need smaller, higher-resolution, reliable, and inexpensive tracking devices to deploy on individual birds of declining species. We are grateful for the rapid advances Microwave Telemetry has made in miniaturizing satellite tags. Creative interdisciplinary interactions with technology companies like Microwave Telemetry helps advance our goals of saving North American birds and their habitats.

Top: Long-tailed Jaeger, Photo by Neil Paprocki; Bottom: Pacific Loon taking off, Photo by Ryan Askren, USGS

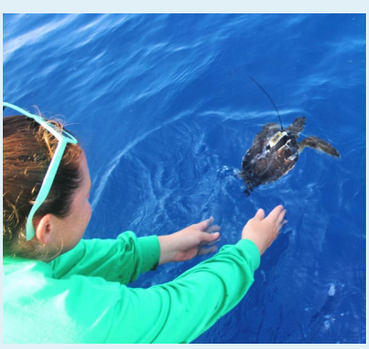
Rising Scholar Update

Sea Turtle Dispersal in Marine Habitats

Katrina Phillips is a PhD candidate in the Conservation Biology program at the University of Central Florida. Her research focuses on describing when, where, and why juvenile sea turtles shift habitats.

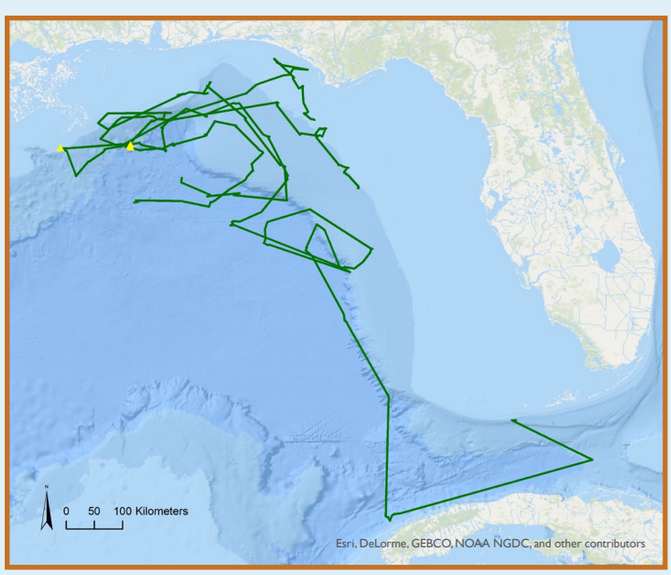
Juvenile dispersal is difficult to observe and monitor for many species, particularly in the ocean. Sea turtles hatch on sandy beaches and enter the marine environment, where they remain offshore for up to a decade or more before recruiting to coastal juvenile habitats. The oceanic life stage is so poorly understood that it is commonly referred to as the "lost years."

Extensive offshore surveys revealed that small turtles around 1–2 years of age could be found with mats of the floating seaweed *Sargassum* in the Gulf of Mexico. These observations included four species: Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), and loggerhead (*Caretta caretta*), all of which are protected by the U.S. Endangered Species Act and listed as vulnerable to critically endangered by the IUCN.



Releasing a green turtle with a Solar 9.5g Argos PTT. Photo by Kate Mansfield

Finding habitats that support sea turtles at this age class was a step toward solving the "lost years," but we're left with two questions: where did they come from, and where do they go? *continued on page 6*



Tracked movements of juvenile green turtles in the Gulf of Mexico from capture-release sites off the coast of Louisiana (in yellow).

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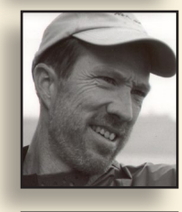
Migration Mystery: Satellite Telemetry Provides Insight into the Life History of Aleutian Terns



Kelly Nesvacil is the Endangered Species Biologist with the Alaska Department of Fish and Game, Division of Wildlife Conservation. She lives in Juneau and conducts field research and develops collaborations among stakeholders for species of conservation concern. Don Lyons is an Assistant Professor (Senior Research) in the Department of Fisheries and Wildlife at Oregon State University. He studies terns and other seabirds in various locations around the Pacific Rim. Susan Oehlers is the wildlife biologist for the Yakutat Ranger District of the Tongass National Forest, where her duties include annual monitoring of the Yakutat area Aleutian tern colonies. Susan is a member of the Pacific Seabird Group (PSG) and co-coordinator of the PSG Aleutian Tern Technical Committee.

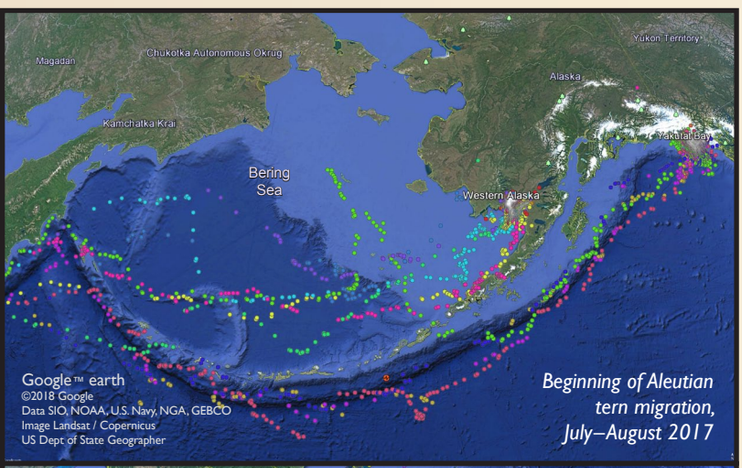
The Aleutian tern (*Onychoprion aleuticus*, ALTE) is a seabird with a small global population and breeding sites restricted to Alaska and the Russian Far East. Aleutian tern population status and trends are difficult to assess due to low breeding site fidelity, breeding habitat plasticity, and frequent colony failure. Additionally, methods for assessing breeding movements, nest monitoring, and colony counts have not been fully developed and implemented in Alaska or elsewhere. Given the unique ecology of the species and the associated data gaps, ALTE is listed as a priority species of conservation concern for many agencies and organizations in Alaska and globally listed as Vulnerable by the IUCN.

In 2017, with support from multiple agencies, we began a collaborative study to look at various aspects of Aleutian tern breeding ecology, including breeding season movements that could potentially document transitions among colonies during the breeding season and identify yet undocumented colonies. Fifteen Solar 2g Argos PTTs from Microwave Telemetry, Inc. were deployed on pre-nesting and nesting Aleutian terns near Dillingham and Yakutat, Alaska during May and June of 2017. High-quality location data were obtained throughout the breeding season from 11 individuals and throughout the migration to Southeast Asia from eight of these individuals. These data were the first high-resolution breeding season and migration movements ever recorded for this species.

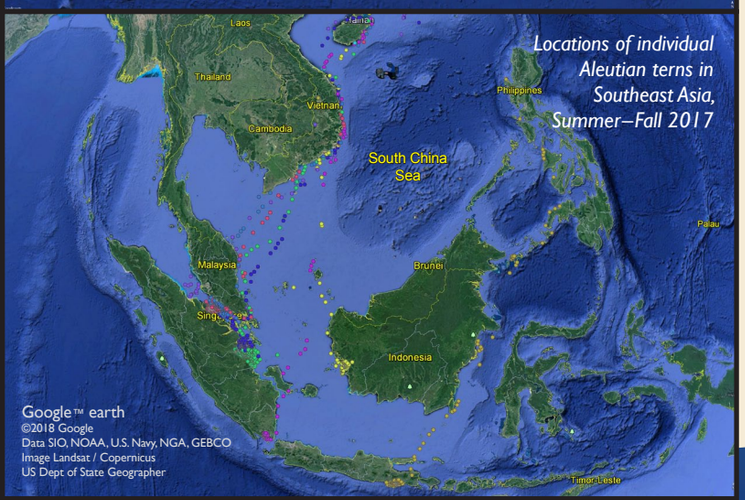
Within the breeding season, we were able to document movements to two previously undocumented colonies, as well as movements to four other known colony locations. Tagged individuals were more strongly associated with colonies that successfully produced fledglings. Local residents at one of the previously undocumented colonies at Clark's Point, Alaska, a small community south of Dillingham, said the Aleutian tern colony is a common, yearly occurrence, except for a few years when a pack of stray dogs were roaming the area. The residents noted that by the time we visited, the "second crop" of Aleutian tern chicks was underway, with successful fledging having occurred earlier in the season as well. We documented the positive likelihood of this occurrence on site with nestling and newly fledged chicks, as well as older juveniles on the wing that were taking part in mobbing potential predators, such as a short-eared owl that patrolled the edges of the colony. Although we documented movements among previously documented as well as undocumented colonies, movements during the breeding season were primarily local-scale, usually less than 100 km from the capture site. Yakutat birds tended to have a bit longer and unidirectional movements that likely included foraging off the continental shelf, while Dillingham tagged birds tended to have shorter foraging movements primarily associated with Nushagak Bay, with some birds foraying into the adjacent Kvichak Bay.

Photo by Tory Rhoads, ADF&G

Aleutian tern outfitted with MTI Solar 2g PTT.



Beginning of Aleutian tern migration, July–August 2017



Locations of individual Aleutian terns in Southeast Asia, Summer–Fall 2017

Overwinter migration started mid- to late July for Yakutat birds, while Aleutian terns tagged in Dillingham started migration beginning mid-August. One bird from Dillingham possibly prospected in the Port Moller area of Alaska, where a known Aleutian tern colony has been recorded. Additionally, several terns flew close to known colony sites on the Kamchatka Peninsula, as well as Sakhalin Island, both on the Russian side of the Bering Sea. Three Aleutian terns spent between 3 and 28 days in the Yellow Sea between China and Korea, before continuing south. Five birds appeared to complete their migration in the Malacca Strait area between Indonesia, Singapore, and Malaysia, one appeared to complete its migration on the south end of Sumatra, one in southeastern Java, and one in southwest Indonesian Borneo.

These movement data are already enhancing our understanding of this poorly known species and generating strong interest from potential partners in Alaska, Russia, and throughout the East Asian-Australasian Flyway. We are very excited to attempt deployment of more PTTs on Aleutian terns in the 2018 breeding season with support from the National Fish and Wildlife Foundation's Pacific Seabird Program, and other agencies and organizations. We could not conduct this research without the support of the communities we visit and we are grateful for their knowledge, enthusiasm, and hospitality.

Partners for the Parks

Photo by John Cancalosi

Call for support leads to creative collaboration, condor conservation, and a chance for the company to come together

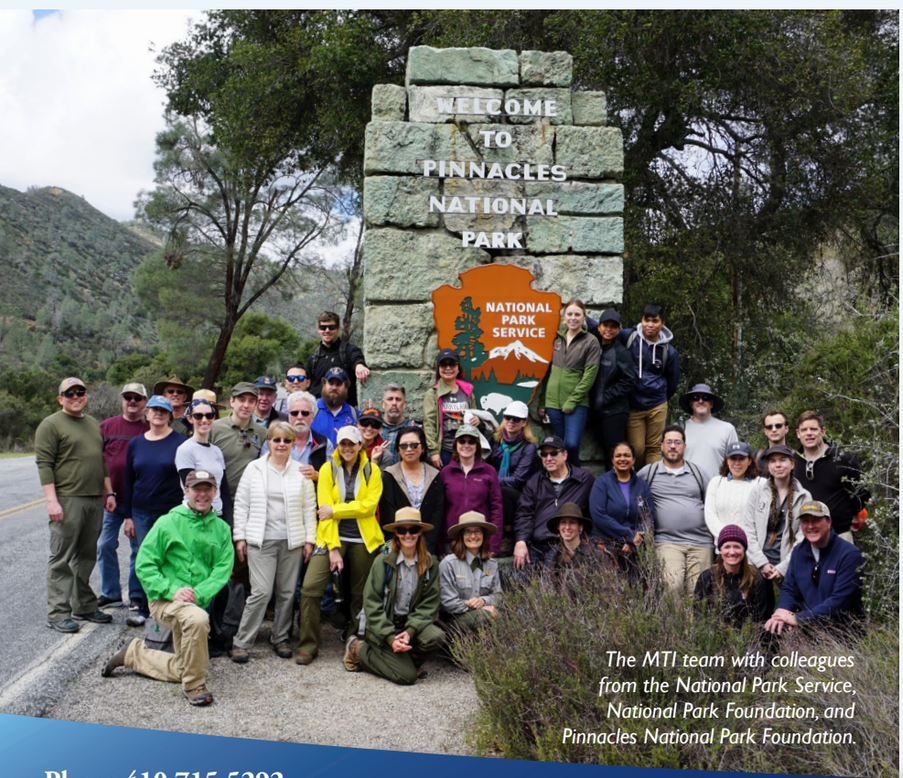
MTI donates Solar Argos/GPS PTTs to the condor recovery efforts by the National Park Service, National Park Foundation, and Pinnacles National Park Foundation.

When King Laughlin and his colleagues from the National Park Foundation visited our office last summer, they came with a very specific message, part of which we already understood quite well: California condors, the nation's largest bird, needed continued conservation work. Considering that the species dwindled to a genetic pool of only 22 individuals in the 1980s (primarily due to poisoning from hunters' lead shot in carrion), and a breeding pair typically raises a clutch of only one chick, it is understandable that it has required many years of captive breeding and strategic assistance to help the population climb to roughly 450 in the US. In fact, Microwave Telemetry has been a part of this cooperative effort since the beginning — we designed the first patagial tags as a request from condor researchers in the early 1990s as a way to monitor captive birds after they were first released into the wild.

The second part of their message was a surprise to us; when the National Park Service conducted a study last year to assess the scientific projects within national parks with regard to their respective community involvement and interest, the California condor restoration project (which includes policy design, mortality assessment, genetic diversity, overall health and wellness, etc.) ranked high on their list. Meaning, this work was not only preserving the condor, it was helping to preserve the National Parks.

Our company exists to support conservation and research, and our team takes pride in that. So when our friends at the National Park Foundation approached us to let us know that our PTTs are an integral part of one of their most cherished projects, it spurred an idea — we could support the project and build the vital link between the work we do in our facility and the work of our colleagues in the field, through a shared experience. It had been many years since we had a company retreat (the late Chris Howey had enthusiastically planned them in the past). In early 2017, Bonnie Davis (a longtime MTI employee) and Lucy Howey began to plan a meaningful and mutually beneficial collaboration, working with Rachel Wolstenholme and Alacia Welch and their talented team at the National Park Service, Pinnacles National Park, and the park's partnering organizations, the Pinnacles National Park Foundation, and of course, the National Park Foundation. The MTI team gladly took on the extra work to manufacture patagial GSM units and Argos/GPS PTTs for the biologists at Pinnacles and personally delivered the PTTs to California. The MTI team was also given a behind-the-scenes opportunity to watch from a staging area as the biologists deployed the tags on the highly endangered birds. It was truly a once in a lifetime experience that offered an authentic and new perspective for our team and a chance to recharge and engage with each other.

MTI staff and family experience a steam train ride through one of California's scenic Redwood forests.



The MTI team with colleagues from the National Park Service, National Park Foundation, and Pinnacles National Park Foundation.

To learn more about condor recovery at Pinnacles National Park, visit https://www.nps.gov/pinn/learn/nature/condors.htm

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Sea Turtle Dispersal

Photo by Kate Mansfield

Katrina with one of the green turtles in her study captured in Sargassum habitat in the Gulf of Mexico.

I am using genetics and ocean simulation models to investigate where oceanic juveniles in the Gulf of Mexico originate, and satellite telemetry to better understand their movements and recruitment to coastal areas.

I began sampling and tagging turtles in 2015 from a launch site south of New Orleans, Louisiana. Our vessel travels the Mississippi River down to the Gulf of Mexico and continues 20–60 miles offshore in search of *Sargassum* habitat. In the summer of 2017, I was able to track five additional oceanic juvenile green turtles thanks to the Christiane Howey Rising Scholar Award. The Solar 9.5g PTTs transmitted for about 35 days; turtles shed their scutes as they grow so also shed the tags. In that timespan, some turtles moved farther over the continental shelf while some moved farther offshore. I will use these tracks to test for what influences these patterns, considering potential factors such as oceanographic currents, genetics, and environmental conditions.

My hope is that a better understanding of juvenile sea turtle dispersal pathways will inform management plans for these species and highlight priority areas for conservation. **Great work, Katrina!**

Christiane Howey Rising Scholar Award

CALL FOR ENTRIES

In addition to granting many educational awards for transmitters over the years, Christiane Howey quietly found ways to help young researchers and start-up programs. To honor Chris, and to carry on in her spirit of generosity, we are proud to offer an annual award in her name: the Christiane Howey Rising Scholar Award.

This award is intended to provide researchers who are starting out their careers with the means to get their projects off the ground. It will provide the recipient with five transmitters of his/her choice. Proposals should include an outline of the project indicating the scope and expected outcome. Applicants are encouraged to include an educational component in their research, but this is not required. Please include a timeline and let us know what model of transmitter you are interested in using. We are looking for a maximum of five pages. The recipient will be responsible for any Argos (or GSM) data distribution costs and any duties/taxes.

Proposals for the 2019 Christiane Howey Rising Scholar Award will be accepted through **October 31, 2018** and reviewed prior to the publication of the Winter 2018 issue of *Tracker News*. The award recipient will be notified in late December to schedule a production slot. Proposals will be judged by an internal committee. For more information, please email **support@microwavetelemetry.com** or visit our website.

MTI Employee Spotlight

Our team is how we do what we do. This issue we want to introduce you to someone who plays an important role in organizing and energizing our team...

Sally Derrico – Office Coordinator

Q: Tell us how you started with the MTI family.

A: Seven years ago, I saw the job advertisement and came in for an interview. It was the mission statement that really stood out to me in the beginning — I liked that this company had such a positive impact on the environment. After I'd started working here, some of my coworkers and I realized that we went to the same church where I sing in the choir.

Q: You certainly have the best voice among us when we sing "Happy Birthday." How long have you been singing?

A: I started singing 24 years ago. Before that, I would only pretend to sing opera, but when I tried out for my church choir, I was told that I had a "soloist's voice." I couldn't read music at the time, so I started taking lessons and even a course at the local community college to get better. Singing brings me so much joy, and I regularly sing solos with the choir now.

Q: You do quite a variety of tasks here — could you name some of the most important ones?

A: The main one would probably be maintaining our database of production form/transmitter information. That includes transmitter IDs, shipping dates, refurbishments, et cetera. I also manage a lot of the order and shipping paperwork, such as the purchase orders and customs documentations. Lots of transmitters means lots of paperwork, so I do my best to keep it all organized and up-to-date. And that's only the half of it!